



COMPLETE MONOGRAPH

2018 GROUP A PUBLIC COMMENT AGENDA

OCTOBER 24 - 31, 2018
GREATER RICHMOND CONVENTION CENTER
RICHMOND, VA

2018 Public Comment Agenda

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by

International Code Council, Inc.

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TABLE OF CONTENTS

	PAGE
Introduction	i
ICC Governmental Member Representatives.....	i
ICC Policy on Financial Assistance for Governmental Member Voting	
Representatives	ii
Advance Registration	ii
Antitrust Compliance	iii
Agenda Format.....	iii
Modifications and Public Comments.....	iii
Consent Agenda.....	iv
Individual Consideration Agenda	iv
ICC Public Comment Hearing Process.....	iv
Electronic voting Public Comment Hearing Followed by Online Governmental	
Consensus Vote	v
View the Public Comment Hearings on Your PC.....	vi
ICC Website	vi
2018/2019 ICC Code Development Schedule.....	vii
2018/2019 Staff Secretaries	ix
CP# 28 – Code Development Procedures	x
Withdrawn Code Change Proposals.....	xxxvi
Public Comment Hearing Schedule.....	xxxvii
Tentative Hearing Order	xxxix
Cross Index of Proposed Changes with Public Comments	xli
Public Comments to the Proposed Changes - Table of Contents	xlvi

INTRODUCTION

This publication contains the Public Comment Agenda for consideration at the Public Comment Hearings of the International Code Council on October 24 – 29 at the Greater Richmond Convention Center, Richmond VA (see page 1). See page xxxvii for the hearing schedule.

This publication contains information necessary for consideration of public comments on the proposed code changes which have been considered at the ICC Committee Action Hearings held on April 15 – 23, 2018, at the Greater Columbus Convention Center in Columbus, OH. More specifically, this agenda addresses hearings on public comments on proposed code changes to the *International Building Code (Egress, Fire Safety and General)*, *International Fire Code*, *International Fuel Gas Code*, *International Mechanical Code*, *International Plumbing Code*, *International Private Sewage Disposal Code*, *International Property Maintenance Code*, *International Residential Code (Mechanical and Plumbing)*, *International Swimming Pool and Spa Code*, and the *International Wildland-Urban Interface Code*.

ICC GOVERNMENTAL MEMBER REPRESENTATIVES

Council Policy #28, Code Development (page x) requires that applications for Governmental Membership must have been received by March 20 of this year in order for the representatives of the Governmental Member to be eligible to vote at this Public Comment Hearing and the Online Governmental Consensus Vote, which occurs approximately two weeks after the hearings. Further, *CP#28* requires that ICC Governmental Member Representatives reflect the eligible voters **30 days prior** to the start of the Public Comment Hearings. This includes new, as well as changes, to voting status. Sections 9.1 and 9.2 of *CP#28* (page xxxiii) read as follows:

- 9.1 Eligible Final Action Voters:** Eligible Final Action voters include ICC Governmental Member Voting Representatives and Honorary Members in good standing who have been confirmed by ICC in accordance with the Electronic Voter Validation System. Such confirmations are required to be revalidated annually. Eligible Final Action voters in attendance at the Public Comment Hearing and those participating in the Online Governmental Consensus Vote shall have one vote per eligible voter on all Codes. Individuals who represent more than one Governmental Member shall be limited to a single vote.
- 9.2 Applications:** Applications for Governmental Membership must be received by the ICC at least 30 days prior to the Committee Action Hearing in order for its designated representatives to be eligible to vote at the Public Comment Hearing or Online Governmental Consensus Vote. Applications, whether new or updated, for Governmental Member Voting Representative status must be received by the Code Council 30 days prior to the commencement of the first day of the Public Comment Hearing in order for any designated representative to be eligible to vote. An individual designated as a Governmental Member Voting Representative shall provide sufficient information to establish eligibility as defined in the ICC Bylaws. The Executive Committee of the ICC Board, in its discretion, shall have the authority to address questions related to eligibility.

As such, new and updated eligible voter status must be received by ICC's Member Services Department **by September 24, 2018**. This applies to both voting at the Public Comment Hearings as well as the Online Governmental Consensus Vote which occurs approximately two weeks after the hearings. This must be done via the Electronic Voter Designation System. Access the Electronic Voter Designation System directly by logging on to www.iccsafe.org/EVDS and using the email address and password connected to your Primary Representative account. The online form can also be accessed by logging onto "My ICC" and selecting "Designate Voters" or through the Electronic Voter Designation link in the left hand menu on the ICC home page at www.iccsafe.org. These records will be used to verify eligible voter status for the Public Comment Hearing and the Online Governmental Consensus Vote. Voting members are strongly encouraged to review their membership record for accuracy so that any necessary changes are made prior to the September 24 deadline. **Representatives of any Governmental Member that has made application for membership after March 16, 2018 will not be able to vote.**

ICC POLICY ON FINANCIAL ASSISTANCE FOR GOVERNMENTAL MEMBER VOTING REPRESENTATIVES

ICC Council Policy 36 Financial Assistance defines the circumstances under which it is permissible for Governmental Member Voting Representatives to accept funds to enable a Governmental Member Voting Representative to attend ICC code hearings. The policy seeks to prohibit, or appropriately regulate financial assistance which is designed to increase Participation by a Particular interest group or by those supporting a Particular position on a proposed code change.

As part of the registration process (see below), eligible voting members are required to verify their voting status in order to receive a voting device. Improper acceptance of financial assistance, or misrepresentation by a Governmental Member Voting Representative about compliance with CP 36, which are discovered after a code hearing, may result in sanctions regarding voting at future hearings by the Governmental Member Voting Representative or by other Governmental Member Voting Representatives from the same governmental member. CP 36 provides, in pertinent Part:

- 2.0. Contributions.** To allow industry and the public to contribute to the goals of the ICC in transparent and accountable processes, organizations and individuals are permitted to contribute financial assistance to Governmental Members to further ICC Code Development Activities provided that:
 - 2.1** Contributions of financial assistance to Governmental Member Voting Representatives for the purposes of enabling participation in ICC Code Development Activities are prohibited except for reimbursements by the ICC or its subsidiaries, a regional, state, or local chapter of the ICC, or the local, state or federal unit of government such Governmental Member Voting Representative is representing. For the purposes of this policy financial assistance includes the payment of expenses on behalf of the Governmental Member or Governmental Member Voting Representative. Governmental Member Voting Representatives may self-fund for purposes of participating in ICC Activities.
 - 2.2** A Governmental Member accepting contributions of financial assistance from industry or other economic interests shall do so by action of its elected governing body or chief administrative authority. A Governmental Member Voting Representative may not directly accept financial assistance from industry or other economic interests.
 - 2.3** Any contributions to a Governmental Member of the ICC shall comply with applicable law, including but not limited to a Governmental Member's ethics, conflict of interest or other similar rules and regulations.

ADVANCE REGISTRATION

The Public Comment Hearings are only one component of the 2018 ICC Annual Conference and Group A Public Comment Hearings. **All attendees to the Public Comment Hearings are required to register. Registration for the Public Comment Hearings is FREE, and is necessary to verify voting status (see above). You are encouraged to register prior to the Public Comment Hearings. To register for the full Conference, the Education Program, or the Public Comment Hearings, go to http://media.iccsafe.org/2018_ICC_AnCon/register.html.**

NOTICE: If you or your companion require special accommodations to participate fully, please advise ICC of your needs.

ANTITRUST COMPLIANCE

ICC brings together numerous government officials and industry members to participate in the code and standard development process. ICC provides basic guidance on the antitrust laws that may be applicable to these and other activities sponsored by ICC (“ICC Activities”). [Click here](#) to view ICC’s policy on Antitrust Compliance.

AGENDA FORMAT

This Public Comment Hearing Agenda includes the Consent Agenda and the Individual Consideration Agenda for the code change proposals that comprise the 2018 Code Development Cycle. This will complete the Public Comment Hearings for the 2018 Code Development Cycle.

The Consent Agenda is comprised of proposed changes to the *International Building Code (Egress, Fire Safety and General)*, *International Fire Code*, *International Fuel Gas Code*, *International Mechanical Code*, *International Plumbing Code*, *International Private Sewage Disposal Code*, *International Property Maintenance Code*, *International Residential Code (Mechanical and Plumbing)*, *International Swimming Pool and Spa Code*, and the *International Wildland-Urban Interface Code*, which did not receive a successful assembly action or public comment, and therefore are not listed on the Individual Consideration Agenda.

The Individual Consideration Agenda is comprised of proposed changes, *which* either received a successful assembly action or received a public comment in response to the Code Committee’s action at the Committee Action Hearings.

Items on the Individual Consideration Agenda are published with information as originally published for the Committee Action Hearing as well as the published hearing results. Following the hearing results is the reason that the item is on the Individual Consideration Agenda followed by the public comments, which were received.

Public testimony will follow the procedures given in *CP#28-05 Code Development* as published on page x. Refer to the tentative hearing order on page xxxix.

MODIFICATIONS & PUBLIC COMMENTS

In addition to modifications made by a committee at the Committee Action Hearings, *CP#28 Code Development* allows successful modifications, which were voted on during the Online Assembly Vote following the Committee Action Hearings. In addition, modifications can be proposed in form of a Public Comment following the Committee Action Hearings. The Public Comment deadline was July 16, 2018 and all Public Comments received have been incorporated into this document. **Further modifications are not permitted beyond those published in this agenda.**

Proposed changes on the Individual Consideration Agenda at the Public Comment Hearings may have up to five possible motions - Approval as Submitted, Approval as Modified by the Code Committee, Approval as Modified by a successful Assembly Action, Approval as Modified by a Public Comment, or Disapproval. A Public Comment Hearings Discussion Guide will be posted and copies available at the hearing which includes a list of allowable motions for each code change proposal.

CONSENT AGENDA

The Public Comment Consent Agenda consists of proposals, which received neither a successful assembly action nor a public comment. The Public Comment Consent Agenda for each code will be placed before the assembly at the beginning of each code with a motion and vote to ratify final action in accordance with the results of the Committee Action Hearing.

INDIVIDUAL CONSIDERATION AGENDA

The Public Comment Hearing Individual Consideration Agenda is comprised of proposals, which have a successful assembly action or public comment. For each code, the proposed changes on the Individual Consideration Agenda shall be placed before the assembly for individual consideration of each item. The hearing order is found on page xxxix and the agenda starts on page 1.

ICC PUBLIC COMMENT HEARING PROCESS

The hearing process will follow CP #28. The process is summarized as follows and will occur for each code noted in the hearing order (CP #28 sections noted):

1. At the start of each of the individual hearings for the respective code (see page xxxix):
 - Requests to withdraw code changes
 - Requests to withdraw public comments
 - Requests to revise the hearing order
 - Consent Agenda voted (Section 7.5.5)
2. The first code change on the hearing order brought to the floor with a standing motion to sustain the committee action.
3. If the Committee Action is not Disapproval, a motion to approve a modification by a public comment may be presented (Section 7.5.9.6).
4. Public testimony on either the Committee Action (if Disapproval) or the public comment (Section 5.5.1)
5. ICC Governmental Member Representatives and Honorary Members (“eligible voters”) in attendance vote on the motion under consideration. (See page i)
6. Depending on the motion and action determined by the vote, subsequent allowable motions in accordance with Sections 7.5.9.8 can be considered or voting on the main motion in accordance with 7.5.9.7 is taken. (A Public Comment Hearing Discussion Guide will be posted and copies available at the hearing, which includes a listing of allowable motions.)
7. The public comment hearing result on the code change determined by a vote of the eligible voters is announced. In accordance with Section 7.5.7, reconsideration is not permitted. This result will be placed on the Online Governmental Consensus Vote (Section 8.0), which will be open approximately two weeks after the hearings are complete (see page v).
8. Repeat 2 – 7 for subsequent code changes
9. Go the next code indicated on the hearing order and repeat 1 – 8.

ELECTRONIC VOTING PUBLIC COMMENT HEARING FOLLOWED BY ONLINE GOVERNMENTAL CONSENSUS VOTE

The public comment hearing is the first step in the process to arrive at Final Action on code changes – Public Comment Hearing (PCH) voting followed by the Online Governmental Consensus Vote (OGCV) utilizing cdpACCESS®. Be sure to review the deadlines and eligible voter information on page i. The sections noted below are the applicable sections of CP #28 which is published on page x.

In accordance with Section 7.9.5.7 electronic voting will be used for voting at the PCH. Electronic voting devices will be available for all eligible voters and can be picked up at a designated area at the entrance to the hearing rooms after registration. Voting devices are to be returned to this designated area at the end of each day and picked up each morning. Therefore, you may want to allow extra time in the mornings to pick up your voting device before the hearings begin.

Public Comment Hearing Vote

The first step is the voting that will occur at the Public Comment Hearing. This process is regulated by Section 7.5.9 of CP #28.

The Consent Agenda will be voted with a motion to ratify the action taken at the Committee Action Hearings. This will be the Final Action on those code changes and they will not be considered in the Online Governmental Consensus Vote (Section 7.5.5).

As part of the Individual Consideration Agenda, individual motions for modifications to the main motion will be dealt with by a hand vote followed by the electronic vote if the moderator cannot determine the outcome of the hand vote. However, in accordance with Section 7.5.9.7, the vote on the main motion to determine the PCH action must be taken electronically with the vote recorded since this is necessary for the second step in the process (see below). As noted in Section 7.5.9.8, if the motion is not successful, motions for Approval as Submitted or Approval as Modified are in order. A motion for Disapproval is not in order. The voting majorities have not changed and are indicated in Section 7.6. As in the past, if the code change proposal does not receive any of the required majorities in accordance with Section 7.6, Section 7.5.9.9 stipulates that the PCH action will be Disapproval. However, the vote recorded will be the vote count on the main motion in accordance with Section 7.5.9.7.

Online Governmental Consensus Vote

The second step in the final action process is the Online Governmental Consensus Vote (OGCV). This process was first used in the 2014 Cycle, and is built into cdpACCESS and is regulated by Section 8.0. It is anticipated that the ballot period will start approximately two weeks after the Public Comment Hearings and will be open for two weeks.

The results of the PCH set the agenda and ballot options for the OGCV. This is stipulated in Section 8.1. For example, if the action taken at the PCH is AMPC 1, 3, 7 (Approved as Modified by Public Comments 1,3 and 7) then the OGCV ballot will be structured to allow eligible voters to vote for either AMPC 1,3, 7 or Disapproval in accordance with the table. The voting majority required for AMPC 1, 3, 7 at the PCH was a 2/3 majority which is the same majority that applies to the OGCV. The vote tally from the PCH will be combined with the vote tally from the OGCV to determine the Final Action. In the example cited, the

combined vote tally would be required to meet the 2/3 majority in order for the final action to be AMPC 1, 3, 7. If the voting majority is less than the 2/3 required, Section 10.3 stipulates the Final Action to be Disapproval.

Be sure to review Section 8.2 which identifies the composition of the ballot. Of note is item 4 where the PCH action is Approved as Modified. The resulting text will be presented in the ballot with the modification(s) incorporated into the original code change in order for the voter to see how the text would appear in the code. A key part of this ballot is also item 10 where the voter will have access to the hearing video from both hearings.

Non-eligible voters will also be able to login and view the OGCV ballot, but will not be permitted to vote.

Eligible voting members who voted at the Public Comment Hearings are not required to vote on the OGCV. The vote entered on the electronic voting device at the PCH will automatically be tabulated on the OGCV.

Final Action on Proposed Code Changes

Section 10.0 regulates the tabulation, certification and posting of the final action results. In accordance with Section 10.4, the Final Action will be published as soon as practicable and will include the action and vote counts from both the PCH and OGCV.

VIEW THE PUBLIC COMMENT HEARINGS ON YOUR PC

The Public Comment Hearings are scheduled to be “webcast”. Streaming video broadcast over the Internet will provide a gateway for all International Code Council members, the construction industry and other interested parties anywhere in the world to view and listen to the hearings. Logging on to the Internet broadcast will be as simple as going to the International Code Council web site, www.iccsafe.org and clicking on a link. [Actual site to be determined - be sure to check the ICC web site for further details].

The hearings can be seen free by anyone with Internet access. Minimum specifications for viewing the hearings are an Internet connection, sound card and Microsoft Windows Media Player. DSL, ISDN, Cable Modems or other leased-line connections are recommended for the best viewing experience. A dial-up modem connection will work, but with reduced video performance.

The 2018 cycle included a new hearing video feature – all hearing videos are now posted following the hearings at <http://hearingvideos.iccsafe.org/>.

ICC WEBSITE - WWW.ICCSAFE.ORG

While great care has been exercised in the publication of this document, there may be errata posted for the Public Comment Agenda. Errata, if any, identified prior to the Public Comment Hearings will be posted as updates to the Public Comment Hearing Agenda on the ICC website at www.iccsafe.org. Users are encouraged to periodically review the ICC Website for updates to the 2018 Public Comment Hearing Agenda.

2018/2019 ICC CODE DEVELOPMENT SCHEDULE

(February 10, 2017)

STEP IN CODE DEVELOPMENT CYCLE	DATE	
	2018 – Group A Codes IBC- E, IBC - FS, IBC -G, IFC, IFGC, IMC, IPC, IPMC, IPSDC, IRC – M, IRC- P, ISPSC, IWUIC, IZC	2019 – Group B Codes Admin, IBC-S, IEBC, IECC-C, IECC- R/IRC-E, IgCC (Ch. 1), IRC – B
2018 EDITION OF I-CODES PUBLISHED	Fall/2017 (except 2018 IgCC, see Group B Codes on next page)	
DEADLINE FOR RECEIPT OF APPLICATIONS FOR ALL CODE COMMITTEES	June 1, 2017 for the 2018/2019 Cycle. Call for committee posted in February /2017.	
DEADLINE FOR cdpACCESS ONLINE RECEIPT OF CODE CHANGE PROPOSALS	January 8, 2018	January 7, 2019
WEB POSTING OF “PROPOSED CHANGES TO THE I-CODES”	February 28, 2018*	March 4, 2019*
COMMITTEE ACTION HEARING (CAH)	April 15 – 23, 2018 Greater Columbus Convention Center Columbus, OH	April 28 – May 8, 2019 Albuquerque Convention Center Albuquerque, NM
ONLINE CAH ASSEMBLY FLOOR MOTION VOTE	Starts approx. two weeks after last day of the CAH. Open for 2 weeks.	Starts approx. two weeks after last day of the CAH. Open for 2 weeks.
WEB POSTING OF “REPORT OF THE COMMITTEE ACTION HEARING”	May 30, 2018	June 11, 2019
DEADLINE FOR cdpACCESS ONLINE RECEIPT OF PUBLIC COMMENTS	July 16, 2018	July 24, 2019
WEB POSTING OF “PUBLIC COMMENT AGENDA”	August 31, 2018*	September 4, 2019*
PUBLIC COMMENT HEARING (PCH) ANNUAL CONFERENCE DATES NOTED BY AC	October 24 – 31, 2018 Greater Richmond Convention Center Richmond, VA AC: October 21 – 23	October 23 – 30, 2019 Clark County, NV AC: October 20 - 22
ONLINE GOVERNMENTAL CONSENSUS VOTE (OGCV)	Starts approx. two weeks after last day of the PCH. Open for 2 weeks.	Starts approx. two weeks after last day of the PCH. Open for 2 weeks.
WEB POSTING OF FINAL ACTION	Following Validation Committee certification of OGCV and ICC Board confirmation.	Following Validation Committee certification of OGCV and ICC Board confirmation.

* Web posting of the “Proposed Changes to the I-Codes” and “Public Comment Agenda” will be posted no later than scheduled. ICC will make every effort to post these documents earlier, subject to code change/public comment volume and processing time.

2018 Group A Codes/Code committees:

- IBC-E: IBC Egress provisions. Chapters 10 and 11.
- IBC-FS: IBC Fire Safety provisions. Chapters 7, 8, 9 (partial), 14 and 26. Majority of IBC Chapter 9 is maintained by the IFC. See notes.
- IBC-G: IBC General provisions. Chapters 3 – 6, 12, 13, 27 – 33.
- IFC: The majority of IFC Chapter 10 is maintained by IBC-E. See notes.
- IFGC
- IMC
- IPC
- IPMC (code changes heard by the IPM/ZC (IPMC & IZC) code committee)
- IPSDC (code changes heard by the IPC code committee)
- IRC-M: IRC Mechanical provisions. Chapters 12 – 23 (code changes heard by the IRC - MP code committee)
- IRC-P: IRC Plumbing provisions. Chapters 25 – 33 (code changes heard by the IRC - MP code committee)
- ISPSC
- IWUIC (code changes heard by the IFC code committee)
- IZC (code changes heard by the IPM/ZC (IPMC & IZC) code committee)

2019 Group B Codes/Code committees:

- Admin: Chapter 1 of all the I-Codes except the IECC, IgCC and IRC. Also includes the update of currently referenced standards in all of the 2018 Codes, except the IgCC.
- IBC-S: IBC Structural provisions. IBC Chapters 15 – 25 and IEBC structural provisions. See notes.
- IEBC: IEBC Non-structural provisions. See notes.
- IECC-C: IECC Commercial energy provisions.
- IECC-R/IRC-E: IECC Residential energy provisions and IRC Energy provisions in Chapter 11.
- IgCC: Chapter 1 of the IgCC. Remainder of the code is based on the provisions of ASHRAE Standard 189.1 *Standard for the Design of High-Performance Green Buildings, Except Low-Rise Residential Buildings*. The 2018 IgCC is scheduled to be published in the Summer/2018.
- IRC-B: IRC Building provisions. Chapters 1 – 10.

A 2020 Group C cycle is not scheduled.

Notes:

- Be sure to review the document entitled “2018/2019 Code Committee Responsibilities” which will be posted. This identifies responsibilities, which are different than Group A and B codes and committees which may impact the applicable code change cycle and resulting code change deadline. As an example, throughout Chapter 14 of the IBC (IBC – Fire Safety), there are numerous sections which include the designation “[BS]” which indicates that the provisions of the section are maintained by the IBC – Structural code committee. Similarly, there are several sections in Chapter 3 of the IMC, which include the designation “[BS]”. These are structural provisions, which will be heard by the IBC – Structural committee. The designations in the code are identified in the Code Committee Responsibilities document.
- I-Code Chapter 1: Proposed changes to the provisions in Chapter 1 of the majority of the I-Codes are heard in Group B (see Admin above for exceptions). Be sure to review the brackets ([]) of the applicable code.
- Definitions. Be sure to review the brackets ([]) in Chapter 2 of the applicable code and the Code Committee Responsibilities document to determine which code committee will consider proposed changes to the definitions.
- Proposed changes to the ICC Performance Code will be heard by the code committee noted in brackets ([]) in the section of the code and in the Code Committee Responsibilities document

2018 - 2019 STAFF SECRETARIES

GROUP A (2018)

IBC – Egress Chapters 10, 11	IBC – Fire Safety Chapters 7, 8, 9, 14, 26	IBC – General Chapters 1-6, 12, 13, 27-34	IFC	IFGC
Kim Paarlberg Indianapolis, IN Ext 4306 kpaarlberg@iccsafe.org	Michelle Britt Chicago Regional Office Ext 4284 mbritt@iccsafe.org Kermit Robinson Western Regional Office Ext 3317 krobinson@iccsafe.org	Kermit Robinson Western Regional Office Ext 3317 krobinson@iccsafe.org Allan Bilka Central Regional Office Ext 4326 abilka@iccsafe.org	Beth Tubbs Northbridge, MA Ext 7708 btubbs@iccsafe.org Keith Enstrom Chicago Regional Office Ext 4342 kenstrom@iccsafe.org	Gregg Gress Chicago Regional Office Ext 4343 ggress@iccsafe.org
IMC	IPC/IPSDC	ICC Performance (All provisions except Structural [BS] and Commercial Energy [CE])	IPMC	IRC Mechanical
Gregg Gress Chicago Regional Office Ext 4343 ggress@iccsafe.org	Fred Grable Chicago Regional Office Ext 4359 fgrable@iccsafe.org	Beth Tubbs Northbridge, MA Ext 7708 btubbs@iccsafe.org	Ed Wirtschoreck Chicago Regional Office Ext 4317 ewirtschoreck@iccsafe.org	Gregg Gress Chicago Regional Office Ext 4343 ggress@iccsafe.org
IRC Plumbing	ISPSC	IWUIC	IZC	
Fred Grable Chicago Regional Office Ext 4359 fgrable@iccsafe.org	Fred Grable Chicago Regional Office Ext 4359 fgrable@iccsafe.org	Keith Enstrom Chicago Regional Office Ext 4342 kenstrom@iccsafe.org	Ed Wirtschoreck Chicago Regional Office Ext 4317 ewirtschoreck@iccsafe.org	

GROUP B (2019)

ADMINISTRATIVE Chapter 1 All Codes (Except IECC, IgCC & IRC)	IBC-Structural Chapters 15-25 IEBC Structural	IECC-Commercial Commercial Chapters C1- C5	IECC/IRC – Residential IECC Residential Chapters R1 – R5, IRC Chapter 11	IEBC
Kim Paarlberg Indianapolis, IN Ext 4306 kpaarlberg@iccsafe.org	Ed Wirtschoreck Chicago Regional Office Ext 4317 ewirtschoreck@iccsafe.org	Michelle Britt Chicago Regional Office Ext 4284 mbritt@iccsafe.org	Michelle Britt Chicago Regional Office Ext 4287 mbritt@iccsafe.org	Beth Tubbs Northbridge, MA Ext 7708 btubbs@iccsafe.org Keith Enstrom Chicago Regional Office Ext 4342 kenstrom@iccsafe.org
ICC Performance (Structural [BS] and Commercial Energy [CE])	IgCC (Chapter 1 Only)	IRC-Building		
Beth Tubbs Northbridge, MA Ext 7708 btubbs@iccsafe.org	Allan Bilka Central Regional Office Ext 4326 abilka@iccsafe.org	Allan Bilka Central Regional Office Ext 4326 abilka@iccsafe.org Kim Paarlberg Indianapolis, IN Ext 4306 kpaarlberg@iccsafe.org		



CP #28-05 CODE DEVELOPMENT

Approved: 9/24/05
Revised: 7/27/18

1.0 Introduction

- 1.1. **Purpose of Council Policy:** The purpose of this Council Policy is to prescribe the Rules of Procedure utilized in the continued development and maintenance of the International Codes (Codes).
- 1.2. **Objectives:** The ICC Code Development Process has the following objectives:
 - 1.2.1 The timely evaluation and recognition of technological developments pertaining to construction regulations.
 - 1.2.2 The open discussion of code change proposals by all parties desiring to participate.
 - 1.2.3 The final determination of Code text by public officials actively engaged in the administration, formulation or enforcement of laws, ordinances, rules or regulations relating to the public health, safety and welfare and by honorary members.
 - 1.2.4 The increased participation of all parties desiring to participate through an online submittal and voting process that includes opportunities for online collaboration.
- 1.3. **Code Publication:** The ICC Board of Directors (ICC Board) shall determine the title and the general purpose and scope of each Code published by the ICC.
 - 1.3.1 **Code Correlation:** The provisions of all Codes shall be consistent with one another so that conflicts between the Codes do not occur. A Code Scoping Coordination Matrix shall determine which Code shall be the primary document, and therefore which code development committee shall be responsible for maintenance of the code text where a given subject matter or code text could appear in more than one Code. The Code Scoping Coordination Matrix shall be administered by the Code Correlation Committee as approved by the ICC Board. Duplication of content or text between Codes shall be limited to the minimum extent necessary for practical usability of the Codes, as determined in accordance with Section 4.5.
- 1.4. **Process Maintenance:** The review and maintenance of the Code Development Process and these Rules of Procedure shall be by the ICC Board. The manner in which Codes are developed embodies core principles of the organization. One of those principles is that the final content of the Codes

is determined by a majority vote of the governmental and honorary members. It is the policy of the ICC Board that there shall be no change to this principle without the affirmation of two-thirds of the governmental and honorary members responding.

- 1.5 Secretariat:** The Chief Executive Officer shall assign a Secretariat for each of the Codes. All correspondence relating to code change proposals and public comments shall be addressed to the Secretariat. The Secretariat shall have the authority to facilitate unforeseen situations which arise in the implementation of this council policy. Staff shall maintain a record of such actions.
- 1.6 Recording:** Individuals requesting permission to record any meeting or hearing, or portion thereof, shall be required to provide the ICC with a release of responsibility disclaimer and shall acknowledge that ICC shall retain sole ownership of the recording, and that they have insurance coverage for liability and misuse of recording materials. Equipment and the process used to record shall, in the judgment of the ICC Secretariat, be conducted in a manner that is not disruptive to the meeting. The ICC shall not be responsible for equipment, personnel or any other provision necessary to accomplish the recording. An unedited copy of the recording shall be forwarded to ICC within 30 days of the meeting. Recordings shall not otherwise be copied, reproduced or distributed in any manner. Recordings shall be returned to ICC or destroyed upon the request of ICC.

2.0 Code Development Cycle

- 2.1 Intent:** The code development cycle shall consist of the complete consideration of code change proposals in accordance with the procedures herein specified, commencing with the deadline for submission of code change proposals (see Section 3.5) and ending with publication of the Final Action on the code change proposals (see Section 10.4).
- 2.2 New Editions:** The ICC Board shall determine the schedule for publishing new editions of the Codes. Each new edition shall incorporate the results of the code development activity since the previous edition.
- 2.3 Supplements:** The results of code development activity between editions may be published.
- 2.4 Emergency Action Procedures:**
 - 2.4.1 Scope:** Emergency actions are limited to those issues representing an immediate threat to health and safety that warrant a more timely response than allowed by the Code Development Process schedule.
 - 2.4.2 Initial Request:** A request for an emergency action shall be based upon perceived threats to health and safety and shall be reviewed by the Codes and Standards Council for referral to the ICC Board for action with their analysis and recommendation.
 - 2.4.3 Board and Member Action:** In the event that the ICC Board determines that an emergency amendment to any Code or supplement thereto is warranted, the same may be adopted by the ICC Board. Such action shall require an affirmative vote of at least two-thirds of the

ICC Board.

The ICC membership shall be notified within ten days after the ICC Boards' official action of any emergency amendment. At the next Annual Business Meeting, any emergency amendment shall be presented to the members for ratification by a majority of the Governmental Member Voting Representatives and Honorary Members present and voting.

All code revisions pursuant to these emergency procedures and the reasons for such corrective action shall be published as soon as practicable after ICC Board action. Such revisions shall be identified as an emergency amendment.

Emergency amendments to any Code shall not be considered as a retro-active requirement to the Code. Incorporation of the emergency amendment into the adopted Code shall be subjected to the process established by the adopting authority.

2.5 Code Development Record. The code development record shall include the official documents and records developed in support of the given code development cycle. This includes the following:

1. Code Change Agenda (Section 4.8)
2. Audio and video recording of the Committee Action Hearing (Section 5.1)
3. The Online Assembly Floor Motion Ballot (Section 5.7.3)
4. Report of the Committee Action Hearing (Section 5.8)
5. Public Comment Agenda (Section 6.6)
6. Public Comment Hearing results (Section 7.5.8.10)
7. Audio and video recording of the Public Comment Hearing (Section 7.1)
8. The Online Governmental Consensus Ballot (Section 8.2)
9. Final Action results (Section 10.4)
10. Errata to the documents noted above

The information resulting from online collaboration between interested parties shall not be part of the code development record.

3.0 Submittal of Code Change Proposals

3.1 Intent: Any interested person, persons or group may submit a code change proposal which will be duly considered when in conformance to these Rules of Procedure.

3.2 Withdrawal of Proposal: A code change proposal may be withdrawn by the proponent (WP) at any time prior to membership action on the consent agenda at the Public Comment Hearing or prior to testimony on the code change proposal on the individual consideration agenda at the Public Comment Hearing. All actions on the code change proposal shall cease immediately upon the withdrawal of the code change proposal.

3.3 Form and Content of Code Change Submittals: Each code change proposal shall be submitted separately and shall be complete in itself. Each submittal shall contain the following information:

- 3.3.1 Proponent:** Each code change proposal shall include the name, title, mailing address, telephone number, and email address of the proponent. Email addresses shall be published with the code change proposals unless the proponent otherwise requests on the submittal form.
- 3.3.1.1** If a group, organization or committee submits a code change proposal, an individual with prime responsibility shall be indicated.
- 3.3.1.2** If a proponent submits a code change proposal on behalf of a client, group, organization or committee, the name and mailing address of the client, group, organization or committee shall be indicated.
- 3.3.2 Code Reference:** Each code change proposal shall relate to the applicable code sections(s) in the latest edition of the Code.
- 3.3.2.1** If more than one section in the Code is affected by a code change proposal, appropriate proposals shall be included for all such affected sections.
- 3.3.2.2** If more than one Code is affected by a code change proposal, appropriate proposals shall be included for all such affected Codes and appropriate cross referencing shall be included in the supporting information.
- 3.3.3 Multiple Code Change Proposals to a Code Section.** A proponent shall not submit multiple code change proposals to the same code section. When a proponent submits multiple code change proposals to the same section, the proposals shall be considered as incomplete proposals and processed in accordance with Section 4.3. This restriction shall not apply to code change proposals that attempt to address differing subject matter within a code section.
- 3.3.4 Text Presentation:** The text of the code change proposal shall be presented in the specific wording desired with deletions shown struck out with a single line and additions shown underlined with a single line.
- 3.3.4.1** A charging statement shall indicate the referenced code section(s) and whether the code change proposal is intended to be an addition, a deletion or a revision to existing Code text.
- 3.3.4.2** Whenever practical, the existing wording of the text shall be preserved with only such deletions and additions as necessary to accomplish the desired change.
- 3.3.4.3** Each code change proposal shall be in proper code format and terminology.
- 3.3.4.4** Each code change proposal shall be complete and specific in the text to eliminate unnecessary confusion or misinterpretation.
- 3.3.4.5** The proposed text shall be in mandatory terms.
- 3.3.5 Supporting Information:** Each code change proposal shall include sufficient supporting information to indicate how the code change proposal is intended to affect the intent and application of the Code.

- 3.3.5.1 Purpose:** The proponent shall clearly state the purpose of the code change proposal (e.g. clarify the Code; revise outdated material; substitute new or revised material for current provisions of the Code; add new requirements to the Code; delete current requirements, etc.)
- 3.3.5.2 Reasons:** The proponent shall justify changing the current Code provisions, stating why the code change proposal is superior to the current provisions of the Code. Code change proposals which add or delete requirements shall be supported by a logical explanation which clearly shows why the current Code provisions are inadequate or overly restrictive, specifies the shortcomings of the current Code provisions and explains how such code change proposals will improve the Code.
- 3.3.5.3 Substantiation:** The proponent shall substantiate the code change proposal based on technical information and substantiation. Substantiation provided which is reviewed in accordance with Section 4.2 and determined as not germane to the technical issues addressed in the code change proposal may be identified as such. The proponent shall be notified that the code change proposal is considered an incomplete proposal in accordance with Section 4.3 and the proposal shall be held until the deficiencies are corrected. The proponent shall have the right to appeal this action in accordance with the policy of the ICC Board. The burden of providing substantiating material lies with the proponent of the code change proposal. Supporting documentation may be provided via a link to a website provided by the proponent and included in the reason statement. The reason statement shall include the date the link was created. All substantiating material published by ICC is material that has been provided by the proponent and in so publishing ICC makes no representations or warranties about its quality or accuracy.
- 3.3.5.4 Bibliography:** The proponent shall submit a bibliography of any substantiating material submitted with the code change proposal. The bibliography shall be published with the code change proposal and the proponent shall make the substantiating materials available for review at the appropriate ICC office and during the public hearing. Supporting documentation may be provided via a link to a website provided by the proponent and included in the bibliography. The reason statement shall include the date the link was created.
- 3.3.5.5 Copyright Release:** The proponent of code change proposals, floor modifications and public comments shall sign a copyright release developed and posted by ICC.
- 3.3.5.6 Cost Impact:** The proponent shall indicate one of the following regarding the cost impact of the code change proposal:

- 1) The code change proposal will increase the cost of construction;
- 2) The code change proposal will decrease the cost of construction; or
- 3) The code change proposal will not increase or decrease the cost of construction.

The proponent shall submit information which substantiates such assertion. This information will be considered by the code development committee and will be included in the published code change proposal. Supporting documentation may be provided via a link to a website provided by the proponent and included in the cost substantiation statement. The cost substantiation statement shall include the date the link was created.

Any proposal submitted which does not include the requisite cost impact information shall be considered incomplete and shall not be processed.

3.4 Online Submittal: Each code change proposal and all substantiating information shall be submitted online at the website designated by ICC. Two copies of each proposed new referenced standard in hard copy or one copy in electronic form shall be submitted. Additional copies may be requested when determined necessary by the Secretariat to allow such information to be distributed to the code development committee. Where such additional copies are requested, it shall be the responsibility of the proponent to send such copies to the respective code development committee.

3.5 Submittal Deadline: ICC shall establish and post the submittal deadline for each cycle. The posting of the deadline shall occur no later than 120 days prior to the code change deadline. Each code change proposal shall be submitted online at the website designated by ICC by the posted deadline. The submitter of a code change proposal is responsible for the proper and timely receipt of all pertinent materials by the Secretariat.

3.6 Referenced Standards: In order for a standard to be considered for reference or to continue to be referenced by the Codes, a standard shall meet the following criteria:

3.6.1 Code References:

3.6.1.1 The standard, including title and date, and the manner in which it is to be utilized shall be specifically referenced in the Code text.

3.6.1.2 The need for the standard to be referenced shall be established.

3.6.2 Standard Content:

3.6.2.1 A standard or portions of a standard intended to be enforced shall be written in mandatory language.

3.6.2.2 The standard shall be appropriate for the subject covered.

3.6.2.3 All terms shall be defined when they deviate from an

- ordinarily accepted meaning or a dictionary definition.
- 3.6.2.4 The scope or application of a standard shall be clearly described.
 - 3.6.2.5 The standard shall not have the effect of requiring proprietary materials.
 - 3.6.2.6 The standard shall not prescribe a proprietary agency for quality control or testing.
 - 3.6.2.7 The test standard shall describe, in detail, preparation of the test sample, sample selection or both.
 - 3.6.2.8 The test standard shall prescribe the reporting format for the test results. The format shall identify the key performance criteria for the element(s) tested.
 - 3.6.2.9 The measure of performance for which the test is conducted shall be clearly defined in either the test standard or in Code text.
 - 3.6.2.10 The standard shall not state that its provisions shall govern whenever the referenced standard is in conflict with the requirements of the referencing Code.
 - 3.6.2.11 The preface to the standard shall announce that the standard is promulgated according to a consensus procedure.

3.6.3 Standard Promulgation:

- 3.6.3.1 Code change proposals with corresponding changes to the code text which include a reference to a proposed new standard or a proposed update of an existing referenced standard shall comply with this section.

3.6.3.1.1 Proposed New Standards. In order for a new standard to be considered for reference by the Code, such standard shall be submitted in at least a consensus draft form in accordance with Section 3.4. If the proposed new standard is not submitted in at least consensus draft form, the code change proposal shall be considered incomplete and shall not be processed. The code change proposal shall be considered at the Committee Action Hearing by the applicable code development committee responsible for the corresponding proposed changes to the code text. If the committee action at the Committee Action Hearing is either As Submitted or As Modified and the standard is not completed, the code change proposal shall automatically be placed on the Public Comment Agenda with the recommendation stating that in order for the public comment to be considered, the new standard shall be completed and readily available prior to the Public Comment Hearing. If the committee action at the Committee Action Hearing is Disapproval, further consideration on the Public Comment Agenda shall include a recommendation stating that in order for the public comment to be considered, the new standard shall be completed and readily available prior to the Public Comment Hearing.

3.6.3.1.2 Update of Existing Standards. Code change proposals which include technical revisions to the code text

to coordinate with a proposed update of an existing referenced standard shall include the submission of the proposed update to the standard in at least a consensus draft form in accordance with Section 3.4. If the proposed update of the existing standard is not submitted in at least consensus draft form, the code change proposal shall be considered incomplete and shall not be processed. The code change proposal, including the update of the existing referenced standard, shall be considered at the Committee Action Hearing by the applicable code development committee responsible for the corresponding changes to the code text. If the committee action at the Committee Action Hearing is either As Submitted or As Modified and the updated standard is not completed, the code change proposal shall automatically be placed on the Public Comment Agenda with the recommendation stating that in order for the public comment to be considered, the updated standard shall be completed and readily available prior to the Public Comment Hearing. If the committee action at the Committee Action Hearing is Disapproval, further consideration on the Public Comment Agenda shall include a recommendation stating that in order for the public comment to be considered, the updated standard shall be completed and readily available prior to the Public Comment Hearing.

Updating of standards without corresponding code text changes shall be accomplished administratively in accordance with Section 4.6.

- 3.6.3.2** The standard shall be developed and maintained through a consensus process such as ASTM or ANSI.

4.0 Processing of Code Change Proposals

- 4.1 Intent:** The processing of code change proposals is intended to ensure that each proposal complies with these Rules of Procedure and that the resulting published code change proposal accurately reflects that proponent's intent.
- 4.2 Review:** Upon receipt in the Secretariat's office, the code change proposals will be checked for compliance with these Rules of Procedure as to division, separation, number of copies, form, language, terminology, supporting statements and substantiating data. Where a code change proposal consists of multiple parts which fall under the maintenance responsibilities of different code committees, the Secretariat shall determine the code committee responsible for determining the committee action in accordance with Section 5.6 and the Code Scoping Coordination Matrix (see Section 1.3.1).
- 4.3 Incomplete Code Change Proposals:** When a code change proposal is submitted with incorrect format, without the required information or judged as not in compliance with these Rules of Procedure, the Secretariat shall notify the proponent of the specific deficiencies and the proposal shall be held until the deficiencies are corrected, with a final date set for receipt of a corrected submittal. If the Secretariat receives the corrected code change proposal after the final date, the proposal shall be held over until the next code development

cycle. Where there are otherwise no deficiencies addressed by this section, a code change proposal that incorporates a new referenced standard shall be processed with an analysis of the referenced standard's compliance with the criteria set forth in Section 3.6.

4.4 Editorial Code Change Proposals. When a code change proposal is submitted that proposes an editorial or format change that, in the opinion of the Secretariat, does not affect the scope or application of the code, the proposal shall be submitted to the Code Correlation Committee who shall deem the code change proposal as editorial or send the proposal back to the Secretariat to be considered by the appropriate code development committee. To be deemed editorial, such proposal shall require a majority vote of the Code Correlation Committee. Editorial proposals shall be published in the Code Change Agenda. Such proposals shall be added to the hearing agenda for consideration by the appropriate code development committee upon written request to ICC by any individual. The deadline to submit such requests shall be 14 days prior to the first day of the Committee Action Hearing. Code Correlation Committee proposals that are not added to a code development committee hearing agenda shall be published in the next edition of the code with no further consideration.

4.5 Copy Editing Code Text: The Chief Executive Officer shall have the authority at all times to make editorial style and format changes to the Code text, or any approved changes, consistent with the intent, provisions and style of the Code. Such editorial style or format changes shall not affect the scope or application of the Code requirements.

4.6 Updating Standards Referenced in the Codes: Standards referenced by the Codes that do not require coordination with a code change proposal to the code text shall be updated administratively by the Administrative Code Development Committee in accordance with these full procedures except that the deadline for availability of the updated standard and receipt by the Secretariat shall be December 1 of the third year of each code cycle. The published version of the new edition of the Code which references the standard will refer to the updated edition of the standard. If the standard is not available by the December 1st deadline, the edition of the standard as referenced by the newly published Code shall revert back to the reference contained in the previous edition and an errata to the Code issued. Multiple standards to be updated may be included in a single proposal.

4.6.1 Updating ICC Standards Referenced in the Codes. All standards developed by ICC and referenced by the Codes which are undergoing an update shall be announced by ICC to allow stakeholders to participate in the update process. Where the updated standard is completed and available by December 1 of the third year of the code cycle, the published version of the new edition of the Code which references the standard shall refer to the updated edition of the standard. If the standard is not available by the December 1st deadline, the edition of the standard as referenced by the newly published Code shall revert back to the reference contained in the previous edition and an errata to the Code issued.

4.7 Preparation: All code change proposals in compliance with these procedures shall be prepared in a standard manner by the Secretariat and be assigned

separate, distinct and consecutive numbers. The Secretariat shall coordinate related proposals submitted in accordance with Section 3.3.2 to facilitate the hearing process.

- 4.8 Code Change Agenda:** All code change proposals shall be posted on the ICC website at least 30 days prior to the Committee Action Hearing on those proposals and shall constitute the agenda for the Committee Action Hearing. Any errata to the Code Change Agenda shall be posted on the ICC website as soon as possible. Code change proposals which have not been published in the original posting or subsequent errata shall not be considered.

5.0 Committee Action Hearing

- 5.1 Intent:** The intent of the Committee Action Hearing is to permit interested parties to present their views including the cost and benefits on the code change proposals on the published agenda. The code development committee will consider such comments as may be presented in the development of their action on the disposition of such code change proposals. At the conclusion of the code development committee deliberations, the committee action on each code change proposal shall be placed before the hearing assembly for consideration in accordance with Section 5.7.

- 5.2 Committee:** The Codes and Standards Council shall review all applications and make committee appointment recommendations to the ICC Board. The Code Development Committees shall be appointed by the ICC Board.

5.2.1 Chairman/Moderator: The Chairman and Vice-Chairman shall be appointed by the Codes and Standards Council from the appointed members of the committee. The ICC President shall appoint one or more Moderators who shall act as presiding officer for the Committee Action_Hearing.

5.2.2 Conflict of Interest: A committee member shall withdraw from and take no part in those matters with which the committee member has an undisclosed financial, business or property interest. The committee member shall not participate in any committee discussion or any committee vote on the matter in which they have an undisclosed interest. A committee member who is a proponent of a code change proposal shall not participate in any committee discussion on the matter or any committee vote. Such committee member shall be permitted to participate in the floor discussion in accordance with Section 5.5 by stepping down from the dais.

5.2.3 Representation of Interest: Committee members shall not represent themselves as official or unofficial representatives of the ICC except at regularly convened meetings of the committee.

5.2.4 Committee Composition: The committee may consist of representation from multiple interests. A minimum of thirty-three and one-third percent (33.3%) of the committee members shall be regulators.

- 5.3 Date and Location:** The date and location of the Committee Action Hearing shall be announced not less than 60 days prior to the date of the hearing.

- 5.4 General Procedures:** *The Robert's Rules of Order* shall be the formal procedure for the conduct of the Committee Action Hearing except as a specific provision of these Rules of Procedure may otherwise dictate. A quorum shall consist of a majority of the voting members of the committee.
- 5.4.1 Chair Voting:** The Chairman of the committee shall vote only when the vote cast will break a tie vote of the committee.
- 5.4.2 Open Hearing:** The Committee Action Hearing is an open hearing. Any interested person may attend and participate in the floor discussion and assembly consideration portions of the hearing. Only code development committee members may participate in the committee action portion of the hearings (see Section 5.6). Participants shall not advocate a position on specific code change proposals with committee members other than through the methods provided in this policy.
- 5.4.3 Presentation of Material at the Public Hearing:** Information to be provided at the hearing shall be limited to verbal presentations and modifications submitted in accordance with Section 5.5.2. Each individual presenting information at the hearing shall state their name and affiliation, and shall identify any entities or individuals they are representing in connection with their testimony. Audio-visual presentations are not permitted. Substantiating material submitted in accordance with Section 3.3.5.3 and other material submitted in response to a code change proposal shall be located in a designated area in the hearing room and shall not be distributed to the code development committee at the public hearing.
- 5.4.4 Agenda Order:** The Secretariat shall publish a Code Change Agenda for the Committee Action Hearing, placing individual code change proposals in a logical order to facilitate the hearing. Any public hearing attendee may move to revise the agenda order as the first order of business at the public hearing, or at any time during the hearing except while another code change proposal is being discussed. Preference shall be given to grouping like subjects together, and for moving items back to a later position on the agenda as opposed to moving items forward to an earlier position.
- 5.4.4.1 Proponent Approval:** A motion to revise the agenda order is considered in order unless the proponent(s) of the moved code change proposals are in attendance in the hearing room and object to the move. Where such objections are raised, the motion to revise the hearing order shall be ruled out of order by the Moderator. The ruling of the Moderator shall be final and not subject to a point of order in accordance with Section 5.4.8. The motion to change the hearing order is not debatable.
- 5.4.4.2 Revised Agenda Order Approved:** A motion to revise the agenda order is subject to a 2/3 vote of those present.
- 5.4.5 Tabling:** Tabling of code change proposals shall be permitted. The motion to table is considered in order unless the proponent(s) of the tabled code change proposals are in attendance at the hearing and object to the tabling. Where such objections are raised, the motion to

table shall be ruled out of order by the Moderator. The ruling of the Moderator shall be final and not subject to a point of order in accordance with Section 5.4.8. The motion to table is not debatable.

The motion to table must identify one of the following as to the location in the agenda when or where the code change proposal(s) will be considered:

1. To a specific date and time within the timeframe of the Code Change Agenda for the code change proposals under consideration, or
2. To a specific location in the Code Change Agenda for the code change proposals under consideration.

5.4.5.1 Tabling approved: A motion to table is subject to a 2/3 vote of those present.

5.4.5.2 Tabled code change proposals back to the floor: The Moderator shall bring the tabled code change proposal(s) back to the floor at the applicable time/agenda location in accordance with Section 5.4.5 Items 1 or 2. The testimony on the code change proposal shall resume at the point in the process where the tabling occurred.

5.4.6 Reconsideration: There shall be no reconsideration of a code change proposal after it has been voted on by the committee in accordance with Section 5.6.

5.4.7 Time Limits: Time limits shall be established as part of the agenda for testimony on all code change proposals at the beginning of each hearing session. Each person requesting to testify on a code change proposal shall be given equal time. In the interest of time and fairness to all hearing participants, the Moderator shall have limited authority to modify time limitations on debate. The Moderator shall have the authority to adjust time limits as necessary in order to complete the hearing agenda.

5.4.7.1 Time Keeping: Keeping of time for testimony by an individual shall be by an automatic timing device. Remaining time shall be evident to the person testifying. Interruptions during testimony shall not be tolerated. The Moderator shall maintain appropriate decorum during all testimony.

5.4.7.2 Proponent Testimony: The Proponent is permitted to waive an initial statement. The Proponent shall be permitted to have the amount of time that would have been allocated during the initial testimony period plus the amount of time that would be allocated for rebuttal. Where the code change proposal is submitted by multiple proponents, this provision shall permit only one proponent of the joint submittal to be allotted additional time for rebuttal.

5.4.8 Points of Order: Any person participating in the public hearing may

challenge a procedural ruling of the Moderator or the Chairman. A majority vote of ICC Members in attendance shall determine the decision.

5.5 Floor Discussion: The Moderator shall place each code change proposal before the hearing for discussion by identifying the proposal and by regulating discussion as follows:

5.5.1 Discussion Order:

1. Proponents. The Moderator shall begin by asking the proponent and then others in support of the code change proposal for their comments.
2. Opponents. After discussion by those in support of a code change proposal, those opposed hereto, if any, shall have the opportunity to present their views.
3. Rebuttal in support. Proponents shall then have the opportunity to rebut points raised by the opponents.
4. Re-rebuttal in opposition. Opponents shall then have the opportunity to respond to the proponent's rebuttal.

5.5.2 Modifications: Modifications to code change proposals may be suggested from the floor by any person participating in the public hearing. The person proposing the modification, or his/her designee, is deemed to be the proponent of the modification.

5.5.2.1 Submission. All modifications shall be submitted electronically to the ICC Secretariat in a format determined by ICC unless determined by the Chairman to be either editorial or minor in nature. The modification will be forwarded electronically to the members of the code development committee during the hearing and will be projected on the screen in the hearing room.

5.5.2.2 Criteria. The Chairman shall rule proposed modifications in or out of order before they are discussed on the floor. A proposed modification shall be ruled out of order if it:

1. changes the scope of the original code change proposal; or
2. is not readily understood to allow a proper assessment of its impact on the original code change proposal or the Code.

The ruling of the Chairman on whether or not the modification is in or out of order shall be final and is not subject to a point of order in accordance with Section 5.4.8.

5.5.2.3 Testimony. When a modification is offered from the floor and ruled in order by the Chairman, a specific floor discussion on that modification is to commence in accordance with the procedures listed in Section 5.5.1.

5.6 Committee Action: Following the floor discussion of each code change

proposal, one of the following motions shall be made and seconded by members of the committee:

1. Approve the code change proposal As Submitted (AS) or
2. Approve the code change proposal As Modified with specific modifications (AM), or
3. Disapprove the code change proposal (D)

Discussion on this motion shall be limited to code development committee members. If a committee member proposes a modification which had not been proposed during floor discussion, the Chairman shall rule on the modification in accordance with Section 5.5.2.2. If a committee member raises a matter of issue, including a proposed modification, which has not been proposed or discussed during the floor discussion, the Moderator shall suspend the committee discussion and shall reopen the floor discussion for comments on the specific matter or issue. Upon receipt of all comments from the floor, the Moderator shall resume committee discussion.

The code development committee shall vote on each motion with the majority dictating the committee's action. Committee action on each code change proposal shall be completed when one of the motions noted above has been approved. Each committee vote shall be supported by a reason.

The code development committee shall maintain a record of its proceedings including the action on each code change proposal.

5.7 Assembly Consideration: At the conclusion of the committee's action on a code change proposal and before the next code change proposal is called to the floor, the Moderator shall ask for a motion from the public hearing attendees who may object to the committee's action. If a motion in accordance with Section 5.7.1 is not brought forward on the committee's action, the results of the Committee Action Hearing shall be established by the committee's action.

5.7.1 Assembly Floor Motion: Any attendee may raise an objection to the committee's action in which case the attendee will be able to make a motion to:

1. Approve the code change proposal As Submitted from the Floor (ASF), or
2. Approve the code change proposal As Modified from the Floor (AMF) with a specific modification that has been previously offered from the floor and ruled in order by the Chairman during floor discussion (see Section 5.5.2) or has been offered by a member of the Committee and ruled in order by the Chairman during committee discussion (see Section 5.6), or
3. Disapprove the code change proposal from the floor (DF).

5.7.2 Assembly Floor Motion Consideration: On receipt of a second to the floor motion, the Moderator shall accept the motion and the second and notify the attendees that the motion will be considered in an online ballot following the hearing in accordance with Section 5.7.3. No additional testimony shall be permitted.

5.7.3 Online Assembly Floor Motion Ballot: Following the Committee

Action Hearing, all assembly floor motions which received a second shall be compiled into an online ballot. The ballot will include:

1. The code change proposal as published.
2. The committee action and reason from the Committee Action Hearing.
3. The floor motion, including modifications which are part of the floor motion.
4. Access to the audio and video of the Committee Action Hearing proceedings.
5. Identification of the ballot period for which the online balloting will be open.

5.7.4 Eligible Online Assembly Motion Voters: All members of ICC shall be eligible to vote on online assembly floor motions. Each member is entitled to one vote, except that each Governmental Member Voting Representative may vote on behalf of its Governmental Member. Individuals who represent more than one Governmental Member shall be limited to a single vote. Application, whether new or updated, for ICC membership must be received by the Code Council 30 days prior to the first day of the Committee Action Hearing. The ballot period will not be extended beyond the published period except as approved by the ICC Board.

5.7.5 Assembly Action: A successful assembly action shall be a majority vote of the votes cast by eligible voters (see Section 5.7.4). A successful assembly action results in an automatic public comment to be considered at the Public Comment Hearing (see Section 7.4).

5.8 Report of the Committee Action Hearing: The results of the Committee Action Hearing, including committee action and reason, online assembly floor motion vote results and the total vote count for each assembly floor motion shall be posted on the ICC website not less than 60 days prior to the Public Comment Hearing, except as approved by the ICC Board.

6.0 Public Comments

6.1 Intent: The public comment process gives attendees at the Public Comment Hearing an opportunity to consider specific objections to the results of the Committee Action Hearing and more thoughtfully prepare for the discussion for public comment consideration. The public comment process expedites the Public Comment Hearing by limiting the items discussed to the following:

1. Consideration of items for which a public comment has been submitted; and
2. Consideration of items which received a successful assembly action.

6.2 Deadline: The deadline for receipt of a public comment to the results of the Committee Action Hearing shall be announced at the Committee Action Hearing but shall not be less than 30 days subsequent to the availability of the Report of the Committee Action Hearing (see Section 5.8).

6.3 Withdrawal of Public Comment: A public comment may be withdrawn by the public commenter at any time prior to public comment consideration of that comment. A withdrawn public comment shall not be subject to public comment

consideration. If the only public comment to a code change proposal is withdrawn by the public commenter prior to the vote on the consent agenda in accordance with Section 7.5.5, the proposal shall be considered as part of the consent agenda. If the only public comment to a code change proposal is withdrawn by the public commenter after the vote on the consent agenda in accordance with Section 7.5.5, the proposal shall continue as part of the individual consideration agenda in accordance with Section 7.5.6, however the public comment shall not be subject to public comment consideration.

6.4 Form and Content of Public Comments: Any interested person, persons, or group may submit a public comment to the results of the Committee Action Hearing which will be considered when in conformance to these requirements. Each public comment to a code change proposal shall be submitted separately and shall be complete in itself. Each public comment shall contain the following information:

6.4.1 Public comment: Each public comment shall include the name, title, mailing address, telephone number and email address of the public commenter. Email addresses shall be published with the public comments unless the commenter otherwise requests on the submittal form.

If a group, organization, or committee submits a public comment, an individual with prime responsibility shall be indicated. If a public comment is submitted on behalf a client, group, organization or committee, the name and mailing address of the client, group, organization or committee shall be indicated. The scope of the public comment shall be consistent with the scope of the original code change proposal, committee action or successful assembly action. Public comments which are determined as not within the scope of the code change proposal, committee action or successful assembly action shall be identified as such. The public commenter shall be notified that the public comment is considered an incomplete public comment in accordance with Section 6.5.1 and the public comment shall be held until the deficiencies are corrected. A copyright release in accordance with Section 3.3.5.5 shall be provided with the public comment.

6.4.2 Code Reference: Each public comment shall include the code change proposal number.

6.4.3 Multiple public comments to a code change proposal. A proponent shall not submit multiple public comments to the same code change proposal. When a proponent submits multiple public comments to the same code change proposal, the public comments shall be considered as incomplete public comments and processed in accordance with Section 6.5.1. This restriction shall not apply to public comments that attempt to address differing subject matter within a code section.

6.4.4 Desired Final Action: In order for a public comment to be considered, the public comment shall indicate the desired Final Action as one of the following:

1. Approve the code change proposal As Submitted (AS), or
2. Approve the code change proposal As Modified by the committee

modification published in the Report of the Committee Action Hearing (AM) or published in a public comment in the Public Comment Agenda (AMPC), or

3. Disapprove the code change proposal (D)

6.4.5 Supporting Information: The public comment shall include a statement containing a reason and justification for the desired Final Action on the code change proposal. Reasons and justification which are reviewed in accordance with Section 6.5 and determined as not germane to the technical issues addressed in the code change proposal or committee action may be identified as such. The public commenter shall be notified that the public comment is considered an incomplete public comment in accordance with Section 6.5.1 and the public comment shall be held until the deficiencies are corrected. The public commenter shall have the right to appeal this action in accordance with the policy of the ICC Board. A bibliography of any substantiating material submitted with a public comment shall be published with the public comment and the substantiating material shall be made available at the Public Comment_Hearing. Supporting documentation may be provided via a link to a website provided by the public commenter and included in the reason statement and bibliography. The reason statement shall include the date the link was created. All substantiating material published by ICC is material that has been provided by the proponent and in so publishing ICC makes no representations or warranties about its quality or accuracy.

6.4.6 Cost Impact: The proponent of the public comment shall indicate one of the following regarding the cost impact of the public comment to the code change proposal:

- 1) The net effect of the public comment and code change proposal will increase the cost of construction;
- 2) The net effect of the public comment and code change proposal will decrease the cost of construction; or
- 3) The net effect of the public comment and code change proposal will not increase or decrease the cost of construction.

The public commenter shall submit information which substantiates such assertion. This information will be considered at the Public Comment Hearing and will be included in the published public comment. Supporting documentation may be provided via a link to a website provided by the public commenter and included in the cost substantiation statement. The cost substantiation statement shall include the date the link was created.

Any public comment submitted which does not include the requisite cost impact information shall be considered incomplete and shall not be processed.

6.4.7 Online submittal: Each public comment and substantiating information shall be submitted online at the website designated by ICC. Additional copies may be requested when determined necessary by the Secretariat.

6.4.8 Submittal Deadline: ICC shall establish and post the submittal

deadline for each cycle. The posting of the deadline shall occur no later than 120 days prior to the public comment deadline. Each public comment shall be submitted online at the website designated by ICC by the posted deadline. The submitter of a public comment is responsible for the proper and timely receipt of all pertinent materials by the Secretariat.

6.5 Review: The Secretariat shall be responsible for reviewing all submitted public comments from an editorial and technical viewpoint similar to the review of code change proposals (see Section 4.2).

6.5.1 Incomplete Public Comment: When a public comment is submitted with incorrect format, without the required information or judged as not in compliance with these Rules of Procedure, the public comment shall not be processed. The Secretariat shall notify the public commenter of the specific deficiencies and the public comment shall be held until the deficiencies are corrected, or the public comment shall be returned to the public commenter with instructions to correct the deficiencies with a final date set for receipt of the corrected public comment.

6.5.2 Duplications: On receipt of duplicate or parallel public comments, the Secretariat may consolidate such public comments for public comment consideration. Each public commenter shall be notified of this action when it occurs.

6.5.3 Deadline: Public comments received by the Secretariat after the deadline set for receipt shall not be published and shall not be considered as part of the public comment consideration. This deadline shall not apply to public comments submitted by the Code Correlation Committee. In order to correlate submitted public comments with action taken at the Committee Action Hearing on code change proposals that did receive a public comment, the Code Correlation Committee, in conjunction with staff processing of public comments, shall review the submitted public comments and submit the necessary public comments in order to facilitate the coordination of code change proposals. Such review and submittal shall not delay the posting of the Public Comment Agenda as required in Section 6.6.

6.6 Public Comment Agenda: The Committee Action Hearing results on code change proposals that have not received a public comment and code change proposals which received public comments or successful assembly actions shall constitute the Public Comment Agenda. The Public Comment Agenda shall be posted on the ICC website at least 30 days prior the Public Comment Hearing. Any errata to the Public Comment Agenda shall be posted on the ICC website as soon as possible. Code change proposals and public comments which have not been published in the original posting or subsequent errata shall not be considered.

7.0 Public Comment Hearing_

7.1 Intent: The Public Comment Hearing is the first of two steps to make a final determination on all code change proposals which have been considered in a code development cycle by a vote cast by eligible voters (see Section 9.0). The second step, which follows the Public Comment Hearing, is the Online Governmental Consensus Vote that is conducted in accordance with Section

8.0.

- 7.2 Date and Location:** The date and location of the Public Comment Hearing shall be announced not less than 60 days prior to the date of the hearing.
- 7.3 Moderator:** The ICC President shall appoint one or more Moderators who shall act as presiding officer for the Public Comment Hearing.
- 7.4 Public Comment Agenda:** The Public Comment Consent Agenda shall be comprised of code change proposals which have neither a successful assembly action nor public comment. The agenda for public testimony and individual consideration shall be comprised of proposals which have a successful assembly action or public comment (see Section 6.1).
- 7.5 Procedure:** *The Robert's Rules of Order* shall be the formal procedure for the conduct of the Public Comment Hearing except as these Rules of Procedure may otherwise dictate.
- 7.5.1 Open Hearing:** The Public Comment Hearing is an open hearing. Any interested person may attend and participate in the floor discussion.
- 7.5.2 Agenda Order:** The Secretariat shall publish a Public Comment Agenda for the Public Comment Hearing, placing individual code change proposals and public comments in a logical order to facilitate the hearing. The proponents or opponents of any code change proposal or public comment may move to revise the agenda order as the first order of business at the public hearing, or at any time during the hearing except while another proposal is being discussed. Preference shall be given to grouping like subjects together and for moving items back to a later position on the agenda as opposed to moving items forward to an earlier position.
- 7.5.2.1 Proponent Approval:** A motion to revise the agenda order is considered in order unless the proponent(s) of the moved code change proposals are in attendance at the hearing and object to the move. Where such objections are raised, the motion to revise the hearing order shall be ruled out of order by the Moderator. The ruling of the Moderator shall be final and not subject to a point of order in accordance with Section 5.4.8. The motion to change the hearing order is not debatable.
- 7.5.2.2 Revised Agenda Order Approved:** A motion to revise the agenda order is subject to a 2/3 vote of those present.
- 7.5.3 Tabling:** Tabling of code change proposals shall be permitted. The motion to table is considered in order unless the proponent(s) of the tabled code change proposals are in attendance at the hearing and object to the tabling. Where such objections are raised, the motion to table shall be ruled out of order by the Moderator. The ruling of the Moderator shall be final and not subject to a point of order in accordance with Section 5.4.8. The motion to table is not debatable.

The motion to table must identify one of the following as to the location in the agenda when or where the code change proposal(s) will be considered:

1. To a specific date and time within the timeframe of the Public Comment Agenda for the code change proposals under consideration, or
2. To a specific location in the Public Comment Agenda for the code change proposals under consideration.

7.5.3.1 Tabling approved: A motion to table is subject to a 2/3 vote of those present.

7.5.3.2 Tabled code change proposals back to the floor: The Moderator shall bring the tabled code change proposal(s) back to the floor at the applicable time/agenda location in accordance with Section 7.5.3 Items 1 or 2. The testimony on the code change proposal shall resume at the point in the process where the tabling occurred.

7.5.4 Presentation of Material at the Public Comment Hearing: Information to be provided at the hearing shall be limited to verbal presentations. Each individual presenting information at the hearing shall state their name and affiliation, and shall identify any entities or individuals they are representing in connection with their testimony. Audio-visual presentations are not permitted. Substantiating material submitted in accordance with Section 6.4.5 and other material submitted in response to a code change proposal or public comment shall be located in a designated area in the hearing room.

7.5.5 Public Comment Consent Agenda: The Public Comment Consent Agenda (see Section 7.4) shall be placed before the assembly with a single motion for Final Action in accordance with the results of the Committee Action Hearing. When the motion has been seconded, the vote shall be taken with no testimony being allowed. A simple majority (50% plus one) based on the number of votes cast by eligible voters shall decide the motion. This action shall not be subject to the Online Governmental Consensus Vote following the Public Comment Hearing (see Section 8.0).

7.5.6 Public Comment Individual Consideration Agenda: Upon completion of the Public Comment Consent Agenda vote, all code change proposals not on the Public Comment Consent Agenda shall be placed before the assembly for individual consideration of each item (see Section 7.4).

7.5.7 Reconsideration: There shall be no reconsideration of a code change proposal after it has been voted on in accordance with Section 7.5.9.

7.5.8 Time Limits: Time limits shall be established as part of the agenda for testimony on all code change proposals at the beginning of each hearing session. Each person requesting to testify on a code change proposal shall be given equal time. In the interest of time and fairness to all hearing participants, the Moderator shall have limited authority to modify time limitations on debate. The Moderator shall have the authority to adjust time limits as necessary in order to complete the hearing agenda.

7.5.8.1 Time Keeping: Keeping of time for testimony by an

individual shall be by an automatic timing device. Remaining time shall be evident to the person testifying. Interruptions during testimony shall not be tolerated. The Moderator shall maintain appropriate decorum during all testimony.

7.5.9 Discussion and Voting: Discussion and voting on code change proposals being individually considered shall be in accordance with the following procedures and the voting majorities in Section 7.6:

7.5.9.1 Proponent testimony: The Proponent of a public comment is permitted to waive an initial statement. The Proponent of the public comment shall be permitted to have the amount of time that would have been allocated during the initial testimony period plus the amount of time that would be allocated for rebuttal. Where a public comment is submitted by multiple proponents, this provision shall permit only one proponent of the joint submittal to waive an initial statement.

7.5.9.2 Points of Order: Any person participating in the public hearing may challenge a procedural ruling of the Moderator. A majority vote of ICC Members in attendance shall determine the decision.

7.5.9.3 Eligible voters: Voting shall be limited to eligible voters in accordance with Section 9.0.

7.5.9.4 Allowable Final Action Motions: The only allowable motions for Final Action are Approval as Submitted (AS), Approval as Modified by the committee (AM) or by one or more modifications published in the Public Comment Agenda (AMPC), and Disapproval (D).

7.5.9.5 Initial Motion: The code development committee action shall be the initial motion considered.

7.5.9.6 Motions for Modifications: Whenever a motion under consideration is for Approval as Submitted or Approval as Modified, a subsequent motion and second for a modification published in the Public Comment Agenda may be made (see Section 6.4.4). Each subsequent motion for modification, if any, shall be individually discussed and voted before returning to the main motion. A two-thirds majority based on the number of votes cast by eligible voters shall be required for a successful motion on all modifications.

7.5.9.7 Voting: After dispensing with all motions for modifications, if any, and upon completion of discussion on the main motion, the Moderator shall then ask for the vote on the main motion. The vote on the main motion shall be taken electronically with the vote recorded and each vote assigned to the eligible voting member. In the event the electronic voting system is determined not to be used by ICC, a hand/standing count will be taken by the Moderator. If the motion fails to receive the majority required in Section 7.6, the Moderator shall ask for a new motion.

7.5.9.8 Subsequent Motion: If the initial motion is unsuccessful, a motion for either Approval as Submitted or Approval as Modified by one or more published modifications is in order. A motion for Disapproval is not in order. The vote on the main motion shall be taken electronically with the vote recorded and each vote assigned to the eligible voting member. In the event the electronic voting system is determined not to be used by ICC, a hand/standing count will be taken by the Moderator. If a successful vote is not achieved, Section 7.5.9.9 shall apply.

7.5.9.9 Failure to Achieve Majority Vote at the Public Comment Hearing. In the event that a code change proposal does not receive any of the required majorities in Section 7.6, the results of the Public Comment Hearing for the code change proposal in question shall be Disapproval. The vote count that will be reported as the Public Comment Hearing result will be the vote count on the main motion in accordance with Section 7.5.9.7.

7.5.9.10 Public Comment Hearing Results: The result and vote count on each code change proposal considered at the Public Comment Hearing shall be announced at the hearing. In the event the electronic voting system is not utilized and a hand/standing count is taken in accordance with Sections 7.5.9.7 and 7.5.9.8, the vote count will not be announced if an individual standing vote count is not taken. The results shall be posted and included in the Online Governmental Consensus Ballot (see Section 8.2).

7.6 Majorities for Final Action: The required voting majority for code change proposals individually considered shall be based on the number of votes cast of eligible voters at the Public Comment Hearing shall be in accordance with the following table:

Committee Action	Desired Final Action		
	AS	AM/AMPC	D
AS	Simple Majority	2/3 Majority	Simple Majority
AM	2/3 Majority	Simple Majority to sustain the Committee Action or; 2/3 Majority on each additional modification and 2/3 Majority on entire code change proposal for AMPC	Simple Majority
D	2/3 Majority	2/3 Majority	Simple Majority

8.0 Online Governmental Consensus Vote

8.1 Public Comment Hearing Results: The results from the Individual Consideration Agenda at the Public Comment Hearing (see Sections 7.5.6 and 7.5.9.10) shall be the basis for the Online Governmental Consensus Vote. The ballot shall include the voting options in accordance with the following table:

Committee Action	Public Comment Hearing result and Voting Majority	Online Governmental Consensus Ballot and Voting Majority	
AS	AS: Simple Majority	AS: Simple Majority	D: Simple Majority
	AMPC: 2/3 Majority	AMPC: 2/3 Majority	D: Simple Majority
	D: Simple Majority	AS: Simple Majority	D: Simple Majority
AM	AS: 2/3 Majority	AS: 2/3 Majority	D: Simple Majority
	AM: Simple Majority	AM: Simple Majority	D: Simple Majority
	AMPC: 2/3 Majority	AMPC: 2/3 Majority	D: Simple Majority
	D: Simple Majority	AM: Simple Majority	D: Simple Majority
D	AS: 2/3 Majority	AS: 2/3 Majority	D: Simple Majority
	AMPC: 2/3 Majority	AMPC: 2/3 Majority	D: Simple Majority
	D: Simple Majority	AS: 2/3 Majority	D: Simple Majority

8.2 Online Governmental Consensus Ballot: The ballot for each code change proposal considered at the Public Comment Hearing will include:

1. The Public Comment Hearing result and vote count.
2. The allowable Online Governmental Consensus Vote actions in accordance with Section 8.1.
3. Where the Public Comment Hearing result is As Submitted (AS) or Disapproval (D), the original code change proposal will be presented.
4. Where the Public Comment Hearing result is As Modified by the committee (AM) or As Modified by one or more Public Comments (AMPC), the original code change and approved modification(s) will be presented.
5. The committee action taken at the Committee Action Hearing.
6. ICC staff identification of correlation issues.
7. For those who voted at the Public Comment Hearing, the ballot will indicate how they voted, unless an electronic vote count is not taken in accordance with Section 7.5.9.10.
8. An optional comment box to provide comments.
9. Access to the Public Comment Agenda which includes: the original code change, the report of the committee action and the submitted public comments.
10. Access to the audio and video of the Committee Action and Public Comment Hearing proceedings.
11. Identification of the ballot period for which the online balloting will be open.

8.3 Voting process: Voting shall be limited to eligible voters in accordance with Section 9.0. Eligible voters are authorized to vote during the Public Comment Hearing and during the Online Governmental Consensus Vote; however, only the last vote cast will be included in the final vote tabulation. The ballot period will not be extended beyond the published period except as approved by the ICC Board.

8.3.1 Participation requirement: A minimum number of participants to conduct the Online Governmental Consensus Vote shall not be required unless the code change proposal(s) were not voted upon utilizing the electronic voting devices at the Public Comment Hearing and the resulting vote was not assigned to each eligible voting member in accordance with Sections 7.5.9.7 and 7.5.9.8 . If this occurs, a minimum number of participants shall be required for those code change proposal(s) based on an assessment of the minimum number

of votes cast during the entire Public Comment Hearing and the Online Governmental Consensus Vote shall determine the final on action on the code change proposal(s) in accordance with Section 10.1.

9.0 Eligible Final Action Voters

9.1 Eligible Final Action Voters: Eligible Final Action voters include ICC Governmental Member Voting Representatives and Honorary Members in good standing who have been confirmed by ICC in accordance with the Electronic Voter Validation System. Such confirmations are required to be revalidated annually. Eligible Final Action voters in attendance at the Public Comment Hearing and those participating in the Online Governmental Consensus Vote shall have one vote per eligible voter on all Codes. Individuals who represent more than one Governmental Member shall be limited to a single vote.

9.2 Applications: Applications for Governmental Membership must be received by the ICC at least 30 days prior to the Committee Action Hearing in order for its designated representatives to be eligible to vote at the Public Comment Hearing or Online Governmental Consensus Vote. Applications, whether new or updated, for Governmental Member Voting Representative status must be received by the Code Council 30 days prior to the commencement of the first day of the Public Comment Hearing in order for any designated representative to be eligible to vote. An individual designated as a Governmental Member Voting Representative shall provide sufficient information to establish eligibility as defined in the ICC Bylaws. The Executive Committee of the ICC Board, in its discretion, shall have the authority to address questions related to eligibility.

10.0 Tabulation, certification and posting of results

10.1 Tabulation and Validation: Following the closing of the online ballot period, the votes received will be combined with the vote tally at the Public Comment Hearing to determine the final vote on the code change proposal. If a hand/standing count is utilized per Subsection 7.5.9.7 or 7.5.9.8, those votes of the Public Comment Hearing will not be combined with the online ballot. ICC shall retain a record of the votes cast and the results shall be certified by a validation committee appointed by the ICC Board. The validation committee shall report the results to the ICC Board, either confirming a valid voting process and result or citing irregularities in accordance with Section 10.2.

10.2 Voting Irregularities: Where voting irregularities or other concerns with the Online Governmental Consensus Voting process which are material to the outcome or the disposition of a code change proposal(s) are identified by the validation committee, such irregularities or concerns shall be immediately brought to the attention of the ICC Board. The ICC Board shall take whatever action necessary to ensure a fair and impartial Final Action vote on all code change proposals, including but not limited to:

1. Set aside the results of the Online Governmental Consensus Vote and have the vote taken again.
2. Set aside the results of the Online Governmental Consensus Vote and declare the Final Action on all code change proposals to be in accordance with the results of the Public Comment Hearing.
3. Other actions as determined by the ICC Board.

10.3 Failure to Achieve Majority Vote: In the event a code change proposal does not receive any of the required majorities for Final Action in Section 8.0, Final Action on the code change proposal in question shall be Disapproval.

10.4 Final Action Results: The Final Action on all code change proposals shall be published as soon as practicable after certification of the results. The results shall include the Final Action taken, including the vote tallies from both the Public Comment Hearing and Online Governmental Consensus Vote, as well the required majority in accordance with Section 8.0. ICC shall maintain a record of individual votes for auditing purposes, however, the record shall not be made public. The exact wording of any resulting text modifications shall be made available to any interested party.

11.0 Code Publication

11.1 Next Edition of the Codes: The Final Action results on code change proposals shall be the basis for the subsequent edition of the respective Code.

11.2 Code Correlation: The Code Correlation Committee is authorized to resolve technical or editorial inconsistencies resulting from actions taken during the code development process by making appropriate changes to the text of the affected code. The process to resolve technical or editorial inconsistencies shall be conducted in accordance with CP#44 Code Correlation Committee.

12.0 Appeals

12.1 Right to Appeal: Any person may appeal an action or inaction in accordance with Council Policy 1 Appeals. Any appeal made regarding voter eligibility, voter fraud, voter misrepresentation or breach of ethical conduct must be supported by credible evidence and must be material to the outcome of the final disposition of a code change proposal(s).

The following actions are not appealable:

1. Variations of the results of the Public Comment Hearing compared to the Final Action result in accordance with Section 10.4.
2. Denied requests to extend the voter balloting period in accordance with Sections 5.7.4 or 8.3.
3. Lack of access to the internet based online collaboration and voting platform to submit a code change proposal, to submit a public comment or to vote.
4. Code Correlation Committee changes made in accordance with Section 11.2.

13.0 Violations

13.1 ICC Board Action on Violations: Violations of the policies and procedures contained in this Council Policy shall be brought to the immediate attention of the ICC Board for response and resolution. Additionally, the ICC Board may take any actions it deems necessary to maintain the integrity of the code development process.

Sections revised in July 27, 2018 revision to CP-28:

4.6.1

Sections revised in December 8, 2017 revision to CP-28:

3.3.5.5

8.3.1

Sections revised in September 9, 2017 revision to CP-28:

3.2

3.3.5.3

3.3.5.4

3.3.5.6

3.6.3.1.1

3.6.3.1.2

4.6

5.4.4

5.4.4.1

5.4.4.2

5.4.5

5.4.5.1

5.4.5.2

5.5.2

5.5.2.2

6.4.5

6.4.6

7.5.2

7.5.2.1

7.5.2.2

7.5.3

7.5.3.1

7.5.3.2

7.5.9.10

8.2 – Number 7

11.2

WITHDRAWN CODE CHANGE PROPOSALS

The following code change proposals were withdrawn subsequent to the Committee Action Hearings:

FS114-18
FS157-18
G51-18

Code change proposals withdrawn prior to the end of the committee action hearings are indicated as such in the 2018 Report of Committee Action Hearings.

2018 PUBLIC COMMENT HEARINGS SCHEDULE

October 24 - 29, 2018

Greater Richmond Convention Center
Richmond, VA

The upcoming 2018 ICC Annual Conference, Group A Public Comment Hearings and Building Safety and Design Expo will be utilizing the same schedule as last year. The Annual Business meeting will be on Monday, October 22nd, followed by the Expo and Education Programs. The conference activities will conclude on Tuesday, October 23rd with the Annual Banquet. Global Connections Day will be held on Wednesday. [Click here](#) for the conference schedule.

The Public Comment Hearings will start on Wednesday, October 24th at **12:00 pm (please note start time)**. The schedule anticipates that the hearings will be completed no later than 7:00 pm on Monday, October 29th. This may require adjustments to the daily start/end times based on hearing progress. The hearings will start with the Building related codes, starting with the Property Maintenance and Building code, followed by the Fire code and then the Plumbing/Mechanical/Fuel Gas (PMG) codes.

Unless noted by “Start no earlier than 8:00 am”, the hearing on each code will begin immediately upon completion of the hearing for the prior code. This includes moving the code up or back from the day indicated based on hearing progress. Actual start times for each code cannot be stipulated due to uncertainties in hearing progress. Be sure to review the tentative hearing order in the Public Comment Agenda (to be posted by August 31st) for code changes that are heard with a code other than that indicated by the code change prefix (see note 4).

Wednesday October 24	Thursday October 25	Friday October 26	Saturday October 27	Sunday October 28	Monday October 29
<p>Start 12 pm</p> <p>IPMC/IZC</p> <p>IBC-G</p> <p>End 7 pm</p>	<p>Start 8 am</p> <p>IBC-G</p> <p>IBC-FS</p> <p>End 7 pm</p>	<p>Start 8 am</p> <p>IBC-FS</p> <p>IBC-E</p> <p>IFC/IWUIC</p> <p>End 7 pm</p>	<p>Start 8 am</p> <p>IFC/IWUIC</p> <p>ISPSC (Start no earlier than 8 am)</p> <p>IFGC</p> <p>IMC</p> <p>End 7 pm</p>	<p>Start 10 am</p> <p>IMC</p> <p>IRC-M</p> <p>IPC/IPSDC</p> <p>End 7 pm</p>	<p>Start 8 am</p> <p>IPC/IPSDC</p> <p>IRC-P</p> <p>Finish 7 pm</p>

SEE NEXT PAGE FOR SCHEDULE NOTES AND LIST OF CODES

Hearing Schedule Notes:

1. Daily start and end hearing times are subject to change based on progress.
2. Mid-morning, lunch and mid-afternoon breaks to be announced. The hearings are scheduled without a dinner break. A lunch break is not scheduled for Wednesday, October 24th.
3. Due to the uncertainties in the hearing process, the start time indicated as "Start no earlier than 8 am" is conservatively estimated and is not intended to be a scheduled target.
4. Consult the hearing order for code changes to be heard with a code other than the code under which the code change is designated.

Codes: (be sure to consult the Cross Index of Proposed Code Changes with Public Comments for changes heard with a different code)

IBC – E: International Building Code – Egress provisions (Chs. 10 and 11)

IBC – FS: International Building Code – Fire Safety provisions (Chs. 7, 8, 9, 14, 26)

IBC – G: International Building Code – General provisions (Chs. 3 – 6, 12, 13, 27 – 33)

IFC/IWUIC: International Fire and Wildland-Urban Interface Codes

IFGC: International Fuel Gas Code

IMC: International Mechanical Code

IPC/IPSDC: International Plumbing and Private Sewage Disposal Codes

IPMC/IZC: International Property Maintenance and Zoning Codes (no code changes received to the IZC)

IRC – M: Mechanical provisions in the International Residential Code (Chs. 12 – 23)

IRC – P: Plumbing provisions in the International Residential Code (Chs. 25 – 33)

ISPSC: International Swimming Pool and Spa Code

TENTATIVE HEARING ORDER FOR EACH INDIVIDUAL CONSIDERATION AGENDA

Note: Code changes to be heard out of numerical order or to be heard with a different code designation are indented. Be sure to review the cross index on page xlii for code change which affect codes other than those under their respective code change number prefix.

IPMC

(See page 1)

G130-18 Part II
PM8-18 Part I
PM8-18 Part II
PM9-18
PM10-18

IBC - GENERAL

(See page 12)

G15-18 Part I
G15-18 Part II
G21-18
P13-18
G1-18

G32-18

G37-18

G39-18

G54-18

G72-18

G76-18

G86-18

G87-18

G88-18

G90-18

G93-18

G94-18

G95-18

G97-18

G108-18

G89-18

FS81-18

FS5-18

FS6-18

FS73-18

G28-18

F266-18

G75-18

G80-18

G84-18

G113-18

G121-18

G122-18

G124-18

G125-18

G133-18

G135-18

G136-18

G137-18

G139-18

G140-18

G149-18

G151-18

IBC - FIRE SAFETY

(Includes

IBC - Structural)

(See page 360)

FS3-18

FS8-18

FS10-18

FS15-18

FS19-18

FS20-18

FS21-18

FS22-18

FS23-18

FS24-18

FS29-18

FS31-18

FS34-18

FS36-18

FS39-18

FS46-18

FS48-18

FS49-18

FS53-18

FS54-18

FS56-18

FS60-18

G34-18

M72-18

FS74-18

FS78-18

FS82-18

FS83-18

FS85-18

FS91-18

FS93-18

FS94-18

FS95-18

FS96-18

FS99-18

FS103-18

FS104-18

FS108-18

FS110-18

FS111-18

FS149-18

S9-18

S17-18

S18-18

S20-18

S21-18

FS155-18

S6-18

S7-18

IBC - EGRESS

(See page 557)

E1-18

E2-18

E13-18

E15-18 Part 1

E18-18

G35-18

E96-18

E20-18

E21-18

E22-18

E24-18

E30-18

E31-18

E32-18

E33-18

E38-18

E39-18

E40-18

E41-18

E42-18

E44-18

E49-18

E51-18

E52-18

E53-18

E58-18

E60-18

E62-18

E64-18

E67-18

E69-18

E70-18

E71-18

E76-18

E79-18

E81-18

E82-18

E86-18

E90-18

G43-18

E92-18

E106-18

E107-18

E108-18

E109-18

E115-18

E117-18

E126-18

IWUIC

(See page 734)

WUIC3-18

WUIC4-18

WUIC5-18

IFC

(See page 745)

F8-18

F13-18

F17-18	F185-18	M23-18	<u>IPSDC</u>
F18-18	F193-18	M25-18	<u>(See page 1350)</u>
F21-18	F199-18	M27-18	PSD1-18
F92 Part I	F203-18	M32-18	PSD3-18
F92 Part II	F209-18	M33-18	P1-18 Part VI
F22-18	F212-18	M34-18	
F23-18	F226-18	M40-18	<u>IPC</u>
F26-18	F229-18	M50-18	<u>(See page 1358)</u>
F28-18	F243-18	M51-18	P14-18
F37-18	F245-18	M62-18	P15-18
F38-18	F254-18	M64-18	P17-18
F43-18	F262-18 Part I	M67-18	P22-18 Part I
F47-18	F263-18	M70-18	P22-18 Part II
F49-18	F264-18	M71-18	P23-18
F63-18	F267-18 Part I	M73-18	P24-18
F64-18	F267-18 Part II	M74-18	P25-18
F65-18	F270-18	M78-18 Part I	P27-18
F67-18	F276-18	M78-18 Part II	P29-18
G91-18	F277-18	M81-18	P35-18
F69-18	F303-18	M88-18	P38-18 Part I
F76-18	F300-18	M93-18	P42-18
F78-18	F304-18	M95-18	P45-18 Part I
F79-18 Part I	F314-18	M96-18	P45-18 Part II
F79-18 Part II	F316-18	M97-18	P48-18 Part I
F81-18	F328-18	M98-18	P50-18 Part I
F84-18		M99-18	P50-18 Part II
F85-18	<u>ISPSC</u>	M102-18	P51-18
F86-18	<u>(See page 1122)</u>	M112-18	P53-18
F87-18	P1-18 Part V	M120-18	P60-18
F91-18	SP1-18		P64-18
F93-18	SP5-18	<u>IRC – MECHANICAL</u>	P65-18
F95-18	SP8-18	<u>(Includes</u>	P66-18
F100-18	SP23-18	<u>IRC - Building)</u>	P70-18
F4 Part I	SP39-18	<u>(See page 1308)</u>	P79-18 Part I
F4 Part II	SP40-18	RB5-18	P82-18 Part I
F106-18	SP43-18	RM3-18	P82-18 Part II
F110-18		RM5-18	P91-18
F117-18	<u>IFGC</u>	RM7-18	P94-18
F126-18	<u>(See page 1138)</u>	RM9-18	P96-18
F128-18	FG1-18	RM12-18	P99-18
F132-18	FG9-18	RM17-18	P104-18
F138-18	FG10-18	RM19-18	P108-18
F144-18	FG14-18	RM22-18	P116-18
F149-18	FG15	RM25-18	P120-18
F152-18	P1-18 Part IV	RM27-18	P121-18
F153-18		RM31-18	P123-18
F158-18	<u>IMC</u>	RM39-18	P124-18
F169-18	<u>(See pages 1148)</u>		P125-18
F173-18	P1-18 Part III	M119-18 Part II	P126-18
F174-18	M3-18		P131-18 Part I
F180-18	M4-18		P131-18 Part II
F182-18	M6-18		P132-18 Part I
	M13-18		P132-18 Part II
	M20-18		
	M21-18		

IRC - PLUMBING
(See page 1533)

P1-18 Part II
P46-18 Part II
P109-18 Part II

RP3-18
RP10-18
RP13-18
RP16-18

2018 ICC CODE DEVELOPMENT CYCLE CROSS INDEX OF PROPOSED CODE CHANGES ON THE PUBLIC COMMENT AGENDA FOR INDIVIDUAL CONSIDERATION

Some of the proposed code changes include sections that are outside of the scope of the chapters or the code listed in the table of 2018-2019 Staff Secretaries on page x. This is done in order to facilitate coordination among the International Codes which is one of the fundamental principles of the International Codes.

Listed in this cross index are proposed code changes that include sections of codes or codes other than those listed on page viii. For example, IBC Section 1705.17 is proposed for revision in code change FS53-18, which is found in the IBC-Fire Safety section of the code change proposal book. This section of the IBC is typically the responsibility of the IBC-Structural Committee as listed in the table of 2018-2019 Staff Secretaries. It is therefore identified in this cross index. Another example is Section 502.9.5 of the International Mechanical Code. The International Mechanical Code is maintained by the IMC Committee, but Section 502.9.5 will be considered for revision in proposed code change F276 which will be on the IFC Committee agenda. In some instances, there are other subsections that are revised by an identified code change that is not included in the cross index.

This information is provided to assist users in locating all of the proposed code changes that would affect a certain section or chapter. For example, to find all of the proposed code changes that would affect Chapter 4 of the IBC, review the proposed code changes in the portion of the monograph for the IBC-General Code Development Committee (listed with a G prefix) then review this cross reference for Chapter 4 of the IBC for proposed code changes published in other code change groups. While care has been taken to be accurate, there may be some omissions in this list.

Letter prefix: Each proposed change number has a letter prefix that will identify where the proposal is published. The letter designations for proposed changes and the corresponding publications are as follows:

PREFIX	PROPOSED CHANGE GROUP (see monograph table of contents for location)
E	International Building Code - Means of Egress
EB	International Existing Building Code
FG	International Fuel Gas Code
FS	International Building Code - Fire Safety
G	International Building Code – General
M	International Mechanical Code
P	International Plumbing Code
PSD	International Private Sewage Disposal Code
PM	International Property Maintenance Code
RM	International Residential Code - Mechanical
RP	International Residential Code - Plumbing
S	International Building Code – Structural
SP	International Swimming Pool and Spa Code

INTERNATIONAL BUILDING CODE	
Section #	Code Change #
Chapter 2	
Building projection	FS15
Continuity of Head-of-Wall Joint System	FS31
Control vestibule	E49
F-Rating	FS53, FS 31
Firestop Identification Device	FS46
Intumescent Fire-resistant materials	FS10
Life Safety Systems	F4 Part II
Perimeter Fire Containment System	FS53
Platform construction	FS20
Spray Applied Foam Plastic	FS155
T-rating	FS31
Terminated stops	FS60
Wind Driven Rain Index	FS93
Chapter 3	
307.1	F18
307.1.1	F276
307.4	F18
311.2	F276
311.3	F276
Chapter 4	
Table 414.5.1	F169, F203
Chapter 7	
705.3	G54
716.4 (New)	G34
716.4.1 (New)	G34
716.4.2 (New)	G34
716.4.3 (New)	G34
717.4	M72
Chapter 8	
801	F92 Part II
801.1	F92 Part II
802.3	F92 Part II
807 (New)	F92 Part II
Chapter 9	
	See IFC Committee Chapter 9 for IBC Chapter 9 Proposals
903.2.10.2	G39
Table 903.2.11.6	G39
Chapter 10	
Table 1004.5	G15 Part II
1023.2	G95
Chapter 11	

1109.2.1.7	P22 Part I
Chapter 17	
1705.17	FS53
Chapter 27	
2702.2.4	F149
Chapter 29	
Table 2902.1	P13
2902.1.1	P15
2902.1.2	P15
2902.1.3	P15
2902.2	P17
2902.3.7	P22 Part II
Chapter 33	
3312.1 (New)	F270
INTERNATIONAL EXISTING BUILDING CODE	
Chapter 15	
1507.1	F270
INTERNATIONAL FIRE CODE	
Chapter 2	
Mechanical-access Enclosed Parking Garage	G39
Chapter 3	
320	PM8 Part II
Chapter 9	
903.2.10.2	G39
Table 903.2.11.6	G39
Chapter 10	See Egress Committee for Chapter 10 of the Fire Code
1011.7	G95
1023.1	G95
INTERNATIONAL FUEL GAS CODE	
Chapter 2	
COPPER ALLOY	P1 Part IV
INTERNATIONAL MECHANICAL CODE	
Chapter 2	
COPPER ALLOY	P1 Part III
FLAMMABILITY CLASSIFICATION	F79 Part II
FLAMMABILITY CLASSIFICATION (Refrigerant)	F79 Part II

REFRIGERENT CONCENTRAION LIMIT (Refrigerant) (RCL)	F79 Part II
REFRIGERENT SAFETY CLASSIFICATION	F79 Part II
REFRIGERANT SAFETY GROUP CLASSIFICATION	F79 Part II
TOXICITY CLASSIFICATION	F79 Part II
TOXICITY CLASSIFICATION (REFRIGERANT) (NEW)	F79 Part II
Chapter 5	
502.9.5	F276
Chapter 11	
1103.1	F79 Part II
Table 1103.1	F79 Part II
1106.5.1	F79 Part I
1106.5.2	F79 Part II
Table 1106.5.2	F79 Part II
INTERNATIONAL PRIVATE SEWAGE DISPOSAL CODE	
Chapter 2	
Copper Alloy (New)	P1 Part VI
INTERNATIONAL PROPERTY MAINTENANCE CODE	
Chapter 4	
404.6	G130 Part II
INTERNATIONAL RESIDENTIAL CODE	
Chapter 2	
COPPER ALLOY	P1 Part II
Chapter 27	
P2708.4	P45 Part II, P46 Part II
Chapter 29	
Table P2903.2	P82 Part II
P2912.1.1	P131 Part II, P132 Part II
Table P3002.3	P109 Part II
P3003.9.4	P109 Part II
INTERNATIONAL SWIMMING POOL AND SPA CODE	
Chapter 2	
COPPER ALLOY	P1 Part V

**2018 PUBLIC COMMENTS TO THE PROPOSED CHANGES TO THE 2018
INTERNATIONAL CODES**

CODE PAGE

IPMC	1
IBC – General	12
IBC – Fire Safety.....	360
IBC – Structural (Heard by IBC-Fire Safety)	536
IBC – Egress.....	557
IWUIC	734
IFC.....	745
ISPSC.....	1122
IFGC.....	1138
IMC	1148
IRC – Building (Heard by IRC – Mechanical).....	1308
IRC – Mechanical	1315
IPSDC.....	1350
IPC.....	1358
IRC - Plumbing	1533

PM8-18 Part I

IPMC: SECTION 310, 310.1, 310.2, 310.3, 310.4, ICC

Proposed Change as Submitted

Proponent: Jonathan Roberts, UL LLC, representing UL LLC (jonathan.roberts@ul.com)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IPMC COMMITTEE. PART II WILL BE HEARD BY THE IFC CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2018 International Property Maintenance Code

Add new text as follows

SECTION 310 STORM SHELTERS

310.1 Inspection and maintenance. Storm shelters required by Section 423 of the International Building Code, Section 1106 of the International Existing Building Code, or otherwise legally required in a jurisdiction shall be inspected and maintained in accordance with this section.

310.2 Door function. Storm shelter doors, and door hardware, shall be maintained to ensure proper door operation as required by ICC 500.

310.3 Damage or missing components. Storm shelters shall be maintained in accordance with ICC 500 so that walls and roofs are intact and undamaged. Any damage to the storm shelter or its impact-protective systems shall be repaired or replaced in accordance with ICC 500. Missing equipment or components shall be replaced.

310.4 Replacement components. Where it is necessary to replace impact-protective systems, including certified doors, shutters, windows or their frames, hardware, and closing mechanisms, replacements shall comply with applicable ICC 500 requirements.

Add new standard(s) follows

ICC

International Code Council
500 New Jersey Avenue, NW 6th
Floor
Washington DC 20001
US

ICC 500-2014:

ICC/NSSA Standard for the Design and Construction of Storm Shelters

Reason: Storm shelters are relied upon to protect citizens in communities prone to tornadoes, hurricanes, or other similar extreme weather events. It is important to make sure that the shelters, in particular the impact protection systems, doors, and latching components are maintained in an operable condition so they will provide shelter when needed. This proposal includes basic safety requirements for maintaining desired protection.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This change would not result in any increase in the initial construction cost, but could be a minimal increase for the inspection, maintenance, and repairs, especially if the storm shelter is damaged by an inclement weather event.

Analysis: The referenced standard, ICC 500-2014, is currently referenced in other 2018 I-codes.

PM8-18 Part I

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee felt that the proposal has merit but needs more work. It should be revised to apply to all storm shelters, not just those required by the IBC. Further it should be expanded to address systems within storm shelters. Lastly, the term "any damage" in Section 310.3 is too broad and could lead to inconsistent interpretation. (Vote: 7-2)

Assembly Action:

None

PM8-18 Part I

Individual Consideration Agenda

Public Comment 1:

Proponent: Jonathan Roberts, UL LLC, representing UL LLC (jonathan.roberts@ul.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Property Maintenance Code

SECTION 310 STORM SHELTERS

310.1 Inspection and maintenance. Storm shelters required by Section 423 of the International Building Code, Section 1106 of the International Existing Building Code, or otherwise legally required in a jurisdiction shall shelters shall be inspected and maintained in accordance with this section.

310.2 Door function. Storm shelter doors, and door hardware, shall be maintained to ensure proper door operation as required by ICC 500.

310.3 Damage or missing components. Storm shelters shall be maintained in accordance with ICC 500 so that walls and roofs are intact and undamaged. Any damage to the storm shelter or its impact-protective systems that impair its functionality shall be repaired or replaced in accordance with ICC 500. Missing equipment or components shall be replaced.

310.4 Replacement components. Where it is necessary to replace impact-protective systems, including certified doors, shutters, windows or their frames, hardware, and closing mechanisms, replacements shall comply with applicable ICC 500 requirements.

Commenter's Reason: The committee liked the proposal and felt it had merit, but they also felt that it needed work. This amended public comment addresses the concerns of the committee as follows:

- The committee felt that the proposal should apply to all storm shelters, not just those required by the IBC. This change was made in section 310.1.
- Additionally the committee felt that the term "any damage" was too broad and could lead to inconsistent enforcement. As a result section 310.3 has also been amended to specifically focus on damage that impairs the functionality of the shelter only and not to focus on other maintenance items such as missing paint and other cosmetic issues.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The change would not result in any increase in the initial construction cost, but could be a minimal increase for the inspection, maintenance, and repairs, especially if the storm shelter functionality is decreased.

Public Comment 2:

Proponent: Lucas Pump, representing Self (l.pump@cedar-rapids.org) requests As Submitted.

Commenter's Reason: This proposal adds basic safety requirements that are specific to the maintenance of *required*

storm shelters, that is not in previous code editions. This is maintenance code, and this speaks to the specific maintenance of these structures.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The maintenance of *required* storm shelters may increase - but, the initial cost of construction will not be affected.

PM8-18 Part I

PM8-18 Part II

IFC: 301.1, SECTION 320, 320.1, 320.2, 320.3, 320.4, ICC

Proposed Change as Submitted

Proponent: Jonathan Roberts, UL LLC, representing UL LLC (jonathan.roberts@ul.com)

2018 International Fire Code

Revise as follows

301.1 Scope. The provisions of this chapter shall govern the occupancy and maintenance of all structures and premises for precautions against fire and the spread of fire and general requirements of fire and life safety.

Add new text as follows

SECTION 320 STORM SHELTERS

320.1 Inspection and maintenance. Storm shelters required by Section 423 of the International Building Code, Section 1106 of the International Existing Building Code, or otherwise legally required in a jurisdiction shall be inspected and maintained in accordance with this section.

320.2 Door function. Storm shelter doors and door hardware shall be maintained to ensure proper door operation as required by ICC 500.

320.3 Damage or missing components. Storm shelters shall be maintained in accordance with ICC 500 so that walls and roofs are intact and undamaged. Any damage to the storm shelter or its impact-protective systems shall be repaired or replaced in accordance with ICC 500. Missing equipment or components shall be replaced.

320.4 Replacement components. Where it is necessary to replace impact-protective systems, including certified doors, shutters, windows or their frames, hardware, and closing mechanisms, replacements shall comply with applicable ICC 500 requirements.

Add new standard(s) follows

ICC

International Code Council, Inc.
500 New Jersey Avenue, NW 6th
Floor
Washington DC 20001
US

ICC 500-2014:

ICC/NSSA Standard for the Design and Construction of Storm Shelters

Reason: Storm shelters are relied upon to protect citizens in communities prone to tornadoes, hurricanes, or other similar extreme weather events. It is important to make sure that the shelters, in particular the impact protection systems, doors, and latching components are maintained in an operable condition so they will provide shelter when needed. This proposal includes basic safety requirements for maintaining desired protection.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This change would not result in any increase in the initial construction cost, but could be a minimal increase for the inspection, maintenance, and repairs, especially if the storm shelter is damaged by an inclement weather event.

Analysis: The referenced standard, ICC 500-2014, is currently referenced in other 2018 I-codes.

PM8-18 Part II

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated objection to adding the standard to the code and that the requirements should not be retroactive. (Vote: 8-4)

Assembly Action:

None

PM8-18 Part II

Individual Consideration Agenda

Public Comment 1:

Proponent: Lucas Pump, representing Self (l.pump@cedar-rapids.org) requests As Submitted.

Commenter's Reason: This proposal adds basic safety requirements that are specific to the maintenance of *required* storm shelters, that is not in previous code editions. This is maintenance code, and this speaks to the specific maintenance of these structures. The reference standard ICC 500 is currently referenced in other 2018 I-Codes.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The maintenance of *required* storm shelters may increase, but the initial cost of construction will not be affected.

PM8-18 Part II

PM9-18

IPMC: 404.4, 404.4.1, 404.5, Table TABLE 404.5

Proposed Change as Submitted

Proponent: Gerard Hathaway, NYS Dept. of State, Div. of Building Standards and Codes, representing New York State Department of State, Division of Building Standards and Codes (gerard.hathaway@dos.state.ny.us)

2018 International Property Maintenance Code

Revise as follows

404.4 ~~Bedroom~~ Habitable room and living room-bedroom requirements. Every habitable room and bedroom ~~and living room~~ shall comply with the requirements of Sections 404.4.1 through 404.4.5.

404.4.1 Room area. Every ~~living room shall contain not less than 120 square feet (11.2 m²) and every bedroom~~ habitable room shall contain not less than 70 square feet (6.5 m²) and every bedroom occupied by more than one person shall contain not less than 50 square feet (4.6 m²) of floor area for each occupant thereof.

404.5 Overcrowding. Dwelling units shall not be occupied by more occupants than permitted by the minimum area requirements of Table 404.5.

**TABLE 404.5
MINIMUM AREA REQUIREMENTS**

SPACE	MINIMUM AREA IN SQUARE FEET		
	1-2 occupants	3-5 occupants	6 or more occupants
Living room ^{a, b}	120 70	120	150
Dining room ^{a, b}	Norequirement	80	100
Bedrooms	Shall comply with Section 404.4.1		

For SI: 1 square foot = 0.0929 m².

- a. See Section 404.5.2 for combined living room/dining room spaces.
- b. See Section 404.5.1 for limitations on determining the minimum occupancy area for sleeping purposes.

Reason: The purpose of this code change is to coordinate the minimum room area requirements found in the International Property Maintenance Code (IPMC) with those found in the International Residential Code (IRC) and the International Building Code (IBC). We have received technical support questions on this subject in New York State, and nationally it has been discussed in industry related online chat rooms.

IPMC 404.4.1 requires that every living room contain not less than 120 square feet (11.2 m²) and every bedroom contain not less than 70 square feet (6.5 m²). The IBC has similar language which is somewhat compatible with the IPMC, requiring that every dwelling unit shall have not less than one room (not specifically a living room) that shall have not less than 120 square feet (11.2 m²) of net floor area, and that other habitable rooms (not only but including bedrooms) shall have a net floor area of not less than 70 square feet (6.5 m²). However, IRC R304.1 simply requires that habitable rooms (including living rooms, bedrooms, etc.) shall have a floor area of not less than 70 square feet (6.5 m²).

Possible scenarios: A dwelling unit could be constructed under the IRC or IBC with a 70 square foot living room as allowed by both the IRC and IBC, receive a Certificate of Occupancy, and they would not be in compliance with the 2018 IPMC, which requires a minimum 120 square foot living room.

The proposed changes to IPMC 404.4 and 404.4.1 are meant to use language (the term "habitable rooms") which is compatible with both the IRC and IBC for consistency. Also, to allow small dwellings to have the minimum 70 square foot living rooms as intended by both the IRC and IBC.

This code change proposal also includes a change in IPMC 404.5 Overcrowding, specifically Table 404.5 Minimum Area Requirements. The "Living Room"/"1-2 occupants" cell of the table has been changed to delete the minimum 120 square foot requirement, and allow a minimum 70 square foot Living Room for 1-2 occupants in small dwellings constructed under either the IRC or IBC.

This change continues the effort to allow smaller dwellings built under the IRC and IBC to be compatible with the IPMC once they are completed. Code change proposal RB106-13 (R304.1, R304.2), approved for the 2015 IRC, removed the requirement that every dwelling unit have at least one room not less than 120 square feet. One of the prime reasons given for that code change proposal was to allow small dwellings to be built under the IRC.

Cost Impact: The code change proposal will decrease the cost of construction. Allowing small homes to be built, without forcing them to provide a 120 square foot living room, will decrease cost.

PM9-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee felt that a 70 square foot living room for up to 2 occupants was too small when compared to the efficiency unit requirements that require a minimum of 120 square feet for a maximum of one occupant. (Vote: 6-3)

Assembly Action:

None

PM9-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Gerard Hathaway, representing Self (gerard.hathaway@dos.ny.gov) requests As Submitted.

Commenter's Reason:

Reason Statement in Response to Committee Disapproval, the original proposal as submitted and this builds on the original reason statement.

One committee member did not think the IPMC has the right or ability to consider a project, approved with a certificate of occupancy, designed in accordance with the IRC or IBC, to be non-compliant as soon as it is completed. IPMC Section 404.5 Overcrowding and Table 404.5 Minimum Area Requirements are retroactive for property maintenance purposes and apply to dwelling units built under the IRC and IBC for municipalities who have adopted the IRC, IBC and IPMC. Municipalities often have local requirements to re-inspect properties when they change hands to confirm that the conditions of the C of O are still in place or as a regular inspection schedule.

The Committee felt that a 70 square foot living room for up to 2 occupants was too small when compared to the efficiency unit requirements that require a minimum of 120 square feet for a maximum of one occupant.

Under IBC Section 1207.4 "Efficiency dwelling units" it is stated that; "An efficiency living unit shall conform to the code except as modified herein." The section allows smaller units if specific provisions are followed. The IPMC has a corresponding Section 404.6 with occupancy limitations that apply only to Efficiency Units constructed under the IBC, and does not apply to dwelling units constructed under the IRC.

The IPMC Efficiency Unit minimum floor area of 120SF is because it is allowed to be the only room except for the required separate closet and bathroom for one occupant, and increasing by 100SF per additional occupant.

The IRC allows a minimum floor area of 70SF per habitable room. However, must still be in compliance with the requirements of the IPMC. The dwelling unit constructed under the IRC to minimum area requirements would have floor areas that add-up as follows: Living Room (70SF), plus Bedroom (70SF for one occupant) plus bathroom closets and any other non-habitable spaces, this is already more than the 120SF Efficiency minimum. If there were two occupants that would add another 70SF if in separate bedrooms (one 100SF bedroom required if they shared).

Again, this proposal is meant simply to coordinate provisions of the IRC with the occupancy limitations of the IPMC.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. The cost impact has no net effect.

Public Comment 2:

Proponent: Lucas Pump, representing Self (l.pump@cedar-rapids.org) requests As Submitted.

Commenter's Reason: This proposal aligns the IRC & IBC with the IPMC. A dwelling unit could be constructed under the IRC or IBC with a 70 sq. ft. living room, and would be immediately not in compliance with the current IPMC. This proposal makes sense, and it prevents conflicts with the other I-Codes. The action committee's reason statement is making a reference to total sq. footage of efficiency units - which is a completely different code section in 404.6. This proposal is referencing the room area of a specific room, not the total living area.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction.

This will allow for a smaller living room at 70 sq. ft. - versus the current 120 sq. ft. requirement, which will decrease the cost of construction.

PM9-18

PM10-18

IPMC: 602.2

Proposed Change as Submitted

Proponent: Kelly Kirk, City of Norfolk, representing City of Norfolk; Christina Jackson, City of Norfolk, representing City of Norfolk

2018 International Property Maintenance Code

Revise as follows

602.2 Residential occupancies. Dwellings shall be provided with heating facilities capable of maintaining a room temperature of 68°F (20°C) in all habitable rooms, *bathrooms* and *toilet rooms* based on the winter outdoor design temperature for the locality indicated in Appendix D of the International Plumbing Code. Cooking appliances shall not be used, nor shall portable unvented fuel-burning space heaters be used, as a means to provide required heating. Additionally, the installation of one or more portable space heaters shall not be used to achieve compliance with this section.

Exception: In areas where the average monthly temperature is above 30°F (-1°C), a minimum temperature of 65°F (18°C) shall be maintained.

Reason: This proposed change is submitted with the intent to bring the IPMC 602.2 verbiage in line with the current IRC R303.9 verbiage so that these I-Codes cohesively reflect the intent of the ICC as currently written in the IRC R303.9.

Bibliography: 2015 IPMC, Section 602.2 - Heating Facilities, Residential Occupancies; ICC; Fourth Printing, December 2015; Page 2.

2015 IRC, Section R303.9 - Required Heating; ICC; Second Printing, January 2016; Page 56.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
None

PM10-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 602.2 Residential occupancies. Dwellings shall be provided with heating facilities capable of maintaining a room temperature of 68°F (20°C) in all habitable rooms, bathrooms and toilet rooms based on the winter outdoor design temperature for the locality indicated in Appendix D of the International Plumbing Code. Cooking appliances shall not be used, nor shall portable unvented fuel-burning space heaters be used, as a means to provide required heating. ~~Additionally,~~ The installation of one or more portable space heaters shall not be used to achieve compliance with this section.
(no change to the exception)

Committee Reason: The committee agreed that this proposal brings the IPCM 602.2 verbiage in line with the current IRC R303.9 verbiage so that these I-Codes consistently address the installation of portable space heaters. The modification removes an unnecessary word. (Vote: 9-0)

Assembly Action:

None

PM10-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Disapprove.

Commenter's Reason: This proposal should be disapproved for the following reasons:

- 1) It is unenforceable. In the property maintenance code, it would require code officials to try to track the sale and use of portable space heaters in residential and commercial buildings on a continuous basis. If found, then a code official would have to confiscate such units, which are available in hardware stores and on-line, and could be replaced in a day.
- 2) It should not apply to existing buildings. The language in the IRC is designed for new construction, to ensure that portable / temporary systems are not used to comply with requirements for heating.
- 3) In existing buildings, it would prevent the use of such systems during periods of building renovations when central heating systems are taken off-line.
- 4) In existing buildings, it would prevent their use in times of emergencies (e.g., a central heating system shut down and could not be repaired or replaced for a significant amount of time, possibly allowing unsafe thermal conditions).
- 5) In existing buildings, portable electric space heaters do not create any emissions or indoor air quality issues.
- 6) Portable electric space heaters are safe to use in existing buildings and are required to meet safety standards, such as UL 1278.
- 7) The International Fire Code (IFC) allows the use of listed portable electric space heaters. Therefore, this provision would conflict with the IFC.

According to the US Energy Information Administration, Nationwide, **37% of U.S. households** supplement their main equipment with a secondary source of heat. **Almost half of these households use portable electric heaters, the most common secondary heating choice in every climate region.** (*emphasis added*) (see <https://www.eia.gov/todayinenergy/detail.php?id=30672> for more information).

For all of these reasons, this proposal does not belong in the Property Maintenance code.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this proposal will have no impact on the cost of construction. Portable electric space heaters are not installed during construction.

PM10-18

G1-18

IBC: 202, 202

Proposed Change as Submitted

Proponent: Stephen Thomas, Colorado Code Consulting, LLC, representing Colorado Chapter ICC (sthomas@coloradocode.net)

2018 International Building Code

SECTION 202 DEFINITIONS

Revise as follows

[BG] ATRIUM. An opening connecting two or more stories other than ~~enclosed stairways~~ interior exit stairways or ramps, exit access stairways or ramps, elevators, hoistways, escalators, plumbing, electrical, air-conditioning or other equipment, which is closed at the top and not defined as a mall. Stories, as used in this definition, do not include balconies within assembly groups or mezzanines that comply with Section 505.

Reason: The terms "interior exit stairways or ramps" and "exit access stairway or ramps" referenced in Chapter 10 were added in the 2012 and 2015 IBC. However, they were not referenced in the Atrium definition. This change is only intended to clean up the language and provide consistency within the code. It may be considered to be editorial.

Cost Impact: The code change proposal will not increase or decrease the cost of construction

The change is editorial in nature. Therefore, there is no cost implication.

G1-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: While the testimony of the proponents was clear, the proposal results in confusion. It is better to leave the definition we have and not add confusion based on regulations and exemptions in Chapter 10. (Vote 9-5)

Assembly Action:

None

G1-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Stephen Thomas, Colorado Code Consulting, LLC, (stthomas@coloradocode.net) representing Colorado Chapter ICC ; Sarah Rice, representing The American Institute of Architects (srice@preview-group.com) ; David Collins, representing The American Institute of Architects (dcollins@preview-group.com) ; Wayne Jewell (wayne.jewell@greenoaktwp.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

[BG] ATRIUM. ~~An opening~~A vertical space which is closed at the top connecting two or more stories other than enclosed stairways, elevators, hoistways, escalators, plumbing, electrical, air conditioning or other equipment, which is closed at the top and not defined as a mall. Stories, as used in this definition, do not include balconies within assembly groups or mezzanines that comply with Section 505 in Groups I-2 and I-3 Occupancies or three stories in all other occupancies.

712.1.7 Atriums. Atriums complying with Section 404 that connect two or more stories in Groups I-2 or I-3 Occupancies or three stories in other occupancies shall be permitted.

Exceptions:

1. Atriums shall not be permitted within Group H Occupancies.
2. Balconies or stories within Groups A-1, A-4 and A-5, and mezzanines that comply with Section 505 shall not be considered a story as it applies to this section

~~In other than Group H occupancies, atriums complying with Section 404 shall be permitted~~

Commenter's Reason: The original intent of the proposal was to just add language that agreed with the current code language. However, the discussion at the Committee Hearing moved to the fact that the entire definition needed to be revised. I agreed to work with others who were interested and come up with a revised definition that did not have a laundry list and clarified what an atrium is. We also removed technical requirements from the definition. The definition in this public comment is much more simple than the previous one and defines what an atrium is. In addition, a change was made to the language in Section 712.1.7 to bring some of the language from the previous definition into the actual code requirement and revise the language to be easier to understand. There is no intent to change any technical requirements in this public comment.

There is a lot of confusion around a two story atrium since the definition starts out saying "An opening connecting two or more stories". Many people confuse this requirement with openings between two stories in Section 712.1.9. The two-story language has been removed from the definition. We then clarified the intent in Section 712.1.7 by saying that two-story atriums in Groups I-2 and I-3 Occupancies and three-story atriums in all other occupancies must comply with Section 404. So, if you have an opening just between two stories in other than Groups 1-2 or I-3, Section 712.1.9 would apply. If the opening connects three or more stories, it would then be an atrium and need to comply with Section 404. We also revised the language from "In other than Group H Occupancies". to an exception stating that the atrium provisions do not apply to Group H Occupancies.

The definition also had an exception within it for balconies and similar areas in assembly occupancies. This exception was relocated into an exception in Section 712.1.7 to maintain that allowance of balconies and mezzanines in Assembly uses.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This is just a clarification of language.

G1-18

G15-18 Part I

PART I - IBC: 303.4, 309.1

PART II - IBC: TABLE 1004.5, (IFC[BE] TABLE 1004.5)

Proposed Change as Submitted

Proponent: Micah Chappell, representing City of Seattle (micah.chappell@seattle.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE GENERAL CODE DEVELOPMENT COMMITTEE. PART II WILL BE HEARD BY THE MEANS OF EGRESS COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

2018 International Building Code

Revise as follows

303.4 Assembly Group A-3. Group A-3 occupancy includes assembly uses intended for worship, recreation or amusement and other assembly uses not classified elsewhere in Group A including, but not limited to:

- Amusement arcades
- Art galleries more than 3,000 square feet
- Bowling alleys
- Community halls
- Courtrooms
- Dance halls (not including food or drink consumption)
- Exhibition halls
- Funeral parlors
- Greenhouses for the conservation and exhibition of plants that provide public access.
- Gymnasiums (without spectator seating)
- Indoor *swimming pools* (without spectator seating)
- Indoor tennis courts (without spectator seating)
- Lecture halls
- Libraries
- Museums
- Places of religious worship*
- Pool and billiard parlors
- Waiting areas in transportation terminals

309.1 Mercantile Group M. Mercantile Group M occupancy includes, among others, the use of a building or structure or a portion thereof for the display and sale of merchandise, and involves stocks of goods, wares or merchandise incidental to such purposes and accessible to the public. Mercantile occupancies shall include, but not be limited to, the following:

- Art galleries 3,000 square feet or less
- Department stores
- Drug stores
- Markets
- Greenhouses for display and sale of plants that provide public access.
- Motor fuel-dispensing facilities
- Retail or wholesale stores
- Sales rooms

Reason: Provides limited sized art gallery space occupancy classification and the corresponding occupant load factor alignment in the code with the common business practices of selling artistic wares and goods. This change will allow small commercial storefronts for retail sales of unique and limited-edition items to patrons browsing displayed works, interacting with sales people and making purchases, to be classified as Mercantile Occupancies. This change is similar in concept to the current small space allowances for an Assembly Occupancy to have a classification as a Business Occupancy.

This change maintains the required standards for hazards associated with the current occupancy classification of A-3 for Art Gallery spaces greater than 3,000 square feet and large Mercantile occupancies.

Cost Impact: The code change proposal will decrease the cost of construction

This code revision has an anticipated cost benefit to the AHJ and building owners/tenants by a reduction in overall expenditures throughout the entire process of permitting, construction, inspection, and operation of retail type businesses in small spaces where an occupancy classification change is currently required. This revision may also provide a cost benefit to the AHJ by increasing business opportunities for individuals and organizations by reducing or eliminating the cost barriers of substantial alterations in these smaller spaces that are often associated with a change in occupancy classification.

G15-18 Part I

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Section 303.1.1 allows smaller assembly spaces to be classified as Group B. The committee felt that this section addressed the issue adequately. The committee also noted that the size of the space may not be the best threshold, but how the space is being used may warrant a classification other than A-3 for galleries. (Vote 12-1)

Assembly Action:

None

G15-18 Part I

Individual Consideration Agenda

Public Comment 1:

Proponent: Micah Chappell, representing Seattle Department of Construction and Inspection (micah.chappell@seattle.gov) requests As Submitted.

Commenter's Reason: G15-18 Part 1 & 2 provide for a use of small assembly spaces for art galleries that are not covered by 303.1.1 and 303.1.2 by allowing a space less than 3000sf and 100 occupants to be classified as an M Occupancy. This change aligns small art gallery space classification with the actual use.

Technical justification for the size and occupant load limitations:

30 gross occupant load factor creates a limited occupant load of 100 occupants on the 3000sf allowable space for the M occupancy Art Gallery.

30 gross occupant load factor is similar to the current assembly art gallery occupant load factor of 30 net but calculating on gross area eliminates the possibility of a spaces labeled as accessory areas or corridors (definition of floor area, net) to be used as a way to increase occupant loads without increasing safety standards.

Allowing small A-3 art galleries to have a classification of M occupancies will provide a code path for small spaces in existing non-sprinklered buildings, that may be on a floor other than the level of exit discharge (IBC Section 902.1.3) to be utilized without having to trigger substantial alterations required by an occupancy classification change.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This code revision has an anticipated cost benefit to the AHJ and building owners/tenants by a reduction in overall expenditures throughout the entire process of permitting, construction, inspection, and operation of retail type businesses in small spaces where an occupancy classification change is currently required. This revision may also provide a cost benefit to the AHJ by increasing business opportunities for individuals and organizations by reducing or eliminating the cost barriers of substantial alterations in these smaller spaces that are often associated with a change in occupancy classification.

G15-18 Part I

G15-18 Part II

IBC: TABLE 1004.5 (IFC[BE] TABLE 1004.5)

Proposed Change as Submitted

Proponent: Micah Chappell, representing City of Seattle (micah.chappell@seattle.gov)

2018 International Building Code

Revise as follows

**TABLE 1004.5
MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT**

FUNCTION OF SPACE	OCCUPANT LOAD FACTOR^a
Accessory storage areas, mechanical equipment room	300 gross
Agricultural building	300 gross
Aircraft hangars	500 gross
Airport terminal Baggage claim Baggage handling Concourse Waiting areas	20 gross 300 gross 100 gross 15 gross
Assembly Gaming floors (keno, slots, etc.) Exhibit gallery and museum	11 gross 30 net
Assembly with fixed seats	See Section 1004.6
Assembly without fixed seats Concentrated (chairs only—not fixed) Standing space Unconcentrated (tables and chairs)	7 net 5 net 15 net
Bowling centers, allow 5 persons for each lane including 15 feet of runway, and for additional areas	7 net
Business areas Concentrated business use areas	150 gross See Section 1004.8
Courtrooms—other than fixed seating areas	40 net
Day care	35 net
Dormitories	50 gross
Educational Classroom area Shops and other vocational room areas	20 net 50 net
Exercise rooms	50 gross
Group H-5 fabrication and manufacturing areas	200 gross
Industrial areas	100 gross
Institutional areas Inpatient treatment areas Outpatient areas Sleeping areas	240 gross 100 gross 120 gross
Kitchens, commercial	200 gross
Library Reading rooms Stack area	50 net 100 gross
Locker rooms	50 gross
Mall buildings—covered and open	See Section 402.8.2
Mercantile	60 gross
<u>Art gallery</u>	<u>30 gross</u>
Storage stock, shipping areas	300 gross
Parking garages	200 gross
Residential	200 gross
Skating rinks, swimming pools Rink and pool Decks	50 gross 15 gross
Stages and platforms	15 net
Warehouses	500 gross

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m².

- a. Floor area in square feet per occupant.

Reason:

Cost Impact: The code change proposal will decrease the cost of construction

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Disapproval of this proposal will match the action of the General Code Development Committee for Part 1. There was no technical justification for the 30 square foot gross. If the art gallery is a mercantile space, the current occupant load factor is 60 sq.ft. - what is different for an art gallery? How is an art gallery different from an exhibition space? What type of space this is intended to address needs to be clarified. (Vote: 13-0)

Assembly Action:

None

G15-18 Part II

Individual Consideration Agenda

Public Comment 1:

Proponent: Micah Chappell, representing Seattle Department of Construction and Inspection (micah.chappell@seattle.gov) requests As Submitted.

Commenter's Reason: G15-18 Part 1 & 2 provide for a use of small assembly spaces for art galleries that are not covered by 303.1.1 and 303.1.2 by allowing a space less than 3000sf and 100 occupants to be classified as an M Occupancy. This change aligns small art gallery space classification with the actual use.

Technical justification for the size and occupant load limitations:

30 gross occupant load factor creates a limited occupant load of 100 occupants on the 3000sf allowable space for the M occupancy Art Gallery.

30 gross occupant load factor is similar to the current assembly art gallery occupant load factor of 30 net but calculating on gross area eliminates the possibility of a spaces labeled as accessory areas or corridors (definition of floor area, net) to be used as a way to increase occupant loads without increasing safety standards.

Allowing small A-3 art galleries to have a classification of M occupancies will provide a code path for small spaces in existing non-sprinklered buildings, that may be on a floor other than the level of exit discharge (IBC Section 902.1.3) to be utilized without having to trigger substantial alterations required by an occupancy classification change.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This code revision has an anticipated cost benefit to the AHJ and building owners/tenants by a reduction in overall expenditures throughout the entire process of permitting, construction, inspection, and operation of retail type businesses in small spaces where an occupancy classification change is currently required. This revision may also provide a cost benefit to the AHJ by increasing business opportunities for individuals and organizations by reducing or eliminating the cost barriers of substantial alterations in these smaller spaces that are often associated with a change in occupancy classification.

G15-18 Part II

G21-18

IBC: 310.2

Proposed Change as Submitted

Proponent: Daniel Willham, County of Fairfax, Virginia, representing Virginia Building and Code Officials Association (VBCOA) (daniel.willham@fairfaxcounty.gov)

2018 International Building Code

Revise as follows

310.2 Residential Group R-1. Residential Group R-1 occupancies containing *sleeping units* or more than two dwelling units where the occupants are primarily *transient* in nature, including:

- Boarding houses (transient)* with more than 10 occupants
- Congregate living facilities (transient)* with more than 10 occupants
- Hotels (*transient*)
- Motels (*transient*)

Reason: There appears to be a gap in the code for hotels (*transient*) that provide *dwelling units*. As currently written, neither the R-1 nor the R-2 descriptions provide clear direction on the classification of hotels (*transient*) that provide *dwelling units*. The commentary clarifies that R-1 occupancies can contain either *sleeping units*, *dwelling units*, or both, but the code as written does not explicitly address *transient* residential occupancies that contain (more than two) *dwelling units*. The key characteristic of group R-1 occupancies is the transient nature of the occupants and not the absence of *dwelling units*. This proposal simply adds language for dwelling units that mirrors that used in the description of R-2 non-transient occupancies. With this clarification, the difference between R-1 and R-2 occupancies will be clearly defined to depend only on the transient or non-transient nature of the occupants, respectively. For reference, an excerpt from the IBC commentary (pg3-37) follows this change proposal.

living facilities are also classified as Group R. Specifically, these facilities are classified as Group R-4. Mainstreaming people who are recovering from alcohol or drug addiction and people who are developmentally disabled is reported to have therapeutic and social benefits. A residential environment often fosters this mainstreaming.

A building or part of a building is considered to be a residential occupancy if it is intended to be used for sleeping accommodations (including assisted living facilities) and is not an institutional occupancy. Institutional occupancies are similar to residential occupancies in many ways. However, they differ from each other in that institutional occupants are in a supervised environment, and, in the case of Groups I-2 and I-3 occupancies, are under some form of restraint or physical limitation that makes them incapable of complete self-preservation. The number of these occupants who are under supervision or are incapable of self-preservation is one distinguishing factor for being classified as an institutional or residential occupancy.

The term Group R refers collectively to the four individual residential occupancy classifications: Groups R-1, R-2, R-3 and R-4. These classifications are differentiated in the code based on the following criteria: 1. Whether the occupants are transient or nontransient in nature; 2. The type and number of dwelling units or sleeping units contained in a single building; and 3. The number of occupants in the facility.

310.2 Definitions. The following terms are defined in Chapter 2:

BOARDING HOUSE.

CONGREGATE LIVING FACILITIES.

DORMITORY.

GROUP HOME.

GUEST ROOM.

LODGING HOUSE.

PERSONAL CARE SERVICE.

TRANSIENT.

❖ This section lists terms that are specifically associated with the subject matter of this section. It is important to emphasize that these terms are not exclusively related to this section but may or may not also be applicable where the term is used elsewhere in the code.

Definitions of terms can help in the understanding and application of the code requirements. The purpose for including a list within this chapter is to provide more convenient access to terms which may have a specific or limited application within this chapter. For the complete definition and associated commentary, refer back to Chapter 2. Terms that are italicized provide a visual identification throughout the code that a definition exists for that term. The use and

application of all defined terms are set forth in Section 201.

310.3 Residential Group R-1. Residential Group R-1 occupancies containing *sleeping units* where the occupants are primarily *transient* in nature, including:

Boarding houses (transient) with more than 10 occupants
Congregate living facilities (transient) with more than 10 occupants

Hotels (*transient*)

Motels (*transient*)

❖ The key characteristic of Group R-1 that differentiates it from other Group R occupancies is that the occupants are considered transient in nature (i.e., those whose length of stay is not more than 30 days). There is an expectation that the occupants are not as familiar with the building as those residents in nontransient facilities such as apartment buildings and single-family dwellings. If occupants are unfamiliar with their surroundings, they may not recognize potential hazards or be able to use the means of egress effectively.

The most common building types classified in Group R-1 are hotels, motels and boarding houses. Facilities classified as Group R-1 occupancies may include dwelling units, sleeping units, or a combination of both. Group R-1 occupancies do not typically have cooking facilities in the unit. When a unit is not equipped with cooking facilities, it does not meet the definition of a "dwelling unit" in Section 202. When this occurs, such units are treated as sleeping units for the application of code provisions (see Commentary Figure 310.3). A recent trend in development is the construction of "extended-stay hotels." While these units may have all of the characteristics of a typical dwelling unit (i.e., cooking, living, sleeping, eating, sanitation), the length of stay is still typically not more than 30 days. As such, these buildings would still be classified as Group R-1. If the length of stay is more than 30 days, these buildings would be classified as Group R-2. If a hotel offers rooms for short-term housing (i.e., more than 30 days), the facility must comply with the provisions for both Groups R-1 and R-2 (see Section 302.1).

Other occupancies are often found in buildings classified in Group R-1. These occupancies include nightclubs (Group A-2), restaurants (Group A-2), gift shops (Group M), business offices (Group B), health clubs (Group A-3) and storage facilities (Group S-1). When this occurs, the building is a mixed occupancy and is subject to the provisions of Section 508.

Transient congregate living facilities and boarding houses with 10 or fewer occupants can be constructed to the standards of Group R-3 occupancies rather than the general category of Group R-1. The primary intent of this provision is to permit bed-and-breakfast-type facilities to be established in existing single-family (one-family) structures. In comparison to the provision under Group R-2 which permits congregate living facilities with fewer than 16 nontransient

Bibliography: 2015 IBC Code and Commentary, Volume 1, International Code Council, 2015, pg. 3-37.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This is a clarification which will not affect construction cost.

Public Hearing Results

Errata: The image in the reason statement was improved.

Committee Action:

As Submitted

Committee Reason: Clarifies that dwelling units used as transient lodging such as short term rentals through systems such as Air B & B should also be classified as Group R-1.. (Vote: 10-4)

Assembly Action:

None

G21-18

Individual Consideration Agenda

Public Comment 1:

Proponent: David Collins, representing The American Institute of Architects (dcollins@preview-group.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

310.2 Residential Group R-1. Residential Group ~~Units not used primarily as permanent residences.~~ R-1 occupancies ~~containing typically will include sleeping units but also include dwelling units when those units are not used primarily as permanent residences, or more than two dwelling units where the occupants are primarily transient in nature,~~ including:

- ~~Boarding houses (transient) with more than 10 occupants~~
- ~~Congregate living facilities (transient) with more than 10 occupants~~
- ~~Hotels (transient)~~
- ~~Motels (transient)~~

310.2.1 Vacation Rental (Cabin, Cottage, Bungalow, Chalet) (Transient). Group R-1 vacation rentals shall be permitted to comply with the construction requirements of the International Residential Code where:

1. The building is composed of a single dwelling unit;
2. The building is occupied by a family or no more than 10 unrelated adults;
3. The building has two exits directly to the exterior at the level of exit discharge; and,
4. The building is located to maintain a minimum fire separation distance of thirty feet.

Commenter's Reason: The Ohio Board of Building Standards has been struggling with the question of various types of facilities that are not clearly identified in the IBC. To better classify the R-1 group, the recommended language was inserted into the IBC to address dwelling units that are not "primarily a permanent residence." A new section for vacation rental units which are transient was also added and criteria put in place that allow them to be constructed per the residential code if it is a single dwelling unit, the occupant load is limited, there are two exits on the level of exit discharge, and the minimum fire separation distance of 30 feet is maintained.

This should clarify how many properties that are rented out on a regular basis, having all the standard features of a home would be regulated under the IBC.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Many questions arise regarding how these specific facilities are to be treated. By this change the code will be clearer and more easily applied.

Public Comment 2:

Proponent: Andrew Klein, representing Lyric, Apartment Jet, National Multifamily Housing Council, Vacation Rental Management Association, Vacasa, Stay Alfred, The Guild, & WhyHotel (andrew@asklein.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

310.2 Residential Group R-1. Residential Group R-1 occupancies containing *sleeping units* or ~~more than two~~ dwelling units where the occupants are primarily *transient* in nature, including:

Apartment houses where 50% or more of the units house occupants who are primarily transient in nature
Boarding houses (*transient*) with more than 10 occupants
Congregate living facilities (*transient*) with more than 10 occupants
Hotels (*transient*)
Motels (*transient*)

310.3 Residential Group R-2. Residential Group R-2 occupancies containing *sleeping units* or more than two *dwelling units* where the occupants are primarily permanent in nature, including:

Apartment houses where fewer than 50% of the units house occupants who are primarily transient in nature
Congregate living facilities (nontransient) with more than 16 occupants

Boarding houses (nontransient)
Convents
Dormitories
Fraternities and sororities
Monasteries

Hotels (nontransient)
Live/work units
Motels (nontransient)
Vacation timeshare properties

Commenter's Reason: This original Proposal, as well as this Public Comment, aim to codify the occupancy classification of multifamily apartment and condominium buildings where some units are made available for rent on a short-term basis through companies like Airbnb, VRBO, HomeAway, WhyHotel, Lyric and others. The original proposal was unenforceable and strayed from the intent of the Code.

The distinction between Group R-1 and R-2 occupancies deals with the level of risk associated with an occupant's level of familiarity with a building. Users of Airbnb type companies expect an at-home environment and are therefore accustomed to the features of the building in which they are renting a unit.

Residential condominiums are treated by the Code the same as multifamily apartments (Group R-2). Individual dwelling units in a Group R-2 occupancy could either be rented by tenants or owned by the occupants--the Code does not make a distinction between either type of tenancy. Furthermore, Section 310.4 also specifically lists vacation timeshare properties as a Group R-2 occupancy with no distinction based on actual rental time. The reason for this is that dwelling units in such buildings are intended to be a place of abode. Fair housing regulations do not include a 30-day criteria for transient/nontransient, similar to what has been traditionally used by the building codes (see the commentary to the definition of INTENDED TO BE OCCUPIED AS A RESIDENCE in the IBC); therefore, beach homes, timeshares and extended stay hotels are classified as R-2.

A building which essentially looks and functions as a multifamily Group R-2 occupancy does not warrant a change of occupancy to a Group R-1 if fewer than 50% of the dwelling units are made available on a short-term basis. This Public Comment adds much needed clarity to the Code so that the Code Official can determine at what point a change of occupancy is warranted for apartment buildings and condominiums where units are made available for rent on short-term bases.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The language codified by this Public Comment is consistent with most code interpretations.

G21-18

G28-18

IBC: [F] 403.3.2; IFC: 914.3.1.2

Proposed Change as Submitted

Proponent: Stephen DiGiovanni, representing ICC Ad Hoc Committee on Tall Wood Buildings (TWB) (TWB@iccsafe.org)

THIS CODE CHANGE PROPOSAL WILL BE HEARD BY THE IFC COMMITTEE. PLEASE CONSULT THE AGENDA FOR THE IFC COMMITTEE.

2018 International Building Code

Revise as follows

[F] 403.3.2 Water supply to required fire pumps. In all buildings that are more than 420 feet (128 m) in building height, and buildings of Type IVA and IVB construction that are more than 120 feet in building height, required fire pumps shall be supplied by connections to not fewer than two water mains located in different streets. Separate supply piping shall be provided between each connection to the water main and the pumps. Each connection and the supply piping between the connection and the pumps shall be sized to supply the flow and pressure required for the pumps to operate.

Exception: Two connections to the same main shall be permitted provided that the main is valved such that an interruption can be isolated so that the water supply will continue without interruption through not fewer than one of the connections.

2018 International Fire Code

914.3.1.2 Water supply to required fire pumps. In all buildings that are more than 420 feet (128 m) in building height, and buildings of Type IVA and IVB construction that are more than 120 feet in building height, required fire pumps shall be supplied by connections to not fewer than two water mains located in different streets. Separate supply piping shall be provided between each connection to the water main and the pumps. Each connection and the supply piping between the connection and the pumps shall be sized to supply the flow and pressure required for the pumps to operate.

Exception: Two connections to the same main shall be permitted provided that the main is valved such that an interruption can be isolated so that the water supply will continue without interruption through not fewer than one of the connections.

Reason: The Ad Hoc Committee on Tall Wood Buildings (TWB) was created by the ICC Board to explore the science of tall wood buildings and take action on developing code changes for tall wood buildings. The TWB has created several code change proposals with respect to the concept of tall buildings of mass timber and the background information is at the end of this Statement. Within the statement are important links to information, including documents and videos, used in the deliberations which resulted in these proposals.

The Ad Hoc Committee has discussed a number of proposals to potentially increase the permitted height and area for Type IV structures, specifically mass timber buildings adding additional Types IVA, IVB & IVC. One of the basic requirements incorporated into these proposed increased heights and areas is the added active and passive protection features to these structures.

The Code Technology Committee, in response to the events of September 11, 2001, submitted proposals for water supply to super high-rise buildings of 420' and higher. This requirement was adopted due to the recognized importance of insuring a continuous water supply to the active fire protection systems in the event of a fire in these structures. This recommendation was highlighted in the National Institute of Standards and Technology's (NIST) report on the structural collapses on September 11th.

This code change proposal brings this same concept to Type IV structures of 120' and higher. This added protection feature would be unique to Type IVA and IVB construction (as proposed in a related code change - see table below) due to the potential contribution of the mass timber to the fuel load in the event of a fire. Due to the limitations of fire service aerial apparatus' ability to apply water to elevated floors the Ad Hoc Committee felt 120' was an appropriate height to initiate the requirement. Another consideration is that currently the code permits structures up to 85' so the committee identified the next level within the codes for additional requirements. Considerations were also given to the difficulty of fire service companies accessing elevated floors under fire conditions.

The Ad Hoc Committee has proposed greater permitted heights and areas of mass timber construction than those contained in the 2018 IBC. The Ad Hoc believes this code change proposal is an important component to these proposed increased heights and areas. If the permitted heights and areas of mass timber construction are raised it is imperative

we adopt related code change proposals to insure the reliable performance of active and passive protection features to insure the safety of occupants and responding fire fighters.

Background information: The ICC Board approved the establishment of an ad hoc committee for tall wood buildings in December of 2015. The purpose of the ad hoc committee is to explore the science of tall wood buildings and to investigate the feasibility and take action on developing code changes for tall wood buildings. The committee is comprised of a balance of stakeholders with additional opportunities for interested parties to participate in the four Work Groups established by the ad hoc committee, namely: Code; Fire; Standards/Definitions; and Structural. For more information, be sure to visit the ICC website <https://www.iccsafe.org/codes-tech-support/cs/icc-ad-hoc-committee-on-tall-wood-buildings/> (link active and up to date as of 12/27/17). As seen in the "Meeting Minutes and Documents" and "Resource Documents" sections of the committee web page, the ad hoc committee reviewed a substantial amount of information in order to provide technical justification for code proposals.

The ad hoc committee developed proposals for the followings code sections. The committee believes this package of code changes will result in regulations that adequately address the fire and life safety issues of tall mass timber buildings.

IBC Code Section	Description
403.3.2	Water supply requirements for fire pumps in high rise buildings of Type IVA and IVB construction.
504.3	Allowable building height (feet) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT construction.
504.4	Allowable building height (stories) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
506.2	Allowable building area for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
508.4.4.1 509.4.1.1 (new)	Requirements for mass timber building elements serving as fire barriers or horizontal assemblies in buildings of Type IVB or IVC construction.
602.4	Type of Construction requirements for new proposed types of construction: Types IVA, IVB and IVC. No changes to Type IV HT construction. Includes definitions for new terms: Mass timber and Noncombustible protection (mass timber). THIS IS THE KEY CODE CHANGE PROPOSAL WHICH OUTLINES THE CONSTRUCTION REQUIREMENTS FOR THE PROPOSED NEW TYPE OF MASS TIMBER BUILDINGS. THE PROPOSAL ALSO ADDRESSES CONCEALED SPACES, ADHESIVE PERFORMANCE AND EXTERIOR WALL PROTECTION.
703.8 (new)	The performance method to determine the increase to the fire resistance rating provided by noncombustible protection applied to the mass timber building element.
703.9 (new)	Requirements for sealants and adhesives to be placed at abutting edges and intersections of mass timber building elements. The reason statement references a Group B proposal to Chapter 17 for special inspection requirements of sealants and adhesives.
718.2.1	Requirements on the use of mass timber building elements used for Fireblocking.
722.7 (new)	Requirements for the fire resistance rating of mass timber elements, including minimum required protection and gypsum board attachment requirements.
3102	Requirements for membrane structures using Type IV HT construction.
3314.7 (new)	New special precautions during construction of buildings of Types IVA, IVB and IVC construction: Standpipes; Water supply for fire department connections; Noncombustible protection required for mass timber elements as construction height increases.
Appendix	Requirements for walls, floors and roofs of Type IV HT construction in buildings located in Fire Districts.
IFC Code Section	Description
701.6	Requirements which stipulate the owner's responsibility to maintain inventory of all required fire resistance rated construction in buildings of Types IVA and IVB construction. This includes an annual inspection and proper repair where necessary.
Proposed changes to be submitted in 2019 Group B	
IBC Chapter 17	Required special inspections of mass timber construction <ul style="list-style-type: none"> • Structural • Sealants and adhesives (see IBC 703.8)
IBC Chapter 23	An update to referenced standard APA PRG 320 Standard for Performance –rated Cross-laminated Timber which is currently undergoing revision to ensure the adequacy of the adhesives under fire conditions.

In addition, fire tests designed to simulate the three new construction types (Types IVA, IVB and IVC) in the ad hoc committee proposals were conducted at the Alcohol Tobacco and Firearms test lab facility. The TWB was involved in the design of the tests, and many members witnessed the test in person or online. The results of the series of 5 fire tests provide additional support for these proposals, and validate the fire performance for each of the types of construction proposed by the committee. The fire tests consisted of one-bedroom apartments on two levels, with both apartments having a corridor leading to a stair. The purpose of the tests was to address the contribution of mass timber to a fire, the performance of connections, the performance of through-penetration fire stops, and to evaluate conditions for responding fire personnel.

To review a summary of the fire tests, please visit:

<http://bit.ly/ATF-firetestreport>

To watch summary videos of the fire tests, which are accelerated to run in 3 ½ minutes, please visit:

<http://bit.ly/ATF-firetestvideos>

Both of these links were confirmed active on 12/27/17.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This section provides information that was not previously set forth in the code, and does not change the requirements of current code, thus there is no cost impact when compared with present requirements.

G28-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval is based upon the proponent's published reason. (Vote: 14-0)

Assembly Action:

None

G28-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Dan Nichols, representing ICC Code Correlation Committee (ccc@iccsafe.org).

Commenter's Reason: The Code Correlation Committee (CCC) is not taking a position on this code change. The CCC submitted this public comment in order to bring a correlation issue to the attention of the full voting membership for the Public Comment Hearings and the Online Governmental Consensus Vote to allow the voting membership to coordinate actions on a package of code changes submitted dealing with tall wood buildings of mass timber construction. This package includes the parent proposal G108-18; if disapproved, the related proposals G28-18, G75-18, G80-18, G84-18, G89-18, FS5-18, FS6-18, FS73-18, FS81-18 and F266-18, will not be correlated with any existing code text if they are approved.

The Code Correlation Committee is a standing committee of the International Code Council whose objectives, procedures and organization are set forth in Council Policy CP#44-13. The objective of the Code Correlation Committee is to maintain technical and editorial consistency among the International Codes and to assist staff in the evaluation and processing of code change proposals and comments that are exclusively editorial.

G28-18

G32-18

IBC: 404.5

Proposed Change as Submitted

Proponent: Sarah Rice, representing Myself (srice@preview-group.com)

2018 International Building Code

Revise as follows

404.5 Smoke control. A smoke control system shall be installed in accordance with Section 909.

Exception-Exceptions:

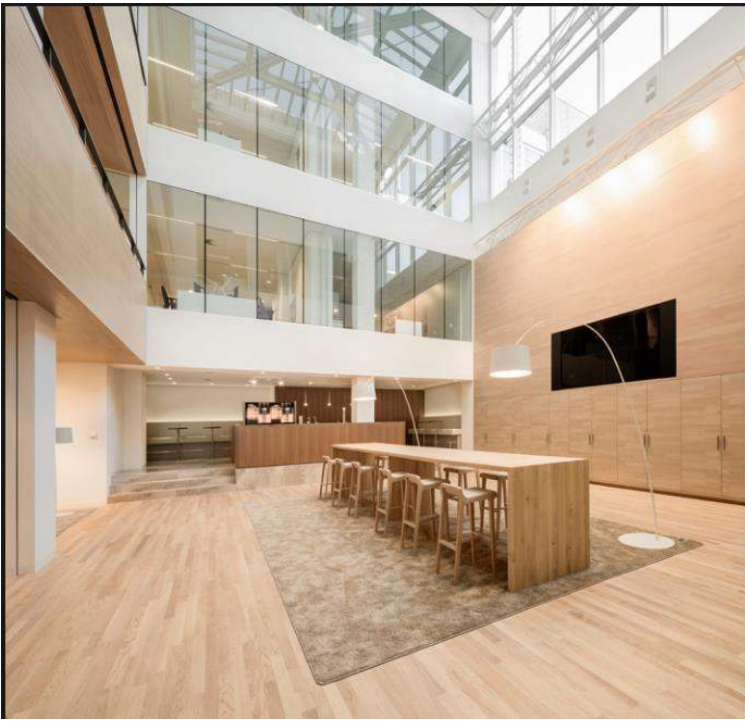
1. In other than Group I-2, and Group I-1, Condition 2, smoke control is not required for *atriums* that connect only two stories.
2. A smoke control system is not required for atriums connecting more than two stories when all of the following are met:
 - 2.1. Only the 2 lowest stories shall be permitted to be open to the atrium.
 - 2.2. All stories above the lowest 2 stories shall be separated from the atrium in accordance with Section 404.6.

Reason: As stated in Section 909, the purpose of a smoke control systems is to provide a tenable environment for the evacuation or relocation of occupants. A smoke control system is NOT intended for the preservation of contents, the timely restoration of operations or for assistance in fire suppression or overhaul activities. Smoke control systems that are required and regulated by the IBC serve a different purpose than the smoke- and heat-venting provisions found in Section 910 and they are not considered exhaust systems under Chapter 5 of the International Mechanical Code. In an atrium that connects more than 2 stories, the smoke control systems is intended to maintained the height of the lowest horizontal surface of the smoke layer interface to at least 6 feet above any walking surface that forms a portion of a required egress system within the smoke zone for a period of not less than either 20 minutes or 1.5 times the calculated egress time, whichever is less.

But what if the only walking surfaces in the atrium are on the 2 lowest stories of the atrium? What if all the walls above the 2 lowest stories are solid without operable openings? What purpose does the smoke control system then serve? We contend none. And if the smoke control system has no real value, then why install it? See Figures 1 - 3 for examples of these spaces.

This proposed change seeks to exempt atriums that connect more than 2 stories from having to have a smoke control system when 1) there are no walking surfaces in the atrium above the 2 lowest stories and 2) there are no operable windows or doors above the 2 lowest stories in the atrium and 3) the walls of the atrium on the upper levels are constructed per Section 404.6 - atrium enclosures..





Cost Impact: The code change proposal will decrease the cost of construction
The cost savings of not providing smoke control system in a building with an atrium will decrease the cost of construction.

G32-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: Modify proposal as follows:
404.5 Smoke control.

A smoke control system shall be installed in accordance with Section 909.

Exceptions:

1. In other than Group I-2, and Group I-1, Condition 2, smoke control is not required for atriums that connect only two stories.
2. A smoke control system is not required for atriums connecting more than two stories when all of the following are met:
 - 2.1. Only the 2 lowest stories shall be permitted to be open to the atrium.
 - 2.2. All stories above the lowest 2 stories shall be separated from the atrium in accordance with ~~Section 404.6~~ the provision for a shaft in Section 713.4.

Committee Reason: Clarifies that the code allows a combination of an atrium with a shaft enclosure. The exception provides an alternative where a natural smoke sink is provided. The modification clarifies that the extension of the atrium needs to meet shaft construction requirements. The proposal doesn't redefine atrium, but replaces smoke control with a natural sink. The proponent may wish to consider via a public comment addressing a hatch or similar means to vent smoke at the top of the shaft. (Vote: 12-2)

Assembly Action:

None

G32-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Dustin Wakefield, representing Bureau of Capital Outlay Management (dustin.wakefield@dgs.virginia.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

404.5 Smoke control. A smoke control system shall be installed in accordance with Section 909.

Exceptions:

1. In other than Group I-2, and Group I-1, Condition 2, smoke control is not required for *atriums* that connect only two stories.
2. A smoke control system is not required for atriums connecting more than two stories when all of the following are met:
 - 2.1. Only the 2 lowest stories shall be permitted to be open to the atrium.
 - 2.2. All stories above the lowest 2 stories shall be separated from the atrium in accordance with ~~the provision~~ the provisions for a shaft in Section ~~713.4~~ 713. The rating of such shaft construction shall be equal to the rating of the floor assembly as required in Table 601 or the provisions of 713.4, whichever is greater. Openings and penetrations in the shaft construction shall be limited to those necessary for the purpose of the shaft.

Commenter's Reason: This modification is necessary to clarify that the intent of this provision is to effectively "turn up" the rated floor assemblies beginning at the floor above the bottom two interconnected levels, thereby creating a "high bay" space with no interconnection of stories above this point. As such, the revised text indicates that the minimum hourly rating of the shaft enclosure is either the rating of the floor, or the provisions of 713.4 for fire-resistance rating of shafts (depending on the number of stories connected).

With the originally proposed modification, there could be cases where 2-hour floors are required, such as in Type I construction, and only two or three additional floors are interconnected above the bottom two levels. This would result in a 1-hour separation for the shaft, which is insufficient based on the intent described above.

Furthermore, this modification brings into play the other shaft provisions of 713, including prohibited openings and penetrations. It is important that these are limited to those items that are necessary for the purpose of the shaft. In this case, this would account for egress doors into the atrium from the upper floor levels as well as penetrations for conduits, sprinklers, etc. that serve the atrium.

Bibliography: There are no applicable external references for this proposed modification.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. Any cost increase associated with this proposed modification is anticipated to be minimal. The increase would be due to the increase from 1-hour shaft construction to 2-hour shaft construction in certain scenarios in Type 1 construction or where floors are required to be rated for 2 hours for other reasons, such as occupancy separation. There could also be ancillary cost increases due to re-routing of various MEP infrastructure that are not permitted to penetrate into the shaft enclosure.

The alternative is always to provide a smoke control system, which would typically overshadow any of the miscellaneous increases in shaft wall construction cost or utility coordination.

G32-18

G34-18

IBC: 202, (New), 404.6, 716.4 (New), 716.4.1 (New), 716.4.2 (New), 716.4.3 (New), Chapter 35

Proposed Change as Submitted

Proponent: Tessa Quinones, The Hickman Group, representing Smoke Guard (admin@thehickmangroup.com)

THIS CODE CHANGE WILL BE HEARD BY THE IBC FIRE SAFETY COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE

2018 International Building Code

SECTION 202 DEFINITIONS

FIRE PROTECTIVE CURTAIN ASSEMBLY. An assembly consisting of a fabric curtain, bottom bar, guides, coil, operating, and closing system.

404.6 Enclosure of atriums. Atrium spaces shall be separated from adjacent spaces by a 1-hour *fire barrier* constructed in accordance with Section 707 or a *horizontal assembly* constructed in accordance with Section 711, or both.

Exceptions:

1. A *fire barrier* is not required where a glass wall forming a smoke partition or a 20-minute fire protective curtain assembly is provided. The glass wall or fire protective curtain assembly shall comply with all of the following:
 - 1.1. Automatic sprinklers are provided along both sides of the separation wall, fire protective curtain assembly and doors, or on the room side only if there is not a walkway on the *atrium* side. The sprinklers shall be located between 4 inches and 12 inches (102 mm and 305 mm) away from the glass and at intervals along the glass or fire protective curtain assembly not greater than 6 feet (1829 mm). The sprinkler system shall be designed so that the entire surface of the glass or fire protective curtain assembly is wet upon activation of the sprinkler system without obstruction;
 - 1.2. The glass wall shall be installed in a gasketed frame in a manner that the framing system deflects without breaking (loading) the glass before the sprinkler system operates; and
 - 1.3. The fire protective curtain assembly shall be installed in accordance with Section 716.4 and shall be actuated in conjunction with the atrium smoke control system, and
 - ~~1.3-1.4.~~ Where glass doors are provided in the glass wall, they shall be either *self-closing* or automatic-closing.
2. A *fire barrier* is not required where a glass-block wall assembly complying with Section 2110 and having a $\frac{3}{4}$ -hour *fire protection rating* is provided.
3. A *fire barrier* is not required between the *atrium* and the adjoining spaces of up to three floors of the *atrium* provided that such spaces are accounted for in the design of the smoke control system.
4. A *fire barrier* is not required between the atrium and the adjoining spaces where the atrium is not required to be provided with a smoke control system.

Add new text as follows

716.4 Fire protective curtain assembly. Approved fire protective curtain assemblies shall be constructed of any materials or assembly of component materials tested without hose stream in accordance with UL 10D, and shall comply with the Sections 716.4.1 through 716.4.3

716.4.1 Label. Fire protective curtain assemblies used as opening protectives in fire rated walls and smoke partitions shall be labeled in accordance with Section 716.2.9.

716.4.2 Smoke and draft control. Fire protective curtain assemblies used to protect openings where smoke and draft control assemblies are required shall comply with Section 716.2.1.4.

716.4.3 Installation. Fire protective curtain assemblies shall be installed in accordance with NFPA 80.

Add new standard(s) follows

10D-14:

Standard for Fire Tests of Fire Protective Curtain Assemblies

Reason: During the last cycle, FS 102-15 was disapproved at least in part on the proposed use of fabric fire protective curtain assemblies as an opening protective having a one-hour fire protection rating and to replace one hour fire barriers. This proposal allows the use of a 20-minute fire protective curtain assembly as an alternative to a non-rated glass wall when protected with sprinklers for the enclosure of an atrium. In addition, the proposal allows fire protective curtain assemblies as an opening protective as permitted by other sections of the IBC.

Both of these applications are consistent with the scope of UL 10D which reads:

These requirements cover the evaluation of fire protective curtain assemblies intended to provide supplemental passive fire protection as part of an engineered fire protection system. Fire protective curtain assemblies provide nonstructural separation only, and are not intended to be substituted for structural hourly rated partitions or opening protectives that have been tested for fire endurance and hose stream performance.

The proposed definition and uses are consistent with NFPA 80-2016 and UL 10D. Some products can also pass UL 1784 for an "S" label.

The proposed requirement that the assembly be "approved" in addition to "listed" allows the Code Official to specifically approve the proposed application.

Cost Impact: The code change proposal will not increase or decrease the cost of construction

The use of the fire protective curtain assembly is an option and as such, atria enclosures can continue to be constructed as currently permitted.

Analysis: A review of the standard proposed for inclusion in the code, UL 10D-14, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

G34-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 404.6 Enclosure of atriums.

Atrium spaces shall be separated from adjacent spaces by a 1-hour fire barrier constructed in accordance with Section 707 or a horizontal assembly constructed in accordance with Section 711, or both.

Exceptions:

1. A fire barrier is not required where a glass wall forming a smoke partition ~~or a 20-minute fire protective curtain assembly~~ is provided. The glass wall ~~or fire protective curtain assembly~~ shall comply with all of the following:
 - 1.1. Automatic sprinklers are provided along both sides of the separation wall, ~~fire protective curtain assembly~~ and doors, or on the room side only if there is not a walkway on the atrium side. The sprinklers shall be located between 4 inches and 12 inches (102 mm and 305 mm) away from the glass and at intervals along the glass ~~or fire protective curtain assembly~~ not greater than 6 feet (1829 mm). The sprinkler system shall be designed so that the entire surface of the glass ~~or fire protective curtain assembly~~ is wet upon activation of the sprinkler system without obstruction;
 - 1.2. The glass wall shall be installed in a gasketed frame in a manner that the framing system deflects without breaking (loading) the glass before the sprinkler system operates; and
 - ~~1.3. The fire protective curtain assembly shall be installed in accordance with Section 716.4 and shall be actuated in conjunction with the atrium smoke control system, and~~
 - ~~1.4. 1.3~~ Where glass doors are provided in the glass wall, they shall be either self-closing or automatic-closing.
2. A fire barrier is not required where a glass-block wall assembly complying with Section 2110 and having a ³/₄-hour fire protection rating is provided.
3. A fire barrier is not required between the atrium and the adjoining spaces of up to three floors of the atrium provided that such spaces are accounted for in the design of the smoke control system.
4. A fire barrier is not required between the atrium and the adjoining spaces where the atrium is not required to be provided with a smoke control system.

Chapter 35- UL

10D-14 17:

Standard for Fire Tests of Fire Protective Curtain Assemblies

Committee Reason: The proposal is a simplified version (after the modification) of the original. The products have been used for years through the alternative methods process, they should be recognized in the code. (Vote: 8-6)

Assembly Action:

None

G34-18

Individual Consideration Agenda

Public Comment 1:

Proponent: David Dodge, representing McKeon Door Company (ddodge@mckeondoor.com) requests Disapprove.

Commenter's Reason: In the committee action hearings this code change was approved as modified. However, the modification did not adequately address all concerns from both the committee and the assembly. The final committee vote was a marginal AM, 8-6. While it may be considered helpful to have something in the code regarding fire and smoke rated fabric assemblies, this code change is not yet ready for final approval and publication due to the following reasons: One of the most common architectural design uses of this new technology, fire and smoke rated fabrics, is to separate vertical spaces horizontally into two-story spaces taking advantage of the exception in 404.5 eliminating the need for smoke evacuation systems in the atrium when the vertical space is limited to two floors only. UL10D, Fire Tests of Fire-Protective Curtain Assemblies was submitted as part of this code change. A representative from UL testified that UL10D is nothing more than UL10C without the hose-stream requirement, see G34-18 CAH video segment: <http://hearingvideos.iccsafe.org/videos/g34-18/>

1. Our current code addresses horizontal applications either as fixed structural floor assemblies or opening protectives within fixed structural floor assemblies as floor fire door assemblies that comply with NFPA 288. The scope of UL10D limits Fire-Protective Curtains to rated applications no greater than 20 minutes. The code change, as currently written could be misinterpreted to allow UL10D as justification for acceptance of NFPA 288 criteria.

2. The new 716.4 language and the new 202 definition language contradict each other.

3. The new language as submitted, 716.4.2, suggests these opening protectives can be used in any fire rated wall.

By disapproving this code change, the proponents can come back in the next cycle with a clean-up of these issues and eliminate the possibility of mis-applications of this new technology in the future.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

G34-18

G35-18

IBC: 404.10.1

Proposed Change as Submitted

Proponent: David Collins, representing The American Institute of Architects (dcollins@preview-group.com)

THIS CODE CHANGE WILL BE HEARD BY THE MEANS OF EGRESS COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

2018 International Building Code

Add new text as follows

404.10.1 Exit stairs in an atrium. Where an atrium contains an interior exit stairway all the following shall be met:

1. The exit stair shall have access from a minimum of two directions.
2. The distance between an exit stair in an atrium, and a minimum of one exit stair enclosed in accordance with Section 1023.2 shall comply with Section 1007.1.1.
3. Exit access travel distance within the atrium shall be measured to the nosing of the landing at the top of the stair on each level served.
4. At least one exit shall not be located in the same atrium.

Reason: An exit stair is currently permitted to be in an atrium enclosure by IBC Sections 2023.1 and 1023.2, which allows enclosure per Section 404.6. These new provisions for the conditions for use of an atrium for an exit stair adds four specific criteria for their use as an exit.

Provision 1 - Accessed from two directions

This means that the exit stair in the atrium must have two paths of travel to allow the occupants to pass by the stair.

Provision 2 - Separation distance

To make it clear that the exit stair in the atrium must be separated from at least one other exit stair meeting IBC Section 1023.2 by the minimum separation distance prescribed in Section 1007.1.1.

Provision 3 - Travel distance

The travel distance within the atrium to the exit stair in the atrium is to be measured to the nosing at the level the stair is serving.

Provision 4 - At least one exit is not in the atrium.

Requires that at least one exit is not permitted to be in the same atrium. The current provisions of Section 404.10 prohibit more than 50% of exit stairs from egressing through the atrium at the level of exit discharge.

Cost Impact: The code change proposal will decrease the cost of construction. This change will facilitate design decisions, reduce the number of required exit enclosures in buildings with an atrium and help with review and approval, reducing the cost of construction.

G35-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This proposal was approved because current Section 1023.2 already allows for a stairway within an atrium to be considered an exit stairway. This language in Items 2 and 3 would clarify that the exit access travel distance and exit separation requirements is measured to the top of the stairway. While the language in Item 1 for two directions could be subject to interpretation, Items 1 and 4 do further limit where a stairway in an atrium can serve as an exit, so this would improve safety. (Vote: 8-7)

Assembly Action:

None

G35-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ed Kulik, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

404.9 Exit access travel distance. Exit access travel distance for areas open to an atrium shall comply with the requirements of this section.

404.10.1 Exit stairs-stairways in an atrium. Where an atrium contains an interior exit stairway all the following shall be met:

1. The ~~exit stair~~ entry to the exit stairway is the edge of the closest riser of the exit stairway.
2. The entry of the exit stairway shall have access from a minimum of two directions.
3. The distance between the entry to an exit stair-stairway in an atrium, and the entrance to a minimum of one exit stair-stairway enclosed in accordance with Section 1023.2 shall comply with the separation in Section 1007.1.1.
4. Exit access travel distance within the atrium shall be measured to the nosing ~~closest riser of the landing at the top of the stair on each level served~~ exit stairway.
5. ~~At least one exit shall not~~ Not more than 50 percent of the exit stairways shall be located in the same atrium.

404.10.11 Interior exit stairways discharge. Not greater than 50 percent of interior exit stairways are permitted to egress through an atrium on the level of exit discharge in accordance with Section 1028.

Commenter's Reason: Open stairways in an atrium are permitted to be exit stairways per Section 1023.2 Exception 2. This proposal added additional criteria for that exit stairway. This modification does not change that allowance. This section is not placed correctly. Current Section 404.10 is for exit discharge - thus the suggested title change for clarification. This new section deals with an exit stairway. Therefore, this should not be a subset of exit discharge through the lobby. This new section should be between exit access and exit discharge sections. The renumbering fixes this.

The correct term is exit stairway, not exit stair - this is revised in the title and the Items.

It is important to clarify that dispersion, separation and travel distance is to the entry/closest riser of the open stairway in the atrium and the entrance to the exit stairway, not the stairway itself or the enclosure. This is the reason for the added Item 1 and revisions to Items 2, 3 and 4.

In Item 4, the language for measurement of the travel distance in Item 4 should match use the same terminology for other open exit stairways in the exception in Section 1017.3. The phrase "on each level served" is redundant.

In Item 5, the proposed language is consistent with exit discharge allowances in Section 1028 - the current language would allow more than 50%.

This public comment is submitted by the ICC BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions there of. In 2017 and 2018 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes and public comments. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The modification is a clarification of the approved text and will have no changes in construction requirements. The original proposal provided guidance on how an exit stairway within an atrium should comply with exit access travel distance and separation. The new item 5 is consistent with the exit discharge allowances. Since there was already an allowance for no enclosure in Section 1023.2 Exception 2, the original proposal is not a decrease in cost of construction.

G35-18

G37-18

IBC: Table TABLE 406.5.4

Proposed Change as Submitted

Proponent: Stephen Skalko, Stephen V. Skalko, P.E. & Associates, LLC, representing Stephen V. Skalko, P.E. & Associates, LLC (svskalko@svskalko-pe.com); Jason Krohn, representing Precast/Prestressed Concrete Institute (jkrohn@pci.org); William Hall, Portland Cement Association, representing Alliance For Concrete Codes and Standards (jhall@cement.org)

2018 International Building Code

Revise as follows

**TABLE 406.5.4
OPEN PARKING GARAGES AREA AND HEIGHT**

TYPE OF CONSTRUCTION	AREA PER TIER (square feet)	HEIGHT (in tiers)		
		Ramp access	Mechanical access	
			Automatic sprinkler system	
			No	Yes
IA	Unlimited	Unlimited	Unlimited	Unlimited
IB	Unlimited	12 tiers	12 tiers	18 tiers
IIA	50,000 75,000	10 tiers	10 tiers	15 tiers
IIB	50,000	8 tiers	8 tiers	12 tiers
IV	50,000	4 tiers	4 tiers	4 tiers

For SI: 1 square foot = 0.0929 m².

Reason: When the International Building Code (IBC) the drafting committees were developing the IBC, they commonly used the least stringent fire safety provisions from one of the legacy codes (i.e. BOCA National Building Code, Standard Building Code, Uniform Building Code) in establishing the requirements. However, for open parking garages the least stringent values in the Standard Building Code (SBC) were not used. The SBC permitted open parking structures of non-combustible construction with less fire resistance (i.e. SBC Type IV construction, IBC Type II construction) to be built up to 400,000 sqft in area per tier. This area value, which was placed in the SBC in the early 1980's, was based on the use of noncombustible materials for construction of the open parking structure, the open sided features for the parking structure which reduced the risk of adverse impact from vehicle fires and the documented low fire risk vehicles pose to the stability of open parking structures[1],[2].

Additional studies of fire experience in open parking structures in the United States since those earlier ones still supports the conclusion that vehicle fires pose a low risk of fire damage to the parking structure. The more recent analysis of parking garage structure fires (i.e. NFPA[3], Parking Market Research Company [4]) by the Fire Safety Committee of the Parking Consultants Council concluded that in about 98.7% of the fires no structural damage occurred due to the parking structure fires studied[5]. This suggests that the present values in Table 406.5.4 for Open Parking Garages of IBC Type II construction are more stringent than necessary based on the low risk of fire damage to the structural elements from vehicle fires and should be permitted to increase.

During the 2015 Group A cycle for code changes to the 2012 IBC, a similar code change was submitted by PCI for consideration (G101-15). The IBC General Code Committee recommended disapproval of the proposal at the code development hearing, suggesting there was merit to allow bigger open parking garages when constructed using buildings of fire resistive construction, however the table values proposed in G101-15 were considered too large. Based on that feedback PCI has modified the original proposal to reduce the area per tier permitted for Type IIA construction as reflected in this code change.

The area per tier proposed is based on a common open parking garage design utilizing a footprint of 240-feet X 315-feet (4 bays @ 60-ft/bay X 35 parking spaces @ 9-ft each), which totals 75,600 sf. The table value was rounded to 75,000 sf. This area per tier, based on 10 tiers, results in an aggregate parking area consistent with the aggregate allowable floor area for an enclosed sprinklered S-2 parking garage, per Tables 504.4 and 506.2.

Based on the low risk of vehicle fires and resulting damage, and the open sided features of these garages, this proposal will permit open parking garages of Type IIA construction to be built to areas like those permitted for sprinklered enclosed parking garages.

Cost Impact: The code change proposal will decrease the cost of construction. Permitting larger open parking garages of Type IIA construction will result in a reduction in cost without any compromise in fire safety through savings in material and construction methods required for open parking structures that would otherwise have to meet Type IB construction.

G37-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee was not convinced there was evidence which warranted this increase in size. Testimony of recent fire loss in an open parking garage prompts concern. Another change has been proposed to the fire code to sprinkler these open parking garages. It was suggested if the sprinkler requirement passes, then a public comment for approval of this item for the Richmond hearing may be appropriate. More information is needed to approve this increase at this time. (Vote: 10-4)

Assembly Action:

None

G37-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Stephen Skalko, Stephen V. Skalko, P.E. & Associates, LLC, representing Precast/Prestressed Concrete Institute (svskalko@svskalko-pe.com); Jason Krohn, Precast/Prestressed Concrete Institute, representing Precast/Prestressed Concrete Institute (jkrohn@pci.org); William Hall, Alliance for Concrete Codes and Standards, representing Alliance for Concrete Codes and Standards (jhall@cement.org) requests As Submitted.

Commenter's Reason: G37-18 should be Approved As Submitted since the technical information in the original reason statement supporting this proposal was not refuted during testimony at the Code Action Hearing (CAH). This proposal will allow an open parking garage of Type IIA construction, which has structural fire resistance of one-hour, to be built larger than an open parking garage constructed of Type IIB, which has no structural fire resistance. It appears the General Committee was reluctant to approve the proposal based on the evidence submitted after opposing testimony regarding a recent loss in an open parking garage raised concerns.

The recent fire loss in an open parking garage that the General Committee refers to in their reason for disapproval involves a fire incident that occurred in the UK at the first of 2018. All the details of this incident were not known at the time of the CAH. However, upon review of the final report by the Merseyside Fire and Rescue Service (MFRS), the parking garage in question, referred to as a car park in the UK, had design features less robust to the effects of fire and fire spread than the designs commonly followed in the United States [Merseyside Fire Rescue Service, *Kings Dock Car Park Fire Protection Report*, April 2018, Merseyside, UK].

The following are two of the most notable differences of these design features contributing to the spread of fire in the UK car park incident:

- ○ The car park had a light gauge aluminum floor drainage tray attached to the underside of, and in line with, the joints of the precast floor system. The trays lead to plastic vertical piping to transfer liquids to the building storm water drainage system. The design called for a 1/2-inch gap between floor panels to allow drainage into the aluminum tray below. This gap in the floor joints allowed burning fuel spills from vehicle gas tanks to flow directly to floors below allowing the fire to spread to vehicles on other floors.

In the United States the floor joints are not left open. They are typically sealed by a combination backer rod and sealant or covered by the placement of a concrete topping with tooled and sealed joints. This not only minimizes spread of fire to floors below by leaking fuels, but also inhibits the spread of flames from the incident floor to vehicles on floors above.

- ○ The building code requirements in the UK permitted only a 15-minutes structural fire resistance of the precast concrete floors for the Kings Dock car park. The fire exposure from the initial vehicle (and subsequent vehicles) damaged the underside of the floor panels above sufficient enough to permit the fire to extend upward to vehicles on the next parking level.

In the US the typical precast floor systems in open parking garages meets at least a minimum of a 1-hour fire resistance, which increases significantly the ability to prevent fire spread between floors.

A study of car park fires in the UK showed a total 3,096 fire incidences over a twelve-year period [BD2552 *Fire Spread in Car Parks*, Building Research Establishment for Department for Communities and Local Government, December 2010]. The average number of car park fires per year for that period was 258/year. This represents a very low number of incidences per year and thus low risk for fires in car parks. The experience with fire incidences in the US is also very low risk for this building occupancy type.

- ○ The US Fire Administration statistics show an average of over 1.7 million fires [FA-311, *Fire in the United States 1994-2004*, 14th edition, August 2007] for the period from 1999 to 2002. When compared to the average total parking garage fires described in the NFPA study cited in the original reason statement (1760 incidents), parking garage fires represent less than 0.1% of the fire incidences.
- ○ The Parking Market Research Company (PMRC) study referenced in the reason statement reached a similar conclusion on such low risk. That study looked at over 4,400 fire incidences for general vehicle parking including garages and surface lots with only 25% of these incidences in parking garages. During that same 3-year period approximately 7 million total fire incidences were reported. The parking garage fires for that 3-year period represent about 0.016% of the total fires.
- ○ The PMRC study also found that structural damage had not occurred in about 98.7% of open parking garage fires studied, which can be attributed to the excellent performance of open parking garages exposed to fire in the US.

Thus, except for that one unusual open parking garage fire incident in the UK, which had other mitigating circumstances contributing to fire spread, the data shows open parking garages to have a very low risk from vehicle fires. In addition, the design practices and features of open parking structures in the US, which minimize fire spread between floors and reasonably withstand the structural impact from fire effects, support allowing Type IIA garages to be built larger than those of Type IIB.

Recommend APPROVAL AS SUBMITTED for G37-18

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. Permitting larger open parking garages of Type IIA construction will result in a reduction in cost without any compromise in fire safety through savings in material and construction methods required for open parking structures that would otherwise have to meet Type IIB construction.

G37-18

G39-18

IBC: 202(New), 406.6.4(New), 406.6.4.1(New), 406.6.4.2(New), 406.6.4.3(New), 406.6.4.4(New), 406.6.4.5(New), TABLE 508.4; 903.2.10.2(New), TABLE 902.3.11.6 (IFC 202(New), 903.2.10.2(New), TABLE 902.3.11.6)

Proposed Change as Submitted

Proponent: James Carver, El Segundo Fire Department, representing El Segundo Fire Department (JCarver@elsegundo.org)

2018 International Building Code

SECTION 202 DEFINITIONS

Add new definition as follows

202 MECHANICAL-ACCESS ENCLOSED PARKING GARAGE An enclosed parking garage other than single car stacking systems which employs parking machines, lifts, elevators or other mechanical devices for vehicle moving from and to street level and in which public occupancy in the garage is prohibited in all areas except the vehicle access bay.

Add new text as follows

406.6.4 Mechanical-access garages. Mechanical-access enclosed parking garages shall be in accordance with Sections 406.6.4.1 through 406.6.4.5.

406.6.4.1 Separation. Mechanical-access enclosed parking garages shall be separated from other occupancies and accessory uses by not less than 2-hour fire barriers constructed in accordance with Section 707 or by not less than 2-hour horizontal assemblies constructed in accordance with Section 711, or both.

406.6.4.2 Smoke removal. A mechanical smoke removal system, in accordance with Section 910.4, shall be provided for all areas containing an enclosed mechanical-access parking garage.

406.6.4.3 Fire control equipment. The fire control equipment, consisting of the fire alarm control unit, mechanical ventilation controls and emergency shut down shall be provided in a room with exterior access. The room size and location shall be approved by the fire code official.

406.6.4.4 Firefighter access. Access doors shall be provided at the ground level for firefighter access as approved by the fire code official.

406.6.4.5 Emergency shutdown switch. A manually activated emergency shutdown switch shall be provided for use by emergency personnel.

Revise as follows

**TABLE 508.4
REQUIRED SEPARATION OF OCCUPANCIES (HOURS)^f**

OCCUPANCY	A, E		I-1 ^a , I-3, I-4		I-2		R ^a		F-2, S-2 ^b , U		B ^e , F-1, M, S-1		H-1		H-2		H-3, H-4		H-5	
	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS
A, E	N	N	1	2	2	NP	1	2	N	1	1	2	NP	NP	3	4	2	3	2	NP
I-1 ^a , I-3, I-4	—	—	N	N	2	NP	1	NP	1	2	1	2	NP	NP	3	NP	2	NP	2	NP
I-2	—	—	—	—	N	N	2	NP	2	NP	2	NP	NP	NP	3	NP	2	NP	2	NP
R ^a	—	—	—	—	—	—	N	N	1 ^c	2 ^c	1	2	NP	NP	3	NP	2	NP	2	NP
F-2, S-2 ^b , U	—	—	—	—	—	—	—	—	N	N	1	2	NP	NP	3	4	2	3	2	NP
B ^e , F-1, M, S-1	—	—	—	—	—	—	—	—	—	—	N	N	NP	NP	2	3	1	2	1	NP
H-1	—	—	—	—	—	—	—	—	—	—	—	—	N	NP	NP	NP	NP	NP	NP	NP
H-2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	N	NP	1	NP	1	NP
H-3, H-4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1 ^d	NP	1	NP
H-5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	N	NP

S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

NS = Buildings not equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

N = No separation requirement.

NP = Not Permitted.

- a. See Section 420.
- b. The required separation from areas used only for private or pleasure vehicles shall be reduced by 1 hour but not to less than 1 hour.
- c. See Section ~~406.3.2~~ 406.3.2 and 406.6.4.
- d. Separation is not required between occupancies of the same classification.
- e. See Section 422.2 for ambulatory care facilities.
- f. Occupancy separations that serve to define fire area limits established in Chapter 9 for requiring fire protection systems shall also comply with Section 707.3.10 and Table 707.3.10 in accordance with Section 901.7.

2018 International Fire Code

SECTION 202 GENERAL DEFINITIONS

Add new definition as follows

202 MECHANICAL-ACCESS ENCLOSED PARKING GARAGE An enclosed parking garage, other than single car stacking system, which employs parking machines, lifts, elevators or other mechanical devices for vehicle moving from and to street level and in which public occupancy in the garage is prohibited in all areas except the vehicle access bay.

Add new text as follows

903.2.10.2 Mechanical-access enclosed parking garages. An approved automatic sprinkler system shall be provided throughout buildings used for the storage of motor vehicles in a mechanical-access enclosed parking garage. The portion of the building that contains the mechanical-access enclosed parking garage shall be protected with a performance-based design specially engineered sprinkler system.

Revise as follows

**TABLE 903.2.11.6
ADDITIONAL REQUIRED FIRE SUPPRESSION SYSTEMS**

SECTION	SUBJECT
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<u>903.2.10.2</u>	<u>Mechanical-access enclosed parking garages</u>
914.2.1	Covered and open mall buildings
914.3.1	High-rise buildings
914.4.1	Atriums
914.5.1	Underground structures
914.6.1	Stages
914.7.1	Special amusement buildings
914.8.2	Airport traffic control towers
914.8.3, 914.8.6	Aircraft hangars
914.9	Flammable finishes
914.10	Drying rooms
914.11.1	Ambulatory care facilities
1029.6.2.3	Smoke-protected assembly seating
1103.5.1	Existing Group A occupancies
1103.5.2	Pyroxylin plastic storage in existing buildings
1103.5.3	Existing Group I-2 occupancies
1103.5.4	Existing Group I-2, Condition 2 occupancies
1103.5.4	Pyroxylin plastics
2108.2	Dry cleaning plants
2108.3	Dry cleaning machines
2309.3.2.6.2	Hydrogen motor fuel-dispensing area canopies
2404.2	Spray finishing in Group A, E, I or R
2404.4	Spray booths and spray rooms
2405.2	Dip-tank rooms in Group A, I or R
2405.4.1	Dip tanks
2405.9.4	Hardening and tempering tanks
2703.10	HPM facilities
2703.10.1.1	HPM work station exhaust
2703.10.2	HPM gas cabinets and exhausted enclosures
2703.10.3	HPM exit access corridor
2703.10.4	HPM exhaust ducts
2703.10.4.1	HPM noncombustible ducts
2703.10.4.2	HPM combustible ducts
2807.3	Lumber production conveyor enclosures
2808.7	Recycling facility conveyor enclosures
3006.1	Class A and B ovens
3006.2	Class C and D ovens
Table 3206.2	Storage fire protection
3206.4	Storage
3704.5	Storage of more than 1,000 cubic feet of loose combustible fibers
5003.8.4.1	Gas rooms
5003.8.5.3	Exhausted enclosures
5004.5	Indoor storage of hazardous materials
5005.1.8	Indoor dispensing of hazardous materials
5104.4.1	Aerosol product warehouses
5106.3.2	Aerosol display and merchandising areas
5306.2.1	Exterior medical gas storage room
5306.2.2	Interior medical gas storage room

5306.2.3	Medical gas storage cabinet
5606.5.2.1	Storage of smokeless propellant
5606.5.2.3	Storage of small arms primers
5704.3.7.5.1	Flammable and combustible liquid storage rooms
5704.3.8.4	Flammable and combustible liquid storage warehouses
5705.3.7.3	Flammable and combustible liquid Group H-2 or H-3 areas
6004.1.2	Gas cabinets for highly toxic and toxic gas
6004.1.3	Exhausted enclosures for highly toxic and toxic gas
6004.2.2.6	Gas rooms for highly toxic and toxic gas
6004.3.3	Outdoor storage for highly toxic and toxic gas
6504.1.1	Pyroxylin plastic storage cabinets
6504.1.3	Pyroxylin plastic storage vaults
6504.2	Pyroxylin plastic storage and manufacturing

For SI: 1 cubic foot = 0.023 m³.

Reason: Enclosed mechanical-access parking garages are being constructed in the United States on an increasing basis, yet there is no prescriptive code requirements for these occupancies. These occupancies are unique from the traditional open mechanical-access parking garage in that there are no openings, the entire structure is enclosed. These occupancies are more similar to automated high rack storage systems, they have no floors, no stairwells and no above ground level access, except maintenance walkways and ladders. With these being a silent occupancy type, the Code does not provide the code official with prescriptive requirements. There are fires involving parked vehicles with the vehicle parked and the ignition system off. If a fire were to occur in an enclosed mechanical-access parking garage, unless the local code authority required additional fire protection during construction, they do not have a point-setter to code requirements. Where these systems have been installed, there is not a consistent fire protection methodology to protecting these structures from a fire.

An enclosed mechanical-access parking garage offers many firefighting challenges; most are constructed in a building shell, without a floor system. The vehicles are parked in a cage/rack system, with no safe elevated access to the interior of the structure. With firefighter safety in mind and to have the ability to use fixed fire suppression to extinguish and/or control these fires, the code proposal is presented.

IFC Section 202 adds a definition for these occupancies. Open mechanical-access parking garages are defined in the Code, but do not pose the firefighting challenge as an enclosed mechanical access parking garage. An open parking garage has floors, stairwells, standpipe connections and natural ventilation. An enclosed garage is in a box, no stairwells or floors or standpipes for elevated firefighting, and no ventilation to remove the products of combustion, heat and super-heated gases.

IBC Section 406 6.1.3 is added to require a minimum 2-hour fire separation between these occupancies and other uses. If a fire were to occur in the occupancy, partitioning is needed to protect adjoining occupancies and other uses until the fire can be contained by the sprinkler system and mechanical ventilation.

IFC Section 320 is added to provide basic prescriptive requirements to provide for firefighter safety and to assist in the extinguishment of these fires, providing ground level access doors for firefighting operations, a room to consolidate the required fire control equipment, mechanical smoke removal and an emergency shut down switch. These occupancies are similar to high-piled automated storage systems. The general requirements are similar to high piled rack and automated storage requirements in Chapter 32.

IFC Section 903.2.10.2 is added to prescriptively require a performance-based designed sprinkler system. With the projected fire load in these occupancies and the inability to get water to the seat of the fire, a prescriptively designed sprinkler system is not anticipated to provide the required water for fire suppression.

Footnote c in IBC Table 508.4 is added to include the new section, 406.6.1.3.

Section 320 is being added to IFC Table 903.2.11.6 to the list of occupancies requiring additional fire suppression systems.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal is to provide prescriptive language for enclosed mechanical-access parking garages. These code requirements are being currently enforced as part of a performance-based design when approved and constructed. As the designed and builder will have prescriptive requirements, they will not be required to obtain an Alternative Materials and Methods approval for each project.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee sees the need to improve the code in this topic, but found the current proposal needs substantial work. They pointed out the following areas needing improvement: sprinkler design criteria; smoke control; the fire control equipment control room and to what extent it needs to parallel other control rooms, definition complexity and the impact this could have on low income housing. The proponent was urged to work with the BCAC to develop improved criteria. (Vote: 14-0)

Assembly Action:

None

G39-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Crystal Sujeski, representing Crystal Sujeski (crystal.sujeski@fire.ca.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

SECTION 202 DEFINITIONS

202 MECHANICAL-ACCESS ENCLOSED PARKING GARAGE An enclosed parking garage ~~other than single car stacking systems,~~ which employs parking machines, lifts, elevators or other mechanical devices for vehicle moving from and to street level and in which public occupancy in the garage is prohibited in all areas except the vehicle access bay.

406.6.4 Mechanical-access garages. Mechanical-access enclosed parking garages shall be in accordance with Sections 406.6.4.1 through 406.6.4.5.

406.6.4.1 Separation. Mechanical-access enclosed parking garages shall be separated from other occupancies and accessory uses by not less than 2-hour fire barriers constructed in accordance with Section 707 or by not less than 2-hour horizontal assemblies constructed in accordance with Section 711, or both.

406.6.4.2 Smoke removal. A mechanical smoke removal system, in accordance with Section 910.4, shall be provided for all areas containing an ~~enclosed mechanical-access parking enclosed parking garage.~~

406.6.4.3 Fire control equipment room. The fire control equipment, consisting of the fire alarm control unit, mechanical ventilation controls and emergency shut down switch shall be provided in a room ~~with exterior access~~ located where the equipment is able to be accessed by the fire service from a secured exterior door of the building. The room shall be a minimum of 50 square feet in size and ~~location shall be in a location that is~~ approved by the fire code official.

406.6.4.4 Firefighter-Fire department access doors. Access doors shall be provided ~~at the ground level for firefighter access as approved by the fire code official~~ in accordance with Section 3206.7.

406.6.4.5-3.1 Emergency shutdown switch. ~~A~~ The mechanical parking system shall be provided with a manually activated emergency shutdown switch shall be provided for use by emergency personnel. The switch shall be clearly identified and shall be in a location approved by the fire code official.

2018 International Fire Code

SECTION 202 GENERAL DEFINITIONS

202 MECHANICAL-ACCESS ENCLOSED PARKING GARAGE An enclosed parking garage, ~~other than single car stacking system,~~ which employs parking machines, lifts, elevators or other mechanical devices for vehicle moving from and to street level and in which public occupancy in the garage is prohibited in all areas except the vehicle access bay.

903.2.10.2 Mechanical-access enclosed parking garages. An approved automatic sprinkler system shall be provided throughout buildings used for the storage of motor vehicles in a mechanical-access enclosed parking garage. The portion of the building that contains the mechanical-access enclosed parking garage shall be protected with a ~~performance-based design~~ specially engineered automatic sprinkler system.

Commenter's Reason: G39-18 has been modified to address the comments and feedback received at the committee action hearings held in Columbus, Ohio in April 2018. The modifications were derived by a task group of industry professionals, code consultants, fire officials, and building officials. The definition has been modified to correlate with the NFPA 88A Standard for Parking Structures document and include all automatic parking systems.

406.6.4.2 The modification was editorial to move the word enclosed after the term mechanical-access to stay consistent within the section.

406.6.4.3 The word "room" was added to the section heading to clarify that the equipment is intended to be housed within a defined space. To address a committee comment on the size of the room, the task group concluded that the appropriate size would be a minimum of 50 square feet. This dimension was derived by comparing the language and use of an emergency response area used in the California Building Code for L occupancy for supplies and equipment. The room is not intended to be used for fire suppression command and control use. The room is designed to only operate fire protection systems.

406.6.4.3.1 The emergency shut down switch has been clarified to what the function is intended to achieve. The section number was moved to become a subsection of the fire control equipment room for code user ease.

406.4.4.4 Fire Department access is a critical component of firefighting operations. The modification gives the minimum access for fire department response. With the similarities between mechanical-access enclosed parking garages and high-pile rack storage systems, the demand for fire fighter access requirements are comparable. To achieve consistency within the code for fire fighter access the reference to section 3206.7 has been added.

903.2.10.2 To address the committee comment about the term performance based design. We modified the proposal to correlate with the high-pile storage language in section 3208.5.1. The intent to require a "specially engineered automatic sprinkler system" is to identify the varied fuel loads, configurations, scope and size of these projects. In this way, the designer and code official will be assured that the hazard is adequately accounted for within the fire protection design.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. The public comment modification will continue to achieve the same goals of the original intent of the proposal. The cost of construction will decrease as designers and code officials will have a minimum, consistent bases for design without having to create alternate means agreements with each jurisdiction the designer, developer intends to submit a project.

G39-18

G43-18

IBC: 407.4.4.1, 407.4.4.3

Proposed Change as Submitted

Proponent: John Williams, Chair, representing Healthcare Committee (AHC@iccsafe.org)

THIS CODE CHANGE WILL BE HEARD BY THE MEANS OF EGRESS COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

2018 International Building Code

Revise as follows

407.4.4 Group I-2 care suites. *Care suites* in Group I-2 shall comply with Sections 407.4.4.1 through 407.4.4.4 and either Section 407.4.4.5 or 407.4.4.6.

407.4.4.1 Exit access through care suites. *Exit* access from all other portions of a building not classified as a *care suite* shall not pass through a *care suite*. ~~In a *care suite* required to have more than one exit, one exit access is permitted to pass through an adjacent *care suite* provided that all of the other requirements of Sections 407.4 and 1016.2 are satisfied.~~

407.4.4.2 Separation. *Care suites* shall be separated from other portions of the building, including other care suites, by a smoke partition complying with Section 710.

407.4.4.3 Access to corridor. Every care suite shall have a door leading directly to an exit access corridor or horizontal exit. Movement from habitable rooms within the care suite shall not require passage through more than three doors and 100 feet (30 480 mm) distance of travel within the care suite to a door leading to the exit access corridor or horizontal exit. Where a care suite is required to have more than one exit access door by Section 407.4.4.5.2 or 407.4.4.6.2, the additional door shall lead directly to an exit access corridor, horizontal exit or an adjacent suite.

Exception-Exceptions:

1. The distance of travel shall be permitted to be increased to 125 feet (38 100 mm) where an automatic smoke detection system is provided throughout the *care suite* and installed in accordance with NFPA 72.
2. Where two or more exit access doors are required by Section 407.4.4.5.2 or 407.4.4.6.2, not more than one of the doors shall be permitted to be an exit door leading to an exit stairway, exit ramp, exit passageway, or an exterior exit door.

Reason: Since this section was heavily edited in the 2012 version of the code, the federal rules have changed. This change reflects those changes and provides additional clarity relating to the exit access options out of a suite. The federal regulations stopped counting number of intervening rooms, instead relying on overall travel (K256 and K257). This proposal is submitted by the ICC Committee on Healthcare (CHC). The CHC was established by the ICC Board to evaluate and assess contemporary code issues relating to healthcare facilities. This is a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. In 2017 the CHC held 2 open meetings and numerous conference calls, *which included members of the committees as well as any interested parties, to discuss and debate the proposed changes.* Information on the CHC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CHC effort can be downloaded from the CHC website at: <https://www.iccsafe.org/codes-tech-support/cs/icc-committee-on-healthcare/>.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal allows for one door out of a suite to be an exit door. This allows for additional design flexibility without adding any additional requirements.

G43-18

Public Hearing Results

Errata: Editorial modifications:

407.4.4.3 Access to corridor. Every care suite shall have a door leading directly to an exit access corridor or horizontal exit. Movement from habitable rooms within the care suite shall not require more than 100 feet (30 480 mm) of travel within the care suite to a door leading to the exit access corridor or horizontal exit. Where a care suite is required to have more than one exit access door by Section 407.4.4.5.2 or 407.4.4.6.2, the additional door shall lead directly to an exit access corridor, horizontal exit or an adjacent suite.

Exceptions:

The distance of travel shall be permitted to be increased to 125 feet (38 100 mm) where an automatic smoke detection system is provided throughout the care suite and installed in accordance with NFPA 72.

Where two or more exit access doors are required by Section 407.4.4.5.2 or 407.4.4.6.2, not more than one of the doors shall be permitted to be an exit door leading to an exit stairway, exit ramp, exit passageway, or an exterior exit door.

Committee Action:

As Submitted

Committee Reason: The committee modified Section 407.4.4.3 to consistently use the defined term "care suite" instead of just "suite". The addition of "of" in the main text and "an" in Exception 2 was for better grammar. This was viewed as editorial only, so the committee did not vote on a modification.

The proposal was approved as appropriate for a facility that used a defend-in-place strategy for occupant safety during a fire event. This will coordinate the IBC with CMS requirements, thus reducing potential conflicts for hospitals and nursing homes. The committee suggested that Exception 2 is really a requirement, and should be moved up into the main text. (Vote: 14-0)

Assembly Action:

None

G43-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Williams, representing Healthcare Committee (ahc@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

407.4.4.3 Access to corridor. Every care suite shall have a door leading directly to an exit access corridor or horizontal exit. Movement from habitable rooms within the care suite shall not require more than 100 feet (30 480 mm) of travel within the care suite to a door leading to the exit access corridor or horizontal exit. Where a care suite is required to have more than one exit access door by Section 407.4.4.5.2 or 407.4.4.6.2, the additional door shall lead directly to an exit access corridor, ~~horizontal~~ exit or an adjacent suite.

ExceptionsException:

1. The distance of travel shall be permitted to be increased to 125 feet (38 100 mm) where an automatic smoke detection system is provided throughout the *care suite* and installed in accordance with NFPA 72.
2. ~~Where two or more exit access doors are required by Section 407.4.4.5.2 or 407.4.4.6.2, not more than one of the doors shall be permitted to be an exit door leading to an exit stairway, exit ramp, exit passageway, or an exterior exit door.~~

Commenter's Reason: This proposal is in response to a recommendation by the Means of Egress Code Development committee that Exception 2 was really a requirement and not an exception. Rather than lists the types of exits, the last sentence is now all inclusive.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal allows for one door out of a suite to be an exit door. This allows for additional design flexibility without adding any additional requirements.

G43-18

G54-18

IBC: 420.2, 705.3

Proposed Change as Submitted

Proponent: Micah Chappell, representing City of Seattle (micah.chappell@seattle.gov)

2018 International Building Code

Revise as follows

420.2 Separation walls. Walls separating *dwelling units* in the same building, walls separating *sleeping units* in the same building and walls separating *dwelling* or *sleeping units* from other occupancies contiguous to them in the same building shall be constructed as *fire partitions* in accordance with Section 708. Exterior walls separating units shall comply with Section 705.3.

Exceptions:

1. Where sleeping units include private bathrooms, walls between bedrooms and the associated private bathrooms are not required to be constructed as fire partitions.
2. Where sleeping units are constructed as suites, walls between bedrooms within the sleeping unit and the walls between the bedrooms and associated living spaces are not required to be constructed as fire partitions.
3. In Group R-3 and R-4 facilities, walls within the dwelling units or sleeping units are not required to be constructed as fire partitions.

705.3 Buildings on the same lot. For the purposes of determining the required wall and opening protection, projections and roof-covering requirements, buildings on the same lot and portions of the same building requiring dwelling or sleeping unit separation shall be assumed to have an imaginary line between them. Section 705.3 Exception 1 shall not be used where dwelling or sleeping unit separation is required.

Where a new building is to be erected on the same lot as an existing building, the location of the assumed imaginary line with relation to the existing building shall be such that the *exterior wall* and opening protection of the existing building meet the criteria as set forth in Sections 705.5 and 705.8.

Exceptions:

1. Two or more buildings on the same lot shall be either regulated as separate buildings or shall be considered as portions of one building if the aggregate area of such buildings is within the limits specified in Chapter 5 for a single building. Where the buildings contain different occupancy groups or are of different types of construction, the area shall be that allowed for the most restrictive occupancy or construction.
2. Where an S-2 parking garage of Construction Type I or IIA is erected on the same lot as a Group R-2 building, and there is no *fire separation distance* between these buildings, then the adjoining *exterior walls* between the buildings are permitted to have occupant use openings in accordance with Section 706.8. However, opening protectives in such openings shall only be required in the exterior wall of the S-2 parking garage, not in the exterior wall openings in the R-2 building, and these opening protectives in the exterior wall of the S-2 parking garage shall be not less than 1¹/₂-hour *fire protection rating*.

Reason: The code requires fire-rated construction between dwelling units, but does not specifically address the situation where the separating wall is exterior. The provisions of 705.3 establish a means to determine the required fire rating and allowable openings for exterior walls of two buildings on the same lot. The same principles should be applied to the requirements for dwelling unit separation.

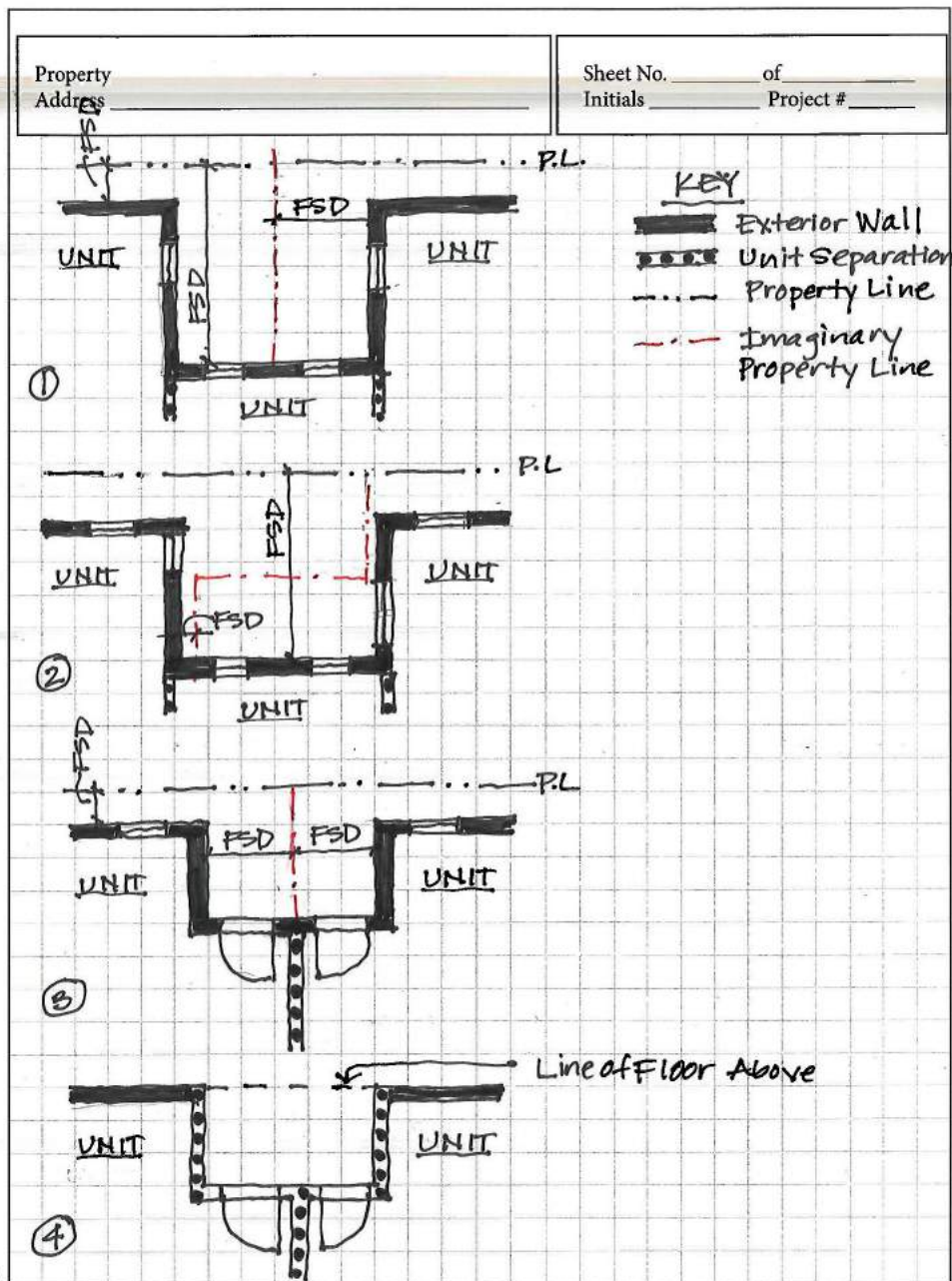
Dwelling unit separation is intended to prevent a fire in one unit from spreading to other units in a building. If adjacent units have unprotected openings in close proximity, fire can more readily spread between units, and to exterior balconies, cladding and roof.

With increasing demand for greater density housing, architects are designing more multifamily residential buildings with smaller units, often with windows on opposite sides of courts.

The provisions of Section 1206 control the minimum sizes of courts, but are silent on the fire-rating requirements, as this section is focused on light and ventilation.

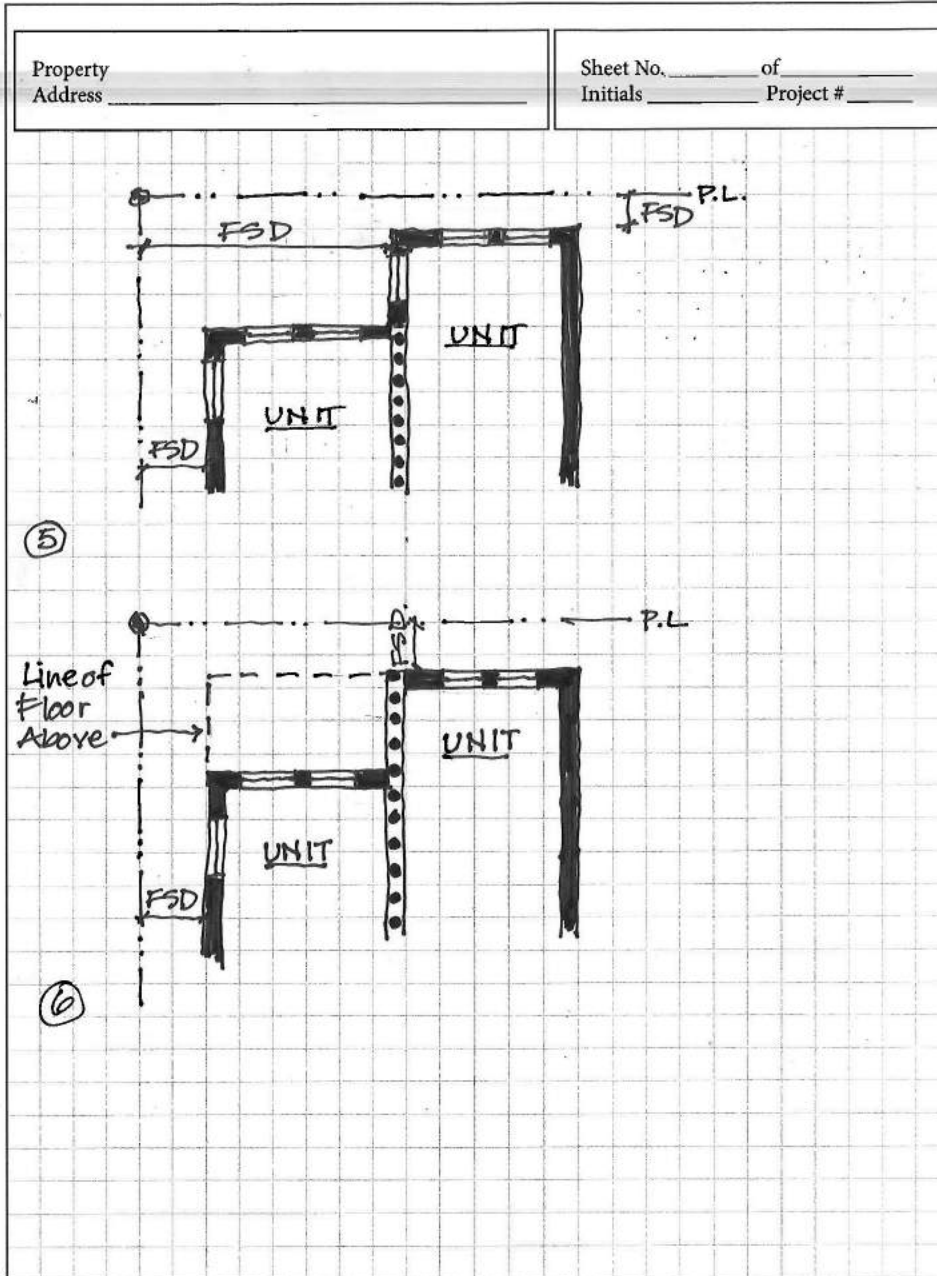
This revision will provide greater clarity for designers and increased safety and privacy for building residents.

Plan Review Calculations DPD



CS 5.21

Plan Review Calculations DPD



CS 521

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Minimal cost implications for construction. Potential property damage and life savings as fires are more likely to be limited to the unit of origin.

G54-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposal would attempt to required buildings with stepped facades to be analyzed as if the steps represent different buildings on the same property. The committee found the proposal to be vague and unenforceable. It is not adequately supported with data that the building designs which it would prohibit are in fact, providing dangerous design conditions. . A case to require a building to be protected from itself was not made. The committee felt that the cost of construction was significantly understated. (Vote: 13-1)

Assembly Action:

None

G54-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Micah Chappell, representing Seattle Department of Construction and Inspection (micah.chappell@seattle.gov) requests As Submitted.

Commenter's Reason: The code change proposal is not to protect the building from itself, but to provide unit separation for the condition when adjacent unit exterior walls are in close proximity. We see the condition shown on the previously submitted sketches quite often in Seattle where the exterior wall of a building undulates to accommodate windows or unit entry doors. Another example is two window openings from adjacent units directly facing each other across a light well. The light well depth could be small as three feet to provide light or ventilation in a yard or court per IBC Section 1205.2 & 1205.3. If the light well were infilled with floor area then the unit separation would require a rated wall between the units and protected openings. Removing the floor area and treating those walls as exterior walls does not remove the hazard from adjacent units.

The philosophy of providing fire protection due to adjacent exterior hazards within the same building is a common approach in the current building code and can be found in the following building code locations:

1023.7: Protect adjacent exterior walls at an angle less than 180 degrees of a nonrated exit stair exterior wall or unprotected opening.

1023.3, 1024.4, 1028.1: Exit stairs/passageways that extend to an exit discharge are required to extend to the exterior edge of the building p. For inset exit doors, protection to be extended to building edge.

This code change proposal extends this protection to unit separation.

This code change proposal will increase construction costs.

I believe the original code proposal should be approved as proposed. This code change will provide clear guidance in how to address the hazard of adjacent units.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction Cost increase as indicated in original proposal.

G54-18

G72-18

IBC: 202, 308.1.1(New), 429 (New), Chapter 35

Proposed Change as Submitted

Proponent: Dave Fable, U.S. General Services Administration, representing U.S. General Services Administration

2018 International Building Code

SECTION 202 DEFINITIONS

Add new definition as follows

LOCK-UP An area located within a building or structure having a predominant occupancy classification other than Group I-3, and where the occupants for penal or correctional purposes are detained for less than 24 hours by the use of security measures not under the occupants' control.

Add new text as follows

308.1.1 Lock-ups. Lock-ups located within a building or structure having a predominant occupancy classification other than Group I-3, where the area has capacity for not more than 50 detainees, and where no individual is detained for 24 hours or more, shall comply with the requirements of the predominant occupancy of the building or structure in which the lock-up is located and with the requirements of Section 429. Lock-ups having a capacity for more than 50 detainees or where any individual is detained for 24 hours or more shall be classified as Group I-3 occupancy and shall comply with the other applicable requirements in this code.

429 LOCK-UPS

429.1 General. Lock-ups located within a building or structure having a predominant occupancy classification other than Group I-3, where the area has capacity for not more than 50 detainees, and where no individual is detained for 24 hours or more, shall comply with the provisions in Sections 429.1 through 429.5 and other applicable provisions of this code.

429.2 Automatic Sprinkler System. Buildings and structures where lock-ups are located shall be equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

429.3 Fire Alarm System. Buildings and structures where lock-ups are located shall be equipped with a fire alarm system that initiates the occupant notification signal installed in accordance with Section 907.6.

429.4 Lock-up Criteria. The lock-up shall comply with the requirements for the predominant occupancy of the building in which the lockup is located, and the following criteria:

1. Doors and other physical restraints to free egress by detainees can be readily released by staff within 2-minutes of the onset of a fire or similar emergency.
2. Staff is in sufficient proximity to the lock-up so as to be able to cause the 2-minute release required by Item 1 whenever detainees occupy the lockup.

Exception:Where staff is not in sufficient proximity to the lock-up so as to be able to cause the 2-minute release required by Item 2, an automatic smoke detection system shall be installed throughout the lock-up area installed in accordance with the requirements in NFPA 72.

3. Staff is authorized to cause the release required by Item 1.
4. Staff is trained and practiced in effecting the release required by Item 1.
5. Where the release required by Item 1 is caused by means of remote release, detainees are not to be restrained from evacuating without the assistance of others.
6. Where security operations necessitate the locking of required means of egress, the following shall apply:
 - 6.1. Detention-grade hardware complying with ASTM F 1577 shall be provided on swinging doors within the required means of egress.
 - 6.2. Sliding doors within the required means of egress shall be designed and engineered for detention and correctional use, and lock cylinders shall meet the cylinder test requirements of ASTM F 1577.

429.5 Fire department notification. The building owner/manager shall notify the fire department with responsibility to respond to the building or structure of the presence of the lockup.

Add new standard(s) follows

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box
C700
West Conshohocken PA 19428-2959
US

F1577-05 (2012):

Standard Test Methods for Detention locks for Swinging Doors

Analysis: A review of the standard proposed for inclusion in the code, [INSERT STANDARD], with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

Reason: The intent of this code change proposal is to address the subject matter of 'lock-ups' where the occupants for penal or correctional purposes are detained for less than 24 hours by the use of security measures not under the occupants' control. A lock-up is basically a holding area in which persons are detained with some degree of security imposed on them that are commonly located in different types of occupancies. For example, lockups are typically located in U.S. Customs and Border Protection facilities at border crossings, airports and seaports; prisoner holding facilities at courthouses; local police departments; security offices at sports stadia; security offices at shopping mall complexes; etc. Currently, the requirements within the IBC require "lock-ups" to meet the rigorous defend in place requirements applicable to Institutional Group I-3 occupancies. This code change proposal provides requirements specifically for lock-ups located in building and structures having a predominant occupancy classification other than Institutional Group I-3 occupancy and provides a reasonable set of safe guards applicable to the predominant occupancy of the building in which the lock-up is located. The subject provisions for lock-ups are meant to apply to holding areas having a capacity of not more than 50 detainees, in which no individual is detained for 24 hours or more. The threshold for the holding area to limit the capacity to not more than 50 detainees is based on the requirements in NFPA 101, Life Safety Code, and seems reasonable for processing/holding areas for facilities at border crossings, airports and seaports and prisoner holding facilities at courthouses.

Section 202 has been revised to include a new definition for a lock-up. Section 308 has also been revised to include a new sub-section 308.1 on lock-ups

A new Section 429, Lock-Ups has been created to provide a reasonable set of safe guards applicable for when a predominant occupancy of the building or structure has an occupancy classification other than Institutional Group I-3 occupancy in which the lock-up is located. For example, safe guards include, but are not limited to: an automatic sprinkler system throughout the building or structure, a fire alarm system, a 2-minute timeframe for trained staff to release the detainees or an option for the installation of a smoke detection system within the lock-up area if the 2-minute timeframe for trained staff to release the detainees cannot be met, detention-grade door hardware to improve reliability, and building owner/manager notification of the local responding fire department of the presence of the lock-up.

Please note that the subject code change proposal is based on the requirements for lock-ups in the National Fire Protection Association 101, Life Safety Code (2018 edition).

The intent of this proposal is to reference ASTM Standard F 1577-05 (2012), Standard Test Methods for Detention Locks for Swinging Doors to improve the reliability of detention-grade hardware for lock-ups.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. We believe the subject code change proposal to include lock-ups will not affect the cost of construction either way.

Requiring lock cylinders of detention door hardware to meet the cylinder test requirements of ASTM F 1577 may increase construction costs.

Analysis: A review of the standard proposed for inclusion in the code, ASTM F1577-05 (2012), with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

G72-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This issue needs to be addressed especially to address facilities where 5 or fewer persons are 'locked' up and not free to egress in malls, small court houses. The committee spoke to areas where the proposal needs further development: 1. Clarity of locking arrangements, specifically unlocking during emergency situations. 2. Consider limiting the number of doors in the path of egress. 3. Relying on the 'owner' to call the fire department in case of emergencies. 4. Cost of compliance for very small jurisdictions that may have only 1 or 2 persons in lock up at any time. 5. Reconsider the maximum threshold. 6. Consider separating those needed for health care and those needed for law enforcement. (Vote 9-5)

Assembly Action:

None

G72-18

Individual Consideration Agenda

Public Comment 1:

Proponent: David Collins, representing The American Institute of Architects (dcollins@preview-group.com) requests As Submitted.

Commenter's Reason: Holding facilities have an extremely important role in various types of facilities. Security needs for retail operations, medical facilities and even governmental facilities often have to deal with persons that are violent or disturbed, have mental health issues that require that the operators of these facilities detain them for a period before the local authorities can retrieve the individual and take them to be dealt with. Without guidance from the IBC, many designers and owners are having to creatively identify the necessary features of such an area for temporarily holding such individuals.

We believe this proposal offers clear and concise requirements for designers, owners and building officials to use in creating appropriate facilities for detention without classifying the space as an I-3 occupancy.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

As stated in the original proposal.

G72-18

G75-18

IBC: Table TABLE 504.3

Proposed Change as Submitted

Proponent: Stephen DiGiovanni, representing ICC Ad Hoc Committee on Tall Wood Buildings (TWB) (TWB@iccsafe.org)

2018 International Building Code

Revise as follows

**TABLE 504.3
ALLOWABLE BUILDING HEIGHT IN FEET ABOVE GRADE PLANE^a**

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION											TYPE OF CONSTRUCTION	TYPE OF CONSTRUCTION
	SEE FOOTNOTES	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
		A	B	A	B	A	B	A	B	C	HT	A	B
A, B, E, F, M, S, U	NS ^b	UL	160	65	55	65	55	<u>65</u>	<u>65</u>	<u>65</u>	65	50	40
	S	UL	180	85	75	85	75	<u>270</u>	<u>180</u>	<u>85</u>	85	70	60
H-1, H-2, H-3, H-5	NS ^{c, d}	UL	160	65	55	65	55	<u>120</u>	<u>90</u>	<u>65</u>	65	50	40
	S	UL	180	85	75	85	75	<u>140</u>	<u>100</u>	<u>85</u>	85	70	60
H-4	NS ^{c, d}	UL	160	65	55	65	55	<u>65</u>	<u>65</u>	<u>65</u>	65	50	40
	S	UL	180	85	75	85	75	<u>140</u>	<u>100</u>	<u>85</u>	85	70	60
I-1 Condition 1, I-3	NS ^{d, e}	UL	160	65	55	65	55	<u>65</u>	<u>65</u>	<u>65</u>	65	50	40
	S	UL	180	85	75	85	75	<u>180</u>	<u>120</u>	<u>85</u>	85	70	60
I-1 Condition 2, I-2	NS ^{d, e, f}	UL	160	65	55	65	55	<u>65</u>	<u>65</u>	<u>65</u>	65	50	40
	S	UL	180	85	75	85	75	<u>180</u>	<u>120</u>	<u>85</u>	85	70	60
I-4	NS ^{d, g}	UL	160	65	55	65	55	<u>65</u>	<u>65</u>	<u>65</u>	65	50	40
	S	UL	180	85	75	85	75	<u>270</u>	<u>180</u>	<u>85</u>	85	70	60
R ^h	NS ^d	UL	160	65	55	65	55	<u>65</u>	<u>65</u>	<u>65</u>	65	50	40
	S13D	60	60	60	60	60	60	<u>60</u>	<u>60</u>	60	60	50	40
	S13R	60	60	60	60	60	60	<u>60</u>	<u>60</u>	<u>60</u>	60	60	60
	S	UL	180	85	75	85	75	<u>270</u>	<u>180</u>	<u>85</u>	85	70	60

For SI: 1 foot = 304.8 mm.

UL = Unlimited; NS = Buildings not equipped throughout with an automatic sprinkler system; S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

- a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.
- b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.
- c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.
- d. The NS value is only for use in evaluation of existing building height in accordance with the International Existing Building Code.
- e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies Condition 1, see Exception 1 of Section 903.2.6.
- f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and Section 1103.5 of the *International Fire Code*.
- g. For new Group I-4 occupancies, see Exceptions 2 and 3 of Section 903.2.6.
- h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.

Reason: The Ad Hoc Committee on Tall Wood Buildings (TWB) was created by the ICC Board to explore the science of tall wood buildings and take action on developing code changes for tall wood buildings. The TWB has created several code change proposals with respect to the concept of tall buildings of mass timber and the background information is at the end of this Statement. Within the statement are important links to information, including documents and videos, used in the deliberations which resulted in these proposals.

The TWB and its various WGs held meetings, studied issues and sought input from various expert sources around the world. The TWB has posted those documents and input on its website for interested parties to follow its progress and to allow those parties to, in turn, provide input to the TWB.

At its first meeting, the TWB discussed a number of performance objectives to be met with the proposed criteria for tall wood buildings:

1. No collapse under reasonable scenarios of complete burn-out of fuel without automatic sprinkler protection being considered.
2. No unusually high radiation exposure from the subject building to adjoining properties to present a risk of ignition under reasonably severe fire scenarios.
3. No unusual response from typical radiation exposure from adjacent properties to present a risk of ignition of the subject building under reasonably severe fire scenarios.
4. No unusual fire department access issues.
5. Egress systems designed to protect building occupants during the design escape time, plus a factor of safety.
6. Highly reliable fire suppression systems to reduce the risk of failure during reasonably expected fire scenarios. The degree of reliability should be proportional to evacuation time (height) and the risk of collapse.

The comprehensive package of proposals from the TWB meet these performance objectives. The TWB also determined that fire testing was necessary to validate these concepts. At its first meeting, members discussed the nature and intention of fire testing so as to ensure meaningful results for the TWB and, more specifically, for the fire service. Subsequently a test plan was developed. The fire tests consisted of one-bedroom apartments on two levels, with both apartments having a corridor leading to a stair. The purpose of the tests was to address the contribution of mass timber to a fire, the performance of connections, the performance of joints, and to evaluate conditions for responding fire personnel. The Fire WG then refined the test plan, which was implemented with a series of five, full-scale, multiple-story building tests at the Alcohol, Tobacco and Firearms (ATF) laboratories in Beltsville, MD. The results of those tests, as well as testing conducted by others, helped form the basis upon which the Codes WG developed its code change proposals. This code change proposal is one of those developed by the Codes WG and approved by the TWB.

To review a summary of the fire tests, please visit:

<http://bit.ly/ATF-firetestreport>

To watch summary videos of the fire tests, which are accelerated to run in 3-1/2 minutes each, please visit:
<http://bit.ly/ATF-firetestvideos>.

Both of these links were confirmed active on 12/27/17

Allowable Height

This proposal addresses the allowable building height, in terms of feet, for the three new construction types proposed by the TWB. As set forth in the proposal to Section 602.4, the three new types of construction are Types IV-A, IV-B, and IV-C. The Committee examined each proposed type of construction for its safety and efficacy with regard to each occupancy type.

The following approach was used to develop proposed allowable heights of the new construction types, based on the conclusions of the Committee:

1. Based upon TWB review of fire safety and structural integrity performance, Type IV-B is equated to Type I-B for height (in feet). A noteworthy item to remember is that, per Section 403.2.1.1 of the IBC, Type IB construction is permitted to be reduced to 1-hour Fire Resistance rating; however, the TWB does not propose to allow the same reduction for Type IV-B. As a result, the comparison is between 2-hr mass timber construction that is partially exposed, versus 1-hr Type IB construction, and the Committee believes that 2-hr mass timber construction that is partially exposed per the limits of proposed Section 602.4 warrants the same heights as allowed for 1-hr Type I-B construction. It should be noted that the unprotected mass timber also needs to meet the 2 hour FRR, thus the protected area will likely be conservatively higher FRR than actually required;
2. Type IV-A should be somewhat larger than IV-B, as Type IV-A construction is entirely protected (no exposed mass timber permitted) and the required rating of the structure is equivalent to those required of Type I-A construction (3-hr rating for structural frame). However, the Committee did not find it acceptable to allow the unlimited heights of Type I-A to be applied to Type IV-A. Instead, the Committee applied a multiplier of 1.5 to the heights proposed for Type IV-B construction, in order to propose reasonable height allowances for IV-A construction;
3. The Committee viewed Type IV-C as similar to existing HT construction with the exception that IV-C has a 2 hour FRR where HT is acceptably fire resistant based on the large sizes of the members. As such, the height in feet is proposed to be equal to the height in feet of Type IV-HT. In terms of stories, however, the Committee proposed an additional number of stories for IV-C in recognition of its greater FRR.

4. While the base code seems to allow significant heights for buildings without sprinklers (e.g., Table 504.3 currently allows a height of 160 feet for NS Type I-B construction for many occupancy classifications), the Committee believes that no additional heights over what is already permitted for Type IV-HT would be proposed for the NS (non sprinklered) rows. As such, where separate rows are provided for heights for the NS situation, the proposed heights for Types IV-A, IV-B, and IV-C are the same as those heights already permitted for Type IV for the NS condition.

This methodology explains the majority of the recommendations here. Specifically, for occupancy groups A, B, E, F, I-4, M, R, S, U, the methodology described above accurately reflects how the height proposals were developed.

After undergoing this methodology to develop initial height recommendations, the Committee then applied professional judgment (from both a fire safety and a structural perspective), to develop a working draft table, cell by cell, for all occupancy types.

The exercise for establishing the allowable number of stories for the three new types of construction started with setting Type I-B allowances equivalent to Type IV-B. The tabular fire resistance ratings of building elements for these two types of construction is identical (not including the reduction permitted by 403.2.1.1), so the identical number of stories was deemed a reasonable starting point. From this point, the TWB Committee reviewed each occupancy classification to see if the Type I-B story allowance required adjustment.

Following is a summary of how allowable number of stories for sprinklered I-B were adjusted for IV-B:

- A-1, A-2, A-3, A-4, A-5, B, E, H-1, H-5, I-1(1), I-1(2), I-2, I-3, I-4, R-1, R-2, R-3, R-4, U: no adjustment, same number of allowable stories as Type I-B.
- F-1 and S-1: reduced from 12 to 7 (2 story increase from Type IV-HT)
- F-2, M, S-2: reduced from 12 to 8 (2 story increase from Type IV-HT)
- H-2: reduced from 3 to 2 (same as Type IV-HT)
- H-3: reduced from 6 to 4 (same as IV-Type HT)
- H-4: reduced from 8 to 7 (1 story increase from Type IV-HT)

Similarly, to establish the height in feet for Type IV-B:

- A-1, A-2, A-3, A-4, A-5, B, E, F-1, F-2, I-4, M, R-1, R-2, R-3, R-4, S-1, S-2, U: same allowable height as I-B.
- H-1, H-2, H-3: reduced from 180' to 90'
- H-4: reduced from 180' to 100'
- H-5: reduced from 160' to 90'
- I-1(1): reduced from 180' to 120'
- I-1(2): reduced from 180' to 65'
- I-2: reduced from 180' to 65'
- I-3: reduced from 180' to 120'

Adjusting IV-B up to IV-A for allowable number of stories:

- A-1, A-2, A-3, A-4, A-5, B, E, F-2, I-4, M, R-1, R-2, R-3, R-4, S-1, S-2, U - 1.5 x IV-B number of stories
- F-1, S-1 increase by 3 stories
- H-1, H-3 same as IV-HT
- H-2, H-4, H-5 increase by 1 story
- I-1(1), I-1(2), I-2, I-3 increase by 2 stories
- H-3 reduced from 6 to 4 (same as IV-HT)
- H-4 reduced from 8 to 7 (1 story increase from IV-HT)
- I-1(1), I-1(2), I-2, I-3, same as IV-HT

Adjusting IV-B to IV-A for building height:

- A-1, A-2, A-3, A-4, A-5, B, E, F-1, F-2, H-1, H-5, I-1(1), I-3, I-4, M, R-1, R-2, R-3, R-4, S-1, S-2, U: multiply 1.5 x Type IV-B (180 ft.)
- H-1, H-2, H-3, H-5: increase by 30 ft.
- H-4: increase by 40 ft.
- I-1(2), I-2: same as Type IV-HT

For instance, for Groups H-1, H-2, H-3, and H-5, while the table allows 160 feet for Type I-B construction, the Committee proposed a height of 90 feet for Type IV-B construction, and is using a multiplier of 1.33 to propose a height for Type IV-A construction of 120 feet height, intentionally made equal to the existing Heavy Timber heights.

For H-4, corrosives represent a health hazard (but not necessarily a fire hazard) to building occupants and first responders, the Committee believed that reduced heights were warranted. These are slightly greater than discussed above for the H-occupancy groups (140 feet versus 120 feet for IV-A construction, and 100 feet versus 90 feet for IV-B construction), but these still are far below what is permitted for Type I-B construction (180 feet permitted for the sprinklered condition), and is in recognition of the particular type of Hazardous occupancy covered by the H-4 occupancy group.

For Group I occupancies, there are two rows in the table, one being a row that includes I-1 Condition 1 and I-3 occupants (more capable of self-preservation) and the other being a row that includes I-1 Condition 2 and I-2 occupants (less capable of self-preservation). For I-1 Condition 1 and I-3 occupants, the Committee proposed a height of 120 feet for Type IV-B (versus 180 feet from the general methodology summarized above) and a height of 180 feet for Type IV-A (versus 270 feet from the general methodology summarized above). For those I-1 Condition 2 and I-2 occupants, the Committee took a very conservative approach and will only allow the heights that are already permitted by code for traditional Type IV construction.

Background information: The ICC Board approved the establishment of an ad hoc committee for tall wood buildings in December of 2015. The purpose of the ad hoc committee is to explore the science of tall wood buildings and to investigate the feasibility and take action on developing code changes for tall wood buildings. The committee is comprised of a balance of stakeholders with additional opportunities for interested parties to participate in the four Work Groups established by the ad hoc committee, namely: Code; Fire; Standards/Definitions; and Structural. For more information, be sure to visit the ICC website <https://www.iccsafe.org/codes-tech-support/cs/icc-ad-hoc-committee-on-tall-wood-buildings/> (link active and up to date as of 12/27/17). As seen in the "Meeting Minutes and Documents" and "Resource Documents" sections of the committee web page, the ad hoc committee reviewed a substantial amount of information in order to provide technical justification for code proposals.

The ad hoc committee developed proposals for the followings code sections. The committee believes this package of code changes will result in regulations that adequately address the fire and life safety issues of tall mass timber buildings.

IBC Code Section	Description
403.3.2	Water supply requirements for fire pumps in high rise buildings of Type IVA and IVB construction.
504.3	Allowable building height (feet) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT construction.
504.4	Allowable building height (stories) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
506.2	Allowable building area for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
508.4.4.1 509.4.1.1 (new)	Requirements for mass timber building elements serving as fire barriers or horizontal assemblies in buildings of Type IVB or IVC construction.
602.4	Type of Construction requirements for new proposed types of construction: Types IVA, IVB and IVC. No changes to Type IV HT construction. Includes definitions for new terms: Mass timber and Noncombustible protection (mass timber). THIS IS THE KEY CODE CHANGE PROPOSAL WHICH OUTLINES THE CONSTRUCTION REQUIREMENTS FOR THE PROPOSED NEW TYPE OF MASS TIMBER BUILDINGS. THE PROPOSAL ALSO ADDRESSES CONCEALED SPACES, ADHESIVE PERFORMANCE AND EXTERIOR WALL PROTECTION.
703.8 (new)	The performance method to determine the increase to the fire resistance rating provided by noncombustible protection applied to the mass timber building element.
703.9 (new)	Requirements for sealants and adhesives to be placed at abutting edges and intersections of mass timber building elements. The reason statement references a Group B proposal to Chapter 17 for special inspection requirements of sealants and adhesives.
718.2.1	Requirements on the use of mass timber building elements used for Fireblocking.
722.7 (new)	Requirements for the fire resistance rating of mass timber elements, including minimum required protection and gypsum board attachment requirements.
3102	Requirements for membrane structures using Type IV HT construction.
3314.7 (new)	New special precautions during construction of buildings of Types IVA, IVB and IVC construction: Standpipes; Water supply for fire department connections; Noncombustible protection required for mass timber elements as construction height increases.
Appendix	Requirements for walls, floors and roofs of Type IV HT construction in buildings located in Fire Districts.
IFC Code Section	Description
701.6	Requirements which stipulate the owner's responsibility to maintain inventory of all required fire resistance rated construction in buildings of Types IVA and IVB construction. This includes an annual inspection and proper repair where necessary.
Proposed changes to be submitted in 2019 Group B	
IBC Chapter 17	Required special inspections of mass timber construction <ul style="list-style-type: none"> • Structural • Sealants and adhesives (see IBC 703.8)
IBC Chapter 23	An update to referenced standard APA PRG 320 Standard for Performance –rated Cross-laminated Timber which is currently undergoing revision to ensure the adequacy of the adhesives under fire conditions.

In addition, fire tests designed to simulate the three new construction types (Types IVA, IVB and IVC) in the ad hoc committee proposals were conducted at the Alcohol Tobacco and Firearms test lab facility. The TWB was involved in the design of the tests, and many members witnessed the test in person or online. The results of the series of 5 fire tests provide additional support for these proposals, and validate the fire performance for each of the types of construction proposed by the committee. The fire tests consisted of one-bedroom apartments on two levels, with both apartments having a corridor leading to a stair. The purpose of the tests was to address the contribution of mass timber to a fire, the performance of connections, the performance of through-penetration fire stops, and to evaluate conditions for responding fire personnel.

To review a summary of the fire tests, please visit:

<http://bit.ly/ATF-firetestreport>

To watch summary videos of the fire tests, which are accelerated to run in 3 ½ minutes, please visit:

<http://bit.ly/ATF-firetestvideos>

Both of these links were confirmed active on 12/27/17.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This section provides information that was not previously set forth in the code, and does not change the requirements of current code, thus there is no cost impact when compared with present requirements.

G75-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: In Table 503.4, the value under Type IV A construction is to be 180 instead of 270 and the value under Type IV B construction is to be 120 instead of 180. All other portions of the proposal are not modified.

Committee Reason: The modification proposed makes this proposal work. The proposal was excessive without it. Otherwise, many of the reasons cited by the committee for proposal G80-18 apply. (Vote: 12-2)

Assembly Action:

None

G75-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jonathan Humble, American Iron and Steel Institute, representing American Iron and Steel Institute (jhumble@steel.org) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

**TABLE 504.3
ALLOWABLE BUILDING HEIGHT IN FEET ABOVE GRADE PLANE^a**

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION											TYPE OF CONSTRUCTION	TYPE OF CONSTRUCTION
	SEE FOOTNOTES	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
		A	B	A	B	A	B	A	B	C	HT	A	B
A, B, E, F, M, S, U	NS ^b	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	270	180	85	85	70	60
H-1, H-2, H-3, H-5	NS ^{c, d}	UL	160	65	55	65	55	120	90	65	65	50	40
	S	UL	180	85	75	85	75	140	100	85	85	70	60
H-4	NS ^{c, d}	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	140	100	85	85	70	60
I-1 Condition 1, I-3	NS ^{d, e}	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	180	120	85	85	70	60
I-1 Condition 2, I-2	NS ^{d, e, f}	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	180	120	85	85	70	60
I-4	NS ^{d, g}	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	270	180	85	85	70	60
R ^h	NS ^d	UL	160	65	55	65	55	65	65	65	65	50	40
	S13D	60	60	60	60	60	60	<u>60</u>	60	60	60	50	40
	S13R	60	60	60	60	60	60	60	60	60	60	60	60
	S	UL	180	85	75	85	75	270	180	85	85	70	60

For SI:

1 foot = 304.8 mm.

UL = Unlimited; NS = Buildings not equipped throughout with an automatic sprinkler system; S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

- a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.
- b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.
- c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.
- d. The NS value is only for use in evaluation of existing building height in accordance with the International Existing Building Code.
- e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies Condition 1, see Exception 1 of Section 903.2.6.
- f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and Section 1103.5 of the *International Fire Code*.
- g. For new Group I-4 occupancies, see Exceptions 2 and 3 of Section 903.2.6.
- h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.

Commenter's Reason: We recommend that the Type IV-B mass timber designation be deleted from the tall wood building proposals.

The origins of the development of the types of construction were originally developed to “account for the response or participation that a building’s structure will have in a fire condition originating within the building as a result of the occupancy or the fuel load” (Example source from BOCA National Building Code 1993 Commentary). The modern day types of construction are parsed out into three primary categories of construction; noncombustible (Types I and II), noncombustible/combustible (Types III and IV) and combustible (Type V). Subcategories were created to identify the protection; Type A for protected and Type B for unprotected.

What we have within proposals G75-18, G80-18, G84-18, G89-18, and G108-18 is the addition of a new construction category that has been proposed based on the need to satisfy aesthetics based on the combination of Types IV-A and IV-C, which is a departure from the black and white construction categories based on construction that is either non-combustible or combustible. We feel this inappropriate for the codes to begin to designate designer type construction categories.

In the past such mixing and matching of construction types into building or structure is more suited to the IBC Section 104.11 (Alternative materials, design and methods of construction and equipment), or through use of the ICC International Performance Code or performance analysis. We feel that these are the most appropriate options for the mixing-and-matching of construction types in building design.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This will not increase or decrease the cost of construction as this code change proposal and public comment address information that was not previously contained in the code, therefore there is no cost impact when compared to present requirements.

Public Comment 2:

Proponent: Brian M. McGraw, P.E., Virginia Department of Fire Programs, State Fire Marshal's Office, representing Virginia State Fire Marshal's Office, Virginia Fire Services Board (brian.mcgraw@vdfp.virginia.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

**TABLE 504.3
ALLOWABLE BUILDING HEIGHT IN FEET ABOVE GRADE PLANE^a**

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION											TYPE OF CONSTRUCTION	TYPE OF CONSTRUCTION
	SEE FOOTNOTES	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
		A	B	A	B	A	B	A	B	C	HT	A	B
A, B, E, F, M, S, U	NS ^b	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	270 <u>85</u>	180 <u>85</u>	85	85	70	60
H-1, H-2, H-3, H-5	NS ^{c, d}	UL	160	65	55	65	55	120 <u>65</u>	90 <u>65</u>	65	65	50	40
	S	UL	180	85	75	85	75	140 <u>85</u>	100 <u>85</u>	85	85	70	60
H-4	NS ^{c, d}	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	140 <u>85</u>	100 <u>85</u>	85	85	70	60
I-1 Condition 1, I-3	NS ^{d, e}	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	180 <u>85</u>	120 <u>85</u>	85	85	70	60
I-1 Condition 2, I-2	NS ^{d, e, f}	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85		65	65	65	65	65	65	50	40
I-4	NS ^{d, g}	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	270 <u>85</u>	180 <u>85</u>	85	85	70	60
R ^h	NS ^d	UL	160	65	55	65	55	65	65	65	65	50	40
	S13D	60	60	60	60	60	60	<u>60</u>	60	60	60	50	40
	S13R	60	60	60	60	60	60	60	60	60	60	60	60
	S	UL	180	85	75	85	75	270 <u>85</u>	180 <u>85</u>	85	85	70	60

For SI: 1 foot = 304.8 mm.

UL = Unlimited; NS = Buildings not equipped throughout with an automatic sprinkler system; S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

- a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.
- b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.
- c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.
- d. The NS value is only for use in evaluation of existing building height in accordance with the International Existing Building Code Code.
- e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies Condition 1, see Exception 1 of Section 903.2.6.
- f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and Section 1103.5 of the *International Fire Code*.
- g. For new Group I-4 occupancies, see Exceptions 2 and 3 of Section 903.2.6.
- h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.

Commenter's Reason: The Virginia Fire Services Board opposes Proposal G75-18 as originally submitted. We propose that the allowable heights in this proposal be reduced to those currently allowed for Type IV-HT construction until additional testing can be performed to validate the assumptions on which the currently proposed heights are based. While we do not oppose the concept of utilizing renewable resources, such as timber, in the construction of buildings, we are not convinced that 270 foot tall wood buildings provide an acceptable level of safety to occupants or responding firefighters.

The reason statement for this proposal indicates that the Ad-Hoc Committee on Tall Wood Buildings (TWB) discussed a number of performance objectives to be met with the proposed criteria for tall wood buildings including:

- Egress systems designed to protect building occupants during the design escape time, plus a safety factor.
- Highly reliable fire suppression systems to reduce the risk of failure during reasonably expected fire scenarios. The degree of reliability should be proportional to evacuation time (height) and the risk of collapse.

There is no reference in the stated performance objectives related to protecting firefighters and other emergency responders during the time required to access and extinguish a fire. The Report on High-Rise Fireground Field Experiments , NIST Technical Note 1797, published in April 2013, indicates times between 21 and 23 minutes from fire ignition for fire crews to reach the 11th floor of a high-rise building, depending on crew size. These times are based on studies involving major metropolitan fire departments. There are many variables that could significantly increase these times, including time for notification of the fire department, turnout time, response time and vertical travel time to reach higher floors.

There were 14 proposals submitted by the TWB. Only one, G28-18, addresses the reliability of fire suppression systems. It requires the water supply to required fire pumps be supplied by connections to not fewer than two water mains located in different streets for tall wood buildings that are more than 120 feet in building height. This proposal does nothing to increase the reliability of fire suppression system in buildings less than 120 feet tall. In addition, it does nothing to increase the reliability of the suppression systems within the building itself. There is no requirement to demonstrate the reliability of the fire suppression system as compared to the evacuation time and risk of collapse. It should also be noted that this proposal allows the construction of tall wood buildings to a height of 65 feet with no requirements for fire suppression systems.

We acknowledge that fire tests have been conducted; however, we do not believe that the results of the fire tests provide sufficient justification to allow tall wood building to be constructed to heights of 270 feet. The original proposal cites engineering judgment as the basis for a comparative analysis between Type I and Type IV buildings and the extrapolation of two-story fire tests to 270 foot tall structures. There has been no testing to demonstrate the performance of these structures after aging for a period of years or decades.

Bibliography: Report on High-Rise Fireground Field Experiments. NIST Technical Note 1797. Butler, Kathryn M. (editor). April 2013. https://cpse.org/wp-content/uploads/2018/02/NIST.TN_.1797-min.pdf

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal does not alter the method of construction; rather it limits the allowable height for this type of construction.

Public Comment 3:

Proponent: Michael O'Brian, International Association of Fire Chiefs, representing Riverside County Fire Department, representing California Fire Chiefs Association (mobrian@brightonareafire.com); Kevin Reinertson (kevin.reinertson@fire.ca.gov)requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

**TABLE 504.3
ALLOWABLE BUILDING HEIGHT IN FEET ABOVE GRADE PLANE^a**

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION											TYPE OF CONSTRUCTION	TYPE OF CONSTRUCTION
	SEE FOOTNOTES	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
		A	B	A	B	A	B	A	B	C	HT	A	B
A, B, E, F, M, S, U	NS ^b	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	270 <u>180</u>	180 <u>120</u>	85	85	70	60
H-1, H-2, H-3, H-5	NS ^{c, d}	UL	160	65	55	65	55	120 <u>85</u>	90 <u>65</u>	65	65	50	40
	S	UL	180	85	75	85	75	140 <u>100</u>	100 <u>85</u>	85	85	70	60
H-4	NS ^{c, d}	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	140 <u>100</u>	100 <u>85</u>	85	85	70	60
I-1 Condition 1, I-3	NS ^{d, e}	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	180 <u>125</u>	120 <u>85</u>	85	85	70	60
I-1 Condition 2, I-2	NS ^{d, e, f}	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	65	65	65	65	50	40
I-4	NS ^{d, g}	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	270 <u>180</u>	180 <u>120</u>	85	85	70	60
R ^h	NS ^d	UL	160	65	55	65	55	65	65	65	65	50	40
	S13D	60	60	60	60	60	60	<u>60</u>	60	60	60	50	40
	S13R	60	60	60	60	60	60	60	60	60	60	60	60
	S	UL	180	85	75	85	75	270 <u>180</u>	180 <u>120</u>	85	85	70	60

For SI: 1 foot = 304.8 mm.

UL = Unlimited; NS = Buildings not equipped throughout with an automatic sprinkler system; S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

- a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.
- b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.
- c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.
- d. The NS value is only for use in evaluation of existing building height in accordance with the International Existing Building Code.
- e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies Condition 1, see Exception 1 of Section 903.2.6.
- f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and Section 1103.5 of the *International Fire Code*.
- g. For new Group I-4 occupancies, see Exceptions 2 and 3 of Section 903.2.6.
- h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.

Commenter's Reason: This is a series of comments to modify the proposed height, stories, and allowable area of the new Type IV-A, Type IV-B, and Type IV-C proposed construction classifications as proposed by the Ad-Hoc Committee on Tall Wood Buildings.

There is concern the formulas utilized are not fully supported by technical substantiation and are missing the needed technical support to allow the construction type to such heights. This change takes a moderate approach and reduces the allowable heights, area, and stories by a factor of 30%.

This proposed public comment doesn't dismiss the concept out of hand, we do feel the current proposals go too far, to fast in an area of significant and long-lasting importance.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

No change in cost of construction as these heights have not been permitted before with this construction classification.

Public Comment 4:

Proponent: Gary Bridgens, representing Mass Timber Code Coalition (info@buildtallbuildsafe.com) requests As Modified by Committee.

Commenter's Reason: PUBLIC COMMENT

SUBMITTED BY GARY BRIDGENS

ON BEHALF OF THE MASS TIMBER CODE COALITION

The Mass Timber Code Coalition has been organized to provide information on the code proposals drafted by the Ad Hoc Committee on Tall Wood Buildings

Mass timber is not new to the *International Building Code* (IBC). Currently listed as Type IV Heavy Timber, this construction type is a proven option that fully complies with the structural and fire resistive requirements of the IBC. The code recognizes that mass timber is a fundamentally different material than dimension lumber used in more familiar "stick built" wood construction. The code also recognizes the inherent fire resistance of mass timber, where charring in a fire event provides protection of inner structures, as well as a consistent and predictable rate of charring.

With the expansion of the mass timber supply chain, panels of cross-laminated timber (CLT), nail-laminated timber (NLT) and glue-laminated timber (Glulam), requests for approvals of tall mass timber buildings (TMTB) by local authorities have become more common. Estimates by industry sources have identified 35 current proposals for tall mass timber buildings, ranging from 7 to 24 stories, in 21 different jurisdictions.

Importantly, this interest in tall mass timber construction has been reliant on various local codes and approval processes. The IBC does not currently account for these tall wood buildings, beyond the current Type IV Heavy Timber height and area limitations.

The Ad Hoc Committee on Tall Wood Buildings (AHC-TWB)

To ensure the IBC keeps pace with the changing construction marketplace, the Board of Directors of the International Code Council (ICC) appointed the Ad Hoc Committee on Tall Wood Buildings (AHC-TWB) in 2015. The AHC-TWB included members from the code official, regulatory, construction, engineering, architectural, fire services and materials communities.

The AHC-TWB was specifically charged with investigating the science of mass timber construction, undertaking any necessary new research and recommending any code changes needed to ensure safety in TMTB. The AHC-TWB set performance criteria of its own: any code change developed was required to achieve the following.

- No collapse under scenarios of complete burn-out of fuel without automatic sprinkler protection;
- No high radiation exposure from the subject building to adjoining properties that risk ignition under severe fire scenarios;
- No unusual response from radiation exposure from adjacent properties that risk ignition of the subject building under severe fire scenarios;
- No unusual fire department access issues;
- Egress systems to protect occupants during design escape times plus a margin of safety;
- Enhanced and redundant fire protection systems to ensure performance during various fire scenarios.

Code Change Proposals

After two years of work, the AHC-TWB has produced 14 code change proposals. All 14 of these proposals were recommended for approval by various ICC committees at the recent ICC 2018 Group A Committee Action Hearing.

The key change, G108-18, defines three new categories of Type -IV Mass Timber construction:

Type IV-A: 1 to 18 stories based on Occupancy Classification. 3-hour fire resistance rating with non-combustible protection throughout;

Type IV-B: 1 to 12 stories based on Occupancy Classification. 2-hour fire resistance rating with non-combustible

protection on most mass timber surfaces;

Type IV-C: 1 to 9 stories based on Occupancy Classification. 2-hour fire resistance rating with non-combustible protection for critical areas; exit enclosures, etc.

Each new construction type defined by the AHC-TWB (Type IV-A, B and C) has fire resistance requirements as robust or more robust than those required for comparable non-combustible (concrete and steel) buildings.

Other provisions provide standards for mass timber manufacturing, height/area restrictions, active and passive fire protection systems, fire safety during construction, enhanced water supply requirements, and standards for sealants and adhesives.

Fire Resistance of Mass Timber

Citing fire and market concerns, both the Portland Cement Association and the National Ready Mix Concrete Association have criticized the AHC-TWB code change proposals as “untested” and “unsound.” However, these criticisms fail to consider that:

The purpose of the International Building Code is to provide building officials with the tools they need to ensure public and first-responder safety. It is not to choose winners and losers in the market, nor is it to defend any single industry’s position;

Tall mass timber buildings already built are performing well;

Mass timber (and heavy timber before it) has undergone extensive fire resistance testing in multiple fire scenarios by Underwriters Laboratories, the Southwest Research Institute, the National Research Council of Canada and the U.S. Government’s ATF Fire Research Laboratory, the world’s largest indoor fire investigation lab.

Numerous mass timber floor/ceiling and wall assemblies have been tested at national laboratories using ASTM E119 standards. This testing history shows that mass timber has repeatedly achieved the hourly fire resistance requirements of the code. This is in part because of charring properties that provide a steady and predictable measurement of fire resistance. Additionally, detailed code requirements for non-combustible protection applied to the mass timber greatly enhance the hourly rating. Further, fire protection systems (active and passive) also ensure safety in mass timber structures.

The AHC-TWB benefitted from recent tests in 2017 at the U.S. ATF Fire Research Laboratory on full-scale mass timber buildings. Most tests assumed an unlikely failure of sprinkler systems:

Mass timber apartment with full fuel load. Fully protected by Type X gypsum wall board. Fire self-extinguished after 3 hours with no significant charring on mass timber surfaces;

Mass timber apartment with full fuel load. 20% exposed CLT ceiling. Test concluded at 4-hour mark after fuel burnout. CLT self-extinguished after charring;

Mass timber apartment with full fuel load. 2 CLT walls fully exposed. Fuel burnout at 4-hours. CLT walls self-extinguished after charring;

Mass timber apartment with full fuel load. All CLT surfaces fully exposed. One sprinkler system. Fire quickly extinguished;

Mass timber apartment with full fuel load. All CLT surfaces fully exposed. One sprinkler system. Fire allowed to grow to flashover (23 minutes) then quickly extinguished.

In fact, proposed Type IVA, B and C fire resistance requirements are the same or more robust than comparable steel and concrete construction. Further detail can be obtained at buildtallbuildsafe.com.

Benefits of Mass Timber Construction

In addition to the obvious environmental attributes of using a renewable resource in construction and the boost for the economies in timber-producing regions, builders and communities cite several distinctive benefits that make mass timber buildings an attractive option:

Builders report several benefits, including:

Job site safety. Mass timber panels are easy to install and can be delivered to a work site as needed, rather than stockpiled. Moreover, worker training is easier as is exposure to job site risk;

Job site efficiency. Persistent labor shortages are eased as more workers are qualified to work with mass timber panels. Jobs are built more quickly and materials are delivered as needed, thereby reducing costs;

Design. The favorable strength-to-weight ratio of CLT and the characteristics of wood offer more design options and more attractive built environments, improving business performance.

Local communities embrace mass timber construction:

Faster and quieter. The dislocation experienced by neighboring communities is reduced in mass timber projects. In addition to lower fire risks, things occur more quickly and panels are installed more simply than comparable steel and concrete sites;

Greener. Forestry officials cite the carbon sequestration properties of wood, but also the benefits to forest management of using wood products more efficiently and effectively, thereby further reducing decay and fire risk;

Energy efficient. Manufacturing mass timber is less energy intensive than other building materials. More importantly, the superior insulation characteristics of wood far outperform steel and concrete structures.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This section provides information that was not previously set forth in the code, and does not change the requirements of current code, thus there is no cost impact when compared with present requirements.

Public Comment 5:

Proponent: Sam Francis, representing American Wood Council (sfrancis@awc.org) requests As Modified by Committee.

Commenter's Reason: AWC was appointed to be a member of the ICC Tall Wood Building Ad Hoc Committee (TWB), the single wood industry representative on the TWB. AWC is not speaking for TWB on this issue. It simply is relaying information regarding the development of the proposals. Other members of the 16-member TWB included representation from architects, engineers, fire protection engineers, fire marshals, testing laboratories, and fire fighters, as well as the major materials industries. After two years of study, listening to testimony, reviewing documents, reviewing public input, conducting an extensive test program, and reviewing test results from tests around the world, the TWB made this proposal to ICC for the membership's consideration.

Early in the process, the TWB heard proposals from four different commentators suggesting maximum stories of 20, 24, 40, and 42 stories. The TWB worked through dozens of drafts of the proposed new types of construction, dozens more pertaining to the building height in stories, nearly a dozen pertaining to building height in feet and nearly a dozen regarding maximum permitted building area per floor. These documents were all posted to the TWB page of the ICC website. Comments were solicited for all drafts.

The first aspect of height and area taken up by the TWB was height in stories. That seemed to be the easiest to get at with the information gleaned from the testimony and documentation presented to the TWB. A public comment by AWC to G80 outlines how experts from around the world presented a case to the TWB that mass timber was equivalent to types I-A and I-B in every way other than the combustibility of the base material. They outlined various strategies for overcoming that combustibility issue. The TWB relied upon this concept of equivalent performance to determine its maximum permitted height in stories. The Reason Statement provided by the TWB Chairman, Steve DiGiovanni, clearly lays out the background for, and the process of, the deliberation on Height in Stories. That is a must read to understand this process and its outcomes.

Next, based upon comments submitted, TWB tried to assign height in feet to its chosen maximum stories. In its first drafts, the maximum number of stories for proposed type IV-A was 24 for a few occupancy groups. Similarly, IV-B was proposed to be limited to 12 stories based on the equivalency mentioned above. Thus, IV-B was assigned the same maximum height in feet as type I-B, 180 feet. In regards to the fire service's ability to address fires in mass timber buildings at these heights, the following rationale was used:

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The height limit, in feet, proposed for Type IV-B is even more conservative when considering that Type IV-B requires a greater degree of fire resistance than that of I-B when the *fire-resistance rating* of the building elements in Type IB construction are reduced to only the *fire-resistance ratings* required for Type IIA as permitted by Section 403.2.1 of the IBC. In effect, the proposed 2 hour fire resistance ratings required for Type IV-B will be twice that allowed by the IBC, since its inception, for those buildings under 420 feet whose building elements are permitted to be of only 1 hour fire resistance in accordance with the high rise provisions of Chapter 4, which will not apply to the proposed mass timber construction types.

Type I-A is, in most cases unlimited in height. The TWB agreed that the performance of IV-A was equivalent, but its conservative approach meant that they chose not to permit IV-A to enjoy the unlimited height that I-A does. In fact, the approach was so conservative that it considered only increasing the height in feet by 50% over type IV-B. So a modest increase of 50% was chosen. This is infinitely less than the unlimited height in feet permitted in type I-A for nearly every use group.

The reason statement offered by the TWB for this proposal clearly explains that the allowable height in feet was determined by assessing the overall performance of the new types of construction and equating them to existing types of construction. It also clearly defines the acceptable performance which it found to be equivalent to the higher types. From the beginning, the TWB has been committed to criteria which result in acceptable performance.

The fire test program, drafted by the Fire Work Group of the TWB may be seen as videos of each of the five tests. They can be found at this link or on the ICC TWB web page.

https://www.youtube.com/playlist?list=PL_sDiz8JiMlwby77vfpSPucEhBuEK22P

This proposal is thoroughly conservative. The following points address claims made by opponents:

Concerns about exterior fire testing:

The TWB proposals significantly reduce the risk of exterior building surface flame propagation by prohibiting all combustibles on the exterior side of exterior walls (except for the required water resistive barrier). Continuous insulation on the exterior, where provided, will be non-combustible. In addition, protection with at least 40 minutes of noncombustible material (typically a layer of 5/8-inch type X gypsum wallboard) is required on the outside of mass timber exterior walls. What is proposed therefore is more conservative than any other construction type, including Types I and II, virtually eliminating the possibility of fire spread on exterior walls due to combustible materials.

Concerns about the testing's relevance to tall wood buildings:

The testing was designed by fire service representation on the TWB committee to directly address potential tall wood buildings, regardless of height. Rather than rely on standardized testing of building assemblies alone, with fire service input the TWB committee chose to undertake full-scale, multistory compartment testing, with high residential fuel loads for which no standardized test exists. Furthermore, in four of the five tests, the normal operation of the required automatic fire suppression system (sprinklers) was not allowed. The fires in tests applicable to the proposed 18 and 12 story limits (Types IV-A and IV-B respectively) were allowed to continue throughout the decay phase and well past burn-out,

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The committee action is incorrectly reported in the CAH report. As shown above in the committee action, it fails to include the Occupancy Group to which the modified height should apply. the text of the modification submitted by Mr. DiGiovanni, is

G75

Table 504.3

Change the following two entries in the table:

Occupancy Classification:	I-4 (sprinklered)
Type IVA	270 <u>180</u>
Type IVB	180 <u>120</u>

SO this should apply to group I-4 only, not all the groups as it appears in the report above

Bibliography:

Modification DiGiovanni - 1

G75

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Type IVB	180 <u>120</u>

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction This is a heretofore unknown type of construction. Adding alternatives in the code generally means creating more choice which should result in lower costs.

The impact of the incorrect modification is to add cost. The impact of this modification is the same as the impact in the original proposal because it only fixes the editorial problem

Public Comment 6:

Proponent: Patrick Ford, representing selfrequests Disapprove.

Commenter's Reason: Reason: These code changes would allow for structurally unsafe conditions to be inherently designed into tall buildings. As proposed, they would introduce new categories of Type IV construction into the code and expand the number of storeys, allowable areas, and maximum heights of buildings framed with combustible materials. I believe that for several reasons, this would greatly increase the risk to firefighters and building occupants, as well as neighboring buildings. Several of the major decisions that went into the creation of this proposal were based on "engineering judgment" and significant extrapolation of test data from a two storey test building to buildings with dozens more storeys.

Aside from the potentially dangerous and unproven provisions in general, there are several specifics relative to structural connections in these new building types and sizes. I do not believe that these were addressed or at the very least not adequately addressed.

The new building types and increased limits allowed for in these proposals should not be allowed, and the proposals should be disapproved for the following reasons:

The AHC-TWB report that was instrumental in many of the provisions indicates that connections were tested, but in fact, no exposed connections were ever tested in any of the assemblies.

The compartment tests did not test any connections, nor did any of the standard ASTM tests, including the E84, E119, E814, nor the NFPA 285 tests.

The full scale test did not have any exposed connections, yet the code explicitly notes exposed steel and metal caps or brackets allowed in type IV construction within the wood chapter. The exposed metal connectors and their fasteners penetrate well beneath the typical char layer of the structural member, significantly reducing the strength of the member at and near the connection itself. This can create many hot spots and potential critical structural failure locations throughout a tall building. No other tests addressed this issue either.

Adhesive based splice connections remain unproven, the overall adhesive requirements being based on a testing protocol derived after a failed test.

The Small Scale Adhesive Qualification Test Protocol (CSA 077 SSA.2) could conceivably be directed toward such connections or splices, but it is a test that lasts only 5 minutes per side of the tested specimen.

As an additional note, the full scale test was run on only a two storey structure, leaving any critical structural connections that may have been needed to support only a single storey above. With code proposals allowing for many times this, these concerns should be much more carefully vetted before approval.

It should also always be remembered that in no other type of tall building allowed by the code, is the structure itself also fuel for the fire.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There would be no cost increase associated with my comment because if the code proposal were defeated, there would be no change in the building allowable from the current code.

Public Comment 7:

Proponent: Robert Grupe, representing Grupe Gypsum Consulting, LLC (rcgconsult@outlook.com)requests Disapprove.

Commenter's Reason: Overall building performance is predicated on the individual systems that comprise the structure. Further these systems are a series of individual building materials that are integrated based on their performance attributes, and compatibility with adjacent building materials. The proposed Tall Wood-frame construction is based primarily on the use of Cross Laminated Timber, CLT. However the proposal does not address potential compatibility issues, and in some cases lacks critical data to support required performance. Therefore, the CLT, system is not ready for use in wholesale high-rise construction. There are at least two critical system design areas that require additional testing and verification. These two examples are offered here to provide areas of specific concern. These examples are expressed in specific published white papers on the use of Cross-Laminated Timber.

The first example is on acoustics, specifically that of sound transmission through floor-assemblies. The current International Building Code has established minimum requirements for floor-to-floor transmission. In a published white paper entitled **Mass Timber High-Rise Design Research: Museum Tower in Los Angeles Reimagined in Mass Timber** (2015) the following statement is made regarding acoustics:

Testing is required to determine the ability of this assembly to obtain the code-required acoustic performance.

The paper covered the design of a timber-framed high-rise building. The acoustical design of the structure was centered around two floor-ceiling systems proposed for this project, both of which did not have any acoustic testing to substantiate compliance. The above comment followed a written description of each proposed floor/ceiling assembly.

Another issue of concern relating to additional required research is the proper design of connections that can accommodate the naturally occurring shrinking and swelling of CLT members primarily due to seasonal changes. The issue is the compatibility and serviceability of sealants and membranes that are incorporated into the CLT system. The following is taken from the **CLT Handbook** (2013):

Differential movement between CLT and other wood-based products or materials (in case of mixed materials and systems) need to be taken into account at the design and detailing stages due to potential shrinkage-induced stress that could undermine the connection capacity in CLT. More information and guidelines related to detailing will be provided in future versions of this document as additional studies need to be performed.

The point to be made here is that these are critical components in system and ultimately building design that require additional testing and research. It is obvious from the above mentioned white paper and handbook that the composite action of the independent building materials that make up the building systems have yet to be fully researched, tested, and detailed for use in general construction.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 8:

Proponent: Patrick Hainault, representing Self (path@matsenford.com) requests Disapprove.

Commenter's Reason: "Tower of Fire destroys LA apartment complex under construction." This headline in the December 8, 2014 LA Times barely scratches the surface in describing the dangers from fires in buildings under construction when those buildings are framed with wood and wood-based materials. This fire not only destroyed at least 239 of the rental units and 2/3rds of the complex at the Da Vinci Apartments but caused significant damage to neighboring buildings and infrastructure, and greatly burdened the surrounding community in general. Yet, this proposal will dramatically raise the allowable heights and areas of buildings made from combustible materials.

It is not rationale to increase the allowable height of buildings as in this proposal when significant problems in much smaller buildings still present a well-documented risk to life and property. The assembly should overturn the committee decision to effectively prohibit the type of proposed construction until and if it can be proven safe during and after construction. The following paragraphs expand on the issues the assembly should consider in evaluating this proposal.

How do we even begin to come to grips with the risk to adjacent properties and occupied buildings during the construction phase when an 18-story wood structure allowed by this proposal is burning in a suburban or urban area? Without safeguards well beyond those currently in the code (or proposed as part of a series of related proposals) to protect adjacent properties and infrastructure, the impacts will be devastating. For example, the Da Vinci fire caused:

- Damage to adjacent buildings. At least four nearby buildings were damaged. The building at 221 N. Figueroa St., where the computers and cubicles melted, had significant damage on its 15 floors, with 300 windows blown out. Three floors were also damaged in the Los Angeles County Department of Health Services building at 313 N. Figueroa. LA Department of Water and Power staff identified at least 160 damaged windows. A Los Angeles Department of Building and Safety spokesman reported windows blew out in the north tower of its department headquarters, and the heat and smoke triggered sprinklers that soaked carpets and desks. Overall, the Da Vinci Apartments fire caused an estimated \$111.5 million in damages, including \$80 million in damage to city properties from the fire and the water used to extinguish it and \$20-\$30 million to the apartment complex.

- Damage to Infrastructure. A Caltrans spokesman estimated the fire caused \$1.5-million damage to the freeway. Roads were closed around the area including a major commuter route during rush hour. Caltrans officials reported an exit sign over the 110 Freeway melted and would have to be replaced, forcing another freeway closure later the same week.
- Extensive impacts on the community. The attached study of the economic risk to taxpayers and the community posed by mid-rise apartments produced by assistant adjunct professor Urvashi Kaul at Columbia University captures the total cost impacts from fires like the Da Vinci apartments and smaller incidents. This study finds that:
 - In Los Angeles County, alone, fires in mid-rise residential buildings with combustible frames could have a negative impact of \$22.6B over 15 years, including \$17.14B in direct losses from property damage.
 - On average, fire in a mid-rise residential building constructed using combustible framing material costs the Los Angeles County a total of \$141.81 per square foot in potential economic impact and \$2.38 per square foot in lost tax revenues.
 - Potential impact the County may face in a single year could be \$1.7 billion, including \$1.3 billion in direct property damage.

The assembly is also urged to reconsider the argument that cladding requirements proposed to address fires in buildings under construction will resolve these issues. As demonstrated in a large fire from 2015 in a wood-framed apartment building in Edgewater, NJ, cladding will not stop a fire from spreading once the framing in part of the building ignites. It doesn't create a barrier between unexposed framing and exposed framing, but only provides some resistance to ignition from within or outside of the building. The Edgewater fire spread rapidly throughout the buildings once framing behind a wall was ignited during repairs to the occupied and fully-clad building.

The Da Vinci and Edgewater fires are not uncommon incidents. Dozens of similar fires have occurred (see more at <http://buildwithstrength.com/america-is-burning/>) in buildings under construction since the market began broadly taking advantage of relatively recent changes to the IBC that allowed taller and larger wood-framed buildings. In a similar fire in Houston, the life of a construction worker literally hung in the balance as he was rescued from a burning wood framed building just seconds before the stories above came crashing down. The assembly can prevent these types of risks from greatly expanding by disapproving this proposal.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 9:

Proponent: William Hall, representing Alliance for Concrete Codes and Standards (jhall@cement.org) requests Disapprove.

Commenter's Reason: At the recent ICC Committee hearings in Columbus, OH, your committee **Failed you**. The general committee charged with looking at proposals and weighing justification **FAILED** to do their job when it came to Tall Wood Buildings. Despite overwhelming testimony that fire tests were inadequate, the committee simply ignored the fact that the TWB ADHOC committee only considered a two story residential structure during testing, and then used **'Engineering Judgment'** to determine that those results will be sufficient for 18 stories.

WHERE is the testing for all the other occupancy groups? 100% increases in story height are proposed for other use groups **without any justification**.

The ICC TWB ADHOC Committee has taken it upon themselves to develop a prescriptive TWB approach that **exceeds** the allowable heights of every country in the world. The United States just recently began looking at Mass Timber for taller buildings and yet, if this proposal goes through, we will allow mass timber 6 stories higher than any other country.

Not only will the U.S. allow the tallest buildings, we will also allow 12 story Mercantile, Storage and Factory to be built **without** gypsum covering on 40% of the CLT surface.

While mass timber may be an acceptable building material, it has not gone through the rigors of that are needed for high rise buildings. **Do not let the U.S. be the testing ground for these Tall Wood Buildings.**

Vote Disapproval

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

No effect

Public Comment 10:

Proponent: James Narva, National Assoc. of State Fire Marshals, representing National Assoc. of State Fire Marshals (jnarva@narvaassociates.com) requests Disapprove.

Commenter's Reason: The National Association of State Fire Marshals (NASFM) opposes the committee action to approve G75-18, G80-18, and G84-18 as submitted.

The proponent(s) of these proposals (TWB) are attempting to validate, and codify, various changes to the tables regarding height, area, and stories based, in part, on professional judgment of the committee. This concern is exacerbated by the understanding that the historic basis for the underlying table values were themselves somewhat arbitrary. Continued consideration of the TWB concept deserves a continuation of testing, evaluation, an abundance of caution, and always a default to the side of safety.

While NASFM doesn't dismiss the concept out of hand, we do feel the current proposals go too far, too fast, in an area of significant and long-lasting importance. The NASFM Model Codes Committee has observed the process and had members present at various meetings and TWB test burns.

In support of our opposition, we ask ICC members to consider the following aspects of these proposals:

- There is no scientific basis for increasing height and area limits beyond what is currently allowable in code for heavy timber buildings.
- There has been no live fire testing at or near the limits being proposed for these buildings.
- There has been no wind aided fire testing conducted.
- There is incomplete data regarding the fire loading of test burn buildings.
- There was no quantitative or qualitative analysis performed in the testing to measure smoke production from the materials
- There was no testing performed to evaluate the effects of exterior fires or how CLT materials are tested to NFPA 285 for compliance
- Professional judgement is insufficient justification for a change of this magnitude.
- No indication that any seismic testing has been performed or evaluated which goes to the issue of resiliency and sustainability.
- To allow a proliferation of larger, taller wood buildings without proper testing and justification is premature and would impact the fire suppression environment significantly.

In the Reason section of each of the three proposals it states the performance objectives for TWB are:

- No collapse under reasonable scenarios of complete burn-out of fuel without automatic sprinkler protection being considered.
- No unusually high radiation exposure from the subject building to adjoining properties to present a risk of ignition under reasonably severe fire scenarios.
- No unusual response from typical radiation exposure from adjacent properties to present a risk of ignition of the subject building under reasonably severe fire scenarios.
- No unusual fire department access issues.
- Egress systems designed to protect building occupants during the design escape time, plus a factor of safety.
- Highly reliable fire suppression systems to reduce the risk of failure during reasonably expected fire scenarios.
- The degree of reliability should be proportional to evacuation time (height) and the risk of collapse.

Since no full-scale live fire testing has been conducted in buildings constructed to the limits being proposed, and the limited application of external influences to fire behavior, it is extremely difficult to accept that these proposals meet the committees own stated objectives. We are left with professional judgment as the only quantifiable substantiation presented for their passage. In addition, the reason statement places an over reliance on the presence of fire sprinklers. NASFM steadfastly supports the use of fire sprinklers. However, we are cognizant of the fact that sprinklers can never be 100% effective given the impact of human behavior in the areas of design, installation, maintenance, and intentional disabling.

NFPA *Sprinklers in Reported U.S. Fires during 2010 to 2014 Fact Sheet*, July 2017, states, "Sprinklers operated effectively in 88% of the fires large enough to activate them and reported sprinkler failures (660 per year) were twice as common as reported fires in which sprinklers were ineffective and did not control the fire."

- 40% of the combined sprinkler problems were due to system shut-offs.
- In three of every five (59%) incidents in which sprinklers failed to operate, the system had been shut off.
- In half (51%) of the fires in which sprinklers were ineffective, the water did not reach the fire.
- The term highly reliable as used by the TWB committee is subjective at best. While it is agreed that sprinklers provide a valuable life-saving service, it is speculative to base a major part of justification on this one item.
- Code committees, fire service organizations, and fire safety advocates have rightly demanded data to support decisions related to code changes. NASFM feels the limited testing, in conjunction with a proposed commitment to conduct additional tests, is insufficient currently to warrant changes of this magnitude.

On behalf of the National Association of State Fire Marshals we urge the membership to oppose the committee recommendation to approve this code change.

Bibliography: NFPA, *Sprinklers in Reported U.S. Fires during 2010 to 2014 Fact Sheet*, July 2017

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There is no cost increase or decrease associated with this comment due to the fact that it is a comment for dismissal of the original proposal.

Public Comment 11:

Proponent: Tien Peng, representing National Ready Mixed Concrete Association (tpeng@nrmca.org)requests Disapprove.

Commenter's Reason: While the Ad Hoc Committee had intended to validate the fire performance of cross laminated timber in fire conditions of buildings, the AWC/ATF compartment testing was limited in scope and not a thorough predictor of fire behavior for high rise building made of a new material. The testing so far is insufficient to capture the fire response characteristics in question. No tests were done to factor in wind, exterior performance, panel connections or moisture, which impacts material performance, fire-fighting and property damage. CLT is a great innovation for the wood industry but it s not ready for prime time and it s certainly not ready for us to build safely to 270 feet and 18 stories. The ICC should not adopt code provisions that will put people at risk.

1. CLT Reliability and Predictability Issues

Cross laminated timber does not have a long enough history to demonstrate their reliability and predictability. The structural design of modern tall buildings is governed by the need to efficiently transfer loading, particularly that from wind, whilst providing increasingly complex building functionality. The use of cross laminated timber implies a highly optimized systems which means the least amount of material to enabled efficient load transfer. Thus, in the event of a fire there is an increased risk not typical in mid-rise constructions, and especially not in a two-story mock up in a lab.

The NFPA with ARUP *Fire Safety Challenges of Tall Wood Buildings*paper noted (NFPA 2013)[i]:

- In a real fire situation, the load-bearing elements in CLT are expected to load-share , or redistribute in a method that is not easily predicted in simple fire testing.
- Previous CLT fire testing has resulted in delamination and char fall-off when exposed to fire conditions.
- This has the potential to increase the fire temperature and burning rate within the compartment, and could impact the structural fire resistance at later stages in the fire duration.

The full-scale fire testing in Norway (SPFR A15101 2016)[ii] showed:

- The temperature increased fast and flashover was reached after four minutes.
- Temperatures were significantly higher than the standard time-temperature curve according to EN 1363-1
- The fire did not cool down before manual suppression was initiated when the test room collapsed 1-hour 36 minutes after ignition
- The sprinklers in the adjacent corridor did not stop the fire from spreading out from the room of origin.
- The charring rate varied much faster than expected

We should not be putting lives in high rises at risk with this level of material unpredictability.

2. Exposed CLT Fire / Moisture /Delamination Issues

The National Institute of Standards (NIST) tests complete previously said there were concerns that flashover occurred earlier with CLTs, heat delamination of the exposed CLT affected its fire performance and a large re-flash occurred on the exposed wall with delamination of the second ply of the CLT. (NIST 2017)[i]

While fire departments understand the risk of collapse with solid wood, there is not enough documentation or history of bonded or laminated wood structures, and they may fail sooner under fire conditions. The problem is that under fire conditions an adhesive may either thermally soften or chemically degrade causing the member to lose its strength, leading to structural collapse. Hence, we see delamination from the NIST testing as well as the very real construction failure on portions of the new College of Forestry building at Oregon State University where a large section of subflooring made of cross-laminated timber gave way between the second and third stories.

Moisture is an important issue for delamination and in many parts of the country the laminated mass timber panels will experience an environment which may exceed the testing limits. Wood will change in all three orthogonal dimensions with changes in moisture, and the changes are not even. This not only means that some species swell more because of their higher density, but also wood of non-uniform density displays non-uniform swelling. Moreover, as wood swells and shrinks,

adhesives do not follow with the same volumetric expansion. RDH Building Science full-scale mock-up study (Lepage 2017) [ii]notes that, The research indicates that CLT and mass timber is susceptible to dangerously high moisture contents, particularly when exposed to liquid water in horizontal applications. and other research indicate that CLT is at risk of structural damage by decay and rotting fungi (Zabel and Morrell 1992)[iii]

Clearly, we should not be putting lives in high rises at risk with this level of material unpredictability.

3. Fire / Connections Vertical Fire Spread

All connections used in current projects are proprietary and no information is publicly available regarding their performance. In a high-rise fire event, it is essential that the fire be prevented from spreading upwards or downwards from the floor of origin, endangering the lives of those waiting on more remote floors. Typically, the floor slab provides a robust barrier inhibiting external fire spread so long as it remains firmly supported by the structure. However, the AWC/ATF compartment fire testing had not adequately accounted for the connections in the CLT technologies to meet this crucial objective. The deformation of the connections when exposed to fire can expose gaps and flammable materials which can lead to spread both upwards through flaming, and downwards through dripping molten materials. Once fire starts spreading away from the floor of origin the safety of the occupants is compromised. Examples of vertical fire spread include:

- Las Vegas Hilton, USA: 22 Stories in approximately 25 minutes
- Caracas Tower, Venezuela: 17 floors in a 24-hour period
- Windsor Tower, Spain: 19 floors, ~7 hours for spread, 24 hours total fire duration
- TVCC Tower, China: 44 floors, around 15 minutes

4. Fire / Stack Effect

A similar concerning pattern emerges when discussing wind and air movement fire performance. One problem common to high-rises but not found in low-rise buildings is the stack effect movement of air inside the building. This air movement is critical to understand what happens during a fire event, as it can intensify a fire or allow flames and combustion gases to move beyond the room of origin. Fire personnel responding to a high-rise fire event need to understand where smoke and toxic gases may be going. Yet, shrinkage, moisture and creep, common in wood products including CLT, will create unpredictable opportunities for air movement within a building.

Air pressure and thermal differential with the use of CLT panels can shift the neutral pressure plane of the building. In cold weather (positive stack effect), the velocity of air channeling into the core from the lower floors is a very real concern to the occupants when they have to defend in place as well as fire service if the fire egress is compromised with smoke. In warm weather (reverse stack effect), where typically the staging floor is two floors below the fire floor, there can be concern of contamination, if there is unpredictability of where the fire path may be taking.

5. Fire / Wind

We typically associate wind with brush and wildland fires but it is just as important in structural fires.

- In 2009 a Texas probationary fire fighter and captain die as a result of rapid fire progression in a wind driven residential fire. Sustained winds from east/south-east at 17 mph with gusts up to 26 mph.
- Virginia Firefighters Battle Three-Alarm Townhouse Fire in 2011. In assessing the high winds and the fire conditions Battalion Barnes says fire crews tried to attack the flames inside two townhouses, but were forced back by intense heat and falling ceilings.
- In 2012 Prince George s County (Maryland), firefighters arrive on scene to a structure fire with winds impacting the rear of the structure. Shortly after forcing the front door open, they saw a dramatic change in fire behavior. As they made entry, they quickly experienced high velocity and high temperature gases, injuring seven firefighters, two critically.

The American Wood Council compartment fire tests did not account for wind loads.

Wind can add to the hazard to a low-rise fire, but it is most concerning around the upper floors of tall buildings. And high-rise fires create unique safety challenges for occupants and firefighters, even without the influence of wind. Wind can change the FLOW PATH of a fire and in some cases create a blowtorch effect and untenable conditions. When a window in the fire apartment fails, the influx of wind can create significant and rapid increases in the heat production of a fire. Smoke and heat spreading through corridors and stairwells, for instance, can inhibit occupants ability to escape and can limit firefighters ability to rescue them. Conditions in a corridor are of critical importance because it is the route that firefighters use to approach a fire and that occupants use to exit a building.

During the course of any structure fire, the wind may also influence exterior conditions and firefighter safety. Accelerated winds near high rises are caused by the downdraft effect, where the air hits a building and, with nowhere else to go, is pushed up, down and around the sides. The air forced downwards increases wind speed at street level. Tests conducted by National Institute of Standards and Technology (NIST 2012), the Fire Fighting Technology Group, FFTG, on positive pressure ventilation determined that an external wind speed of as low as 10 mph could cause a vented room within a structure to quickly spread from an apartment unit to a vent point, represented by a stairwell door. The spreading had floor-to-ceiling and wall-to-wall fire involvement with blowtorch effects. Moreover, if several towers stand near each other, the channeling effect, a wind acceleration created by air having to be squeezed through a narrow space. This Venturi effect will endanger the adjacent buildings.

6. Fire on Exterior

The AWC/ATF compartment fire tests did not account for exterior fire conditions and the proposed exterior proposal does not meet the required testing of CLT assemblies.

An important aspect of fire behavior in the affected building involves the burning behavior of materials on the exterior. While the AWC/ATF test demonstrated an understanding of CLT in an interior fire situation, the circumstances contributing to ignition scenarios of the exterior can be equally complex and equally important. In the past few years we have seen a number of deadly high-rise fires that propagated on the exterior of the structure.

- 2018 Almas Tower in Dubai, UAE
- 2017 Marco Polo apartment complex in Hawaii
- 2018 Grenfell Tower fire in West London

Simply testing the interior fire scenario does not capture potentially important parameters affecting CLT elements in tall wood buildings. If a fire in a heavy-timber building is not extinguished by the initial attack, a tremendous conflagration with flames coming out of the windows will spread fire to adjoining buildings by radiated heat. In a high-rise fire event, it is essential that the fire be prevented from spreading upwards or downwards from the floor of origin, endangering the lives of those waiting on more remote floors.

Notably missing from the proposals is how the mass timber exterior assembly in buildings over 40 feet in height would comply with NFPA 285, *Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components*.

- *Section 1403.5*: For combustible water-resistive barriers in buildings over 40 feet in height of Type I, II, III, or IV construction.
- *Section 1407.10.4*: For metal composite materials (MCM) used on buildings of Type I, II, III, and **IV** construction.
- *Section 1409.10.4*: For high-pressure decorative exterior-grade compact laminates (HPL) exterior wall coverings used on buildings of Type I, II, III, and **IV** construction.
- *Section 1509.6.2*: Combustible mechanical equipment screens used on buildings of Type I, II, III, and **IV** buildings.
- *Section 2603.5.5*: Exterior walls of buildings of Type I, II, III, and **IV** construction of any height incorporating foam plastic insulation, except for one-story sprinklered buildings.

This is a requirement yet there is no reference to NFPA 285 testing of exterior CLT assemblies. One test by Nordic Engineered Wood published under the Canadian ULC S134 is not enough of a sample size to validate the tall wood proposals. Again, there is not enough historical fires with cross laminated timber to provide information that can be used in an 85-ft building, much less one at 270 feet.

7. Limits of Redundancy

The ICC TW-AHC claimed the added safety factor of active sprinkler systems adds to the safety of the proposals. Without a doubt, the inclusion of fire sprinkler systems in our buildings since the late 1980s has been effective at increasing the chances of survival in a fire. But when systems don't operate as intended (such as in a freeze failure with water damage) or fail in a high-rise fire condition, the impact can be large, not just in monetary terms, but also in the lives of the occupants and fire fighters.

The full-scale fire testing completed in Norway showed the sprinklers in the adjacent corridor did not stop the fire from spreading out from the room of origin. (SPFR A15101 2016).^[iv] Moreover, according to NFPA's report *U.S. Experience with Sprinklers*, sprinklers were effective at controlling the fire in 96% of fires in which they operated, but sprinklers were only effective in 88% of the fires large enough to activate them. The reported sprinkler failures (660 per year) were twice as common as reported fires in which sprinklers were ineffective and did not control the fire. A National Institute of Standards and Technology (NIST) study, *Estimates of Operational Reliability of Fire Protection Systems*, also demonstrates this over-reliance on fire sprinklers is misguided.

8. Untested Reference Standard

State and local governments that adopt and enforce model building codes which references a number of standards. Yet, the proposals regularly cite the newly referenced standard, *ANSI/APA PRG 320-2018: Standard for Performance-Rated Cross-Laminated Timber*, an untested document. The reference to ANSI/APA PRG 320-2018 resolves nothing and takes no legal responsibility for performance failure. APA PRG 320 has no real history of use or validation as a reliable document and no jurisdiction refers to this document. It is premature to utilize a standard that is rarely referenced and start building to 18 stories from it.

Bibliography: [i] <https://www.nist.gov/el/fire-research-division-73300/national-fire-research-laboratory-73306/fire-safety-challenges-0>

[ii] <https://buildingsciencelabs.com/wp-content/uploads/2017/11/CCBST-2017-Moisture-Uptake-Testing-for-CLT-Floor-Panels.pdf>

[iii] Zabel RA, Morrell JJ (2012) Wood microbiology: decay and its prevention. Academic press.

[iv] <http://www.mypaper.se/html5/customer/355/11143/?page=21>

[v] https://sustainable-fire-engineering.sustainable-design.ie/wp-content/uploads/2015/08/NFPA-FPRF_Tall-Wood-Buildings-Fire-Safety-Challenges_2013.pdf

[vi] <http://www.mypaper.se/html5/customer/355/11143/?page=21>

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposed public comment would **reduce cost of construction**. Substantiation and references below.

1. Research:

A recent feasibility study [[i]] reveals that CLT construction is significantly more costly than other well-established construction methods such as concrete. Renowned structural engineers, Cary Kopczynski & Company found that the cost of the CLT structural system for a typical 10 story apartment building would cost \$48 to \$56 per square foot compared to \$42 to \$46 per square foot for concrete, translating nearly **20% premium** for Cross Laminated Timber.

2. Brock Commons, British Columbia

Per "University of British Columbia: Report to The Board of Governors, Tall Wood Student Residence, Brock Commons Phase 1" Report [[ii]], dated September 30, 2014,

- "The capital cost for the project is estimated at \$44 million (\$40m standard construction, plus \$4m wood premium)."
- "The \$4m estimated premium for advanced wood design and construction is to be funded from external sources including \$3.45m secured to date from the Canada Wood Council (CWC) and Forest Innovation Investment."

This is a **10% premium** for Cross Laminated Timber at the 18-Story Brock Commons.

3. Framework Oregon:

Per the January 5, 2018 *Portland Oregonian* article "Wheeler Defends Decision to Invest in Pricey Complex" of the Portland Oregonian[[iii]],

- "While each unit is expected to cost an average \$480,000 to build, the city's contribution will amount to \$100,000 per apartment."
- Despite a pledge from Mayor Ted Wheeler to bring down the cost of affordable housing in Portland, the Portland Housing Bureau had nonetheless awarded the building \$6 million toward the \$29 million total. (A **21% subsidy** by the taxpayers for the 12- Story Framework project).

By the July 16, 2018 *Willamette Week (WW)* article "Plans for Record-Setting Timber Tower in Downtown Portland Fall Through" [[iv]] reported,

- The building, which was slated to include 60 *affordable* apartments, was projected to cost \$651.43 per square foot, *WW* reported in December. (The 660-square foot two bedroom apartments were projected to cost \$567,389 to build.)

4. Lumber Pricing:

And this doesn't consider the recent price increases of softwood lumber that have risen wildly from \$424 per board foot a year ago to \$536 in the second quarter of 2018. That's a **26% increase** in just one year. At the same time, concrete prices rose at a stable rate of 5%.

[i] http://buildingstudies.org/pdf/related_studies/Cross_Laminated_Timber_Feasibility_Study_Feb-2018.pdf

[ii] http://bog2.sites.olt.ubc.ca/files/2014/09/3.2_2014.09_Tall-Wood-Building.pdf

[iii] https://www.oregonlive.com/politics/index.ssf/2018/01/portland_mayor_ted_wheeler_def.html

[iv] <http://www.wweek.com/news/city/2018/07/16/plans-for-record-setting-timber-tower-in-downtown-portland-fall-through/>

Public Comment 12:

Proponent: Adam Shoemaker, representing ClarkDietrich (adam.shoemaker@clarkdietrich.com) requests Disapprove.

Commenter's Reason: IBC Section 602.2 states that Types I and II construction are those types of construction in which the building elements listed in Table 601 are of noncombustible materials, except as permitted in Section 603 and elsewhere in this code.

In table 601, Type IB and proposed Type IVB have the same Fire-Resistance Rating (FRR) requirements. I don't believe you can justify in this proposal to allow combustible AND non-combustible elements with the same FRR to have the same allowable building heights in table 504.3. It is not reasonable to extrapolate a two-story fire test into a 180-foot tall building with combustible structural elements, when a structure with non-combustible elements has the same allowable height.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
No cost effect.

Public Comment 13:

Proponent: Richard Swan, representing International Association of Fire Fighters (rswan@iaff.org) requests Disapprove.

Commenter's Reason: At this time the International Association of Fire Fighters is unable to support any change in the height or area of this type of construction. We believe there is still not enough research into many of the components and there is still little data on the materials and components used in the building of these products.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
If not adopted no change to the public on cost.

Public Comment 14:

Proponent: Larry Williams, representing Steel Framing Industry Association requests Disapprove.

Commenter's Reason: The leap in assumptions that fire tests on a two-story mock up can be extrapolated to fire performance of an 18-story building is an unreasonable extension in the allowance for use of "professional judgement." Proponents of G108-18 and related proposals state that the expected fire performance of mass timber buildings was "validated by a series of full scale multiple-story fire tests." However, the actual model tested was only two storeys in height, and from this test users are expected to have confidence that a 180-foot tall building construction with cross-laminated timber will exhibit identical performance.

The fundamental problem of this assumption is that some characteristics of large fires have not been observed on small fires, either because they do not occur in small fires or because they are too small to be detected. It seems likely that a different set of controls of fire behavior may take over after a fire reaches a certain size or intensity. The difficulty of extrapolating from small to large fires is further complicated by the fact that behavior of fire is a pattern phenomenon--the behavior at one point is often dependent on the behavior at another point. The behavior of one part of a fire may change even if burning conditions at that point do not vary when the characteristics of the fire at some other point changes.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with current requirements.

Public Comment 15:

Proponent: Dan Nichols, representing ICC Code Correlation Committee (ccc@iccsafe.org).

Commenter's Reason: The Code Correlation Committee (CCC) is not taking a position on this code change. The CCC submitted this public comment in order to bring a correlation issue to the attention of the full voting membership for the Public Comment Hearings and the Online Governmental Consensus Vote to allow the voting membership to coordinate actions on a package of code changes submitted dealing with tall wood buildings of mass timber construction. This package includes the parent proposal G108-18; if disapproved, the related proposals G28-18, G75-18, G80-18, G84-18,

G89-18, FS5-18, FS6-18, FS73-18, FS81-18 and F266-18, will not be correlated with any existing code text if they are approved.

The Code Correlation Committee is a standing committee of the International Code Council whose objectives, procedures and organization are set forth in Council Policy CP#44-13. The objective of the Code Correlation Committee is to maintain technical and editorial consistency among the International Codes and to assist staff in the evaluation and processing of code change proposals and comments that are exclusively editorial.

G75-18

G76-18

IBC: Table TABLE 504.3, Table TABLE 504.4

Proposed Change as Submitted

Proponent: Stephen Skalko, Stephen V. Skalko, P.E. & Associates, LLC, representing Masonry Alliance for Codes and Standards (svskalko@svskalko-pe.com); Jason Krohn, representing Precast/Prestressed Concrete Institute (jkrohn@pci.org); William Hall, Portland Cement Association, representing Alliance For Concrete Codes and Standards (jhall@cement.org)

2018 International Building Code

Revise as follows

**TABLE 504.3
ALLOWABLE BUILDING HEIGHT IN FEET ABOVE GRADE PLANE^a**

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION									
	SEE FOOTNOTES	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
A, B, E, F, M, S, U	NS ^b	UL	160	65	55	65	55	65	50	40
	S	UL	180	85	75	85	75	85	70	60
B	NS	UL	160	80	55	65	55	65	50	40
	S	UL	180	100	75	85	75	85	70	60
H-1, H-2, H-3, H-5	NS ^{c, d}	UL	160	65	55	65	55	65	50	40
	S	UL	180	85	75	85	75	85	70	60
H-4	NS ^{c, d}	UL	160	65	55	65	55	65	50	40
	S	UL	180	85	75	85	75	85	70	60
I-1 Condition 1, I-3	NS ^{d, e}	UL	160	65	55	65	55	65	50	40
	S	UL	180	85	75	85	75	85	70	60
I-1 Condition 2, I-2	NS ^{d, e, f}	UL	160	65	55	65	55	65	50	40
	S	UL	180	85	75	85	75	85	70	60
I-4	NS ^{d, g}	UL	160	65	55	65	55	65	50	40
	S	UL	180	85	75	85	75	85	70	60
R ^h	NS ^d	UL	160	65 80	55	65	55	65	50	40
	S13D	60	60	60	60	60	60	60	50	40
	S13R	60	60	60	60	60	60	60	60	60
	S	UL	180	85 100	75	85	75	85	70	60

For SI: 1 foot = 304.8 mm.

UL = Unlimited; NS = Buildings not equipped throughout with an automatic sprinkler system; S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with

- See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.
- See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.
- New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.
- The NS value is only for use in evaluation of existing building height in accordance with the International Existing Building Code.
- New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies Condition 1, see Exception 1 of Section 903.2.6.
- New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and Section 1103.5 of the *International Fire Code*.
- For new Group I-4 occupancies, see Exceptions 2 and 3 of Section 903.2.6.
- New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.

**TABLE 504.4
ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE^{a, b}**

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION									
	SEE FOOTNOTES	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
A-1	NS	UL	5	3	2	3	2	3	2	1

	S	UL	6	4	3	4	3	4	3	2
A-2	NS	UL	11	3	2	3	2	3	2	1
	S	UL	12	4	3	4	3	4	3	2
A-3	NS	UL	11	3	2	3	2	3	2	1
	S	UL	12	4	3	4	3	4	3	2
A-4	NS	UL	11	3	2	3	2	3	2	1
	S	UL	12	4	3	4	3	4	3	2
A-5	NS	UL	UL	UL	UL	UL	UL	UL	UL	UL
	S	UL	UL	UL	UL	UL	UL	UL	UL	UL
B	NS	UL	11	5 <u>6</u>	3	5	3	5	3	2
	S	UL	12	6 <u>7</u>	4	6	4	6	4	3
E	NS	UL	5	3	2	3	2	3	1	1
	S	UL	6	4	3	4	3	4	2	2
F-1	NS	UL	11	4	2	3	2	4	2	1
	S	UL	12	5	3	4	3	5	3	2
F-2	NS	UL	11	5	3	4	3	5	3	2
	S	UL	12	6	4	5	4	6	4	3
H-1	NS ^{c, d}	1	1	1	1	1	1	1	1	NP
	S									
H-2	NS ^{c, d}	UL	3	2	1	2	1	2	1	1
	S									
H-3	NS ^{c, d}	UL	6	4	2	4	2	4	2	1
	S									
H-4	NS ^{c, d}	UL	7	5	3	5	3	5	3	2
	S	UL	8	6	4	6	4	6	4	3
H-5	NS ^{c, d}	4	4	3	3	3	3	3	3	2
	S									
I-1 Condition 1	NS ^{d, e}	UL	9	4	3	4	3	4	3	2
	S	UL	10	5	4	5	4	5	4	3
I-1 Condition 2	NS ^{d, e}	UL	9	4	3	4	3	4	3	2
	S	UL	10	5	4	5	4	5	4	3
I-2	NS ^{d, f}	UL	4	2	1	1	NP	1	1	NP
	S	UL	5	3	2	2	2	2	2	1
I-3	NS ^{d, e}	UL	4	2	1	2	1	2	2	1
	S	UL	5	3	2	3	2	3	3	2
I-4	NS ^{d, g}	UL	5	3	2	3	2	3	1	1
	S	UL	6	4	3	4	3	4	2	2
M	NS	UL	11	4	2	4	2	4	3	1
	S	UL	12	5	3	5	3	5	4	2
R-1 ^h	NS ^d	UL	11	4	4	4	4	4	3	2
	S13R	4	4	4	4	4	4	4	4	3
	S	UL	12	5 <u>6</u>	5	5	5	5	4	3
R-2 ^h	NS ^d	UL	11	4	4	4	4	4	3	2
	S13R	4	4	4	4	4	4	4	4	3
	S	UL	12	5 <u>6</u>	5	5	5	5	4	3
R-3 ^h	NS ^d	UL	11	4	4	4	4	4	3	3
	S13D	4	4	4	4	4	4	4	3	2
	S13R	4	4	4	4	4	4	4	4	3
	S	UL	12	5 <u>6</u>	5	5	5	5	4	4

R-4 ^h	NS ^d	UL	11						3	2
	S13D	4	4	4	4	4	4	4	3	2
	S13R	4	4						4	3
	S	UL	12	5 6	5	5	5	5	4	3
S-1	NS	UL	11	4	2	3	2	4	3	1
	S	UL	12	5	3	4	3	5	4	2
S-2	NS	UL	11	5	3	4	3	4	4	2
	S	UL	12	6	4	5	4	5	5	3
U	NS	UL	5	4	2	3	2	4	2	1
	S	UL	6	5	3	4	3	5	3	2

UL = Unlimited; NP = Not Permitted; NS = Buildings not equipped throughout with an automatic sprinkler system; S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

- a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.
- b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.
- c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.
- d. The NS value is only for use in evaluation of existing building height in accordance with the International Existing Building Code.
- e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies, Condition 1, see Exception 1 of Section 903.2.6.
- f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and 1103.5 of the International Fire Code.
- g. For new Group I-4 occupancies, see Exceptions 2 and 3 of Section 903.2.6.
- h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.

Reason: Since development of the early building codes, and even with the International Building Code today, building size has typically been determined based on a combination of factors; (a) the occupancy type for the building; (b) the materials used to construct the building; and (c), the presence of automatic sprinkler protection. Regarding occupancy types, the fire loads associated with contents found in a particular occupancy group and the relative risk of danger to the occupants from fire because of the occupancy characteristics are considered. For the materials used to construct the building the presence of combustible materials used in the construction of the building structure itself are key. As the quantity of combustible materials decreases the relative risk of fire size, spread of fire to adjacent properties, and danger to the fire service are less such that the building sizes are allowed to increase. Another factor considered from a building materials aspect is the degree of fire resistance provided. When structural fire resistance is provided to the load carrying structural members the risk of damage to the structure or potential for collapse is also considered reduced. Finally, sprinkler protection has been utilized as a factor in allowing increases in the size of buildings. A good discussion of these concepts can be found in the report *"Fire-Resistance Classifications of Building Construction"*, Report BMS92, National Bureau of Standards, October 7, 1942.

One thing of importance in the report is that buildings constructed of noncombustible materials and provided with at least 1-hour of fire resistance (classified as Fireproof construction in the report) were considered to be a much lower risk to the safety of the occupants and fire service, and to the spread of fire, than buildings constructed of noncombustible materials with little or no fire resistance (classified as Incombustible construction in the report). The same was said for buildings constructed with a combination of noncombustible exterior walls and interior combustible structural materials (classified as Exterior-Protected construction in the report). Hence the report advised that these noncombustible buildings with at least 1-hour fire resistance could be built to taller heights due to the lack of combustible materials in the structural systems combined with some level of fire resistance.

Unfortunately, when you look at Tables 504.3 and 504.4 in the 2018 International Building Code, building occupancies with low internal fire loads such as Group B, Business and Group R, Residential, when constructed of one-hour fire rated noncombustible construction (i.e. Type IIA), are not given due credit for the enhanced fire risk attributes when compared to

buildings of one-hour fire resistance construction using a combination of noncombustible exterior walls and interior combustible structural materials (i.e. Types IIIA and Type IV). This is especially apparent when comparing these Group B and R occupancies to Group F, Factory and Group S, Storage Occupancies in Table 504.4.

Recognizing the lower fire risk of Type IIA construction compared to Type IIIA and Type IV construction, this code change proposes permitting Group B and Group R buildings of Type IIA construction to be built one story and 15-feet higher. These increases are attributed to elimination of the fire load present in the structural components, combined with the 1-hour fire resistance for these noncombustible structural elements, consistent with the fire safety premises for building construction types in BMS92. The new story heights are increased in proportion to the story heights/number of stories for existing buildings of Type IIA Group B and Group R, with rounding to be consistent with other values in Table 504.3.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Presently Group B and R occupancy buildings of noncombustible construction with 1-hour fire resistance (i.e. Type IIA) are only allowed to be built to the same story height as buildings of Group B and R occupancy with a combination combustible/noncombustible construction and a 1-hour fire resistance (i.e. Type IIIA and IV). However, to build Group B or R occupancy buildings of noncombustible construction taller, the fire resistance of the structural elements (i.e. columns and floors) are required to be increased to 2-hours (i.e. Type IB construction).

This proposal recognizes the improved fire safety of Group B and R occupancy buildings of Type IIA construction, compared to Types IIIA and IV construction of the same occupancy groups, since Type IIA buildings have a reduced fire load associated with the reduced use of combustible structural components. Allowing one additional story height of Group B and R occupancy buildings without having to increase the fire resistance of columns and floors will reduce the cost of construction of these noncombustible buildings Group B and R occupancies.

G76-18

Public Hearing Results

Errata: Missing table cells have been restored.

Committee Action:

Disapproved

Committee Reason: The committee felt that a newer study and analysis is needed before making this change in the current code. In addition, the proposal conflicts with Section 510.6. (Vote: 13-1)

Assembly Action:

None

G76-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Stephen Skalko, representing Precast/Prestressed Concrete Institute (svskalko@svskalko-pe.com); Jason Krohn, Precast/Prestressed Concrete Institute, representing Precast/Prestressed Concrete Institute (jkrohn@pci.org); William Hall, Alliance for Concrete Codes and Standards, representing Alliance for Concrete Codes and Standards (jhall@cement.org)requests As Submitted.

Commenter's Reason: REASON: G76-18 is recommended for Approval As Submitted based on an additional technical study to answer the General Committee concerns.

Previously in the support statement for G76-18 it was identified that buildings constructed of noncombustible materials and provided with at least 1-hour of fire resistance (classified as Fireproof construction in the report) were considered to be a much lower risk to the safety of the occupants and fire service, and to the spread of fire, than buildings constructed of noncombustible materials with little or no fire resistance (classified as Incombustible construction in the report). The same was said for buildings constructed with a combination of noncombustible exterior walls and interior combustible structural materials (classified as Exterior-Protected construction in the report). These conclusions were cited from the report *Fire-Resistance Classifications of Building Construction*, Report BMS 92, National Bureau of Standards, October 7, 1942.

In their reason for Disapproval the General Committee stated *a newer study and analysis is needed before making this change in the current code*. Responding to this reason for disapproval an additional analysis has been performed to show that a building constructed of noncombustible materials poses a far less risk to the occupants and fire service than one constructed wholly or partly of combustible materials. This analysis was done by comparing the fire load density (FLD) of the occupied floor for an example Group R, Residential constructed of Type IIA construction and the same building constructed of Type IIIA construction.

The FLD can be defined as the fire load per unit floor area of a building and is well documented to reflect the total fire load in a building consisting of: (1) *combustible materials generally comprising furniture, equipment and stored objects goods*; and (2), *combustible components of the structural elements (permanent fire load) which can burn during a fire*. [p 1131, Chapter 35, SFPE Handbook of Fire Protection Engineering, Vol. 1, 2016.]. In comparing buildings of Type IIA construction with Type IIIA construction, the fire load portion of the FLD attributable to furniture, equipment, etc. can be treated as equal since it can be assumed the residents of a dwelling will have the same general fire load regardless of the building construction type. Thus, the main difference in the FLD of the building which can pose additional risk to occupants and fire service will be reflected by the permanent fire load of the structural components which can burn during a fire (e.g. the structural wood components).

The example building used in the analysis is a fully sprinklered, 5-story apartment building that is 23,056 square feet in footprint area. The typical floor plan and dimensions are shown in Figure 1.

Building structural features are approximately as follows:

- Exterior walls (bearing) - 2X6 fire retardant treated studs @ 16-in o.c. Total length 766 feet
- Interior walls between dwelling units (bearing) DBL 2X4 wood studs @ 16-in o.c. Total length 480 feet
- Interior corridor walls (bearing) - 2X4 wood studs @ 16-in o.c. Total length 580 feet
- Floor system 18-inch wood floor trusses, 3/4-inch gypcrete on 3/4-structural wood floor panel, 5/8-in Type X GWB on resilient channels.
- Roof system pre-engineered wood trusses (4:12 slope), 5/8-in structural wood sheathing, asphalt shingle roof

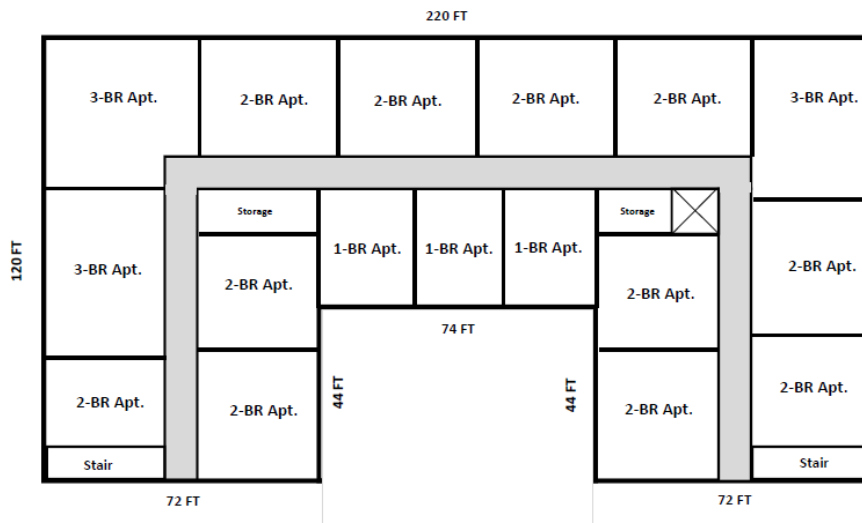


FIGURE 1

Typical Floor for 5-story

Apartment Building

The permanent fire load of the structural components of a Type IIA building can generally be considered insignificant since the components are required to be of non-combustible materials according to the IBC. For the Type IIIA building the analysis examined the structural fire load contributed by the framing members of the exterior walls, the interior dwelling unit separation walls, the interior corridor walls and the structural wood floor panels. The additional contribution to the fire load density by the combustible interior non-bearing walls within each apartment and the floor trusses were not included. These were not considered for simplicity of the calculations but their inclusion would significantly increase the fire load density for each floor of the building so the conclusions reported are conservative.

In Section 7.3.2 of NFPA 557, *Standard for Determination of Fire Loads for Use in Structural Fire Protection Design, 2016*, the heat of combustion value for materials derived entirely of wood can be accepted as the value of 15MJ/kg. Further, in recognition of the fire retarding properties of some wood products, Section 7.3.4.6 of NFPA 557 permits the heat of combustion value to be taken as 10 MJ/kg. These values, converted to IP units, were used in this analysis. The IP units used are 6448 BTU/LB and 4,299 BTU/LB, respectively.

The wood species used in buildings of Type IIIA construction can vary depending on location and structural design parameters however, conservatively, the wood density was assumed to be 33-LB/FT³. This value is consistent with the mid-range density for several wood species commonly used for light wood frame buildings. Taking into consideration a combination of wood studs, and top and bottom plates, the fire load contribution of wood for the three wall systems based on the heat of combustion of the wood can be summarized as follows [Ceiling height of the example apartment was specified at 8-ft 11-in]:

- 766 feet of 2X6 fire retardant wood studs for the exterior walls contributes approximately 61 million BTUs to the fire load per floor.
- 480 feet of DBL 2X4 wood studs for the tenant walls contributes approximately 68 million BTUs to the fire load per floor.
- 580 feet of 2X4 wood studs for the corridor walls contributes approximately 42 million BTUs to the fire load per floor.

In addition to the walls noted, consideration was also given to include the quantity of wood floor sheathing contributing to the fire load for the typical floor. Based on nominal 3/4-thick structural wood panels and excluding the floor openings for the two stairs and elevator shaft, the contribution is estimated to be 276 million BTUs per story for the 23,056 ft² example building floor area.

Thus, the fire load attributable to much of the wood framing on each story of the example building is over 400 million BTUs of fire load. Divided by the building area this results in an FLD attributable to the main light framed wood walls and floor deck of about 17,350 BTU/ft². This value makes it apparent why the BMS 92 Study referenced above concluded that noncombustible buildings with one-hour fire resistance (i.e. Type IIA) were considered a much lower risk to the safety of the occupants and the fire service, and to the spread of fire than buildings classified as Exterior-Protected construction (i.e. Type III) in the report.

To further illustrate this point, Figures 2 and 3 show two buildings under construction. Figure 2 is a 6-story building of noncombustible framing (i.e. like Type II). Figure 3 is a 5-story building of combustible framing (i.e. like Type III). These pictures illustrate the difference in the amount of combustible materials present based on construction type reflected by the analysis above.



Figure 2

Noncombustible Framing



Figure 3

Combustible Framing

Recognizing the lower fire risk of Type IIA construction compared to Type IIIA and Type IV construction, this code change proposes permitting Group B and Groups R buildings of Type IIA construction to be built one story and 15-feet higher. These increases are attributed to elimination of the fire load present in the structural components, combined with the 1-hour fire resistance for these noncombustible structural elements, consistent with the fire safety premises for building construction types in BMS92. The new story heights are increased in proportion to the story heights/number of stories for

existing buildings of Type IIA Group B and Groups R, with rounding to be consistent with other values in Table 504.3. This proposal is also consistent with story increase allowed for Group F and S occupancy buildings, which contain much larger FLD due to contents, when changing from Type IIIA construction to Type IIA construction in Table 504.4.

The other item the General Committee noted in their reason statement was that the proposal conflicts with IBC Section 510.6. Upon examination of Section 510.6 this conclusion is not correct. In Section 510.1 the code identifies that the following provisions in this section (i.e. 510), including 510.6, are for the purpose of exempting from, or modify, the specific requirements of Chapter 5, such as allowable heights and areas based on the occupancy classification and type of construction. Thus, Section 510.6 specifically allows a height increase for Type IIA buildings in Groups R-1 and R-2 up to nine stories and 100-feet in height provided the other requirements in the section are followed. Nothing would prohibit the code user from applying Section 510.6 if they wanted to build a Group R-1 or R-2 building of Type IIA construction up to nine stories and 100-feet provided that section is followed.

By the same token, the code does not require any of the provisions in Section 510 be met provided the normal height and area requirements in Chapter 5 are met. Approval of G76-18 will allow Group R-1 R-2 buildings of Type IIA construction up to 6-stories in recognition that the fire risk to occupants and the fire service is significantly reduced when combustible structural components permitted in 5-story Type IIIA construction buildings are removed when Type IIA construction is chosen.

Recommend APPROVAL AS SUBMITTED for G76-18.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. Presently Group B and R occupancy buildings of noncombustible construction with 1-hour fire resistance (i.e. Type IIA) are only allowed to be built to the same story height as buildings of Group B and R occupancy with a combination combustible/noncombustible construction and a 1-hour fire resistance (i.e. Type IIIA and IV). However, to build Group B or R occupancy buildings of noncombustible construction taller, the fire resistance of the structural elements (i.e. columns and floors) are required to be increased to 2-hours (i.e. Type IB construction).

This proposal recognizes the improved fire safety of Group B and R occupancy buildings of Type IIA construction, compared to Types IIIA and IV construction of the same occupancy groups, since Type IIA buildings have a reduced fire load associated with the reduced use of combustible structural components. Allowing one additional story height of Group B and R occupancy buildings without having to increase the fire resistance of columns and floors will reduce the cost of construction of these noncombustible buildings Group B and R occupancies.

G76-18

G80-18

IBC: Table TABLE 504.4

Proposed Change as Submitted

Proponent:

Stephen DiGiovanni, representing ICC Ad Hoc Committee on Tall Wood Buildings (TWB)
(TWB@iccsafe.org)

2018 International Building Code

Revise as follows

TABLE 504.4

ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE^{a, b}

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION					
	TYPE IV			TYPE IV	TYPE V	
	A	B	C	HT	A	B
A-1	<u>3</u>	<u>3</u>	<u>3</u>	3	2	1
	<u>9</u>	<u>6</u>	<u>4</u>	4	3	2
A-2	<u>3</u>	<u>3</u>	<u>3</u>	3	2	1
	<u>18</u>	<u>12</u>	<u>6</u>	4	3	2
A-3	<u>3</u>	<u>3</u>	<u>3</u>	3	2	1
	<u>18</u>	<u>12</u>	<u>6</u>	4	3	2
A-4	<u>3</u>	<u>3</u>	<u>3</u>	3	2	1
	<u>18</u>	<u>12</u>	<u>6</u>	4	3	2
A-5	<u>1</u>	<u>1</u>	<u>1</u>	UL	UL	UL
	<u>UL</u>	<u>UL</u>	<u>UL</u>	UL	UL	UL
B	<u>5</u>	<u>5</u>	<u>5</u>	5	3	2
	<u>18</u>	<u>12</u>	<u>9</u>	6	4	3
E	<u>3</u>	<u>3</u>	<u>3</u>	3	1	1
	<u>9</u>	<u>6</u>	<u>4</u>	4	2	2
F-1	<u>3</u>	<u>3</u>	<u>3</u>		2	1
	<u>10</u>	<u>7</u>	<u>5</u>	5	3	2
F-2	<u>5</u>	<u>5</u>	<u>5</u>	5	3	2
	<u>12</u>	<u>8</u>	<u>6</u>	6	4	3
H-1	<u>NP</u>	<u>NP</u>	<u>NP</u>			
	<u>1</u>	<u>1</u>	<u>1</u>	1	1	NP

H-2	<u>1</u>	<u>1</u>	<u>1</u>	2	1	1
	<u>2</u>	<u>2</u>	<u>2</u>			
H-3	<u>3</u>	<u>3</u>	<u>3</u>	4	2	1
	<u>4</u>	<u>4</u>	<u>4</u>			
H-4	<u>5</u>	<u>5</u>	<u>5</u>	5	3	2
	<u>8</u>	<u>7</u>	<u>6</u>	6	4	3
H-5	<u>2</u>	<u>2</u>	<u>2</u>	3	3	2
	<u>3</u>	<u>3</u>	<u>3</u>			
I-1 Condition 1	<u>4</u>	<u>4</u>	<u>4</u>	4	3	2
	<u>10</u>	<u>7</u>	<u>5</u>	5	4	3
I-1 Condition 2	<u>3</u>	<u>3</u>	<u>3</u>	4	3	2
	<u>10</u>	<u>6</u>	<u>4</u>			
I-2	<u>NP</u>	<u>NP</u>	<u>NP</u>	1	1	NP
	<u>7</u>	<u>5</u>	<u>1</u>			
I-3	<u>2</u>	<u>2</u>	<u>2</u>	2	2	1
	<u>7</u>	<u>5</u>	<u>3</u>	3	3	2
I-4	<u>3</u>	<u>3</u>	<u>3</u>	3	1	1
	<u>9</u>	<u>6</u>	<u>4</u>	4	2	2
M	<u>4</u>	<u>4</u>	<u>4</u>	4	3	1
	<u>12</u>	<u>8</u>	<u>6</u>	5	4	2
R-1 ^h	<u>4</u>	<u>4</u>	<u>4</u>	4	3	2
					4	3
	<u>18</u>	<u>12</u>	<u>8</u>	5	4	3
R-2 ^h	<u>4</u>	<u>4</u>	<u>4</u>	4	3	2
					4	3
	<u>18</u>	<u>12</u>	<u>8</u>	5	4	3
R-3 ^h					3	3
	<u>4</u>	<u>4</u>	<u>4</u>	4	3	3
					4	4
	<u>18</u>	<u>12</u>	<u>5</u>	5	4	4
R-4 ^h					3	2
	<u>4</u>	<u>4</u>	<u>4</u>	4	3	2
					4	3
	<u>18</u>	<u>12</u>	<u>5</u>	5	4	3
S-1	<u>4</u>	<u>4</u>	<u>4</u>	4	3	1
	<u>10</u>	<u>7</u>	<u>5</u>	5	4	2
S-2	<u>4</u>	<u>4</u>	<u>4</u>	4	4	2
	<u>12</u>	<u>8</u>	<u>5</u>	5	5	3
U	<u>4</u>	<u>4</u>	<u>4</u>	4	2	1
	<u>9</u>	<u>6</u>	<u>5</u>	5	3	2

PORTIONS OF TABLE NOT SHOWN REMAIN UNCHANGED

~~UL~~TUL = Unlimited; NP = Not Permitted; NS = Buildings not equipped throughout with an automatic sprinkler system; S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

- a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.
- b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.
- c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.
- d. The NS value is only for use in evaluation of existing building height in accordance with the International Existing Building Code.
- e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies, Condition 1, see Exception 1 of Section 903.2.6.
- f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and 1103.5 of the International Fire Code.
- g. For new Group I-4 occupancies, see Exceptions 2 and 3 of Section 903.2.6.
- h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.

Reason:

The Ad Hoc Committee on Tall Wood Buildings (TWB) was created by the ICC Board to explore the science of tall wood buildings and take action on developing code changes for tall wood buildings. The TWB has created several code change proposals with respect to the concept of tall buildings of mass timber and the background information is at the end of this Statement. Within the statement are important links to information, including documents and videos, used in the deliberations which resulted in these proposals.

The TWB and its various WGs held meetings, studied issues and sought input from various expert sources around the world. The TWB has posted those documents and input on its website for interested parties to follow its progress and to allow those parties to, in turn, provide input to the TWB.

At its first meeting, the TWB discussed a number of performance objectives to be met with the proposed criteria for tall wood buildings:

1. No collapse under reasonable scenarios of complete burn-out of fuel without automatic sprinkler protection being considered.
2. No unusually high radiation exposure from the subject building to adjoining properties to present a risk of ignition under reasonably severe fire scenarios.
3. No unusual response from typical radiation exposure from adjacent properties to present a risk of ignition of the subject building under reasonably severe fire scenarios.
4. No unusual fire department access issues.
5. Egress systems designed to protect building occupants during the design escape time, plus a factor of safety.

6. Highly reliable fire suppression systems to reduce the risk of failure during reasonably expected fire scenarios. The degree of reliability should be proportional to evacuation time (height) and the risk of collapse.

The comprehensive package of proposals from the TWB meet these performance objectives.

The TWB also determined that fire testing was necessary to validate these concepts. At its first meeting, members discussed the nature and intention of fire testing so as to ensure meaningful results for the TWB and, more specifically, for the fire service. Subsequently a test plan was developed. The fire tests consisted of one-bedroom apartments on two levels, with both apartments having a corridor leading to a stair. The purpose of the tests was to address the contribution of mass timber to a fire, the performance of connections, the performance of joints, and to evaluate conditions for responding fire personnel. The Fire WG then refined the test plan, which was implemented with a series of five, full-scale, multiple-story building tests at the Alcohol, Tobacco and Firearms (ATF) laboratories in Beltsville, MD. The results of those tests, as well as testing conducted by others, helped form the basis upon which the Codes WG developed its code change proposals. This code change proposal is one of those developed by the Codes WG and approved by the TWB.

To review a summary of the fire tests, please visit:

<http://bit.ly/ATF-firetestreport>

To watch summary videos of the fire tests, which are accelerated to run in 3-1/2 minutes each, please visit: <http://bit.ly/ATF-firetestvideos>.

Both of these links were confirmed active on 12/27/17.

Number of Stories

This proposal addresses the building height, in terms of the number of stories, for the three new construction types proposed by the TWB. As set forth in the proposal to Section 602.4, the three new types of construction are Types IV-A, IV-B, and IV-C. The Committee examined each proposed type of construction for its safety and efficacy with regard to each occupancy.

The following approach was considered appropriate for the heights of the new construction types, based on the conclusions of the Committee:

1. Based upon TWB review of fire safety and structural integrity performance, Type IV-B is equated to Type I-B for height (in number of stories). A noteworthy item is that, per Section 403.2.1.1 of the IBC, Type I-B construction is permitted to be reduced to 1-hour Fire Resistance Rating (FRR); however, the TWB does not propose to allow the same reduction for Type IV-B. As a result, the comparison is between 2-hr mass timber construction that is permitted to be partially unprotected, versus 1-hr Type IB construction, and the Committee believes that 2-hr mass timber construction that is partially exposed per the limits of proposed Section 602.4 warrants the same heights as allowed for 1-hr Type I-B construction;
2. Type IV-A should be somewhat larger than IV-B, as Type IV-A construction is entirely protected (no exposed mass timber permitted) and the required rating of the structure is equivalent to those required of Type I-A construction (3-hr rating for structural frame). However, the Committee did not find it acceptable to allow the scale of heights

(many of which are unlimited) of Type I-A to be applied to Type IV-A. Instead, the Committee applied a multiplier of 1.5 to the heights proposed for Type IV-B construction (rounded up or down based on judgment) in order to propose reasonable height allowances for IV-A construction;

3. The Committee viewed Type IV-C as sufficiently similar to existing HT construction, especially in terms of the percentage of exposed wood (it is permitted to be entirely unprotected), and the resulting contribution to fire. While the height in feet for Type IV-C is proposed to be equal to the height in feet of Type IV-HT, the Committee felt that additional stories was warranted in some cases. Therefore, in terms of stories, the Committee proposes additional number of stories for Type IV-C construction when compared to traditional Type IV heavy timber construction. The Committee feels that some recognition is warranted for the fire resistance rating requirements (Type IV-C has 2-hour rating on structural elements, whereas traditional Type IV Heavy Timber used dimensional wood, which is understood to yield an approximate fire resistance rating equivalent to about 1-hour construction) and provided that flexibility when developing height, in terms of stories, for Type IV-C construction. A multiplier of 1.5 was applied from the Type IV-HT heights to develop reasonable numbers of stories for Type IV-C construction.
4. While the base code seems to allow significant heights for buildings without sprinklers (e.g., Table 504.4 currently allows 11 stories for NS Type I-B construction for many occupancy classifications), the Committee believes that no additional heights over what is already permitted for Type IV should be proposed for the NS (non sprinklered) rows. As such, where separate rows are provided for heights for the NS condition, the proposed heights for Types IV-A, IV-B, and IV-C are the same as those heights already permitted for Type IV for the NS condition.

This methodology explains the majority of the recommendations included in this proposal. Specifically, for occupancy groups A, B, E, R, and U, the methodology described above accurately reflects how the height proposals were developed.

The Committee applied professional judgment (from both a fire safety and a structural perspective) to develop a draft table, cell by cell, for all occupancy types. After further examination, reduced heights were proposed for F, H, I, M, and S occupancy classifications.

For F-1 occupancies, the Committee proposed a height of 7 stories for Type IV-B construction (versus the 12 stories currently permitted for I-B construction). A multiplier of 1.5 was used to propose a height of 10 stories for Type IV-A construction (when rounded down). No additional height was proposed for Type IV-C construction (Type IV-C proposed at 5 stories, and 5 stories is already permitted by code for Type IV-HT).

For F-2 occupancies, again the Committee is proposing a reduced number of stories, with 8 stories for Type IV-B construction (versus 12 stories that would be derived from the methodology). Again, a multiplier of 1.5 was used to propose a height of 12 stories for Type IV-A construction. No additional height is proposed for Type IV-C construction (Type IV-C proposed at 6 stories, and 6 stories is already permitted by code for Type IV-HT).

A conservative approach also explains the proposed heights for Group H occupancies. For Group H-1, only 1 story buildings are permitted by Table 504.4 for all construction types, so the proposal was adjusted to also limit all of the new Type IV construction types to 1 story as well.

For Groups H-2, H-3, and H-5, heights were intentionally made equal to the existing Heavy Timber heights. In other words, there is no proposal to any increased heights over what is already allowed by code for these use groups.

Group H-4, being corrosives which represents a health hazard (but not necessarily a fire hazard) to occupants and first responders, was also reduced, slightly. The TWB proposes 7 stories for Type IV-B construction (equivalency to Type I-B would have yielded 8 stories). The proposal allows only 8 stories for Type IV-A construction. No additional height is proposed for Type IV-C construction (Type IV-C proposed at 6 stories, and 6 stories is already permitted by code for Type IV-HT).

For Group I, the Committee took a more conservative approach and proposed an equivalent number of stories for Type IV-A construction, as is provided for Type I-B construction (10 stories for both construction types and occupancy types). The allowable heights for Type IV-B construction were selected to fall between the 10 stories for Type IV-A and the number of stories for Type IV-C construction. The Committee proposed a height of 7 stories for I-1, and 6 stories for I-2. No additional height was proposed for Type IV-C construction (IV-C construction heights in floors is equal to the number of floors already allowed for Type IV-HT, 5 stories for I-1, 4 stories for I-2).

For Group M occupancies, the Committee again took a conservative approach, and proposed an equivalent number of stories for Type IV-A construction, as is provided for Type I-B construction (12 stories for both construction types). The proposal for Type IV-B construction is 8 stories which is based on the use of the multiplier of 1.5 with respect to the Type IV-A proposal. A modest increase (from 5 to 6 stories) is proposed for Type IV-C construction due to the higher requirement for structural fire-resistance.

For Group S, while the base code does not differentiate between S-1 and S-2 in Type I-B construction (both 12 stories), the Committee recognized that the base code does provide a difference for Group F (10 stories for F-1, 12 stories for F-2). As explained above, this led the Committee to propose lower heights for F-1, than for F-2. The Committee felt this was appropriate with respect to the hazard differences between F-1 and F-2. Rather than basing our proposal for S occupancies on the same starting point of 12 stories, the Committee decided to simply copy the proposed heights for Group F into the rows for Group S for both IV-A and IV-B construction types. No additional height is proposed for IV-C construction (IV-C proposed at 5 stories for both S-1 and S-2, same as existing Type IV-HT heights).

Background information: The ICC Board approved the establishment of an ad hoc committee for tall wood buildings in December of 2015. The purpose of the ad hoc committee is to explore the science of tall wood buildings and to investigate the feasibility and take action on developing code changes for tall wood buildings. The committee is comprised of a balance of stakeholders with additional opportunities for interested parties to participate in the four Work Groups established by the ad hoc committee, namely: Code; Fire; Standards/Definitions; and Structural. For more information, be sure to visit the ICC website <https://www.iccsafe.org/codes-tech-support/cs/icc-ad-hoc-committee-on-tall-wood-buildings/> (link active and up to date as of 12/27/17). As seen in the "Meeting Minutes and Documents" and "Resource Documents" sections of the committee web page, the ad hoc committee reviewed a substantial amount of information in order to provide technical justification for code proposals.

The ad hoc committee developed proposals for the followings code sections. The committee believes this package of code changes will result in regulations that adequately address the fire and life safety issues of tall mass timber buildings

IBC Code Section	Description
403.3.2	Water supply requirements for fire pumps in high rise buildings of Type IVA and IVB construction.
504.3	Allowable building height (feet) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT construction.
504.4	Allowable building height (stories) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
506.2	Allowable building area for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
508.4.4.1 509.4.1.1 (new)	Requirements for mass timber building elements serving as fire barriers or horizontal assemblies in buildings of Type IVB or IVC construction.
602.4	Type of Construction requirements for new proposed types of construction: Types IVA, IVB and IVC. No changes to Type IV HT construction. Includes definitions for new terms: Mass timber and Noncombustible protection (mass timber). THIS IS THE KEY CODE CHANGE PROPOSAL WHICH OUTLINES THE CONSTRUCTION REQUIREMENTS FOR THE PROPOSED NEW TYPE OF MASS TIMBER BUILDINGS. THE PROPOSAL ALSO ADDRESSES CONCEALED SPACES, ADHESIVE PERFORMANCE AND EXTERIOR WALL PROTECTION.
703.8 (new)	The performance method to determine the increase to the fire resistance rating provided by noncombustible protection applied to the mass timber building element.
703.9 (new)	Requirements for sealants and adhesives to be placed at abutting edges and intersections of mass timber building elements. The reason statement references a Group B proposal to Chapter 17 for special inspection requirements of sealants and adhesives.
718.2.1	Requirements on the use of mass timber building elements used for Fireblocking.
722.7 (new)	Requirements for the fire resistance rating of mass timber elements, including minimum required protection and gypsum board attachment requirements.
3102	Requirements for membrane structures using Type IV HT construction.
3314.7 (new)	New special precautions during construction of buildings of Types IVA, IVB and IVC construction: Standpipes; Water supply for fire department connections; Noncombustible protection required for mass timber elements as construction height increases.
Appendix	Requirements for walls, floors and roofs of Type IV HT construction in buildings located in Fire Districts.
IFC Code Section	Description
701.6	Requirements which stipulate the owner's responsibility to maintain inventory of all required fire resistance rated construction in buildings of Types IVA and IVB construction. This includes an annual inspection and proper repair where necessary.
Proposed changes to be submitted in 2019 Group B	
IBC Chapter 17	Required special inspections of mass timber construction <ul style="list-style-type: none"> • Structural • Sealants and adhesives (see IBC 703.8)
IBC Chapter 23	An update to referenced standard APA PRG 320 Standard for Performance-rated Cross-laminated Timber which is currently undergoing revision to ensure the adequacy of the adhesives under fire conditions.

In addition, fire tests designed to simulate the three new construction types (Types IVA, IVB and IVC) in the ad hoc committee proposals were conducted at the Alcohol Tobacco and Firearms test lab facility. The TWB was involved in the design of the tests, and many members witnessed the test in person or online. The results of the series of 5 fire tests provide additional support for these proposals, and validate the fire performance for each of the types of construction proposed by the committee. The fire tests consisted of one-bedroom apartments on two levels, with both apartments having a corridor leading to a stair. The purpose of the tests was to address the contribution of mass timber to a fire, the performance of connections, the performance of through-penetration fire stops, and to evaluate conditions for responding fire personnel.

To review a summary of the fire tests, please visit:

<http://bit.ly/ATF-firetestreport>

To watch summary videos of the fire tests, which are accelerated to run in 3 ½ minutes, please visit:

<http://bit.ly/ATF-firetestvideos>

Both of these links were confirmed active on 12/27/17.

Cost Impact: The code change proposal will not increase or decrease the cost of construction

This section provides information that was not previously set forth in the code, and does not change the requirements of current code, thus there is no cost impact when compared with present requirements.

G80-18

Public Hearing Results

Errata:

The complete table is now shown

Committee Action:

As Submitted

Committee Reason:

We need to have increased heights for these new construction types based on all the work that has been done. Tweaks can be made and debated in the public comment process for other story heights. However, Canada has already set presidents for tall wood structures. We may already have overkill in fire protection features to address the additional stories. The information supporting this proposal is online on the ICC website for those that have concerns. (Vote: 12-2)

Assembly Action:

None

G80-18

Individual Consideration Agenda

Public Comment 1:

Proponent:

Jonathan Humble, American Iron and Steel Institute, representing American Iron and Steel Institute (Jhumble@steel.org) requests As Modified by This Public Comment

Modify as follows:

2018 International Building Code

TABLE 504.4

ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE^{a, b}

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION										TYPE OF CONSTRUCTION	TYPE OF CONSTRUCTION	TYPE OF CONSTRUCTION
	SEE FOOTNOTES	TYPE I		TYPE II		TYPE III		TYPE IV		TYPE IV	TYPE V		
		A	B	A	B	A	B	A	B	C	HT	A	B
A-1	NS	U L	5	3	2	3	2	3	3	3	3	2	1
	S	U L	6	4	3	4	3	9	6	4	4	3	2
A-2	NS	U L	11	3	2	3	2	3	3	3	3	2	1
	S	U L	12	4	3	4	3	18	12	6	4	3	2
A-3	NS	U L	11	3	2	3	2	3	3	3	3	2	1
	S	U L	12	4	3	4	3	18	12	6	4	3	2
A-4	NS	U L	11	3	2	3	2	3	3	3	3	2	1
	S	U L	12	4	3	4	3	18	12	6	4	3	2
A-5	NS	U L	U L	U L	U L	U L	U L	1	1	1	UL	UL	UL
	S	U L	U L	U L	U L	U L	U L	UL	UL	UL	UL	UL	UL
B	NS	U L	11	5	3	5	3	5	5	5	5	3	2
	S	U L	12	6	4	6	4	18	12	9	6	4	3
E	NS	U L	5	3	2	3	2	3	3	3	3	1	1

	S	U L	6	4	3	4	3	9	6	4	4	2	2
F-1	NS	U L	11	4	2	3	2		3	3	3		2
	S	U L	12	5	3	4	3	10	7	5	5	3	2
F-2	NS	U L	11	5	3	4	3	5	5	5	5	3	2
	S	U L	12	6	4	5	4	12	8	6	6	4	3
H-1	NS ^{c,d}		1	1	1	1	1	NP	NP	NP	1	1	NP
	S							1	1	1			
H-2	NS ^{c,d}	U L	3	2	1	2	1	1	1	1	2	1	1
	S							2	2	2			
H-3	NS ^{c,d}	U L	6	4	2	4	2	3	3	3	4	2	1
	S							4	4	4			
H-4	NS ^{c,d}	U L	7	5	3	5	3	5	5	5	5	3	2
	S	U L	8	6	4	6	4	8	7	6	6	4	3
H-5	NS ^{c,d}		4	4	3	3	3	2	2	2	3	3	2
	S							3	3	3			
I-1 Condition 1	NS ^{d,e}	U L	9	4	3	4	3	4	4	4	4	3	2
	S	U L	10	5	4	5	4	10	7	5	5	4	3
I-1 Condition 2	NS ^{d,e}	U L	9	4				3	3	3	4	3	2
	S	U L	10	5	3	4	3	10	6	4			
I-2	NS ^{d,f}	U L	4	2				NP	NP	NP	1	1	NP
	S	U L	5	3	1	1	NP	7	5	1			
I-3	NS ^{d,e}	U L	4	2	1	2	1	2	2	2	2	2	1
	S	U L	5	3	2	3	2	7	5	3	3	3	2
I-4	NS ^{d,g}	U L	5	3	2	3	2	3	3	3	3	1	1
	S	U L	6	4	3	4	3	9	6	4	4	2	2
M	NS	U L	11	4	2	4	2	4	4	4	4	3	1
	S	U L	12	5	3	5	3	12	8	6	5	4	2
R-1 ^h	NS ^d	U L	11									3	2
	S13R		4	4					4	4	4	4	3
	S	U L	12	5	5	5	5	18	12	8	5	4	3

R-2 ^h	NS ^d	U L	11	4	4	4	4	4	4	4	4	4	3	2
	S13R		4	4	4								4	3
	S	U L	12	5	5	5	5	18	12	8	5		4	3
R-3 ^h	NS ^d	U L	11										3	3
	S13D		4	4	4	4	4	4	4	4	4		3	3
	S13R		4	4									4	4
	S	U L	12	5	5	5	5	18	12	5	5		4	4
R-4 ^h	NS ^d	U L	11										3	2
	S13D		4	4	4	4	4	4	4	4	4		3	2
	S13R		4	4									4	3
	S	U L	12	5	5	5	5	18	12	5	5		4	3
S-1	NS	U L	11	4	2	3	2	4	4	4	4		3	1
	S	U L	12	5	3	4	3	10	7	5	5		4	2
S-2	NS	U L	11	5	3	4	3	4	4	4	4		4	2
	S	U L	12	6	4	5	4	12	8	5	5		5	3
U	NS	U L	5	4	2	3	2	4	4	4	4		2	1
	S	U L	6	5	3	4	3	9	6	5	5		3	2

TUL = Unlimited; NP = Not Permitted; NS = Buildings not equipped throughout with an automatic sprinkler system; S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

- a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.
- b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.
- c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.
- d. The NS value is only for use in evaluation of existing building height in accordance with the International Existing Building Code.
- e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies, Condition 1, see Exception 1 of Section 903.2.6.
- f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and 1103.5 of the International Fire Code.
- g. For new Group I-4 occupancies, see Exceptions 2 and 3 of Section 903.2.6.

- h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.

Commenter's Reason:

We recommend that the Type IV-B mass timber designation be deleted from the tall wood building proposals.

The origins of the development of the types of construction were originally developed to “account for the response or participation that a building’s structure will have in a fire condition originating within the building as a result of the occupancy or the fuel load” (Example source from BOCA National Building Code 1993 Commentary). The modern day types of construction are parsed out into three primary categories of construction; noncombustible (Types I and II), noncombustible/combustible (Types III and IV) and combustible (Type V). Subcategories were created to identify the protection; Type A for protected and Type B for unprotected.

What we have within proposals G75-18, G80-18, G84-18, G89-18, and G108-18 is the addition of a new construction category that has been proposed based on the need to satisfy aesthetics based on the combination of Types IV-A and IV-C, which is a departure from the black and white construction categories based on construction that is either non-combustible or combustible. We feel this inappropriate for the codes to begin to designate designer type construction categories.

In the past such mixing and matching of construction types into building or structure is more suited to the IBC Section 104.11 (Alternative materials, design and methods of construction and equipment), or through use of the ICC International Performance Code or performance analysis. We feel that these are the most appropriate options for the mixing-and-matching of construction types in building design.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This will not increase or decrease the cost of construction as this code change proposal and public comment address information that was not previously contained in the code, therefore there is no cost impact when compared to present requirements.

Public Comment 2:

Proponent:

Brian M. McGraw, P.E., State Fire Marshal, Virginia Department of Fire Programs, State Fire Marshal's Office, representing Virginia State Fire Marshal's Office, Virginia Fire Services Board (brian.mcgraw@vdfp.virginia.gov) requests As Modified by This Public Comment

Modify as follows:

2018 International Building Code

TABLE 504.4

ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE^{a, b}

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION										TYPE OF CONSTRUCTION	TYPE OF CONSTRUCTION	TYPE OF CONSTRUCTION
	SEE FOOTNOTES	TYPE I		TYPE II		TYPE III		TYPE IV		TYPE IV	TYPE V		
		A	B	A	B	A	B	A	B	C	HT	A	B
A-1	NS	U	5	3	2	3	2	3	3	3	3	2	1
	S	U	6	4	3	4	3	9 4	6 4	4	4	3	2
A-2	NS	U	11	3	2	3	2	3	3	3	3	2	1
	S	U	12	4	3	4	3	18 4	12 4	6 4	4	3	2
A-3	NS	U	11	3	2	3	2	3	3	3	3	2	1
	S	U	12	4	3	4	3	18 4	12 4	6 4	4	3	2
A-4	NS	U	11	3	2	3	2	3	3	3	3	2	1
	S	U	12	4	3	4	3	18 4	12 4	6 4	4	3	2
A-5	NS	U	U	U	U	U	U	1	1	1	UL	UL	UL
	S	U	U	U	U	U	U	UL	UL	UL	UL	UL	UL
B	NS	U	11	5	3	5	3	5	5	5	5	3	2
	S	U	12	6	4	6	4	18 6	12 6	9 6	6	4	3
E	NS	U	5	3	2	3	2	3	3	3	3	1	1
	S	U	6	4	3	4	3	9 4	6 4	4	4	2	2
F-1	NS	U	11	4	2	3	2		3	3	3		2
	S	U	12	5	3	4	3	10	7 3	5 3	5 3	3	2
F-2	NS	U	11	5	3	4	3	5	5	5	5	3	2
	S	U	12	6	4	5	4	12 6	8 6	6	6	4	3
H-1	NS ^{c, d}	1	1	1	1	1	1	NP	NP	NP	1	1	NP
	S							1	1	1			
H-2	NS ^{c, d}	U	3	2	1	2	1	1	1	1	2	1	1
	S	L						2	2	2			
H-3	NS ^{c, d}	U	6	4	2	4	2	3	3	3	4	2	1
	S	L						4	4	4			
H-4	NS ^{c, d}	U	7	5	3	5	3	5	5	5	5	3	2

	S	U L	8	6	4	6	4	<u>86</u>	<u>76</u>	6	6	4	3		
H-5	NS ^{c,d}	U L	4	4	3	3	3	2	2	2	3	3	2		
	S	U L	4	4	3	3	3	3	3	3					
I-1 Condition 1	NS ^{d,e}	U L	9	4	3	4	3	4	4	4	4	3	2		
	S	U L	10	5	4	5	4	<u>105</u>	<u>75</u>	5	5	4	3		
I-1 Condition 2	NS ^{d,e}	U L	9	4	3	4	3	3	3	3	4	3	2		
	S	U L	10	5				<u>104</u>	<u>64</u>	4					
I-2	NS ^{d,f}	U L	4	2	1	1	N P	NP	NP	NP	1	1	NP		
	S	U L	5	3				<u>71</u>	<u>51</u>	1					
I-3	NS ^{d,e}	U L	4	2	1	2	1	2	2	2	2	2	1		
	S	U L	5	3	2	3	2	<u>73</u>	<u>53</u>	3	3	3	2		
I-4	NS ^{d,g}	U L	5	3	2	3	2	3	3	3	3	1	1		
	S	U L	6	4	3	4	3	<u>94</u>	<u>64</u>	4	4	2	2		
M	NS	U L	11	4	2	4	2	4	4	4	4	3	1		
	S	U L	12	5	3	5	3	<u>125</u>	<u>85</u>	<u>65</u>	5	4	2		
R-1 ^h	NS ^d	U L	11	4	4	4	4	4	4	4	4	4	3	2	
	S13R	U L	4										4	4	3
	S	U L	12	5	5	5	5	<u>185</u>	<u>125</u>	<u>85</u>	5	4	3		
R-2 ^h	NS ^d	U L	11	4	4	4	4	4	4	4	4	4	3	2	
	S13R	U L	4										4	4	3
	S	U L	12	5	5	5	5	<u>185</u>	<u>125</u>	<u>85</u>	5	4	3		
R-3 ^h	NS ^d	U L	11	4	4	4	4	4	4	4	4	4	3	3	
	S13D	U L	4										4	3	3
	S13R	U L	4										4	4	4
	S	U L	12	5	5	5	5	<u>185</u>	<u>125</u>	5	5	4	4		
R-4 ^h	NS ^d	U L	11	4	4	4	4	4	4	4	4	4	3	2	
	S13D	U L	4										4	3	2
	S13R	U L	4										4	4	3
	S	U L	12	5	5	5	5	<u>185</u>	<u>125</u>	5	5	4	3		
S-1	NS	U L	11	4	2	3	2	4	4	4	4	3	1		

	S	U L	12	5	3	4	3	10 5	7 5	5	5	4	2
S-2	NS	U L	11	5	3	4	3	4	4	4	4	4	2
	S	U L	12	6	4	5	4	12 5	8 5	5	5	5	3
U	NS	U L	5	4	2	3	2	4	4	4	4	2	1
	S	U L	6	5	3	4	3	9 5	6 5	5	5	3	2

TUL = Unlimited; NP = Not Permitted; NS = Buildings not equipped throughout with an automatic sprinkler system; S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

- a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.
- b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.
- c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.
- d. The NS value is only for use in evaluation of existing building height in accordance with the International Existing Building Code.
- e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies, Condition 1, see Exception 1 of Section 903.2.6.
- f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and 1103.5 of the International Fire Code.
- g. For new Group I-4 occupancies, see Exceptions 2 and 3 of Section 903.2.6.
- h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.

Commenter's Reason:

The Virginia Fire Services Board opposes Proposal G80-18 as originally submitted. We propose that the allowable heights in this be proposal be reduced to those currently allowed for Type IV-HT construction until additional testing can be performed to validate the assumptions on which the currently proposed heights are based. While we do not oppose the concept of utilizing renewable resources, such as timber, in the construction of buildings, we are not convinced that 18-story “tall wood buildings” provide an acceptable level of safety to occupants or responding firefighters.

The reason statement for this proposal indicates that the Ad-Hoc Committee on Tall Wood Buildings (TWB) “discussed a number of performance objectives to be met with the proposed criteria for tall wood buildings” including:

- Egress systems designed to protect building occupants during the design escape time, plus a safety factor.

- Highly reliable fire suppression systems to reduce the risk of failure during reasonably expected fire scenarios. The degree of reliability should be proportional to evacuation time (height) and the risk of collapse.

There is no reference in the stated performance objectives related to protecting firefighters and other emergency responders during the time required to access and extinguish a fire. The Report on High-Rise Fireground Field Experiments, NIST Technical Note 1797, published in April 2013, indicates times between 21 and 23 minutes from fire ignition for fire crews to reach the 11th floor of a high-rise building, depending on crew size. These times are based on studies involving major metropolitan fire departments. There are many variables that could significantly increase these times, including time for notification of the fire department, turnout time, response time and vertical travel time to reach higher floors.

There were 14 proposals submitted by the TWB. Only one, G28-18, addresses the reliability of fire suppression systems. It requires the water supply to required fire pumps be supplied by connections to not fewer than two water mains located in different streets for tall wood buildings that are more than 120 feet in building height. This proposal does nothing to increase the reliability of fire suppression system in buildings less than 120 feet tall. In addition, it does nothing to increase the reliability of the suppression systems within the building itself. There is no requirement to demonstrate the reliability of the fire suppression system as compared to the evacuation time and risk of collapse. It should also be noted that this proposal allows the construction of tall wood buildings to a height of 65 feet with no requirements for fire suppression systems.

We acknowledge that fire tests have been conducted; however, we do not believe that the results of the fire tests provide sufficient justification to allow tall wood building to be constructed to heights of 18 stories. The original proposal cites "engineering judgment" as the basis for a comparative analysis between Type I and Type IV buildings and the extrapolation of two-story fire tests to 18 story structures. There has been no testing to demonstrate the performance of these structures after aging for a period of years or decades.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal does not change the method of construction; rather it limits the height to which the type of construction can be built.

Public Comment 3:

Proponent:

Michael O'Brian, International Association of Fire Chiefs, representing Riverside County Fire Department, representing California Fire Chiefs Association (mobrian@brightonareafire.com); Kevin Reinertson (kevin.reinertson@fire.ca.gov) requests As Modified by This Public Comment

.

Further modify as follows:

2018 International Building Code

TABLE 504.4

ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE^{a, b}

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION										TYPE OF CONSTRUCTION	TYPE OF CONSTRUCTION	TYPE OF CONSTRUCTION	
	SEE FOOTNOTES	TYPE I		TYPE II		TYPE III		TYPE IV		TYPE IV	TYPE V			
		A	B	A	B	A	B	A	B	C	HT	A	B	
A-1	NS	U L	5	3	2	3	2	3	3	3	3	3	2	1
	S	U L	6	4	3	4	3	96	65	4	4	4	3	2
A-2	NS	U L	11	3	2	3	2	3	3	3	3	3	2	1
	S	U L	12	4	3	4	3	1812	128	64	4	4	3	2
A-3	NS	U L	11	3	2	3	2	3	3	3	3	3	2	1
	S	U L	12	4	3	4	3	1812	128	64	4	4	3	2
A-4	NS	U L	11	3	2	3	2	3	3	3	3	3	2	1
	S	U L	12	4	3	4	3	1812	128	64	4	4	3	2
A-5	NS	U L	U L	U L	U L	U L	UL	1	1	1	1	UL	UL	UL
	S	U L	U L	U L	U L	U L	UL	UL	UL	UL	UL	UL	UL	UL
B	NS	U L	11	5	3	5	3	5	5	5	5	5	3	2
	S	U L	12	6	4	6	4	1812	128	96	6	6	4	3
E	NS	U L	5	3	2	3	2	3	3	3	3	3	1	1
	S	U L	6	4	3	4	3	96	65	4	4	4	2	2
F-1	NS	U L	11	4	2	3	2		3	3	3	3		2
	S	U L	12	5	3	4	3	10	7	5	5	5	3	2
F-2	NS	U L	11	5	3	4	3	5	5	5	5	5	3	2
	S	U L	12	6	4	5	4	127	86	6	6	6	4	3
H-1	NS ^{c, d}	U L	1	1	1	1	1	1	1	1	1	1	1	NP
	S	U L	1	1	1	1	1	1	1	1	1	1	1	NP
H-2	NS ^{c, d}	U L	3	2	1	2	1	1	1	1	1	1	1	1
	S	U L	3	2	1	2	1	2	2	2	2	2	1	1

H-3	NS ^{c, d}	U	6	4	2	4	2	3	3	3	4	2	1									
	S	L	4	4	4	4	4	4	4	4												
H-4	NS ^{c, d}	U	7	5	3	5	3	5	5	5	5	3	2									
	S	L	8	6	4	6	4	8	7	6				6								
H-5	NS ^{c, d}	4	4	3	3	3	3	2	2	2	3	3	2									
	S							3	3	3												
I-1 Condition 1	NS ^{d, e}	U	9	4	3	4	3	4	4	4	4	3	2									
	S	L	10	5	4	5	4	107	76	5				5								
I-1 Condition 2	NS ^{d, e}	U	9	4	3	4	3	3	3	3	4	3	2									
	S	L	10	5				107	65	4												
I-2	NS ^{d, f}	U	4	2	1	1	N	NP	NP	NP	1	1	NP									
	S	L	5	3				75	53	1												
I-3	NS ^{d, e}	U	4	2	1	2	1	2	2	2	2	2	1									
	S	L	5	3	2	3	2	75	54	3				3								
I-4	NS ^{d, g}	U	5	3	2	3	2	3	3	3	3	1	1									
	S	L	6	4	3	4	3	96	65	4				4								
M	NS	U	11	4	2	4	2	4	4	4	4	3	1									
	S	L	12	5	3	5	3	128	85	6				5								
R-1 ^h	NS ^d	U	11	4	4	4	4	4	4	4	4	4	3	2								
	S13R	L	4												4	4	4	4	4	4	4	4
	S	U	12												5	5	5	5	1812	128	8	5
R-2 ^h	NS ^d	U	11	4	4	4	4	4	4	4	4	4	3	2								
	S13R	L	4	4											4	4	4	4	4	4	4	
	S	U	12	5											5	5	5	1812	128	8	5	
R-3 ^h	NS ^d	U	11	4	4	4	4	4	4	4	4	4	3	3								
	S13D	L	4												4	4	4	4	4	4	4	
	S13R	L	4												4	4	4	4	4	4	4	4
	S	U	12												5	5	5	5	1812	128	5	5
R-4 ^h	NS ^d	U	11	4	4	4	4	4	4	4	4	4	3	2								
	S13D	L	4												4	4	4	4	4	4	4	
	S13R	L	4												4	4	4	4	4	4	4	4

	S	U L	12	5	5	5	5	5	4812	428	5	5	4	3
S-1	NS	U L	11	4	2	3	2	4	4	4	4	4	3	1
	S	U L	12	5	3	4	3	407	76	5	5	4	2	
S-2	NS	U L	11	5	3	4	3	4	4	4	4	4	2	
	S	U L	12	6	4	5	4	428	87	5	5	5	3	
U	NS	U L	5	4	2	3	2	4	4	4	4	2	1	
	S	U L	6	5	3	4	3	97	6	5	5	3	2	

TUL = Unlimited; NP = Not Permitted; NS = Buildings not equipped throughout with an automatic sprinkler system; S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

- a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.
- b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.
- c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.
- d. The NS value is only for use in evaluation of existing building height in accordance with the International Existing Building Code.
- e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies, Condition 1, see Exception 1 of Section 903.2.6.
- f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and 1103.5 of the International Fire Code.
- g. For new Group I-4 occupancies, see Exceptions 2 and 3 of Section 903.2.6.
- h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.

Commenter's Reason:

This is a series of comments to modify the proposed height, stories, and allowable area of the new Type IV-A, Type IV-B, and Type IV-C proposed construction classifications as proposed by the Ad-Hoc Committee on Tall Wood Buildings.

There is concern on the formulas utilized are not fully supported by technical substantiation and are missing the needed technical support to allow the construction type to such heights. This change takes a moderate approach and reduces the allowable heights, area, and stories by a factor of 30%.

This proposed public comment doesn't dismiss the concept out of hand, we do feel the current proposals go too far, to fast in an area of significant and long-lasting importance.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This change will modify the allowable heights and will not increase or decrease as the allowable heights are new to the code

Public Comment 4:

Proponent:

Gary Bridgens, representing Mass Timber Code Coalition (info@buildtallbuildsafe.com) requests As Submitted

Commenter's Reason:

PUBLIC COMMENT

SUBMITTED BY GARY BRIDGENS

ON BEHALF OF THE MASS TIMBER CODE COALITION

The Mass Timber Code Coalition has been organized to provide information on the code proposals drafted by the Ad Hoc Committee on Tall Wood Buildings

Mass timber is not new to the *International Building Code (IBC)*. Currently listed as Type IV Heavy Timber, this construction type is a proven option that fully complies with the structural and fire resistive requirements of the IBC. The code recognizes that mass timber is a fundamentally different material than dimension lumber used in more familiar stick built wood construction. The code also recognizes the inherent fire resistance of mass timber, where charring in a fire event provides protection of inner structures, as well as a consistent and predictable rate of charring.

With the expansion of the mass timber supply chain, panels of cross-laminated timber (CLT), nail-laminated timber (NLT) and glue-laminated timber (Glulam), requests for approvals of tall mass timber buildings (TMTB) by local authorities have become more common. Estimates by industry sources have identified 35 current proposals for tall mass timber buildings, ranging from 7 to 24 stories, in 21 different jurisdictions.

Importantly, this interest in tall mass timber construction has been reliant on various local codes and approval processes. The IBC does not currently account for these tall wood buildings, beyond the current Type IV Heavy Timber height and area limitations.

The Ad Hoc Committee on Tall Wood Buildings (AHC-TWB)

To ensure the IBC keeps pace with the changing construction marketplace, the Board of Directors of the International Code Council (ICC) appointed the Ad Hoc Committee on Tall Wood Buildings (AHC-TWB) in 2015. The AHC-TWB included members from the code official, regulatory, construction, engineering, architectural, fire services and materials communities.

The AHC-TWB was specifically charged with investigating the science of mass timber construction, undertaking any necessary new research and recommending any code changes needed to ensure safety in TMTB. The AHC-TWB set performance criteria of its own: any code change developed was required to achieve the following.

1. No collapse under scenarios of complete burn-out of fuel without automatic sprinkler protection;
2. No high radiation exposure from the subject building to adjoining properties that risk ignition under severe fire scenarios;
3. No unusual response from radiation exposure from adjacent properties that risk ignition of the subject building under severe fire scenarios;
4. No unusual fire department access issues;
5. Egress systems to protect occupants during design escape times plus a margin of safety;
6. Enhanced and redundant fire protection systems to ensure performance during various fire scenarios.

Code Change Proposals

After two years of work, the AHC-TWB has produced 14 code change proposals. All 14 of these proposals were recommended for approval by various ICC committees at the recent ICC 2018 Group A Committee Action Hearing.

The key change, G108-18, defines three new categories of Type -IV Mass Timber construction:

Type IV-A: 1 to 18 stories based on Occupancy Classification. 3-hour fire resistance rating with non-combustible protection throughout;

Type IV-B: 1 to 12 stories based on Occupancy Classification. 2-hour fire resistance rating with non-combustible protection on most mass timber surfaces;

Type IV-C: 1 to 9 stories based on Occupancy Classification. 2-hour fire resistance rating with non-combustible protection for critical areas; exit enclosures, etc.

Each new construction type defined by the AHC-TWB (Type IV-A, B and C) has fire resistance requirements as robust or more robust than those required for comparable non-combustible (concrete and steel) buildings.

Other provisions provide standards for mass timber manufacturing, height/area restrictions, active and passive fire protection systems, fire safety during construction, enhanced water supply requirements, and standards for sealants and adhesives.

Fire Resistance of Mass Timber

Citing fire and market concerns, both the Portland Cement Association and the National Ready Mix Concrete Association have criticized the AHC-TWB code change proposals as untested and unsound. However, these criticisms fail to consider that:

1. The purpose of the International Building Code is to provide building officials with the tools they need to ensure public and first-responder safety. It is not to choose winners and losers in the market, nor is it to defend any single industry's position;

2. Tall mass timber buildings already built are performing well;
3. Mass timber (and heavy timber before it) has undergone extensive fire resistance testing in multiple fire scenarios by Underwriters Laboratories, the Southwest Research Institute, the National Research Council of Canada and the U.S. Government's ATF Fire Research Laboratory, the world's largest indoor fire investigation lab.

Numerous mass timber floor/ceiling and wall assemblies have been tested at national laboratories using ASTM E119 standards. This testing history shows that mass timber has repeatedly achieved the hourly fire resistance requirements of the code. This is in part because of charring properties that provide a steady and predictable measurement of fire resistance. Additionally, detailed code requirements for non-combustible protection applied to the mass timber greatly enhance the hourly rating. Further, fire protection systems (active and passive) also ensure safety in mass timber structures.

The AHC-TWB benefitted from recent tests in 2017 at the U.S. ATF Fire Research Laboratory on full-scale mass timber buildings. Most tests assumed an unlikely failure of sprinkler systems:

1. Mass timber apartment with full fuel load. Fully protected by Type X gypsum wall board. Fire self-extinguished after 3 hours with no significant charring on mass timber surfaces;
2. Mass timber apartment with full fuel load. 20% exposed CLT ceiling. Test concluded at 4-hour mark after fuel burnout. CLT self-extinguished after charring;
3. Mass timber apartment with full fuel load. 2 CLT walls fully exposed. Fuel burnout at 4-hours. CLT walls self-extinguished after charring;
4. Mass timber apartment with full fuel load. All CLT surfaces fully exposed. One sprinkler system. Fire quickly extinguished;
5. Mass timber apartment with full fuel load. All CLT surfaces fully exposed. One sprinkler system. Fire allowed to grow to flashover (23 minutes) then quickly extinguished.

In fact, proposed Type IVA, B and C fire resistance requirements are the same or more robust than comparable steel and concrete construction. Further detail can be obtained at buildtallbuildsafe.com.

Benefits of Mass Timber Construction

In addition to the obvious environmental attributes of using a renewable resource in construction and the boost for the economies in timber-producing regions, builders and communities cite several distinctive benefits that make mass timber buildings an attractive option:

Builders report several benefits, including:

1. **Job site safety.** Mass timber panels are easy to install and can be delivered to a work site as needed, rather than stockpiled. Moreover, worker training is easier as is exposure to job site risk;
2. **Job site efficiency.** Persistent labor shortages are eased as more workers are qualified to work with mass timber panels. Jobs are built more quickly and materials are delivered as needed, thereby reducing costs;
3. **Design.** The favorable strength-to-weight ratio of CLT and the characteristics of wood offer more design options and more attractive built environments, improving business performance.

Local communities embrace mass timber construction:

1. **Faster and quieter.** The dislocation experienced by neighboring communities is reduced in mass timber projects. In addition to lower fire risks, things occur more quickly and panels are installed more simply than comparable steel and concrete sites;
2. **Greener.** Forestry officials cite the carbon sequestration properties of wood, but also the benefits to forest management of using wood products more efficiently and effectively, thereby further reducing decay and fire risk;
3. **Energy efficient.** Manufacturing mass timber is less energy intensive than other building materials. More importantly, the superior insulation characteristics of wood far outperform steel and concrete structures.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This section provides information that was not previously set forth in the code, and does not change the requirements of current code, thus there is no cost impact when compared with present requirements.

Public Comment 5:

Proponent:

Sam Francis, representing American Wood Council (sfrancis@awc.org) requests As Submitted

Commenter's Reason:

AWC was appointed to be a member of the ICC Tall Wood Building Ad Hoc Committee (TWB), the single wood industry representative on the TWB. AWC is not speaking for TWB on this issue. It simply is relaying information regarding the development of the proposals. Other members of the 16-member TWB included representation from architects, engineers, fire protection engineers, fire marshals, testing laboratories, and fire fighters, as well as the major materials industries. After two years of study, listening to testimony, reviewing documents, reviewing public input, conducting an extensive test program, and reviewing test results from tests around the world, the TWB made this proposal to ICC for the membership's consideration.

Early in the process, the TWB heard proposals from four different commenters suggesting maximum stories of 20, 24, 40, and 42 stories. The TWB worked through dozens of drafts of the proposed new types of construction, dozens more pertaining to the building height in stories, nearly a dozen pertaining to building height in feet and nearly a dozen regarding maximum permitted building area per floor. These documents were all posted to the TWB page of the ICC website. Comments were solicited for all drafts.

The first draft of Table 504.4 (allowable stories) was based on the discussions by the TWB at its November, 2016 meeting and considered by the Codes Work Group (Codes WG) in February, 2017. In March, 2017, comments to the February draft were considered by the Codes WG. In May, 2017, the Codes WG reported to the TWB its recommendations for a maximum number of stories for Type IV-A of 24 for many use groups, including B and R.

In June the TWB considered reducing the recommended number of stories for several occupancies, including B and R, due to reported opposition to the higher limits. Thus, as a result, the maximum number of stories was reduced from 24 to 18 for many occupancies including R, and from 24 to 20 for Group B because of the lower fuel load and increased occupant awareness in Group B. These drafts were also posted by the TWB on the ICC website. No one publicly commented on the original recommendations nor on the TWB reductions in maximum stories to accommodate what was believed to be opposition to its position.

Finally, the TWB held its last meeting (by video conference) December 27, 2017 to finalize all proposals before the January 6, 2018 submittal deadline. In that meeting it was suggested that continuing to allow Group B to be 20 stories seemed to be an outlier and, for that reason alone, the TWB again reduced Group B to the current 18 story limit.

The reason statement offered by the TWB for this proposal clearly explains that the allowable stories was determined by assessing the overall performance of the new types of construction and equating them to existing types of construction. From the beginning of this process, the TWB considered the body of data and fire protection engineering principles, deliberated the issue and concluded that because of the complete package of extensive features such as the required fire resistance ratings, the extensive noncombustible protection required on the surface of the mass timber elements, the prohibition of light frame wood assemblies altogether, and many other restrictive features, the performance of IV-B was indeed equivalent to I-B in every way. This concept was presented by several researchers who had been invited to present to the TWB at its initial face-to-face meeting. Similarly, due to the even more extensive required features in Type IV-A, including redundant water supply, they concluded that the performance of Type IV-A was equivalent to I-A. The TWB agreed that the performance was equivalent, but its conservative approach meant that they chose not to permit IV-A to enjoy the unlimited number of stories that I-A does. In fact, it was so conservative that it initially considered only doubling of the number of stories, which is infinitely less than the unlimited number of stories permitted in type I-A for nearly every use group. They ultimately proposed even fewer stories than that.

Moreover, the number of stories proposed for Type IV-B are even more conservative when considering that Type IV-B requires a greater degree of fire resistance than that of I-B when the *fire-resistance rating* of the building elements in Type IB construction are reduced to only the *fire-resistance ratings* required for Type IIA as permitted by Section 403.2.1 of the IBC. In effect, the proposed 2 hour fire resistance ratings required for Type IV-B will be twice that allowed by the IBC, since its inception, for those buildings under 420 feet whose building elements are permitted to be of only 1 hour fire resistance in accordance with the highrise provisions of Chapter 4, which will not apply to the proposed mass timber construction types.

From the beginning, the TWB has been committed to criteria which result in acceptable performance. Critics of the proposed allowable number of stories have been heard to comment that 18 stories will not be the end of increased story limits, but, indeed, 18 stories was not the beginning of it, either! Rather, 18 stories is a conservative limit that was reduced, by concession, not evidence, from 24 stories, to 20 stories, and finally to 18 stories.

Finally, much has been said about the proposed heights, but it s important to consider this: unlike noncombustible construction types I-A and I-B, which for most use groups are unlimited in allowable area per story no matter how tall, these proposed mass timber construction types will be increasingly limited in allowable area per floor as the building gets higher. This is because Equations 5-2 and 5-3 in the IBC limit the total allowable area of the building to no more than three times the allowable area of a single story. (Story areas for most use groups in Types I-A and I-B are [never](#) limited no matter how tall because their single-story areas are unlimited.) As a result, in the proposed mass timber

construction types the compartmentalization of building areas between fire resistance rated and protected assemblies is vastly increased, and the allowable area between fire resistance rated and protected elements is vastly reduced, compared to Types I-A and I-B construction. See Tables 1 and 2 below for a comparison.

This proposal is thoroughly conservative. The following points address claims made by opponents:

Concerns about exterior fire testing:

The TWB proposals significantly reduce the risk of exterior building surface flame propagation by prohibiting all combustibles on the exterior side of exterior walls (except for the required water resistive barrier). Continuous insulation on the exterior, where provided, will be non-combustible. In addition, protection with at least 40 minutes of noncombustible material (typically a layer of 5/8-inch type X gypsum wallboard) is required on the outside of mass timber exterior walls. What is proposed therefore is more conservative than any other construction type, including Types I and II, virtually eliminating the possibility of fire spread on exterior walls due to combustible materials.

Concerns about the testing s relevance to tall wood buildings:

The testing was designed by fire service representation on the TWB committee to directly address potential tall wood buildings, regardless of height. Rather than rely on standardized testing of building assemblies alone, with fire service input the TWB committee chose to undertake full-scale, multistory compartment testing, with high residential fuel loads for which no standardized test exists. Furthermore, in four of the five tests, the normal operation of the required automatic fire suppression system (sprinklers) was not allowed. The fires in tests applicable to the proposed 18 and 12 story limits (Types IV-A and IV-B respectively) were allowed to continue throughout the decay phase and well past burn-out, the most conservative approach possible. In other words, because the fire tests were specifically designed to address tall wood buildings of any height, the absolute worst circumstances were assumed: sprinklers not working, no active suppression of any kind, and the fire allowed to burn until self-extinguishment after the burning room contents are consumed (a tiny percentage of all possible fire scenarios). This parallels expectations for Type I buildings.

Concerns that wind has not been addressed in the testing:

There are no current test standards for exterior exposure that includes wind as a component. This means that even Types I and II buildings--which may have combustible materials on the exterior of the exterior walls, such as foam plastic insulation--are not tested to specific wind criteria. The new construction types proposed for tall wood building do not permit combustible materials on the exterior of exterior walls (as opposed to all other construction types), and in addition all mass timber building elements in exterior walls are required to be protected on the exterior side by noncombustible material equaling at least 40 minutes of fire resistance (typically 5/8-inch Type X gypsum wallboard). This very conservative criteria is intended to take the possibility of exterior fire spread completely out of the question.

In regard to wind reaching the interior of the building, since the extensive noncombustible protection of the interior in building over 12 stories is designed to allow complete burn-out of contents in the case of sprinkler malfunction, if wind were to cause contents to burn faster, there is no negative impact on fire performance of the protected building elements themselves. Fire scientists believe that protected mass timber will respond favorably to a more severe fire that is flamed by wind, since burn-out of contents may be achieved sooner. In regard to Type IV-C which permits totally exposed mass timber throughout, the allowable height in feet from grade is not increased from what is allowed for current Type IV heavy timber construction, and 2-hour fire resistance ratings of building

elements are required throughout (as opposed to heavy timber dimensions only in current Type IV). Finally, combustible light frame walls are not permitted in the proposed new construction types, only mass timber elements

Concerns that loads from upper stories were not considered in the fire testing:

Structural loads will in large part govern the size of mass timber members, as it does concrete and steel members. As the loads from upper stories increase, the structural design requires loadbearing mass timber walls and columns to get bigger or more numerous. In buildings over 12 stories, these mass timber elements are required to be protected by at least three layers of 5/8 type X gypsum, as part of the 3-hour rating. This is an extremely conservative approach for all buildings ranging from 12 to 18 stories. The intent is to prevent the mass timber building elements from becoming involved in the fire even in the extremely small percentage of fire that are not controlled by the sprinkler system or eventually put out by the fire department.

Concerns that increased hazards from storage and mercantile occupancies, and their effect on firefighting, were not considered:

The TWB committee specifically addressed mercantile (M) and storage occupancies (typically S-1) and the hazards associated with their higher fuel loads. They did this by placing stricter limits on their height. M and S-1 occupancies groups are not allowed over 12 and 10 stories respectively even in Type IV-A, which has 3-hour walls and columns and 2-hour floors, and is required incorporate noncombustible protection equal to 2/3 of the required rating (three layers of 5/8 Type X gypsum wall board on loadbearing walls and columns). By comparison, Groups M and S-1 in Type I-A construction with the same ratings are unlimited in height. Type I-B allows both Groups M and S-1 up to 12 stories with only 2-hour walls and columns, whereas Type IV-B with equal ratings and required noncombustible protection is limited to eight stories (M) and seven stories (S-1).

Concerns about fire sealants and connections during the testing:

Researchers noted inconsistencies in some installations during the testing at ATF, but this has no bearing on the efficacy of the tests, which were successful in spite of these irregularities. Even so, to address this and undesirable results at the FPRF tests at NIST, a proposed requirement for all splices and intersections to have adhesive sealant followed by a proposed modification requiring special inspection of sealant installation was proposed by the TWB committee at the Committee Action Hearing. The sealant requirement was approved but the modification for its special inspection was ruled beyond the scope of the original proposal, but has been reconstituted as a Public Comment which can be put forward at the public comment hearings this fall.

Concerns that there is only limited information available about how CLT performs or can be used with other materials:

There is extensive information available about CLT construction from many sources, including the increasing number of manufacturers of CLT. For example, a CLT Handbook, addressing structural design, lateral design, connections, fire performance, sound performance, building envelope design, environmental performance, and handling during construction has been available for free for several years. The American Wood Council's National Design Specification for Wood Construction, an ANSI accredited standard, has been updated to incorporate structural and fire design provisions for CLT. There are other guidelines for structural and fire resistance issues published by AWC and other organizations, including information on hybrid systems with steel and concrete.

Among the other advantages of CLT are that it does not distort, lose its strength, or explosively spall when exposed to high temperatures. It has inherently high fire resistance due to its mass, and when protected with gypsum wallboard protection performs improves. Early testing of a highly loaded CLT exterior wall by AWC yielded a 3-hour rating with only one layer of 5/8 Type X gypsum wallboard. Also, in general, CLT responds well to flame impingement by remaining strong and stable when the gypsum is cracked or losing integrity. It is much less heat sensitive than certain noncombustible materials.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction

This is about new types of construction. Adding new types of construction means more choices in construction. More alternatives means lower cost in many cases.

Public Comment 6:

Proponent:

Patrick Ford, representing self (pat@matsenford.com) requests Disapprove

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Commenter's Reason:

Reason: These code changes would allow for structurally unsafe conditions to be inherently designed into tall buildings. As proposed, they would introduce new categories of Type IV construction into the code and expand the number of storeys, allowable areas, and maximum heights of buildings framed with combustible materials. I believe that for several reasons, this would greatly increase the risk to firefighters and building occupants, as well as neighboring buildings. Several of the major decisions that went into the creation of this proposal were based on "engineering judgment" and significant extrapolation of test data from a two storey test building to buildings with dozens more storeys.

Aside from the potentially dangerous and unproven provisions in general, there are several specifics relative to structural connections in these new building types and sizes. I do not believe that these were addressed or at the very least not adequately addressed.

The new building types and increased limits allowed for in these proposals should not be allowed, and the proposals should be disapproved for the following reasons:

1. The AHC-TWB report that was instrumental in many of the provisions indicates that connections were tested, but in fact, no exposed connections were ever tested in any of the assemblies.
2. The compartment tests did not test any connections, nor did any of the standard ASTM tests, including the E84, E119, E814, nor the NFPA 285 tests.
3. The full scale test did not have any exposed connections, yet the code explicitly notes exposed steel and metal caps or brackets allowed in type IV construction within the wood chapter. The exposed metal connectors and their fasteners penetrate well beneath the typical char layer of the structural member, significantly reducing the strength of the member at and near the connection itself. This can

create many hot spots and potential critical structural failure locations throughout a tall building. No other tests addressed this issue either.

4. Adhesive based splice connections remain unproven, the overall adhesive requirements being based on a testing protocol derived after a failed test.
5. The Small Scale Adhesive Qualification Test Protocol (CSA 077 SSA.2) could conceivably be directed toward such connections or splices, but it is a test that lasts only 5 minutes per side of the tested specimen.
6. As an additional note, the full scale test was run on only a two storey structure, leaving any critical structural connections that may have been needed to support only a single storey above. With code proposals allowing for many times this, these concerns should be much more carefully vetted before approval.

It should also always be remembered that in no other type of tall building allowed by the code, is the structure itself also fuel for the fire.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There would be no cost increase associated with my comment because if the code proposal were defeated, there would be no change in the building allowable from the current code.

Public Comment 7:

Proponent:

Robert Grupe, representing Grupe Gypsum Consulting, LLC (rcgconsult@outlook.com) requests Disapprove

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Commenter's Reason:

Overall building performance is predicated on the individual systems that comprise the structure. Further these systems are a series of individual building materials that are integrated based on their performance attributes, and compatibility with adjacent building materials. The proposed Tall Wood-frame construction is based primarily on the use of Cross Laminated Timber, CLT. However the proposal does not address potential compatibility issues, and in some cases lacks critical data to support required performance. Therefore, the CLT, system is not ready for use in wholesale high-rise construction. There are at least two critical system design areas that require additional testing and verification. These two examples are offered here to provide areas of specific concern. These examples are expressed in specific published white papers on the use of Cross-Laminated Timber.

The first example is on acoustics, specifically that of sound transmission through floor-assemblies. The current International Building Code has established minimum requirements for floor-to-floor transmission. In a published white paper entitled ***Mass Timber High-Rise Design Research: Museum Tower in Los Angeles Reimagined in Mass Timber*** (2015) the following statement is made regarding acoustics:

“Testing is required to determine the ability of this assembly to obtain the code-required acoustic performance.”

The paper covered the design of a timber-framed high-rise building. The acoustical design of the structure was centered around two floor-ceiling systems proposed for this project, both of which did not have any acoustic testing to substantiate compliance. The above comment followed a written description of each proposed floor/ceiling assembly.

Another issue of concern relating to additional required research is the proper design of connections that can accommodate the naturally occurring shrinking and swelling of CLT members primarily due to seasonal changes. The issue is the compatibility and serviceability of sealants and membranes that are incorporated into the CLT system. The following is taken from the **CLT Handbook** (2013):

“Differential movement between CLT and other wood-based products or materials (in case of mixed materials and systems) need to be taken into account at the design and detailing stages due to potential shrinkage-induced stress that could undermine the connection capacity in CLT. More information and guidelines related to detailing will be provided in future versions of this document as additional studies need to be performed.”

The point to be made here is that these are critical components in system and ultimately building design that require additional testing and research. It is obvious from the above mentioned white paper and handbook that the composite action of the independent building materials that make up the building systems have yet to be fully researched, tested, and detailed for use in general construction.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements

Public Comment 8:

Proponent:

Patrick Hainault, representing Self (path@matsenford.com) requests Disapprove

Commenter's Reason:

“Tower of Fire destroys LA apartment complex under construction.” This headline in the December 8, 2014 LA Times barely scratches the surface in describing the dangers from fires in buildings under construction when those buildings are framed with wood and wood-based materials. This fire not only destroyed [at least 239](#) of the rental units and [2/3rds of the complex](#) at the Da Vinci Apartments but caused significant damage to neighboring buildings and infrastructure, and greatly burdened the surrounding community in general. Yet, this proposal will dramatically raise the allowable heights and areas of buildings made from combustible materials.

It is not rationale to increase the allowable height of buildings as in this proposal when significant problems in much smaller buildings still present a well-documented risk to life and property. The assembly should overturn the committee decision to effectively prohibit the type of proposed construction until and if it can be proven safe [during](#) and after construction. The following paragraphs expand on the issues the assembly should consider in evaluating this proposal.

How do we even begin to come to grips with the risk to adjacent properties and occupied buildings during the construction phase when an 18- story wood structure allowed by this proposal is burning in a suburban or urban area? Without safeguards well beyond those currently in the code (or proposed as part of a series of related proposals) to protect adjacent properties and infrastructure, the impacts will be devastating. For example, the Da Vinci fire caused:

- Damage to adjacent buildings. At least four nearby buildings were damaged. The building at 221 N. Figueroa St., where the computers and cubicles melted, had significant damage on its 15 floors, with 300 windows blown out. Three floors were also damaged in the Los Angeles County Department of Health Services building at 313 N. Figueroa. LA Department of Water and Power staff identified at least 160 damaged windows. A Los Angeles Department of Building and Safety spokesman reported windows blew out in the north tower of its department headquarters, and the heat and smoke triggered sprinklers that soaked carpets and desks. Overall, the Da Vinci Apartments fire caused an estimated \$111.5 million in damages, including [\\$80 million](#) in damage to city properties from the fire and the water used to extinguish it and [\\$20-\\$30 million](#) to the apartment complex.
- Damage to Infrastructure. A Caltrans spokesman estimated the fire caused \$1.5-million damage to the freeway. Roads were closed around the area including a major commuter route during rush hour. Caltrans officials reported an exit sign over the 110 Freeway melted and would have to be replaced, forcing another freeway closure later the same week.
- Extensive impacts on the community. The attached study of the economic risk to taxpayers and the community posed by mid-rise apartments produced by assistant adjunct professor Urvashi Kaul at Columbia University captures the total cost impacts from fires like the Da Vinci apartments and smaller incidents. This study finds that:
 - In Los Angeles County, alone, fires in mid-rise residential buildings with combustible frames could have a negative impact of \$22.6B over 15 years, including \$17.14B in direct losses from property damage.
 - On average, fire in a mid-rise residential building constructed using combustible framing material costs the Los Angeles County a total of \$141.81 per square foot in potential economic impact and \$2.38 per square foot in lost tax revenues.
 - Potential impact the County may face in a single year could be \$1.7 billion, including \$1.3 billion in direct property damage.

The assembly is also urged to reconsider the argument that cladding requirements proposed to address fires in buildings under construction will resolve these issues. As demonstrated in a large fire from 2015 in a wood-framed apartment building in Edgewater, NJ, cladding will not stop a fire from spreading once the framing in part of the building ignites. It doesn't create a barrier between unexposed framing and exposed framing, but only provides some resistance to ignition from within or outside of the building. The Edgewater fire spread rapidly throughout the buildings once framing behind a wall was ignited during repairs to the occupied and fully-clad building.

The Da Vinci and Edgewater fires are not uncommon incidents. [Dozens of similar fires](#) have occurred (see more at <http://buildwithstrength.com/america-is-burning/>) in buildings under construction since the market began broadly taking advantage of relatively recent changes to the IBC that allowed taller and larger wood-framed buildings. In a similar fire in Houston, the life of a construction worker literally hung in the balance as he was rescued from a burning wood framed building just seconds before the stories above came crashing down. The assembly can prevent these types of risks from greatly expanding by disapproving this proposal.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 9:

Proponent:

William Hall, Portland Cement Association, representing Alliance for Concrete Codes and Standards (jhall@cement.org) requests Disapprove

Commenter's Reason:

At the recent ICC Committee hearings in Columbus, OH, your committee **Failed you**. The general committee charged with looking at proposals and weighing justification **FAILED** to do their job when it came to Tall Wood Buildings. Despite overwhelming testimony that fire tests were inadequate, the committee simply ignored the fact that the TWB ADHOC committee only considered a two story residential structure during testing, and then used "**Engineering Judgment**" to determine that those results will be sufficient for 18 stories.

WHERE is the testing for all the other occupancy groups? 100% increases in story height are proposed for other use groups **without any justification**.

The ICC TWB ADHOC Committee has taken it upon themselves to develop a prescriptive TWB approach that **exceeds** the allowable heights of every country in the world. The United States just recently began looking at Mass Timber for taller buildings and yet, if this proposal goes through, we will allow mass timber 6 stories higher than any other country.

Not only will the U.S. allow the tallest buildings, we will also allow 12 story Mercantile, Storage and Factory to be built **without** gypsum covering on 40% of the CLT surface.

While mass timber may be an acceptable building material, it has not gone through the rigors of that are needed for high rise buildings. **Do not let the U.S. be the testing ground for these Tall Wood Buildings.**

Vote Dissapproval

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

No effect

Public Comment 10:

Proponent:

Marc Nard, Portland Cement Association, representing Portland Cement Association (mnard@cement.org) requests Disapprove

Commenter's Reason:

Mass Timber is a new and incompletely tested building method. There has been insufficient / inadequate testing of the complete system to date. As code officials prescriptive limits are strictly adhered to. You would not allow even a single story increase in the currently allowed construction height of 6 stories. If a contractor asked to be allowed to build to 7 stories he would be told NO that would exceed the height code allows. Now not only is the wood industry seeking to simply exceed the height limitation of 6 stories by one story the desire is to extend the height beyond 6 stories and in fact, without proper testing, NO wind testing or proper justification randomly raise the height allowance three times the current limit allowed to 18 stories. for Mass Timber structures.

18 Story structures far exceeds the level of fire department access. I have 12 years experience as a firefighter in the States of Indiana and Michigan and would urge DISAPPROVAL. Not being able to reach the fire in a combustible building is a recipe for disaster. Common sense and the experience learned from high rise fires dictates that to be safe we use NONCOMBUSTIBLE materials, Type 1 and Type II construction not just open the door for untested systems to be built as high rises. Having combustible construction above the level of fire department access puts occupants, fire fighters and emergency services persons at unnecessary risks.

Wood structures will burn and this affects them and adjacent structures as well. It simply does not provide the Resiliency, Safety and Piece of Mind that Concrete and Steel offer. Fire testing to date has been done on two story structures. We need testing on an 18 story structure both with and without sprinkler protection (they can fail or be inoperative on occasion) and we need testing with wind and water pooling to see how the system reacts to the additional deteriorating factors.

Cross Laminated Timber / Mass Timber burns and chars in a fire. Wood is a combustible product. Given enough heat and oxygen it acts as a fuel and will burn. Note: if the char rate is 1 per hour in a typical fire then after a 2 hour fire exposure a 6 inch wall assembly is now missing 4 inches of structural material. There is no repair method offered so that if there is a kitchen fire and the material is damaged no one as decided it would be an advantage to develop and disseminate the repair procedures prior to building and occupying these structures. This is a major mistake.

To date no standard, including NFPA 285, has a wind component that has been part of the testing of Mass Timber. The recent loss of life in the London high rise fire shows clearly that wind is an accelerating factor in a high rise fire. Support DISAPPROVAL do not experiment with structures people live in and use. Do the testing on full size structures prior to putting these extended height allowances into the code and be certain we test for wind effect.

In the case of a fire event there are two major overriding issues beyond the combustibility of wood products. First, where does the water go after a sprinkler head is activated either by fire or by accidental event (kids throwing a ball in an apartment and hitting a sprinkler head). Second, if the fire department does have to fight an active fire the additional volume of water from attack lines adds to the already added load of sprinkler head water. The connectors have not been tested. There is no provision for a drainage system. What effect will this have on adhesives holding these systems together. What about weather that causes windows to blow out and rain or wind blown debris to enter and pool in the structure. Mold and mildew are a serious concern that have not been addressed. The behavior of Mass Timber / CLT in high rise structures is completely dependent on

proper connections. All connections being used to date are considered proprietary meaning that there is no information available to the public on their design capacities and failure rate.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proponent has submitted a Cost Impact statement that declares that this will not increase the cost of construction. CLT / Mass Timber is a brand new technology which is bound to have a cost increase on the cost of construction using current code compliant non-combustible construction materials.

Disapproving this code change proposal will not increase or increase the cost of construction.

The proposed text provides information that was not previously in the code and thus there is no comparative data. This only underlines the necessity for approximate cost of construction materials and does not alleviate the need for comparison cost of construction values. Perspective building owners and designers have to have some gauge to go by as they determine materials cost in construction.

Public Comment 11:

Proponent:

Lawrence Novak, representing Portland Cement Association (lnovak@cement.org) requests Disapprove

Commenter's Reason:

- - Wood absorbs water, and the resulting rot and mold can seriously impair a wood structures' overall anticipated performance. Note: non-combustible materials such as concrete, masonry and structural steel do not rot.
 -
 - The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood Ad-Hoc. There is no information on the performance of the proprietary connections during fires?
 -
 - Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.
 -
 - Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.
 -
 - It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a

sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues.

-
- There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.
-
- To date, there has been no full scale CLT fire tests done to ASTM standards.
-
- Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Charring wood will add fuel to the fire and increase the heat and smoke output relative to noncombustible materials. Note: if the char rate is 1" per hour in a fire, then after 2 hours in a fire, a 6" thick CLT wood load bearing wall will only have 2" of structural material left. This is not acceptable and is not addressed in the code change proposals.
-
- Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete, masonry and steel.
-
- Allowing wood framed structures to be built above the level of fire department access is a serious mistake. The vast majority of municipal ladder trucks cannot reach above the 7th floor.
-
- There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

- Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 12:

Proponent:

Tien Peng, representing National Ready Mixed Concrete Association (tpeng@nrmca.org) requests Disapprove

Commenter's Reason:

While the Ad Hoc Committee had intended to validate the fire performance of cross laminated timber in fire conditions of buildings, the AWC/ATF compartment testing was limited in scope and not a thorough predictor of fire behavior for high rise building made of a new material. The testing so far is insufficient to capture the fire response characteristics in question. No tests were done to factor in wind, exterior performance, panel connections or moisture, which impacts material performance, fire-fighting and property damage. CLT is a great innovation for the wood industry but it's not ready for prime time and it's certainly not ready for us to build safely to 270 feet and 18 stories. The ICC should not adopt code provisions that will put people at risk.

1. CLT Reliability and Predictability Issues

Cross laminated timber does not have a long enough history to demonstrate their reliability and predictability. The structural design of modern tall buildings is governed by the need to efficiently transfer loading, particularly that from wind, whilst providing increasingly complex building functionality. The use of cross laminated timber implies a highly optimized systems which means the least amount of material to enabled efficient load transfer. Thus, in the event of a fire there is an increased risk not typical in mid-rise constructions, and especially not in a two-story mock up in a lab.

The NFPA with ARUP *Fire Safety Challenges of Tall Wood Buildings* paper noted (NFPA 2013)[i]:

- In a real fire situation, the load-bearing elements in CLT are expected to load-share , or redistribute in a method that is not easily predicted in simple fire testing.
- Previous CLT fire testing has resulted in delamination and char fall-off when exposed to fire conditions.
- This has the potential to increase the fire temperature and burning rate within the compartment, and could impact the structural fire resistance at later stages in the fire duration.

The full-scale fire testing in Norway (SPFR A15101 2016)[ii] showed:

- The temperature increased fast and flashover was reached after four minutes.
- Temperatures were significantly higher than the standard time-temperature curve according to EN 1363-1
- The fire did not cool down before manual suppression was initiated when the test room collapsed 1-hour 36 minutes after ignition
- The sprinklers in the adjacent corridor did not stop the fire from spreading out from the room of origin.
- The charring rate varied much faster than expected

We should not be putting lives in high rises at risk with this level of material unpredictability.

2. Exposed CLT Fire / Moisture /Delamination Issues

The National Institute of Standards (NIST) tests complete previously said there were concerns that flashover occurred earlier with CLTs, heat delamination of the exposed CLT affected its fire performance and a large re-flash occurred on the exposed wall with delamination of the second ply of the CLT. (NIST 2017)[j]

While fire departments understand the risk of collapse with solid wood, there is not enough documentation or history of bonded or laminated wood structures, and they may fail sooner under fire conditions. The problem is that under fire conditions an adhesive may either thermally soften or chemically degrade causing the member to lose its strength, leading to structural collapse. Hence, we see delamination from the NIST testing as well as the very real construction failure on portions of the new College of Forestry building at Oregon State University where a large section of subflooring made of cross-laminated timber gave way between the second and third stories.

Moisture is an important issue for delamination and in many parts of the country the laminated mass timber panels will experience an environment which may exceed the testing limits. Wood will change in all three orthogonal dimensions with changes in moisture, and the changes are not even. This not only means that some species swell more because of their higher density, but also wood of non-

uniform density displays non-uniform swelling. Moreover, as wood swells and shrinks, adhesives do not follow with the same volumetric expansion. RDH Building Science full-scale mock-up study (Lepage 2017)[ii]notes that, The research indicates that CLT and mass timber is susceptible to dangerously high moisture contents, particularly when exposed to liquid water in horizontal applications. and other research indicate that CLT is at risk of structural damage by decay and rotting fungi (Zabel and Morrell 1992)[iii]

Clearly, we should not be putting lives in high rises at risk with this level of material unpredictability.

3. Fire / Connections Vertical Fire Spread

All connections used in current projects are proprietary and no information is publicly available regarding their performance. In a high-rise fire event, it is essential that the fire be prevented from spreading upwards or downwards from the floor of origin, endangering the lives of those waiting on more remote floors. Typically, the floor slab provides a robust barrier inhibiting external fire spread so long as it remains firmly supported by the structure. However, the AWC/ATF compartment fire testing had not adequately accounted for the connections in the CLT technologies to meet this crucial objective. The deformation of the connections when exposed to fire can expose gaps and flammable materials which can lead to spread both upwards through flaming, and downwards through dripping molten materials. Once fire starts spreading away from the floor of origin the safety of the occupants is compromised. Examples of vertical fire spread include:

- Las Vegas Hilton, USA: 22 Stories in approximately 25 minutes
- Caracas Tower, Venezuela: 17 floors in a 24-hour period
- Windsor Tower, Spain: 19 floors, ~7 hours for spread, 24 hours total fire duration
- TVCC Tower, China: 44 floors, around 15 minutes

4. Fire / Stack Effect

A similar concerning pattern emerges when discussing wind and air movement fire performance. One problem common to high-rises but not found in low-rise buildings is the stack effect movement of air inside the building. This air movement is critical to understand what happens during a fire event, as it can intensify a fire or allow flames and combustion gases to move beyond the room of origin. Fire personnel responding to a high-rise fire event need to understand where smoke and toxic gases may be going. Yet, shrinkage, moisture and creep, common in wood products including CLT, will create unpredictable opportunities for air movement within a building.

Air pressure and thermal differential with the use of CLT panels can shift the neutral pressure plane of the building. In cold weather (positive stack effect), the velocity of air channeling into the core from the lower floors is a very real concern to the occupants when they have to defend in place as well as fire service if the fire egress is compromised with smoke. In warm weather (reverse stack effect), where typically the staging floor is two floors below the fire floor, there can be concern of contamination, if there is unpredictability of where the fire path may be taking.

5. Fire / Wind

We typically associate wind with brush and wildland fires but it is just as important in structural fires.

- In 2009 a Texas probationary fire fighter and captain die as a result of rapid fire progression in a wind driven residential fire. Sustained winds from east/south-east at 17 mph with gusts up to 26 mph.

- Virginia Firefighters Battle Three-Alarm Townhouse Fire in 2011. In assessing the high winds and the fire conditions Battalion Barnes says fire crews tried to attack the flames inside two townhouses, but were forced back by intense heat and falling ceilings.
- In 2012 Prince George's County (Maryland), firefighters arrive on scene to a structure fire with winds impacting the rear of the structure. Shortly after forcing the front door open, they saw a dramatic change in fire behavior. As they made entry, they quickly experienced high velocity and high temperature gases, injuring seven firefighters, two critically.

The American Wood Council compartment fire tests did not account for wind loads.

Wind can add to the hazard to a low-rise fire, but it is most concerning around the upper floors of tall buildings. And high-rise fires create unique safety challenges for occupants and firefighters, even without the influence of wind. Wind can change the FLOW PATH of a fire and in some cases create a blowtorch effect and untenable conditions. When a window in the fire apartment fails, the influx of wind can create significant and rapid increases in the heat production of a fire. Smoke and heat spreading through corridors and stairwells, for instance, can inhibit occupants ability to escape and can limit firefighters ability to rescue them. Conditions in a corridor are of critical importance because it is the route that firefighters use to approach a fire and that occupants use to exit a building.

During the course of any structure fire, the wind may also influence exterior conditions and firefighter safety. Accelerated winds near high rises are caused by the downdraft effect, where the air hits a building and, with nowhere else to go, is pushed up, down and around the sides. The air forced downwards increases wind speed at street level. Tests conducted by National Institute of Standards and Technology (NIST 2012), the Fire Fighting Technology Group, FFTG, on positive pressure ventilation determined that an external wind speed of as low as 10 mph could cause a vented room within a structure to quickly spread from an apartment unit to a vent point, represented by a stairwell door. The spreading had floor-to-ceiling and wall-to-wall fire involvement with blowtorch effects. Moreover, if several towers stand near each other, the channeling effect, a wind acceleration created by air having to be squeezed through a narrow space. This Venturi effect will endanger the adjacent buildings.

6. Fire on Exterior

The AWC/ATF compartment fire tests did not account for exterior fire conditions and the proposed exterior proposal does not meet the required testing of CLT assemblies.

An important aspect of fire behavior in the affected building involves the burning behavior of materials on the exterior. While the AWC/ATF test demonstrated an understanding of CLT in an interior fire situation, the circumstances contributing to ignition scenarios of the exterior can be equally complex and equally important. In the past few years we have seen a number of deadly high-rise fires that propagated on the exterior of the structure.

- 2018 Almas Tower in Dubai, UAE
- 2017 Marco Polo apartment complex in Hawaii
- 2018 Grenfell Tower fire in West London

Simply testing the interior fire scenario does not capture potentially important parameters affecting CLT elements in tall wood buildings. If a fire in a heavy-timber building is not extinguished by the initial attack, a tremendous conflagration with flames coming out of the windows will spread fire to adjoining buildings by radiated heat. In a high-rise fire event, it is essential that the fire be prevented

from spreading upwards or downwards from the floor of origin, endangering the lives of those waiting on more remote floors.

Notably missing from the proposals is how the mass timber exterior assembly in buildings over 40 feet in height would comply with NFPA 285, *Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components*.

- *Section 1403.5*: For combustible water-resistive barriers in buildings over 40 feet in height of Type I, II, III, or IV construction.
- *Section 1407.10.4*: For metal composite materials (MCM) used on buildings of Type I, II, III, and **IV** construction.
- *Section 1409.10.4*: For high-pressure decorative exterior-grade compact laminates (HPL) exterior wall coverings used on buildings of Type I, II, III, and **IV** construction.
- *Section 1509.6.2*: Combustible mechanical equipment screens used on buildings of Type I, II, III, and **IV** buildings.
- *Section 2603.5.5*: Exterior walls of buildings of Type I, II, III, and **IV** construction of any height incorporating foam plastic insulation, except for one-story sprinklered buildings.

This is a requirement yet there is no reference to NFPA 285 testing of exterior CLT assemblies. One test by Nordic Engineered Wood published under the Canadian ULC S134 is not enough of a sample size to validate the tall wood proposals. Again, there is not enough historical fires with cross laminated timber to provide information that can be used in an 85-ft building, much less one at 270 feet.

7. Limits of Redundancy

The ICC TW-AHC claimed the added safety factor of active sprinkler systems adds to the safety of the proposals. Without a doubt, the inclusion of fire sprinkler systems in our buildings since the late 1980 s has been effective at increasing the chances of survival in a fire. But when systems don t operate as intended (such as in a freeze failure with water damage) or fail in a high-rise fire condition, the impact can be large, not just in monetary terms, but also in the lives of the occupants and fire fighters.

The full-scale fire testing completed in Norway showed the The sprinklers in the adjacent corridor did not stop the fire from spreading out from the room of origin. (SPFR A15101 2016).[iv] Moreover, according to NFPA s report *U.S. Experience with Sprinklers*, sprinklers were effective at controlling the fire in 96% of fires in which they operated, but sprinklers were only effective in 88% of the fires large enough to activate them. The reported sprinkler failures (660 per year) were twice as common as reported fires in which sprinklers were ineffective and did not control the fire. A National Institute of Standards and Technology (NIST) study, *Estimates of Operational Reliability of Fire Protection Systems*, also demonstrates this over-reliance on fire sprinklers is misguided.

8. Untested Reference Standard

State and local governments that adopt and enforce model building codes which references a number of standards. Yet, the proposals regularly cite the newly referenced standard, *ANSI/APA PRG 320-2018: Standard for Performance-Rated Cross-Laminated Timber*, an untested document. The reference to ANSI/APA PRG 320-2018 resolves nothing and takes no legal responsibility for performance failure. APA PRG 320 has no real history of use or validation as a reliable document and no jurisdiction refers to this document. It is premature to utilize a standard that is rarely referenced and start building to 18 stories from it.

Bibliography:

[i] <https://www.nist.gov/el/fire-research-division-73300/national-fire-research-laboratory-73306/fire-safety-challenges-0>

[ii] <https://buildingsciencelabs.com/wp-content/uploads/2017/11/CCBST-2017-Moisture-Uptake-Testing-for-CLT-Floor-Panels.pdf>

[iii] Zabel RA, Morrell JJ (2012) Wood microbiology: decay and its prevention. Academic press.

[iv] <http://www.mypaper.se/html5/customer/355/11143/?page=21>

[v] https://sustainable-fire-engineering.sustainable-design.ie/wp-content/uploads/2015/08/NFPA-FPRF_Tall-Wood-Buildings-Fire-Safety-Challenges_2013.pdf

[vi] <http://www.mypaper.se/html5/customer/355/11143/?page=21>

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposed public comment would **reduce cost of construction**. Substantiation and references below.

1. Research:

A recent feasibility study [[i]] reveals that CLT construction is significantly more costly than other well-established construction methods such as concrete. Renowned structural engineers, Cary Kopczynski & Company found that the cost of the CLT structural system for a typical 10 story apartment building would cost \$48 to \$56 per square foot compared to \$42 to \$46 per square foot for concrete, translating nearly **20% premium** for Cross Laminated Timber.

2. Brock Commons, British Columbia

Per “University of British Columbia: Report to The Board of Governors, Tall Wood Student Residence, Brock Commons Phase 1” Report [[ii]], dated September 30, 2014,

- “The capital cost for the project is estimated at \$44 million (\$40m standard construction, plus \$4m wood premium).”
- “The \$4m estimated premium for advanced wood design and construction is to be funded from external sources including \$3.45m secured to date from the Canada Wood Council (CWC) and Forest Innovation Investment.”

This is a **10% premium** for Cross Laminated Timber at the 18-Story Brock Commons.

3. Framework Oregon:

Per the January 5, 2018 *Portland Oregonian* article “Wheeler Defends Decision to Invest In Pricey Complex” of the *Portland Oregonian*[[iii]],

- “While each unit is expected to cost an average \$480,000 to build, the city’s contribution will amount to \$100,000 per apartment.”
- Despite a pledge from Mayor Ted Wheeler to bring down the cost of affordable housing in Portland, the Portland Housing Bureau had nonetheless awarded the building \$6 million toward the \$29 million total. (A **21% subsidy** by the taxpayers for the 12- Story Framework project).

By the July 16, 2018 *Willamette Week* (*WW*) article “Plans for Record-Setting Timber Tower in Downtown Portland Fall Through” ^{[[iv]]} reported,

- The building, which was slated to include 60 *affordable* apartments, was projected to cost \$651.43 per square foot, *WW* reported in December. (The 660-square foot two bedroom apartments were projected to cost \$567,389 to build.)

4. Lumber Pricing:

And this doesn’t consider the recent price increases of softwood lumber that have risen wildly from \$424 per board foot a year ago to \$536 in the second quarter of 2018. That’s a **26% increase** in just one year. At the same time, concrete prices rose at a stable rate of 5%.

[i] http://buildingstudies.org/pdf/related_studies/Cross_Laminated_Timber_Feasibility_Study_Feb-2018.pdf

[ii] http://bog2.sites.olt.ubc.ca/files/2014/09/3.2_2014.09_Tall-Wood-Building.pdf

[iii] https://www.oregonlive.com/politics/index.ssf/2018/01/portland_mayor_ted_wheeler_def.html

[iv] <http://www.wweek.com/news/city/2018/07/16/plans-for-record-setting-timber-tower-in-downtown-portland-fall-through/>

Public Comment 13:

Proponent:

Greg Ralph, representing ClarkDietrich Engineering Services requests Disapprove

.

Commenter's Reason:

Proponents of G80 -18 claim the combustible CLT products have been validated by full scale multiple-story fire tests. In reality, the tests were only two stories. The low-rise tests have been severely extrapolated to the proposed 18 stories.

There is significant concern of the wisdom to extrapolate to these extremes. The characteristics of a fire event of this magnitude are unknown. The impact of the fuel load of these combustible materials is of significant concern. The proposed extrapolation from two stories to 18 is unreasonable.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared to the present requirements.

Public Comment 14:

Proponent:

Adam Shoemaker, representing ClarkDietrich (adam.shoemaker@clarkdietrich.com) requests Disapprove

.

Commenter's Reason:

In IBC Section 602.2 it states that Types I and II construction are those types of construction in which the building elements listed in Table 601 **are of noncombustible materials**, except as permitted in Section 603 and elsewhere in this code.

In table 601, Type IB and proposed Type IVB have the same Fire-Resistance Rating (FRR) requirements. I don't believe you can justify in this proposal to allow combustible AND non-combustible elements with the same FRR to have the same allowable number of stories above plane grade table 504.4. It is not reasonable to extrapolate the data from a two story fire test on combustible structural elements as an equal to Type IB non-combustible structural elements.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

No cost impact.

Public Comment 15:

Proponent:

Paul Tennis, representing Portland Cement Association (pdtennis@comporium.net) requests Disapprove

.

Commenter's Reason:

- There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.
- Allowing wood structures to be built above the level of fire department access is a serious mistake.
- Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.
- Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1" per hour in a fire, then after 2 hours in a fire, a 6" thick CLT wood load bearing wall will only have 2" of structural material left. This is not acceptable and is not addressed in the code change proposals.

- There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.
- It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?
- Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.
- Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.
- The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood Ad-Hoc. There is no information on the performance of the proprietary connections during fires?

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 16:

Proponent:

Larry Williams, representing Steel Framing Industry Association (williams@steelframingassociation.org) requests Disapprove

Commenter's Reason:

The leap in assumptions that fire tests on a two-storey mock up can be extrapolated to fire performance of an 18-story building is an unreasonable extension in the allowance for use of "professional judgement."

Proponents of G108-18 and related proposals state that the expected fire performance of mass timber buildings was "validated by a series of full scale multiple-story fire tests." However, the actual model tested was only two storeys in height, and from this test users are expected to have confidence that a 180-foot tall building construction with cross-laminated timber will exhibit identical performance.

The fundamental problem of this assumption is that some characteristics of large fires have not been observed on small fires, either because they do not occur in small fires or because they are too small to be detected. It seems likely that a different set of controls of fire behavior may take over after a fire reaches a certain size or intensity. The difficulty of extrapolating from small to large fires is further complicated by the fact that behavior of fire is a pattern phenomenon--the behavior at one point is often dependent on the behavior at another point. The behavior of one part of a fire may

change even if burning conditions at that point do not vary when the characteristics of the fire at some other point changes.

The structural and fire resistance performance of cross-laminated timber is fundamentally determined by the performance of the adhesive used to hold the layers of the product together. Delamination as a result of exposure of CLT to heat and flame have been identified as an issue of concern through both independent research and tests conducted under the supervision of members of the Ad Hoc Tall Wood Committee.

The solution to this concern was the addition of language in the proposal to reference PRG 320-18 which had not been published at the time of the submission of the proposed G108-18. Since the proposal was submitted, the PRG 320-18 has been published with an Appendix B that is intended to provide a test procedure to be used in evaluating the elevated temperature performance of adhesives.

This Appendix B has been public for less than 5 months, and consequently has no history of use that would validate assumptions that we are being asked to make. In addition, it clearly states that not all factors needed for a risk assessment are incorporated into the development of the Appendix. Further, the task of verifying that any of the methods discussed in the Appendix is left to the user.

Given the important role that adhesives play in the structural performance and safety of a bonded system, too little is known or provided that would ensure that 180-foot tall structures would be safe in the event of a fire or exposure to heat.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with current requirements.

Public Comment 17:

Proponent:

Dan Nichols, representing ICC Code Correlation Committee (ccc@iccsafe.org)

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Commenter's Reason:

The Code Correlation Committee (CCC) is not taking a position on this code change. The CCC submitted this public comment in order to bring a correlation issue to the attention of the full voting membership for the Public Comment Hearings and the Online Governmental Consensus Vote to allow the voting membership to coordinate actions on a package of code changes submitted dealing with tall wood buildings of mass timber construction. This package includes the parent proposal G108-18; if disapproved, the related proposals G28-18, G75-18, G80-18, G84-18, G89-18, FS5-18, FS6-18, FS73-18, FS81-18 and F266-18, will not be correlated with any existing code text if they are approved.

The Code Correlation Committee is a standing committee of the International Code Council whose objectives, procedures and organization are set forth in Council Policy CP#44-13. The objective of the Code Correlation Committee is to maintain technical and editorial consistency among the International Codes and to assist staff in the evaluation and processing of code change proposals and comments that are exclusively editorial.

G80-18

G84-18

IBC: Table TABLE 506.2

Proposed Change as Submitted

Proponent:

Stephen DiGiovanni, representing ICC Ad Hoc Committee on Tall Wood Buildings (TWB)
(TWB@iccsafe.org)

2018 International Building Code

Revise as follows

TABLE 506.2

OCCUPANCY CLASSIFICATION				TYPE OF CONSTRUCTION	TYPE OF CONSTRUCTION	TYPE OF CONSTRUCTION
	TYPE IV			TYPE V		
	<u>A</u>	<u>B</u>	<u>C</u>	HT	A	B
A-1	<u>45,000</u>	<u>30,000</u>	<u>18,750</u>	15,000	11,500	5,500
	<u>180,000</u>	<u>120,000</u>	<u>75,000</u>	60,000	46,000	22,000
	<u>135,000</u>	<u>90,000</u>	<u>56,250</u>	45,000	34,500	16,500
A-2	<u>45,000</u>	<u>30,000</u>	<u>18,750</u>	15,000	11,500	6,000
	<u>180,000</u>	<u>120,000</u>	<u>75,000</u>	60,000	46,000	24,000
	<u>135,000</u>	<u>90,000</u>	<u>56,250</u>	45,000	34,500	18,000
A-3	<u>45,000</u>	<u>30,000</u>	<u>18,750</u>	15,000	11,500	6,000
	<u>180,000</u>	<u>120,000</u>	<u>75,000</u>	60,000	46,000	24,000
	<u>135,000</u>	<u>90,000</u>	<u>56,250</u>	45,000	34,500	18,000
A-4	<u>45,000</u>	<u>30,000</u>	<u>18,750</u>	15,000	11,500	6,000
	<u>180,000</u>	<u>120,000</u>	<u>75,000</u>	60,000	46,000	24,000
	<u>135,000</u>	<u>90,000</u>	<u>56,250</u>	45,000	34,500	18,000
A-5	<u>UL</u>	<u>UL</u>	<u>UL</u>	UL	UL	UL

B	<u>108,00</u> <u>0</u>	<u>72,000</u>	<u>45,000</u>	36,000	18,000	9,000
	<u>432,00</u> <u>0</u>	<u>288,00</u> <u>0</u>	<u>180,00</u> <u>0</u>	144,000	72,000	36,000
	<u>324,00</u> <u>0</u>	<u>216,00</u> <u>0</u>	<u>135,00</u> <u>0</u>	108,000	54,000	27,000
E	<u>76,500</u>	<u>51,000</u>	<u>31,875</u>	25,500	18,500	9,500
	<u>306,00</u> <u>0</u>	<u>204,00</u> <u>0</u>	<u>127,50</u> <u>0</u>	102,000	74,000	38,000
	<u>229,50</u> <u>0</u>	<u>153,00</u> <u>0</u>	<u>95,625</u>	76,500	55,500	28,500
F-1	<u>100,50</u> <u>0</u>	<u>67,000</u>	<u>41,875</u>	33,500	14,000	8,500
	<u>402,00</u> <u>0</u>	<u>268,00</u> <u>0</u>	<u>167,50</u> <u>0</u>	134,000	56,000	34,000
	<u>301,50</u> <u>0</u>	<u>201,00</u> <u>0</u>	<u>125,62</u> <u>5</u>	100,500	42,000	25,500
F-2	<u>151,50</u> <u>0</u>	<u>101,00</u> <u>0</u>	<u>63,125</u>	50,500	21,000	13,000
	<u>606,00</u> <u>0</u>	<u>404,00</u> <u>0</u>	<u>252,50</u> <u>0</u>	202,000	84,000	52,000
	<u>454,50</u> <u>0</u>	<u>303,00</u> <u>0</u>	<u>189,37</u> <u>5</u>	151,500	63,000	39,000
H-1	<u>10,500</u>	<u>10,500</u>	<u>10,500</u>	10,500	7,500	NP
H-2	<u>10,500</u>	<u>10,500</u>	<u>10,500</u>	10,500	7,500	3,000
H-3	<u>25,500</u>	<u>25,500</u>	<u>25,500</u>	25,500	10,000	5,000
H-4	<u>72,000</u>	<u>54,000</u>	<u>40,500</u>	36,000	18,000	6,500
	<u>288,00</u> <u>0</u>	<u>216,00</u> <u>0</u>	<u>162,00</u> <u>0</u>	144,000	72,000	26,000
	<u>216,00</u> <u>0</u>	<u>162,00</u> <u>0</u>	<u>121,50</u> <u>0</u>	108,000	54,000	19,500
H-5	<u>72,000</u>	<u>54,000</u>	<u>40,500</u>	36,000	18,000	9,000
	<u>288,00</u> <u>0</u>	<u>216,00</u> <u>0</u>	<u>162,00</u> <u>0</u>	144,000	72,000	36,000
	<u>216,00</u> <u>0</u>	<u>162,00</u> <u>0</u>	<u>121,50</u> <u>0</u>	108000	54,000	27,000
I-1	<u>54,000</u>	<u>36,000</u>	<u>18,000</u>	18,000	10,500	4,500
	<u>216,00</u> <u>0</u>	<u>144,00</u> <u>0</u>	<u>72,000</u>	72,000	42,000	18,000
	<u>162,00</u> <u>0</u>	<u>108,00</u> <u>0</u>	<u>54,000</u>	54,000	31,500	13,500
I-2	<u>36,000</u>	<u>24,000</u>	<u>12,000</u>	12,000	9,500	NP

	<u>144,00</u> <u>0</u>	<u>96,000</u>	<u>48,000</u>	48,000	38,000	NP
	<u>108,00</u> <u>0</u>	<u>72,000</u>	<u>36,000</u>	36,000	28,500	NP
I-3	<u>36,000</u>	<u>24,000</u>	<u>12,000</u>	12,000	7,500	5,000
	<u>144,00</u> <u>0</u>	<u>96,000</u>	<u>48,000</u>	48,000	30,000	20,000
	<u>108,00</u> <u>0</u>	<u>72,000</u>	<u>36,000</u>	36,000	22,500	15,000
I-4	<u>76,500</u>	<u>51,000</u>	<u>25,500</u>	25,500	18,500	9,000
	<u>306,00</u> <u>0</u>	<u>204,00</u> <u>0</u>	<u>102,00</u> <u>0</u>	102,000	74,000	36,000
	<u>229,50</u> <u>0</u>	<u>153,00</u> <u>0</u>	<u>76,500</u>	76,500	55,500	27,000
M	<u>61,500</u>	<u>41,000</u>	<u>25,625</u>	20,500	14,000	9,000
	<u>246,00</u> <u>0</u>	<u>164,00</u> <u>0</u>	<u>102,50</u> <u>0</u>	82,000	56,000	36,000
	<u>184,50</u> <u>0</u>	<u>123,00</u> <u>0</u>	<u>76,875</u>	61,500	42,000	27,000
R-1h	<u>61,500</u>	<u>41,000</u>	<u>25,625</u>	20,500	12,000	7,000
	<u>246,00</u> <u>0</u>	<u>164,00</u> <u>0</u>	<u>102,50</u> <u>0</u>	82,000	48,000	28,000
	<u>184,50</u> <u>0</u>	<u>123,00</u> <u>0</u>	<u>76,875</u>	61,500	36,000	21,000
R-2h	<u>61,500</u>	<u>41,000</u>	<u>25,625</u>	20,500	12,000	7,000
	<u>246,00</u> <u>0</u>	<u>164,00</u> <u>0</u>	<u>102,50</u> <u>0</u>	82,000	48,000	28,000
	<u>184,50</u> <u>0</u>	<u>123,00</u> <u>0</u>	<u>76,875</u>	61,500	36,000	21,000
R-3h	<u>UL</u>	<u>UL</u>	<u>UL</u>	UL	UL	UL
R-4h						
	<u>61,500</u>	<u>41,000</u>	<u>25,625</u>	20,500	12,000	7,000
	<u>246,00</u> <u>0</u>	<u>164,00</u> <u>0</u>	<u>102,50</u> <u>0</u>	82,000	48,000	28,000
	<u>184,50</u> <u>0</u>	<u>123,00</u> <u>0</u>	<u>76,875</u>	61,500	36,000	21,000

S-1	<u>76,500</u>	<u>51,000</u>	<u>31,875</u>	25,500	14,000	9,000
	<u>306.00</u> 0	<u>204.00</u> 0	<u>127.50</u> 0	102,000	56,000	36,000
	<u>229.50</u> 0	<u>153.00</u> 0	<u>95,625</u>	76,500	42,000	27,000
S-2	<u>115.50</u> 0	<u>77,000</u>	<u>48,125</u>	38,500	21,000	13,500
	<u>462.00</u> 0	<u>308.00</u> 0	<u>192.50</u> 0	154,000	84,000	54,000
	<u>346.50</u> 0	<u>231.00</u> 0	<u>144,37</u> 5	115,500	63,000	40,500
U	<u>54,000</u>	<u>36,000</u>	<u>22,500</u>	18,000	9,000	5,500
	<u>216.00</u> 0	<u>144.00</u> 0	<u>90,000</u>	72,000	36,000	22,000
	<u>162.00</u> 0	<u>108.00</u> 0	<u>67,500</u>	54,000	27,000	16,500

PORTIONS OF TABLE REMOVED REMAIN UNCHANGED

For SI: 1 square foot = 0.0929 m².

UL = Unlimited; NP = Not Permitted; NS = Buildings not equipped throughout with an automatic sprinkler system; S1 = Buildings a maximum of one story above grade plane equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; SM = Buildings two or more stories above grade plane equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

- a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.
- b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.
- c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.
- d. The NS value is only for use in evaluation of existing building area in accordance with the International Existing Building Code.
- e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies, Condition 1, see Exception 1 of Section 903.2.6.
- f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and Section 1103.5 of the International Fire Code.
- g. New Group I-4 occupancies see Exceptions 2 and 3 of Section 903.2.6.
- h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.
- i. The maximum allowable area for a single-story nonsprinklered Group U greenhouse is permitted to be 9,000 square feet, or the allowable area shall be permitted to comply with Table C102.1 of Appendix C.

Reason:

The Ad Hoc Committee on Tall Wood Buildings (TWB) was created by the ICC Board to explore the science of tall wood buildings and take action on developing code changes for tall wood buildings. The TWB has created several code change proposals with respect to the concept of tall buildings of mass timber and the background information is at the end of this Statement. Within the statement are important links to information, including documents and videos, used in the deliberations which resulted in these proposals.

The TWB and its various WGs held meetings, studied issues and sought input from various expert sources around the world. The TWB has posted those documents and input on its website for interested parties to follow its progress and to allow those parties to, in turn, provide input to the TWB.

At its first meeting, the TWB discussed a number of performance objectives to be met with the proposed criteria for tall wood buildings:

1. No collapse under reasonable scenarios of complete burn-out of fuel without automatic sprinkler protection being considered.
2. No unusually high radiation exposure from the subject building to adjoining properties to present a risk of ignition under reasonably severe fire scenarios.
3. No unusual response from typical radiation exposure from adjacent properties to present a risk of ignition of the subject building under reasonably severe fire scenarios.
4. No unusual fire department access issues.
5. Egress systems designed to protect building occupants during the design escape time, plus a factor of safety.
6. Highly reliable fire suppression systems to reduce the risk of failure during reasonably expected fire scenarios. The degree of reliability should be proportional to evacuation time (height) and the risk of collapse.

The comprehensive package of proposals from the TWB meet these performance objectives.

Allowable Area

In addressing this topic, it was necessary to develop height and area criteria to address each new type of construction being proposed. Relying upon each new type of construction proposed for tall wood buildings (Types IV-A, IV-B and IV-C), the committee examined each type of construction for its safety and efficacy with regard to each occupancy type. This proposal on allowable areas should be considered as a companion proposal to the height proposals. The three proposals were developed with regard to one another as well as with regard to the new types of construction.

The TWB also determined that fire testing was necessary to validate these concepts. At its first meeting, members discussed the nature and intention of fire testing so as to ensure meaningful results for the TWB and, more specifically, for the fire service. Subsequently a test plan was developed. The fire tests consisted of one-bedroom apartments on two levels, with both apartments having a corridor leading to a stairway. The purpose of the tests was to address the contribution of mass timber to a fire, the performance of connections, the performance of joints, and to evaluate conditions for responding fire personnel. The Fire WG then refined the test plan, which was implemented with a series of five full-scale, multiple-story building tests at the Alcohol, Tobacco and Firearms (ATF) laboratories in Beltsville, MD. The results of those tests, as well as testing conducted by others, helped the Committee form the basis upon which the Codes WG developed its code change proposals. This code change proposal is one of those developed by the Codes WG and adopted by the TWB.

To review a summary of the fire tests, please visit:

<http://bit.ly/ATF-firetestreport>

To watch summary videos of the fire tests, which are accelerated to run in 3-1/2 minutes each, please visit: <http://bit.ly/ATF-firetestvideos>.

Both of these links were confirmed active on 12/27/17.

Each proposed new type of construction was examined for its fire safety characteristics and compared to the existing, long-standing type of construction known as Heavy Timber. The committee found that it was reasonable to develop a multiplier which could be applied to the traditional HT areas. This was done for each new type of construction. Thus, the proposed new Type IV-C was 1.25 times the HT allowable area, IV-B was 2.00 times the HT allowable area and IV-A was 3.00 times the HT allowable area.

These multipliers were examined in terms of relative performance compared to traditional HT. They were reexamined on a case-by-case basis based upon relative hazard and occupancy classification. Some hazards were perceived to be greater and, thus, areas were adjusted downward to reflect the hazard. Other situations were similarly considered. For example, Hazardous and Institutional occupancies do not fully follow the multiplier method, as most areas for those occupancies were reduced from what the multiplier method would suggest.

Also, the committee reconsidered this proposal with respect to the companion height proposal. This review was to be sure that allowable areas were commensurate with the risk posed by being allowed on some particular story or at some height above grade plane.

Background information: The ICC Board approved the establishment of an ad hoc committee for tall wood buildings in December of 2015. The purpose of the ad hoc committee is to explore the science of tall wood buildings and to investigate the feasibility and take action on developing code changes for tall wood buildings. The committee is comprised of a balance of stakeholders with additional opportunities for interested parties to participate in the four Work Groups established by the ad hoc committee, namely: Code; Fire; Standards/Definitions; and Structural. For more information, be sure to visit the ICC website <https://www.iccsafe.org/codes-tech-support/cs/icc-ad-hoc-committee-on-tall-wood-buildings/> (link active and up to date as of 12/27/17). As seen in the "Meeting Minutes and Documents" and "Resource Documents" sections of the committee web page, the ad hoc committee reviewed a substantial amount of information in order to provide technical justification for code proposals.

The ad hoc committee developed proposals for the followings code sections. The committee believes this package of code changes will result in regulations that adequately address the fire and life safety issues of tall mass timber buildings.

IBC Code Section	Description
403.3.2	Water supply requirements for fire pumps in high rise buildings of Type IVA and IVB construction.
504.3	Allowable building height (feet) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT construction.
504.4	Allowable building height (stories) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
506.2	Allowable building area for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
508.4.4.1 509.4.1.1 (new)	Requirements for mass timber building elements serving as fire barriers or horizontal assemblies in buildings of Type IVB or IVC construction.
602.4	Type of Construction requirements for new proposed types of construction: Types IVA, IVB and IVC. No changes to Type IV HT construction. Includes definitions for new terms: Mass timber and Noncombustible protection (mass timber). THIS IS THE KEY CODE CHANGE PROPOSAL WHICH OUTLINES THE CONSTRUCTION REQUIREMENTS FOR THE PROPOSED NEW TYPE OF MASS TIMBER BUILDINGS. THE PROPOSAL ALSO ADDRESSES CONCEALED SPACES, ADHESIVE PERFORMANCE AND EXTERIOR WALL PROTECTION.
703.8 (new)	The performance method to determine the increase to the fire resistance rating provided by noncombustible protection applied to the mass timber building element.
703.9 (new)	Requirements for sealants and adhesives to be placed at abutting edges and intersections of mass timber building elements. The reason statement references a Group B proposal to Chapter 17 for special inspection requirements of sealants and adhesives.
718.2.1	Requirements on the use of mass timber building elements used for Fireblocking.
722.7 (new)	Requirements for the fire resistance rating of mass timber elements, including minimum required protection and gypsum board attachment requirements.
3102	Requirements for membrane structures using Type IV HT construction.
3314.7 (new)	New special precautions during construction of buildings of Types IVA, IVB and IVC construction: Standpipes; Water supply for fire department connections; Noncombustible protection required for mass timber elements as construction height increases.
Appendix	Requirements for walls, floors and roofs of Type IV HT construction in buildings located in Fire Districts.
IFC Code Section	Description
701.6	Requirements which stipulate the owner's responsibility to maintain inventory of all required fire resistance rated construction in buildings of Types IVA and IVB construction. This includes an annual inspection and proper repair where necessary.
Proposed changes to be submitted in 2019 Group B	
IBC Chapter 17	Required special inspections of mass timber construction <ul style="list-style-type: none"> • Structural • Sealants and adhesives (see IBC 703.8)
IBC Chapter 23	An update to referenced standard APA PRG 320 Standard for Performance-rated Cross-laminated Timber which is currently undergoing revision to ensure the adequacy of the adhesives under fire conditions.

In addition, fire tests designed to simulate the three new construction types (Types IVA, IVB and IVC) in the ad hoc committee proposals were conducted at the Alcohol Tobacco and Firearms test lab facility. The TWB was involved in the design of the tests, and many members witnessed the test in person or online. The results of the series of 5 fire tests provide additional support for these proposals, and validate the fire performance for each of the types of construction proposed by the committee. The fire tests consisted of one-bedroom apartments on two levels, with both apartments having a corridor leading to a stair. The purpose of the tests was to address the contribution of mass timber to a fire, the performance of connections, the performance of through-penetration fire stops, and to evaluate conditions for responding fire personnel.

To review a summary of the fire tests, please visit:

<http://bit.ly/ATF-firetestreport>

To watch summary videos of the fire tests, which are accelerated to run in 3 ½ minutes, please visit:

<http://bit.ly/ATF-firetestvideos>

Both of these links were confirmed active on 12/27/17.

Cost Impact: The code change proposal will not increase or decrease the cost of construction

This section provides information that was not previously set forth in the code, and does not change the requirements of current code, thus there is no cost impact when compared with present requirements.

G84-18

Public Hearing Results

Errata:

The balance of the table's columns are now shown.

Committee Action:

As Submitted

Committee Reason:

The committee approved the proposal based on their previous testimony as recorded in the committee reason statements to proposals G27, G75, G80, G89, G108, G146, G152, FS5, FS6, F73 and FS81. (Vote: 14-0)

Assembly Action:

None

G84-18

Individual Consideration Agenda

Public Comment 1:

Proponent:

Jonathan Humble, American Iron and Steel Institute, representing American Iron and Steel Institute (Jhumble@steel.org) requests As Modified by This Public Comment

Modify as follows:

2018 International Building Code

TABLE 506.2

ALLOWABLE AREA FACTOR (A_i = NS, S1, S13R, S13D or SM, as applicable) IN SQUARE FEET ^a
_b

OCCUPANCY CLASSIFICATION						TYPE OF CONSTRUCTION	TYPE OF CONSTRUCTION	TYPE OF CONSTRUCTION
	TYPE III		TYPE IV			HT	TYPE V	
	A	B	A	B	C		A	B
A-1	14,000	8,500	45,000	30,000	18,750	15,000	11,500	5,500
	56,000	34,000	180,000	120,000	75,000	60,000	46,000	22,000
	42,000	25,500	135,000	90,000	56,250	45,000	34,500	16,500
A-2	14,000	9,500	45,000	30,000	18,750	15,000	11,500	6,000
	56,000	38,000	180,000	120,000	75,000	60,000	46,000	24,000
	42,000	28,500	135,000	90,000	56,250	45,000	34,500	18,000
A-3	14,000	9,500	45,000	30,000	18,750	15,000	11,500	6,000
	56,000	38,000	180,000	120,000	75,000	60,000	46,000	24,000
	42,000	28,500	135,000	90,000	56,250	45,000	34,500	18,000
A-4	14,000	9,500	45,000	30,000	18,750	15,000	11,500	6,000
	56,000	38,000	180,000	120,000	75,000	60,000	46,000	24,000
	42,000	28,500	135,000	90,000	56,250	45,000	34,500	18,000
A-5								
	UL	UL	UL	UL	UL	UL	UL	UL
B	28,500	19,000	108,000	72,000	45,000	36,000	18,000	9,000
	114,000	76,000	432,000	288,000	180,000	144,000	72,000	36,000
	85,500	57,000	324,000	216,000	135,000	108,000	54,000	27,000
E	23,500	14,500	76,500	51,000	31,875	25,500	18,500	9,500

		94,000	58,000	306,000	204,000	127,500	102,000	74,000	38,000
		70,500	43,500	229,500	153,000	95,625	76,500	55,500	28,500
F-1		19,000	12,000	100,500	67,000	41,875	33,500	14,000	8,500
		76,000	48,000	402,000	268,000	167,500	134,000	56,000	34,000
		57,000	36,000	301,500	201,000	125,625	100,500	42,000	25,500
F-2		28,500	18,000	151,500	101,000	63,125	50,500	21,000	13,000
		114,000	72,000	606,000	404,000	252,500	202,000	84,000	52,000
		85,500	54,000	454,500	303,000	189,375	151,500	63,000	39,000
H-1		9,500	7,000	10,500	10,500	10,500	10,500	7,500	NP
H-2		9,500	7,000	10,500	10,500	10,500	10,500	7,500	3,000
H-3		17,500	13,000	25,500	25,500	25,500	25,500	10,000	5,000
H-4		28,500	17,500	72,000	54,000	40,500	36,000	18,000	6,500
		114,000	70,000	288,000	216,000	162,000	144,000	72,000	26,000
		85,500	52,500	216,000	162,000	121,500	108,000	54,000	19,500
H-5		28,500	19,000	72,000	54,000	40,500	36,000	18,000	9,000
		114,000	76,000	288,000	216,000	162,000	144,000	72,000	36,000
		85,500	57,000	216,000	162,000	121,500	108,000	54,000	27,000
I-1		16,500	10,000	54,000	36,000	18,000	18,000	10,500	4,500
		66,000	40,000	216,000	144,000	72,000	72,000	42,000	18,000
		49,500	30,000	162,000	108,000	54,000	54,000	31,500	13,500
I-2		12,000	NP	36,000	24,000	12,000	12,000	9,500	NP
		48,000	NP	144,000	96,000	48,000	48,000	38,000	NP
		36,000	NP	108,000	72,000	36,000	36,000	28,500	NP
I-3		10,500	7,500	36,000	24,000	12,000	12,000	7,500	5,000
		42,000	30,000	144,000	96,000	48,000	48,000	30,000	20,000
		31,500	22,500	108,000	72,000	36,000	36,000	22,500	15,000
I-4		23,500	13,000	76,500	51,000	25,500	25,500	18,500	9,000
		94,000	52,000	306,000	204,000	102,000	102,000	74,000	36,000
		70,500	39,000	229,500	153,000	76,500	76,500	55,500	27,000
M		18,500	12,500	61,500	41,000	25,625	20,500	14,000	9,000
		74,000	50,000	246,000	164,000	102,500	82,000	56,000	36,000
		55,500	37,500	184,500	123,000	76,875	61,500	42,000	27,000
R-1h		24,000	16,000	61,500	41,000	25,625	20,500	12,000	7,000

		96,000	64,000	246,000	164,000	102,500	82,000	48,000	28,000
		72,000	48,000	184,500	123,000	76,875	61,500	36,000	21,000
R-2h		24,000	16,000	61,500	41,000	25,625	20,500	12,000	7,000
		96,000	64,000	246,000	164,000	102,500	82,000	48,000	28,000
R-2h		72,000	48,000	184,500	123,000	76,875	61,500	36,000	21,000
R-3h		UL	UL	UL	UL	UL	UL	UL	UL
R-4h									
		24,000	16,000	61,500	41,000	25,625	20,500	12,000	7,000
		96,000	64,000	246,000	164,000	102,500	82,000	48,000	28,000
		72,000	48,000	184,500	123,000	76,875	61,500	36,000	21,000
S-1		26,000	17,500	76,500	51,000	31,875	25,500	14,000	9,000
		104,000	70,000	306,000	204,000	127,500	102,000	56,000	36,000
		78,000	52,500	229,500	153,000	95,625	76,500	42,000	27,000
S-2		39,000	26,000	115,500	77,000	48,125	38,500	21,000	13,500
		156,000	104,000	462,000	308,000	192,500	154,000	84,000	54,000
		117,000	78,000	346,500	231,000	144,375	115,500	63,000	40,500
U		14,000	8,500	54,000	36,000	22,500	18,000	9,000	5,500
		56,000	34,000	216,000	144,000	90,000	72,000	36,000	22,000
		42,000	25,500	162,000	108,000	67,500	54,000	27,000	16,500

For SI: 1 square foot = 0.0929 m².

UL = Unlimited; NP = Not Permitted; NS = Buildings not equipped throughout with an automatic sprinkler system; S1 = Buildings a maximum of one story above grade plane equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; SM = Buildings two or more stories above grade plane equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

- a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.
- b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.
- c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.

- d. The NS value is only for use in evaluation of existing building area in accordance with the International Existing Building Code.
- e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies, Condition 1, see Exception 1 of Section 903.2.6.
- f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and Section 1103.5 of the International Fire Code.
- g. New Group I-4 occupancies see Exceptions 2 and 3 of Section 903.2.6.
- h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.
- i. The maximum allowable area for a single-story nonsprinklered Group U greenhouse is permitted to be 9,000 square feet, or the allowable area shall be permitted to comply with Table C102.1 of Appendix C.

Commenter's Reason:

We recommend that the Type IV-B mass timber designation be deleted from the tall wood building proposals.

The origins of the development of the types of construction were originally developed to “account for the response or participation that a building’s structure will have in a fire condition originating within the building as a result of the occupancy or the fuel load” (Example source from BOCA National Building Code 1993 Commentary). The modern day types of construction are parsed out into three primary categories of construction; noncombustible (Types I and II), noncombustible/combustible (Types III and IV) and combustible (Type V). Subcategories were created to identify the protection; Type A for protected and Type B for unprotected.

What we have within proposals G75-18, G80-18, G84-18, G89-18, and G108-18 is the addition of a new construction category that has been proposed based on the need to satisfy aesthetics based on the combination of Types IV-A and IV-C, which is a departure from the black and white construction categories based on construction that is non-combustible or combustible. We feel this inappropriate for the codes to begin to designate designer type construction categories.

In the past such mixing and matching of construction types into building or structure is more suited to the IBC Section 104.11 (Alternative materials, design and methods of construction and equipment), or through use of the ICC International Performance Code or performance analysis. We feel that these are the most appropriate options for the mixing-and-matching of construction types in building design.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This will not increase or decrease the cost of construction as this code change proposal and public comment address information that was not previously contained in the code, therefore there is no cost impact when compared to present requirements.

Public Comment 2:

Proponent:

Brian M. McGraw, P.E., Virginia Department of Fire Programs, State Fire Marshal's Office, representing Virginia State Fire Marshal's Office, Virginia Fire Services Board (brian.mcgraw@vdfp.virginia.gov) requests As Modified by This Public Comment

Modify as follows:

2018 International Building Code

TABLE 506.2

ALLOWABLE AREA FACTOR (A_i = NS, S1, S13R, S13D or SM, as applicable) IN SQUARE FEET ^a

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION				TYPE OF CONSTRUCTION	TYPE OF CONSTRUCTION
	TYPE IV				TYPE V	
	A	B	C	HT	A	B
A-1	45,000 15,000	30,000 15,000	18,750 15,000	15,000	11,500	5,500
	180,000 60,000	120,000 60,000	75,000 60,000	60,000	46,000	22,000
	135,000	90,000	56,250	45,000	34,500	16,500
A-2	45,000 15,000	30,000 15,000	18,750 15,000	15,000	11,500	6,000
	180,000 60,000	120,000 60,000	75,000 60,000	60,000	46,000	24,000
	135,000	90,000	56,250	45,000	34,500	18,000
A-3	45,000 15,000	30,000 15,000	18,750 15,000	15,000	11,500	6,000
	180,000 60,000	120,000 60,000	75,000 60,000	60,000	46,000	24,000
	135,000	90,000	56,250	45,000	34,500	18,000
A-4	45,000 15,000	30,000 15,000	18,750 15,000	15,000	11,500	6,000
	180,000 60,000	120,000 60,000	75,000 60,000	60,000	46,000	24,000
	135,000	90,000	56,250	45,000	34,500	18,000
A-5	UL	UL	UL	UL	UL	UL
B	108,000 36,000	72,000 36,000	45,000 36,000	36,000	18,000	9,000
	432,000	288,000	180,000	144,000	72,000	36,000
	324,000	216,000 54,000	135,000 54,000	108,000 54,000	54,000	27,000

E	76,500 <u>25,500</u>	51,000 <u>25,500</u>	31,875 <u>25,500</u>	25,500	18,500	9,500
	306,000	204,000	127,500	102,000	74,000	38,000
	229,500	153,000 <u>55,000</u>	95,625 <u>55,000</u>	76,500 <u>55,000</u>	55,500	28,500
F-1	400,500 <u>33,500</u>	67,000 <u>33,500</u>	41,875 <u>33,500</u>	33,500	14,000	8,500
	402,000	268,000	167,500	134,000	56,000	34,000
	301,500	201,000 <u>42,000</u>	125,625 <u>42,000</u>	100,500 <u>42,000</u>	42,000	25,500
F-2	451,500 <u>50,500</u>	101,000 <u>50,500</u>	63,125 <u>50,500</u>	50,500	21,000	13,000
	606,000 <u>202,000</u>	404,000 <u>202,000</u>	252,500 <u>202,000</u>	202,000	84,000	52,000
	454,500	303,000 <u>151,500</u>	189,375 <u>151,500</u>	151,500	63,000	39,000
H-1	10,500	10,500	10,500	10,500	7,500	NP
H-2	10,500	10,500	10,500	10,500	7,500	3,000
H-3	25,500 <u>10,000</u>	25,500 <u>10,000</u>	25,500 <u>10,000</u>	25,500	10,000	5,000
	72,000	54,000	40,500	36,000	18,000	6,500
H-4	36,000 <u>288,000</u>	36,000 <u>216,000</u>	36,000 <u>162,000</u>	144,000	72,000	26,000
	144,000	144,000	144,000	108,000	54,000	19,500
	216,000	162,000	121,500	108,000	54,000	19,500
H-5	72,000 <u>36,000</u>	54,000 <u>36,000</u>	40,500 <u>36,000</u>	36,000	18,000	9,000
	288,000 <u>144,000</u>	216,000 <u>144,000</u>	162,000 <u>144,000</u>	144,000	72,000	36,000
	216,000	162,000	121,500	108,000	54,000	27,000
	54,000	36,000 <u>18,000</u>	18,000	18,000	10,500	4,500
I-1	18,000	18,000	18,000	18,000	10,500	4,500

		216,000	144,000	72,000	72,000	42,000	18,000
		162,000	108,000	54,000	54,000		
			<u>31,500</u>	<u>31,500</u>	<u>31,500</u>	31,500	13,500
I-2		36,000	24,000				
		<u>12,000</u>	<u>12,000</u>	12,000	12,000	9,500	NP
		144,000	96,000	48,000	48,000	38,000	NP
		108,000	72,000	36,000	36,000		
		<u>28,500</u>	<u>28,500</u>	<u>28,500</u>	28,500	NP	
I-3		36,000	24,000				
		<u>12,000</u>	<u>12,000</u>			7,500	5,000
		144,000	96,000				
		<u>48,000</u>	<u>48,000</u>	48,000	48,000	30,000	20,000
		108,000	72,000				
		<u>36,000</u>	<u>36,000</u>	36,000	36,000	22,500	15,000
I-4		76,500	51,000				
		<u>25,500</u>	<u>25,500</u>			18,500	9,000
		306,000	204,000				
		<u>102,000</u>	<u>102,000</u>	102,000	102,000	74,000	36,000
		229,500	153,000				
		<u>76,500</u>	<u>76,500</u>	76,500	76,500	55,500	27,000
M		61,500	41,000	25,625			
		<u>20,500</u>	<u>20,500</u>	<u>20,500</u>	20,500	14,000	9,000
		246,000	164,000	102,500	82,000	56,000	36,000
		184,500	123,000	76,875	61,500		
		<u>42,000</u>	<u>42,000</u>	<u>42,000</u>	42,000	27,000	
R-1h		61,500	41,000	25,625			
		<u>20,500</u>	<u>20,500</u>	<u>20,500</u>	20,500	12,000	7,000
		246,000	164,000	102,500	82,000	48,000	28,000
		184,500	123,000	76,875	61,500		
		<u>36,000</u>	<u>36,000</u>	<u>36,000</u>	36,000	21,000	
R-2h		61,500	41,000	25,625			
		<u>20,500</u>	<u>20,500</u>	<u>20,500</u>	20,500	12,000	7,000
		246,000	164,000	102,500	82,000	48,000	28,000
		184,500	123,000	76,875	61,500		
		<u>36,000</u>	<u>36,000</u>	<u>36,000</u>	36,000	21,000	
R-3h		UL	UL	UL	UL	UL	UL

R-4h							
	61,500	41,000	25,625	20,500	12,000	7,000	
	246,000	164,000 <u>48,000</u>	102,500 <u>48,000</u>	82,000 <u>48,000</u>	48,000	28,000	
	184,500	123,000 <u>36,000</u>	76,875 <u>36,000</u>	61,500 <u>36,000</u>	36,000	21,000	
	76,500	51,000	31,875	25,500	14,000	9,000	
	306,000	204,000 <u>56,000</u>	127,500 <u>56,000</u>	102,000 <u>56,000</u>	56,000	36,000	
	229,500	153,000 <u>42,000</u>	95,625 <u>42,000</u>	76,500 <u>42,000</u>	42,000	27,000	
S-1							
	115,500	77,000	48,125	38,500	21,000	13,500	
	462,000	308,000 <u>84,000</u>	192,500 <u>84,000</u>	154,000 <u>84,000</u>	84,000	54,000	
	346,500	231,000 <u>63,000</u>	144,375 <u>63,000</u>	115,500 <u>63,000</u>	63,000	40,500	
S-2							
	54,000	36,000	22,500	18,000	9,000	5,500	
	18,000	18,000	18,000				
	216,000	144,000	90,000	72,000	36,000	22,000	
	72,000	72,000	72,000				
	162,000	108,000	67,500	54,000	27,000	16,500	
	54,000	54,000	54,000				
U							

For SI: 1 square foot = 0.0929 m².

UL = Unlimited; NP = Not Permitted; NS = Buildings not equipped throughout with an automatic sprinkler system; S1 = Buildings a maximum of one story above grade plane equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; SM = Buildings two or more stories above grade plane equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

- a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.
- b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.
- c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.
- d. The NS value is only for use in evaluation of existing building area in accordance with the International Existing Building Code.
- e. 903.2.6.oup I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies, Condition 1, see Exception 1 of Section 903.2.6.
- f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and Section 1103.5 of the International Fire Code.
- g. New Group I-4 occupancies see Exceptions 2 and 3 of Section 903.2.6.
- h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.
- i. The maximum allowable area for a single-story nonsprinklered Group U greenhouse is permitted to be 9,000 square feet, or the allowable area shall be permitted to comply with Table C102.1 of Appendix C.

Commenter's Reason:

The Virginia Fire Services Board opposes Proposal G84-18 as originally submitted. We propose that the allowable areas in this proposal be reduced to those currently allowed for Type IV-HT construction until additional testing can be performed to validate the assumptions on which the currently proposed areas are based. While we do not oppose the concept of utilizing renewable resources, such as timber, in the construction of buildings, we are not convinced that “tall wood buildings” with floor areas of up to 432,000 square feet per floor provide an acceptable level of safety to occupants or responding firefighters.

The reason statement for this proposal indicates that the Ad-Hoc Committee on Tall Wood Buildings (TWB) “discussed a number of performance objectives to be met with the proposed criteria for tall wood buildings” including:

- Egress systems designed to protect building occupants during the design escape time, plus a safety factor.
- Highly reliable fire suppression systems to reduce the risk of failure during reasonably expected fire scenarios. The degree of reliability should be proportional to evacuation time (height) and the risk of collapse.

There is no reference in the stated performance objectives related to protecting firefighters and other emergency responders during the time required to access and extinguish a fire. The Report on High-Rise Fireground Field Experiments, NIST Technical Note 1797, published in April 2013, indicates times between 21 and 23 minutes from fire ignition for fire crews to reach the 11th floor of a high-rise building, depending on crew size. These times are based on studies involving major metropolitan fire departments. There are many variables that could significantly increase these times, including time for notification of the fire department, turnout time, response time and vertical travel time to reach higher floors.

There were 14 proposals submitted by the TWB. Only one, G28-18, addresses the reliability of fire suppression systems. It requires the water supply to required fire pumps be supplied by connections

to not fewer than two water mains located in different streets for tall wood buildings that are more than 120 feet in building height. This proposal does nothing to increase the reliability of fire suppression system in buildings less than 120 feet tall. In addition, it does nothing to increase the reliability of the suppression systems within the building itself. There is no requirement to demonstrate the reliability of the fire suppression system as compared to the evacuation time and risk of collapse. It should also be noted that this proposal allows the construction of tall wood buildings to a height of 65 feet with no requirements for fire suppression systems.

We acknowledge that fire tests have been conducted; however, we do not believe that the results of the fire tests provide sufficient justification to allow tall wood building to be constructed with areas of up to 432,000 square feet per story. The original proposal cites "engineering judgment" as the basis for a comparative analysis between Type I and Type IV buildings and the extrapolation of two-story fire tests to the proposed building areas. There has been no testing to demonstrate the performance of these structures after aging for a period of years or decades.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal does not change the method of construction; rather, it limits the allowable area for the specified type of construction.

Public Comment 3:

Proponent:

Kevin Reinertson, representing Riverside County Fire Department, representing California Fire Chiefs Association (kevin.reinertson@fire.ca.gov); Michael O'Brian (mobrian@brightonareafire.com) requests As Modified by This Public Comment

Modify as follows:

2018 International Building Code

TABLE 506.2

ALLOWABLE AREA FACTOR (A_i = NS, S1, S13R, S13D or SM, as applicable) IN SQUARE FEET ^a_b

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION					
	TYPE IV				TYPE V	
	A	B	C	HT	A	B
A-1	45,000	30,000	18,750	15,000	11,500	5,500
	<u>31,500</u>	<u>21,000</u>	<u>15,000</u>			
	180,000	120,000	75,000	60,000	46,000	22,000
	<u>126,000</u>	<u>84,000</u>	<u>60,000</u>			

		<u>135,000</u>	<u>90,000</u>	<u>56,250</u>	45,000	34,500	16,500
		<u>108,000</u>	<u>63,000</u>	<u>45,000</u>			
A-2		<u>45,000</u>	<u>30,000</u>	<u>18,750</u>	15,000	11,500	6,000
		<u>31,500</u>	<u>21,000</u>	<u>15,000</u>			
		<u>180,000</u>	<u>120,000</u>	<u>75,000</u>	60,000	46,000	24,000
		<u>126,000</u>	<u>84,000</u>	<u>60,000</u>			
		<u>135,000</u>	<u>90,000</u>	<u>56,250</u>	45,000	34,500	18,000
		<u>108,000</u>	<u>63,000</u>	<u>45,000</u>			
A-3		<u>45,000</u>	<u>30,000</u>	<u>18,750</u>	15,000	11,500	6,000
		<u>31,500</u>	<u>21,000</u>	<u>15,000</u>			
		<u>180,000</u>	<u>120,000</u>	<u>75,000</u>	60,000	46,000	24,000
		<u>126,000</u>	<u>84,000</u>	<u>60,000</u>			
		<u>135,000</u>	<u>90,000</u>	<u>56,250</u>	45,000	34,500	18,000
		<u>108,000</u>	<u>63,000</u>	<u>45,000</u>			
A-4		<u>45,000</u>	<u>30,000</u>	<u>18,750</u>	15,000	11,500	6,000
		<u>31,500</u>	<u>21,000</u>	<u>15,000</u>			
		<u>180,000</u>	<u>120,000</u>	<u>75,000</u>	60,000	46,000	24,000
		<u>126,000</u>	<u>84,000</u>	<u>60,000</u>			
		<u>135,000</u>	<u>90,000</u>	<u>56,250</u>	45,000	34,500	18,000
		<u>108,000</u>	<u>63,000</u>	<u>45,000</u>			
A-5		UL	UL	UL	UL	UL	UL
B		<u>108,000</u>	<u>72,000</u>	<u>45,000</u>	36,000	18,000	9,000
		<u>75,500</u>	<u>50,500</u>	<u>36,000</u>			
		<u>432,000</u>	<u>288,000</u>	<u>180,000</u>	144,000	72,000	36,000
		<u>302,500</u>	<u>201,500</u>	<u>144,000</u>			
		<u>324,000</u>	<u>216,000</u>	<u>135,000</u>	108,000	54,000	27,000
		<u>226,750</u>	<u>151,500</u>	<u>108,000</u>			
E		<u>76,500</u>	<u>51,000</u>	<u>31,875</u>	25,500	18,500	9,500
		<u>53,500</u>	<u>35,550</u>	<u>25,500</u>			

		<u>306,000</u>	<u>204,000</u>	<u>127,500</u>	102,000	74,000	38,000
		<u>214,000</u>	<u>142,750</u>	<u>102,000</u>			
		<u>229,500</u>	<u>153,000</u>	<u>95,625</u>	76,500	55,500	28,500
		<u>160,500</u>	<u>107,000</u>	<u>76,500</u>			
F-1		<u>400,500</u>	<u>67,000</u>	<u>41,875</u>	33,500	14,000	8,500
		<u>70,500</u>	<u>47,000</u>	<u>33,500</u>			
		<u>402,000</u>	<u>268,000</u>	<u>167,500</u>	134,000	56,000	34,000
		<u>281,500</u>	<u>187,500</u>	<u>134,000</u>			
		<u>301,500</u>	<u>201,000</u>	<u>125,625</u>	100,500	42,000	25,500
		<u>211,000</u>	<u>140,750</u>	<u>100,500</u>			
F-2		<u>151,500</u>	<u>101,000</u>	<u>63,125</u>	50,500	21,000	13,000
		<u>106,000</u>	<u>70,750</u>	<u>50,500</u>			
		<u>606,000</u>	<u>404,000</u>	<u>252,500</u>	202,000	84,000	52,000
		<u>424,000</u>	<u>282,750</u>	<u>202,000</u>			
		<u>454,500</u>	<u>303,000</u>	<u>189,375</u>	151,500	63,000	39,000
		<u>318,000</u>	<u>212,000</u>	<u>151,500</u>			
H-1		10,500	10,500	10,500	10,500	7,500	NP
H-2		10,500	10,500	10,500	10,500	7,500	3,000
H-3		25,500	25,500	25,500	25,500	10,000	5,000
H-4		<u>72,000</u>	<u>54,000</u>	<u>40,500</u>	36,000	18,000	6,500
		<u>50,400</u>	<u>37,800</u>	<u>36,000</u>			
		<u>288,000</u>	<u>216,000</u>	<u>162,000</u>	144,000	72,000	26,000
		<u>201,600</u>	<u>151,200</u>	<u>144,000</u>			
		<u>216,000</u>	<u>162,000</u>	<u>121,500</u>	108,000	54,000	19,500
		<u>151,200</u>	<u>113,400</u>	<u>108,000</u>			
H-5		<u>72,000</u>	<u>54,000</u>	<u>40,500</u>	36,000	18,000	9,000
		<u>50,400</u>	<u>37,800</u>	<u>36,000</u>			

	<u>288,000</u>	<u>216,000</u>	<u>162,000</u>	144,000	72,000	36,000
	<u>201,600</u>	<u>151,200</u>	<u>144,000</u>			
	<u>216,000</u>	<u>162,000</u>	<u>121,500</u>	108,000	54,000	27,000
	<u>151,200</u>	<u>113,400</u>	<u>108,000</u>			
I-1	<u>54,000</u>	<u>36,000</u>	18,000	18,000	10,500	4,500
	<u>37,800</u>	<u>25,200</u>				
	<u>216,000</u>	<u>144,000</u>	72,000	72,000	42,000	18,000
	<u>151,200</u>	<u>100,800</u>				
I-2	<u>162,000</u>	<u>108,000</u>	54,000	54,000	31,500	13,500
	<u>113,400</u>	<u>75,600</u>				
	<u>36,000</u>	<u>24,000</u>	12,000	12,000	9,500	NP
	<u>25,200</u>	<u>16,800</u>				
I-3	<u>144,000</u>	<u>96,000</u>	48,000	48,000	38,000	NP
	<u>100,800</u>	<u>67,200</u>				
	<u>408,000</u>	<u>72,000</u>	36,000	36,000	28,500	NP
	<u>75,600</u>	<u>50,400</u>				
I-4	<u>36,000</u>	<u>24,000</u>	12,000	12,000	7,500	5,000
	<u>25,200</u>	<u>16,800</u>				
	<u>144,000</u>	<u>96,000</u>	48,000	48,000	30,000	20,000
	<u>100,800</u>	<u>67,200</u>				
I-4	<u>408,000</u>	<u>72,000</u>	36,000	36,000	22,500	15,000
	<u>75,600</u>	<u>50,400</u>				
	<u>76,500</u>	<u>51,000</u>	25,500	25,500	18,500	9,000
	<u>53,500</u>	<u>35,700</u>				
I-4	<u>306,000</u>	<u>204,000</u>	102,000	102,000	74,000	36,000
	<u>214,200</u>	<u>142,800</u>				
	<u>229,500</u>	<u>153,000</u>	76,500	76,500	55,500	27,000
	<u>160,650</u>	<u>107,100</u>				
M	<u>61,500</u>	<u>41,000</u>	<u>25,625</u>	20,500	14,000	9,000
	<u>43,050</u>	<u>28,500</u>	<u>20,500</u>			

		<u>246,000</u>	<u>164,000</u>	<u>102,500</u>	82,000	56,000	36,000
		<u>172,200</u>	<u>115,000</u>	<u>82,000</u>			
		<u>184,500</u>	<u>123,000</u>	<u>76,875</u>	61,500	42,000	27,000
		<u>129,150</u>	<u>86,000</u>	<u>61,500</u>			
R-1 ^h		<u>61,500</u>	<u>41,000</u>	<u>25,625</u>	20,500	12,000	7,000
		<u>43,050</u>	<u>28,500</u>	<u>20,500</u>			
		<u>246,000</u>	<u>164,000</u>	<u>102,500</u>	82,000	48,000	28,000
		<u>172,200</u>	<u>115,000</u>	<u>82,000</u>			
		<u>184,500</u>	<u>123,000</u>	<u>76,875</u>	61,500	36,000	21,000
		<u>129,150</u>	<u>86,000</u>	<u>61,500</u>			
R-2 ^h		<u>61,500</u>	<u>41,000</u>	<u>25,625</u>	20,500	12,000	7,000
		<u>43,050</u>	<u>28,500</u>	<u>20,500</u>			
		<u>246,000</u>	<u>164,000</u>	<u>102,500</u>	82,000	48,000	28,000
		<u>172,200</u>	<u>115,000</u>	<u>82,000</u>			
		<u>184,500</u>	<u>123,000</u>	<u>76,875</u>	61,500	36,000	21,000
		<u>129,150</u>	<u>86,000</u>	<u>61,500</u>			
R-3 ^h		UL	UL	UL	UL	UL	UL
R-4 ^h		<u>61,500</u>	<u>41,000</u>	<u>25,625</u>	20,500	12,000	7,000
		<u>43,050</u>	<u>28,500</u>	<u>20,500</u>			
		<u>246,000</u>	<u>164,000</u>	<u>102,500</u>	82,000	48,000	28,000
		<u>172,200</u>	<u>115,000</u>	<u>82,000</u>			
		<u>184,500</u>	<u>123,000</u>	<u>76,875</u>	61,500	36,000	21,000
		<u>129,150</u>	<u>86,000</u>	<u>61,500</u>			
S-1		<u>76,500</u>	<u>51,000</u>	<u>31,875</u>	25,500	14,000	9,000
		<u>53,585</u>	<u>35,500</u>	<u>25,500</u>			
		<u>306,000</u>	<u>204,000</u>	<u>127,500</u>	102,000	56,000	36,000
		<u>214,200</u>	<u>143,000</u>	<u>102,000</u>			

	<u>229,500</u>	153,000	<u>95,625</u>	76,500	42,000	27,000
	<u>160,650</u>	107,100	<u>76,500</u>			
S-2	<u>115,500</u>	<u>77,000</u>	<u>48,125</u>	38,500	21,000	13,500
	<u>80,850</u>	<u>53,900</u>	<u>38,500</u>			
	<u>462,000</u>	<u>308,000</u>	<u>192,500</u>	154,000	84,000	54,000
	<u>323,400</u>	<u>215,600</u>	<u>154,000</u>			
	<u>346,500</u>	<u>231,000</u>	<u>144,375</u>	115,500	63,000	40,500
	<u>242,550</u>	<u>161,700</u>	<u>115,500</u>			
U	<u>54,000</u>	<u>36,000</u>	<u>22,500</u>	18,000	9,000	5,500
	<u>37,800</u>	<u>25,200</u>	<u>18,000</u>			
	<u>216,000</u>	<u>144,000</u>	<u>90,000</u>	72,000	36,000	22,000
	<u>151,200</u>	<u>100,800</u>	<u>72,000</u>			
	<u>162,000</u>	<u>108,000</u>	<u>67,500</u>	54,000	27,000	16,500
	<u>113,400</u>	<u>75,600</u>	<u>54,000</u>			

For SI: 1 square foot = 0.0929 m².

UL = Unlimited; NP = Not Permitted; NS = Buildings not equipped throughout with an automatic sprinkler system; S1 = Buildings a maximum of one story above grade plane equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; SM = Buildings two or more stories above grade plane equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

- a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.
- b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.
- c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.
- d. The NS value is only for use in evaluation of existing building area in accordance with the International Existing Building Code.
- e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies, Condition 1, see Exception 1 of Section 903.2.6.
- f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and Section 1103.5 of the International Fire Code.
- g. New Group I-4 occupancies see Exceptions 2 and 3 of Section 903.2.6.
- h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.

- i. The maximum allowable area for a single-story nonsprinklered Group U greenhouse is permitted to be 9,000 square feet, or the allowable area shall be permitted to comply with Table C102.1 of Appendix C.

Commenter's Reason:

This is a series of comments to modify the proposed height, stories, and allowable area of the new Type IV-A, Type IV-B, and Type IV-C proposed construction classifications as proposed by the Ad-Hoc Committee on Tall Wood Buildings.

There is concern on the formulas utilized are not fully supported by technical substantiation and are missing the needed technical support to allow the construction type to such heights. This change takes a moderate approach and reduces the allowable heights, area, and stories by a factor of 30%.

This proposed public comment doesn't dismiss the concept out of hand, we do feel the current proposals go too far, to fast in an area of significant and long-lasting importance.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The area for this proposal is not allowed currently and therefore doesn't increase or decrease

Public Comment 4:

Proponent:

Gary Bridgens, representing Mass Timber Code Coalition (info@buildtallbuildsafe.com) requests As Submitted

Commenter's Reason:

PUBLIC COMMENT

SUBMITTED BY GARY BRIDGENS

ON BEHALF OF THE MASS TIMBER CODE COALITION

The Mass Timber Code Coalition has been organized to provide information on the code proposals drafted by the Ad Hoc Committee on Tall Wood Buildings

Mass timber is not new to the *International Building Code* (IBC). Currently listed as Type IV Heavy Timber, this construction type is a proven option that fully complies with the structural and fire resistive requirements of the IBC. The code recognizes that mass timber is a fundamentally different material than dimension lumber used in more familiar "stick built" wood construction. The code also recognizes the inherent fire resistance of mass timber, where charring in a fire event provides protection of inner structures, as well as a consistent and predictable rate of charring.

With the expansion of the mass timber supply chain, panels of cross-laminated timber (CLT), nail-laminated timber (NLT) and glue-laminated timber (Glulam), requests for approvals of tall mass

timber buildings (TMTB) by local authorities have become more common. Estimates by industry sources have identified 35 current proposals for tall mass timber buildings, ranging from 7 to 24 stories, in 21 different jurisdictions.

Importantly, this interest in tall mass timber construction has been reliant on various local codes and approval processes. The IBC does not currently account for these tall wood buildings, beyond the current Type IV Heavy Timber height and area limitations.

The Ad Hoc Committee on Tall Wood Buildings (AHC-TWB)

To ensure the IBC keeps pace with the changing construction marketplace, the Board of Directors of the International Code Council (ICC) appointed the Ad Hoc Committee on Tall Wood Buildings (AHC-TWB) in 2015. The AHC-TWB included members from the code official, regulatory, construction, engineering, architectural, fire services and materials communities.

The AHC-TWB was specifically charged with investigating the science of mass timber construction, undertaking any necessary new research and recommending any code changes needed to ensure safety in TMTB. The AHC-TWB set performance criteria of its own: any code change developed was required to achieve the following.

1. No collapse under scenarios of complete burn-out of fuel without automatic sprinkler protection;
2. No high radiation exposure from the subject building to adjoining properties that risk ignition under severe fire scenarios;
3. No unusual response from radiation exposure from adjacent properties that risk ignition of the subject building under severe fire scenarios;
4. No unusual fire department access issues;
5. Egress systems to protect occupants during design escape times plus a margin of safety;
6. Enhanced and redundant fire protection systems to ensure performance during various fire scenarios.

Code Change Proposals

After two years of work, the AHC-TWB has produced 14 code change proposals. All 14 of these proposals were recommended for approval by various ICC committees at the recent ICC 2018 Group A Committee Action Hearing.

The key change, G108-18, defines three new categories of Type -IV Mass Timber construction:

Type IV-A: 1 to 18 stories based on Occupancy Classification. 3-hour fire resistance rating with non-combustible protection throughout;

Type IV-B: 1 to 12 stories based on Occupancy Classification. 2-hour fire resistance rating with non-combustible protection on most mass timber surfaces;

Type IV-C: 1 to 9 stories based on Occupancy Classification. 2-hour fire resistance rating with non-combustible protection for critical areas; exit enclosures, etc.

Each new construction type defined by the AHC-TWB (Type IV-A, B and C) has fire resistance requirements as robust or more robust than those required for comparable non-combustible (concrete and steel) buildings.

Other provisions provide standards for mass timber manufacturing, height/area restrictions, active and passive fire protection systems, fire safety during construction, enhanced water supply requirements, and standards for sealants and adhesives.

Fire Resistance of Mass Timber

Citing fire and market concerns, both the Portland Cement Association and the National Ready Mix Concrete Association have criticized the AHC-TWB code change proposals as “untested” and “unsound.” However, these criticisms fail to consider that:

1. The purpose of the International Building Code is to provide building officials with the tools they need to ensure public and first-responder safety. It is not to choose winners and losers in the market, nor is it to defend any single industry’s position;
2. Tall mass timber buildings already built are performing well;
3. Mass timber (and heavy timber before it) has undergone extensive fire resistance testing in multiple fire scenarios by Underwriters Laboratories, the Southwest Research Institute, the National Research Council of Canada and the U.S. Government’s ATF Fire Research Laboratory, the world’s largest indoor fire investigation lab.

Numerous mass timber floor/ceiling and wall assemblies have been tested at national laboratories using ASTM E119 standards. This testing history shows that mass timber has repeatedly achieved the hourly fire resistance requirements of the code. This is in part because of charring properties that provide a steady and predictable measurement of fire resistance. Additionally, detailed code requirements for non-combustible protection applied to the mass timber greatly enhance the hourly rating. Further, fire protection systems (active and passive) also ensure safety in mass timber structures.

The AHC-TWB benefitted from recent tests in 2017 at the U.S. ATF Fire Research Laboratory on full-scale mass timber buildings. Most tests assumed an unlikely failure of sprinkler systems:

1. Mass timber apartment with full fuel load. Fully protected by Type X gypsum wall board. Fire self-extinguished after 3 hours with no significant charring on mass timber surfaces;
2. Mass timber apartment with full fuel load. 20% exposed CLT ceiling. Test concluded at 4-hour mark after fuel burnout. CLT self-extinguished after charring;
3. Mass timber apartment with full fuel load. 2 CLT walls fully exposed. Fuel burnout at 4-hours. CLT walls self-extinguished after charring;
4. Mass timber apartment with full fuel load. All CLT surfaces fully exposed. One sprinkler system. Fire quickly extinguished;
5. Mass timber apartment with full fuel load. All CLT surfaces fully exposed. One sprinkler system. Fire allowed to grow to flashover (23 minutes) then quickly extinguished.

In fact, proposed Type IVA, B and C fire resistance requirements are the same or more robust than comparable steel and concrete construction. Further detail can be obtained at buildtallbuildsafe.com.

Benefits of Mass Timber Construction

In addition to the obvious environmental attributes of using a renewable resource in construction and the boost for the economies in timber-producing regions, builders and communities cite several distinctive benefits that make mass timber buildings an attractive option:

Builders report several benefits, including:

1. **Job site safety.** Mass timber panels are easy to install and can be delivered to a work site as needed, rather than stockpiled. Moreover, worker training is easier as is exposure to job site risk;
2. **Job site efficiency.** Persistent labor shortages are eased as more workers are qualified to work with mass timber panels. Jobs are built more quickly and materials are delivered as needed, thereby reducing costs;
3. **Design.** The favorable strength-to-weight ratio of CLT and the characteristics of wood offer more design options and more attractive built environments, improving business performance.

Local communities embrace mass timber construction:

1. **Faster and quieter.** The dislocation experienced by neighboring communities is reduced in mass timber projects. In addition to lower fire risks, things occur more quickly and panels are installed more simply than comparable steel and concrete sites;
2. **Greener.** Forestry officials cite the carbon sequestration properties of wood, but also the benefits to forest management of using wood products more efficiently and effectively, thereby further reducing decay and fire risk;
3. **Energy efficient.** Manufacturing mass timber is less energy intensive than other building materials. More importantly, the superior insulation characteristics of wood far outperform steel and concrete structures.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This section provides information that was not previously set forth in the code, and does not change the requirements of current code, thus there is no cost impact when compared with present requirements.

Public Comment 5:

Proponent:

Sam Francis, representing American Wood Council (sfrancis@awc.org) requests As Submitted

Commenter's Reason:

AWC was appointed to be a member of the ICC Tall Wood Building Ad Hoc Committee (TWB), the single wood industry representative on the TWB. AWC is not speaking for TWB on this issue. It simply is relaying information regarding the development of the proposals. Other members of the 16-member TWB included representation from architects, engineers, fire protection engineers, fire marshals, testing laboratories, and fire fighters, as well as the major materials industries. After two years of study, listening to testimony, reviewing documents, reviewing public input, conducting an

extensive test program, and reviewing test results from tests around the world, the TWB made this proposal to ICC for the membership's consideration.

Early in the process, the TWB heard proposals from four different commenters suggesting maximum stories of 20, 24, 40, and 42 stories. The TWB worked through dozens of drafts of the proposed new types of construction, dozens more pertaining to the building height in stories, nearly a dozen pertaining to building height in feet and nearly a dozen regarding maximum permitted building area per floor. These documents were all posted to the TWB page of the ICC website. Comments were solicited for all drafts.

The first aspect of height and area taken up by the TWB was height in stories. That seemed to be the easiest to get at with the information gleaned from the testimony and documentation presented to the TWB. A public comment by AWC to G80 outlines how experts from around the world presented a case to the TWB that mass timber was equivalent to types I-A and I-B in every way other than the combustibility of the base material. They outlined various strategies for overcoming that combustibility issue. The TWB relied upon this concept of equivalent performance to determine its maximum permitted height in stories. The Reason Statement provided by the TWB Chairman, Steve DiGiovanni, clearly lays out the background for, and the process of, the deliberation on Height in Stories. That is a must read to understand this process and its outcomes.

Next, based upon comments submitted, TWB tried to assign height in feet to its chosen maximum stories. In its first drafts, the maximum number of stories for proposed type IV-A was 24 for a few occupancy groups. Similarly, IV-B was proposed to be limited to 12 stories based on the equivalency mentioned above. Thus, IV-B was assigned the same maximum height in feet as type I-B, 180 feet. My Public Comment on G75 explains the TWB's rationale for assigning the stories in its proposal.

The TWB took up the allowable area issue. The Reason Statement of its proposal G84-18 describes in great detail the process by which the TWB created a draft H A table, reviewed it cell by cell for efficacy, reasonable fire safety and so on. Based on that review, the TWB modified results using professional judgment and input from commenters. Thus the H A proposal saw many cells of reduced allowable area. This is a well prepared package, well thought out, with good documentation which is all available on the ICC website, TWB page. It is the product of the performance approach the TWB chose to use in following the ICC Board of Directors instructions to study the issues. The technical support for the proposal is the criteria that these construction types meet the fire resistance required of other existing construction. The TWB then developed a fire test plan which validated the concepts.

Of equal importance here is that the TWB recognizes that mass timber is NOT wood frame, light weight construction, or stick built construction. In fact, in order to ensure that its performance objectives would be correctly interpreted and that any building constructed to these requirements would meet, and probably exceed, its performance expectations.

Some observers have the mistaken belief that the permitted areas of this proposal will allow larger areas than those permitted for concrete or steel construction. The TWB insists that since these types of construction are based on equivalent performance, they are a great decrease from I-A or I-B construction's allowable areas. See the tables attached at the end of this comment for a comparison of the allowable areas. Clearly, Unlimited area is considerably larger than the finite, limits of the TWB proposal.

The fire test program, drafted by the Fire Work Group of the TWB to validate these concepts, may be seen as videos of each of the five tests. They can be found at this link or on the ICC TWB web page.

https://www.youtube.com/playlist?list=PL_sDiz8JiMlwby77vfpPSPucEhBuEK22P

This proposal is thoroughly conservative. Mass timber buildings are completely different from conventional wood construction of studs and joists. Besides the automatic fire suppression and other life safety systems required for all high rises (including enhanced water supply), all loadbearing walls in mass timber buildings will be solid wood slabs typically between 6 and 20 inches thick, fire resistance rated, and directly protected with noncombustible protection equally at least 2/3 of the required rating. Light frame wood stud construction is prohibited. Nonbearing partitions will be solid mass timber slabs or noncombustible (steel) studs. All loadbearing horizontal assemblies will be solid mass timber slabs between 4 and 12 inches thick, fire resistance rated, protected on the underside with noncombustible protection equaling at least 2/3 of the required rating, and on the upper side with not less than one inch of noncombustible material. Light frame wood joist construction is prohibited. All construction enclosing concealed spaces will be noncombustible (steel) framing or mass timber protected with noncombustible materials. Full scale compartments fire tests for this new construction system reflecting Types IV-A and IV-B construction have shown that conservative residential fuel loads will completely burn out without the mass timber becoming involved in the fire, or will self-extinguish following burn-out, all without the sprinkler system operating.

The following points respond to misleading claims made by opponents:

***Measures to prevent exterior fire propagation exceed current
tall building code requirements***

Proposed code requirements to prevent exterior fire spread on tall mass timber buildings are significantly more restrictive than what is permitted for non-combustible construction. **Simply put; no combustible materials are permitted on the exterior side of exterior walls** (except for a required water-resistive barrier). What is proposed for tall mass timber buildings is more conservative than any other construction type, including non-combustible Types I and II. Exterior walls of these buildings will require:

- Continuous insulation on the exterior, where provided, must be non-combustible.
- Protection with at least 40 minutes of fire resistance from noncombustible materials.
- Additional testing to an exterior fire propagation standard

***Tall wood building fire tests expand beyond standard testing
and consider severe real fire demonstrations***

No other building elements have been tested in fires as severe as those used to substantiate the building code proposals. Fire testing for mass timber exposed timber building elements to extreme fires, which, in reality, will be extremely rare in sprinklered tall wood buildings. In addition to reviewing results of standardized testing of mass timber building elements, the ICC Tall Wood Building (TWB) committee, which included members of the fire service, developed and witnessed full-scale, multistory building compartment fire testing. In the tests, in addition to having typical residential furnishings as a fuel load, a number of wood cribs were added to provide additional fuel to increase the challenge on the building. **The three unsprinklered tests resulted in the fire self-extinguishing, and in the two tests that included sprinklers, the fire was easily contained immediately after sprinkler activation.**

- These real fire scenarios with high fire loads proved the integrity of a typical building constructed with cross-laminated timber (CLT).
- Tests representing fires in buildings of proposed 18- and 12-story heights (Types IV-A and IV-B, respectively) were allowed to continue to burn for hours, throughout the decay phase and well past burn-out, the most conservative approach possible.
- In the tests, the absolute worst circumstances were presented: sprinklers not working, no fire suppression of any kind, and fires burning without any intervention until self-extinguishment. This parallels the expected performance of non-combustible Type I buildings.

Wind-driven fire is not a code requirement for any building,

- ***but precautionary requirements for mass timber ensure a lower risk factor***

There are no current fire test standards for exterior building exposure or vertical flame propagation that includes wind as a test element. **Even Type I and II buildings -- which are allowed to have combustible materials on exterior walls, such as foam plastic insulation -- are not tested with added wind.**

- Even in high wind, the new tall wood construction types will require non-combustible materials on the exterior, limiting the possibility of wind-driven exterior fire spread. [SH1]
- Interiors of buildings over 12 stories will require additional layers of interior non-combustible protection, providing protection against wind penetrating the exterior.
- Non-combustible protection of mass timber elements is designed to allow complete burn-out of contents in the case of sprinkler malfunction. If wind were to cause contents to burn faster, there is no negative impact on fire performance of the protected building elements themselves.
- Mass timber buildings, as proposed, would exclude the use of traditional light frame wood walls and floors, and mass timber elements would need to be completely protected with non-combustible materials for any building greater than 12 stories in height.

- ***Massive timber building elements can carry***

heavy loads for extended time periods under fire exposure

Like their concrete and steel counterparts, as loads from upper stories increase, structural design requires loadbearing mass timber walls and columns to get bigger.

- As required for steel, in buildings over 12 stories mass timber elements will be required to have at least three layers of 5/8 type X gypsum wallboard as additional protection, as part of a required 3-hour fire-resistance rating. This is an extremely conservative approach for all buildings ranging from 12 to 18 stories.
- The established objective was to ensure that mass timber building elements do not become involved in a fire, even in the extremely rare circumstance where there is no control by a sprinkler system or extinguishment by the fire service.
 - ***Greater hazards from storage and mercantile occupancies are recognized***

The ICC committee chose to specifically address mercantile (M) and storage occupancies (typically S-1), and the hazards associated with their higher fuel loads, by placing stricter limits on the height of buildings containing these occupancies.

M and S-1 occupancy groups will not be allowed over 12 and 10 stories, respectively, in building Types IV-B and IV-A, which have the greatest additional fire resistance

requirements. By comparison, Groups M and S-1 in non-combustible Type I-A construction are allowed to be unlimited in height, and beams and bearing walls can be reduced to a 2 hour fire resistance rating.

***The enforcement community readily understands the code
and the measures necessary to inspect tall mass timber buildings***

As with any new structural system, there will be a learning curve, and the wood products industry is committed to providing education. There is already an abundance of training available, and much of it is free. Many code officials have already taken advantage of these extensive training opportunities.

Fire sealants, fasteners, and connections contribute to overall performance

In some cases during fire testing, sealants were not used at all and all fire tests were nonetheless very successful.

If seen as important, a proposed modification requiring special inspection of a sealant installation could be put forward at the public comment hearings this fall. Multiple connection configurations were incorporated into the multi-story fire test structure. Floors of CLT were supported by wood and steel ledgers that were properly protected from heat exposure. Wood columns and beams were connected with steel, which was protected from fire as would be required by the code.

***Tall mass timber buildings have been successfully built in North America,
Europe, and Australia and are in use with great success***

There is extensive information available about CLT construction from many sources, including the increasing number of CLT manufacturers.

The published *CLT Handbook* addresses structural and lateral design, connections, fire performance, sound performance, building envelope design, environmental performance, and handling during construction, and is available for free. The American Wood Council's *National Design Specification for Wood Construction*, an ANSI accredited standard referenced in the *International Building Code*, now includes structural and fire design provisions for CLT. There are other guidelines for mass timber structural and fire resistance published by AWC and other organizations, including information on hybrid systems with steel and concrete. Among the advantages of CLT are:

- It does not distort, twist, rapidly lose strength, or explosively spall when exposed to high temperatures from fires.
- It has inherent high fire resistance due to its mass, and when protected with gypsum wallboard performance even improves. ASTM E119 testing of a loaded CLT exterior wall by AWC resulted in a 3-hour fire resistance rating when protected with only a single layer of 5/8 Type X gypsum wallboard.
- Mass timber responds well to flame and heat impingement by remaining strong and stable, providing continuous support for gypsum wallboard, allowing it to remain in place for a longer period of time.

- Mass timber is much less sensitive than certain noncombustible materials when subject to elevated temperature.

The enforcement community readily understands the code

and the measures necessary to inspect tall mass timber buildings

As with any new structural system, there will be a learning curve, and the wood products industry is committed to providing education. There is already an abundance of training available, and much of it is free. Many code officials have already taken advantage of these extensive training opportunities.

Adhesives used in CLT have excellent performance at elevated temperatures

The adhesives used in CLT have been standardized and requirements are mandated by the ANSI/APA standard PRG 320-18, which is also proposed for adoption in the 2021 *International Building Code*.

Variations in adhesive performance in early testing conducted by the National Fire Protection Research Foundation led to important revisions of PRG 320-18 that mandate required adhesive integrity under fire exposure, eliminating the possibility of delamination, fire regrowth or secondary flashover. CLT manufactured to APA PRG 320-18 requirements must demonstrate that the adhesive has been tested to these protocols. Qualifying adhesives are required in all proposed mass timber construction types.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction

This proposal will offer more choices in Type of Construction. More alternatives generally means the ability to select a type which results in less cost.

Public Comment 6:

Proponent:

Patrick Ford, representing self (pat@matsenford.com) requests Disapprove

Commenter's Reason:

Reason: These code changes would allow for structurally unsafe conditions to be inherently designed into tall buildings. As proposed, they would introduce new categories of Type IV construction into the code and expand the number of storeys, allowable areas, and maximum heights of buildings framed with combustible materials. I believe that for several reasons, this would greatly increase the risk to firefighters and building occupants, as well as neighboring buildings. Several of the major decisions that went into the creation of this proposal were based on "engineering judgment" and significant extrapolation of test data from a two storey test building to buildings with dozens more storeys.

Aside from the potentially dangerous and unproven provisions in general, there are several specifics relative to structural connections in these new building types and sizes. I do not believe that these were addressed or at the very least not adequately addressed.

The new building types and increased limits allowed for in these proposals should not be allowed, and the proposals should be disapproved for the following reasons:

1. The AHC-TWB report that was instrumental in many of the provisions indicates that connections were tested, but in fact, no exposed connections were ever tested in any of the assemblies.
2. The compartment tests did not test any connections, nor did any of the standard ASTM tests, including the E84, E119, E814, nor the NFPA 285 tests.
3. The full scale test did not have any exposed connections, yet the code explicitly notes exposed steel and metal caps or brackets allowed in type IV construction within the wood chapter. The exposed metal connectors and their fasteners penetrate well beneath the typical char layer of the structural member, significantly reducing the strength of the member at and near the connection itself. This can create many hot spots and potential critical structural failure locations throughout a tall building. No other tests addressed this issue either.
4. Adhesive based splice connections remain unproven, the overall adhesive requirements being based on a testing protocol derived after a failed test.
5. The Small Scale Adhesive Qualification Test Protocol (CSA 077 SSA.2) could conceivably be directed toward such connections or splices, but it is a test that lasts only 5 minutes per side of the tested specimen.
6. As an additional note, the full scale test was run on only a two storey structure, leaving any critical structural connections that may have been needed to support only a single storey above. With code proposals allowing for many times this, these concerns should be much more carefully vetted before approval.

It should also always be remembered that in no other type of tall building allowed by the code, is the structure itself also fuel for the fire.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There would be no cost increase associated with my comment because if the code proposal were defeated, there would be no change in the building allowable from the current code.

Public Comment 7:

Proponent:

Patrick Hainault, representing Self (path@matsenford.com) requests Disapprove

Commenter's Reason:

“Tower of Fire destroys LA apartment complex under construction.” This headline in the December 8, 2014 LA Times barely scratches the surface in describing the dangers from fires in buildings under construction when those buildings are framed with wood and wood-based materials. This fire not only destroyed [at least 239](#) of the rental units and [2/3rds of the complex](#) at the Da Vinci Apartments but caused significant damage to neighboring buildings and infrastructure, and greatly

burdened the surrounding community in general. Yet, this proposal will dramatically raise the allowable heights and areas of buildings made from combustible materials.

It is not rationale to increase the allowable height of buildings as in this proposal when significant problems in much smaller buildings still present a well-documented risk to life and property. The assembly should overturn the committee decision to effectively prohibit the type of proposed construction until and if it can be proven safe [during](#) and after construction. The following paragraphs expand on the issues the assembly should consider in evaluating this proposal.

How do we even begin to come to grips with the risk to adjacent properties and occupied buildings during the construction phase when an 18- story wood structure allowed by this proposal is burning in a suburban or urban area? Without safeguards well beyond those currently in the code (or proposed as part of a series of related proposals) to protect adjacent properties and infrastructure, the impacts will be devastating. For example, the Da Vinci fire caused:

- **Damage to adjacent buildings.** At least four nearby buildings were damaged. The building at 221 N. Figueroa St., where the computers and cubicles melted, had significant damage on its 15 floors, with 300 windows blown out. Three floors were also damaged in the Los Angeles County Department of Health Services building at 313 N. Figueroa. LA Department of Water and Power staff identified at least 160 damaged windows. A Los Angeles Department of Building and Safety spokesman reported windows blew out in the north tower of its department headquarters, and the heat and smoke triggered sprinklers that soaked carpets and desks. Overall, the Da Vinci Apartments fire caused an estimated \$111.5 million in damages, including [\\$80 million](#) in damage to city properties from the fire and the water used to extinguish it and [\\$20-\\$30 million](#) to the apartment complex.
- **Damage to Infrastructure.** A Caltrans spokesman estimated the fire caused \$1.5-million damage to the freeway. Roads were closed around the area including a major commuter route during rush hour. Caltrans officials reported an exit sign over the 110 Freeway melted and would have to be replaced, forcing another freeway closure later the same week.
- **Extensive impacts on the community.** The attached study of the economic risk to taxpayers and the community posed by mid-rise apartments produced by assistant adjunct professor Urvashi Kaul at Columbia University captures the total cost impacts from fires like the Da Vinci apartments and smaller incidents. This study finds that:
 - In Los Angeles County, alone, fires in mid-rise residential buildings with combustible frames could have a negative impact of \$22.6B over 15 years, including \$17.14B in direct losses from property damage.
 - On average, fire in a mid-rise residential building constructed using combustible framing material costs the Los Angeles County a total of \$141.81 per square foot in potential economic impact and \$2.38 per square foot in lost tax revenues.
 - Potential impact the County may face in a single year could be \$1.7 billion, including \$1.3 billion in direct property damage.

The assembly is also urged to reconsider the argument that cladding requirements proposed to address fires in buildings under construction will resolve these issues. As demonstrated in a large fire from 2015 in a wood-framed apartment building in Edgewater, NJ, cladding will not stop a fire from spreading once the framing in part of the building ignites. It doesn't create a barrier between unexposed framing and exposed framing, but only provides some resistance to ignition from within or outside of the building. The Edgewater fire spread rapidly throughout the buildings once framing behind a wall was ignited during repairs to the occupied and fully-clad building.

The Da Vinci and Edgewater fires are not uncommon incidents. [Dozens of similar fires](#) have occurred (see more at <http://buildwithstrength.com/america-is-burning/>) in buildings under construction since the market began broadly taking advantage of relatively recent changes to the IBC that allowed taller and larger wood-framed buildings. In a similar fire in Houston, the life of a construction worker literally hung in the balance as he was rescued from a burning wood framed building just seconds before the stories above came crashing down. The assembly can prevent these types of risks from greatly expanding by disapproving this proposal.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 8:

Proponent:

William Hall, representing Alliance for Concrete Codes and Standards (jhall@cement.org) requests Disapprove

Commenter's Reason:

At the recent ICC Committee hearings in Columbus, OH, your committee **Failed you**. The general committee charged with looking at proposals and weighing justification **FAILED** to do their job when it came to Tall Wood Buildings. Despite overwhelming testimony that fire tests were inadequate, the committee simply ignored the fact that the TWB ADHOC committee only considered a two story residential structure during testing, and then used "**Engineering Judgment**" to determine that those results will be sufficient for 18 stories.

WHERE is the testing for all the other occupancy groups? 100% increases in story height are proposed for other use groups **without any justification**.

The ICC TWB ADHOC Committee has taken it upon themselves to develop a prescriptive TWB approach that **exceeds** the allowable heights of every country in the world. The United States just recently began looking at Mass Timber for taller buildings and yet, if this proposal goes through, we will allow mass timber 6 stories higher than any other country.

Not only will the U.S. allow the tallest buildings, we will also allow 12 story Mercantile, Storage and Factory to be built **without** gypsum covering on 40% of the CLT surface.

While mass timber may be an acceptable building material, it has not gone through the rigors of that are needed for high rise buildings. **Do not let the U.S. be the testing ground for these Tall Wood Buildings.**

Vote Disapproval

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

No effect

Public Comment 9:

Proponent:

Tien Peng, representing National Ready Mixed Concrete Association (tpeng@nrmca.org) requests Disapprove

Commenter's Reason:

While the Ad Hoc Committee had intended to validate the fire performance of cross laminated timber in fire conditions of buildings, the AWC/ATF compartment testing was limited in scope and not a thorough predictor of fire behavior for high rise building made of a new material. The testing so far is insufficient to capture the fire response characteristics in question. No tests were done to factor in wind, exterior performance, panel connections or moisture, which impacts material performance, fire-fighting and property damage. CLT is a great innovation for the wood industry but it's not ready for prime time and it's certainly not ready for us to build safely to 270 feet and 18 stories. The ICC should not adopt code provisions that will put people at risk.

1. CLT Reliability and Predictability Issues

Cross laminated timber does not have a long enough history to demonstrate their reliability and predictability. The structural design of modern tall buildings is governed by the need to efficiently transfer loading, particularly that from wind, whilst providing increasingly complex building functionality. The use of cross laminated timber implies a highly optimized systems which means the least amount of material to enabled efficient load transfer. Thus, in the event of a fire there is an increased risk not typical in mid-rise constructions, and especially not in a two-story mock up in a lab.

The NFPA with ARUP *Fire Safety Challenges of Tall Wood Buildings* paper noted (NFPA 2013)[i]:

- In a real fire situation, the load-bearing elements in CLT are expected to load-share , or redistribute in a method that is not easily predicted in simple fire testing.
- Previous CLT fire testing has resulted in delamination and char fall-off when exposed to fire conditions.
- This has the potential to increase the fire temperature and burning rate within the compartment, and could impact the structural fire resistance at later stages in the fire duration.

The full-scale fire testing in Norway (SPFR A15101 2016)[ii] showed:

- The temperature increased fast and flashover was reached after four minutes.
- Temperatures were significantly higher than the standard time-temperature curve according to EN 1363-1
- The fire did not cool down before manual suppression was initiated when the test room collapsed 1-hour 36 minutes after ignition
- The sprinklers in the adjacent corridor did not stop the fire from spreading out from the room of origin.
- The charring rate varied much faster than expected

We should not be putting lives in high rises at risk with this level of material unpredictability.

2. Exposed CLT Fire / Moisture /Delamination Issues

The National Institute of Standards (NIST) tests complete previously said there were concerns that flashover occurred earlier with CLTs, heat delamination of the exposed CLT affected its fire performance and a large re-flash occurred on the exposed wall with delamination of the second ply of the CLT. (NIST 2017)[i]

While fire departments understand the risk of collapse with solid wood, there is not enough documentation or history of bonded or laminated wood structures, and they may fail sooner under fire conditions. The problem is that under fire conditions an adhesive may either thermally soften or chemically degrade causing the member to lose its strength, leading to structural collapse. Hence, we see delamination from the NIST testing as well as the very real construction failure on portions of the new College of Forestry building at Oregon State University where a large section of subflooring made of cross-laminated timber gave way between the second and third stories.

Moisture is an important issue for delamination and in many parts of the country the laminated mass timber panels will experience an environment which may exceed the testing limits. Wood will change in all three orthogonal dimensions with changes in moisture, and the changes are not even. This not only means that some species swell more because of their higher density, but also wood of non-uniform density displays non-uniform swelling. Moreover, as wood swells and shrinks, adhesives do not follow with the same volumetric expansion. RDH Building Science full-scale mock-up study (Lepage 2017)[ii]notes that, The research indicates that CLT and mass timber is susceptible to dangerously high moisture contents, particularly when exposed to liquid water in horizontal applications. and other research indicate that CLT is at risk of structural damage by decay and rotting fungi (Zabel and Morrell 1992)[iii]

Clearly, we should not be putting lives in high rises at risk with this level of material unpredictability.

3. Fire / Connections Vertical Fire Spread

All connections used in current projects are proprietary and no information is publicly available regarding their performance. In a high-rise fire event, it is essential that the fire be prevented from spreading upwards or downwards from the floor of origin, endangering the lives of those waiting on more remote floors. Typically, the floor slab provides a robust barrier inhibiting external fire spread so long as it remains firmly supported by the structure. However, the AWC/ATF compartment fire testing had not adequately accounted for the connections in the CLT technologies to meet this crucial objective. The deformation of the connections when exposed to fire can expose gaps and flammable materials which can lead to spread both upwards through flaming, and downwards through dripping molten materials. Once fire starts spreading away from the floor of origin the safety of the occupants is compromised. Examples of vertical fire spread include:

- Las Vegas Hilton, USA: 22 Stories in approximately 25 minutes
- Caracas Tower, Venezuela: 17 floors in a 24-hour period
- Windsor Tower, Spain: 19 floors, ~7 hours for spread, 24 hours total fire duration
- TVCC Tower, China: 44 floors, around 15 minutes

4. Fire / Stack Effect

A similar concerning pattern emerges when discussing wind and air movement fire performance. One problem common to high-rises but not found in low-rise buildings is the stack effect movement

of air inside the building. This air movement is critical to understand what happens during a fire event, as it can intensify a fire or allow flames and combustion gases to move beyond the room of origin. Fire personnel responding to a high-rise fire event need to understand where smoke and toxic gases may be going. Yet, shrinkage, moisture and creep, common in wood products including CLT, will create unpredictable opportunities for air movement within a building.

Air pressure and thermal differential with the use of CLT panels can shift the neutral pressure plane of the building. In cold weather (positive stack effect), the velocity of air channeling into the core from the lower floors is a very real concern to the occupants when they have to defend in place as well as fire service if the fire egress is compromised with smoke. In warm weather (reverse stack effect), where typically the staging floor is two floors below the fire floor, there can be concern of contamination, if there is unpredictability of where the fire path may be taking.

5. Fire / Wind

We typically associate wind with brush and wildland fires but it is just as important in structural fires.

- In 2009 a Texas probationary fire fighter and captain die as a result of rapid fire progression in a wind driven residential fire. Sustained winds from east/south-east at 17 mph with gusts up to 26 mph.
- Virginia Firefighters Battle Three-Alarm Townhouse Fire in 2011. In assessing the high winds and the fire conditions Battalion Barnes says fire crews tried to attack the flames inside two townhouses, but were forced back by intense heat and falling ceilings.
- In 2012 Prince George's County (Maryland), firefighters arrive on scene to a structure fire with winds impacting the rear of the structure. Shortly after forcing the front door open, they saw a dramatic change in fire behavior. As they made entry, they quickly experienced high velocity and high temperature gases, injuring seven firefighters, two critically.

The American Wood Council compartment fire tests did not account for wind loads.

Wind can add to the hazard to a low-rise fire, but it is most concerning around the upper floors of tall buildings. And high-rise fires create unique safety challenges for occupants and firefighters, even without the influence of wind. Wind can change the FLOW PATH of a fire and in some cases create a blowtorch effect and untenable conditions. When a window in the fire apartment fails, the influx of wind can create significant and rapid increases in the heat production of a fire. Smoke and heat spreading through corridors and stairwells, for instance, can inhibit occupants ability to escape and can limit firefighters ability to rescue them. Conditions in a corridor are of critical importance because it is the route that firefighters use to approach a fire and that occupants use to exit a building.

During the course of any structure fire, the wind may also influence exterior conditions and firefighter safety. Accelerated winds near high rises are caused by the downdraft effect, where the air hits a building and, with nowhere else to go, is pushed up, down and around the sides. The air forced downwards increases wind speed at street level. Tests conducted by National Institute of Standards and Technology (NIST 2012), the Fire Fighting Technology Group, FFTG, on positive pressure ventilation determined that an external wind speed of as low as 10 mph could cause a vented room within a structure to quickly spread from an apartment unit to a vent point, represented by a stairwell door. The spreading had floor-to-ceiling and wall-to-wall fire involvement with blowtorch effects. Moreover, if several towers stand near each other, the channeling effect, a wind acceleration created by air having to be squeezed through a narrow space. This Venturi effect will endanger the adjacent buildings.

6. Fire on Exterior

The AWC/ATF compartment fire tests did not account for exterior fire conditions and the proposed exterior proposal does not meet the required testing of CLT assemblies.

An important aspect of fire behavior in the affected building involves the burning behavior of materials on the exterior. While the AWC/ATF test demonstrated an understanding of CLT in an interior fire situation, the circumstances contributing to ignition scenarios of the exterior can be equally complex and equally important. In the past few years we have seen a number of deadly high-rise fires that propagated on the exterior of the structure.

- 2018 Almas Tower in Dubai, UAE
- 2017 Marco Polo apartment complex in Hawaii
- 2018 Grenfell Tower fire in West London

Simply testing the interior fire scenario does not capture potentially important parameters affecting CLT elements in tall wood buildings. If a fire in a heavy-timber building is not extinguished by the initial attack, a tremendous conflagration with flames coming out of the windows will spread fire to adjoining buildings by radiated heat. In a high-rise fire event, it is essential that the fire be prevented from spreading upwards or downwards from the floor of origin, endangering the lives of those waiting on more remote floors.

Notably missing from the proposals is how the mass timber exterior assembly in buildings over 40 feet in height would comply with NFPA 285, *Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components*.

- *Section 1403.5*: For combustible water-resistive barriers in buildings over 40 feet in height of Type I, II, III, or IV construction.
- *Section 1407.10.4*: For metal composite materials (MCM) used on buildings of Type I, II, III, and IV construction.
- *Section 1409.10.4*: For high-pressure decorative exterior-grade compact laminates (HPL) exterior wall coverings used on buildings of Type I, II, III, and IV construction.
- *Section 1509.6.2*: Combustible mechanical equipment screens used on buildings of Type I, II, III, and IV buildings.
- *Section 2603.5.5*: Exterior walls of buildings of Type I, II, III, and IV construction of any height incorporating foam plastic insulation, except for one-story sprinklered buildings.

This is a requirement yet there is no reference to NFPA 285 testing of exterior CLT assemblies. One test by Nordic Engineered Wood published under the Canadian ULC S134 is not enough of a sample size to validate the tall wood proposals. Again, there is not enough historical fires with cross laminated timber to provide information that can be used in an 85-ft building, much less one at 270 feet.

7. Limits of Redundancy

The ICC TW-AHC claimed the added safety factor of active sprinkler systems adds to the safety of the proposals. Without a doubt, the inclusion of fire sprinkler systems in our buildings since the late 1980s has been effective at increasing the chances of survival in a fire. But when systems don't operate as intended (such as in a freeze failure with water damage) or fail in a high-rise fire condition, the impact can be large, not just in monetary terms, but also in the lives of the occupants and fire fighters.

The full-scale fire testing completed in Norway showed the The sprinklers in the adjacent corridor did not stop the fire from spreading out from the room of origin. (SPFR A15101 2016).[iv] Moreover, according to NFPA s report *U.S. Experience with Sprinklers*, sprinklers were effective at controlling the fire in 96% of fires in which they operated, but sprinklers were only effective in 88% of the fires large enough to activate them. The reported sprinkler failures (660 per year) were twice as common as reported fires in which sprinklers were ineffective and did not control the fire. A National Institute of Standards and Technology (NIST) study, *Estimates of Operational Reliability of Fire Protection Systems*, also demonstrates this over-reliance on fire sprinklers is misguided.

8. Untested Reference Standard

State and local governments that adopt and enforce model building codes which references a number of standards. Yet, the proposals regularly cite the newly referenced standard, *ANSI/APA PRG 320-2018: Standard for Performance-Rated Cross-Laminated Timber*, an untested document. The reference to ANSI/APA PRG 320-2018 resolves nothing and takes no legal responsibility for performance failure. APA PRG 320 has no real history of use or validation as a reliable document and no jurisdiction refers to this document. It is premature to utilize a standard that is rarely referenced and start building to 18 stories from it.

Bibliography:

[i] <https://www.nist.gov/el/fire-research-division-73300/national-fire-research-laboratory-73306/fire-safety-challenges-0>

[ii] <https://buildingsciencelabs.com/wp-content/uploads/2017/11/CCBST-2017-Moisture-Uptake-Testing-for-CLT-Floor-Panels.pdf>

[iii] Zabel RA, Morrell JJ (2012) *Wood microbiology: decay and its prevention*. Academic press.

[iv] <http://www.mypaper.se/html5/customer/355/11143/?page=21>

[v] https://sustainable-fire-engineering.sustainable-design.ie/wp-content/uploads/2015/08/NFPA-FPRF_Tall-Wood-Buildings-Fire-Safety-Challenges_2013.pdf

[vi] <http://www.mypaper.se/html5/customer/355/11143/?page=21>

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposed public comment would **reduce cost of construction**. Substantiation and references below.

1. Research:

A recent feasibility study [[i]] reveals that CLT construction is significantly more costly than other well-established construction methods such as concrete. Renowned structural engineers, Cary Kopczynski & Company found that the cost of the CLT structural system for a typical 10 story apartment building would cost \$48 to \$56 per square foot compared to \$42 to \$46 per square foot for concrete, translating nearly **20% premium** for Cross Laminated Timber.

2. Brock Commons, British Columbia

Per “University of British Columbia: Report to The Board of Governors, Tall Wood Student Residence, Brock Commons Phase 1” Report [[ii]], dated September 30, 2014,

- “The capital cost for the project is estimated at \$44 million (\$40m standard construction, plus \$4m wood premium).”
- “The \$4m estimated premium for advanced wood design and construction is to be funded from external sources including \$3.45m secured to date from the Canada Wood Council (CWC) and Forest Innovation Investment.”

This is a **10% premium** for Cross Laminated Timber at the 18-Story Brock Commons.

3. Framework Oregon:

Per the January 5, 2018 *Portland Oregonian* article “Wheeler Defends Decision to Invest In Pricey Complex” of the *Portland Oregonian*[[iii]],

- “While each unit is expected to cost an average \$480,000 to build, the city’s contribution will amount to \$100,000 per apartment.”
- Despite a pledge from Mayor Ted Wheeler to bring down the cost of affordable housing in Portland, the Portland Housing Bureau had nonetheless awarded the building \$6 million toward the \$29 million total. (A **21% subsidy** by the taxpayers for the 12- Story Framework project).

By the July 16, 2018 *Willamette Week (WW)* article “Plans for Record-Setting Timber Tower in Downtown Portland Fall Through” [[iv]] reported,

- The building, which was slated to include 60 *affordable* apartments, was projected to cost \$651.43 per square foot, *WW* reported in December. (The 660-square foot two bedroom apartments were projected to cost \$567,389 to build.)

4. Lumber Pricing:

And this doesn’t consider the recent price increases of softwood lumber that have risen wildly from \$424 per board foot a year ago to \$536 in the second quarter of 2018. That’s a **26% increase** in just one year. At the same time, concrete prices rose at a stable rate of 5%.

[i] http://buildingstudies.org/pdf/related_studies/Cross_Laminated_Timber_Feasibility_Study_Feb-2018.pdf

[ii] http://bog2.sites.olt.ubc.ca/files/2014/09/3.2_2014.09_Tall-Wood-Building.pdf

[iii] https://www.oregonlive.com/politics/index.ssf/2018/01/portland_mayor_ted_wheeler_def.html

[iv] <http://www.wweek.com/news/city/2018/07/16/plans-for-record-setting-timber-tower-in-downtown-portland-fall-through/>

Public Comment 10:

Proponent:

Adam Shoemaker, representing ClarkDietrich (adam.shoemaker@clarkdietrich.com) requests Disapprove

Commenter's Reason:

In IBC Section 602.2 it states that Types I and II construction are those types of construction in which the building elements listed in Table 601 are of noncombustible materials, except as permitted in Section 603 and elsewhere in this code.

I do not believe it is a conservative or safe approach to allow for 190% and 252% increases in allowable area for Type IVA and IVB combustible elements over that of non-combustible structural elements. The testing submitted does not show side by side comparisons of these two systems. It is not reasonable to extrapolate data from a 2-story fire test of combustible materials into such huge increases in area as compared to Type IB non-combustible construction.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

No cost impact.

Public Comment 11:

Proponent:

Larry Williams, representing Steel Framing Industry Association (williams@steelframingassociation.org) requests Disapprove

Commenter's Reason:

The leap in assumptions that fire tests on a two-story mock up can be extrapolated to fire performance of an 18-story building is an unreasonable extension in the allowance for use of professional judgement.

Proponents of G108-18 and related proposals state that the expected fire performance of mass timber buildings was validated by a series of full scale multiple-story fire tests. However, the actual model tested was only two storeys in height, and from this test users are expected to have confidence that a 180-foot tall building construction with cross-laminated timber will exhibit identical performance.

The fundamental problem of this assumption is that some characteristics of large fires have not been observed on small fires, either because they do not occur in small fires or because they are too small to be detected. It seems likely that a different set of controls of fire behavior may take over after a fire reaches a certain size or intensity. The difficulty of extrapolating from small to large fires is further complicated by the fact that behavior of fire is a pattern phenomenon--the behavior at one point is often dependent on the behavior at another point. The behavior of one part of a fire may change even if burning conditions at that point do not vary when the characteristics of the fire at some other point changes.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with current requirements.

Public Comment 12:

Proponent:

Dan Nichols, representing ICC Code Correlation Committee (ccc@iccsafe.org).

Commenter's Reason:

The Code Correlation Committee (CCC) is not taking a position on this code change. The CCC submitted this public comment in order to bring a correlation issue to the attention of the full voting membership for the Public Comment Hearings and the Online Governmental Consensus Vote to allow the voting membership to coordinate actions on a package of code changes submitted dealing with tall wood buildings of mass timber construction. This package includes the parent proposal G108-18; if disapproved, the related proposals G28-18, G75-18, G80-18, G84-18, G89-18, FS5-18, FS6-18, FS73-18, FS81-18 and F266-18, will not be correlated with any existing code text if they are approved.

The Code Correlation Committee is a standing committee of the International Code Council whose objectives, procedures and organization are set forth in Council Policy CP#44-13. The objective of the Code Correlation Committee is to maintain technical and editorial consistency among the International Codes and to assist staff in the evaluation and processing of code change proposals and comments that are exclusively editorial.

G84-18

G86-18

IBC: 506.3.2, 506.3.3, 506.3.3 (New), Table 506.3.3 (New)

Proposed Change as Submitted

Proponent: Stephen Thomas, Colorado Code Consulting, LLC, representing Colorado Chapter ICC (stthomas@coloradocode.net)

2018 International Building Code

Revise as follows

506.3 Frontage increase. Every building shall adjoin or have access to a *public way* to receive an area factor increase based on frontage. Area factor increase shall be determined in accordance with Sections 506.3.1 through 506.3.3.

506.3.1 Minimum percentage of perimeter. To qualify for an area factor increase based on frontage, a building shall have not less than 25 percent of its perimeter on a *public way* or open space. Such open space shall be either on the same lot or dedicated for public use and shall be accessed from a street or approved *fire lane*.

506.3.2 Minimum frontage distance. To qualify for an area factor increase based on frontage, the *public way* or open space adjacent to the building perimeter shall have a minimum distance (~~*W*~~) of 20 feet (6096 mm) measured at right angles from the building face to any of the following:

1. The closest interior lot line.
2. The entire width of a street, alley or public way.
3. The exterior face of an adjacent building on the same property.

~~Where the value of *W* is greater than 30 feet (9144 mm), a value of 30 feet (9144 mm) shall be used in calculating the *building area* increase based on frontage, regardless of the actual width of the *public way* or open space. Where the value of *W* varies along the perimeter of the building, the calculation performed in accordance with Equation 5-5 shall be based on the weighted average calculated in accordance with Equation 5-4.~~

$$W = (L_1 \times w_1 + L_2 \times w_2 + L_3 \times w_3 \dots) / F$$

~~(Equation 5-4)~~

~~where:~~

~~*W* (Width: weighted average) = Calculated width of *public way* or open space (feet).~~

~~*L_n* = Length of a portion of the exterior perimeter wall.~~

~~*w_n* = Width (≥ 20 feet) of a *public way* or open space associated with that portion of the exterior perimeter wall.~~

~~*F* = Building perimeter that fronts on a *public way* or open space having a width of 20 feet (6096 mm) or more.~~

~~**Exception:** Where a building meets the requirements of Section 507, as applicable, except for compliance with the minimum 60-foot (18 288 mm) *public way* or *yard* requirement, and the value of *W* is greater than 30 feet (9144 mm), the value of *W* shall not exceed 60 feet (18 288 mm).~~

The frontage increase shall be based on the smallest public way or open space that is 20 feet (6096 mm) or greater, and the percentage of building perimeter having a minimum 20 feet (6096 mm) public way or open space.

506.3.3 Amount of increase. The area factor increase based on frontage shall be determined in accordance with ~~Equation 5-5:~~

$$I_f = [F/P - 0.25]W/30$$

~~(Equation 5-5)~~

~~where:~~

~~*I_f* = Area factor increase due to frontage.~~

~~*F* = Building perimeter that fronts on a *public way* or open space having minimum distance of 20 feet (6096 mm).~~

~~*P* = Perimeter of entire building (feet).~~

~~W = Width of public way or open space (feet) in accordance with Section 506.3.2.~~

~~Table 506.3.3.~~

~~$t_f = [F/P - 0.25]W/30$~~

Add new text as follows

**Table 506.3.3
FRONTAGE INCREASE FACTOR**

<u>Percentage (%) of Perimeter</u>	<u>Open Space</u>			
	<u>0 to less than 20 Feet</u>	<u>20 to less than 25 Feet</u>	<u>25 to less than 30 Feet</u>	<u>30 Feet or greater</u>
<u>0 to less than 25</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>25 to less than 50</u>	<u>0</u>	<u>0.17</u>	<u>0.21</u>	<u>0.25</u>
<u>50 to less than 75</u>	<u>0</u>	<u>0.33</u>	<u>0.42</u>	<u>0.50</u>
<u>75 to 100</u>	<u>0</u>	<u>0.5</u>	<u>0.63</u>	<u>0.75</u>

Reason: Calculating the frontage increase is a confusing process for little benefit. This proposal simplifies the process by creating a table outlining the increase based on the percentage of open space around the building and the distance of that open space. It still uses the concept of the percentage of open space around the building. The values in the table are based on the calculations using Equation 5-5. The proposal also deletes the confusing weighted average calculation that most people do not use.

For example, if you have a building that has a perimeter of open space of 63% and the smallest open space is 25 feet, the increase would be 0.42. Using the calculation in Equation 5-5, it would be 0.32. This is a 10% difference. The total increase for a Group B Occupancy of Type VB Construction would be 2,790 square feet using the equation and 3,780 using the table. This is a difference of 990 square feet. This is negligible in the overall scheme of allowable area calculations.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This is a simplification of an existing calculation in the code. It should not affect the cost of construction.

G86-18

Public Hearing Results

Errata:

The proposal has been corrected.

Committee Action:

Disapproved

Committee Reason:

The tabular version found some favor with the committee, but it wasn't convinced that even with the modifications offered that the change was neutral. A well crafted public comment with some examples may make this acceptable. (Vote: 10-4)

Assembly Action:

None

G86-18

Individual Consideration Agenda

Public Comment 1:

Proponent:

Stephen Thomas, Colorado Code Consulting, LLC, representing Colorado Chapter ICC (sthomas@coloradocode.net) requests As Modified by This Public Comment

Modify as follows:

2018 International Building Code

506.3 Frontage increase.

Every building shall adjoin or have access to a *public way* to receive an area factor increase based on frontage. Area factor increase shall be determined in accordance with Sections 506.3.1 through 506.3.3.

506.3.1 Minimum percentage of perimeter.

To qualify for an area factor increase based on frontage, a building shall have not less than 25 percent of its perimeter on a *public way* or open space. Such open space shall be either on the same lot or dedicated for public use and shall be accessed from a street or approved *fire lane*.

506.3.2 Minimum frontage distance.

To qualify for an area factor increase based on frontage, the *public way* or open space adjacent to the building perimeter shall have a minimum distance of 20 feet (6096 mm) measured at right angles from the building face to any of the following:

1. The closest interior lot line.
2. The entire width of a street, alley or public way.
3. The exterior face of an adjacent building on the same property.

The frontage increase shall be based on the smallest public way or open space that is 20 feet (6096 mm) or greater, and the percentage of building perimeter having a minimum 20 feet (6096 mm) public way or open space.

506.3.3 Amount of increase.

The area factor increase based on frontage shall be determined in accordance with

Table 506.3.3.

FRONTAGE INCREASE FACTOR

<u>Percentage (%) of Perimeter</u>	<u>Open Space</u>			
	<u>0 to less than 20 Feet</u>	<u>20 to less than 25 Feet</u>	<u>25 to less than 30 Feet</u>	<u>30 Feet or greater</u>
<u>0 to less than 25</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>25 to less than 50</u>	<u>0</u>	<u>0.17</u>	<u>0.21</u>	<u>0.25</u>
<u>50 to less than 75</u>	<u>0</u>	<u>0.33</u>	<u>0.42</u>	<u>0.50</u>
<u>75 to 100</u>	<u>0</u>	<u>0.5</u>	<u>0.63</u>	<u>0.75</u>

[Interpolation is permitted.](#)

506.3.3.1 Section 507 Buildings

[Where a building meets the requirements of Section 507, as applicable, except for compliance with the minimum 60-foot \(18 288 mm\) public way or yard requirement, the The area factor increase based on frontage shall be determined in accordance with Table 506.3.3.1.](#)

[Table 506.3.3.1](#)

[SECTION 507 BUILDINGS](#)

	<u>Open Space</u>					
<u>% perimeter</u>	<u>30 to less than 35 feet</u>	<u>35 to less than 40 feet</u>	<u>40 feet to less than 45 feet</u>	<u>45 feet to less than 50 feet</u>	<u>50 feet to less than 55 feet</u>	<u>55 feet to less than 60 feet</u>
<u>0 to less than 25</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>25 to less than 50</u>	<u>0.29</u>	<u>0.33</u>	<u>0.38</u>	<u>0.42</u>	<u>0.46</u>	<u>0.5</u>
<u>50 to less than 75</u>	<u>0.58</u>	<u>0.67</u>	<u>0.75</u>	<u>0.83</u>	<u>0.92</u>	<u>1.00</u>
<u>75 to 100</u>	<u>0.88</u>	<u>1.00</u>	<u>1.13</u>	<u>1.25</u>	<u>1.38</u>	<u>1.5</u>

Interpolation is permitted.

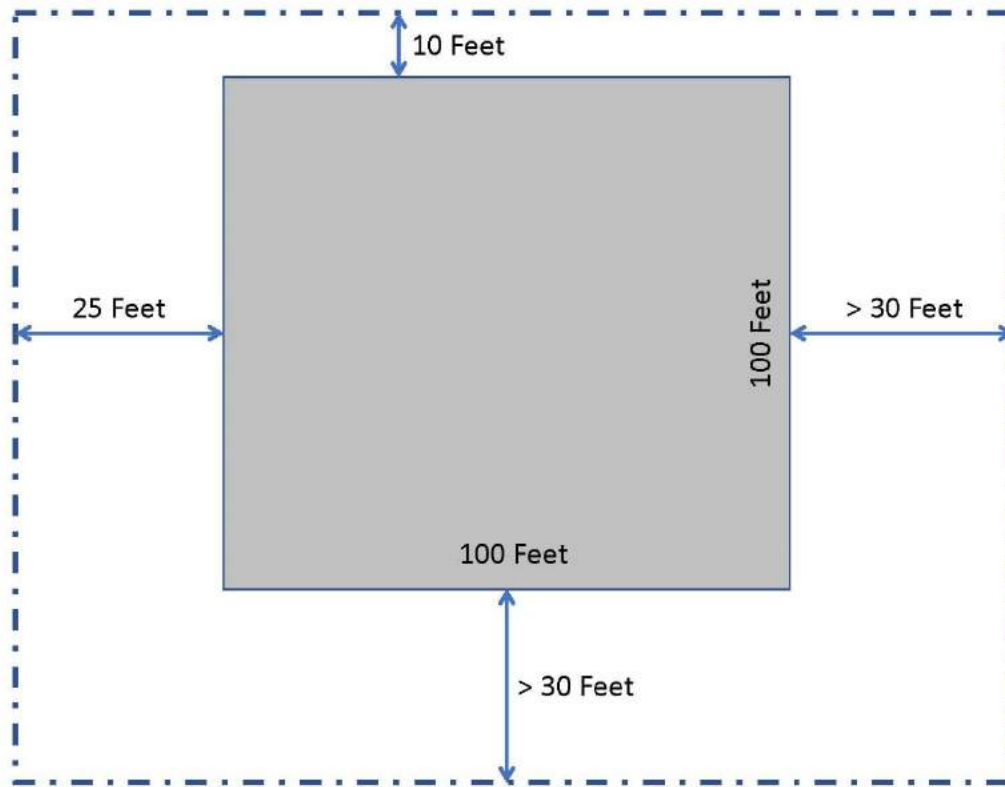
Commenter's Reason:

This proposal makes the frontage increase much easier to calculate. It takes the existing equation and puts into a table format. When we changed the equation in the 2015 IBC, many people are using the wrong value from the table and the calculation is wrong. The user of the code is supposed to use the NS number from Table 506.2 to determine the frontage increase. However, many people are incorrectly using the S1 or SM value from the table. These new tables will eliminate that confusion and potential error by putting the frontage increases into a table.

The committee was in support of the concept, but felt that some improvements could be made to the table. They suggested that language be added to allow the user to interpolate the values within the table. That language was added to this public comment. They also had concerns that the provisions of the exception to Section 506.3.2 was not included in the proposal. This exception permits a larger increase for those buildings listed in Section 507. An additional table has been added to this public comment to address that exception and provides those values. It is based on the same calculation but with higher values.

To use the table, you need to figure the percentage of the building perimeter that has at least a 20 foot open space. Then you determine the dimension of the smallest open space over 20 feet. You then take those two values and go into the table to determine the frontage increase. For example, if you have a building on a site as shown in Figure 1, you can see that three of the four perimeter walls have at least a 20 foot yard and the building is 100 X 100. Therefore, $300/400 = 75\%$ perimeter with at least a 20 foot yard. The smallest yard is 25 feet on the left side. Therefore, you go into the table and enter the bottom row at "75% to 100%" and go across to the "25 to less than 30 feet" column and find that you would get a 63% frontage increase based on this layout. You could interpolate within the table if you would like.

The intent of the proposal is to simplify the allowable area calculation and reduce the number of mistakes that we now see.



Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There is no change to the underlying code requirements

G86-18

G87-18

IBC: 508.3.1.2

Proposed Change as Submitted

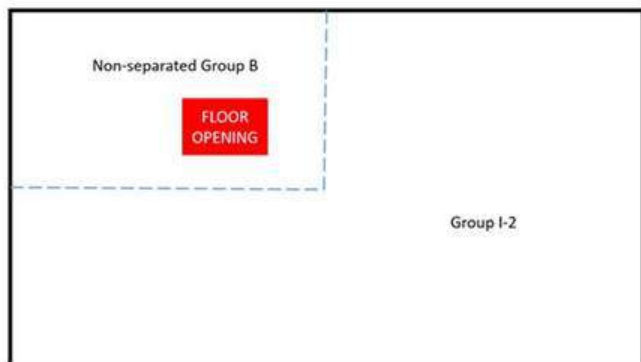
Proponent: John Williams, Chair, representing Healthcare Committee (AHC@iccsafe.org)

2018 International Building Code

Revise as follows

508.3.1.2 Group I-2, Condition 2 occupancies. Where one of the nonseparated occupancies is Group I-2, Condition 2, the ~~most restrictive~~ requirements of Sections 407, 509 and 712 shall apply throughout the fire area containing the Group I-2 occupancy. The ~~most restrictive~~ requirements of Chapter 10 for Group I-2, Condition 2 shall apply to the path of egress from the Group I-2, Condition 2 occupancy up to and including the exit discharge.

Reason: This section relates to the use of non-separated mixed uses in hospitals. Historically a hospital building has broadly been considered as an I-2 occupancy. However, designs are increasingly using this non-separated option to create situations that adversely impact the I-2 occupancy. This language was added in the previous cycle to with the intent to require certain non-separated facility designs to follow some of the basic requirements for Group I-2, Condition 2 hospitals. The goal was to point designers and code officials to four key components to consider when designing non-separated uses: Section 407 which contains specific healthcare requirements, Section 509 for incidental uses, Section 712 for vertical openings and Chapter 10 for egress. Failure to follow these could have adverse impacts on patients and staff. For example, unprotected floor openings allowed by 712 are prohibited in Group I-2, they are not prohibited in Group B. Without this section, a design would be allowed to punch a hole in the floor that adversely affects the I-2 patients on that floor.



An unintended consequence of the language is that by referencing the “most restrictive” requirements, the section prohibits the use of any exception permissible for Group I-2. It also doesn’t clearly identify which requirements should be considered. For example, we did not intend to apply Group H restrictions on these conditions just because they are more restrictive. There are several exceptions that should be maintained for these parts of the building, especially in Chapter 10. This change clarifies that all of the I-2 specific requirements apply, whether they are more or less restrictive.

This proposal is submitted by the ICC Committee on Healthcare (CHC). The CHC was established by the ICC Board to evaluate and assess contemporary code issues relating to healthcare facilities. This is a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. In 2017 the CHC held 2 open meetings and numerous conference calls, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Information on the CHC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CHC effort can be downloaded from the CHC website at: <https://www.iccsafe.org/codes-tech-support/cs/icc-committee-on-healthcare/>.

Cost Impact: The code change proposal will decrease the cost of construction. This clarification would remove requirements for more restrictive provisions where hospital provisions apply.

G87-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proponent asked for disapproval as they were unsure whether the proposal as submitted conflicts with the federal standards. (Vote: 14-0)

Assembly Action:

None

G87-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Williams, representing Healthcare Committee (ahc@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

508.3.1.2 Group I-2, Condition 2 occupancies. ~~Where one of the nonseparated occupancies is~~ The requirements for Group I-2, Condition 2, the requirements of in Sections 407, 509 and 712 shall apply throughout the fire area containing the Group I-2 occupancy. The requirements of Chapter 10 for Group I-2, Condition 2 shall apply to the path of egress from the Group I-2, Condition 2 occupancy up to and including the exit discharge.

Commenter's Reason: The revised language is a clarification of requirements. The provisions for hospitals should be applied on a component by component basis such as fire areas. This should not apply to everything in the building, however, the concentration should be on the fire area within the building. The last sentence applies when the means of egress from a hospital goes through a business area.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This clarification would remove requirements for more restrictive provisions where hospital provisions apply.

G87-18

G88-18

IBC: Table TABLE 508.4

Proposed Change as Submitted

Proponent: Ed Kulik, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Building Code

Revise as follows

**TABLE 508.4
REQUIRED SEPARATION OF OCCUPANCIES (HOURS)^f**

OCCUPANCY	A, E		I-1 ^a , I-3, I-4		I-2		R ^a		F-2, S-2 ^b , U		B ^e , F-1, M, S-1		H-1		H-2		H-3, H-4		H-5	
	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS
A, E	N	N	1	2	2	NP	1	2	N	1	1	2	NP	NP	3	4	2	3	2	NP
I-1 ^a , I-3, I-4	<u>1</u>	<u>2</u>	N	N	2	NP	1	NP	1	2	1	2	NP	NP	3	NP	2	NP	2	NP
I-2	<u>2</u>	<u>NP</u>	<u>2</u>	<u>NP</u>	N	N	2	NP	2	NP	2	NP	NP	NP	3	NP	2	NP	2	NP
R ^a	<u>1</u>	<u>2</u>	<u>N</u>	<u>N</u>	<u>2</u>	<u>NP</u>	N	N	1 ^c	2 ^c	1	2	NP	NP	3	NP	2	NP	2	NP
F-2, S-2 ^b , U	<u>N</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>N</u>	<u>N</u>	<u>1c</u>	<u>2c</u>	N	N	1	2	NP	NP	3	4	2	3	2	NP
B ^e , F-1, M, S-1	<u>1</u>	<u>2</u>	<u>1</u>	<u>2</u>	<u>2</u>	<u>NP</u>	<u>N</u>	<u>N</u>	<u>1</u>	<u>2</u>	N	N	NP	NP	2	3	1	2	1	NP
H-1	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	N	NP	NP	NP	NP	NP	NP	NP
H-2	<u>3</u>	<u>4</u>	<u>3</u>	<u>NP</u>	<u>3</u>	<u>NP</u>	<u>3</u>	<u>NP</u>	<u>3</u>	<u>4</u>	<u>2</u>	<u>3</u>	<u>NP</u>	<u>NP</u>	N	NP	1	NP	1	NP
H-3, H-4	<u>2</u>	<u>3</u>	<u>2</u>	<u>NP</u>	<u>2</u>	<u>NP</u>	<u>2</u>	<u>NP</u>	<u>2</u>	<u>3</u>	<u>1</u>	<u>2</u>	<u>NP</u>	<u>NP</u>	<u>1</u>	<u>NP</u>	1 ^d	NP	1	NP
H-5	<u>2</u>	<u>NP</u>	<u>2</u>	<u>NP</u>	<u>2</u>	<u>NP</u>	<u>2</u>	<u>NP</u>	<u>2</u>	<u>NP</u>	<u>1</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>1</u>	<u>NP</u>	<u>1</u>	<u>NP</u>	N	NP

S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

NS = Buildings not equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

N = No separation requirement.

NP = Not Permitted.

- a. See Section 420.
- b. The required separation from areas used only for private or pleasure vehicles shall be reduced by 1 hour but not to less than 1 hour.
- c. See Section 406.3.2.
- d. Separation is not required between occupancies of the same classification.
- e. See Section 422.2 for ambulatory care facilities.
- f. Occupancy separations that serve to define fire area limits established in Chapter 9 for requiring fire protection systems shall also comply with Section 707.3.10 and Table 707.3.10 in accordance with Section 901.7.

Reason: Filling in the balance of Table 508.4 will avoid confusion and make the table more clear and functional.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal is an editorial change and adds no new requirements to the code.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Committee members spoke both in support and opposition to this proposal which intends to replicate the existing information in the upper right half of the table in the lower left half. However errors were found in the proposal which showed that further refinement was needed. (Vote: 14-0)

Assembly Action:

None

G88-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ed Kullik, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

**TABLE 508.4
REQUIRED SEPARATION OF OCCUPANCIES (HOURS)^f**

OCCUPANCY	A, E		I-1 ^a , I-3, I-4		I-2		R ^a		F-2, S-2 ^b , U		B ^e , F-1, M,S-1		H-1		H-2		H-3, H-4		H-5	
	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS
A, E	N	N	1	2	2	NP	1	2	N	1	1	2	NP	NP	3	4	2	3	2	NP
I-1 ^a , I-3, I-4	1	2	N	N	2	NP	1	NP	1	2	1	2	NP	NP	3	NP	2	NP	2	NP
I-2	2	NP	2	NP	N	N	2	NP	2	NP	2	NP	NP	NP	3	NP	2	NP	2	NP
R ^a	1	2	1	NP	2	NP	N	N	1 ^c	2 ^c	1	2	NP	NP	3	NP	2	NP	2	NP
F-2, S-2 ^b , U	N	1	1	2	2	NP	1 ^c	2 ^c	N	N	1	2	NP	NP	3	4	2	3	2	NP
B ^e , F-1, M, S-1	1	2	1	2	2	NP	1	2	1	2	N	N	NP	NP	2	3	1	2	1	NP
H-1	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	N	NP	NP	NP	NP	NP	NP	NP
H-2	3	4	3	NP	3	NP	3	NP	3	4	2	3	NP	NP	N	NP	1	NP	1	NP
H-3, H-4	2	3	2	NP	2	NP	2	NP	2	3	1	2	NP	NP	1	NP	1 ^d	NP	1	NP
H-5	2	NP	2	NP	2	NP	2	NP	2	NP	1	NP	NP	NP	1	NP	1	NP	N	NP

S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

NS = Buildings not equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

N = No separation requirement.

NP = Not Permitted.

- a. See Section 420.
- b. The required separation from areas used only for private or pleasure vehicles shall be reduced by 1 hour but not to less than 1 hour.
- c. See Section 406.3.2.
- d. Separation is not required between occupancies of the same classification.
- e. See Section 422.2 for ambulatory care facilities.
- f. Occupancy separations that serve to define fire area limits established in Chapter 9 for requiring fire protection systems shall also comply with Section 707.3.10 and Table 707.3.10 in accordance with Section 901.7.

Commenter's Reason: Filling in the balance of Table 508.4 will avoid confusion and make the table more clear and functional. The public comment addresses the inconsistencies that were brought up during testimony.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal is an editorial change and adds no new requirements to the code.

G88-18

G89-18

IBC: 508.4.4.1, 509.4.1.1 (New)

Proposed Change as Submitted

Proponent: Stephen DiGiovanni, representing ICC Ad Hoc Committee on Tall Wood Buildings (TWB) (TWB@iccsafe.org)

2018 International Building Code

508.4.4 Separation. Individual occupancies shall be separated from adjacent occupancies in accordance with Table 508.4.

Revise as follows

508.4.4.1 Construction. Required separations shall be *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both, so as to completely separate adjacent occupancies. Mass timber elements serving as fire barriers or horizontal assemblies to separate occupancies in Type IV-B or IV-C construction shall be separated from the interior of the building with an approved thermal barrier consisting of a minimum of 1/2 inch (12.7 mm) gypsum board or a noncombustible equivalent.

Add new text as follows

509.4.1.1 Type IV-B and IV-C construction. Where Table 509 specifies a fire-resistance-rated separation, mass timber elements serving as fire barriers or a horizontal assembly in Type IV-B or IV-C construction shall be separated from the interior of the incidental use with an approved thermal barrier consisting of a minimum of 1/2 inch (12.7 mm) gypsum board or a noncombustible equivalent.

Reason: The Ad Hoc Committee on Tall Wood Buildings (TWB) was created by the ICC Board to explore the science of tall wood buildings and take action on developing code changes for tall wood buildings. The TWB has created several code change proposals with respect to the concept of tall buildings of mass timber and the background information is at the end of this Statement. Within the statement are important links to information, including documents and videos, used in the deliberations which resulted in these proposals.

This code change proposal represents one of many submitted designed to address a new type of construction called mass timber (e.g. new construction types IV-A, IV-B, and IV-C).

On this subject of “fire barriers,” the committee determined that additional measures were necessary to address cases where mass timber is serving as a fire barrier or horizontal assembly. Section 508.4 describes the third option for separating mixed occupancies within a building. Section 509.4 discusses the fire-resistance rated separation that is required for incidental uses within a larger use group. Section 509 also permits, when stated, protection by an automatic sprinkler system without fire barriers, however the construction enclosing the incidental use must resist the passage of smoke in accordance with Section 509.4.2.

The concern is that without any modifications to these provisions regulating separated occupancies and incidental uses, a fire barrier or horizontal assembly could be designed using mass timber that would comply with the fire resistance rating, but which would allow any exposed mass timber to contribute to the fuel load. This can occur in Types IV-B and IV-C construction.

The committee applied professional judgment by choosing to emulate the existing thermal barrier requirements by applying those requirements to these two sections. The intent of this proposal is to have the thermal barrier delay or prevent the ignition of the mass timber, thus delaying or preventing the mass timber’s contribution to the fuel load. This will also allow additional time for fire and life safety measures to be executed as well as allow first responders additional time to perform their services.

The committee’s intent is that the thermal barrier only needs to cover an exposed wood surface. The thermal barrier is not required in addition to any noncombustible protection that is required in Section 602.4, nor does it add to the fire resistance rating of the mass timber.

Mass timber walls or floors serving as fire barriers for separated uses (Section 508.4) would need to have a thermal barrier on both faces of the assembly.

For Section 509.4 (incidental use separations) the intent is to provide the thermal barrier only on the side where the hazard exists, that is, the side facing the incidental use. For example, if a mass timber floor assembly of the incidental use contains a noncombustible topping this provision would not require the addition of a thermal barrier on mass timber

surfaces not facing the incidental use area. In addition, the thermal barrier would not be required if the sprinkler option is exercised.

It should be noted that this proposal is only addressing the contribution of exposed mass timber's face to the fuel load of a fire, and is not recommending any modifications to the fire resistance requirements of Sections 508 or 509 or to the other mass timber provisions.

Background information: The ICC Board approved the establishment of an ad hoc committee for tall wood buildings in December of 2015. The purpose of the ad hoc committee is to explore the science of tall wood buildings and to investigate the feasibility and take action on developing code changes for tall wood buildings. The committee is comprised of a balance of stakeholders with additional opportunities for interested parties to participate in the four Work Groups established by the ad hoc committee, namely: Code; Fire; Standards/Definitions; and Structural. For more information, be sure to visit the ICC website <https://www.iccsafe.org/codes-tech-support/cs/icc-ad-hoc-committee-on-tall-wood-buildings/> (link active and up to date as of 12/27/17). As seen in the "Meeting Minutes and Documents" and "Resource Documents" sections of the committee web page, the ad hoc committee reviewed a substantial amount of information in order to provide technical justification for code proposals.

The ad hoc committee developed proposals for the followings code sections. The committee believes this package of code changes will result in regulations that adequately address the fire and life safety issues of tall mass timber buildings.

IBC Code Section	Description
403.3.2	Water supply requirements for fire pumps in high rise buildings of Type IVA and IVB construction.
504.3	Allowable building height (feet) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT construction.
504.4	Allowable building height (stories) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
506.2	Allowable building area for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
508.4.4.1 509.4.1.1 (new)	Requirements for mass timber building elements serving as fire barriers or horizontal assemblies in buildings of Type IVB or IVC construction.
602.4	Type of Construction requirements for new proposed types of construction: Types IVA, IVB and IVC. No changes to Type IV HT construction. Includes definitions for new terms: Mass timber and Noncombustible protection (mass timber). THIS IS THE KEY CODE CHANGE PROPOSAL WHICH OUTLINES THE CONSTRUCTION REQUIREMENTS FOR THE PROPOSED NEW TYPE OF MASS TIMBER BUILDINGS. THE PROPOSAL ALSO ADDRESSES CONCEALED SPACES, ADHESIVE PERFORMANCE AND EXTERIOR WALL PROTECTION.
703.8 (new)	The performance method to determine the increase to the fire resistance rating provided by noncombustible protection applied to the mass timber building element.
703.9 (new)	Requirements for sealants and adhesives to be placed at abutting edges and intersections of mass timber building elements. The reason statement references a Group B proposal to Chapter 17 for special inspection requirements of sealants and adhesives.
718.2.1	Requirements on the use of mass timber building elements used for Fireblocking.
722.7 (new)	Requirements for the fire resistance rating of mass timber elements, including minimum required protection and gypsum board attachment requirements.
3102	Requirements for membrane structures using Type IV HT construction.
3314.7 (new)	New special precautions during construction of buildings of Types IVA, IVB and IVC construction: Standpipes; Water supply for fire department connections; Noncombustible protection required for mass timber elements as construction height increases.
Appendix	Requirements for walls, floors and roofs of Type IV HT construction in buildings located in Fire Districts.
IFC Code Section	Description
701.6	Requirements which stipulate the owner's responsibility to maintain inventory of all required fire resistance rated construction in buildings of Types IVA and IVB construction. This includes an annual inspection and proper repair where necessary.
Proposed changes to be submitted in 2019 Group B	
IBC Chapter 17	Required special inspections of mass timber construction <ul style="list-style-type: none"> • Structural • Sealants and adhesives (see IBC 703.8)
IBC Chapter 23	An update to referenced standard APA PRG 320 Standard for Performance –rated Cross-laminated Timber which is currently undergoing revision to ensure the adequacy of the adhesives under fire conditions.

In addition, fire tests designed to simulate the three new construction types (Types IVA, IVB and IVC) in the ad hoc committee proposals were conducted at the Alcohol Tobacco and Firearms test lab facility. The TWB was involved in the design of the tests, and many members witnessed the test in person or online. The results of the series of 5 fire tests provide additional support for these proposals, and validate the fire performance for each of the types of construction proposed by the committee. The fire tests consisted of one-bedroom apartments on two levels, with both apartments having a corridor leading to a stair. The purpose of the tests was to address the contribution of mass timber to a fire, the performance of connections, the performance of through-penetration fire stops, and to evaluate conditions for responding fire personnel.

To review a summary of the fire tests, please visit:

<http://bit.ly/ATF-firetestreport>

To watch summary videos of the fire tests, which are accelerated to run in 3 ½ minutes, please visit:

<http://bit.ly/ATF-firetestvideos>

Both of these links were confirmed active on 12/27/17.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This section provides information that was not previously set forth in the code, and does not change the requirements of current code, thus there is no cost impact when compared with present requirements.

G89-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 508.4.4.1 Construction. Required separations shall be fire barriers constructed in accordance with Section 707 or horizontal assemblies constructed in accordance with Section 711, or both, so as to completely separate adjacent occupancies. Mass timber elements serving as fire barriers or horizontal assemblies to separate occupancies in Type IV-B or IV-C construction shall be separated from the interior of the building with an approved thermal barrier consisting of a minimum of 1/2 inch (12.7 mm) gypsum board or a ~~noncombustible equivalent material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.~~

509.4.1.1 Type IV-B and IV-C construction. Where Table 509 specifies a fire-resistance-rated separation, mass timber elements serving as fire barriers or a horizontal assembly in Type IV-B or IV-C construction shall be separated from the interior of the incidental use with an approved thermal barrier consisting of a minimum of 1/2 inch (12.7 mm) gypsum board or a ~~noncombustible equivalent material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.~~

(Portions of proposal not shown are not modified.)

Committee Reason: The modification makes the proposal consistent with the current code. The proposal was approved based upon the proponents published reason statement. (Vote: 14-0)

Assembly Action:

None

G89-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jonathan Humble, representing American Iron and Steel Institute (jhumble@steel.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

508.4.4.1 Construction. Required separations shall be *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both, so as to completely separate adjacent occupancies. Mass timber elements serving as fire barriers or horizontal assemblies to separate occupancies in Type IV-B ~~or IV-C~~ construction shall be separated from the interior of the building with an approved thermal barrier consisting of a minimum of 1/2 inch (12.7 mm) gypsum board or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.

509.4.1.1 Type ~~IV-B and IV-C~~ construction. Where Table 509 specifies a fire-resistance-rated separation, mass timber elements serving as fire barriers or a horizontal assembly in Type IV-B ~~or IV-C~~ construction shall be separated from the interior of the incidental use with an approved thermal barrier consisting of a minimum of 1/2 inch (12.7 mm) gypsum board or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.

Commenter's Reason: We recommend that the Type IV-B mass timber designation be deleted from the tall wood building proposals.

The origins of the development of the types of construction were originally developed to “account for the response or participation that a building’s structure will have in a fire condition originating within the building as a result of the occupancy or the fuel load” (Example source from BOCA National Building Code 1993 Commentary). The modern day types of construction are parsed out into three primary categories of construction; noncombustible (Types I and II), noncombustible/combustible (Types III and IV) and combustible (Type V). Subcategories were created to identify the protection; Type A for protected and Type B for unprotected.

What we have within proposals G75-18, G80-18, G84-18, G89-18, and G108-18 is the addition of a new construction category that has been proposed based on the need to satisfy aesthetics based on the combination of Types IV-A and IV-C, which is a departure from the black and white construction categories based on construction that is non-combustible or

combustible. We feel this inappropriate for the codes to begin to designate designer type construction categories.

In the past such mixing and matching of construction types into building or structure is more suited to the IBC Section 104.11 (Alternative materials, design and methods of construction and equipment), or through use of the ICC International Performance Code or performance analysis. We feel that these are the most appropriate options for the mixing-and-matching of construction types in building design.

(Note to staff: The modifications shown to the term "material" are an outcome of the cdpACCESS system and not part of this public comment.)

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This will not increase or decrease the cost of construction as this code change proposal and public comment address information that was not previously contained in the code, therefore there is no cost impact when compared to present requirements.

Public Comment 2:

Proponent: Dan Nichols, representing ICC Code Correlation Committee (ccc@iccsafe.org).

Commenter's Reason: The Code Correlation Committee (CCC) is not taking a position on this code change. The CCC submitted this public comment in order to bring a correlation issue to the attention of the full voting membership for the Public Comment Hearings and the Online Governmental Consensus Vote to allow the voting membership to coordinate actions on a package of code changes submitted dealing with tall wood buildings of mass timber construction. This package includes the parent proposal G108-18; if disapproved, the related proposals G28-18, G75-18, G80-18, G84-18, G89-18, FS5-18, FS6-18, FS73-18, FS81-18 and F266-18, will not be correlated with any existing code text if they are approved.

The Code Correlation Committee is a standing committee of the International Code Council whose objectives, procedures and organization are set forth in Council Policy CP#44-13. The objective of the Code Correlation Committee is to maintain technical and editorial consistency among the International Codes and to assist staff in the evaluation and processing of code change proposals and comments that are exclusively editorial.

G89-18

G90-18

IBC: , 508.1, 508.5, 508.5.1, 508.5.2, 508.5.3, 508.5.4, 508.5.5, 508.5.6, 508.5.7, 508.5.8, 508.5.9, 508.5.10, 508.5.11

Proposed Change as Submitted

Proponent: Ed Kulik, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Building Code

Delete without substitution

~~SECTION 419 LIVE/WORK UNITS~~

Revise as follows

508.1 General. Each portion of a building shall be individually classified in accordance with Section 302.1. Where a building contains more than one occupancy group, the building or portion thereof shall comply with the applicable provisions of Section 508.2, 508.3 or, 508.4, 508.5, or a combination of these sections.

Exceptions:

1. Occupancies separated in accordance with Section 510.
2. Where required by Table 415.6.2, areas of Group H-1, H-2 and H-3 occupancies shall be located in a *detached building* or structure.
- ~~3. Uses within live/work units, complying with Section 419, are not considered separate occupancies.~~

~~419.1508.5~~ General Live/Work Units. A *live/work unit* shall comply with Sections ~~419.1-508.5~~ through ~~419.9-508.5.11~~.

Exception: Dwelling or sleeping units that include an office that is less than 10 percent of the area of the *dwelling unit* are permitted to be classified as *dwelling units* with accessory occupancies in accordance with Section 508.2.

~~419.1-1508.5.1~~ Limitations. All of the following shall apply to live/work areas:

1. The *live/work unit* is permitted to be not greater than 3,000 square feet (279 m²) in area.
2. The nonresidential area is permitted to be not more than 50 percent of the area of each *live/work unit*.
3. The nonresidential area function shall be limited to the first or main floor only of the *live/work unit*.
4. Not more than five nonresidential workers or employees are allowed to occupy the nonresidential area at any one time.

~~419.2508.5.2~~ Occupancies. *Live/work units* shall be classified as a Group R-2 occupancy. Separation requirements found in Sections 420 and 508 shall not apply within the *live/work unit* where the *live/work unit* is in compliance with Section ~~419-508.5~~. Nonresidential uses that would otherwise be classified as either a Group H or S occupancy shall not be permitted in a *live/work unit*.

Exception: Storage shall be permitted in the *live/work unit* provided that the aggregate area of storage in the nonresidential portion of the *live/work unit* shall be limited to 10 percent of the space dedicated to nonresidential activities.

~~419.3-508.5.3~~ Means of egress. Except as modified by this section, the *means of egress* components for a *live/work unit* shall be designed in accordance with Chapter 10 for the function served.

~~419.3-1508.5.4~~ Egress capacity. The egress capacity for each element of the *live/work unit* shall be based on the occupant load for the function served in accordance with Table 1004.5.

~~419.3-2508.5.5~~ Spiral stairways. *Spiral stairways* that conform to the requirements of Section 1011.10 shall be permitted.

~~419-4508.5.6~~ Vertical openings. Floor openings between floor levels of a *live/work unit* are permitted without enclosure.

~~[F]~~ **419-5508.5.7 Fire protection.** The *live/work unit* shall be provided with a monitored *fire alarm* system where required by Section 907.2.9 and an *automatic sprinkler system* in accordance with Section 903.2.8.

~~419-6508.5.8 Structural.~~ Floors within a *live/work unit* shall be designed for the live loads in Table 1607.1, based on the function within the space.

~~419-7508.5.9 Accessibility.~~ Accessibility shall be designed in accordance with Chapter 11 for the function served.

~~419-8508.5.10 Ventilation.~~ The applicable *ventilation* requirements of the International Mechanical Code shall apply to each area within the *live/work unit* for the function within that space.

~~419-9508.5.11 Plumbing facilities.~~ The nonresidential area of the *live/work unit* shall be provided with minimum plumbing facilities as specified by Chapter 29, based on the function of the nonresidential area. Where the nonresidential area of the *live/work unit* is required to be *accessible* by Section 1107.6.2.1, the plumbing fixtures specified by Chapter 29 shall be *accessible*.

Reason: Relocating Section 419 on Live/Work Units to Section 508 Mixed Occupancies provides a clearer description under Mixed Use Occupancies since the unit is not only residential nor business use. An example is a doctor's office occupying part of a detached dwelling, or townhouses with an office, store or restaurant on the first floor and a residence occupying parts or all of upper floors.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This is an editorial relocation of existing requirements.

G90-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The committee approved the change recognizing that live/work units are a method of addressing mixed occupancy in a space and therefore is well placed in Section 508. The Chapter 4 location was felt to be no longer needed as these units have become more mainstream and not 'special' in nature. (Vote: 8-6)

Assembly Action:

None

G90-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Stephen Thomas, Colorado Code Consulting, LLC, representing Colorado Chapter ICC (stthomas@coloradocode.net) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

310.3.1 Live/Work Units Live/work units located within townhouses that comply with Section 508.5 are permitted to comply with the International Residential Code provided an automatic sprinkler system is installed in accordance with Section 903.3.1.3 or Section P2904 of the International Residential Code.

508.5 Live/Work Units. A *live/work unit* shall comply with Sections 508.5 through 508.5.11.

Exception-Exceptions:

1. Dwelling or sleeping units that include an office that is less than 10 percent of the area of the *dwelling unit* are permitted to be classified as *dwelling units* with accessory occupancies in accordance with Section ~~508-508.2~~.
2. Live/work units located within townhouses that comply with this section are permitted to comply with the International Residential Code provided an automatic sprinkler system is installed in accordance with Section 903.3.1.3 or Section P2904 of the International Residential Code.

Commenter's Reason: It has always been understood that live-work units located in townhouses could be constructed under the International Residential Code (IRC). In fact, the Effective Use of the International Building Code in the Preface states, The IRC can also be used for the construction of live/work units (as defined in Section 419) and small bed and breakfast-style hotels where there are five or fewer guest rooms and the hotel is owner occupied . Although this is not part of the specific code requirements, it does set forth the intent that live/work units could be constructed under the IRC. In addition, Section 101.2 of the IRC includes an exception that allows live/work units to be constructed under that that code. The exception states, "Live/work units located in townhouses and complying with the requirements of Section 419 of the International Building Code". This proposal would provide consistency between the two codes to allow townhouses to be constructed under the IRC as long as they also comply with Section 419 of the IBC.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Since it was already assumed that live/work could be constructed under the IRC, there is no cost difference.

G90-18

G91-18

IBC: Table [F] TABLE 509

Proposed Change as Submitted

Proponent: Ed Kulik, Chair, representing ICC Building Code Action Committee (BCAC@iccsafe.org)

THIS CODE CHANGE WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE

2018 International Building Code

Revise as follows

**[F] TABLE 509
INCIDENTAL USES**

ROOM OR AREA	SEPARATION AND/OR PROTECTION
Furnace room where any piece of equipment is over 400,000 Btu per hour input ^a	1 hour or provide automatic sprinkler system
Rooms with boilers where the largest piece of equipment is over 15 psi and 10 horsepower ^a	1 hour or provide automatic sprinkler system
Refrigerant machinery room ^a	1 hour or provide automatic sprinkler system
Hydrogen fuel gas rooms, not classified as Group H	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.
Incinerator rooms ^a	2 hours and provide automatic sprinkler system
Paint shops, not classified as Group H, located in occupancies other than Group F	2 hours; or 1 hour and provide automatic sprinkler system
In Group E occupancies, laboratories and vocational shops not classified as Group H	1 hour or provide automatic sprinkler system
In Group I-2 occupancies, laboratories not classified as Group H	1 hour and provide automatic sprinkler system
In ambulatory care facilities, laboratories not classified as Group H	1 hour or provide automatic sprinkler system
Laundry rooms over 100 square feet	1 hour or provide automatic sprinkler system
In Group I-2, laundry rooms over 100 square feet	1 hour
Group I-3 cells and Group I-2 patient rooms equipped with padded surfaces	1 hour
In Group I-2, physical plant maintenance shops	1 hour
In ambulatory care facilities or Group I-2 occupancies, waste and linen collection rooms with containers that have an aggregate volume of 10 cubic feet or greater	1 hour
In other than ambulatory care facilities and Group I-2 occupancies, waste and linen collection rooms over 100 square feet	1 hour or provide automatic sprinkler system
In ambulatory care facilities or Group I-2 occupancies, storage rooms greater than 100 square feet	1 hour
Stationary storage battery systems having an energy capacity greater than the threshold quantity specified in Table 1206.2 of the International Fire Code	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.
Electrical installations and transformers ^a	See Sections 110.26 through 110.34 and Sections 450.8 through 450.48 of NFPA 70 for protection and separation requirements.

For SI: 1 square foot = 0.0929 m², 1 pound per square inch (psi) = 6.9 kPa, 1 British thermal unit (Btu) per hour = 0.293 watts, 1 horsepower = 746 watts, 1 gallon = 3.785 L, 1 cubic foot = 0.0283 m³.

a. See Chapter 6 of the International Fire Code for additional construction related requirements

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>.

This is a simple footnote pointer so designers are aware of additional construction and/or installation requirements for these incidental use building systems that are located in Chapter 6 of the International Fire Code.

This proposal is part of a comprehensive update to IFC Chapter 6 by the F-CAC. F-CAC fully supports this proposal.

Cost Impact: The code change proposal will not increase or decrease the cost of construction

This proposal adds a pointer to existing requirements in the IFC. No new or additional construction requirements are being introduced into the IBC.

G91-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposal was disapproved as it was seen as an unnecessary pointer. There appears to be very little related to Table 509 found within Chapter 6 of the IFC. (Vote: 11-3)

Assembly Action:

None

G91-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ed Kullik, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Submitted.

Commenter's Reason: Section 509 is used during the design process of the building. The proposed pointer, in the form of a footnote to IBC Table 509 for specific room or area types, directs the code user to the additional applicable construction/installation requirements in Chapter 6 of the Fire Code with the Building Code for these incidental uses, which otherwise might be missed.

Reference to Chapter 6 of the Fire Code is applicable, because it focuses on building systems and services as they relate to potential safety hazards and when and how they should be installed. This chapter brings together all building system- and service-related issues for convenience and provides a more systematic view of buildings. The following building services and systems construction/installation requirements for the following are addressed: fuel-fired appliances, electrical equipment, wiring and hazards, mechanical refrigeration, elevator operation, maintenance and fire service keys, commercial kitchen hoods, commercial kitchen cooking oil storage and hyperbaric facilities.

Additionally, the FCAC submitted 17 proposals as part of a comprehensive package addressing technical and organizational changes to Chapter 6 of the Fire Code. These changes included additional construction and installation requirements for building systems and services which were approved at the Committee Action Hearing, including installation of fuel oil tanks within buildings and non-portable fuel-fired appliances, construction of refrigeration machinery rooms, and listed and labeled electrical equipment.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal adds a pointer to existing requirements in the IFC. No new or additional construction requirements are being introduced into the IBC.

G91-18

G93-18

IBC: 509.3

Proposed Change as Submitted

Proponent: David Collins, representing The American Institute of Architects (dcollins@preview-group.com); Stephen Thomas, Colorado Code Consulting, LLC, representing Colorado Chapter ICC (stthomas@coloradocode.net)

2018 International Building Code

**[F] TABLE 509
INCIDENTAL USES**

ROOM OR AREA	SEPARATION AND/OR PROTECTION
Furnace room where any piece of equipment is over 400,000 Btu perhour input	1 hour or provide automatic sprinkler system
Rooms with boilers where the largest piece of equipment is over 15psi and 10 horsepower	1 hour or provide automatic sprinkler system
Refrigerant machinery room	1 hour or provide automatic sprinkler system
Hydrogen fuel gas rooms, not classified as Group H	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E,I and R occupancies.
Incinerator rooms	2 hours and provide automatic sprinkler system
Paint shops, not classified as Group H, located in occupancies otherthan Group F	2 hours; or 1 hour and provide automatic sprinkler system
In Group E occupancies, laboratories and vocational shops notclassified as Group H	1 hour or provide automatic sprinkler system
In Group I-2 occupancies, laboratories not classified as Group H	1 hour and provide automatic sprinkler system
In ambulatory care facilities, laboratories not classified as Group H	1 hour or provide automatic sprinkler system
Laundry rooms over 100 square feet	1 hour or provide automatic sprinkler system
In Group I-2, laundry rooms over 100 square feet	1 hour
Group I-3 cells and Group I-2 patient rooms equipped with padded surfaces	1 hour
In Group I-2, physical plant maintenance shops	1 hour
In ambulatory care facilities or Group I-2 occupancies, waste and linen collection rooms with containers that have an aggregate volume of 10 cubic feet or greater	1 hour
In other than ambulatory care facilities and Group I-2 occupancies, waste and linen collection rooms over 100 square feet	1 hour or provide automatic sprinkler system
In ambulatory care facilities or Group I-2 occupancies, storage rooms greater than 100 square feet	1 hour
Stationary storage battery systems having an energy capacity greater than the threshold quantity specified in Table 1206.2 of the International Fire Code	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.
Electrical installations and transformers	See Sections 110.26 through 110.34 and Sections 450.8 through 450.48 of NFPA 70 for protection and separation requirements.

For SI: 1 square foot = 0.0929 m², 1 pound per square inch (psi) = 6.9 kPa, 1 British thermal unit (Btu) per hour = 0.293 watts, 1 horsepower = 746 watts, 1 gallon = 3.785 L, 1 cubic foot = 0.0283 m³.

509.2 Occupancy classification. Incidental uses shall not be individually classified in accordance with Section 302.1. Incidental uses shall be included in the building occupancies within which they are located.

Delete without substitution

509.3 Area limitations. ~~Incidental uses shall not occupy more than 10 percent of the building area of the story in which they are located.~~

Reason: We submitted changes to eliminate the 10% area limitation on incidental uses over the last two code cycles. Each of those proposals were disapproved by the committee and the membership. We were told by the opponents, the way to fix the problem is to require incidental uses over 10% of the story area to be classified as an occupancy. Independently we each drafted a proposed change to say that if one incidental use; or an aggregate of incidental uses on a story exceeds the 10% limit that they would be classified as a distinct occupancy. The more we tried to provide rationale for such a change, the more the construct came crashing down.

The original purpose of incidental uses that are all specifically listed in Table 509 is to address a hazard of one type or another. Each of the uses in Table 509 poses a hazard to the balance of the primary use of the building or story. The solutions to address those risks are rated separations, automatic sprinkler system or both. The hazard exists whether the use is 5% of a story, 15% of a story or 50% of a story. The protection needs to be provided regardless of the area of the incidental use(s). The 10% limit is particularly impractical and onerous if strictly enforced on the health care industry. Laboratories, laundry rooms, maintenance shops, storage rooms; waste and linen collection - going over 10% is a frequent design issue.

The solution urged on us is to say things that are an incidental use when limited to 10% of the story (and part of the primary occupancy) are to be called a different occupancy when they get larger doesn't work either way you try to wrap the code around it.

A. Distinct uses - no longer incidental uses. If we say that these uses exceeding 10% of story are something else and no longer an incidental use, then the protections required by Table 509 disappear. If we assign other occupancies then we are left to rely on Section 508 mixed occupancies to provide protections. But often the protections will be less. In a non-separated approach you may get a fully sprinklered building, but you won't get rated separations. In a separated mixed occupancy approach you might get sprinklers; you might get rated separations; and sometimes you might get both, but you aren't going to be assured of the protections required for the smaller things allowed under incidental uses.

B. Distinct uses - but still incidental uses. If we say that these uses exceeding 10% are another occupancy AND remain an incidental use in order to preserve the protections. What have we done? We've proved that the 10% limit is meaningless because you are still getting the protections of incidental uses regardless of size.

A final point about assigning other occupancy categories to these uses (when exceeding 10%) is that the application of the code will be inconsistent from jurisdiction to jurisdiction; from project to project.

Eliminating the 10% limit makes sure that each of these uses in Table 509 will be consistently protected from project to project; jurisdiction to jurisdiction.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This is intended to clarify the code language.

G93-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: After returning this item from the Table, the proponents stated they were unable to arrive at a compromise. There was a consensus that these items require protections as provided in Section 509. There was not a consensus on whether the 10% limit could be eliminated outright or if the elimination needs to be balanced by new provisions to address larger installations. When asked by the proponents, the committee was more supportive of efforts to fix the provisions over leaving them as they stand. (Vote: 11-3)

Assembly Action:

None

G93-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Stephen Thomas, Colorado Code Consulting, LLC, representing Colorado Chapter ICC (sthomas@coloradocode.net) ; David Collins representing AIA (dcollins@preview-group.com) ; Sarah Rice (srice@preview-group.com); Wayne Jewell (wayne.jewell@greenoaktwp.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

509.2 Occupancy classification. ~~Incidental uses shall not be individually~~ An incidental use area shall be classified in accordance with Section 302.1. Incidental uses shall be included in the building occupancies within which they are located the occupancy of that portion of the building in which it is located or the building shall be classified as a mixed occupancy and shall comply with Section 508.

509.3 Area limitations. ~~Incidental~~ The area of incidental uses shall not occupy more than 10 percent of the building area of the story in which they are located be limited within a building.

Commenter's Reason: There is a serious hole in the current code as it relates to incidental uses. The current code limits incidental uses to 10% of the area of the story that they are located within, similar to accessory occupancies in Section 508.2.3. The problem is that there is no direction in the code as to what to do when the incidental use exceeds 10% of the story area or it is the entire building. We have tried to delete the 10% requirement over the past few code cycles to solve this issue. However, the committee has disapproved the change each time including this cycle. Therefore, we are changing our approach to respond to the committee and the opposition testimony to address this issue. The committee and opposition all stated that if the incidental use exceeded 10% of the area, then it should be classified as a specific occupancy. However, the current Section 509.2 states that you cannot classify an incidental use as an occupancy. So, this public comment revises that section to allow the design professional to classify the use as an occupancy or keep it as an incidental use. If they classify the use as an occupancy, then they would need to comply with Section 508 and determine whether it is an accessory occupancy, nonseparated occupancy or separated occupancy. It would be left to the discretion of the design professional.

Section 509.3 has been revised to state that the area of incidental uses is no longer limited. The primary purpose of this revision is for healthcare facilities. Most of the uses listed in Table 509 are located within healthcare occupancies. In many cases, these areas exceed the 10% limitation and has created a problem. This would allow healthcare to have as many incidental uses as they want and be consistent with NFPA 101 Life Safety Code. This has been a goal of the Health Care Subcommittee over the past few code cycles.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. In some cases, the separation between the uses could be eliminated.

G93-18

G94-18

IBC: 510.2

Proposed Change as Submitted

Proponent: Lawrence Lincoln, Salt Lake City Corporation, representing Self (larry.lincoln@slcgov.com)

2018 International Building Code

510.2 Horizontal building separation allowance. A building shall be considered as separate and distinct buildings for the purpose of determining area limitations, continuity of *fire walls*, limitation of number of *stories* and type of construction where all of the following conditions are met:

1. The buildings are separated with a *horizontal assembly* having a *fire-resistance rating* of not less than 3 hours. Where vertical offsets are provided as part of a *horizontal assembly*, the vertical offset and the structure supporting the vertical offset shall have a *fire-resistance rating* of not less than 3 hours.
2. The building below, including the *horizontal assembly*, is of Type IA construction.
3. *Shaft, stairway, ramp* and escalator enclosures through the *horizontal assembly* shall have not less than a 2-hour *fire-resistance rating* with opening protectives in accordance with Section 716.

Exception: Where the enclosure walls below the *horizontal assembly* have not less than a 3-hour *fire-resistance rating* with opening protectives in accordance with Section 716, the enclosure walls extending above the *horizontal assembly* shall be permitted to have a 1-hour *fire-resistance rating*, provided:

1. The building above the *horizontal assembly* is not required to be of Type I construction;
 2. The enclosure connects fewer than four *stories*; and
 3. The enclosure opening protectives above the *horizontal assembly* have a *fire protection rating* of not less than 1 hour.
4. Where buildings above the horizontal assembly are of Type III, IV or V construction, stairways within enclosures specified in Item 3 shall be constructed of either noncombustible materials or fire retardant treated wood.
- ~~5.4-~~The building or buildings above the *horizontal assembly* shall be permitted to have multiple Group A occupancy uses, each with an *occupant load* of less 300, or Group B, M, R or S occupancies.
- ~~6. 5-~~The building below the *horizontal assembly* shall be protected throughout by an approved *automatic sprinkler system* in accordance with Section 903.3.1.1, and shall be permitted to be any occupancy allowed by this code except Group H.
- ~~7. 6-~~The maximum *building height* in feet (mm) shall not exceed the limits set forth in Section 504.3 for the building having the smaller allowable height as measured from the *grade plane*.

Reason: IBC section 1011.7 requires that Stairway construction be built of materials consistent with the types permitted for the type of construction of the building. Buildings designed in accordance with section 510.2 are inherently of two different types of construction where the horizontal assembly is the dividing line. When taking into consideration the materials that would be consistent with the type of construction of the stairway construction within a fire-rated stair enclosure, the transition from combustible materials (above the horizontal assembly) to noncombustible materials (below the horizontal assembly) makes no sense within the fire-rated stair enclosure when the type of construction above the horizontal assembly is of type III, IV or V and the type of construction below the horizontal assembly is type I-A (required by section 510.2). In other words, it makes no sense to transition from combustible materials to noncombustible materials when you are within the same environment (the fire-rated stair enclosure). Please note that this code proposal would allow fire-retardant-treated wood as a construction material within that portion of the fire-rated stair enclosure that is part of the type I-A construction. Since fire is never anticipated to originate within a fire-rated stair enclosure, this allowance seems reasonable.

Cost Impact: The code change proposal will decrease the cost of construction
The proposed code change will decrease the cost of construction as this code change would lessen a code requirement.

G94-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee saw the wording of G95-18 as a better solution to this issue. (Vote: 12-2)

Assembly Action:

None

G94-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Lawrence Lincoln, representing Self (larry.lincoln@slcgov.com) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

510.2 Horizontal building separation allowance. A building shall be considered as separate and distinct buildings for the purpose of determining area limitations, continuity of *fire walls*, limitation of number of *stories* and type of construction where all of the following conditions are met:

1. The buildings are separated with a *horizontal assembly* having a *fire-resistance rating* of not less than 3 hours. Where vertical offsets are provided as part of a *horizontal assembly*, the vertical offset and the structure supporting the vertical offset shall have a *fire-resistance rating* of not less than 3 hours.
2. The building below, including the *horizontal assembly*, is of Type IA construction.
3. *Shaft, stairway, ramp* and escalator enclosures through the *horizontal assembly* shall have not less than a 2-hour *fire-resistance rating* with opening protectives in accordance with Section 716.

Exception: Where the enclosure walls below the *horizontal assembly* have not less than a 3-hour *fire-resistance rating* with opening protectives in accordance with Section 716, the enclosure walls extending above the *horizontal assembly* shall be permitted to have a 1-hour *fire-resistance rating*, provided:

1. The building above the *horizontal assembly* is not required to be of Type I construction;
 2. The enclosure connects fewer than four *stories*; and
 3. The enclosure opening protectives above the *horizontal assembly* have a *fire protection rating* of not less than 1 hour.
4. Where buildings above the horizontal assembly are of Type III, IV or V construction, stairways within the enclosures specified in Item 3 shall be allowed to be constructed of either noncombustible materials or fire-retardant treated wood, any material allowed by the code.
 5. The building or buildings above the *horizontal assembly* shall be permitted to have multiple Group A occupancy uses, each with an *occupant load* of less 300, or Group B, M, R or S occupancies.
 6. The building below the *horizontal assembly* shall be protected throughout by an approved *automatic sprinkler system* in accordance with Section 903.3.1.1, and shall be permitted to be any occupancy allowed by this code except Group H.
 7. The maximum *building height* in feet (mm) shall not exceed the limits set forth in Section 504.3 for the building having the smaller allowable height as measured from the *grade plane*.

Commenter's Reason: IBC section 1011.7 requires that Stairway construction be built of materials consistent with the types permitted for the type of construction of the building. Buildings designed in accordance with section 510.2 are inherently of two different types of construction where the horizontal assembly is the dividing line. When taking into consideration the materials that would be consistent with the type of construction of the stairway construction located within a fire-rated stair enclosure, the transition from combustible materials (above the horizontal assembly) to noncombustible materials (below the horizontal assembly) makes no sense within the fire-rated stair enclosure when the type of construction above the horizontal assembly is of Type III, IV or V and the type of construction below the horizontal assembly is Type I-A (as required by section 510.2). In other words, it makes no sense to transition from combustible materials to noncombustible materials when you are within the same environment (the fire-rated stair enclosure). By mentioning Item 3 in this code change proposal, clarity is provided to the code user clearly indicating that combustible materials ('any material allowed by the code') are allowed to be used within the stairway enclosures required by Item 3,

when the building above the horizontal assembly is of Type III, IV or V construction. 'Pointers' from IBC section 1011.7 is unnecessary since IBC section 510.2 is a more specific requirement. Since fire is never anticipated to originate from within a fire-rated stair enclosure, regardless of the fire-rating of the stair enclosure, this code change allowance seems reasonable.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. The proposed public comment and code change will decrease the cost of construction as this code change would lessen a code requirement of the installation of noncombustible materials to that of combustible materials.

G94-18

G95-18

IBC: 510.2, 1011.7, 1023.2 (IFC[BE] 1011.7, 1023.2)

Proposed Change as Submitted

Proponent: Lee Kranz, representing City of Bellevue, WA (lkranz@bellevuewa.gov)

2018 International Building Code

Revise as follows

510.2 Horizontal building separation allowance. A building shall be considered as separate and distinct buildings for the purpose of determining area limitations, continuity of *fire walls*, limitation of number of *stories* and type of construction where all of the following conditions are met:

1. The buildings are separated with a *horizontal assembly* having a *fire-resistance rating* of not less than 3 hours. Where vertical offsets are provided as part of a *horizontal assembly*, the vertical offset and the structure supporting the vertical offset shall have a *fire-resistance rating* of not less than 3 hours.
2. The building below, including the *horizontal assembly*, is of Type IA construction.
3. *Shaft, stairway, ramp* and escalator enclosures through the *horizontal assembly* shall have not less than a 2-hour *fire-resistance rating* with opening protectives in accordance with Section 716.

Exception: Where the enclosure walls below the *horizontal assembly* have not less than a 3-hour *fire-resistance rating* with opening protectives in accordance with Section 716, the enclosure walls extending above the *horizontal assembly* shall be permitted to have a 1-hour *fire-resistance rating*, provided:

1. The building above the *horizontal assembly* is not required to be of Type I construction;
 2. The enclosure connects fewer than four *stories*; and
 3. The enclosure opening protectives above the *horizontal assembly* have a *fire protection rating* of not less than 1 hour.
4. Interior exit stairways located within the Type IA building are permitted to be of combustible materials where both of the following requirements are met:
- 4.1. The building above the Type IA building is of Type III, IV, or V construction.
 - 4.2. The stairway located in the Type IA building is enclosed by 3-hour fire-resistance rated construction with opening protectives in accordance with Section 716.
5. The building or buildings above the *horizontal assembly* shall be permitted to have multiple Group A occupancy uses, each with an *occupant load* of less 300, or Group B, M, R or S occupancies.
- 5-6. The building below the *horizontal assembly* shall be protected throughout by an approved *automatic sprinkler system* in accordance with Section 903.3.1.1, and shall be permitted to be any occupancy allowed by this code except Group H.
- 6-7. The maximum *building height* in feet (mm) shall not exceed the limits set forth in Section 504.3 for the building having the smaller allowable height as measured from the *grade plane*.

1011.7 Stairway construction. *Stairways* shall be built of materials consistent with the types permitted for the type of construction of the building, ~~except that wood handrails shall be permitted for all types of construction.~~

Exceptions:

1. Wood handrails shall be permitted in all types of construction.
2. Interior exit stairway in accordance with Section 510.2

1023.2 Construction. Enclosures for interior exit *stairways* and *ramps* shall be constructed as *fire barriers* in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. *Interior exit stairway* and *ramp* enclosures shall have a *fire-resistance rating* of not less than 2 hours where connecting four stories or more and not less than 1 hour where connecting less than four stories. The number of stories connected by the interior exit *stairways* or *ramps* shall include any *basements*, but not any *mezzanines*. *Interior exit stairways* and *ramps* shall have a *fire-resistance rating* not less than the floor assembly penetrated, but need not exceed 2 hours.

Exceptions:

1. *Interior exit stairways and ramps* in Group I-3 occupancies in accordance with the provisions of Section 408.3.8.
2. *Interior exit stairways* within an *atrium* enclosed in accordance with Section 404.6.
3. *Interior exit stairway in accordance with Section 510.2.*

Reason: In podium buildings utilizing a 3-hour fire-resistance rated horizontal assembly constructed in accordance with Section 510.2 it is very common for the building above the horizontal assembly to be of combustible construction, including the landings, stair stringers and treads. The code currently requires that a transition be made from wood to metal, or some other non-combustible materials, within the stair enclosure at the point where the stair goes from being located in a combustible building to the Type IA non-combustible building. This is not practical or warranted. Fires do not typically start within the fire-resistance rated stair enclosure. Exception #4.2 of this proposal provides additional protection by requiring that the stair shaft be of not less than a 3-hour fire resistance rating with 3-hour rated door assemblies as required by Section 716. This essentially creates a vertical offset of the 3-hour horizontal assembly which is currently allowed by Section 510.2. This section states that "Where vertical offsets are provided as part of a horizontal assembly, the vertical offset and the structure supporting the vertical offset shall have a *fire-resistance rating* of not less than 3 hours."

We have also included two 'pointer' exceptions in Chapter 10. Without the pointer exceptions someone might argue that these Chapter 10 provisions are more restrictive and override the exception in 510.2. The exemption for wood handrails currently found in the text of Section 1011.7 has been reformatted by placing it into exception #1.

Cost Impact: The code change proposal will decrease the cost of construction. Allowing stairs to be of combustible construction will be less expensive than if they were required to be of non-combustible materials. Also, the cost to design the stair will be reduced because a transition from wood to steel (or other non-combustible materials) will no longer be required.

G95-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The issue of stairway construction through podium buildings has been a issue for many jurisdictions and the cause of many alternative method reviews - and approvals. This proposal was preferable to G94-18. It provides a good clarification of the stair transition between upper and lower buildings. The presence of sprinklers throughout both buildings adds to the acceptability of this approach. (Vote: 14-0)

Assembly Action:

None

G95-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Stephen Skalko, Stephen V. Skalko, P.E. & Associates, LLC, representing Masonry Alliance for Codes and Standards (svskalko@svskalko-pe.com) ; William Hall, Alliance for Concrete Codes and Standards, representing Alliance for Concrete Codes and Standards (jhall@cement.org) requests Disapprove.

Commenter's Reason: G95-18 should be DISAPPROVED for the following reasons:

- The amount of wood material being introduced into the construction of the stair enclosure and exit stair by the new alternate provisions in Item (4) to 510.2 can increase the fire load associated with the means of egress significantly for podium style buildings covered by this section. Based on a review of the only (3) hour fire rated wood stud wall assemblies in the UL Directory, the complex wall details required to form the 3-hour enclosure require far more wood materials than typical 2X4 or 2X6 stud walls.

The 3-hour fire rated wall assemblies, U370, U382, U390 V304, showed the walls in the U-series require two separate stud walls be constructed, with a minimum 1-inch space between opposing studs, to create a cavity that is to be completely filled with a sprayed fiber cellulose material. The studs are spaced a maximum of 16-inches on center. The single V-series assembly requires the wall assembly to be constructed of 5-1/2-in X 6-in wood columns spaced at a maximum of 96-inches on center. The wood columns are connected together by horizontal 2 X 4 wood girts on each side spaced 16-inches on center.

The net effect of these assemblies will more than double the amount of wood (e.g. more studs, more top plates, etc.) presently permitted in the crucial means of egress enclosure within the Type IA construction for these podium style buildings.

- The proponent states *the proposal will decrease the cost of construction. Allowing stairs to be of combustible construction will be less expensive then if they were required to be of noncombustible materials* . That statement is not necessarily true based on a review of the listed wood stud wall assemblies required to meet the 3-hour fire resistance rating

The U-series 3-hour fire rated wall assemblies in the UL Directory (U370, U382, U390) require two separate stud walls (16-in o.c.) be constructed with a space between studs that is completely filled with a sprayed fiber cellulose material. The U-series wall assemblies are then covered with two layers of Type C gypsum board. The V-series assembly in the UL Directory (V304) is constructed of 5-1/2-in X 6-in wood columns @ 96-inches o.c. and connected together by horizontal 2 X 4 wood girts 16-inches o.c. on each side. Four (4) layers of 5/8-inch gypsum board are applied to the horizontal girts in staggered layers.

Based on other cost studies of wood frame walls versus masonry walls the costs for these complex wood stud walls could easily exceed that required for concrete or masonry walls (www.buildingstudies.org).

- The General Committee reason states *the presence of sprinklers throughout both buildings adds to the acceptability of this approach* . Nothing in this proposal requires buildings located above the 3-hour horizontal assembly to be sprinklered. It is possible to have multiple Group Assembly occupancies with separate fire area compartments in accordance with Section 707.3.10, or a Group B, M or S occupancy in the building above, without sprinkler protection being required. The proposal to allow the increased combustible construction for the stair enclosure and exit stair was approved incorrectly thinking that the buildings above and below the horizontal assembly are sprinklered.

G95-18 decreases the fire safety for the occupants and the fire service in buildings constructed using the podium provisions in Section 510.2 by allowing an increase in the amount of combustible materials based on reasons that are incorrect or not sufficiently justified.

Recommend DISAPPROVAL of G95-18

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The cost of construction will remain unchanged if the proposal is disapproved.

G95-18

G97-18

IBC: 510.4

Proposed Change as Submitted

Proponent: David Collins, representing The American Institute of Architects (dcollins@preview-group.com)

2018 International Building Code

Revise as follows

510.4 Parking beneath Group R. Where a ~~maximum one story above grade plane~~ Group S-2 parking garage, one story above grade plane, enclosed or open, or combination thereof, of Type I construction or open of Type IV construction, with a grade entrance, is ~~provided under~~ located below a building of Group R building, the Group S-2 parking garage and Group R building shall be considered separate and distinct buildings. The number of *stories* to be used in determining the minimum type of construction of the Group R building shall be measured from the floor above ~~such as the parking area garage~~. The floor assembly between the parking garage and the Group R above shall comply with the type of construction required for the parking garage and shall also provide a *fire-resistance rating* not less than the mixed occupancy separation required in Section 508.4.

The maximum building height in feet shall not exceed the limits set forth in Section 504.3 for the building having the smaller allowable height as measured from the grade plane.

Reason: The current language in this section is confusing and awkward. This section addresses the upper height limit in stories, but does not address it in feet.

Cost Impact: The code change proposal will decrease the cost of construction
By clarifying the intent of the code the cost of design, review and approval of projects should be simplified and reduce the overall cost of construction.

G97-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The committee agreed with the proponents reason statement. (Vote: 8-6)

Assembly Action:

None

G97-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jeffrey Shapiro, representing National Fire Sprinkler Association (jeff.shapiro@intlcodeconsultants.com) requests Disapprove.

Commenter's Reason: Although this change was intended as a simple cleanup, there is a major unintended technical change that eliminates the current requirement for fire sprinklers to be included in the garage level. In the 2018 code, Section 903.2.8 requires all BUILDINGS containing a Group R fire area to be sprinklered, and because horizontal separation in Section 510.4 is not currently recognized as a basis for creating separate buildings, the Group R fire area triggers Section 903.2.8 and requires the entire building, including the garage to be sprinklered. The text being added by this proposal stating, "the Group S-2 parking garage and the Group R building shall be considered separate and distinct buildings" changes how the code applies because it designates the S-2 garage as a separate building, thereby disconnecting the garage from the sprinkler requirement in Section 903.2.8. Hence, if this proposal is approved, a building built to Section 510.4 would not require sprinklers under the 2021 edition. Because this consequence was not mentioned or justified by the original proposal or at the committee hearing, the proposal needs to be DISAPPROVED.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. If the section is deleted, the code will then defer to Section 510.2 for pedestal construction.

G97-18

G108-18

IBC: 202, 602.4, 602.4.1, 602.4.1.1 (New), 604.2.4.1.2(New), 602.4.1.2.1 (New), 602.4.1.3 (New), 602.4.1.4 (New), 602.4.1.5 (New), 602.4.1.6 (New), 602.4.2, 602.4.2.1 (New), 602.4.2.2 (New), 602.4.2.2.1 (New), 602.4.2.2.2 (New), 602.4.2.2.3 (New), 602.4.2.2.4 (New), 602.4.2.3 (New), 602.4.2.4 (New), 602.4.2.5 (New), 602.4.2.6 (New), 602.4.3, 602.4.3.1 (New), 602.4.3.2 (New), 602.4.3.3 (New), 602.4.3.4 (New), 602.4.3.5 (New), 602.4.3.6 (New), 602.4.4(New), , TABLE 601, TABLE 602

Proposed Change as Submitted

Proponent: Stephen DiGiovanni, representing ICC Ad Hoc Committee on Tall Wood Buildings (TWB) (TWB@iccsafe.org)

2018 International Building Code

SECTION 202 DEFINITIONS

Revise as follows

[BS] WALL, LOAD-BEARING. Any wall meeting either of the following classifications:

1. Any metal or wood stud wall that supports more than 100 pounds per linear foot (1459 N/m) of vertical load in addition to its own weight.
2. Any *masonry* or concrete, or mass timber wall that supports more than 200 pounds per linear foot (2919 N/m) of vertical load in addition to its own weight.

Add new definition as follows

MASS TIMBER. Structural elements of Type IV construction primarily of solid, built-up, panelized or engineered wood products that meet minimum cross section dimensions of Type IV construction.

NONCOMBUSTIBLE PROTECTION (FOR MASS TIMBER).

Noncombustible material, in accordance with Section 703.5, designed to increase the fire-resistance rating and delay the combustion of mass timber.

Revise as follows

602.4 Type IV. ~~Type IV construction is that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of solid wood, laminated wood, heavy timber (HT) or structural composite lumber (SCL) without concealed spaces. The minimum dimensions for permitted materials including solid timber, glued laminated timber, structural composite lumber (SCL), and cross laminated timber and details of Type IV construction shall comply with the provisions of this section and Section 2304.11. Exterior walls complying with Section 602.4.1 or 602.4.2 shall be permitted. Interior walls and partitions not less than 1-hour fire-resistance rating or heavy timber complying with Section 2304.11.2.2 shall be permitted.~~

Type IV construction is that type of construction in which the building elements are mass timber or noncombustible materials and have fire resistance ratings in accordance with Table 601. Mass timber elements shall meet the fire resistance rating requirements of this section based on either the fire resistance rating of the noncombustible protection, the mass timber, or a combination of both and shall be determined in accordance with Section 703.2 or 703.3. The minimum dimensions and permitted materials for building elements shall comply with the provisions of this section and Section 2304.11. Mass timber elements of Types IV A, IV B and IV C construction shall be protected with noncombustible protection applied directly to the mass timber in accordance with Sections 602.4.1 through 602.4.3. The time assigned to the noncombustible protection shall be determined in accordance with Section 703.8 and comply with 722.7.

Cross-laminated timber shall be labeled as conforming to the heat performance requirements of Section 6.1.3.4 of DOC PS1 and have no delamination in any specimen, except where occurring at a localized characteristic when permitted in the product standard.

Exterior load-bearing walls and nonload-bearing walls shall be mass timber construction, or shall be of noncombustible construction.

Exception: Exterior load-bearing walls and nonload-bearing walls of Type IV-HT Construction in accordance with Section 602.4.4.

The interior building elements, including nonload-bearing walls and partitions, shall be of mass timber construction or of noncombustible construction.

Exception: Interior building elements and nonload-bearing walls and partitions of Type IV-HT Construction in accordance with Section 602.4.4.

Combustible concealed spaces are not permitted except as otherwise indicated in Sections 602.4.1 through 602.4.4. Combustible stud spaces within light frame walls of Type IV-HT construction shall not be considered concealed spaces, but shall comply with Section 718.

In buildings of Type IV-A, B, and C, construction with an occupied floor located more than 75 feet above the lowest level of fire department access, up to and including 12 stories or 180 feet above grade plane, mass timber interior exit and elevator hoistway enclosures shall be protected in accordance with Section 602.4.1.2. In buildings greater than 12 stories or 180 feet above grade plane, interior exit and elevator hoistway enclosures shall be constructed of non-combustible materials.

Add new text as follows

602.4.1 Type IV-A. Building elements in Type IV-A construction shall be protected in accordance with Sections 602.4.1.1 through 602.4.1.6. The required fire resistance rating of noncombustible elements and protected mass timber elements shall be determined in accordance with Section 703.2 or Section 703.3.

602.4.1.1 Exterior protection. The outside face of exterior walls of mass timber construction shall be protected with noncombustible protection with a minimum assigned time of 40 minutes as determined in Section 722.7.1(a). All components of the exterior wall covering, shall be of noncombustible material except water resistive barriers having a peak heat release rate of less than 150kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18MJ/kg as determined in accordance with ASTM E1354 and having a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E 84 or UL 723. The ASTM E 1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².

602.4.1.2 Interior protection. Interior faces of all mass timber elements, including the inside faces of exterior mass timber walls and mass timber roofs, shall be protected with materials complying with Section 703.5.

602.4.1.2.1 Protection time. Noncombustible protection shall contribute a time equal to or greater than times assigned in Table 722.7.1(a), but not less than 80 minutes. The use of materials and their respective protection contributions listed in Table 722.7.1(b) shall be permitted to be used for compliance with Section 722.7.1.

602.4.1.3 Floors. The floor assembly shall contain a noncombustible material not less than one inch in thickness above the mass timber. Floor finishes in accordance with Section 804 shall be permitted on top of the noncombustible material. The underside of floor assemblies shall be protected in accordance with 602.4.1.2.

602.4.1.4 Roofs. The interior surfaces of roof assemblies shall be protected in accordance with Section 602.4.1.2. Roof coverings in accordance with Chapter 15 shall be permitted on the outside surface of the roof assembly.

602.4.1.5 Concealed spaces. Concealed spaces shall not contain combustibles other than electrical, mechanical, fire protection, or plumbing materials and equipment permitted in plenums in accordance with Section 602 of the International Mechanical Code, and shall comply with all applicable provisions of Section 718. Combustible construction forming concealed spaces shall be protected in accordance with Sections 602.4.1.2.

602.4.1.6 Shafts. Shafts shall be permitted in accordance with Sections 713 and Section 718. Both the shaft side and room side of mass timber elements shall be protected in accordance with Section 602.4.1.2.

602.4.2 Type IV-B. Building elements in Type IV-B construction shall be protected in accordance with Sections 602.4.2.1 through 602.4.2.6. The required fire resistance rating of noncombustible elements or mass timber elements shall be determined in accordance with Section 703.2 or Section 703.3.

602.4.2.1 Exterior protection. The outside face of exterior walls of mass timber construction shall be protected with non-combustible protection with a minimum assigned time of 40 minutes as determined in Section 722.7.1(a). All components of the exterior wall covering shall be of noncombustible material except water resistive barriers having a peak heat release rate of less than 150kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18MJ/kg as determined in accordance with ASTM E1354, and having a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E 84 or UL 723. The ASTM E 1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².

602.4.2.2 Interior protection. Interior faces of all mass timber elements, including the inside face of exterior mass

timber walls and mass timber roofs, shall be protected, as required by this section, with materials complying with Section 703.5.

602.4.2.2.1 Protection time. Noncombustible protection shall contribute a time equal to or greater than times assigned in Table 722.7.1(a), but not less than 80 minutes. The use of materials and their respective protection contributions listed in Table 722.7.1(b) shall be permitted to be used for compliance with Section 722.7.1.

602.4.2.2.2 Protected area. All interior faces of all mass timber elements shall be protected in accordance with Section 602.4.2.2.1, including the inside face of exterior mass timber walls and mass timber roofs.

Exceptions: Unprotected portions of mass timber ceilings and walls complying with Section 602.4.2.2.4 and the following:

1. Unprotected portions of mass timber ceilings, including attached beams, shall be permitted and shall be limited to an area equal to 20% of the floor area in any dwelling unit or fire area; or
2. Unprotected portions of mass timber walls, including attached columns, shall be permitted and shall be limited to an area equal to 40% of the floor area in any dwelling unit or fire area; or
3. Unprotected portions of both walls and ceilings of mass timber, including attached columns and beams, in any dwelling unit or fire area shall be permitted in accordance with section 602.4.2.2.3.
4. Mass timber columns and beams which are not an integral portion of walls or ceilings, respectively, shall be permitted to be unprotected without restriction of either aggregate area or separation from one another.

602.4.2.2.3 Mixed unprotected areas. In each dwelling unit or fire area, where both portions of ceilings and portions of walls are unprotected, the total allowable unprotected area shall be determined in accordance with Equation 6-1.

$(U_{tc}/U_{ac}) + (U_{tw}/U_{aw}) \leq 1$ (Equation 6-1) where:

U_{tc} = Total unprotected mass timber ceiling areas

U_{ac} = Allowable unprotected mass timber ceiling area conforming to Section 602.4.2.2.2, Exception 1

U_{tw} = Total unprotected mass timber wall areas

U_{aw} = Allowable unprotected mass timber wall area conforming to Section 602.4.2.2.2, Exception 2

602.4.2.2.4 Separation distance between unprotected mass timber elements. In each dwelling unit or fire area, unprotected portions of mass timber walls and ceilings shall be not less than 15 feet from unprotected portions of other walls and ceilings, measured horizontally along the ceiling and from other unprotected portions of walls measured horizontally along the floor.

602.4.2.3 Floors. The floor assembly shall contain a noncombustible material not less than one inch in thickness above the mass timber. Floor finishes in accordance with Section 804 shall be permitted on top of the noncombustible material. The underside of floor assemblies shall be protected in accordance with Section 602.4.1.2.

602.4.2.4 Roofs. The interior surfaces of roof assemblies shall be protected in accordance with 602.4.2.2 except, in nonoccupiable spaces, they shall be treated as a concealed space with no portion left unprotected. Roof coverings in accordance with Chapter 15 shall be permitted on the outside surface of the roof assembly.

602.4.2.5 Concealed spaces. Concealed spaces shall not contain combustibles other than electrical, mechanical, fire protection, or plumbing materials and equipment permitted in plenums in accordance with Section 602 of the International Mechanical Code, and shall comply with all applicable provisions of Section 718. Combustible construction forming concealed spaces shall be protected in accordance with Section 602.4.1.2.

602.4.2.6 Shafts. Shafts shall be permitted in accordance with Section 713 and Section 718. Both the shaft side and room side of mass timber elements shall be protected in accordance with Section 602.4.1.2.

602.4.3 Type IV-C. Building elements in Type IV-C construction shall be protected in accordance with Sections 602.4.3.1 through 602.4.3.6. The required fire resistance rating of building elements shall be determined in accordance with Section 703.2 or Section 703.3.

602.4.3.1 Exterior protection. The exterior side of walls of combustible construction shall be protected with non-

combustible protection with a minimum assigned time of 40 minutes as determined in Section 722.7.1(a). All components of the exterior wall covering, shall be of noncombustible material except water resistive barriers having a peak heat release rate of less than 150kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18MJ/kg as determined in accordance with ASTM E1354 and having a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E 84 or UL 723. The ASTM E 1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².

602.4.3.2 Interior protection. Mass timber elements are permitted to be unprotected.

602.4.3.3 Floors. Floor finishes in accordance with Section 804 shall be permitted on top of the floor construction.

602.4.3.4 Roofs. Roof coverings in accordance with Chapter 15 shall be permitted on the outside surface of the roof assembly.

602.4.3.5 Concealed spaces. Concealed spaces shall not contain combustibles other than electrical, mechanical, fire protection, or plumbing materials and equipment permitted in plenums in accordance with Section 602 of the International Mechanical Code, and shall comply with all applicable provisions of Section 718. Combustible construction forming concealed spaces shall be protected with noncombustible protection with a minimum assigned time of 40 minutes as determined in Section 722.7.1(a).

602.4.3.6 Shafts. Shafts shall be permitted in accordance with Section 713 and Section 718. Shafts and elevator hoistway and interior exit stairway enclosures shall be protected with noncombustible protection with a minimum assigned time of 40 minutes as determined in Section 722.7.1(a), on both the inside of the shaft and the outside of the shaft.

602.4.4 Type IV-HT. Type IV construction (Heavy Timber, HT) is that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of solid wood, laminated heavy timber or structural composite lumber (SCL), without concealed spaces. The minimum dimensions for permitted materials including solid timber, glued-laminated timber, structural composite lumber (SCL) and cross laminated timber (CLT) and details of Type IV construction shall comply with the provisions of this section and Section 2304.11. Exterior walls complying with Section 602.4.4.1 or 602.4.4.2 shall be permitted. Interior walls and partitions not less than one hour fire resistance rating or heavy timber conforming with Section 2304.11.2.2 shall be permitted.

Revise as follows

~~602.4.1~~**602.4.4.1 Fire-retardant-treated wood in exterior walls.** *Fire-retardant-treated wood* framing and sheathing complying with Section 2303.2 shall be permitted within exterior wall assemblies not less than 6 inches (152 mm) in thickness with a 2-hour rating or less.

~~602.4.2~~**602.4.4.2 Cross-laminated timber in exterior walls.** *Cross-laminated timber* complying with Section 2303.1.4 shall be permitted within exterior wall assemblies not less than 6 inches (152 mm) in thickness with a 2-hour rating or less, provided the exterior surface of the cross-laminated timber is protected by one the following:

1. *Fire-retardant-treated wood* sheathing complying with Section 2303.2 and not less than ¹⁵/₃₂ inch (12 mm) thick;
2. *Gypsum board* not less than ¹/₂ inch (12.7 mm) thick; or
3. A noncombustible material.

~~602.4.3~~**602.4.4.3 Exterior structural members.** Where a horizontal separation of 20 feet (6096 mm) or more is provided, wood columns and arches conforming to heavy timber sizes complying with Section 2304.11 shall be permitted to be used externally.

**TABLE 601
FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)**

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Primary structural frame ^f (see Section 202)	3 ^{a, b}	2 ^{a, b}	1 ^b	0	1 ^b	0	<u>3^a</u>	<u>2^a</u>	<u>2^a</u>	HT	1 ^b	0
Bearing walls Exterior ^{e, f} Interior	3	2	1	0	2	2	<u>3</u>	<u>2</u>	<u>2</u>	2	1	0
	3 ^a	2 ^a	1	0	1	0	<u>3</u>	<u>2</u>	<u>2</u>	1/HT	1	0
Nonbearing walls and partitions Exterior	See Table 602											
Nonbearing walls and partitions Interior ^d	0	0	0	0	0	0	<u>0</u>	<u>0</u>	<u>0</u>	See Section 2304.11.2	0	0
Floor construction and associated secondary members (see Section 202)	2	2	1	0	1	0	<u>2</u>	<u>2</u>	<u>2</u>	HT	1	0
Roof construction and associated secondary members (see Section 202)	1 ^{1/2} ^b	1 ^{b, c}	1 ^{b, c}	0 ^c	1 ^{b, c}	0	<u>1^{1/2}</u>	<u>1</u>	<u>1</u>	HT	1 ^{b, c}	0

For SI: 1 foot = 304.8 mm.

- a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.
- b. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members in roof construction shall not be required, including protection of primary structural frame members, roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.
- c. In all occupancies, heavy timber complying with Section 2304.11 shall be allowed where a 1-hour or less fire-resistance rating is required.
- d. Not less than the fire-resistance rating required by other sections of this code.
- e. Not less than the fire-resistance rating based on fire separation distance (see Table 602).
- f. Not less than the fire-resistance rating as referenced in Section 704.10.

**TABLE 602
FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION
DISTANCE^{a, d, g}**

FIRE SEPARATION DISTANCE =X (feet)	TYPE OF CONSTRUCTION	OCCUPANCY GROUP H^e	OCCUPANCYGROUP F-1, M, S-1^f	OCCUPANCYGROUP A, B, E, F-2, I, Rⁱ, S-2, U^h
X < 5 ^b	All	3	2	1
5 ≤ X < 10	IA, IVA	3	2	11
	Others	2	1	
10 ≤ X < 30	IA, IB, IVA, IVB	2	1	1 ^c
	IIB, VB	1	0	0
	Others	1	1	1 ^c
X ≥ 30	All	0	0	0

For SI: 1 foot = 304.8 mm.

- a. Load-bearing exterior walls shall also comply with the fire-resistance rating requirements of Table 601.
- b. See Section 706.1.1 for party walls.
- c. Open parking garages complying with Section 406 shall not be required to have a fire-resistance rating.
- d. The fire-resistance rating of an exterior wall is determined based upon the fire separation distance of the exterior wall and the story in which the wall is located.
- e. For special requirements for Group H occupancies, see Section 415.6.
- f. For special requirements for Group S aircraft hangars, see Section 412.3.1.
- g. Where Table 705.8 permits nonbearing exterior walls with unlimited area of unprotected openings, the required fire-resistance rating for the exterior walls is 0 hours.
- h. For a building containing only a Group U occupancy private garage or carport, the exterior wall shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet (1523 mm) or greater.
- i. For a Group R-3 building of Type II-B or Type V-B construction, the exterior wall shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet (1523 mm) or greater.

Reason: The Ad Hoc Committee on Tall Wood Buildings (TWB) was created by the ICC Board to explore the science of tall wood buildings and take action on developing code changes for tall wood buildings. The TWB has created several code change proposals with respect to the concept of tall buildings of mass timber and the background information is at the end of this Statement. Within the statement are important links to information, including documents and videos, used in the deliberations which resulted in these proposals.

The TWB and its various WGs held meetings, studied issues and sought input from various expert sources around the world. The TWB has posted those documents and input on its website for interested parties to follow its progress and to allow those parties to, in turn, provide input to the TWB.

At its first meeting, the TWB discussed a number of performance objectives to be met with the proposed criteria for tall wood buildings:

1. No collapse under reasonable scenarios of complete burn-out of fuel without automatic sprinkler protection being considered.
2. No unusually high radiation exposure from the subject building to adjoining properties to present a risk of ignition under reasonably severe fire scenarios.
3. No unusual response from typical radiation exposure from adjacent properties to present a risk of ignition of the subject building under reasonably severe fire scenarios.
4. No unusual fire department access issues.
5. Egress systems designed to protect building occupants during the design escape time, plus a factor of safety.
6. Highly reliable fire suppression systems to reduce the risk of failure during reasonably expected fire scenarios. The degree of reliability should be proportional to evacuation time (height) and the risk of collapse.

The comprehensive package of proposals from the TWB meet these performance objectives.

Definitions

Included in the proposal for Section 602.4 are three new/revised definitions; Wall, Load-Bearing; Mass Timber; and Noncombustible protection (for mass timber). They are important to understanding the subsequent proposed change to Section 602.4.

Load-bearing wall: The modification to the term “load-bearing wall” has been updated to include “mass timber” as a category equivalent to that of masonry or concrete. Based on the research done by the wood trade associations, mass timber walls (e.g. sawn, glued-laminated, cross-laminated timbers) have the ability to support the minimum 200 pounds per linear foot vertical load requirement.

Mass Timber: The term “mass timber” is being proposed to represent both the legacy heavy timber (a.k.a. Type IV construction) and the three (3) new construction types that are proposed for Chapter 6 of the IBC. The purpose of creating this term and definition was to establish a single term which represented the various sawn and engineered timber products that are referenced in IBC Chapter 23 (Wood) and in PRG-320 “Standard for Performance-rated Cross-laminated Timber.”

“Noncombustible Protection (For Mass Timber): The definition of “Noncombustible Protection (For Mass Timber)” is created to address the passive fire protection of mass timber. Mass timber is permitted to have its own fire-resistance rating (e.g., Mass Timber only) or have a fire resistance rating based on the fire resistance through a combination of the mass timber fire-resistance plus protection by non-combustible materials as defined in Section 703.5 (e.g., additional materials that delay the combustion of mass timber, such as gypsum board). While it is not common to list a code section number within a definition it was felt necessary in this case to ensure that the user was able to understand the intent. The protection by a non-combustible material will act to delay the combustion of the Mass Timber.

Types of Construction

The Committee recognized that tall, mass timber buildings around the world generally fell into three categories: one in which the mass timber was fully protected by noncombustible protection, a second type in which the protection was permitted to be omitted to expose the wood in certain limited amounts of walls or ceilings, and a third type in which the mass timber for the structure was permitted to be unprotected.

The TWB also determined that fire testing was necessary to validate these concepts. At its first meeting, members discussed the nature and intention of fire testing so as to ensure meaningful results for the TWB and, more specifically, for the fire service. Subsequently a test plan was developed. The fire tests consisted of one-bedroom apartments on two levels, with both apartments having a corridor leading to a stairway. The purpose of the tests was to address the contribution of mass timber to a fire, the performance of connections, the performance of joints, and to evaluate conditions for responding fire personnel. The Fire WG then refined the test plan, which was implemented with a series of five, full-scale, multiple-story building tests at the Alcohol, Tobacco and Firearms (ATF) laboratories in Beltsville, MD. The results of those tests, as well as testing conducted by others, helped form the basis upon which the Codes WG developed its code change proposals. This code change proposal is one of those developed by the Codes WG and approved by the TWB.

To review a summary of the fire tests, please visit:

<http://bit.ly/ATF-firetestreport>

To watch summary videos of the fire tests, which are accelerated to run in 3-1/2 minutes each, please visit:

<http://bit.ly/ATF-firetestvideos>.

Both of these links were confirmed active on 12/27/17.

The completely protected type of construction, as noted above, is identified as Type IV-A. The protection is defined by a new section, 722.7, proposed in a separate code change. Testing has shown that mass timber construction protected with noncombustible protection, primarily multiple layers of 5/8-inch Type X gypsum board, can survive a complete burnout of a residential fuel load without engaging the mass timber in the fire. (See video or report above.) In considering this type of construction and its potential height and/or allowable area, the TWB wanted to make sure that code users realize that the protection specified in the text applies to all building elements. Thus, the text clearly requires protection for the floor surface, all wall and ceiling surfaces, the inside roof surfaces, the underside of floor surfaces, and shafts. In addition, Type IV-A construction is proposed to have the same fire resistance rating requirements as the existing Type I-A construction, which sets forth requirements for 2-hour and 3-hour structural elements. The specified fire resistance rating for Type IV-A construction is conservative in that the fire resistance rating of the structural elements was selected to be able to passively sustain the fuel loads associated with the various occupancies without the benefit of automatic sprinkler protection, and without involving the contribution of the structural members, similar to the strategy employed in the IBC for Type I construction.

Type IV-B allows some exposed wood surfaces of the ceiling, the walls or columns and beams. The amount of exposed surface permitted to be installed, as well as the required separation between unprotected portions, is clearly specified to limit the contribution of the structure in an interior fire. For example, two different walls may share the unprotected area but the two walls must be separated by a distance of 15 feet. Type IV-B has been subjected to the same fire tests under the same conditions as Type IV-A and the results demonstrate that a predictable char layer develops on mass timber in the same fashion as traditional sawn lumber, provided that substantial delamination is avoided. (See video or report above.) It should be noted that, while portions of the mass timber may be unprotected, concealed spaces, shafts and other specified areas are required to be fully protected by noncombustible protection. Type IV-B is provided with the same base fire resistance requirements as the existing Type I-B construction, which sets forth requirements for 2-hour structural elements. Please note that the allowance per IBC Section 403.2.1.1 to reduce I-B construction to 1-hour structural elements is not proposed for Type IV-B construction. Essentially, where a building is permitted to be constructed of I-B construction and has 1-hour protection, that same building will still require 2-hour structural elements for Type IV-B construction.

Type IV-C construction permits fully exposed mass timber. Important caveats are that concealed spaces, shafts, elevator hoistways, and interior exit stairway enclosures are not permitted to be exposed, but instead are required to have noncombustible protection. The IV-C construction is differentiated from traditional Heavy Timber construction in that Type IV-C construction is required to be 2-hour fire rated. While the added fire rating is required, the committee does not propose any additional height, in terms of feet, for Type IV-C buildings; in other words, the height in feet for Type IV-C and Type IV-HT are identical. However, due to the added fire resistance ratings, the committee has proposed added floors for some occupancy groups of Type IV-C construction.

Tables 601 and 602: Included in the proposal are modification of Tables 601 and 602. This is necessary to set the performance requirement for these new types of construction based upon mass timber. It should be noted that these Fire Resistance Ratings are set to have the requirements similar to those of Type I construction. In other words, IV-A has the same FRR as I-A; IV-B has the same FRR as I-B. Because there is no Type I corollary to IV-C, it was set the same as IV-B. The IV-C has to achieve all its fire resistance by the performance of the mass timber itself because no noncombustible protection is required. This is reflected in greatly reduced permitted height, in both feet and stories, in other TWB proposals to Table 504.3, 504.4 and 506.2.

Background information: The ICC Board approved the establishment of an ad hoc committee for tall wood buildings in December of 2015. The purpose of the ad hoc committee is to explore the science of tall wood buildings and to investigate the feasibility and take action on developing code changes for tall wood buildings. The committee is comprised of a balance of stakeholders with additional opportunities for interested parties to participate in the four Work Groups established by the ad hoc committee, namely: Code; Fire; Standards/Definitions; and Structural. For more information, be sure to visit the ICC website <https://www.iccsafe.org/codes-tech-support/cs/icc-ad-hoc-committee-on-tall-wood-buildings/> (link active and up to date as of 12/27/17). As seen in the "Meeting Minutes and Documents" and "Resource Documents" sections of the committee web page, the ad hoc committee reviewed a substantial amount of information in order to provide technical justification for code proposals.

The ad hoc committee developed proposals for the followings code sections. The committee believes this package of code changes will result in regulations that adequately address the fire and life safety issues of tall mass timber buildings.

IBC Code Section	Description
403.3.2	Water supply requirements for fire pumps in high rise buildings of Type IVA and IVB construction.
504.3	Allowable building height (feet) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT construction.
504.4	Allowable building height (stories) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
506.2	Allowable building area for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
508.4.4.1 509.4.1.1 (new)	Requirements for mass timber building elements serving as fire barriers or horizontal assemblies in buildings of Type IVB or IVC construction.
602.4	Type of Construction requirements for new proposed types of construction: Types IVA, IVB and IVC. No changes to Type IV HT construction. Includes definitions for new terms: Mass timber and Noncombustible protection (mass timber). THIS IS THE KEY CODE CHANGE PROPOSAL WHICH OUTLINES THE CONSTRUCTION REQUIREMENTS FOR THE PROPOSED NEW TYPE OF MASS TIMBER BUILDINGS. THE PROPOSAL ALSO ADDRESSES CONCEALED SPACES, ADHESIVE PERFORMANCE AND EXTERIOR WALL PROTECTION.
703.8 (new)	The performance method to determine the increase to the fire resistance rating provided by noncombustible protection applied to the mass timber building element.
703.9 (new)	Requirements for sealants and adhesives to be placed at abutting edges and intersections of mass timber building elements. The reason statement references a Group B proposal to Chapter 17 for special inspection requirements of sealants and adhesives.
718.2.1	Requirements on the use of mass timber building elements used for Fireblocking.
722.7 (new)	Requirements for the fire resistance rating of mass timber elements, including minimum required protection and gypsum board attachment requirements.
3102	Requirements for membrane structures using Type IV HT construction.
3314.7 (new)	New special precautions during construction of buildings of Types IVA, IVB and IVC construction: Standpipes; Water supply for fire department connections; Noncombustible protection required for mass timber elements as construction height increases.
Appendix	Requirements for walls, floors and roofs of Type IV HT construction in buildings located in Fire Districts.
IFC Code Section	Description
701.6	Requirements which stipulate the owner's responsibility to maintain inventory of all required fire resistance rated construction in buildings of Types IVA and IVB construction. This includes an annual inspection and proper repair where necessary.
Proposed changes to be submitted in 2019 Group B	
IBC Chapter 17	Required special inspections of mass timber construction <ul style="list-style-type: none"> • Structural • Sealants and adhesives (see IBC 703.8)
IBC Chapter 23	An update to referenced standard APA PRG 320 Standard for Performance –rated Cross-laminated Timber which is currently undergoing revision to ensure the adequacy of the adhesives under fire conditions.

In addition, fire tests designed to simulate the three new construction types (Types IVA, IVB and IVC) in the ad hoc committee proposals were conducted at the Alcohol Tobacco and Firearms test lab facility. The TWB was involved in the design of the tests, and many members witnessed the test in person or online. The results of the series of 5 fire tests provide additional support for these proposals, and validate the fire performance for each of the types of construction proposed by the committee. The fire tests consisted of one-bedroom apartments on two levels, with both apartments having a corridor leading to a stair. The purpose of the tests was to address the contribution of mass timber to a fire, the performance of connections, the performance of through-penetration fire stops, and to evaluate conditions for responding fire personnel.

To review a summary of the fire tests, please visit:

<http://bit.ly/ATF-firetestreport>

To watch summary videos of the fire tests, which are accelerated to run in 3 ½ minutes, please visit:

<http://bit.ly/ATF-firetestvideos>

Both of these links were confirmed active on 12/27/17.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This section provides information that was not previously set forth in the code, and does not change the requirements of current code, thus there is no cost impact when compared with present requirements.

Analysis: The standards referenced in the changes in this proposal, DOC PS1, ASTM E1354, ASTM E84 and UL 723, are already referenced in the International Codes.

G108-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 602.4 Type IV.

Type IV construction is that type of construction in which the building elements are mass timber or noncombustible materials and have fire resistance ratings in accordance with Table 601. Mass timber elements shall meet the fire resistance rating requirements of this section based on either the fire resistance rating of the noncombustible protection, the mass timber, or a combination of both and shall be determined in accordance with Section 703.2 or 703.3. The minimum dimensions and permitted materials for building elements shall comply with the provisions of this section and Section 2304.11. Mass timber elements of Types IV A, IV B and IV C construction shall be protected with noncombustible protection applied directly to the mass timber in accordance with Sections 602.4.1 through 602.4.3. The time assigned to the noncombustible protection shall be determined in accordance with Section 703.8 and comply with 722.7.

Cross-laminated timber shall be labeled as conforming to PRG 320 - 18 as referenced in Section 2303.1.4, ~~the heat performance requirements of Section 6.1.3.4 of DOC PS1 and have no delamination in any specimen, except where occurring at a localized characteristic when permitted in the product standard.~~

Exterior load-bearing walls and nonload-bearing walls shall be mass timber construction, or shall be of noncombustible construction.

Exception: Exterior load-bearing walls and nonload-bearing walls of Type IV-HT Construction in accordance with

602.4.1.1 Exterior protection.

The outside face of exterior walls of mass timber construction shall be protected with noncombustible protection with a minimum assigned time of 40 minutes as determined in Section 722.7.1(~~a~~). All components of the exterior wall covering, shall be of noncombustible material except water resistive barriers having a peak heat release rate of less than 150kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18MJ/kg as determined in accordance with ASTM E1354 and having a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E 84 or UL 723. The ASTM E 1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².

602.4.1.2.1 Protection time.

Noncombustible protection shall contribute a time equal to or greater than times assigned in Table 722.7.1(~~1a~~), but not less than 80 minutes. The use of materials and their respective protection contributions listed in Table 722.7.1(~~2b~~) shall be permitted to be used for compliance with Section 722.7.1.

602.4.2.1 Exterior protection.

The outside face of exterior walls of mass timber construction shall be protected with non-combustible protection with a minimum assigned time of 40 minutes as determined in Section 722.7.1(~~a~~). All components of the exterior wall covering shall be of noncombustible material except water resistive barriers having a peak heat release rate of less than 150kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18MJ/kg as determined in accordance with ASTM E1354, and having a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E 84 or UL 723. The ASTM E 1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².

602.4.2.2.1 Protection time.

Noncombustible protection shall contribute a time equal to or greater than times assigned in Table 722.7.1(~~1a~~), but not less than 80 minutes. The use of materials and their respective protection contributions listed in Table 722.7.1(~~2b~~) shall be permitted to be used for compliance with Section 722.7.1.

602.4.3.1 Exterior protection.

The exterior side of walls of combustible construction shall be protected with non-combustible protection with a minimum assigned time of 40 minutes as determined in Section 722.7.1(~~a~~). All components of the exterior wall covering, shall be of noncombustible material except water resistive barriers having a peak heat release rate of less than 150kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18MJ/kg as determined in accordance

with ASTM E1354 and having a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E 84 or UL 723. The ASTM E 1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².

602.4.3.5 Concealed spaces.

Concealed spaces shall not contain combustibles other than electrical, mechanical, fire protection, or plumbing materials and equipment permitted in plenums in accordance with Section 602 of the International Mechanical Code, and shall comply with all applicable provisions of Section 718. Combustible construction forming concealed spaces shall be protected with noncombustible protection with a minimum assigned time of 40 minutes as determined in Section 722.7.1(a).

602.4.3.6 Shafts.

Shafts shall be permitted in accordance with Section 713 and Section 718. Shafts and elevator hoistway and interior exit stairway enclosures shall be protected with noncombustible protection with a minimum assigned time of 40 minutes as determined in Section 722.7.1(a), on both the inside of the shaft and the outside of the shaft.

(Portions of proposal not shown are not modified.)

Committee Reason: Some portions of the modification were editorial and other portions were needed as the referenced standard needed to be incorporated into the code change. The definitions clarify that there are different types of mass timber construction. It is a rational way of addressing protected vs. unprotected construction. This allows the code to keep up with innovations in construction practice that are actually occurring in the field. This is an opportunity for faster construction with less foundation. All testing was done that should have been done, and more than has ever been done for other construction types. (Vote: 13-1)

Assembly Action:

None

G108-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ali Fattah, City of San Diego, representing Selfrequests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

602.4.2.2.2 Protected area. All interior faces of all mass timber elements shall be protected in accordance with Section 602.4.2.2.1, including the inside face of exterior mass timber walls and mass timber roofs.

Exceptions: ~~Unprotected portions of mass timber ceilings and walls complying with Section 602.4.2.2.4 and the following:~~

- ~~1. Unprotected portions of mass timber ceilings, including attached beams, shall be permitted and shall be limited to an area equal to 20% of the floor area in any dwelling unit or fire area; or~~
- ~~2. Unprotected portions of mass timber walls, including attached columns, shall be permitted and shall be limited to an area equal to 40% of the floor area in any dwelling unit or fire area; or~~
- ~~3. Unprotected portions of both walls and ceilings of mass timber, including attached columns and beams, in any dwelling unit or fire area shall be permitted in accordance with section 602.4.2.2.3.~~
- ~~4. Mass timber columns and beams which are not an integral portion of walls or ceilings, respectively, shall be permitted to be unprotected without restriction of either aggregate area or separation from one another.~~

602.4.2.2.3 Mixed unprotected areas. ~~In each dwelling unit or fire area, where both portions of ceilings and portions of walls are unprotected, the total allowable unprotected area shall be determined in accordance with Equation 6-1. $(U_{tc}/U_{ac}) + (U_{tw}/U_{aw}) \leq 1$ (Equation 6-1) where:~~

~~U_{tc} = Total unprotected mass timber ceiling areas~~

~~U_{ac} = Allowable unprotected mass timber ceiling area conforming to Section 602.4.2.2.2, Exception 1~~

~~U_{tw} = Total unprotected mass timber wall areas~~

~~U_{aw} = Allowable unprotected mass timber wall area conforming to Section 602.4.2.2.2, Exception 2~~

Commenter's Reason: This public comment is submitted to address practical enforcement difficulties that will arise when permitting partially protected CLT and mass timber elements based on a determination of the floor area of a unit or a percentage of the fire area. This will very difficult to establish in the field and it will be difficult over the life of the building to keep track of these modifications. In fact alterations where drywall is removed may also be exempt from a building permit. by the IBC in chapter 1.

Three types of construction have been developed by the Tall Wood Ad-hoc Committee (unprotected, protected and better protected) that did an excellent job in explaining the code changes allowing tall wood buildings to anyone interested in participating. While there was limited opposition raised at the Committee Action Hearings by representatives from competing materials industries, and some regulatory members opposed to certain provisions had taken a wait and see approach and wanted to watch the debate. I happened to be on the fence receptive to both views. On the one hand if an assembly is protected why should there be a concern for what is in the assembly. On the other hand if the protection is breached the CLT can contribute to the fire load in that after the building contents have fully burned there is the possibility that the wood could continue to burn the fire testing notwithstanding. But I am in support of the concept and believe enough justification has been provided allow adoption into the code even if there is not 100% consensus.

A flaw in the sections proposed to be deleted in this public comment is that Section 711.2 requires that horizontal assemblies be continuous and that the supporting construction shall be protected to afford the required fire resistance rating of the horizontal assembly supported. The sections allow omission of the required protective covering for what may be good reasons with technical justification but in violation of the code concept that the load path should be maintained and that the full assembly needs to be protected to its supports.

Additionally there seems to be no amount of tolerance because the percentage of the unit area has to be converted to feet and square feet, so the consequence of exposing 5 more square feet for example can not be quantified by the Building Official. Also what happens when dwelling units are combined in whole or in part does the area of the new unit establish the base line? The fire area will be more than 20% or the 40% so does 1 tenant space get all the exposed wood ceiling and the adjacent no. Who will keep track of all the drywall removal.

We have had poor experiences with partially protected steel buildings where the protection was required for occupancy separations and not the type of construction and the proposal will be worst since it has the potential to bridge tenant spaces. I think it adds unnecessary complexity that can be addressed on a case by case basis through an alternate methods application. Additionally a ceiling will required to establish a sound transmission class and an IIC rating and by allowing the omission the two sections will make the task of determining compliance even more complex.

It is better to have a protected type of construction and an unprotected type of construction just like all the other building materials with the sub A and B designators for most type of construction. We request that the membership of ICC support the efforts of the Tall Wood Ad-hoc committee but not support the regulations proposed to be deleted.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The net effect of the public comment and code change proposal will minimally increase the cost of construction. However the proposal will streamline the permit approval and inspection process because it eliminates the effort and thus the costs to the jurisdiction and the property owner necessary to keep track of the quantity of exposed walls and ceilings within a fire area that can span multiple tenants and floor to floor. Since this is a new requirement that will not be implemented until 2022 it is difficult to quantify the cost impact since valuations are not available for the new types of construction. ICC's valuation for Type IV construction housing a = Group R-2 is \$139.91 and assume \$3/sqft for sprinklers therefore assume an approximate valuation of \$145 per sq ft. Installed drywall is approximately \$2.5 per sq ft so increasing drywall by 40% increases valuation by 1.72%.

It is worth noting that by omitting gypsum board from the ceilings and walls required to comply with sound transmission requirements in IBC Chapter 12 will incur additional costs for field testing.

This is a new technology and the code requires either protected or unprotected construction the deleted sections allow a hybrid. There is limited cost data at this time.

Public Comment 2:

Proponent: Jonathan Humble, representing American Iron and Steel Institute (jhumble@steel.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

**TABLE 601
FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)**

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Primary structural frame ^f (see Section 202)	3 ^{a, b}	2 ^{a, b}	1 ^b	0	1 ^b	0	3 ^a	2 ^a	2 ^a	HT	1 ^b	0
Bearing walls Exterior ^{e, f} Interior	3	2	1	0	2	2	3	2	2	2	1	0
	3 ^a	2 ^a	1	0	1	0	3	2	2	1/HT	1	0
Nonbearing walls and partitions Exterior	See Table 602											
Nonbearing walls and partitions Interior ^d	0	0	0	0	0	0	0	0	0	See Section 2304.11.2	0	0
Floor construction and associated secondary members (see Section 202)	2	2	1	0	1	0	2	2	2	HT	1	0
Roof construction and associated secondary members (see Section 202)	1 ^{1/2} ^b	1 ^{b, c}	1 ^{b, c}	0 ^c	1 ^{b, c}	0	1 ^{1/2}	1	1	HT	1 ^{b, c}	0

For SI: 1 foot = 304.8 mm.

- a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.
- b. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members in roof construction shall not be required, including protection of primary structural frame members, roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.
- c. In all occupancies, heavy timber complying with Section 2304.11 shall be allowed where a 1-hour or less fire-resistance rating is required.
- d. Not less than the fire-resistance rating required by other sections of this code.
- e. Not less than the fire-resistance rating based on fire separation distance (see Table 602).
- f. Not less than the fire-resistance rating as referenced in Section 704.10.

**TABLE 602
FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION
DISTANCE^{a, d, g}**

FIRE SEPARATION DISTANCE =X (feet)	TYPE OF CONSTRUCTION	OCCUPANCY GROUP H^e	OCCUPANCY GROUP F-1, M, S-1^f	OCCUPANCY GROUP A, B, E, F-2, I, Rⁱ, S-2, U^h
X < 5 ^b	All	3	2	1
5 ≤ X < 10	IA, IVA Others	32	2 1	11
10 ≤ X < 30	IA, IB, IVA, IVB IIB, VB Others	21 1	1 0 1	1 ^c 0 1 ^c
X ≥ 30	All	0	0	0

For SI: 1 foot = 304.8 mm.

- a. Load-bearing exterior walls shall also comply with the fire-resistance rating requirements of Table 601.
- b. See Section 706.1.1 for party walls.
- c. Open parking garages complying with Section 406 shall not be required to have a fire-resistance rating.
- d. The fire-resistance rating of an exterior wall is determined based upon the fire separation distance of the exterior wall and the story in which the wall is located.
- e. For special requirements for Group H occupancies, see Section 415.6.
- f. For special requirements for Group S aircraft hangars, see Section 412.3.1.
- g. Where Table 705.8 permits nonbearing exterior walls with unlimited area of unprotected openings, the required fire-resistance rating for the exterior walls is 0 hours.
- h. For a building containing only a Group U occupancy private garage or carport, the exterior wall shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet (1523 mm) or greater.
- i. For a Group R-3 building of Type II-B or Type V-B construction, the exterior wall shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet (1523 mm) or greater.

602.4 Type IV. Timber (HT) or structural composite lumber (SCL) without concealed spaces. The minimum dimensions for permitted materials including solid timber, glued-laminated timber, structural composite lumber (SCL), and cross-laminated timber and details of Type IV construction is that type of construction in which the building elements are mass timber or noncombustible materials and have fire resistance ratings in accordance with Table 601. Mass timber elements shall meet the fire resistance rating requirements of this section based on either the fire resistance rating of the noncombustible protection, the mass timber, or a combination of both and shall be determined in accordance with Section 703.2 or 703.3. The minimum dimensions and permitted materials for building elements shall comply with the provisions of this section and Section 2304.11. Mass timber elements of Types IV A, ~~IV B~~ and IV C construction shall be protected with noncombustible protection applied directly to the mass timber in accordance with Sections 602.4.1 through 602.4.3. The time assigned to the noncombustible protection shall be determined in accordance with Section 703.8 and comply with 722.7.

Cross-laminated timber shall be labeled as conforming to PRG 320 - 18 as referenced in Section 2303.1.4.

Exterior load-bearing walls and nonload-bearing walls shall be mass timber construction, or shall be of noncombustible construction.

Exception: Exterior load-bearing walls and nonload-bearing walls of Type IV-HT Construction in accordance with Section 602.4.4.

The interior building elements, including nonload-bearing walls and partitions, shall be of mass timber construction or of noncombustible construction.

Exception: Interior building elements and nonload-bearing walls and partitions of Type IV-HT Construction in accordance with Section 602.4.4..

Combustible concealed spaces are not permitted except as otherwise indicated in Sections 602.4.1 through 602.4.4. Combustible stud spaces within light frame walls of Type IV-HT construction shall not be considered concealed spaces, but shall comply with Section 718.

In buildings of Type IV-A, B, and C, construction with an occupied floor located more than 75 feet above the lowest level of fire department access, up to and including 12 stories or 180 feet above grade plane, mass timber interior exit and elevator hoistway enclosures shall be protected in accordance with Section 602.4.1.2. In buildings greater than 12 stories or 180 feet above grade plane, interior exit and elevator hoistway enclosures shall be constructed of non-combustible materials.

~~602.4.2 Type IV-B. Building elements in Type IV-B construction shall be protected in accordance with Sections 602.4.2.1 through 602.4.2.6. The required fire resistance rating of noncombustible elements or mass timber elements shall be determined in accordance with Section 703.2 or Section 703.3.~~

~~602.4.2.1 Exterior protection. The outside face of exterior walls of mass timber construction shall be protected with non-combustible protection with a minimum assigned time of 40 minutes as determined in Section 722.7.1. All components of the exterior wall covering shall be of noncombustible material except water resistive barriers having a peak heat release rate of less than 150 kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354, and having a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E 84 or UL 723. The ASTM E 1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².~~

~~602.4.2.2 Interior protection. Interior faces of all mass timber elements, including the inside face of exterior mass timber walls and mass timber roofs, shall be protected, as required by this section, with materials complying with Section 703.5.~~

~~602.4.2.2.1 Protection time. Noncombustible protection shall contribute a time equal to or greater than times assigned in Table 722.7.1(1), but not less than 80 minutes. The use of materials and their respective protection contributions listed in Table 722.7.1(2) shall be permitted to be used for compliance with Section 722.7.1.~~

~~602.4.2.2.2 Protected area. _~~

~~-~~

~~All interior faces of all mass timber elements shall be protected in accordance with Section 602.4.2.2.1, including the inside face of exterior mass timber walls and mass timber roofs.~~

~~Exceptions: Unprotected portions of mass timber ceilings and walls complying with Section 602.4.2.2.4 and the following:~~

- ~~1. Unprotected portions of mass timber ceilings, including attached beams, shall be permitted and shall be limited to an area equal to 20% of the floor area in any dwelling unit or fire area; or~~
- ~~2. Unprotected portions of mass timber walls, including attached columns, shall be permitted and shall be limited to an area equal to 40% of the floor area in any dwelling unit or fire area; or~~
- ~~3. Unprotected portions of both walls and ceilings of mass timber, including attached columns and beams, in any dwelling unit or fire area shall be permitted in accordance with section 602.4.2.2.3.~~
- ~~4. Mass timber columns and beams which are not an integral portion of walls or ceilings, respectively, shall be permitted to be unprotected without restriction of either aggregate area or separation from one another.~~

~~602.4.2.2.3 Mixed unprotected areas. In each dwelling unit or fire area, where both portions of ceilings and portions of walls are unprotected, the total allowable unprotected area shall be determined in accordance with Equation 6-1. $(U_{tc}/U_{ac}) + (U_{tw}/U_{aw}) \leq 1$ (Equation 6-1) where:~~

~~U_{tc} = Total unprotected mass timber ceiling areas~~

~~U_{ac} = Allowable unprotected mass timber ceiling area conforming to Section 602.4.2.2.2, Exception 1~~

~~U_{tw} = Total unprotected mass timber wall areas~~

~~U_{aw} = Allowable unprotected mass timber wall area conforming to Section 602.4.2.2.2, Exception 2~~

~~602.4.2.2.4 Separation distance between unprotected mass timber elements. In each dwelling unit or fire area, unprotected portions of mass timber walls and ceilings shall be not less than 15 feet from unprotected portions of other walls and ceilings, measured horizontally along the ceiling and from other unprotected portions of walls measured horizontally along the floor.~~

~~602.4.2.3 Floors. The floor assembly shall contain a noncombustible material not less than one inch in thickness above the mass timber. Floor finishes in accordance with Section 804 shall be permitted on top of the noncombustible material.~~

~~The underside of floor assemblies shall be protected in accordance with Section 602.4.1.2.~~

~~**602.4.2.4 Roofs.** The interior surfaces of roof assemblies shall be protected in accordance with 602.4.2.2 except, in nonoccupiable spaces, they shall be treated as a concealed space with no portion left unprotected. Roof coverings in accordance with Chapter 15 shall be permitted on the outside surface of the roof assembly.~~

~~**602.4.2.5 Concealed spaces.** Concealed spaces shall not contain combustibles other than electrical, mechanical, fire protection, or plumbing materials and equipment permitted in plenums in accordance with Section 602 of the International Mechanical Code, and shall comply with all applicable provisions of Section 718. Combustible construction forming concealed spaces shall be protected in accordance with Section 602.4.1.2.~~

~~**602.4.2.6 Shafts.** Shafts shall be permitted in accordance with Section 713 and Section 718. Both the shaft side and room side of mass timber elements shall be protected in accordance with Section 602.4.1.2.~~

Commenter's Reason: We recommend that the Type IV-B mass timber designation be deleted from the tall wood building proposals.

The origins of the development of the types of construction were originally developed to “account for the response or participation that a building’s structure will have in a fire condition originating within the building as a result of the occupancy or the fuel load” (Example source from BOCA National Building Code 1993 Commentary). The modern day types of construction are parsed out into three primary categories of construction; noncombustible (Types I and II), noncombustible/combustible (Types III and IV) and combustible (Type V). Subcategories were created to identify the protection; Type A for protected and Type B for unprotected.

What we have within proposals G75-18, G80-18, G84-18, G89-18, and G108-18 is the addition of a new construction category that has been proposed based on the need to satisfy aesthetics based on the combination of Types IV-A and IV-C, which is a departure from the black and white construction categories based on construction that is non-combustible or combustible. We feel this inappropriate for the codes to begin to designate designer type construction categories.

In the past such mixing and matching of construction types into building or structure is more suited to the IBC Section 104.11 (Alternative materials, design and methods of construction and equipment), or through use of the ICC International Performance Code or performance analysis. We feel that these are the most appropriate options for the mixing-and-matching of construction types in building design.

(NOTE: Remainder of the section will need to be renumbered as will other related correlating sections.)

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This will not increase or decrease the cost of construction as this code change proposal and public comment address information that was not previously contained in the code, therefore there is no cost impact when compared to present requirements.

Public Comment 3:

Proponent: Jeffrey Shapiro, International Code Consultants, representing Self (jeff.shapiro@intlcodeconsultants.com)requests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

602.4.1.1 Exterior protection. Combustible materials, including but not limited to assemblies and materials tested in accordance with Section 1410, shall not be used as any part of the building exterior.

Exceptions:

1. ~~Mass timber shall be permitted for exterior construction where all exterior facing surfaces are. The outside face of exterior walls of mass timber construction shall be protected with noncombustible protection with having a minimum assigned time of 80 minutes for high-rise buildings and 40 minutes as determined in for other buildings in accordance with Section 722.7.1. All components of the exterior wall covering, shall be of noncombustible material except water resistive barriers, during which time the mass timber shall not ignite.~~
2. ~~The exterior wall shall be permitted to include a water-resistive barrier having a peak heat release rate of less than 150kW 150 kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18MJ 18 MJ/kg as determined in accordance with ASTM E1354, and having a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E 84 or UL 723. The ASTM E 1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².~~

602.4.2.1 Exterior protection. Combustible materials, including but not limited to assemblies and materials tested in accordance with Section 1410, shall not be used as any part of the building exterior.

Exceptions:

1. ~~Mass timber shall be permitted for exterior construction where all exterior facing surfaces are protected with noncombustible protection having. The outside face of exterior walls of mass timber construction shall be protected with non-combustible protection with a minimum assigned time of 80 minutes for high-rise buildings and 40 minutes as determined in for other buildings in accordance with Section 722.7.1. All components of the exterior wall covering shall be of noncombustible material except water resistive barriers, during which time the mass timber shall not ignite.~~
2. ~~The exterior wall shall be permitted to include a water-resistive barrier having a peak heat release rate of less than 150kW 150 kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18MJ 18 MJ/kg as determined in accordance with ASTM E1354, and having a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E 84 or UL 723. The ASTM E 1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².~~

602.4.3.1 Exterior protection. Combustible materials, including but not limited to assemblies and materials tested in accordance with Section 1410, shall not be used as any part of the building exterior.

Exceptions:

1. ~~Mass timber shall be permitted for exterior construction where all exterior facing surfaces are protected with noncombustible protection having. The exterior side of walls of combustible construction shall be protected with non-combustible protection with a minimum assigned time of 80 minutes for high-rise buildings and 40 minutes as determined in for other buildings in accordance with Section 722.7.1. All components of the exterior wall covering, shall be of noncombustible material except water resistive barriers, during which time the mass timber shall not ignite.~~
2. ~~The exterior wall shall be permitted to include a water-resistive barrier having a peak heat release rate of less than 150kW 150 kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18MJ 18 MJ/kg as determined in accordance with ASTM E1354 and having a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E 84 or UL 723. The ASTM E 1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².~~

Commenter's Reason: The intent of this public comment is generally consistent with the original provisions, but modifications have been suggested to accomplish the following:

1. Strengthen the text to make it clear that a compliant water-resistive barrier is the ONLY combustible material permitted in the building exterior, with the exception of properly protected mass timber. This includes a clarification specifically prohibiting NFPA 285 assemblies to prevent the prospect of such assemblies being proposed as an alternative method of compliance. This is necessary because of changes proposed to NFPA 285 that would expand the use of NFPA 285 assemblies to include combustible structures. Until such time that NFPA 285 has been thoroughly vetted with respect to questions raised under FS99-18, this specific prohibition is necessary for Type IV construction given interest that has already been documented.

2. Require increased protection of exterior mass timber members for high-rise buildings. The risks associated with an exterior face fire involving a heavy timber structure, outside of the sprinklered envelope and minimally accessible or inaccessible to firefighters due to height, is too great for a 40-minute exposure, particularly recognizing that the exposure used in fire test methods specified in Section 703.3 (such as ASTM E119) are not necessarily representative of the heat

flux that might be associated with exterior fire conditions (such as a wind-driven fire event). There is no guarantee, and in fact it is not likely, that an assembly having a 40-minute rating in a standardized fire test will actually provide 40 minutes of protection in an actual fire event. Doubling the protection, essentially adding a second layer of 5/8-inch Type X gypsum board, is a prudent step to provide additional safety given limited experience with tall mass timber buildings.

3. Clarify that the noncombustible protection must do more than simply increase the fire-resistance rating of the exterior wall members. For exterior walls, given the concerns cited above, it is important that ignition of the structural members must be prevented for the prescribed time period. Presumably, this would already be accomplished by the currently specified test method, but it is appropriate for the requirement to be specifically stated.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. Yup, this is going to cost more, but the cost is justified. Frankly, I prefer limiting mass timber to heights to below the high-rise threshold, but this is offered as an attempt to reach a negotiated solution, to address my primary concern with taller buildings, which is exterior fire spread, vs. a more stringent height restriction.

Public Comment 4:

Proponent: Gilbert Shields-Whitten, self, representing self requests As Submitted.

Commenter's Reason: One thing is clear from reading through the public comments for the ICC code change proposal for Tall Wood Buildings: the concrete industry is desperate to stop mass timber. The ICC should not be fooled by their latest efforts to mislead members of the public and the code community.

It is no secret that the National Ready Mixed Concrete Association (NRMCA) has been running a well-funded campaign to stop wood for some time. Their latest scheme to stuff the ballot with comments against mass timber is patently obvious.

How obvious?

Nearly every proponent submitting a request to DISAPPROVE code change proposal G108-18 works for a business in the concrete and cement industry based on the email address or company name provided.

All but a handful of comments have been copied and pasted based on talking points provided by NRMCA in a Call-To-Action document that was sent out to members at the end of June. PCA also provided suggested talking points.

Compare the suggested language below to the comments and you will see they are identical, including typos and grammatical errors.

Why would NRMCA and others do this? In their own words, money and market share.

The latest video produced by NRMCA makes the claim is made that the builders and wood industry conspired to weaken building codes which has resulted in rampant fires and costing money and lives

And at their annual meeting, they show that right now every single six-story building made with wood leaves half a million dollars of this industry's money on the table.

However, cross-laminated timber, which most of you have heard of at this point, is another big threat to putting concrete first. It has the potential to halt the progress of Build With Strength.

Don't be fooled by this and focus on the science.

ACTION REQUESTED! STOP TALL WOOD Urge the International Code Council (ICC) to Vote No on Mass Timber Proposals that Threaten Public Safety

This is an **extremely** critical issue and NRMCA needs your help in providing a public comment for **Disapproval on G108-18, a proposal that would allow Cross Laminated Timber use in up to 18 story buildings in the International Building Code**. Complete instructions are listed below as well as sample comments. Please consider taking this important step for your industry and please share with as many concrete industry colleagues as possible. Deadline for public

Select *Reason* and either enter (or copy paste) the sample reasons below, modify the sample reasons, or enter your own reason statement.

Some sample reasons you may want to consider for your Public Comment are:

- ○ There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.
- Allowing wood structures to be built above the level of fire department access is a serious mistake.
- Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.
- Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1 per hour in a fire, then after 2 hours in a fire, a 6 thick CLT wood load bearing wall will only have 2 of structural material left. This is not acceptable and is not addressed in the code change proposals.
- There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.
- It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?
- Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.
- Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.
- The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood Ad-Hoc. There is no information on the performance of the proprietary connections during fires?

Select *Cost Impact* and enter (or copy paste) the text below:

- ○ ■ Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

The International Code Council soon will vote on proposed code changes that among other things would allow tall wood buildings to be built up to 18 stories, despite a lack of rigorous scientific or in-the-field fire and structural testing.

NOW IS THE TIME TO TAKE ACTION by urging the ICC to say no to these dangerous proposals that are up for a final vote which closes on Nov 27, 2018. Join the public hearing process to let your voices be heard. This highly-combustible mass timber must be stopped! However, and to be clear, your comments need to be technical in nature and substantive. Just saying wood burns or I don't like CLT (while true) is not enough.

SUBMIT PUBLIC COMMENTS: Online public comments can be submitted by **July 16, 2018** through the ICC's [cdpACCESS website](#).

PCA's talking points:

STOP TALL WOOD PROPOSALS AT THE INTERNATIONAL CODE COUNCIL Background and Talking Points Multi-story mass timber buildings being considered by the International Code Council will present a threat to health and safety. The ICC code change proposals, and TALL WOOD structures built with cross-laminated timber (CLT) generally, are:

UNTESTED, UNPROVEN AND UNSOUND

UNTESTED: Wood-industry funded tests performed in the U.S. and Canada were completely inadequate, failing to examine real-world structural risk factors, potential firefighting safety impacts and other important risk factors to public health and safety. No exterior fire testing was performed for TALL WOOD. The limited testing done was irrelevant to the proposed code changes related to TALL WOOD as high as 18 stories. No tests were done to factor in wind, which impacts fire-fighting and property damage. Fire tests did not factor in heavy loads from upper stories, nor did they examine firefighting impacts from contents of storage or mercantile buildings. Fire sealants and connections were not done correctly, thus highlighting the problem with understanding the dangers TALL WOOD structures.

UNPROVEN: While non-combustible concrete and steel have been used for centuries to build tall buildings and structures, mass timber products, like cross-laminated timber, are unknown and unproven construction materials. Only the wood industry has information about how CLT performs and connects with other building materials, including dry wall, steel and concrete. Contractors and code officials have no experience in inspecting TALL WOOD buildings, thus raising potential structural and fire risks. The adhesives used in producing CLT have not been standardized, further raising risks associated with fire and structural performance. It is unclear how CLT performs with water damage from fire response efforts, heavy rain and floods or natural disasters.

UN SOUND: Common sense knows, and every day we see, that TALL WOOD buildings are high-risk and dangerous to public health and safety when it comes to natural and man-made disasters like hurricanes and wildfires. TALL WOOD buildings would be taller than the vast majority of firefighting equipment raising life safety and property damage risk exponentially.

Potential uses for TALL WOOD structures, such as dorms or assisted-living facilities, would put the most vulnerable Americans in harm's way. Submit public comments by July 16th or attend public hearings October 24-31 in Richmond, Va. Help STOP TALL WOOD ICC code changes!

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Approval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 5:

Proponent: Gary Bridgens, representing Mass Timber Code Coalition (info@buildtallbuildsafe.com) requests As Modified by Committee.

Commenter's Reason: PUBLIC COMMENT

SUBMITTED BY GARY BRIDGENS

ON BEHALF OF THE MASS TIMBER CODE COALITION

The Mass Timber Code Coalition has been organized to provide information on the code proposals drafted by the Ad Hoc Committee on Tall Wood Buildings

Mass timber is not new to the *International Building Code* (IBC). Currently listed as Type IV Heavy Timber, this construction type is a proven option that fully complies with the structural and fire resistive requirements of the IBC. The code recognizes that mass timber is a fundamentally different material than dimension lumber used in more familiar stick built wood construction. The code also recognizes the inherent fire resistance of mass timber, where charring in a fire event provides protection of inner structures, as well as a consistent and predictable rate of charring.

With the expansion of the mass timber supply chain, panels of cross-laminated timber (CLT), nail-laminated timber (NLT) and glue-laminated timber (Glulam), requests for approvals of tall mass timber buildings (TMTB) by local authorities have become more common. Estimates by industry sources have identified 35 current proposals for tall mass timber buildings, ranging from 7 to 24 stories, in 21 different jurisdictions.

Importantly, this interest in tall mass timber construction has been reliant on various local codes and approval processes. The IBC does not currently account for these tall wood buildings, beyond the current Type IV Heavy Timber height and area limitations.

The Ad Hoc Committee on Tall Wood Buildings (AHC-TWB)

To ensure the IBC keeps pace with the changing construction marketplace, the Board of Directors of the International Code Council (ICC) appointed the Ad Hoc Committee on Tall Wood Buildings (AHC-TWB) in 2015. The AHC-TWB included members from the code official, regulatory, construction, engineering, architectural, fire services and materials communities.

The AHC-TWB was specifically charged with investigating the science of mass timber construction, undertaking any necessary new research and recommending any code changes needed to ensure safety in TMTB. The AHC-TWB set performance criteria of its own: any code change developed was required to achieve the following.

- No collapse under scenarios of complete burn-out of fuel without automatic sprinkler protection;
- No high radiation exposure from the subject building to adjoining properties that risk ignition under severe fire scenarios;
- No unusual response from radiation exposure from adjacent properties that risk ignition of the subject building under severe fire scenarios;
- No unusual fire department access issues;
- Egress systems to protect occupants during design escape times plus a margin of safety;
- Enhanced and redundant fire protection systems to ensure performance during various fire scenarios.

Code Change Proposals

After two years of work, the AHC-TWB has produced 14 code change proposals. All 14 of these proposals were recommended for approval by various ICC committees at the recent ICC 2018 Group A Committee Action Hearing.

The key change, G108-18, defines three new categories of Type -IV Mass Timber construction:

Type IV-A: 1 to 18 stories based on Occupancy Classification. 3-hour fire resistance rating with non-combustible protection

throughout;

Type IV-B: 1 to 12 stories based on Occupancy Classification. 2-hour fire resistance rating with non-combustible protection on most mass timber surfaces;

Type IV-C: 1 to 9 stories based on Occupancy Classification. 2-hour fire resistance rating with non-combustible protection for critical areas; exit enclosures, etc.

Each new construction type defined by the AHC-TWB (Type IV-A, B and C) has fire resistance requirements as robust or more robust than those required for comparable non-combustible (concrete and steel) buildings.

Other provisions provide standards for mass timber manufacturing, height/area restrictions, active and passive fire protection systems, fire safety during construction, enhanced water supply requirements, and standards for sealants and adhesives.

Fire Resistance of Mass Timber

Citing fire and market concerns, both the Portland Cement Association and the National Ready Mix Concrete Association have criticized the AHC-TWB code change proposals as untested and unsound. However, these criticisms fail to consider that:

The purpose of the International Building Code is to provide building officials with the tools they need to ensure public and first-responder safety. It is not to choose winners and losers in the market, nor is it to defend any single industry's position;
Tall mass timber buildings already built are performing well;
Mass timber (and heavy timber before it) has undergone extensive fire resistance testing in multiple fire scenarios by Underwriters Laboratories, the Southwest Research Institute, the National Research Council of Canada and the U.S. Government's ATF Fire Research Laboratory, the world's largest indoor fire investigation lab.

Numerous mass timber floor/ceiling and wall assemblies have been tested at national laboratories using ASTM E119 standards. This testing history shows that mass timber has repeatedly achieved the hourly fire resistance requirements of the code. This is in part because of charring properties that provide a steady and predictable measurement of fire resistance. Additionally, detailed code requirements for non-combustible protection applied to the mass timber greatly enhance the hourly rating. Further, fire protection systems (active and passive) also ensure safety in mass timber structures.

The AHC-TWB benefitted from recent tests in 2017 at the U.S. ATF Fire Research Laboratory on full-scale mass timber buildings. Most tests assumed an unlikely failure of sprinkler systems:

Mass timber apartment with full fuel load. Fully protected by Type X gypsum wall board. Fire self-extinguished after 3 hours with no significant charring on mass timber surfaces;
Mass timber apartment with full fuel load. 20% exposed CLT ceiling. Test concluded at 4-hour mark after fuel burnout. CLT self-extinguished after charring;
Mass timber apartment with full fuel load. 2 CLT walls fully exposed. Fuel burnout at 4-hours. CLT walls self-extinguished after charring;
Mass timber apartment with full fuel load. All CLT surfaces fully exposed. One sprinkler system. Fire quickly extinguished;
Mass timber apartment with full fuel load. All CLT surfaces fully exposed. One sprinkler system. Fire allowed to grow to flashover (23 minutes) then quickly extinguished.

In fact, proposed Type IVA, B and C fire resistance requirements are the same or more robust than comparable steel and concrete construction. Further detail can be obtained at buildtallbuildsafe.com.

Benefits of Mass Timber Construction

In addition to the obvious environmental attributes of using a renewable resource in construction and the boost for the economies in timber-producing regions, builders and communities cite several distinctive benefits that make mass timber buildings an attractive option:

Builders report several benefits, including:

Job site safety. Mass timber panels are easy to install and can be delivered to a work site as needed, rather than stockpiled. Moreover, worker training is easier as is exposure to job site risk;

Job site efficiency. Persistent labor shortages are eased as more workers are qualified to work with mass timber panels. Jobs are built more quickly and materials are delivered as needed, thereby reducing costs;

Design. The favorable strength-to-weight ratio of CLT and the characteristics of wood offer more design options and more attractive built environments, improving business performance.

Local communities embrace mass timber construction:

Faster and quieter. The dislocation experienced by neighboring communities is reduced in mass timber projects. In addition to lower fire risks, things occur more quickly and panels are installed more simply than comparable steel and concrete sites;

Greener. Forestry officials cite the carbon sequestration properties of wood, but also the benefits to forest management of using wood products more efficiently and effectively, thereby further reducing decay and fire risk;

Energy efficient. Manufacturing mass timber is less energy intensive than other building materials. More importantly, the superior insulation characteristics of wood far outperform steel and concrete structures.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This section provides information that was not previously set forth in the code, and does not change the requirements of current code, thus there is no cost impact when compared with present requirements.

Public Comment 6:

Proponent: Brian M Adkins, Gonsalves & Santucci, Inc. DBA Conco (The Conco Companies), representing self (badkins@conconow.com) requests Disapprove.

Commenter's Reason:

- There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.
- Allowing wood structures to be built above the level of fire department access is a serious mistake.
- Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.
- Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1" per hour in a fire, then after 2 hours in a fire, a 6" thick CLT wood load bearing wall will only have 2" of structural material left. This is not acceptable and is not addressed in the code change proposals.
- There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.
- It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?
- Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.
- Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.
- The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood AdHoc. There is no information on the performance of the proprietary connections during fires?
- In addition to all of the reasons above I believe it would be a colossal mistake to allow for inferior construction to take the place of the longevity and success that has been proven in the cast-in-place concrete industry.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

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Public Comment 7:

Proponent: Leslie Ainsworth, representing Self (les@lesainsworth.com) requests Disapprove.

Commenter's Reason: Who would want to live in an 18 story building made of wood? What fire department would want to respond to a 2nd story fire in an 18 story building made of wood. There is no complete testing justification to increase the height limit to exceed 6 stories. Neither the Fire Code Action Committee or the Building Code Action Committee voted

to support this measure. Wood is not as fire resistant as non combustible building materials such as concrete and steel. This measure will cost lives. Who wants this on their conscience?

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This will make the building more dangerous, and worth less in the future

Public Comment 8:

Proponent: ALBERT ANDREWS, ANDREWS CONCRETE PUMPING, representing ANDREWS CONCRETE PUMPING
PRESIDENT requests Disapprove.

Commenter's Reason: HAVE WE NOT LEARNED FROM THE PAST? WOOD STRUCTURES ARE BLOWN AWAY IN HIGH WINDS, CRUMBLE DURING NATURAL DISASTERS, CONSUMED DURING A FIRE IN MINUTES OR DAMAGED BEYOND REPAIR. WOOD STRUCTURES WILL NOT STAND THE TEST OF TIME. DO YOU WANT YOURSELF OR YOUR FAMILY AND FRIENDS IN WOOD BUILT HOTELS, MID OR HIGH RISE OFFICE BUILDINGS, MULTI STORY COMDOMINIUMS OR APARTMENTS? THEY ARE UNSUSTAINABLE AND LIFE THREATENING. INSURANCE RATES WILL SKY ROCKET AS SEEN IN THE PAST WHEN STRUCTURES DON'T STAND UP TO MOTHER NATURE OR OUR MISTAKES. THERE IS A REASON WHY STONE, MASONRY, CONCRETE AND STEEL STRUCTURES LAST. BE DOLLAR WISE AND MORALLY CORRECT. YOU WILL SLEEP BETTER KNOWING YOU MADE THE RIGHT DECISION.

- There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.
- Allowing wood structures to be built above the level of fire department access is a serious mistake.
- Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.
- Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1" per hour in a fire, then after 2 hours in a fire, a 6" thick CLT wood load bearing wall will only have 2" of structural material left. This is not acceptable and is not addressed in the code change proposals.
- There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.
- It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?
- Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.
- Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.
- The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood AdHoc. There is no information on the performance of the proprietary connections during fires?

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 9:

Proponent: Hari Krishna R Bandi, representing The Conco Companies (hbandi@conconow.com); Jennifer Nenni (jnenni@conconow.com); Carl Walker (carl@centralpumping.com) requests Disapprove.

Commenter's Reason: Allowing wood structures to be built above the level of fire department access is a serious mistake. Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel

Bibliography: Don't have one

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 10:

Proponent: Kenneth Barefield, Conco, representing Conco Companies (kbarefield@conconow.com) requests Disapprove.

Commenter's Reason: There is currently no complete testing or engineering justification for expanding the height

limitation for mass timber from 6 stories to 18 stories. There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment results in no change to existing code test. Therefore there is no change in the cost of construction.

Public Comment 11:

Proponent: Jeffrey Bolichowski, MasonryWorx, representing MasonryWorx (jeff@armstrongstrategy.com) requests Disapprove.

Commenter's Reason: These comments represent the position of MasonryWorx, the provincial association for Ontario's brick, block and stone masonry industry.

Non-combustible concrete and steel have been used for centuries to build tall buildings and structures. However, mass timber products, like cross-laminated timber, are unknown and unproven. Common sense and history both demonstrate that tall wooden buildings are high-risk and pose significant dangers to public health and safety. This is particularly true when these wooden towers are tested by natural and man-made disasters such as hurricanes and wildfires.

There is currently no complete testing or engineering justification for tripling the height limitation for mass timber from the present six storeys to 18.

In fact, wood industry-funded tests in the United States and Canada were completely inadequate. These tests failed to examine real-world structural risk factors, potential firefighting safety impacts from weather, or material-related risk factors to public health and safety.

No exterior fire testing was performed for tall wood buildings, and the limited testing done was irrelevant to the proposed changes. The tests did not factor in wind, heavy loads from upper storeys, or firefighting impacts from contents of storage or mercantile buildings. Fire sealants and connections were also not done correctly.

The most significant oversights are wind and water testing. There has been no wind component involved in the fire testing of mass timber assemblies, despite the wind pressures tall buildings inevitably face. Similarly, mass timber systems have not been tested with the additional water load which accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident which opens a sprinkler head. These oversights are serious and glaring, and represent critical safety flaws.

Permitting wood structures to be built above the level of fire department access is a serious public safety risk, particularly with many fire departments unable to easily procure high-ladder trucks. These buildings would present significantly greater fire risks: Wood does not offer the resilience and fire protection of materials which do not combust, such as concrete block.

Particularly troubling is that, while cross-laminated timber will char in a fire, charring is not the same thing as not combusting. A char rate of 1" per hour in a fire will result in a six-inch-thick CLT wood load-bearing wall being left with only 2" of structure left after just two hours of burning. This is not acceptable, and it is not addressed in the code change proposal.

This change would permit the construction of tall buildings with dangerous materials which are untested, unproven and unsound. History and precedent have shown the dangers of tall wood buildings again and again.

Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes. Given the serious flaws in the testing process and the enormous safety hazards involved, we urge the ICC to vote NO on the use of highly-combustible mass timber in tall buildings.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

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Public Comment 12:

Proponent: Timothy Bourcier, Commercial Metals Company, representing self (tim.bourcier@cmc.com); Daniel Zechmeister (dan@masonryinfo.org); James Farny (jamiefarny@yahoo.com); Mark Young (markyoung@brundagebone.com); Robert Mercer (r.brett.mercer@gmail.com); Jason Chojnacki (jason.chojnacki@vcimentos.com); Jason Grafton (jgrafton@cckservices.com); Kate Caddell (kate@ajandris.com); Brad Cottrell (brad.cottrell@cmc.com); Billy Milligan

(billy.milligan@cmc.com); Amy Trygestad (atrygestad@crsi.org); Kelly Walker (kelly@masonryinfo.org); Rouzbeh Mahmoudzadeh (rmahmoudzadeh@conconow.com); Melissa Kline (makline777@gmail.com); Anthony Johnson (tjohnson@crsi.org); Holly Bertucelli (hbertucelli@conconow.com)requests Disapprove.

Commenter's Reason:

- There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.
- Allowing wood structures to be built above the level of fire department access is a serious mistake.
- Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.
- Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1 per hour in a fire, then after 2 hours in a fire, a 6 thick CLT wood load bearing wall will only have 2 of structural material left. This is not acceptable and is not addressed in the code change proposals.
- There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.
- It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?
- Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.
- Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.
- The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood AdHoc, there is no information on the performance of the proprietary connections during fires.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

- Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements

Public Comment 13:

Proponent: Brandon Bowers, representing Concorequests Disapprove.

Commenter's Reason: Unsafe, unethical and a mere shortcut for immoral reasons. Corporate greed once again coming into play leaving several thousand innocent people at risk.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment results in no change to existing code test. Therefore there is no change in the cost of construction.

Public Comment 14:

Proponent: Michael Ziemba, Vototantim, representing self (mike.ziemba@vcimentos.com)requests Disapprove.

Commenter's Reason: Wood does not offer the resilience and fire protection of other non-combustible materials like concrete and steel. Allowing wooden structures to be built above fire dept. access is not safe. Neither the Fire Code Action Committee or the Building Code Action Committee have voted to support this code change.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 15:

Proponent: Ben Brown, self, representing Self (bbrown@chasehipps.com)requests Disapprove.

Commenter's Reason: Safety and sustainability must guide this decision. Tall timber buildings are a fire hazard, this has been proven over and over again. We can't repeat our mistakes of the past. We also need buildings that are built to last. Concrete and steel can be tested and meet specifications over and over again.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

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Public Comment 16:

Proponent: Gary Brown, representing R L McCoy (garybrown@rlmccoy.net) requests Disapprove.

Commenter's Reason: Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout.

A test standard for adhesives has been proposed, but not fully vetted by the cognizant committees.

It's still a wood by-product, once enough heat is created it will start to burn.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment results in no change to existing code test. Therefore there is no change in the cost of construction.

Public Comment 17:

Proponent: Michael Calderon, representing The Conco Companies requests Disapprove.

Commenter's Reason: Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but no fully vetted by the cognizant committees.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment results in no change to existing code test. Therefore there is no change in the cost of construction.

Public Comment 18:

Proponent: Ross Carbo, representing self (rcarbo@conconow.com) requests Disapprove.

Commenter's Reason:

- There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.
- Allowing wood structures to be built above the level of fire department access is a serious mistake.
- Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.
- Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1" per hour in a fire, then after 2 hours in a fire, a 6" thick CLT wood load bearing wall will only have 2" of structural material left. This is not acceptable and is not addressed in the code change proposals.
- There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.
- It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?
- Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.
- Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.
- The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood AdHoc. There is no information on the performance of the proprietary connections during fires?

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment results in no change to existing code test. Therefore there is no change in the cost of construction.

Public Comment 19:

Proponent: Kerem Cetinbas, representing MAC Corporation of VA (info@macofva.com) requests Disapprove.

Commenter's Reason:

- There are many unanswered questions in regard to the safety for the code change. Kindly note the comments below.
- There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.
- Allowing wood structures to be built above the level of fire department access is a serious mistake.
- Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.
- Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1" per hour in a fire, then after 2 hours in a fire, a 6" thick CLT wood load bearing wall will only have 2" of structural material left. This is not acceptable and is not addressed in the code change proposals.
- There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.
- It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?
- Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.
- Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.
- The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood AdHoc. There is no information on the performance of the proprietary connections during fires.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 20:

Proponent: dean chandler, representing self (dchandler@conconow.com) requests Disapprove.

Commenter's Reason:

- There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.
- There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment results in no change to existing code test. Therefore there is no change in the cost of construction.

Public Comment 21:

Proponent: John Chrysler, Masonry Institute of America, representing Masonry Institute of America (jc@masonryinstitute.org) requests Disapprove.

Commenter's Reason: ● There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.

- Allowing wood structures to be built above the level of fire department access is a serious mistake.
- Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.
- Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1" per hour in a fire, then after 2 hours in a fire, a 6" thick CLT wood load bearing wall will only have 2" of structural material left. This is not acceptable and is not addressed in the code change proposals.
- There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.

- It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?

- Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.

- Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.

- The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood Ad-Hoc. There is no information on the performance of the proprietary connections during fires?

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 22:

Proponent: Alex Cody, representing The Conco Companies (acody@conconow.com) requests Disapprove.

Commenter's Reason:

- Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1 per hour in a fire, then after 2 hours in a fire, a 6 thick CLT
- The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood AdHoc. There is no information on the performance of the proprietary connections during fires?
- It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 23:

Proponent: Gregory Colvin, representing self (greg@ohioconcrete.org); Alpa Swinger (aswinger@cement.org); Robert Hamilton (bob.hamilton@conforms.com) requests Disapprove.

Commenter's Reason: There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposal section provides information that was not previously set forth in the code, thus there is no cost impact when compared with the present requirements.

Public Comment 24:

Proponent: ANNA DART, Conco Companies, representing Self; Leah Gunther, representing American Concrete Pumping Association (leah@concretepumpers.com) requests Disapprove.

Commenter's Reason:

- Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 25:

Proponent: Charles Day, Votorantim / St Marys cement LLC, representing Self; John Doubikin (john.doubikin@vcimentos.com); Michael Marzka (michael.marzka@vcimentos.com); Bruce Moroz (bruce.moroz@vcimentos.com); David Jones (djones@addisontx.gov); Lawrence Novak (lnovak@cement.org) requests Disapprove.

Commenter's Reason:

- Wood absorbs water, and the resulting rot and mold can seriously impair a wood structures' overall anticipated performance. Note: non-combustible materials such as concrete, masonry and structural steel do not rot.
- The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood Ad-Hoc. There is no information on the performance of the proprietary connections during fires?
- Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.
- Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.
- It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?
- There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.
- To date, there has been no full scale CLT fire tests done to ASTM standards.
- Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Charring wood will add fuel to the fire and increase the heat and smoke output relative to noncombustible materials. Note: if the char rate is 1" per hour in a fire, then after 2 hours in a fire, a 6" thick CLT wood load bearing wall will only have 2" of structural material left. This is not acceptable and is not addressed in the code change proposals.
- Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete, masonry and steel.
- Allowing wood framed structures to be built above the level of fire department access is a serious mistake. The vast majority of municipal ladder trucks cannot reach above the 7th floor.
- There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

- Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 26:

Proponent: joe dickinson, Walker Concrete Company, LLC, representing Walker Concrete Company, LLC; michael stevens (mstevens@natcem.com); Spencer Weitman (sweitman@natcem.com); Steve Wise (swise@natcem.com); Steve Lode (slode@natcem.com); Mark Mitzel (mmitzel@natcem.com); Bart Moore (bmoore@natcem.com) requests Disapprove.

Commenter's Reason: • Inadequate and/or incomplete testing and engineering do not provide justification for exceeding the existing height limitation for wood construction from 6 stories and raising it to 18 stories for Tall Wood structures.

- Allowing Tall Wood structures to be built above the level of fire department access puts building occupants and firefighters at significant additional risk.

- Wood does not offer the resilience and fire protection due to both manmade and natural disasters compared to non-combustible alternatives like concrete and steel.

- Cross-Laminated Timber chars in a fire. Charring is not equivalent to non-combustible. Charring is a deterioration of the wood (e.g. a 6" load bearing CLT with a char rate of 1" per hour will have lost over 60% of its structural strength after 2 hours in a fire). This is not acceptable and is not addressed in the code change proposals.

- There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.

- It is unknown what impacts will occur to a Tall Wood structure if water accumulates as a result of a fire sprinkler system discharge due either to fire or an accidental activation. Moreover, testing has not been performed to determine

the structural performance when additional water is applied by active firefighting and the resulting damage such as swelling of the wood, combined impacts of water and high temperature to the structural integrity of the manufactured wood as well as connection systems. In addition, the potential for water damage must address the short as well as long-term impacts of mold and dry rot.

- Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.
- Adhesives used between the layers of CLT are currently not standardized. The absence of a standard is key to determining whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives was proposed, but not fully vetted by the cognizant committees.
- The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities. In addition there is insufficient information on the performance of the proprietary connections during fires.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 27:

Proponent: Donald Doggett, Doggett Concrete, Inc., representing Doggett Concrete inc (ddoggett@doggettconcrete.com)requests Disapprove.

Commenter's Reason: This is a dangerous trend that will create fire hazards and structural risk that far outweigh any potential benefits for construction.

Bibliography: <http://vancitycondoguide.com/concrete-vs-wood-buildings/> "Well, it's a popular question, concrete vs wood buildings- which is better and what do you recommend I buy? It's a longstanding debate and today i'll shed some light on the debate and hopefully give you some key takeaways to help you with your purchasing decision. Concrete buildings, although generally more expensive than wood frame buildings, are worth it in the long term. It's important to always look long term, in all aspects of life. The same thinking can be applied to when investing in your next condo."

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There are no cost savings for the public that will be passed along. There will be increased cost in maintenance

Public Comment 28:

Proponent: Doug Dreiling, Buzzi Unicem USA, representing self (douglas.dreiling@buzziunicemusa.com)requests Disapprove.

Commenter's Reason: There are too many reasons, one of the biggest is the lack of independent testing. My son in-law is a fire fighter and he is very concerned with the dangers in a fire. The toxicity of the glues and fire retardants to start with. There was a fire just last year in Overland Park, KS, of a CLT, and the fire was so hot that house a half a mile away were affected with hot ambers.

Common sense tells you wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.

Public Comment 29:

Proponent: William Dwyer, representing Putzmeister America (dwyerb@putzam.com)requests Disapprove.

Commenter's Reason: Allowing wood structures to be built above the level of fire department access is a serious mistake. Also, wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 30:

Proponent: Bonnie Erickson, representing Self (bonnie_erickson2010@comcast.net)requests Disapprove.

Commenter's Reason: This is crazy, who wants to live in a high rise built with wood? Who wants to fight that fire? Who wants to insure it? Who wants to be responsible for the lives lost? And who wants to own it 20 years from now?

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Code change will not increase or decrease construction cost, and will devalue the building

Public Comment 31:

Proponent: Patrick Ford, Matsen Ford Design Associates, Inc., representing selfrequests Disapprove.

Commenter's Reason: Reason: These code changes would allow for structurally unsafe conditions to be inherently designed into tall buildings. As proposed, they would introduce new categories of Type IV construction into the code and expand the number of storeys, allowable areas, and maximum heights of buildings framed with combustible materials. I believe that for several reasons, this would greatly increase the risk to firefighters and building occupants, as well as neighboring buildings. Several of the major decisions that went into the creation of this proposal were based on "engineering judgment" and significant extrapolation of test data from a two storey test building to buildings with dozens more storeys.

Aside from the potentially dangerous and unproven provisions in general, there are several specifics relative to structural connections in these new building types and sizes. I do not believe that these were addressed or at the very least not adequately addressed.

The new building types and increased limits allowed for in these proposals should not be allowed, and the proposals should be disapproved for the following reasons:

The AHC-TWB report that was instrumental in many of the provisions indicates that connections were tested, but in fact, no exposed connections were ever tested in any of the assemblies.

The compartment tests did not test any connections, nor did any of the standard ASTM tests, including the E84, E119, E814, nor the NFPA 285 tests.

The full scale test did not have any exposed connections, yet the code explicitly notes exposed steel and metal caps or brackets allowed in type IV construction within the wood chapter. The exposed metal connectors and their fasteners penetrate well beneath the typical char layer of the structural member, significantly reducing the strength of the member at and near the connection itself. This can create many hot spots and potential critical structural failure locations throughout a tall building. No other tests addressed this issue either.

Adhesive based splice connections remain unproven, the overall adhesive requirements being based on a testing protocol derived after a failed test.

The Small Scale Adhesive Qualification Test Protocol (CSA 077 SSA.2) could conceivably be directed toward such connections or splices, but it is a test that lasts only 5 minutes per side of the tested specimen.

As an additional note, the full scale test was run on only a two storey structure, leaving any critical structural connections that may have been needed to support only a single storey above. With code proposals allowing for many times this, these concerns should be much more carefully vetted before approval.

It should also always be remembered that in no other type of tall building allowed by the code, is the structure itself also fuel for the fire.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 32:

Proponent: Mariah Garcia, representing Conco (mgarcia@conconow.com)requests Disapprove.

Commenter's Reason: Allowing wood structures to be built above the level of fire department access is dangerous and a serious mistake! Wood does not offer the resilience and fire protection of non-combustible alternatives such as

concrete and steel.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 33:

Proponent: Nathan Germany, representing Tri-Way Concrete Pumping, Inc. (nathangermany@tri-wayconcretepumping.com)requests Disapprove.

Commenter's Reason: There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories, as wood does not offer the resilience and fire protection of non-combustible alternatives such as concrete and steel. In addition, Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. For example: if the char rate is 1" per hour in a fire, then after 2 hours in a fire, a 6" thick CLT wood load bearing wall will only have 2" of structural material left. This is not acceptable and is not addressed in the code change proposals. Plus, there has been no wind component involved in the fire testing of Mass Timber assemblies. Additionally, the adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. While a testing standard for these adhesives has been proposed, it has not been fully vetted by the cognizant committees. This type of testing is essential and failing to do so would be egregious mistake. In closing, allowing wood structures to be built above the level that allows for fire department access is a serious mistake. It poses a safety risk to not only to fire department rescuers, but to the general public living/working in and adjacent to these buildings, as their structural integrity will easily be compromised during a fire. This is a mistake.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 34:

Proponent: Steve Gonsalves, representing Concorequests Disapprove.

Commenter's Reason: Neither the fire code action committee nor the Building Code Action Committee voted to support this series of code changes. This is a serious and dangerous mistake! Allowing wood structures to be built above the level of fire department access is dangerous. Wood does not offer the support and resilience or fire protection of non-combustible alternatives like concrete and steel.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 35:

Proponent: Edq Griffith, representing St. Marys Cement, Inc. (ed.griffith@vcimentos.com)requests Disapprove.

Commenter's Reason: Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel, this is a serious safety issue and has been evidenced by disastrous fires.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 36:

Proponent: Robert Grupe, representing Grupe Gypsum Consulting, LLC (rcgconsult@outlook.com)requests Disapprove.

Commenter's Reason: Overall building performance is predicated on the individual systems that comprise the structure. Further these systems are a series of individual building materials that are integrated based on their

performance attributes, and compatibility with adjacent building materials. The proposed Tall Wood-frame construction is based primarily on the use of Cross Laminated Timber, CLT. However the proposal does not address potential compatibility issues, and in some cases lacks critical data to support required performance. Therefore, the CLT, system is not ready for use in wholesale high-rise construction. There are at least two critical system design areas that require additional testing and verification. These two examples are offered here to provide areas of specific concern. These examples are expressed in specific published white papers on the use of Cross-Laminated Timber. The first example is on acoustics, specifically that of sound transmission through floor-assemblies. The current International Building Code has established minimum requirements for floor-to-floor transmission. In a published white paper entitled **Mass Timber High-Rise Design Research: Museum Tower in Los Angeles Reimagined in Mass Timber** (2015) the following statement is made regarding acoustics:

Testing is required to determine the ability of this assembly to obtain the code-required acoustic performance.

The paper covered the design of a timber-framed high-rise building. The acoustical design of the structure was centered around two floor-ceiling systems proposed for this project, both of which did not have any acoustic testing to substantiate compliance. The above comment followed a written description of each proposed floor/ceiling assembly.

Another issue of concern relating to additional required research is the proper design of connections that can accommodate the naturally occurring shrinking and swelling of CLT members primarily due to seasonal changes. The issue is the compatibility and serviceability of sealants and membranes that are incorporated into the CLT system. The following is taken from the **CLT Handbook** (2013):

Differential movement between CLT and other wood-based products or materials (in case of mixed materials and systems) need to be taken into account at the design and detailing stages due to potential shrinkage-induced stress that could undermine the connection capacity in CLT. More information and guidelines related to detailing will be provided in future versions of this document as additional studies need to be performed.

The point to be made here is that these are critical components in system and ultimately building design that require additional testing and research. It is obvious from the above mentioned white paper and handbook that the composite action of the independent building materials that make up the building systems have yet to be fully researched, tested, and detailed for use in general construction.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 37:

Proponent: Larry Williams, Steel Framing Industry Association, representing Steel Framing Industry Association requests Disapprove.

Commenter's Reason: G108-18 proposes to modify IBC Section 202, Table 601, and various sections of 602, to recognize cross laminated timber (CLT) as a special class of Type IV construction.

The structural and fire resistance performance of cross-laminated timber is fundamentally determined by the performance of the adhesive used to hold the layers of the product together. Delamination as a result of exposure of CLT to heat and flame have been identified as an issue of concern through both independent research and tests conducted under the supervision of members of the Ad Hoc Tall Wood Committee.

The solution to this concern was the addition of language in the proposal to reference PRG 320-18 which had not been published at the time of the submission of the proposed G108-18. Since the proposal was submitted, the PRG 320-18 has been published with an Appendix B that is intended to provide a test procedure to be used in evaluating the elevated temperature performance of adhesives.

This Appendix B has been public for less than 6 months, and consequently has no history of use that would validate assumptions that we are being asked to make. In addition, it clearly states that not all factors needed for a risk assessment are incorporated into the development of the Appendix. Further, the task of verifying that any of the methods discussed in the Appendix is left to the user.

Given the important role that adhesives play in the structural performance and safety of a bonded system, too little is known or provided that would ensure that 180-foot tall structures would be safe in the event of a fire or exposure to heat.

The leap in assumptions that fire tests on a two-storey mock up can be extrapolated to fire performance of an 18-story building is an unreasonable extension in the allowance for use of "professional judgement."

Proponents of G108-18 and related proposals state that the expected fire performance of mass timber buildings was

“validated by a series of full scale multiple-story fire tests.” However, the actual model tested was only two storeys in height, and from this test users are expected to have confidence that a 180-foot tall building construction with cross-laminated timber will exhibit identical performance.

The fundamental problem of this assumption is that some characteristics of large fires have not been observed on small fires, either because they do not occur in small fires or because they are too small to be detected. It seems likely that a different set of controls of fire behavior may take over after a fire reaches a certain size or intensity. The difficulty of extrapolating from small to large fires is further complicated by the fact that behavior of fire is a pattern phenomenon--the behavior at one point is often dependent on the behavior at another point. The behavior of one part of a fire may change even if burning conditions at that point do not vary when the characteristics of the fire at some other point changes.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with current requirements.

Public Comment 38:

Proponent: Eric Gutierrez, Self, representing Selfrequests Disapprove.

Commenter's Reason:

- There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.
- Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1 per hour in a fire, then after 2 hours in a fire, a 6 thick CLT wood load bearing wall will only have 2 of structural material left. This is not acceptable and is not addressed in the code change proposals.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 39:

Proponent: steve gynn, Votorantim, representing Votorantim (steven.gynn@vcimentos.com)requests Disapprove.

Commenter's Reason: Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel. The safety aspects alone without the support of the construction committees are enough to stop this action. Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.

What testing has been completed to prove the long term viability of tall wood structures in the event of a fire?

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements

Public Comment 40:

Proponent: Frederick Hahn, Construction Forms, representing Self (rick.hahn@conforms.com)requests Disapprove.

Commenter's Reason: UNTESTED: Wood-industry funded tests performed in the U.S. and Canada were completely inadequate, failing to examine real-world structural risk factors, potential firefighting safety impacts from weather, and material-related risk factors to public health and safety.

UNPROVEN: While non-combustible concrete and steel have been used for centuries to build tall buildings and structures, mass timber products, like cross-laminated timber, are unknown and unproven construction materials.

UNSOUND: Common sense knows, and history shows, that TALL WOOD buildings are high-risk and dangerous to public health and safety when it comes to natural and man-made disasters like hurricanes and wildfires.

With recent fires that have occurred both during and after construction of these tinderboxes, there should be at the very least better studies done by independent sources. Concrete and steel have been proven over decades to be a far safer building from a fire safety standpoint.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 41:

Proponent: Patrick Hainault, Matsen Ford Design Associates, Inc., representing Selfrequests Disapprove.

Commenter's Reason: "Tower of Fire destroys LA apartment complex under construction." This headline in the December 8, 2014 LA Times barely scratches the surface in describing the dangers from fires in buildings under construction when those buildings are framed with wood and wood-based materials. This fire not only destroyed at least 239 of the rental units and 2/3rds of the complex at the Da Vinci Apartments but caused significant damage to neighboring buildings and infrastructure, and greatly burdened the surrounding community in general. Yet, this proposal will dramatically raise the allowable heights and areas of buildings made from combustible materials.

It is not rationale to increase the allowable height of buildings as in this proposal when significant problems in much smaller buildings still present a well-documented risk to life and property. The assembly should overturn the committee decision to effectively prohibit the type of proposed construction until and if it can be proven safe during and after construction. The following paragraphs expand on the issues the assembly should consider in evaluating this proposal.

How do we even begin to come to grips with the risk to adjacent properties and occupied buildings during the construction phase when an 18- story wood structure allowed by this proposal is burning in a suburban or urban area? Without safeguards well beyond those currently in the code (or proposed as part of a series of related proposals) to protect adjacent properties and infrastructure, the impacts will be devastating. For example, the Da Vinci fire caused:

- **Damage to adjacent buildings.** At least four nearby buildings were damaged. The building at 221 N. Figueroa St., where the computers and cubicles melted, had significant damage on its 15 floors, with 300 windows blown out. Three floors were also damaged in the Los Angeles County Department of Health Services building at 313 N. Figueroa. LA Department of Water and Power staff identified at least 160 damaged windows. A Los Angeles Department of Building and Safety spokesman reported windows blew out in the north tower of its department headquarters, and the heat and smoke triggered sprinklers that soaked carpets and desks. Overall, the Da Vinci Apartments fire caused an estimated \$111.5 million in damages, including \$80 million in damage to city properties from the fire and the water used to extinguish it and \$20-\$30 million to the apartment complex.
- **Damage to Infrastructure.** A Caltrans spokesman estimated the fire caused \$1.5-million damage to the freeway. Roads were closed around the area including a major commuter route during rush hour. Caltrans officials reported an exit sign over the 110 Freeway melted and would have to be replaced, forcing another freeway closure later the same week.
- **Extensive impacts on the community.** The attached study of the economic risk to taxpayers and the community posed by mid-rise apartments produced by assistant adjunct professor Urvashi Kaul at Columbia University captures the total cost impacts from fires like the Da Vinci apartments and smaller incidents. This study finds that:
 - In Los Angeles County, alone, fires in mid-rise residential buildings with combustible frames could have a negative impact of \$22.6B over 15 years, including \$17.14B in direct losses from property damage.
 - On average, fire in a mid-rise residential building constructed using combustible framing material costs the Los Angeles County a total of \$141.81 per square foot in potential economic impact and \$2.38 per square foot in lost tax revenues.
 - Potential impact the County may face in a single year could be \$1.7 billion, including \$1.3 billion in direct property damage.

The assembly is also urged to reconsider the argument that cladding requirements proposed to address fires in buildings under construction will resolve these issues. As demonstrated in a large fire from 2015 in a wood-framed apartment building in Edgewater, NJ, cladding will not stop a fire from spreading once the framing in part of the building ignites. It doesn't create a barrier between unexposed framing and exposed framing, but only provides some resistance to ignition from within or outside of the building. The Edgewater fire spread rapidly throughout the buildings once framing behind a wall was ignited during repairs to the occupied and fully-clad building.

The Da Vinci and Edgewater fires are not uncommon incidents. Dozens of similar fires have occurred (see more at <http://buildwithstrength.com/america-is-burning/>) in buildings under construction since the market began broadly taking advantage of relatively recent changes to the IBC that allowed taller and larger wood-framed buildings. In a similar fire in Houston, the life of a construction worker literally hung in the balance as he was rescued from a burning wood framed building just seconds before the stories above came crashing down. The assembly can prevent these types of risks from greatly expanding by disapproving this proposal.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of

construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 42:

Proponent: William Hall, Portland Cement Association, representing Alliance for Concrete Codes and Standards (jhall@cement.org) requests Disapprove.

Commenter's Reason: At the recent ICC Committee hearings in Columbus, OH, your committee **FAILED you**. The general committee charged with looking at proposals and weighing justification **FAILED** to do their job when it came to Tall Wood Buildings. Despite overwhelming testimony that fire tests were inadequate, the committee simply ignored the fact that the TWB ADHOC committee only considered a two story residential structure during testing, and then used **'Engineering Judgment'** to determine that those results will be sufficient for 18 stories. They **FAILED** to ask for justification to allow other occupancy groups a 100% increase in height. WHERE is the testing for all the other occupancy groups? 100% increases in story height are proposed for other use groups **without any justification**.

The ICC TWB ADHOC Committee has taken it upon themselves to develop a prescriptive TWB approach that **exceeds the allowable heights of every country in the world**. The United States just recently began looking at Mass Timber for taller buildings and yet, if this proposal goes through, ICC will allow mass timber 6 stories higher than any other country.

Not only will the U.S. allow the tallest wood buildings, we will also allow 12 story Mercantile, Storage and Factory to be built **without** gypsum covering on 40% of the CLT surface. Again, more than any other Country.

While mass timber may be an acceptable building material, it has not gone through the testing rigors that are needed for safe high rise buildings. **Do not let the U.S. be the testing ground for these Tall Wood Buildings.**

Vote for Disapproval

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
No effect

Public Comment 43:

Proponent: Mary Murphy Harrison, representing Barney & Dickenson Inc (mmh@stny.rr.com) requests Disapprove.

Commenter's Reason:
Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete, masonry, and steel.

There has been no wind testing of wood structures above 6 stories.

Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood/Mass Timber code Changes.

Most fire departments do not have the ability to fight fires above 6 stories effectively.

Water from sprinklers will accumulate in lower floors causing concerns for mold, water load, and water damage.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 44:

Proponent: Lindsey Haugh, Conco, representing Conco (lhaugh@mail.csuchico.edu) requests Disapprove.

Commenter's Reason: Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel and with the frequency of wildfire devastation (especially in California) this act would permit possibility of future destruction.

Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1 per hour in a fire, then after 2 hours in a fire, a 6 thick CLT wood load bearing wall will only have 2 of structural material left. This is not acceptable and is not addressed in the code change proposals.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment results in no change to existing code test. Therefore there is no change in the cost of construction.

Public Comment 45:

Proponent: Shawna Helber, C.E. Collins & Assoc., representing Selfrequests Disapprove.

Commenter's Reason: Allowing wood structures to be built above the level of fire department access is a serious mistake.

Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment results in no change to existing code test. Therefore there is no change in the cost of construction.

Public Comment 46:

Proponent: Jennifer Herrera, representing Conco (jherrera@conconow.com)requests Disapprove.

Commenter's Reason: There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories. Allowing wood structures to be built above the level of fire department access is a serious mistake. Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel. Allowing wood structures to be built above the level of fire department access is a serious mistake.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel. Wood is a serious mistake!! This will put the lives of people in danger if there were to be a fire or earthquake and people were on the top stories of a wooden structure.

Public Comment 47:

Proponent: Frank Howard, representing Howard Concrete Pumping Co., Inc. (fhoward1@howardconcretepumping.com)requests Disapprove.

Commenter's Reason:

Allowing wood structures to be built above the level of fire department access is a serious mistake, and Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel. Further,there is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 48:

Proponent: Shane Huff, representing MMC Materials, Inc.requests Disapprove.

Commenter's Reason: I am opposed to increasing the current height limitations on mass timber construction for the following reasons:

- There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.
- Allowing wood structures to be built above the level of fire department access is a serious mistake.
- Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.
- Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1" per hour in a fire, then after 2 hours in a fire, a 6" thick CLT wood load bearing wall will only have 2" of structural material left. This is not acceptable and is not addressed in the code change proposals.
- There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.
- It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?
- Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.
- Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.
- The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood Ad-Hoc. There is no information on the performance of the proprietary connections during fires?

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 49:

Proponent: Anthony Inglese, representing self; Peter Lalley (plalley@conconow.com) requests Disapprove.

Commenter's Reason: Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment results in no change to existing code test. Therefore there is no change in the cost of construction.

Public Comment 50:

Proponent: Heidi Jandris, A. Jandris & Sons, Inc., representing A. Jandris & Sons, Inc. requests Disapprove.

Commenter's Reason: Fire test (ASTM E119) dates back to a time when homes were furnished with natural materials such as cotton, leather, wool and wood. Modern homes are furnished with much more flammable materials, which are petroleum based; carpets, foam furniture, plastic based coverings, etc. These materials are much more combustible and much quicker to reach flash point. Wood structures with increasingly flammable interior furnishings, often with toxic flame retardants as the answer are not compatible. Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel. Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes. Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.

UNTESTED: Wood-industry funded tests performed in the U.S. and Canada were completely inadequate, failing to examine real-world structural risk factors, potential firefighting safety impacts from weather, and material-related risk factors to public health and safety.

UNPROVEN: While non-combustible concrete and steel have been used for centuries to build tall buildings and structures, mass timber products, like cross-laminated timber, are unknown and unproven construction materials.

UNSOUND: Common sense knows, and history shows, that TALL WOOD buildings are high-risk and dangerous to public health and safety when it comes to natural and man-made disasters like hurricanes and wildfires.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 51:

Proponent: Shawn Kalyn, Votorantim St Marys Cement LLC, representing selfrequests Disapprove.

Commenter's Reason: There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories

VOC (volatile organic compounds) with the adhesives used in the glues of CLT s and flame retardants should be investigated for the limits of exposure for indoor air quality of inhabitants.

Moisture control and agents used for the prevention of mold control needs to be addressed for both construction and occupancy. Mold spores can bloom during construction as shown in OSB board where agents used did not control or kill of the spore growth internally within the product.

Allowing wood framed structures to be built above the level of fire department access is a serious mistake. The vast majority of municipal ladder trucks cannot reach above the 7th floor.

Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete, masonry and steel.

Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Charring wood will add fuel to the fire and increase the heat and smoke output relative to noncombustible materials. Note: if the char rate is 1 per hour in a fire, then after 2 hours in a fire, a 6 thick CLT wood load bearing wall will only have 2 of structural material left. This is not acceptable and is not addressed in the code change proposals.

To date, there has been no full scale CLT fire tests done to ASTM standards. There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.

It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?

Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.

Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.

The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood Ad-Hoc. There is no information on the performance of the proprietary connections during fires?

Wood absorbs water, and the resulting rot and mold can seriously impair a wood structures overall anticipated performance. Note: non-combustible materials such as concrete, masonry and structural steel do not rot.

Bibliography: Shawn Kalyn B.Eng LEED AP bd+c
Technical Services Engineer

-In the building and construction industry for over 25 years.

-Graduate of Ryerson University in 2000 with degree in Civil Engineering

-took an oath "Calling of the Engineer"

-Work on CSA, ASTM and other industry standards

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

- Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 52:

Proponent: Janet Kasson, representing American Concrete Pumping Association (janet@concretepumpers.com)requests Disapprove.

Commenter's Reason: The code change will not increase or decrease the cost of construction

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 53:

Proponent: Danielle Kleinhans, representing Concrete Reinforcing Steel Institute (dkleinhans@crsi.org) requests Disapprove.

Commenter's Reason: There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories and wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 54:

Proponent: Steven Kosmatka, Portland Cement Association, representing Portland Cement Association (skosmatka@cement.org) requests Disapprove.

Commenter's Reason: Wood does not offer the resilience and fire protection of non-combustible alternatives. Most fire departments cannot handle an 18 story fire in a building made of combustible material. Residents in nursing home or assisted living facilities would not be able to escape. Fire fighters cannot get 18 stories of wheel chair bound occupants down the stairs and out in time.

Fire and related engineering research is not adequate to support the proposal.

Please disapprove this proposal.

Bibliography: There is no properly conducted fire research with wind forces at 18 stories available to support the proposal's claims.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. 18 story wood construction is currently not allowed, therefore disapproving this action has no impact on construction cost relative to current code.

Public Comment 55:

Proponent: Robert Krulik, Ohio Concrete, representing self (bob@ohioconcrete.org) requests Disapprove.

Commenter's Reason:

- Wood absorbs water, and the resulting rot and mold can seriously impair a wood structures' overall anticipated performance. Non-combustible materials such as concrete, masonry and structural steel do not rot.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

- Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 56:

Proponent: Guillermo Velarde, representing Concorequests Disapprove.

Commenter's Reason:

- There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.
- Allowing wood structures to be built above the level of fire department access is a mistake that places lives in serious danger.
- Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.
- Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1 per hour in a fire, then after 2 hours in a fire, a 6 thick CLT wood load bearing wall will only have 2 of structural material left. This is not acceptable and is not addressed in the code change proposals.
- There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.
- It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?
- Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.
- Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.
- The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood AdHoc. There is no information on the performance of the proprietary connections during fires?

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment results in no change to existing code test. Therefore there is no change in the cost of construction.

Public Comment 57:

Proponent: Meredith Lambert, Conco, representing Conco (mlambert@conconow.com) requests Disapprove.

Commenter's Reason: I believe that this proposal promotes construction methodology which is not fire safe or in the best interests of the general public for materials. Further it is irresponsible to use wood in this manner further impacting the deforestation of our country and others.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 58:

Proponent: elizabeth Langhauser, representing Self (bplanghauser@gmail.com) requests Disapprove.

Commenter's Reason: Allowing wood structures to be build above the level of fire department access is a serious mistake. Furthermore, there is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 59:

Proponent: John Lee, Cemstone Products Company, representing Self requests Disapprove.

Commenter's Reason: Allowing wood structures to be built above the level of fire department access is a serious mistake.

There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.

Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.

Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1 per hour in a fire, then after 2 hours in a fire, a 6 thick CLT wood load bearing wall will only have 2 of structural material left. This is not acceptable and is not addressed in the code change proposals.

There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.

It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?

Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.

Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.

The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood AdHoc. There is no information on the performance of the proprietary connections during fires?

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 60:

Proponent: Danny Mace, representing Self; Paul Tennis (pdtennis@comporium.net) requests Disapprove.

Commenter's Reason:

There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.

Allowing wood structures to be built above the level of fire department access is a serious mistake.

Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 61:

Proponent: Mark Manahan, Gonsalves & Santucci, Inc., representing self requests Disapprove.

Commenter's Reason:

- There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.
- Allowing wood structures to be built above the level of fire department access is a serious mistake.
- Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.
- Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1 per hour in a fire, then after 2 hours in a fire, a 6 thick CLT wood load bearing wall will only have 2 of structural material left. This is not acceptable and is not addressed in the code change proposals.
- There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.
- It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?
- Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.
- Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.
- The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood AdHoc. There is no information on the performance of the proprietary connections during fires?
- This would increase the use of wood products in construction and contribute to deforestation and environmental problems.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

- This public comment results in no change to existing code test. Therefore there is no change in the cost of construction.

Public Comment 62:

Proponent: DOUGLAS MARQUIS, Conco, representing selfrequests Disapprove.

Commenter's Reason: As a witness to the devastation of a multi-level residential wood structure, I am opposed to building tall residential structures from combustible materials. Wood simply does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.

The process should seriously reconsider supporting an approval when neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.

The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood AdHoc. There is no information on the performance of the proprietary connections during fires?

I'm concerned this decision has already been rubber stamped for approval prior to this process.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 63:

Proponent: William Marsh, Hydro Rents Carolina, representing Hydro Rents Carolina (bill.marsh@hydro-rents.com)requests Disapprove.

Commenter's Reason: There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories. Additionally, wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 64:

Proponent: Christy Martin (Marie C. Martin) Exe. Director, Concrete Promotional Group, Inc., representing Concrete Promotional Group, Inc.requests Disapprove.

Commenter's Reason:

- There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.
- Allowing wood framed structures to be built above the level of fire department access is a serious mistake. The vast majority of municipal ladder trucks cannot reach above the 7th floor.
- Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete, masonry and steel.
- Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Charring wood will add fuel to the fire and increase the heat and smoke output relative to noncombustible materials. Note: if the char rate is 1 per hour in a fire, then after 2 hours in a fire, a 6 thick CLT wood load bearing wall will only have 2 of structural material left. This is not acceptable and is not addressed in the code change proposals.
- To date, there has been no full scale CLT fire tests done to ASTM standards.
- There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.
- It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?
- Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.
- Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.
- The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood Ad-Hoc. There is no information on the performance of the proprietary connections during fires?
- Wood absorbs water, and the resulting rot and mold can seriously impair a wood structures overall anticipated performance. Note: non-combustible materials such as concrete, masonry and structural steel do not rot.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 65:

Proponent: Chris Mason, Prairie Material, representing Prairie Materialrequests Disapprove.

Commenter's Reason: I'm not convinced that there has been sufficient testing on the properties of the materials (and joining materials) in the event of a fire, as well as the long-term effects of water.

I m also concerned that the environmental gains may be overstated and, when taking into account, the life-cycle cost to obtain, process, deliver and assemble, the any potential gains would be negligible and not worth the risk.

On a very human and practical level, I wouldn't want to have my kids or grandkids sleeping in a wood high-rise. It s unsettling to think what could happen with regard to stairwells, elevator shafts and access for emergency services personnel, when taking into considerations flammability and generated heat.

I hope unbiased research and testing can continue and am not in favor green lighting the change at this time.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

It is yet unknown the extent to which this code change proposal may or may not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus, it appears there is not a known cost impact when compared with present requirements.

Public Comment 66:

Proponent: Tina McIntyre, CalPortland, representing self (tmcintyre@calportland.com)requests Disapprove.

Commenter's Reason:

There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories. A matter of safety must be considered.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of

construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. this proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 67:

Proponent: Dan McCoy, PE, representing R. L. McCoy, Inc. (danmccoy@rlmccoy.net)requests Disapprove.

Commenter's Reason: I've been concerned in recent years that wood has been getting stretched beyond reasonable limits. It used to be we were limited to four floors without some special analysis. We don't like using it for tall structures but sometimes, if it's allowed by code, contractors and/or architects will push it. Unfortunately, there are creep issues that can affect plumbing, etc. and the fire protection issue is very real. There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories. Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel. Hopefully, the code council looks at this more closely.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 68:

Proponent: Ganesha Mohanram, Conco Companies, representing Conco Companies (gmohanram@conconow.com)requests Disapprove.

Commenter's Reason: We all know and been studying the difference between Wood construction and Concrete Construction. We have been talking how safe concrete structures when compared to wood construction. Cros laminated Timber chars in fire; however charring is not equivalent to non-combustible. Note: if the char rate is 1 per hour in a fire, then after 2 hours in a fire, a 6 thick CLT wood load bearing wall will only have 2 of structural material left. This is not acceptable and is not addressed in the code change proposals. And currently there is no satisfied engineering justification on construction high raised i.e from 6 stories to 18 stories with mass timber thus, allowing wood structures to be built above the level of fire department access is a serious mistake.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 69:

Proponent: Debbie Moreno, representing Conco (dmoreno@conconow.com)requests Disapprove.

Commenter's Reason:

- There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories. I would never live or work in a high rise that is made of wood. A fire can take down a high rise in minutes, also the fact that would can rot overtime.....

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment results in no change to existing code test. Therefore there is no change in the cost of construction.

Public Comment 70:

Proponent: Todd Morgan, Ramcrete, Inc, representing Ramcreterequests Disapprove.

Commenter's Reason: Allowing wood structures to be built about the level of fire department access is a serious mistake and puts many lives in harms way. Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete or steel.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 71:

Proponent: Marc Nard, Portland Cement Association, representing Portland Cement Association (mnard@cement.org)requests Disapprove.

Commenter's Reason: Mass Timber is a new and incompletely tested building method. There has been insufficient / inadequate testing of the complete system to date. As code officials prescriptive limits are strictly adhered to. You would not allow even a single story increase in the currently allowed construction height of 6 stories. If a contractor asked to be allowed to build to 7 stories he would be told NO that would exceed the height code allows. Now not only is the wood industry seeking to simply exceed the height limitation of 6 stories by one story the desire is to extend the height beyond 6 stories and in fact, without proper testing, NO wind testing or proper justification randomly raise the height allowance three times the current limit allowed to 18 stories. for Mass Timber structures.

18 Story structures far exceeds the level of fire department access. I have 12 years experience as a firefighter in the States of Indiana and Michigan and would urge DISAPPROVAL. Not being able to reach the fire in a combustible building is a recipe for disaster. Common sense and the experience learned from high rise fires dictates that to be safe we use NONCOMBUSTIBLE materials, Type 1 and Type II construction not just open the door for untested systems to be built as high rises. Having combustible construction above the level of fire department access puts occupants, fire fighters and emergency services persons at unnecessary risks.

Wood structures will burn and this affects them and adjacent structures as well. It simply does not provide the Resiliency, Safety and Piece of Mind that Concrete and Steel offer. Fire testing to date has been done on two story structures. We need testing on an 18 story structure both with and without sprinkler protection (they can fail or be inoperative on occasion) and we need testing with wind and water pooling to see how the system reacts to the additional deteriorating factors.

Cross Laminated Timber / Mass Timber burns and chars in a fire. Wood is a combustible product. Given enough heat and oxygen it acts as a fuel and will burn. Note: if the char rate is 1 per hour in a typical fire then after a 2 hour fire exposure a 6 inch wall assembly is now missing 4 inches of structural material. There is no repair method offered so that if there is a kitchen fire and the material is damaged no one as decided it would be an advantage to develop and disseminate the repair procedures prior to building and occupying these structures. This is a major mistake.

To date no standard, including NFPA 285, has a wind component that has been part of the testing of Mass Timber. The recent loss of life in the London high rise fire shows clearly that wind is an accelerating factor in a high rise fire. Support DISAPPROVAL do not experiment with structures people live in and use. Do the testing on full size structures prior to putting these extended height allowances into the code and be certain we test for wind effect.

In the case of a fire event there are two major overriding issues beyond the combustibility of wood products. First, where does the water go after a sprinkler head is activated either by fire or by accidental event (kids throwing a ball in an apartment and hitting a sprinkler head). Second, if the fire department does have to fight an active fire the additional volume of water from attack lines adds to the already added load of sprinkler head water. The connectors have not been tested. There is no provision for a drainage system. What effect will this have on adhesives holding these systems together. What about weather that causes windows to blow out and rain or wind blown debris to enter and pool in the structure. Mold and mildew are a serious concern that have not been addressed. The behavior of Mass Timber / CLT in high rise structures is completely dependent on proper connections. All connections being used to date are considered proprietary meaning that there is no information available to the public on their design capacities and failure rate.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proponent has submitted a Cost Impact statement that declares that this will not increase the cost of construction. CLT / Mass Timber is a brand new technology which is bound to have a cost increase on the cost of construction using current code compliant non-combustible construction materials.

Disapproving this code change proposal will not increase or increase the cost of construction.

The proposed text provides information that was not previously in the code and thus there is no comparative data. This only underlines the necessity for approximate cost of construction materials and does not alleviate the need for comparison cost of construction values. Perspective building owners and designers have to have some gauge to go by as they determine materials cost in construction.

Public Comment 72:

Proponent: Gwen Wang, Portland Cement Association, representing Self (gwang@cement.org)requests Disapprove.

Commenter's Reason:

There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories. Allowing wood structures to be built above the level of fire department access is a serious mistake.

Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel. There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 73:

Proponent: Mark Nowak, representing Steel Framing Industry Association requests Disapprove.

Commenter's Reason: This proposal should be disapproved for the following reasons:

The proposed language prohibits the use of combustible materials on the exterior of walls and in concealed spaces. This creates a conflict with the International Energy Conservation Code (IECC) and ASHRAE Standard 90.1 (Energy Standard for Buildings except Low Rise Residential Buildings).

Given all buildings will require continuous or other combustible insulation under the IECC or ASHRAE 90.1*, the two-story fire tests conducted in support of this proposal are inadequate** to extrapolate to buildings of the heights and number of stories permitted under the series of proposals that includes G108, G-75, G80, and G84-18.

Code officials and designers will face a dilemma over how to interpret the new requirements against the energy code requirements. One possible interpretation would effectively give these buildings an exemption to the use of the 90.1 and IECC envelope energy requirements, given there are no practical alternatives for compliance. The end result will be inconsistent enforcement or no energy code enforcement.

The proponents are attributing to these newly defined Type IV assemblies a performance level equivalent to some non-combustible materials, but traditional noncombustible materials can be constructed with combustible continuous exterior insulation. Clearly, the new Type IV construction categories do not offer the same level of protection, or the proponents would not have placed such a significant limitation on commonly-used combustible materials.

This proposal attempts to introduce several new categories of Type IV construction into the code that will greatly expand the number of stories, allowable area, and maximum height of buildings framed with materials made from combustible wood products such as cross-laminated timber. This greatly increases the risk to firefighters, building occupants, and neighboring buildings and infrastructure. Many of the major decisions that went into the creation of this proposal were based on expert opinion and relied on significant extrapolation to buildings with up to 9 times as many stories as the tests that were conducted. However, even within the context of these shortcomings, several key issues as discussed above were not adequately addressed or not addressed at all.

**With the IECC and 90.1, combustible material (insulation) on the exterior and/or in concealed spaces is almost always necessary for compliance. Even under the performance compliance path using energy modeling, it would be almost impossible to avoid the use of combustible continuous exterior insulation in the northern climate zones. Of the three major foam plastic insulation materials commonly used in buildings for continuous insulation - EPS, XPS, and polyisocyanurate - all are combustible.*

***There are no tests that were submitted to support that the proposed assemblies can meet the fire propagation tests in NFPA 285 (required in Chapter 26 of the IBC). Although the two-story tests conducted in support of the proposal were not intended to address this issue, that itself is a significant oversight. Simply declaring that noncombustible materials can't be used is not sufficient to overlook other code requirements that require such materials.*

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 74:

Proponent: Gabriel Ojeda, Fritz-Pak Corporation, representing Fritz-Pak Corporation (gabrielojeda@fritzpak.com) requests Disapprove.

Commenter's Reason: It was 104F yesterday in Dallas Texas. Can you imagine first responders having to deal with ambient heat plus having to fight a fire in a wood structure. There hasn't been enough testing and research on building over 6 stories to be safe for the occupants and first responders. Fire fighting equipment does not reach above 6 stories. Allowing construction of wood structures without enough testing and experience is not right.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Code change will not change or decrease cost of construction. However it will increase the risks that first responders must endure.

Public Comment 75:

Proponent: Thomas OMalley, Schwing America Inc, representing Schwing America Inc requests Disapprove.

Commenter's Reason:

- Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.
- Allowing wood structures to be built above the level of fire department access is a serious mistake.
- There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment results in no change to existing code test. Therefore there is no change in the cost of construction.

Public Comment 76:

Proponent: Maizer Ouijdani, Conco, representing Conco requests Disapprove.

Commenter's Reason:

- Allowing wood structures to be built above the level of fire department access is a serious mistake. Do not forget what happened in Chicago!

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 77:

Proponent: Jim Pajk, Votorantim St. Marys Cement LLC, representing self; Thomas Tietz (tom.tietz@cncement.org); Steve Parker (steve.parker@farmersbranchtx.gov) requests Disapprove.

Commenter's Reason:

- ○ There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.
- Allowing wood framed structures to be built above the level of fire department access is a serious mistake. The vast majority of municipal ladder trucks cannot reach above the 7th floor.
- Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete, masonry and steel.
- Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Charring wood will add fuel to the fire and increase the heat and smoke output relative to noncombustible materials. Note: if the char rate is 1” per hour in a fire, then after 2 hours in a fire, a 6” thick CLT wood load bearing wall will only have 2” of structural material left. This is not acceptable and is not addressed in the code change proposals.
- To date, there has been no full scale CLT fire tests done to ASTM standards.
- There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.
- It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?
- Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.
- Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.
- The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood Ad-Hoc. There is no information on the performance of the proprietary connections during fires?
- Wood absorbs water, and the resulting rot and mold can seriously impair a wood structures’ overall anticipated performance. Note: non-combustible materials such as concrete, masonry and structural steel do not rot.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

- Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 78:

Proponent: Tien Peng, representing National Ready Mixed Concrete Association (tpeng@nrmca.org) requests Disapprove.

Commenter's Reason: While the Ad Hoc Committee had intended to validate the fire performance of cross laminated timber in fire conditions of buildings, the AWC/ATF compartment testing was limited in scope and not a thorough predictor of fire behavior for high rise building made of a new material. The testing so far is insufficient to capture the fire response characteristics in question. No tests were done to factor in wind, exterior performance, panel connections or moisture, which impacts material performance, fire-fighting and property damage. CLT is a great innovation for the wood industry but it s not ready for prime time and it s certainly not ready for us to build safely to 270 feet and 18 stories. The ICC should not adopt code provisions that will put people at risk.

1. CLT Reliability and Predictability Issues

Cross laminated timber does not have a long enough history to demonstrate their reliability and predictability. The structural design of modern tall buildings is governed by the need to efficiently transfer loading, particularly that from wind, whilst providing increasingly complex building functionality. The use of cross laminated timber implies a highly optimized systems which means the least amount of material to enabled efficient load transfer. Thus, in the event of a fire there is an increased risk not typical in mid-rise constructions, and especially not in a two-story mock up in a lab.

The NFPA with ARUP *Fire Safety Challenges of Tall Wood Buildings* paper noted (NFPA 2013)[i]:

- In a real fire situation, the load-bearing elements in CLT are expected to load-share , or redistribute in a method that is not easily predicted in simple fire testing.
- Previous CLT fire testing has resulted in delamination and char fall-off when exposed to fire conditions.
- This has the potential to increase the fire temperature and burning rate within the compartment, and could impact the structural fire resistance at later stages in the fire duration.

The full-scale fire testing in Norway (SPFR A15101 2016)[ii] showed:

- The temperature increased fast and flashover was reached after four minutes.
- Temperatures were significantly higher than the standard time-temperature curve according to EN 1363-1
- The fire did not cool down before manual suppression was initiated when the test room collapsed 1-hour 36 minutes after ignition
- The sprinklers in the adjacent corridor did not stop the fire from spreading out from the room of origin.
- The charring rate varied much faster than expected

We should not be putting lives in high rises at risk with this level of material unpredictability.

2. Exposed CLT Fire / Moisture /Delamination Issues

The National Institute of Standards (NIST) tests complete previously said there were concerns that flashover occurred earlier with CLTs, heat delamination of the exposed CLT affected its fire performance and a large re-flash occurred on the exposed wall with delamination of the second ply of the CLT. (NIST 2017)[i]

While fire departments understand the risk of collapse with solid wood, there is not enough documentation or history of bonded or laminated wood structures, and they may fail sooner under fire conditions. The problem is that under fire conditions an adhesive may either thermally soften or chemically degrade causing the member to lose its strength, leading to structural collapse. Hence, we see delamination from the NIST testing as well as the very real construction failure on portions of the new College of Forestry building at Oregon State University where a large section of subflooring made of cross-laminated timber gave way between the second and third stories.

Moisture is an important issue for delamination and in many parts of the country the laminated mass timber panels will experience an environment which may exceed the testing limits. Wood will change in all three orthogonal dimensions with changes in moisture, and the changes are not even. This not only means that some species swell more because of their higher density, but also wood of non-uniform density displays non-uniform swelling. Moreover, as wood swells and shrinks, adhesives do not follow with the same volumetric expansion. RDH Building Science full-scale mock-up study (Lepage 2017) [ii]notes that, The research indicates that CLT and mass timber is susceptible to dangerously high moisture contents, particularly when exposed to liquid water in horizontal applications. and other research indicate that CLT is at risk of structural damage by decay and rotting fungi (Zabel and Morrell 1992)[iii]

Clearly, we should not be putting lives in high rises at risk with this level of material unpredictability.

3. Fire / Connections Vertical Fire Spread

All connections used in current projects are proprietary and no information is publicly available regarding their performance. In a high-rise fire event, it is essential that the fire be prevented from spreading upwards or downwards from the floor of origin, endangering the lives of those waiting on more remote floors. Typically, the floor slab provides a robust barrier inhibiting external fire spread so long as it remains firmly supported by the structure. However, the AWC/ATF compartment fire testing had not adequately accounted for the connections in the CLT technologies to meet this crucial objective. The deformation of the connections when exposed to fire can expose gaps and flammable materials which can lead to spread both upwards through flaming, and downwards through dripping molten materials. Once fire starts spreading away from the floor of origin the safety of the occupants is compromised. Examples of vertical fire spread include:

- Las Vegas Hilton, USA: 22 Stories in approximately 25 minutes
- Caracas Tower, Venezuela: 17 floors in a 24-hour period
- Windsor Tower, Spain: 19 floors, ~7 hours for spread, 24 hours total fire duration
- TVCC Tower, China: 44 floors, around 15 minutes

4. Fire / Stack Effect

A similar concerning pattern emerges when discussing wind and air movement fire performance. One problem common to high-rises but not found in low-rise buildings is the stack effect movement of air inside the building. This air movement is critical to understand what happens during a fire event, as it can intensify a fire or allow flames and combustion gases to move beyond the room of origin. Fire personnel responding to a high-rise fire event need to understand where smoke and toxic gases may be going. Yet, shrinkage, moisture and creep, common in wood products including CLT, will create unpredictable opportunities for air movement within a building.

Air pressure and thermal differential with the use of CLT panels can shift the neutral pressure plane of the building. In cold weather (positive stack effect), the velocity of air channeling into the core from the lower floors is a very real concern to the occupants when they have to defend in place as well as fire service if the fire egress is compromised with smoke. In warm weather (reverse stack effect), where typically the staging floor is two floors below the fire floor, there can be concern of contamination, if there is unpredictability of where the fire path may be taking.

5. Fire / Wind

We typically associate wind with brush and wildland fires but it's just as important in structural fires.

- In 2009 a Texas probationary fire fighter and captain die as a result of rapid fire progression in a wind driven residential fire. Sustained winds from east/south-east at 17 mph with gusts up to 26 mph.
- Virginia Firefighters Battle Three-Alarm Townhouse Fire in 2011. In assessing the high winds and the fire conditions Battalion Barnes says fire crews tried to attack the flames inside two townhouses, but were forced back by intense heat and falling ceilings.
- In 2012 Prince George's County (Maryland), firefighters arrive on scene to a structure fire with winds impacting the rear of the structure. Shortly after forcing the front door open, they saw a dramatic change in fire behavior. As they made entry, they quickly experienced high velocity and high temperature gases, injuring seven firefighters, two critically.

The American Wood Council compartment fire tests did not account for wind loads.

Wind can add to the hazard to a low-rise fire, but it is most concerning around the upper floors of tall buildings. And high-rise fires create unique safety challenges for occupants and firefighters, even without the influence of wind. Wind can change the FLOW PATH of a fire and in some cases create a blowtorch effect and untenable conditions. When a window in the fire apartment fails, the influx of wind can create significant and rapid increases in the heat production of a fire. Smoke and heat spreading through corridors and stairwells, for instance, can inhibit occupants ability to escape and can limit firefighters ability to rescue them. Conditions in a corridor are of critical importance because it is the route that firefighters use to approach a fire and that occupants use to exit a building.

During the course of any structure fire, the wind may also influence exterior conditions and firefighter safety. Accelerated winds near high rises are caused by the downdraft effect, where the air hits a building and, with nowhere else to go, is pushed up, down and around the sides. The air forced downwards increases wind speed at street level. Tests conducted by National Institute of Standards and Technology (NIST 2012), the Fire Fighting Technology Group, FFTG, on positive pressure ventilation determined that an external wind speed of as low as 10 mph could cause a vented room within a structure to quickly spread from an apartment unit to a vent point, represented by a stairwell door. The spreading had floor-to-ceiling and wall-to-wall fire involvement with blowtorch effects. Moreover, if several towers stand near each other, the channeling effect, a wind acceleration created by air having to be squeezed through a narrow space. This Venturi effect will endanger the adjacent buildings.

6. Fire on Exterior

The AWC/ATF compartment fire tests did not account for exterior fire conditions and the proposed exterior proposal does not meet the required testing of CLT assemblies.

An important aspect of fire behavior in the affected building involves the burning behavior of materials on the exterior. While the AWC/ATF test demonstrated an understanding of CLT in an interior fire situation, the circumstances contributing to ignition scenarios of the exterior can be equally complex and equally important. In the past few years we have seen a number of deadly high-rise fires that propagated on the exterior of the structure.

- 2018 Almas Tower in Dubai, UAE
- 2017 Marco Polo apartment complex in Hawaii
- 2018 Grenfell Tower fire in West London

Simply testing the interior fire scenario does not capture potentially important parameters affecting CLT elements in tall wood buildings. If a fire in a heavy-timber building is not extinguished by the initial attack, a tremendous conflagration with flames coming out of the windows will spread fire to adjoining buildings by radiated heat. In a high-rise fire event, it is essential that the fire be prevented from spreading upwards or downwards from the floor of origin, endangering the lives of those waiting on more remote floors.

Notably missing from the proposals is how the mass timber exterior assembly in buildings over 40 feet in height would comply with NFPA 285, *Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components*.

- *Section 1403.5:* For combustible water-resistive barriers in buildings over 40 feet in height of Type I, II, III, or IV construction.
- *Section 1407.10.4:* For metal composite materials (MCM) used on buildings of Type I, II, III, and **IV** construction.
- *Section 1409.10.4:* For high-pressure decorative exterior-grade compact laminates (HPL) exterior wall coverings used on buildings of Type I, II, III, and **IV** construction.
- *Section 1509.6.2:* Combustible mechanical equipment screens used on buildings of Type I, II, III, and **IV** buildings.
- *Section 2603.5.5:* Exterior walls of buildings of Type I, II, III, and **IV** construction of any height incorporating foam plastic insulation, except for one-story sprinklered buildings.

This is a requirement yet there is no reference to NFPA 285 testing of exterior CLT assemblies. One test by Nordic Engineered Wood published under the Canadian ULC S134 is not enough of a sample size to validate the tall wood proposals. Again, there is not enough historical fires with cross laminated timber to provide information that can be used in an 85-ft building, much less one at 270 feet.

7. Limits of Redundancy

The ICC TW-AHC claimed the added safety factor of active sprinkler systems adds to the safety of the proposals. Without a doubt, the inclusion of fire sprinkler systems in our buildings since the late 1980 s has been effective at increasing the chances of survival in a fire. But when systems don t operate as intended (such as in a freeze failure with water damage) or fail in a high-rise fire condition, the impact can be large, not just in monetary terms, but also in the lives of the occupants and fire fighters.

The full-scale fire testing completed in Norway showed the The sprinklers in the adjacent corridor did not stop the fire from spreading out from the room of origin. (SPFR A15101 2016).[iv] Moreover, according to NFPA s report *U.S. Experience with Sprinklers*, sprinklers were effective at controlling the fire in 96% of fires in which they operated, but sprinklers were only effective in 88% of the fires large enough to activate them. The reported sprinkler failures (660 per year) were twice as common as reported fires in which sprinklers were ineffective and did not control the fire. A National Institute of Standards and Technology (NIST) study, *Estimates of Operational Reliability of Fire Protection Systems*, also demonstrates this over-reliance on fire sprinklers is misguided.

8. Untested Reference Standard

State and local governments that adopt and enforce model building codes which references a number of standards. Yet, the proposals regularly cite the newly referenced standard, *ANSI/APA PRG 320-2018: Standard for Performance-Rated Cross-Laminated Timber*, an untested document. The reference to ANSI/APA PRG 320-2018 resolves nothing and takes no legal responsibility for performance failure. APA PRG 320 has no real history of use or validation as a reliable document and no jurisdiction refers to this document. It is premature to utilize a standard that is rarely referenced and start building to 18 stories from it.

- [i]<https://www.nist.gov/el/fire-research-division-73300/national-fire-research-laboratory-73306/fire-safety-challenges-0>
- [ii]<https://buildingsciencelabs.com/wp-content/uploads/2017/11/CCBST-2017-Moisture-Uptake-Testing-for-CLT-Floor-Panels.pdf>
- [iii]Zabel RA, Morrell JJ (2012) Wood microbiology: decay and its prevention. Academic press.
- [iv]<http://www.mypaper.se/html5/customer/355/11143/?page=21>
- [i]https://sustainable-fire-engineering.sustainable-design.ie/wp-content/uploads/2015/08/NFPA-FPRF_Tall-Wood-Buildings-Fire-Safety-Challenges_2013.pdf
- [ii]<http://www.mypaper.se/html5/customer/355/11143/?page=21>

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 [ii]<https://buildingsciencelabs.com/wp-content/uploads/2017/11/CCBST-2017-Moisture-Uptake-Testing-for-CLT-Floor-Panels.pdf>

[iii]Zabel RA, Morrell JJ (2012) Wood microbiology: decay and its prevention. Academic press.

[iv]<http://www.mypaper.se/html5/customer/355/11143/?page=21>

[i]https://sustainable-fire-engineering.sustainable-design.ie/wp-content/uploads/2015/08/NFPA-FPRF_Tall-Wood-Buildings-Fire-Safety-Challenges_2013.pdf

[ii]<http://www.mypaper.se/html5/customer/355/11143/?page=21>

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposed public comment would **reduce cost of construction**. Substantiation and references below.

1. Research:

A recent feasibility study ^{[[i]]} reveals that CLT construction is significantly more costly than other well-established construction methods such as concrete. Renowned structural engineers, Cary Kopczynski & Company found that the cost of the CLT structural system for a typical 10 story apartment building would cost \$48 to \$56 per square foot compared to \$42 to \$46 per square foot for concrete, translating nearly **20% premium** for Cross Laminated Timber.

2. Brock Commons, British Columbia

Per "University of British Columbia: Report to The Board of Governors, Tall Wood Student Residence, Brock Commons Phase 1" Report ^{[[ii]]}, dated September 30, 2014,

- "The capital cost for the project is estimated at \$44 million (\$40m standard construction, plus \$4m wood premium)."
- "The \$4m estimated premium for advanced wood design and construction is to be funded from external sources including \$3.45m secured to date from the Canada Wood Council (CWC) and Forest Innovation Investment."

This is a **10% premium** for Cross Laminated Timber at the 18-Story Brock Commons.

3. Framework Oregon:

Per the January 5, 2018 *Portland Oregonian* article "Wheeler Defends Decision to Invest In Pricy Complex" of the Portland Oregonian^{[[iii]]},

- "While each unit is expected to cost an average \$480,000 to build, the city's contribution will amount to \$100,000 per apartment."
- Despite a pledge from Mayor Ted Wheeler to bring down the cost of affordable housing in Portland, the Portland Housing Bureau had nonetheless awarded the building \$6 million toward the \$29 million total. (A **21% subsidy** by the taxpayers for the 12- Story Framework project).

By the July 16, 2018 *Willamette Week (WW)* article "Plans for Record-Setting Timber Tower in Downtown Portland Fall Through" ^{[[iv]]} reported,

- The building, which was slated to include 60 *affordable* apartments, was projected to cost \$651.43 per square foot, *WW* reported in December. (The 660-square foot two bedroom apartments were projected to cost \$567,389 to build.)

4. Lumber Pricing:

And this doesn't consider the recent price increases of softwood lumber that have risen wildly from \$424 per board foot a year ago to \$536 in the second quarter of 2018. That's a **26% increase** in just one year. At the same time, concrete prices rose at a stable rate of 5%.

^[i] http://buildingsstudies.org/pdf/related_studies/Cross_Laminated_Timber_Feasibility_Study_Feb-2018.pdf

^[ii] http://bog2.sites.olt.ubc.ca/files/2014/09/3.2_2014.09_Tall-Wood-Building.pdf

^[iii] https://www.oregonlive.com/politics/index.ssf/2018/01/portland_mayor_ted_wheeler_def.html

^[iv] <http://www.wweek.com/news/city/2018/07/16/plans-for-record-setting-timber-tower-in-downtown-portland-fall-through/>

Public Comment 79:

Proponent: Chris Pernicano, representing San Diego Concrete Pumping Inc. (pernicanospumping@san.rr.com) requests Disapprove.

Commenter's Reason: Allowing wood structures to be built above fire department access is a big mistake Wood does not offer the resilience and fire protection of non combustible materials such as concrete and steel

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 80:

Proponent: Nick Popoff, St Marys Cement/Votorantim, representing Self (njpopoff@comcast.net) requests Disapprove.

Commenter's Reason: Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete, masonry and steel. To increase the height from 6 stories to 18 stories doesn't appear to be wise from a

combustibility perspective. From a resilience and durability perspective, 18 stories is a lot of building that won't be able to stand the test of time...nor withstand some of nature's forces. I fear for the safety of anyone living in a wood structure higher than 6 stories

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. There will be no savings with this proposal...life cycle analysis will be diminished...the greatest risk is fire.

Public Comment 81:

Proponent: Nicholas Porte, Portland Cement Association, representing PCA (nporte@cement.org) requests Disapprove.

Commenter's Reason:

- Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes
- Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Charring wood will add fuel to the fire and increase the heat and smoke output relative to noncombustible materials.

Public Comment 82:

Proponent: Miguel Quiroz-Mosqueda, The Conco Companies, representing Self requests Disapprove.

Commenter's Reason: When neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes we should understand why, not just keep trying to push this proposal forward.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment results in no change to existing code test. Therefore there is no change in the cost of construction.

Public Comment 83:

Proponent: Greg Ralph, representing ClarkDietrich Engineering Services requests Disapprove.

Commenter's Reason: The proposal greatly expands the allowable height and area of Type IV construction with materials made from combustible wood products, namely cross-laminated timber. Much of these changes are based on opinion and extrapolation of small scale testing. The expanded provisions tremendously increase the risk to occupants, first responders and all adjacent structures.

The glue that holds the strands of the CLT together is the critical link to the structural and fire performance. The proponents themselves have identified delamination due to exposure to fire and heat as an area of concern. Adequate testing to verify the durability of the adhesive has not been provided.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with the present requirements.

Public Comment 84:

Proponent: JONATHAN RAMOS, Conco, representing Conco requests Disapprove.

Commenter's Reason: To provide and ensure safe buildings in California. Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 85:

Proponent: Franzine Rendon, self, representing selfrequests Disapprove.

Commenter's Reason:

- There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.
- There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.
- It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment results in no change to existing code test. Therefore there is no change in the cost of construction.

Public Comment 86:

Proponent: Ryan Richardson, The Conco Companies, representing The Conco Companiesrequests Disapprove.

Commenter's Reason: Allowing wood structures to be built above the level of fire department access is a serious mistake and could lead to extremely large disasters in our country. Even if a fire suppression system "could be" capable of extinguishing the initial fire the structure itself could not handle the subsequent damages from water. I think that the initially the cost of these buildings might seem appealing, but after a few years and some accidents/disasters the costs would skyrocket. Driven by insurance and repair costs, and many of reasons that will become apparent if these structures are approved.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 87:

Proponent: G Michael Robinson, representing Carolina Stalite Co.requests Disapprove.

Commenter's Reason: Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood/Mass Timber Code changes. There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories. Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 88:

Proponent: Larry Rowland, Lehigh White Cment Company, representing selfrequests Disapprove.

Commenter's Reason: Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes. Tall Wood construction with mass timbers is untested. The wood-industry funded tests performed in the U.S. and Canada were completely inadequate, failing to examine real-world structural risk factors, potential firefighting safety impacts from weather, and material-related risk factors to public health and safety. Cross-Laminated Timber (CLT) chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1" per hour in a fire, then after 2 hours in a fire, a 6" thick CLT wood load bearing wall will only have 2" of structural material left. This is not acceptable and is not addressed in the code change proposals.

Tall Wood construction is unproven: While non-combustible concrete and steel have been used for centuries to build tall buildings and structures, mass timber products, like cross-laminated timber, are unknown and unproven construction materials. It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues. I state again, neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.

Tall Wood construction is unsound: Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees. Furthermore the behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities. There is no information on the performance of the proprietary connections during fires. Common sense knows, and history shows, that TALL WOOD buildings are high-risk and dangerous to public health and safety when it comes to natural and man-made disasters like hurricanes and wildfires.

Bibliography: Satisfied

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 89:

Proponent: Todd Schrimpf, The Conco Companies, representing Selfrequests Disapprove.

Commenter's Reason: Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.

Allowing wood structures to be built above the level of fire department access is a serious mistake.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment results in no change to existing code test. Therefore there is no change in the cost of construction.

Public Comment 90:

Proponent: Sue Schumacher, Collins and Associates, representing Selfrequests Disapprove.

Commenter's Reason:

Allowing wood structures to be built above the level of fire department access is a serious mistake.

Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.

The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood Ad-Hoc. There is no information on the performance of the proprietary connections during fires?

Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1" per hour in a fire, then after 2 hours in a fire, a 6" thick CLT wood load bearing wall will only have 2" of structural material left. This is not acceptable and is not addressed in the code change proposals.

On a personal note - Prior to beginning graduate school in Toledo, Ohio, my daughter leased an existing apartment not even questioning what the building was made of. Prior to moving in, a fireworks rocket hit the roof and caught fire; before the fire department could even arrive on the scene, the entire building was engulfed in flames and several attached buildings were lost as well before they were able to put it out. Questioning how this could happen, we later learned the buildings were constructed with wood. I thank God that she wasn't living there at the time of the fire and shudder to think what might have happened if she were.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 91:

Proponent: Jim Schumacher, retired, representing selfrequests Disapprove.

Commenter's Reason: Allowing wood structures to be built above the level of fire department access is a serious mistake. Too many people could die in wood built apartments fires

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of

construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 92:

Proponent: Adam Shoemaker, ClarkDietrich, representing ClarkDietrich (adam.shoemaker@clarkdietrich.com) requests Disapprove.

Commenter's Reason: This proposal aims to add three new Type IV Fire-Resistant Rating (FRR) Requirements to Table 601. In the IBC Section 602.1 it states that The building elements shall have a **fire-resistance rating** not less than that specified in Table 601 and exterior walls shall have a fire-resistance rating not less than that specified in Table 602. Where required to have a fire-resistance rating by Table 601, **building elements shall comply with the applicable provisions of Section 703.2**. In IBC Section 703.2 it then states that The fire-resistance rating of building elements, components or assemblies **shall be determined in accordance with the test procedures set forth in ASTM E119 or UL 263** or in accordance with Section 703.3. Section 703.3 again calls for comparisons against ASTM E119 and UL 263. The fire testing that was done to support this proposal did not include any ASTM E119 or UL 263 testing, therefore it should not be approved.

In addition, Section 602.2 states that Types I and II construction are those types of construction in which the building elements listed in Table 601 **are of noncombustible materials**, except as permitted in Section 603 and elsewhere in this code. I don't believe you can justify allowing Type IV combustible structural elements to have the same FRR as Type I and II NON-combustible structural elements. This is not a conservative or proven safe approach and should not be allowed.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

No cost impact.

Public Comment 93:

Proponent: James Singleton, representing self requests Disapprove.

Commenter's Reason: At a time when carbon dioxide is at an all time high in our atmosphere composition. We need to mitigate the impact of deforestation of our planet. The change in this proposal would set an increase of demand of lumber products which greatly impacts our environment.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment results in no change to existing code test. Therefore there is no change in the cost of construction.

Public Comment 94:

Proponent: Stephen Skalko, Stephen V. Skalko, P.E. & Associates, LLC, representing Stephen V. Skalko, P.E. & Associates, LLC (svskalko@svskalko-pe.com) requests Disapprove.

Commenter's Reason: G108-18 should be disapproved because the issue of fire resistance of connections for mass timber construction has not been sufficiently addressed in this proposal. The present code requirements for nominal heavy timber members have an approximate 1-hour fire resistance. This code proposal adds three new types of heavy timber construction (Types IV-A, IV-B and IV-C) which have fire resistance requirements for the primary structural frame and secondary members for at least two hours (three-hours for Type IV-A primary members). There is no language to direct the code user on what should be provided or expected to protect the connections for these higher fire resistances. The topic of fire resistance protection of connections has been treated too lightly considering the importance of these connections for maintaining structural stability for these taller mass timber buildings during and after a fire incident. The ICC Tall Wood Building Committee was told that there are proprietary connections that have been used in Europe to accomplish these higher fire resistance ratings required. However, documentation in the form of fire tests, technical reports or other reference material has not been provided to substantiate these claims.

And the CLT Handbook available for designers is not much help either [CLT Cross-Laminated Timber Handbook US Edition, 2013]. In Chapter 8, Fire, Section 5 Connections the handbook states:

Due to the high thermal conductivity of steel, metallic fasteners and plates directly exposed to fire may heat up and conduct heat into the wood members. The wood components may then experience charring on the exposed surface and around the fastener. As a result, the capacity of the metallic connection is reduced to the strength reduction of the steel fasteners at

elevated temperatures and the charring of the wood members. Therefore, where a fire resistance rating is required by the IBC, connections and fasteners are required to be protected from fire exposure by wood, gypsum board or other protection approved for the required rating .

While the protection cited may increase the fire endurance of the metallic portions of the connections, the connection elements will still be subjected to elevated temperatures during a fire event. Data has not been provided to demonstrate what those elevated temperatures will be with the various protection systems noted so there is no way to evaluate the potential for internal charring of connector holes. There is also no methodology provided that would allow for a comprehensive post-fire evaluation of the remaining structure.

A technical research report on connections for tall wood buildings prepared for the National Research Council of Canada reported that the fire resistance for concealed connections may be on the order of 1 to 1-1/2 hours [Canadian Commission on Building and Fire Codes, Standing Committee on Fire Protection, *Review of Fire Resistant Design of Connections*, January 2017, page 8]. The report conclusion suggests that some extra overlay of wood may be necessary for the 2-hour and 3-hour fire resistance of mass timber provisions proposed by the ICC TWB Committee. This is not to suggest that 2-hour fire or 3-hour resistances of connections cannot be achieved. But, connections must be given extra attention and standard methods for the industry may not be sufficient.

This extra attention is what is lacking in the ICC TWB Code Proposals. Nothing in the proposals brings to the attention of the designer or code official this very important fire aspect of providing proper fire rated connections for the prescriptive CLT requirements. Before the membership approves provisions for taller mass timber buildings, the ICC TWB Committee should have the opportunity to perform their due diligence by a review of connections with fire resistances greater than 1-hour for mass timber buildings based on fire tests reports, technical reports or other reference material documenting that 2-hour and 3-hour fire resistance ratings can be achieved.

Because of the need to study in more depth what and how 2-hour and 3-hour fire rated connections for these proposed mass timber buildings is accomplished, this proposal should be DISAPPROVED and sent back to the ICC TWB Committee to address this critical shortcoming.

G108-18 should be disapproved because the issue of fire resistance of connections for mass timber construction has not been sufficiently addressed in this proposal. The present code requirements for nominal heavy timber members have an approximate 1-hour fire resistance. This code proposal adds three new types of heavy timber construction (Types IV-A, IV-B and IV-C) which have fire resistance requirements for the primary structural frame and secondary members for at least two hours (three-hours for Type IV-A primary members). There is no language to direct the code user on what should be provided or expected to protect the connections for these higher fire resistances. The topic of fire resistance protection of connections has been treated too lightly considering the importance of these connections for maintaining structural stability for these taller mass timber buildings during and after a fire incident.

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This extra attention is what is lacking in the ICC TWB Code Proposals. Nothing in the proposals brings to the attention of the designer or code official this very important fire aspect of providing proper fire rated connections for the prescriptive CLT requirements. Before the membership approves provisions for taller mass timber buildings, the ICC TWB Committee should have the opportunity to perform their due diligence by a review of connections with fire resistances greater than 1-hour for mass timber buildings based on fire tests reports, technical reports or other reference material documenting that 2-hour and 3-hour fire resistance ratings can be achieved.

Because of the need to study in more depth what and how 2-hour and 3-hour fire rated connections for these proposed mass timber buildings is accomplished, this proposal should be DISAPPROVED and sent back to the ICC TWB Committee to address this critical shortcoming.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Mass timber buildings require protection of connections.

Public Comment 95:

Proponent: Jason Krohn, Precast/Prestressed Concrete Institute, representing Precast/Prestressed Concrete Institute (jkrohn@pci.org) requests Disapprove.

Commenter's Reason: G108-18 should be disapproved because the long-term performance of adhesives used in the cross-laminated timber after exposure to fire have not been thoroughly examined. Presentations on the results of fire tests performed on CLT by the National Research Council of Canada for the National Fire Protection Research Foundation were given to the ICC TWB Committee. One of the areas of concern that showed up in Phase 2 of those tests was delamination of a CLT floor/ceiling panel during the cooldown period of a test which resulted in a regrowth of the fire within the compartment. The delamination was attributed to a bonding failure of the adhesive that had been used in the manufacture of the CLT floor/ceiling panel after exposure to high heat.

To address this test finding, revisions to the adhesive requirements in 2015 edition of ANSI/APA PRG 320, *Standard for Performance Rated Cross-Laminated Timber* were incorporated through the APA standards process. PRG 320-2015 is referenced in the IBC as the performance standard for CLT members. In the 2018 edition of PRG 320 the adhesives used for CLT panels are required to be evaluated and meet criteria in the Annex B of the Standard titled *Practice for Evaluating Elevated Temperature Performance of Adhesives Used in Cross-Laminated Timber*. However, those criteria are for the purpose of evaluating the performance of adhesives used in CLT exposed to heat and flame under controlled conditions (Section B1.4). The pass/fail criteria in Section B1.3 expect the CLT floor-ceiling slab to sustain the applied load during the specified fire exposure for a period of 240 minutes without char layer fall-off resulting in fire regrowth during the cooling phase of a fully developed fire .

While this testing may be sufficient to show that an adhesive would have prevented delamination for the specified time period, it does not in any way demonstrate that the adhesives are still capable of providing the long term structural performance after exposure to elevated temperatures experienced during a fire event. And, neither does ANSI 405, *Standard for Adhesives for Use in Structural Glue Laminated Timber*, which is referenced in PRG 320, address long-term performance of adhesives that have been subjected to fire exposure. Like PRG 320, Section 2.1.7 of ANSI 405 is intended to qualify adhesives according to the CSA 0177 small scale flame test to avoid delamination due to intensive heat, such as fire exposure (C2.1.7). No methodology has been provided that would allow for a comprehensive post-fire evaluation of the remaining structure.

Before the membership approves provisions for taller mass timber buildings the ICC TWB Committee should have the opportunity to perform their due diligence by a review of the long-term performance of adhesives that have been subjected to fire exposure. This is especially important for buildings that may be as tall as 18-stories.

Because of the need to study in more depth the long-term performance of adhesives that have been subjected to fire exposure, this proposal should be DISAPPROVED and sent back to the ICC TWB Committee to address this critical issue.

G108-18 should be disapproved because the long-term performance of adhesives used in the cross-laminated timber after exposure to fire have not been thoroughly examined. Presentations on the results of fire tests performed on CLT by the National Research Council of Canada for the National Fire Protection Research Foundation were given to the ICC TWB Committee. One of the areas of concern that showed up in Phase 2 of those tests was delamination of a CLT floor/ceiling panel during the cooldown period of a test which resulted in a regrowth of the fire within the compartment. The delamination was attributed to a bonding failure of the adhesive that had been used in the manufacture of the CLT floor/ceiling panel after exposure to high heat.

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Because of the need to study in more depth the long-term performance of adhesives that have been subjected to fire exposure, this proposal should be DISAPPROVED and sent back to the ICC TWB Committee to address this critical issue.

G108-18 should be disapproved because the long-term performance of adhesives used in the cross-laminated timber after exposure to fire have not been thoroughly examined. Presentations on the results of fire tests performed on CLT by the National Research Council of Canada for the National Fire Protection Research Foundation were given to the ICC TWB Committee. One of the areas of concern that showed up in Phase 2 of those tests was delamination of a CLT floor/ceiling panel during the cooldown period of a test which resulted in a regrowth of the fire within the compartment. The delamination was attributed to a bonding failure of the adhesive that had been used in the manufacture of the CLT floor/ceiling panel after exposure to high heat.

To address this test finding, revisions to the adhesive requirements in 2015 edition of ANSI/APA PRG 320, *Standard for Performance Rated Cross-Laminated Timber* were incorporated through the APA standards process. PRG 320-2015 is referenced in the IBC as the performance standard for CLT members. In the 2018 edition of PRG 320 the adhesives used for CLT panels are required to be evaluated and meet criteria in the Annex B of the Standard titled *Practice for Evaluating Elevated Temperature Performance of Adhesives Used in Cross-Laminated Timber*. However, those criteria are for the purpose of evaluating the performance of adhesives used in CLT exposed to heat and flame under controlled conditions (Section B1.4). The pass/fail criteria in Section B1.3 expect the CLT floor-ceiling slab to sustain the applied load during the specified fire exposure for a period of 240 minutes without char layer fall-off resulting in fire regrowth during the cooling phase of a fully developed fire .

While this testing may be sufficient to show that an adhesive would have prevented delamination for the specified time period, it does not in any way demonstrate that the adhesives are still capable of providing the long term structural performance after exposure to elevated temperatures experienced during a fire event. And, neither does ANSI 405, *Standard for Adhesives for Use in Structural Glue Laminated Timber*, which is referenced in PRG 320, address long-term performance of adhesives that have been subjected to fire exposure. Like PRG 320, Section 2.1.7 of ANSI 405 is intended to qualify adhesives according to the CSA 0177 small scale flame test to avoid delamination due to intensive heat, such as fire exposure (C2.1.7). No methodology has been provided that would allow for a comprehensive post-fire evaluation of the remaining structure.

Before the membership approves provisions for taller mass timber buildings the ICC TWB Committee should have the opportunity to perform their due diligence by a review of the long-term performance of adhesives that have been subjected to fire exposure. This is especially important for buildings that may be as tall as 18-stories.

Because of the need to study in more depth the long-term performance of adhesives that have been subjected to fire exposure, this proposal should be DISAPPROVED and sent back to the ICC TWB Committee to address this critical issue.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Using proper adhesives for long term resistance to the effects of fire are part of mass timber construction.

Public Comment 96:

Proponent: James Sorensen, representing Alberta Masonry Council requests Disapprove.

Commenter's Reason: Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel. Concrete products have a much longer lifespan, reduce insurance premiums and require less maintenance. It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues?

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements. Concrete products will also reduce the long term maintenance costs of buildings.

Public Comment 97:

Proponent: ALAN SPARKMAN, Tennessee Concrete Association, representing Tennessee Concrete Association, Executive Director requests Disapprove.

Commenter's Reason: There are a number of important reasons I am opposed:

There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.

- Allowing wood structures to be built above the level of fire department access is a serious mistake.
- Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1" per hour in a fire, then after 2 hours in a fire, a 6" thick CLT wood load bearing wall will only have 2" of structural material left. This is not acceptable and is not addressed in the code change proposals.
- There has been no wind component involved in the fire testing of Mass Timber assemblies. This type of testing should be essential and required for any building system to be used at the heights anticipated in this proposal.
- It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and subsequent water damage and mold issues are likely to be significant.
- Neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes.
- Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees.
- The behavior of CLT is completely dependent on the connections, and all connections used to date are proprietary. There is no publicly available information on their design or capacities, even for the Tall Wood AdHoc. There is no information on the performance of the proprietary connections during fires, and the performance of different systems and materials will have a significant impact on the performance of these buildings for fire as well as wind and earthquakes.

Bibliography: Satisfied

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 98:

Proponent: Malcolm Stolarski, representing calportlandrequests Disapprove.

Commenter's Reason: □ Allowing wood structures to be built above the level of fire department access is a serious mistake, because wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 99:

Proponent: Robert Sullivan, representing CEMEX, Inc. (robertl.sullivan@cemex.com)requests Disapprove.

Commenter's Reason: There is currently no complete testing or engineering justification for expanding the height limitation for mass timber from 6 stories to 18 stories.

Allowing wood structures to be built above the level of fire department access is a serious mistake for the following reasons:

- 1) Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel.
- 2) Cross-Laminated Timber chars in a fire; however, charring is not equivalent to non-combustible. Note: if the char rate is 1" per hour in a fire, then after 2 hours in a fire, a 6" thick CLT wood load bearing wall will only have 2" of structural material left. This is not acceptable and is not addressed in the code change proposals.

3) There has been no wind component involved in the fire testing of Mass Timber assemblies. This is a serious mistake. This type of testing is essential.

4) It is unknown what will happen to water that accumulates as a result of a fire sprinkler system discharge as a result of fire or accidental incident that opens a sprinkler head. The system has not been tested with the additional water load and what of the water damage and mold issues? □

5) Most importantly, neither the Fire Code Action Committee nor the Building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Changes. □ Adhesives used between the layers of CLT have not been standardized and are key to whether the CLT delaminates during fire and continues to advance till complete burnout. A test standard for the adhesives has been proposed, but not fully vetted by the cognizant committees. □

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 100:

Proponent: LEE THOMPSON, CHAMPION CONCRETE PUMPING, representing PRESIDENT requests Disapprove.

Commenter's Reason: Allowing wood structures to be built above the level of fire department access is a serious mistake. Neither the fire code action committee nor the building Code Action Committee voted to support this series of Tall Wood / Mass Timber Code Change.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 101:

Proponent: Patrick A. Thompson, Advanced Pumping LLC, representing Advanced Pumping LLC (pthompson@advancedpumping.net) requests Disapprove.

Commenter's Reason: Tall wood buildings are not safe. There is eminent risk to the lives of the occupants and first responders. Examples are the wood frame building that burned down in Mexico recently.

Wood does not offer the resilience and fire protection of steel or concrete, or fire proof coatings on steel. I would rather take my chances in a steel framed building, than a cross laminated wood framed building. Where is the proof that after the same length of time the cross laminated frame building would have the structural integrity for the first responders to make it in and out.

What happens when the fire starts at the lower floors and climbs up the building creating its own chimney affect. Or heaven forbid, the fire creates its own windstorm, and causes more oxygen to come in contact with the fuel "wood"???

How does someone verify the type of glue used in the lamination process will not add fuel to the fire???

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 102:

Proponent: Amy Vander Heyden, Conco, representing Conco requests Disapprove.

Commenter's Reason: As a licensed architect it is my professional obligation to protect the health, safety, and welfare of the public in buildings. I disapprove the proposed adoption of increased wood structures. There is insufficient testing and documentation that cross-laminated timber is sufficient in the event of a fire. Note the following:

- Charring is not equivalent to non-combustible so the dimensions of the timber would need to be significantly larger to compensate for required fire ratings.
- Missing testing and documentation of the wind component involved in fire testing
- Missing testing and documentation of the accumulation of water loads from sprinklers and long term mold risk during a rebuild.
- Neither the Fire Code Action Committee nor the Building Code Action Committee supported these changes.
- Incomplete testing, documentation, and regulation of the adhesives used within the layers of CLT
- Missing standardization, documentation, and legislation of connection details for which the structural integrity of the building is contingent.

Proceeding with this initiative is irresponsible and puts the public at unnecessary risk.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this code change proposal will not increase or decrease the cost of construction. This proposed section provides the information that was not previously set forth in the code, thus there is no cost impact when compared with present requirements.

Public Comment 103:

Proponent: Dan Nichols, representing ICC Code Correlation Committee (ccc@iccsafe.org).

Commenter's Reason: The Code Correlation Committee (CCC) is not taking a position on this code change. The CCC submitted this public comment in order to bring a correlation issue to the attention of the full voting membership for the Public Comment Hearings and the Online Governmental Consensus Vote to allow the voting membership to coordinate actions on a package of code changes submitted dealing with tall wood buildings of mass timber construction. This package includes the parent proposal G108-18; if disapproved, the related proposals G28-18, G75-18, G80-18, G84-18, G89-18, FS5-18, FS6-18, FS73-18, FS81-18 and F266-18, will not be correlated with any existing code text if they are approved.

The Code Correlation Committee is a standing committee of the International Code Council whose objectives, procedures and organization are set forth in Council Policy CP#44-13. The objective of the Code Correlation Committee is to maintain technical and editorial consistency among the International Codes and to assist staff in the evaluation and processing of code change proposals and comments that are exclusively editorial.

G108-18

G113-18

IBC: 603.1

Proposed Change as Submitted

Proponent: John Williams, Chair, representing Healthcare Committee (AHC@iccsafe.org)

2018 International Building Code

Revise as follows

603.1 Allowable materials. Combustible materials shall be permitted in buildings of Type I or II construction in the following applications and in accordance with Sections 603.1.1 through 603.1.3:

1. *Fire-retardant-treated wood* shall be permitted in:
 - 1.1. Nonbearing partitions where the required *fire-resistance rating* is 2 hours or less.
 - 1.2. Nonbearing *exterior walls* where fire-resistance-rated construction is not required.
 - 1.3. Roof construction, including girders, trusses, framing and decking.

Exception-Exceptions:

1. In buildings of Type IA construction exceeding two *stories above grade plane*, *fire-retardant-treated wood* is not permitted in roof construction where the vertical distance from the upper floor to the roof is less than 20 feet (6096 mm).
 2. Group I-2, combustible roof construction shall be covered by minimum of a Class A roof covering or roof assembly, and shall be separated from the story below by a horizontal assembly with a fire-resistance rating of not less than 2 hours.
- 1.4. Balconies, porches, decks and exterior stairways not used as required exits on buildings three *stories* or less above grade plane.
2. Thermal and acoustical insulation, other than foam plastics, having a *flame spread index* of not more than 25.

Exceptions:

1. Insulation placed between two layers of noncombustible materials without an intervening airspace shall be allowed to have a *flame spread index* of not more than 100.
 2. Insulation installed between a finished floor and solid decking without intervening airspace shall be allowed to have a *flame spread index* of not more than 200.
3. Foam plastics in accordance with Chapter 26.
 4. Roof coverings that have an A, B or C classification.
 5. *Interior floor finish* and floor covering materials installed in accordance with Section 804.
 6. Millwork such as doors, door frames, window sashes and frames.
 7. *Interior wall and ceiling finishes* installed in accordance with Section 803.
 8. *Trim* installed in accordance with Section 806.
 9. Where not installed greater than 15 feet (4572 mm) above grade, show windows, nailing or furring strips and wooden bulkheads below show windows, including their frames, aprons and show cases.
 10. Finish flooring installed in accordance with Section 805.
 11. Partitions dividing portions of stores, offices or similar places occupied by one tenant only and that do not establish a *corridor* serving an *occupant load* of 30 or more shall be permitted to be constructed of *fire-retardant-treated wood*, 1-hour fire-resistance-rated construction or of wood panels or similar light construction up to 6 feet (1829 mm) in height.
 12. Stages and platforms constructed in accordance with Sections 410.2 and 410.3, respectively.
 13. Combustible *exterior wall coverings*, balconies and similar projections and bay or oriel windows in accordance with Chapter 14 and Section 705.2.3.1.
 14. Blocking such as for handrails, millwork, cabinets and window and door frames.
 15. Light-transmitting plastics as permitted by Chapter 26.
 16. Mastics and caulking materials applied to provide flexible seals between components of *exterior wall* construction.
 17. Exterior plastic veneer installed in accordance with Section 2605.2.
 18. Nailing or furring strips as permitted by Section 803.15.
 19. Heavy timber as permitted by Note c to Table 601 and Sections 602.4.3 and 705.2.3.1.
 20. Aggregates, component materials and admixtures as permitted by Section 703.2.2.
 21. Sprayed fire-resistant materials and intumescent and mastic fire-resistant coatings, determined on the basis of *fire resistance* tests in accordance with Section 703.2 and installed in accordance with Sections 1705.14 and 1705.15, respectively.
 22. Materials used to protect penetrations in fire-resistance-rated assemblies in accordance with Section 714.
 23. Materials used to protect joints in fire-resistance-rated assemblies in accordance with Section 715.
 24. Materials allowed in the concealed spaces of buildings of Types I and II construction in accordance with Section 718.5.
 25. Materials exposed within plenums complying with Section 602 of the International Mechanical Code.
 26. Wall construction of freezers and coolers of less than 1,000 square feet (92.9 m²), in size, lined on both sides with noncombustible materials and the building is protected throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

Reason: This proposal creates conformance with more restrictive federal certification requirements (K162). The goal here is to create a complete two hour assembly below the lowest combustible member. This creates added layers of

protection for protect in place environment from fires originating in mechanical equipment, embers from adjacent fires, etc.

This proposal is submitted by the ICC Committee on Healthcare (CHC). The CHC was established by the ICC Board to evaluate and assess contemporary code issues relating to healthcare facilities. This is a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. In 2017 the CHC held 2 open meetings and numerous conference calls, *which included members of the committees as well as any interested parties, to discuss and debate the proposed changes.* Information on the CHC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CHC effort can be downloaded from the CHC website at: <https://www.iccsafe.org/codes-tech-support/cs/icc-committee-on-healthcare/>.

Cost Impact: The code change proposal will increase the cost of construction

This proposal will increase cost based on the added 2-hour horizontal separation and potentially higher roof cover rating. However, it does not add cost to the healthcare industry because certified facilities already follow these requirements in the context of the CMS federal standards.

G113-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: NFPA 101 requirements of 2012 would allow this material. There should be a public comment on this that fixes the threshold. (Vote: 10-4)

Assembly Action:

None

G113-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Williams, representing Healthcare Committee (ahc@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

603.1 Allowable materials. Combustible materials shall be permitted in buildings of Type I or II construction in the following applications and in accordance with Sections 603.1.1 through 603.1.3:

1. *Fire-retardant-treated wood* shall be permitted in:
 - 1.1. Nonbearing partitions where the required *fire-resistance rating* is 2 hours or less.
 - 1.2. Nonbearing *exterior walls* where fire-resistance-rated construction is not required.
 - 1.3. Roof construction, including girders, trusses, framing and decking.

Exceptions:

1. In buildings of Type IA construction exceeding two *stories above grade plane*, *fire-retardant-treated wood* is not permitted in roof construction where the vertical distance from the upper floor to the roof is less than 20 feet (6096 mm).
2. Group I-2, ~~combustible~~ roof construction containing fire-retardant-treated wood shall be covered by minimum of a Class A roof covering or roof assembly, and shall be separated from the story below by a horizontal assembly with the roof assembly shall have a fire-resistance rating of not less than 2 hours if required by the construction type.
- 1.4. Balconies, porches, decks and exterior stairways not used as required exits on buildings three *stories* or less above grade plane.
2. Thermal and acoustical insulation, other than foam plastics, having a *flame spread index* of not more than 25.

Exceptions:

1. Insulation placed between two layers of noncombustible materials without an intervening airspace shall be allowed to have a *flame spread index* of not more than 100.
2. Insulation installed between a finished floor and solid decking without intervening airspace shall be allowed to have a *flame spread index* of not more than 200.
3. Foam plastics in accordance with Chapter 26.
4. Roof coverings that have an A, B or C classification.
5. *Interior floor finish* and floor covering materials installed in accordance with Section 804.
6. Millwork such as doors, door frames, window sashes and frames.
7. *Interior wall and ceiling finishes* installed in accordance with Section 803.
8. *Trim* installed in accordance with Section 806.
9. Where not installed greater than 15 feet (4572 mm) above grade, show windows, nailing or furring strips and wooden bulkheads below show windows, including their frames, aprons and show cases.
10. Finish flooring installed in accordance with Section 805.
11. Partitions dividing portions of stores, offices or similar places occupied by one tenant only and that do not establish a *corridor* serving an *occupant load* of 30 or more shall be permitted to be constructed of *fire-retardant-treated wood*, 1-hour fire-resistance-rated construction or of wood panels or similar light construction up to 6 feet (1829 mm) in height.
12. Stages and platforms constructed in accordance with Sections 410.2 and 410.3, respectively.
13. Combustible *exterior wall coverings*, balconies and similar projections and bay or oriel windows in accordance with Chapter 14 and Section 705.2.3.1.
14. Blocking such as for handrails, millwork, cabinets and window and door frames.
15. Light-transmitting plastics as permitted by Chapter 26.
16. Mastics and caulking materials applied to provide flexible seals between components of *exterior wall* construction.
17. Exterior plastic veneer installed in accordance with Section 2605.2.
18. Nailing or furring strips as permitted by Section 803.15.
19. Heavy timber as permitted by Note c to Table 601 and Sections 602.4.3 and 705.2.3.1.
20. Aggregates, component materials and admixtures as permitted by Section 703.2.2.
21. Sprayed fire-resistant materials and intumescent and mastic fire-resistant coatings, determined on the basis of *fire resistance* tests in accordance with Section 703.2 and installed in accordance with Sections 1705.14 and 1705.15, respectively.
22. Materials used to protect penetrations in fire-resistance-rated assemblies in accordance with Section 714.
23. Materials used to protect joints in fire-resistance-rated assemblies in accordance with Section 715.
24. Materials allowed in the concealed spaces of buildings of Types I and II construction in accordance with Section 718.5.
25. Materials exposed within plenums complying with Section 602 of the International Mechanical Code.
26. Wall construction of freezers and coolers of less than 1,000 square feet (92.9 m²), in size, lined on both sides with noncombustible materials and the building is protected throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

Commenter's Reason: The committee correctly disapproved the proposed language, which was intended to cover non-

fire retardant treated wood. In its current location, the proposal outlines what is required for FRT. There is a federal requirement that the roofs be covered with a class A rated roof, and that is reflected here. It also reminds the user to ensure that if the construction type requires a fire rated assembly, then roof assembly that contains the FRT must meet this rating.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. This proposal will increase cost based on the potentially higher roof cover rating. However, it does not add cost to the healthcare industry because certified facilities already follow these requirements in the context of the CMS federal standards.

G113-18

G121-18

IBC: 1204.1

Proposed Change as Submitted

Proponent: Peter Valkov, City of Fargo, ND, representing City of Fargo, North Dakota (pvalkov@cityoffargo.com); Christine Rose, City of Fargo, representing City of Fargo (crose@cityoffargo.com)

2018 International Building Code

Revise as follows

1204.1 General. Every space intended for human occupancy shall be provided with natural light by means of exterior glazed openings in accordance with Section 1204.2 or shall be provided with artificial light in accordance with Section 1204.3. Exterior glazed openings shall open directly onto a *public way* or onto a *yard* or *court* in accordance with Section 1205.

In Group E and I-4 occupancies, rooms intended to be used as classrooms or day care rooms shall be provided with natural light. Artificial light shall not be substituted for such required natural light.

Reason: I am driven to propose this change on behalf of all little members of our society who cannot propose this change themselves.

Through my profession, I am reviewing many day care and school plans. Every time I see a classroom without windows, every time I see day care using an old building purposed for store or storage and hastily re-purposed for day care without any regard for the need of natural light (and this happens too often), I feel extremely sad. I am also very concerned that we as a society force our kids to places that have no natural light. We force them as they do not have choice, or say, or option to make a decision.

Researching the importance of natural light for the health and the intellectual development in little children gives me hope such a change is more than needed and possible, it is long overdue.

Having discussed my idea with colleagues in the City of Fargo and design professionals from the area also provided me with positive feedback. Architects, I have spoken to, also confirmed this change is possible from a design standpoint and it won't provide burden on the schools and day care facilities alike.

Therefore, today, I state my hope this change is made integral part of the building code as a part of our constant quest for healthier and safer buildings. Buildings that promote better and more natural environment for those amongst us that need it the most!

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Cost Impact: The code change proposal will not increase or decrease the cost of construction. The need and requirement for windows is already a part of the International Building Code. Therefore, I do not foresee any changes in construction cost as a result from such a change.

G121-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: While the committee understands the concerns addressed by the proposal, many start up schools begin in the basement of a facility which often are already provided with sprinkler systems and code compliant egress facilities to make the building safe. This proposal would be too limiting regarding the types of spaces that could be used for such start up schools. Furthermore, many classrooms are not on an outside wall and may not have the opportunity to install skylights. If the proponent returns with a public comment, the committee also recommends that the proposed modifications be considered. The proponent mentioned existing buildings, which should be addressed in the International Existing Building Code. (Vote: 14-0)

Assembly Action:

None

G121-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Tom Zaremba, representing Glazing Industry Code Committee requests As Submitted.

Commenter's Reason: This is the first Code cycle for this laudable Proposal. The original Proponent did an excellent job of substantiating the health and environmental benefits of natural light, particularly for children whose brains and emotional habits are still developing and who are required to be in school or in day care during long portions of the daylight hours they experience throughout their most formative years. The importance of natural light to human health is quickly moving from research to building design, and its importance cannot responsibly be ignored. The Committee viewed the Proposal's purpose favorably and did not dispute these benefits. However, it disapproved the Proposal out of concern it would impose a barrier to starting schools and day care centers in Church basements and similar existing buildings, either by making them too expensive to retrofit or by preventing them entirely.

However, under IBC Sections 305.1.1 and 303.1.4, educational rooms accessory to places of worship with occupant loads < 100 per room (which includes virtually all educational rooms in these types of facilities) are not considered separate occupancies. Similarly, under IBC Section 305.2.1 and 305.2.2, rooms in religious facilities providing day care (which includes educational, supervision or personal care services) during services or for 5 or fewer children also remain as part of the Group A-3 Occupancy. In both situations relating to religious facilities, the educational or day care rooms would not change from Group A-3 so this Proposal would not affect them.

The Committee was also concerned that some classrooms are not on exterior walls or under roofs so as to permit skylights. However, Section 1204.2.1 permits such rooms to use natural light from adjoining spaces to meet the natural light requirements of the Code. It is already common for interior rooms have wall window and door lites that allow in light from corridors and social spaces along exterior walls.

We recognize the Proposal might benefit from modified language, either in this Cycle or the next, but the issue is too important to abandon without further discussion. The importance of natural light to human health is moving from research to building design practice, and it is time to recognize its importance by including it in these IBC occupancies. Since the new education and institutional day care facilities being built today will affect the health and welfare of our children for decades to come, this Proposal will ensure that our school children will benefit from natural lighting for years to come.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The additional requirements could add design costs to the cost of construction.

G121-18

G122-18

IBC: 1206.1

Proposed Change as Submitted

Proponent: Lee Kranz, representing Washington Association of Building Officials Technical Code Development Committee (lkranz@bellevuewa.gov)

2018 International Building Code

Revise as follows

1206.1 Scope. This section shall apply to common interior walls, partitions and floor/ceiling assemblies between adjacent *dwelling units* and *sleeping units* or between *dwelling units* and *sleeping units* and adjacent public areas. ~~such as halls, corridors, stairways or service areas.~~

Reason: There are building designs where a dwelling unit or sleeping unit in a mixed occupancy building may be adjacent to a commercial space where airborne and structure-borne sound is significant and may interrupt the occupants of the dwelling or sleeping unit unless the common interior walls, partitions and floor/ceiling assemblies are designed to limit sound transmissions to an acceptable level. This proposal deletes the examples currently listed at the end of Section 1206.1 which effectively broadens the scope of uses where sound abatement requirements can be enforced and provides the building official with authority to require sound abatement when appropriate. Occupants of the affected dwelling units and sleeping units may not realize that additional sound abatement has been provided but the quality of their lives will improve as a result.

Cost Impact: The code change proposal will increase the cost of construction. This code change has the potential to increase the cost of construction because there may be a need to provide sound abatement between dwelling units or sleeping units and adjacent public areas.

G122-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This is not an expansion of the scope of this provision. It is a clarification. This is not limited to the areas that have been stricken. It includes public areas "such as," meaning many other things. Chapter 12 is interior environment. Exterior building features are not addressed in Chapter 12. (Vote: 8-7)

Assembly Action:

None

G122-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Cesar Lujan, representing National Association of Home Builders (clujan@nahb.org) requests Disapprove.

Commenter's Reason: The intent of the original proposal, as described in the reason statement, is to expand the sound transmission requirements in order to provide sound abatement between dwelling or sleeping units that are adjacent to commercial spaces in a mixed occupancy building. It removes the examples of public areas, providing the building official the authority to determine when sound abatement is appropriate between dwelling units and public areas. The IBC does not define "Public Areas". The IBC does, however, define "Public-Use Areas" and "Public Entrance". Any common area within a residential building (i.e. fitness room, library, party room) that is only accessible to building tenants and their guests is not a "Public Area". This would include corridors and stairways that can only be accessed by tenants and their guests in a secured building.

As stated in the proposal, the intent is to broaden the scope of uses where sound abatement requirements can be enforced, effectively providing the building official the authority to define what a "Public Area" is. However, the proposal may end up reducing the areas where sound abatement is required since "Public Areas" is not defined in the IBC. Furthermore, since "Service Areas" was removed from the list of examples of a public area, it would remove the need to provide sound abatement between dwelling units and these types of spaces. "Service Area" is a defined term in the IBC.

The proposed changes to this section of the IBC would make it difficult to consistently determine and enforce which common interior walls and partitions and floor/ceiling assemblies require sound transmission ratings. "Public Areas" is a term that is broad and debatable.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. Will not increase the cost of construction compared to current code.

G122-18

G124-18

IBC: 1206.2

Proposed Change as Submitted

Proponent: Michael Schmeida, Gypsum Association, representing Gypsum Association (mschmeida@gypsum.org)

2018 International Building Code

Revise as follows

1206.2 Airborne sound. Walls, partitions and floor-ceiling assemblies separating *dwelling units* and *sleeping units* from each other or from public or service areas shall have a sound transmission class of not less than 50, or not less than 45 if field tested, for airborne noise where tested in accordance with ASTM E90. Alternatively, the sound transmission class of walls, partitions and floor-ceiling assemblies shall be established by an engineering analysis either conducted or reviewed by an approved acoustical professional based on a comparison of walls, partitions and floor-ceiling assemblies having sound transmission class ratings as determined by the test procedures set forth in ASTM E90. Penetrations or openings in construction assemblies for piping; electrical devices; recessed cabinets; bathtubs; soffits; or heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings. This requirement shall not apply to entrance doors; however, such doors shall be tight fitting to the frame and sill.

Reason: There are several engineering analysis tools for sound performance on the market. However, if the design professional is unfamiliar with acoustical engineering, they can be very misleading and therefore lead to a building performing under the expected performance levels. And as acoustical considerations are something most design professionals are not very familiar with at this point in time, the opportunity for error is above average. This change is intended to make sure that systems specified using the engineering analysis option are properly scrutinized by experts in acoustics and therefore are most likely going to perform as expected.

Cost Impact: The code change proposal will increase the cost of construction. The estimated cost impact would be \$500. However, it should be pointed out that the engineering analysis is an option - there are other ways to meet the criteria of this section already mandated by the code where no additional cost would be incurred.

G124-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This would put a burden on the code official. There is a lack of certification for this. It could be in conflict with 1206.2 and 1206.3. A professional engineer can do this. (Vote: 14-0)

Assembly Action:

None

G124-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Matthew Golden, Pliteq, representing Pliteq, Director of Research (mgolden@pliteq.com); Joseph Bridger (joe@sacnc.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1206.2 Airborne sound. Walls, partitions and floor-ceiling assemblies separating *dwelling units* and *sleeping units* from each other or from public or service areas shall have a sound transmission class of not less than 50, or not less than 45 if field tested, for airborne noise where tested in accordance with ASTM E90. ~~Alternatively, the sound transmission class of walls, partitions and floor-ceiling assemblies shall be established by engineering analysis based on a comparison of walls, partitions and floor-ceiling assemblies having sound transmission class ratings as determined by the test procedures set forth in ASTM E90.~~ Penetrations or openings in construction assemblies for piping; electrical devices; recessed cabinets; bathtubs; soffits; or heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings. This requirement shall not apply to entrance doors; however, such doors shall be tight fitting to the frame and sill.

Commenter's Reason: The current code change request was designed to fix an issue that was created with the previous cycle's change to this section (2018). That previous change added the following sentence to 1206.2: Alternatively, the sound transmission class of walls, partitions and floor-ceiling assemblies shall be established by engineering analysis based on a comparison of walls, partitions and floor-ceiling assemblies having sound transmission class ratings as determined by the test procedures set forth in ASTM E90.

There are two main issues with this language. The first is that there is no industry-agreed-upon method or approved standard to conduct this analysis. The referenced ASTM standard (E90) is only for measurements; it does not address extrapolation or interpolation of measured data to make judgments about other untested assemblies.

The second is with regard to who is qualified to conduct this analysis. Building acoustics is a small and specialized field. Unfortunately, there are professionals who believe that they know acoustics sufficiently to make these judgments who do not. Further, there is no current licensure for acoustical engineering, anyone can claim to be an expert in the field. (There has been a Professional Engineering in Acoustics available in Oregon but it is not longer offered. The Institute of Noise Control Engineering (INCE) has a Board Certification in Noise Control Engineering but it is not a licensure) Since it is a specialized field, even engineers licensed in other fields will generally not have adequate knowledge to determine acoustical performance of an untested assembly. Inaccurate judgments have been submitted and approved as code officials generally do not have sufficient acoustical expertise to determine if they are inaccurate. As a result, the committee's concern of burdening the code officials with the proposed change is already an existing reality under the 2018 code language.

Understanding the Committee's concerns with the proposed code modification, this revised modification is now proposed to address both the committee's concerns and the problems that have been occurring under the 2018 code. We propose to revert to the 2015 language by deleting the sentence until an appropriate licensure is established. This alleviates the burden on the code officials that currently exists without adding the burden of determining who is or is not qualified to make the judgment.

Bibliography: ASTM Standard E90, 2009 (2016). Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements, ASTM International, West Conshohocken, PA, 2009, DOI: 10.1520/E0090-09R16, www.astm.org.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The code change has no financial impact.

Public Comment 2:

Proponent: Samantha Rawlings, Veneklasen Associates, representing Veneklasen Associates (srawlings@veneklasen.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

1206.2 Airborne sound. Walls, partitions and floor-ceiling assemblies separating *dwelling units* and *sleeping units* from each other or from public or service areas shall have a sound transmission class of not less than 50, or not less than 45 if field tested, for airborne noise where tested in accordance with ASTM E90. ~~Alternatively, the sound transmission class of walls, partitions and floor-ceiling assemblies shall be established by engineering analysis based on a comparison of walls, partitions and floor-ceiling assemblies having sound transmission class ratings as determined by the test procedures set forth in ASTM E90.~~ Penetrations or openings in construction assemblies for piping; electrical devices; recessed cabinets; bathtubs; soffits; or heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings. This requirement shall not apply to entrance doors; however, such doors shall be tight fitting to the frame and sill.

1206.3 Structure-borne sound. Floor-ceiling assemblies between *dwelling units* and *sleeping units* or between a *dwelling unit* or *sleeping unit* and a public or service area within the structure shall have an impact insulation class rating of not less than 50, or not less than 45 if field tested, where tested in accordance with ASTM E492. ~~Alternatively, the impact insulation class of floor-ceiling assemblies shall be established by engineering analysis based on a comparison of floor-ceiling assemblies having impact insulation class ratings as determined by the test procedures in ASTM E492.~~

Commenter's Reason: The current code change request was designed to fix an issue that was created with the previous cycle's change to this section (2018). That previous change added the following sentence to 1206.2 and a similar sentence to 1206.3:

Alternatively, the sound transmission class of walls, partitions and floor-ceiling assemblies shall be established by engineering analysis based on a comparison of walls, partitions and floor-ceiling assemblies having sound transmission class ratings as determined by the test procedures set forth in ASTM E90.

The issue with this section is that there is no industry-agreed-upon method or approved standard to conduct this analysis. The referenced ASTM standards (E90 for 1206.2 and E492 for 1206.3) are for measurements only; they do not address extrapolation or interpolation of measured data to make judgments about other untested assemblies. Further, there are professionals who believe that they know acoustics sufficiently to make these judgments who do not. Since there is no licensure for acoustical engineering, anyone can claim to be an expert in the field. Further, it is a specialized field that even engineers licensed in other fields will generally not have adequate knowledge to determine acoustical performance of an untested assembly. Inaccurate judgments have been submitted and approved as code officials generally do not have sufficient acoustical expertise to determine if they are inaccurate. As a result, the committee's concern of burdening the code officials with the proposed change is already an existing reality under the 2018 code language.

Understanding the Committee's concerns with the proposed code modification, this revised modification is now proposed to address both the committee's concerns and the problems that have been occurring under the 2018 code. We propose to revert to the 2015 language by deleting the sentences. This alleviates the burden on the code officials that currently exists without adding the burden of determining who is or is not qualified to make the judgment. It also eliminates the potential conflict with 1206.3, by making the same changes to 1206.2 and 1206.3.

Bibliography: ASTM Standard E90, 2009 (2016). Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements, ASTM International, West Conshohocken, PA, 2009, DOI: 10.1520/E0090-09R16, www.astm.org.
ASTM Standard E492, 2009 (2016). Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine, ASTM International, West Conshohocken, PA 2009, DOI: 10.1520/E0492-09R16E01

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The code change has no financial impact.

G125-18

IBC: 1206.2, Chapter 35

Proposed Change as Submitted

Proponent: Michael Schmeida, representing Gypsum Association (mschmeida@gypsum.org)

2018 International Building Code

Revise as follows

1206.2 Airborne sound. Walls, partitions and floor-ceiling assemblies separating *dwelling units* and *sleeping units* from each other or from public or service areas shall have a sound transmission class of not less than 50, or not less than 45 if field tested, for airborne noise where tested in accordance with ASTM E90. Alternatively, the sound transmission class of walls, partitions and floor-ceiling assemblies shall be established by engineering analysis based on a comparison of walls, partitions and floor-ceiling assemblies having sound transmission class ratings as determined by the test procedures set forth in ASTM E90. Penetrations or openings in construction assemblies for piping; electrical devices; recessed cabinets; bathtubs; soffits; or heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings. Intersections between walls and floors and wall-to-wall intersections shall be sealed or otherwise treated in accordance to ASTM C919. This requirement shall not apply to entrance doors; however, such doors shall be tight fitting to the frame and sill.

Add new standard(s) follows

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box
C700
West Conshohocken PA 19428-2959
US

C919-12(2017):

Standard Practice for Use of Sealants in Acoustical Applications

Reason: This change addresses sound flanking paths not previously addressed, requiring intersections to be sealed. If unsealed, these paths can reduce the effectiveness of walls by at least 5 STC points versus the tested systems. A differential of 3 STC points becomes perceptible by humans and 5 points is the threshold at which it becomes a nuisance. Sound intrusion via these unsealed intersections can cause noticeable deterioration in sound isolation performance.

Nuisance noise has a measurable impact on human health. A report by the World Health Organization on noise effects and morbidity linked "noise annoyance" (as it was called in the report) to increased risk for several health issues including arthritic symptoms, hypertension, and migraines.

The code already contains requirements for sound transmission, but by not addressing intersections, it leaves a sound transmission path which can negate the effects of other measures taken to reduce sound transmission.

The handbook of sound engineers states that "an acoustical sealant is required to caulk all joints of a partition if the highest TL (transmission loss) is to be attained."

This simple and relatively inexpensive step will ensure sound transmission performance in actual installations lives up to the expectations set by laboratory testing.

Bibliography: WHO LARES Final Report, Noise Effects on Morbidity, Niemann and Maschke, Berlin Center for Public Health

Handbook for Sound Engineers, Jones, D. (2008), pp. 77-78

Noise Control Manual for Residential Buildings, Harris, D.A., (1997), pp. 73-76.

Cost Impact: The code change proposal will increase the cost of construction. This proposal is estimated to add approximately \$20 per room requiring sealing to construction costs, for sealant and labor.

Analysis: A review of the standard proposed for inclusion in the code, ASTM C919-12(2017), with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proponent asked for disapproval. The increased cost could be a concern. (Vote: 13-1)

Assembly Action:

None

G125-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Tim Earl, representing The Gypsum Association (tearl@gbhinternational.com) requests As Modified by This Public Comment.

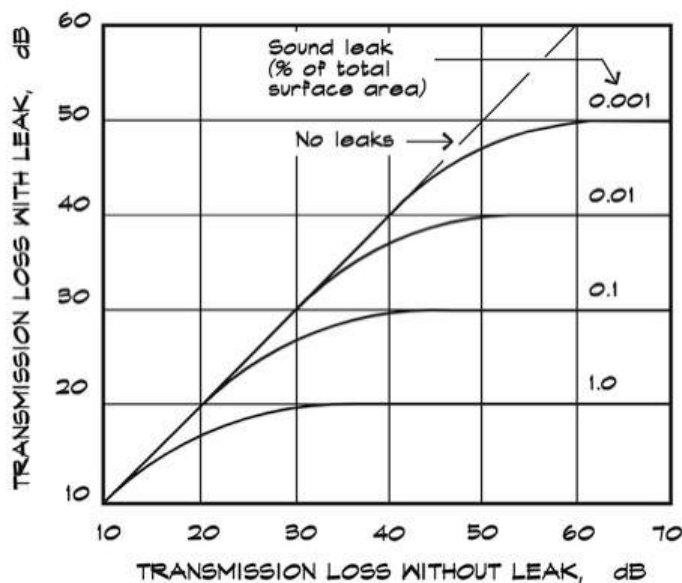
Modify as follows:

2018 International Building Code

1206.2 Airborne sound. Walls, partitions and floor-ceiling assemblies separating *dwelling units* and *sleeping units* from each other or from public or service areas shall have a sound transmission class of not less than 50, or not less than 45 if field tested, for airborne noise where tested in accordance with ASTM E90. Alternatively, the sound transmission class of walls, partitions and floor-ceiling assemblies shall be established by engineering analysis based on a comparison of walls, partitions and floor-ceiling assemblies having sound transmission class ratings as determined by the test procedures set forth in ASTM E90. Penetrations or openings in construction assemblies for piping; electrical devices; recessed cabinets; bathtubs; soffits; or heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings. ~~Intersections—All intersections between walls and floors and wall-to-wall wall-to-wall and wall-to-ceiling assemblies shall be either treated with joint compound and joint tape in accordance with ASTM C840 or sealed in accordance with sections 7 and 8 of ASTM C919. All floor-to-wall assembly intersections shall be sealed or otherwise treated in accordance to ASTM C919. This with sections 7 and 8 of ASTM C919. This~~ requirement shall not apply to entrance doors; however, such doors shall be tight fitting to the frame and sill.

Commenter's Reason: The proponent asked for disapproval of the original proposal at Committee Action Hearings in order to provide a better proposal that was both more accurate and in line with current practices. Work has shown that flanking from improperly treated joints can reduce the sound performance as demonstrated in the figure from Long, Marshall. *Architectural Acoustics, 2nd Edition*. Academic Press, 02/2014.

Composite transmission loss of a leaky panel as a function of the total percentage of leaks (Reynolds, 1981)



The code already addresses many of the other major sources of flanking, not having back-to-back outlet boxes as an example, but it does not address joints of partitions. As the figure shows, reducing the leakage by a factor of 10 improves performance by approximately 10dB. 3dB to 5dB is perceptible and 10 dB roughly reflects a doubling in performance. Even going from 1/100 of the wall leaking to 1/10,000 improves performance.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The expected cost of doing this with sealants alone would be approximately \$20/room, based on the estimate of one quart tube of acoustical caulk needed per room to seal the top and bottom and the few minutes to do it, assuming two of the walls need sealed. Since the tape and mud method is already done in the installation of drywall, those wall to wall, wall to floor, and wall to ceiling intersections not typically sealed and would not result in any added substantial cost - in most cases a couple of dollars or less, based on an estimate of an additional 10 feet of joints per room needing to be sealed.

G125-18

G130-18 Part II

IPMC: 404.6

Proposed Change as Submitted

Proponent: Ed Kulik, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Property Maintenance Code

Revise as follows

404.6 Efficiency unit. Nothing in this section shall prohibit an efficiency ~~living dwelling~~ unit from meeting the following requirements:

1. A unit occupied by not more than one occupant shall have a minimum clear floor area of 120 square feet (11.2 m²). A unit occupied by not more than two *occupants* shall have a minimum clear floor area of ~~220-190~~ square feet (~~20.4-17.6~~ m²). A unit occupied by three *occupants* shall have a minimum clear floor area of ~~320-260~~ square feet (~~29.7-24.1~~ m²). These required areas shall be exclusive of the areas required by Items 2 and 3.
2. The unit shall be provided with a kitchen sink, cooking appliance and refrigeration facilities, each having a minimum clear working space of ~~30-40~~ inches (~~762-990~~ mm) in front. Light and *ventilation* conforming to this code shall be provided.
Exception: Dwelling units not required to be Accessible units. Type A units and Type B units shall have a clear working space of not less than 30 inches (762 mm) in front of the kitchen sink, cooking appliance and refrigerator.
3. The unit shall be provided with a separate *bathroom* containing a water closet, lavatory and bathtub or shower.
4. The maximum number of *occupants* shall be three.

Reason:

Cost Impact: The code change proposal will decrease the cost of construction

G130-18 Part II

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Referencing accessible units in the IPMC will cause confusion as most property maintenance inspectors can not be expected to identify accessible units and therefore may misapply the provisions. (Vote: 7-2)

Assembly Action:

None

G130-18 Part II

Individual Consideration Agenda

Public Comment 1:

Proponent: Ed Kullik, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Property Maintenance Code

404.6 Efficiency unit. Nothing in this section shall prohibit an efficiency dwelling unit from meeting the following requirements:

1. A unit occupied by not more than one occupant shall have a minimum clear floor area of 120 square feet (11.2 m²). A unit occupied by not more than two *occupants* shall have a minimum clear floor area of 190 square feet (17.6 m²). A unit occupied by three *occupants* shall have a minimum clear floor area of 260 square feet (24.1 m²). These required areas shall be exclusive of the areas required by Items 2 and 3.
2. The unit shall be provided with a kitchen sink, cooking appliance and refrigeration facilities, each having a minimum clear working space of ~~40-30~~ inches (990-762 mm) in front. Light and *ventilation* conforming to this code shall be provided-

~~**Exception:** Dwelling units not required to be Accessible units, Type A units and Type B units shall have a clear working space of not less than 30 inches (762 mm) in front of the kitchen sink, cooking appliance and refrigerator.~~

3. The unit shall be provided with a separate *bathroom* containing a water closet, lavatory and bathtub or shower.
4. The maximum number of *occupants* shall be three.

Commenter's Reason: This public comment restores the minimum clear working space in front of the kitchen facilities in an efficiency unit to 30 inches and deletes the exception that refers to Accessible units, Type A units and Type B units. The 40 inch clearance is required for a new building constructed in accordance with the IBC and the A117.1 standard, but is not necessarily required for an existing building. For an existing building, increasing the clear working space to 40 inches would only be required if the unit were altered or added to. Ordinary maintenance and repairs would not trigger a need to bring the clear working space into compliance.

The typical activity that would be required of a tenant or owner cited under the IPMC to bring the unit up to minimum health and safety standards is most likely the repair or replacement of a non-working appliance, or the repair or replacement of deteriorated floor, wall or ceiling finishes. The IPMC in turn requires such work (or any other work to correct conditions cited by the property maintenance inspector) to be in accordance with the IEBC. Unless the work was extensive enough to qualify as a Level 2 Alteration under the IEBC, an upgrade for accessibility would not be required. If such a level of work is needed, the IEBC would likely require the owner or their authorized agent (e.g. architect, contractor or other professional hired by the owner) to apply for a building permit and submit construction documents. Presumably, either the owner's authorized agent or the building official would catch the need to increase the clear working space.

The primary reason the IPMC committee voted to disapprove G130, Part II was over concerns the typical property maintenance inspector would not necessarily be familiar with ICC A117.1, ADA or the Fair Housing Act Design Guidelines, and therefore not know what Accessible Units, Type A units and Type B units are. The BCAC agrees with the committee that it isn't necessary for the property maintenance inspector to know when the clearance needs to be increased, as that would be triggered by work done under the IEBC and reviewed by the building department, and has removed the language of concern. As there were no other objections to the proposal, the BCAC asks the Committee Action of Disapprove be overturned and this Public Comment be considered.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The net effect of the public comment and code change proposal will not increase or decrease the cost of construction because the resulting change is simply to allow smaller areas for efficiency units.

G130-18 Part II

G130-18 Part I

IBC: 1207.4

Proposed Change as Submitted

Proponent: Ed Kulik, representing ICC Building Code Action Committee (bcac@iccsafe.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE GENERAL CODE DEVELOPMENT COMMITTEE. PART II WILL BE HEARD BY THE PROPERTY MAINTENANCE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

2018 International Building Code

Revise as follows

1207.4 Efficiency dwelling units. An efficiency ~~living dwelling~~ unit shall conform to the requirements of the code except as modified herein:

1. The unit shall have a living room of not less than ~~220-190~~ square feet (~~20.4-17.6~~ m²) of floor area. An additional ~~100-70~~ square feet (~~9.3-6.5~~ m²) of floor area shall be provided for each occupant of such unit in excess of two.
2. The unit shall be provided with a separate closet.
3. ~~The For other than Accessible, Type A and Type B dwelling units, the~~ unit shall be provided with a kitchen sink, cooking appliance and ~~refrigeration facilities~~ refrigerator, each having a clear working space of not less than 30 inches (762 mm) in front. Light and ventilation conforming to this code shall be provided.
4. The unit shall be provided with a separate bathroom containing a water closet, lavatory and bathtub or shower.

Reason: The market is trending toward smaller living areas in multi-family R-2 structures particularly in urban areas. US Census statistics show that in 2000, app. 46,000 rental units built were less than 1,000 sq.ft. In 2015, 114,000 units and in 2016, 99,000 units were less than 1,000 sq.ft. The Urban Land Institute reported in 2013 that major Municipalities including New York City, San Francisco, Boston, Dallas and Philadelphia are allowing smaller apartments with Seattle and Portland (OR) having no minimum sizes. The proposed reduction allows for a modest decrease (13.6%) in the required living room area and (30%) in the floor area for each occupant of such unit in excess of two. Code Professionals are receiving proposals for dwelling units in R2 structures that are nonconforming with the minimum standards in the IBC. The Room Area standard for dwelling units in BOCA and SBBC as well as the 2000 edition of IBC required that one room must have a minimum floor area of 150 sq.ft. This was reduced to 120 sq.ft in the 2003 IBC and remains today. The minimum living room area for efficiency units in the 2000 IBC is the same as the 2018 IBC. No reduction has been proposed even though the overall dwelling unit room area standard has been reduced. The proposal complies with the current language in IBC Section 1207.3. which requires that habitable rooms be at least 120 sq.ft.

IBC 1207.4: The change from "living unit" to "dwelling unit" is to use a defined term to describe these efficiency apartments. The change in Item 3 corrects potential existing conflicts with Chapter 10 of ICC A117.1. which requiring a clear working space of 40 inches in front of the kitchen sink, cooking appliance and refrigerator for Accessible, Type A or B units. The change from "refrigeration facilities" to "refrigerator" is to use a more clearly understood term, and eliminate someone believing that another type of fixture, such as a beer cooler, would be sufficient.

IPC 404.6: The changes to the IPC are for coordination with the revisions to the IBC for efficiency apartments.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>.

Cost Impact: The code change proposal will decrease the cost of construction

This proposal could decrease the cost of construction where efficiency apartments are built to the lower minimum sizes required by the text that is proposed.

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This proposal addresses the increasing real need for smaller dwelling units. This proposed language is useable and enforceable. (Vote: 8-6)

Assembly Action:

None

G130-18 Part I

G133-18

IBC: 1209.3.1, 1209.3.1.1

Proposed Change as Submitted

Proponent: Eirene Knott, representing Metropolitan Kansas City Chapter of the ICC (Eirene.Knott@brrarch.com)

2018 International Building Code

[P] 1209.3.1 Water closet compartment. Each water closet utilized by the public or employees shall occupy a separate compartment with walls or partitions and a door enclosing the fixtures to ensure privacy.

Exceptions:

1. Water closet compartments shall not be required in a single-occupant toilet room with a lockable door.
2. Toilet rooms located in child day care facilities and containing two or more water closets shall be permitted to have one water closet without an enclosing compartment.
3. This provision is not applicable to toilet areas located within Group I-3 occupancy housing areas.

Add new text as follows

1209.3.1.1 Water closet compartment size. Where a compartment is provided, the compartment shall be not less than 30 inches (762 mm) in width and not less than 60 inches (1524 mm) in depth for floor-mounted water closets and not less than 30 inches (762 mm) in width and 56 inches (1422) in depth for wall-hung water closets. The compartment shall provide not less than 21 inches (533 mm) of clearance in front of the water closet to any wall, fixture or door.

Reason: This proposal is bringing language from the IPC into the IBC where designers that utilize the IBC can find this information more readily. Most architectural firms do not have an IPC in their office, but rather rely upon the IBC to provide the information needed for the design aspect of the project. This code change brings language directly from the IPC with specifics that will be utilized by a designer so that the toilet room layout will comply with the requirements of the IPC. There is specific information in the IBC on the requirements for urinal partitions, so bringing language in specific to the toilet partitions would be a natural supplement to the information already provided

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This is just adding language that already exists in the IPC so this will not impact the construction cost.

Analysis: This is a [P] controlled section. This is a matter of IBC-G Committee deciding whether it is appropriate to have the same language contained in the IPC placed in the IBC. Technical changes to this section should not be made by IBC-G.

G133-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This is an area that is quite often missed and should be referenced. A public comment may be in order. But where do we stop regarding bringing in requirements from other codes? That is a slippery slope. It may be more appropriate to have a simple and brief pointer. Chapter 29 may be the proper place for this. (Vote: 13-0)

Assembly Action:

None

G133-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Eirene Knott, representing Metropolitan Kansas City Chapter of the ICC (eirene.knott@brrarch.com); David Collins (dcollins@preview-group.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

[P] 2903 Installation of Fixtures

[P] 2903.1 Setting Fixtures shall be set level and in proper alignment with reference to adjacent walls.

[P] 2903.1.1 Water closets, urinals, lavatories and bidets. A water closet, urinal, lavatory or bidet shall not be set closer than 15 inches (381 mm) from its center to any side wall, partition, vanity or other obstruction. Where partitions or other obstructions do not separate adjacent fixtures, fixtures shall not be set closer than 30 inches (762 mm) center to center between adjacent fixtures. There shall be not less than a 21-inch (533 mm) clearance in front of a water closet, urinal, lavatory or bidet to any wall, fixture or door. Water closet compartments shall be not less than 30 inches (762 mm) in width and not less than 60 inches (1524 mm) in depth for floor-mounted water closets and not less than 30 inches (762 mm) in width and 56 inches (1422 mm) in depth for wall-hung water closets.

Exception: An accessible children's water closet shall be set not closer than 12 inches (305 mm) from its center to the required partition or to the wall on one side.

[P] 2903.1.2 Public Lavatories In employee and public toilet rooms, the required lavatory shall be located in the same room as the required water closet.

[P] 2903.1.3 Location of fixtures and piping Piping, fixtures or equipment shall not be located in such a manner as to interfere with the normal operation of windows, doors or other means of egress openings.

[P] 2903.1.4 Water closet compartment Each water closet utilized by the public or employees shall occupy a separate compartment with walls or partitions and a door enclosing the fixtures to ensure privacy.

Exceptions:

1. Water closet compartments shall not be required in a single-occupant toilet room with a lockable door.
2. Toilet rooms located in child day care facilities and containing two or more water closets shall be permitted to have one water closet without an enclosing compartment.
3. This provision is not applicable to toilet areas located within Group I-3 housing areas.

[P] 2903.1.5 Urinal Partitions Each urinal utilized by the public or employees shall occupy a separate area with walls or partitions to provide privacy. The horizontal dimension between walls or partitions at each urinal shall be not less than 30 inches (762 mm). The walls or partitions shall begin at a height not greater than 12 inches (305 mm) from and extend not less than 60 inches (1524 mm) above the finished floor surface. The walls or partitions shall extend from the wall surface at each side of the urinal not less than 18 inches (457 mm) or to a point not less than 6 inches (152 mm) beyond the outermost front lip of the urinal measured from the finished backwall surface, whichever is greater.

Exceptions:

1. Urinal partitions shall not be required in a single-occupant or family/assisted-use toilet room with a lockable door.
2. Toilet rooms located in child day care facilities and containing two or more urinals shall be permitted to have one urinal without partitions.

Commenter's Reason: The committee disapproved the code change saying that it was a slippery slope bringing more language for requirements from other codes. This language is essential to the designer when designing a building. Both architects and interior designers need to know what the minimum code requirements are for toilet compartments and the spacing of the fixtures. By not having this language in the IBC, they are not aware of the requirements as most designers only utilize the IBC. Without some direction or pointer in the IBC, they will not know what these requirements are and their designs will not be code compliant.

The committee suggested my proposed language be placed in Chapter 29, so I have created a new section within the Chapter that has pulled language directly from the IPC relative to fixture installation.

The committee also wanted a simple and brief pointer. I am not sure how much more simple and brief it can be other than to tell someone to go to a specific section in the IPC. However, I have brought language directly from the IPC to make sure everything relative to fixtures was provided for design purposes. If this language ever changes, I am hopeful that it will be updated from the IPC and strongly urge the CCC to make sure this is scoped by the IPC.

The table below indicates where the language was taken from in the IPC to become part of the IBC.

Proposed IBC	2018 IPC
2903.1	405.3
2903.1.1	405.3.1
2903.1.2	405.3.2
2903.1.3	405.3.3
2903.1.4	405.3.4
2903.1.5	405.3.5

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The code change proposal will not increase or decrease the cost of construction .

This is just adding language that already exists in the IPC so this will not impact the construction cost.

G133-18

G135-18

IBC: Chapter 12, 1201.1, SECTION 1210, 1210.1, 1210.2, 1210.2.1, 1210.2.2, 1210.2.3, 1210.2.4, 1210.2.5, 1210.2.6, 1210.2.7, 1210.2.8, 2010.2.9, 1210.2.10, 1210.2.11, 1210.3, 1210.3.1, 1210.3.2, 1210.3.3, 1210.3.4, 1210.3.5, Table TABLE 1210.3, 1210.3.6, 1210.3.7

Proposed Change as Submitted

Proponent: Craig Conner, representing self (craig.conner@mac.com); Jani Palmer, representing Environmental Protection Agency (Palmer.janise@epa.gov)

2018 International Building Code

CHAPTER 12 INTERIOR ENVIRONMENT

Revise as follows

1201.1 Scope. The provisions of this chapter shall govern ventilation, temperature control, lighting, *yards and courts*, sound transmission, room dimensions, surrounding materials ~~and~~, rodentproofing associated with the interior spaces of ~~buildings-buildings~~, and radon.

Add new text as follows

SECTION 1210 RADON

1210.1 Applicability. Section 1210 shall apply to use groups E and I located in radon zone 1 as defined in IRC Table AF101(1).

Exception: Compliance with Section 1210 shall not be required where the authority having jurisdiction has defined the radon zone as Zone 2 or 3.

1210.2 Radon testing. Radon testing shall be performed in accordance with Sections 1210.2.1 through 1210.2.11.

1210.2.1 Airtightness. Testing shall be performed after the building passes its airtightness test.

1210.2.2 Fan. Where the system includes a fan, testing shall be performed after the radon control system installation is complete and operating with the fan.

1210.2.3 Lowest level. Testing shall be performed at the lowest level that will be occupied, inclusive of unfinished spaces. Spaces that are physically separated and severed by different HVAC systems shall be tested separately.

1210.2.4 Spaces not tested. Testing shall not be performed in a closet, hallway, stairway, laundry room, furnace room, bathroom or kitchen.

1210.2.5 Test kits and monitors. Testing shall be performed with a commercially available test kit or with a continuous radon monitor that can be calibrated. Testing with test kits shall include two tests, which shall be averaged. Testing shall be in accordance with the testing device manufacturer's instructions.

1210.2.6 Testing agency. Testing shall be performed by the builder, a registered design professional or an approved third party.

1210.2.7 Time period. Testing shall extend at least 48 hours or to the minimum specified by the testing device manufacturer, which ever is longer. This initial testing shall be permitted to extend past occupancy.

1210.2.8 Test results. Test results shall be provided directly to the owner by the test lab or testing party. The test results shall be delivered before or after occupancy.

2010.2.9 Additional test kit. An additional pre-paid test kit shall be provided to the owner to use when they choose. The test kit shall include mailing, or emailing the results from the testing lab to the owner. The builder shall also be permitted to receive the test results.

1210.2.10 Test result. This section does not require a specific test result, rather it requires the test be performed and the results be provided to the registered design professional or owner.

1210.2.11 Test result report. The registered design professional or owner shall be informed prior to occupancy and in writing that "A radon test result of 4 pCi/L or above is the 'action level' set by the U.S. Environmental Protection Agency (EPA. EPA recommends radon reduction measures to lower radon levels below 4 pCi/L." Or "For a radon test result of 4 pCi/L or above [name of builder or jurisdiction having authority] recommends radon reduction measures to lower radon levels below 4 pCi/L."

1210.3 Radon reduction measures. Radon reduction measures shall be in accordance with Sections 1210.3.1 through 1210.3.6 and Table 1210.3.

1210.3.1 Soil-gas barriers and base course. A base course in accordance with Section 1805.4.1 shall be installed below slabs and foundations. There shall be a continuous base course under each soil-gas retarder that is separated by foundation walls or footings. Foundation walls and floors in contact with the soil shall be damp proofed or waterproofed in accordance with Section 1805. Punctures, tears and gaps around penetrations of the soil-gas retarder shall be repaired or covered with an additional soil-gas retarder. The soil-gas retarder shall be a continuous 6-mil (0.15 mm) polyethylene or an approved equivalent. Approved alternative soil gas collection areas, such as sealed crawlspaces, shall be permitted.

1210.3.2 Soil gas collection. There shall be an unobstructed path for soil gas flow within the base course and out through the vent in the roof. Soil gases below the foundation shall be collected by a perforated pipe with a diameter of not less than 4 inches (10 cm) and not less than 10 ft (3 m) in total length that is mechanically fastened to a tee with two horizontal openings within the base course for radon collection or an equivalent method. The tee fitting connection within the base course and the soil gas vent pipe that extends to the roof shall be designed to prevent clogging of the radon collection path. Alternately the soil gas collection shall be by approved radon collection mats or an equivalent approved method.

1210.3.3 Soil gas entry routes. Openings in slabs, soil-gas retarders, and joints such as plumbing, ground water control systems, soil-gas vent pipes, piping and structural supports, shall be sealed against air leakage at the penetrations with a polyurethane caulk, expanding foam or other approved sealing method. Gaps, seams and joints below grade in walls and footings that surround soil gas collection areas shall be closed with cementitious materials, damp proofing, or other approved products. Closure shall be provided to prevent air migration between the base course that serves soil gas collection and exterior foundation drain systems located outside of the walls or footings that surround the soil gas collection areas. Masonry unit walls below grade shall provide a barrier between soil gas and interior spaces, including but not limited to, barriers within the hollow masonry units, full grouting, solid masonry units or other approved method. Sumps intended for ground water control shall have gasketed lids or be otherwise sealed and shall not be connected to the soil-gas exhaust system.

1210.3.4 Soil gas vent. A gas-tight vent pipe not less than 3 to 4 inches in diameter shall extend from the soil-gas permeable layer through the roof. Alternately, the vent shall extend from the soil-gas permeable layer to at least 30 feet above grade and shall not be less than 4 feet vertically above or 10 feet horizontally away from operable windows, doors or skylights. The vent pipe shall be sloped to avoid collecting condensate or rainwater. The vent pipe size shall not be reduced at any location as it goes from gas collection to the roof. Exposed and visible interior vent pipes shall be identified with not less than one label reading "Radon Reduction System" on each floor and in habitable attics.

1210.3.5 Vent pipe diameter. The minimum vent pipe diameter shall be as specified in Table 1210.3.5.

**TABLE 1210.3.5
Maximum Vented Foundation Area**

Maximum Area Vented	Minimum Pipe Diameter
2,500 ft ² (232 m ²)	3 inch (7.6 cm)
4,000 ft ² (372 m ²)	4 inch (10 cm)
Unlimited	6 inch (15.2 cm)

1210.3.6 Multiple vented areas. In dwellings where interior footings or other barriers separate the soil-gas permeable layer, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that terminates above the roof or individual vent pipes shall terminate separately above the roof.

1210.3.7 Fan. Each sub-slab soil-gas exhaust system shall include a fan, or dedicated space for the post-construction installation of a fan. The electrical supply for the fan shall be located within 6 feet (1.8 m) of the fan.

Reason: Radon in schools presents a significant health risk. Thousands of schools are affected by radon. EPA found that 41% of schools that had high radon were located geographically within Zone 1 (high radon potential), It is common knowledge that there is no way to know your building's radon level unless you test. Post-construction mitigation is very expensive; preventative measures, such as adding radon reducing features during construction, can save future costs and lives.

Cost Impact: The code change proposal will increase the cost of construction. The cost of three test kits with prepaid analysis and prepaid postage is less than \$80, probably less than \$50 in builder quantity including tax. Where there were multiple spaces that are physically separated and served by different HVAC systems each space would incur that cost.

The cost of the measures in the building varies widely with building size. Many elements of the radon resistant features are already required by code; for example, the base course under the foundation, and air tightness for the building; these would not add cost for the radon system.

G135-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal contains a large amount of unenforceable language. A lot of substantiation was provided for schools, but not all Group I occupancies. The timing may not be right to make radon mitigation mandatory as there are testing and liability issues that still need to be worked out. There is science behind this proposal and it appears to be a significant problem, but school boards, possibly at the state level, should have been engaged. The starting place for this may be best as an appendix, much like in the residential code. It would be better to bring the tables over rather than reference the residential code. (Vote: 14-0)

Assembly Action:

None

G135-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Craig Conner, representing Environmental Protection Agency (craig.conner@mac.com); Jani Palmer, EPA; Gary Hodgden, AQP Inc, representing AQP Inc (gary@aair.com); Bruce Snead, representing self (bsnead@ksu.edu) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

1210.1 Applicability. Section 1210 shall apply to use groups E and ~~H4~~ located in radon zone 1 as defined in ~~IRC~~ Table AF101(1). 1210.1

Exception: Compliance with Section 1210 shall not be required where the authority having jurisdiction has defined the radon zone as Zone 2 or 3.

1210.2.1 Airtightness. Testing shall be performed after the building passes its airtightness ~~test requirements~~.

1210.2.3 Lowest level. Testing shall be performed at the lowest level that will be occupied, inclusive of unfinished spaces. Spaces that are physically separated and ~~severed~~ severed by different HVAC systems shall be tested separately.

1210.2.7 Time period. Testing shall extend at least 48 hours or to the minimum specified by the testing device manufacturer, which ever is longer. ~~This initial testing shall be permitted to extend past occupancy.~~

1210.2.8 Test results reported. Written test results from the test lab or testing party ~~The test results shall be delivered before or after occupancy. shall be provided with the construction documents.~~

2010.2.9 Additional test kit. An additional pre-paid test kit shall be provided ~~to for~~ the owner to use when they choose. The test kit shall include mailing, or emailing the results from the testing lab to the owner. ~~The builder shall also be permitted to receive the test results.~~

1210.2.10 Test result, result and fan. ~~This section does not require a specific test result, rather it requires the test be performed and the results be provided to the registered design professional or owner. Where the radon test result is 4 pCi/L or greater the radon vent pipe fan shall be installed.~~

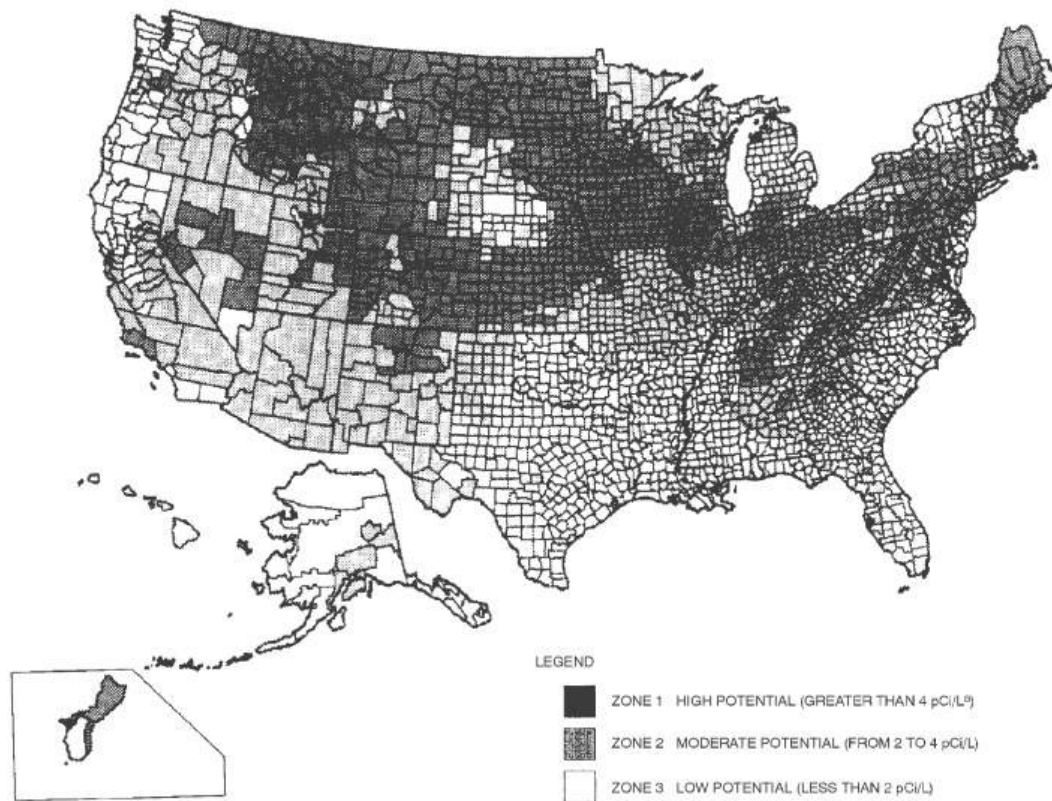
1210.2.11 Test result report. ~~The registered design professional or owner shall be informed prior to occupancy and in writing that "A radon test result of 4 pCi/L or above is the 'action level' set by the U.S. Environmental Protection Agency (EPA. EPA recommends radon reduction measures to lower radon levels below 4 pCi/L." Or "For a radon test result of 4 pCi/L or above [name of builder or jurisdiction having authority] recommends radon reduction measures to lower radon levels below 4 pCi/L."~~

1210.3.2 Soil gas collection. There shall be an unobstructed path for soil gas flow within the base course and ~~out~~ outside through the vent in the roof. ~~Soil gases below the foundation shall be collected by a perforated pipe with a diameter of not less than 4 inches (10 cm) and not less than 10 ft (3 m) in total length that is mechanically fastened to a~~

tee with two horizontal openings within the base course for radon collection or an equivalent method. The tee fitting connection within the base course and the soil gas vent pipe that extends to the roof shall be designed to prevent clogging of the radon collection path. Alternately the soil gas collection shall be by approved radon collection mats or an equivalent approved method.

1210.3.4 Soil gas vent. A gas-tight vent pipe not less than 3 to 4 inches in diameter shall extend from the soil-gas permeable layer through the roof. Alternately, the vent shall extend ~~from the soil-gas permeable layer to~~ to at least 30 feet above grade and shall not be less than 4 feet vertically above or 10 feet horizontally away from operable windows, doors or ~~skylights~~ skylights; ~~and the room opposite the side vent shall be tested for radon.~~ The vent pipe shall be sloped to avoid collecting condensate or rainwater. The vent pipe size shall not be reduced at any location as it goes from gas collection to the roof. Exposed and visible interior vent pipes shall be identified with not less than one label reading "Radon Reduction System" on each floor and in habitable attics.

1210.3.6 Multiple vented areas. In dwellings where interior footings or other barriers separate the soil-gas permeable layer, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that terminates ~~above the roof~~ outside or individual vent pipes shall terminate ~~separately above the roof~~ outside separately.



a. pCi/L standards for picocuries per liter of air. The U.S. Environmental Protection Agency (EPA) recommends that homes that measure 4 pCi/L and greater be mitigated.

The map assigns each U.S. county to one of three zones based on radon potential. Radon Zone 1 has the highest radon potential. Table AF101 lists the Zone 1 counties illustrated on the map.

**FIGURE 1210.1
EPA MAP OF RADON ZONES**

**TABLE 1210.1
HIGH RADON-POTENTIAL (ZONE 1) COUNTIES**

ALABAMA	Morgan	Stanton	Washington	Morris	Lehigh	Fairfax
Calhoun	Moultrie	Trego	Watsonwan	Somerset	Luzerne	Falls Church
Clay	Ogle	Wallace	Wilkin	Sussex	Lycoming	Fluvanna
Cleburne	Peoria	Washington	Winona	Warren	Mifflin	Frederick
Colbert	Piatt	Wichita	Wright	NEW MEXICO	Monroe	Fredericksburg
Coosa	Pike	Wyandotte	Yellow Medicine	Bernalillo	Montgomery	Giles
Franklin	Putnam	KENTUCKY	MISSOURI	Colfax	Montour	Goochland
Jackson	Rock Island	Adair	Andrew	Mora	Northampton	Harrisonburg
Lauderdale	Sangamon	Allen	Atchison	Rio Arriba	Northumberland	Henry
Lawrence	Schuyler	Barren	Buchanan	San Miguel	Perry	Highland
Limestone	Scott	Bourbon	Cass	Santa Fe	Schuykill	Lee
Madison	Stark	Boyle	Clay	Taos	Snyder	Lexington
Morgan	Stephenson	Bullitt	Clinton	NEW YORK	Sullivan	Louisa
Talladega	Tazewell	Casey	Holt	Albany	Susquehanna	Martinsville
CALIFORNIA	Vermilion	Clark	Iron	Allegany	Tioga	Montgomery
Santa Barbara	Warren	Cumberland	Jackson	Broome	Union	Nottoway
Ventura	Whiteside	Fayette	Nodaway	Cattaraugus	Venango	Orange
COLORADO	Winnebago	Franklin	Platte	Cayuga	Westmoreland	Page
Adams	Woodford	Green	MONTANA	Chautauqua	Wyoming	Patrick
Arapahoe	INDIANA	Harrison	Beaverhead	Chemung	York	Pittsylvania

<u>Baca</u>	<u>Adams</u>	<u>Hart</u>	<u>Big Horn</u>	<u>Chenango</u>	RHODE ISLAND	<u>Powhatan</u>
<u>Bent</u>	<u>Allen</u>	<u>Jefferson</u>	<u>Blaine</u>	<u>Columbia</u>	<u>Kent</u>	<u>Pulaski</u>
<u>Boulder</u>	<u>Bartholomew</u>	<u>Jessamine</u>	<u>Broadwater</u>	<u>Cortland</u>	<u>Washington</u>	<u>Radford</u>
<u>Chaffee</u>	<u>Benton</u>	<u>Lincoln</u>	<u>Carbon</u>	<u>Delaware</u>	S. CAROLINA	<u>Roanoke</u>
<u>Cheyenne</u>	<u>Blackford</u>	<u>Marion</u>	<u>Carter</u>	<u>Dutchess</u>	<u>Greenville</u>	<u>Rockbridge</u>
<u>Clear Creek</u>	<u>Boone</u>	<u>Mercer</u>	<u>Cascade</u>	<u>Erie</u>	S. DAKOTA	<u>Rockingham</u>
<u>Crowley</u>	<u>Carroll</u>	<u>Metcalfe</u>	<u>Chouteau</u>	<u>Genesee</u>	<u>Aurora</u>	<u>Russell</u>
<u>Custer</u>	<u>Cass</u>	<u>Monroe</u>	<u>Custer</u>	<u>Greene</u>	<u>Beadle</u>	<u>Salem</u>
<u>Delta</u>	<u>Clark</u>	<u>Nelson</u>	<u>Daniels</u>	<u>Livingston</u>	<u>Bon Homme</u>	<u>Scott</u>
<u>Denver</u>	<u>Clinton</u>	<u>Pendleton</u>	<u>Dawson</u>	<u>Madison</u>	<u>Brookings</u>	<u>Shenandoah</u>
<u>Dolores</u>	<u>De Kalb</u>	<u>Pulaski</u>	<u>Deer Lodge</u>	<u>Onondaga</u>	<u>Brown</u>	<u>Smyth</u>
<u>Douglas</u>	<u>Decatur</u>	<u>Robertson</u>	<u>Fallon</u>	<u>Ontario</u>	<u>Brule</u>	<u>Spotsylvania</u>
<u>El Paso</u>	<u>Delaware</u>	<u>Russell</u>	<u>Fergus</u>	<u>Orange</u>	<u>Buffalo</u>	<u>Stafford</u>
<u>Elbert</u>	<u>Elkhart</u>	<u>Scott</u>	<u>Flathead</u>	<u>Otsego</u>	<u>Campbell</u>	<u>Staunton</u>
<u>Fremont</u>	<u>Fayette</u>	<u>Taylor</u>	<u>Gallatin</u>	<u>Putnam</u>	<u>Charles Mix</u>	<u>Tazewell</u>
<u>Garfield</u>	<u>Fountain</u>	<u>Warren</u>	<u>Garfield</u>	<u>Rensselaer</u>	<u>Clark</u>	<u>Warren</u>
<u>Gilpin</u>	<u>Fulton</u>	<u>Woodford</u>	<u>Glacier</u>	<u>Schoharie</u>	<u>Clay</u>	<u>Washington</u>
<u>Grand</u>	<u>Grant</u>	MAINE	<u>Granite</u>	<u>Schuyler</u>	<u>Codington</u>	<u>Waynesboro</u>
<u>Gunnison</u>	<u>Hamilton</u>	<u>Androskoggin</u>	<u>Hill</u>	<u>Seneca</u>	<u>Corson</u>	<u>Winchester</u>
<u>Huerfano</u>	<u>Hancock</u>	<u>Aroostook</u>	<u>Jefferson</u>	<u>Steuben</u>	<u>Davison</u>	<u>Wythe</u>
<u>Jackson</u>	<u>Harrison</u>	<u>Cumberland</u>	<u>Judith Basin</u>	<u>Sullivan</u>	<u>Day</u>	WASHINGTON
<u>Jefferson</u>	<u>Hendricks</u>	<u>Franklin</u>	<u>Lake</u>	<u>Tioga</u>	<u>Deuel</u>	<u>Clark</u>
<u>Kiowa</u>	<u>Henry</u>	<u>Hancock</u>	<u>Lewis and Clark</u>	<u>Tompkins</u>	<u>Douglas</u>	<u>Ferry</u>
<u>Kit Carson</u>	<u>Howard</u>	<u>Kennebec</u>	<u>Madison</u>	<u>Ulster</u>	<u>Edmunds</u>	<u>Okanogan</u>
<u>Lake</u>	<u>Huntington</u>	<u>Lincoln</u>	<u>McCone</u>	<u>Washington</u>	<u>Faulk</u>	<u>Pend Oreille</u>
<u>Larimer</u>	<u>Jay</u>	<u>Oxford</u>	<u>Meagher</u>	<u>Wyoming</u>	<u>Grant</u>	<u>Skamania</u>
<u>Las Animas</u>	<u>Jennings</u>	<u>Penobscot</u>	<u>Missoula</u>	<u>Yates</u>	<u>Hamlin</u>	<u>Spokane</u>
<u>Lincoln</u>	<u>Johnson</u>	<u>Piscataquis</u>	<u>Park</u>	N. CAROLINA	<u>Hand</u>	<u>Stevens</u>
<u>Logan</u>	<u>Kosciusko</u>	<u>Somerset</u>	<u>Phillips</u>	<u>Alleghany</u>	<u>Hanson</u>	W. VIRGINIA
<u>Mesa</u>	<u>LaGrange</u>	<u>York</u>	<u>Pondera</u>	<u>Buncombe</u>	<u>Hughes</u>	<u>Berkeley</u>
<u>Moffat</u>	<u>Lawrence</u>	MARYLAND	<u>Powder River</u>	<u>Cherokee</u>	<u>Hutchinson</u>	<u>Brooke</u>
<u>Montezuma</u>	<u>Madison</u>	<u>Baltimore</u>	<u>Powell</u>	<u>Henderson</u>	<u>Hyde</u>	<u>Grant</u>
<u>Montrose</u>	<u>Marion</u>	<u>Calvert</u>	<u>Prairie</u>	<u>Mitchell</u>	<u>Jerauld</u>	<u>Greenbrier</u>
<u>Morgan</u>	<u>Marshall</u>	<u>Carroll</u>	<u>Ravalli</u>	<u>Rockingham</u>	<u>Kingsbury</u>	<u>Hampshire</u>
<u>Otero</u>	<u>Miami</u>	<u>Frederick</u>	<u>Richland</u>	<u>Transylvania</u>	<u>Lake</u>	<u>Hancock</u>
<u>Ouray</u>	<u>Monroe</u>	<u>Harford</u>	<u>Roosevelt</u>	<u>Watauga</u>	<u>Lincoln</u>	<u>Hardy</u>
<u>Park</u>	<u>Montgomery</u>	<u>Howard</u>	<u>Rosebud</u>	N. DAKOTA	<u>Lyman</u>	<u>Jefferson</u>
<u>Phillips</u>	<u>Noble</u>	<u>Montgomery</u>	<u>Sanders</u>	<u>All Counties</u>	<u>Marshall</u>	<u>Marshall</u>
<u>Pitkin</u>	<u>Orange</u>	<u>Washington</u>	<u>Sheridan</u>	OHIO	<u>McCook</u>	<u>Mercer</u>
<u>Prowers</u>	<u>Putnam</u>	MASS.	<u>Silver Bow</u>	<u>Adams</u>	<u>McPherson</u>	<u>Mineral</u>
<u>Pueblo</u>	<u>Randolph</u>	<u>Essex</u>	<u>Stillwater</u>	<u>Allen</u>	<u>Miner</u>	<u>Monongalia</u>
<u>Rio Blanco</u>	<u>Rush</u>	<u>Middlesex</u>	<u>Teton</u>	<u>Ashland</u>	<u>Minnehaha</u>	<u>Monroe</u>
<u>San Miguel</u>	<u>Scott</u>	<u>Worcester</u>	<u>Toole</u>	<u>Auglaize</u>	<u>Moody</u>	<u>Morgan</u>
<u>Summit</u>	<u>Shelby</u>	MICHIGAN	<u>Valley</u>	<u>Belmont</u>	<u>Perkins</u>	<u>Ohio</u>
<u>Teller</u>	<u>St. Joseph</u>	<u>Branch</u>	<u>Wibaux</u>	<u>Butler</u>	<u>Potter</u>	<u>Pendleton</u>
<u>Washington</u>	<u>Steuben</u>	<u>Calhoun</u>	<u>Yellowstone</u>	<u>Carroll</u>	<u>Roberts</u>	<u>Pocahontas</u>
<u>Weld</u>	<u>Tippecanoe</u>	<u>Cass</u>	NEBRASKA	<u>Champaign</u>	<u>Sanborn</u>	<u>Preston</u>
<u>Yuma</u>	<u>Tipton</u>	<u>Hillsdale</u>	<u>Adams</u>	<u>Clark</u>	<u>Spink</u>	<u>Summers</u>
CONNECTICUT	<u>Union</u>	<u>Jackson</u>	<u>Boone</u>	<u>Clinton</u>	<u>Stanley</u>	<u>Wetzel</u>

Fairfield	Vermillion	Kalamazoo	Boyd	Columbiana	Sully	WISCONSIN
Middlesex	Wabash	Lenawee	Burt	Coshocton	Turner	Buffalo
New Haven	Warren	St. Joseph	Butler	Crawford	Union	Crawford
New London	Washington	Washtenaw	Cass	Darke	Walworth	Dane
GEORGIA	Wayne	MINNESOTA	Cedar	Delaware	Yankton	Dodge
Cobb	Wells	Becker	Clay	Fairfield	TENNESSEE	Door
De Kalb	White	Big Stone	Colfax	Fayette	Anderson	Fond du Lac
Fulton	Whitley	Blue Earth	Cuming	Franklin	Bedford	Grant
Gwinnett	IOWA	Brown	Dakota	Greene	Blount	Green
IDAHO	All Counties	Carver	Dixon	Guernsey	Bradley	Green Lake
Benevah	KANSAS	Chippewa	Dodge	Hamilton	Claiborne	Iowa
Blaine	Atchison	Clay	Douglas	Hancock	Davidson	Jefferson
Boise	Barton	Cottonwood	Fillmore	Hardin	Giles	Lafayette
Bonner	Brown	Dakota	Franklin	Harrison	Grainger	Langlade
Boundary	Cheyenne	Dodge	Frontier	Holmes	Greene	Marathon
Butte	Clay	Douglas	Furnas	Huron	Hamblen	Menominee
Camas	Cloud	Faribault	Gage	Jefferson	Hancock	Pepin
Clark	Decatur	Fillmore	Gosper	Knox	Hawkins	Pierce
Clearwater	Dickinson	Freeborn	Greeley	Licking	Hickman	Portage
Custer	Douglas	Goodhue	Hamilton	Logan	Humphreys	Richland
Elmore	Ellis	Grant	Harlan	Madison	Jackson	Rock
Fremont	Ellsworth	Hennepin	Hayes	Marion	Jefferson	Shawano
Gooding	Finney	Houston	Hitchcock	Mercer	Knox	St. Croix
Idaho	Ford	Hubbard	Hurston	Miami	Lawrence	Vernon
Kootenai	Geary	Jackson	Jefferson	Montgomery	Lewis	Walworth
Latah	Gove	Kanabec	Johnson	Morrow	Lincoln	Washington
Lemhi	Graham	Kandiyohi	Kearney	Muskingum	Loudon	Waukesha
Shoshone	Grant	Kittson	Knox	Perry	Marshall	Waupaca
Valley	Gray	Lac Qui Parle	Lancaster	Pickaway	Maury	Wood
ILLINOIS	Greeley	Le Sueur	Madison	Pike	McMinn	WYOMING
Adams	Hamilton	Lincoln	Nance	Preble	Meigs	Albany
Boone	Haskell	Lyon	Nemaha	Richland	Monroe	Big Horn
Brown	Hodgeman	Mahnomon	Nuckolls	Ross	Moore	Campbell
Bureau	Jackson	Marshall	Otoe	Seneca	Perry	Carbon
Calhoun	Jewell	Martin	Pawnee	Shelby	Roane	Converse
Carroll	Johnson	McLeod	Phelps	Stark	Rutherford	Crook
Cass	Kearny	Meeker	Pierce	Summit	Smith	Fremont
Champaign	Kingman	Mower	Platte	Tuscarawas	Sullivan	Goshen
Coles	Kiowa	Murray	Polk	Union	Trousdale	Hot Springs
De Kalb	Lane	Nicollet	Red Willow	Van Wert	Union	Johnson
De Witt	Leavenworth	Nobles	Richardson	Warren	Washington	Laramie
Douglas	Lincoln	Norman	Saline	Wayne	Wayne	Lincoln
Edgar	Logan	Olmsted	Sarpy	Wyandot	Williamson	Natrona
Ford	Marion	Otter Tail	Saunders	PENNSYLVANIA	Wilson	Niobrara
Fulton	Marshall	Pennington	Seward	Adams	UTAH	Park
Greene	McPherson	Pipestone	Stanton	Allegheny	Carbon	Sheridan
Grundy	Meade	Polk	Thayer	Armstrong	Duchesne	Sublette
Hancock	Mitchell	Pope	Washington	Beaver	Grand	Sweetwater
Henderson	Nemaha	Ramsey	Wayne	Bedford	Piute	Teton

<u>Henry</u>	<u>Ness</u>	<u>Red Lake</u>	<u>Webster</u>	<u>Berks</u>	<u>Sanpete</u>	<u>Uinta</u>
<u>Iroquois</u>	<u>Norton</u>	<u>Redwood</u>	<u>York</u>	<u>Blair</u>	<u>Sevier</u>	<u>Washakie</u>
<u>Jersey</u>	<u>Osborne</u>	<u>Renville</u>	NEVADA	<u>Bradford</u>	<u>Uintah</u>	
<u>Jo Daviess</u>	<u>Ottawa</u>	<u>Rice</u>	<u>Carson City</u>	<u>Bucks</u>	VIRGINIA	
<u>Kane</u>	<u>Pawnee</u>	<u>Rock</u>	<u>Douglas</u>	<u>Butler</u>	<u>Alleghany</u>	
<u>Kendall</u>	<u>Phillips</u>	<u>Roseau</u>	<u>Eureka</u>	<u>Cameron</u>	<u>Amelia</u>	
<u>Knox</u>	<u>Pottawatomie</u>	<u>Scott</u>	<u>Lander</u>	<u>Carbon</u>	<u>Appomattox</u>	
<u>La Salle</u>	<u>Pratt</u>	<u>Sherburne</u>	<u>Lincoln</u>	<u>Centre</u>	<u>Augusta</u>	
<u>Lee</u>	<u>Rawlins</u>	<u>Sibley</u>	<u>Lyon</u>	<u>Chester</u>	<u>Bath</u>	
<u>Livingston</u>	<u>Republic</u>	<u>Stearns</u>	<u>Mineral</u>	<u>Clarion</u>	<u>Bland</u>	
<u>Logan</u>	<u>Rice</u>	<u>Steele</u>	<u>Pershing</u>	<u>Clearfield</u>	<u>Botetourt</u>	
<u>Macon</u>	<u>Riley</u>	<u>Stevens</u>	<u>White Pine</u>	<u>Clinton</u>	<u>Bristol</u>	
<u>Marshall</u>	<u>Rooks</u>	<u>Swift</u>	NEW HAMPSHIRE	<u>Columbia</u>	<u>Brunswick</u>	
<u>Mason</u>	<u>Rush</u>	<u>Todd</u>	<u>Carroll</u>	<u>Cumberland</u>	<u>Buckingham</u>	
<u>McDonough</u>	<u>Saline</u>	<u>Traverse</u>	NEW JERSEY	<u>Dauphin</u>	<u>Buena Vista</u>	
<u>McLean</u>	<u>Scott</u>	<u>Wabasha</u>	<u>Hunterdon</u>	<u>Delaware</u>	<u>Campbell</u>	
<u>Menard</u>	<u>Sheridan</u>	<u>Wadena</u>	<u>Mercer</u>	<u>Franklin</u>	<u>Chesterfield</u>	
<u>Mercer</u>	<u>Sherman</u>	<u>Waseca</u>	<u>Monmouth</u>	<u>Fulton</u>	<u>Clarke</u>	

Commenter's Reason: Protection of public health, safety and welfare is the core goal of the I-codes. I-codes are greatly reducing risks from hazards such as fire, earthquake, tornado, winds, electrocution, falling, and unsafe plumbing, Reducing risks from lung cancer caused by buildings is similarly needed, especially where children are likely to be present. This proposal applies only to schools and daycares (use groups E and I4) in areas with high radon potential. Schools and daycares should not contribute to future lung cancers in children.

American Cancer Society says "The leading cause of lung cancer in non-smokers is exposure to radon gas." (ref 1) The link between radon and lung cancer has been firmly established for about 20 years (ref 2). Radon is estimated to cause about 21,000 deaths per year from lung cancer (ref 2). Children exposed to high levels of radon are more likely to develop lung cancer later in life. (ref 3). Given the large number of fatalities induced by radon in buildings and the sensitivity of children, radon should be reduced in schools and daycares in high radon potential areas.

Most radon originates under the building foundation; therefore, most of the radon reduction construction is under the foundation. Installing radon reduction measures after the new foundation is in place is expensive.

More than half the states have some kind of statewide radon requirement or have local jurisdictions that have adopted radon requirements. You can look at your state law and radon in the LawAtlas. The LawAtlas covers both schools and daycares, as well as other aspects of radon law. (<http://lawatlas.org/datasets/state-radon-laws> click "explore", click your state)

Jurisdictions and schools boards have shown great concern for radon by their actions. Multiple states and school districts have recognized the need to protect school children from radon. These jurisdictions and school districts are primarily in the high radon potential zone (Zone 1) where this code change would apply. As reported by the LawAtlas, eight states require school testing. Those states are Colorado, Connecticut, Florida, Minnesota, New Jersey, Rhode Island, Virginia and West Virginia. Illinois recommends testing. Some states -- Connecticut, Rhode Island and West Virginia -- require that radon-resistant construction features be built into new schools that are located in high radon potential areas.

Multiple states and jurisdictions have recognized the need to protect children in daycare. These are primarily in the high radon potential zone (Zone 1) where this change would apply. As reported by the LawAtlas, some form of radon testing and/or mitigation in daycares is required in ten states. Those states are Connecticut, Iowa, Illinois, Michigan, New Hampshire, Rhode Island, New Jersey, Florida, and Idaho daycares.

Deaths from radon significantly exceed deaths from other building-related risks; such as fires, falls, electrocution, tornadoes, hurricanes, winds, fires, etc. In part this is because the codes have reduced these other risks, but have not yet addressed radon. Radon reduction should be added to the IBC.

This public comment responds to multiple comments from the committee and others:

--"air tightness test" was changed to "air tightness requirements", in recognition that commercial building have air tightness requirements, but may not be tested.

--Radon test results shall be included with construction documents.

--Test results delivered after occupancy would be after code enforcement authority has expired; therefore, the language allowing test results to be delivered after occupancy was removed.

--Radon zone map and table were brought into the IBC as requested by the committee. Zone table will be two pages long when formatted like in IRC.

Comments were made both for and against the radon-reduction requirements being in the main body of the code or an appendix. Due to the large death toll from radon in buildings and the impact on children, the proponents believe radon reduction and testing should be in the main body of the code for schools and daycares.

Bibliography: 1) Lung Cancer Risks for Non-Smokers. American Cancer Society. Nov 6, 2017
<https://www.cancer.org/latest-news/why-lung-cancer-strikes-nonsmokers.html>

2) U.S. National Research Council Committee on the Biological Effects of Ionizing Radiation. 1999.

<https://www.nap.edu/read/5499/chapter/1#viii><https://www.nap.edu/read/5499/chapter/5#97>

Historically the link between radon and lung cancer was not understood. Radon is an invisible, tasteless and odorless gas. There is a long period between exposure to radon and the symptoms of lung cancer. Recognition that radon increased lung cancers came from early studies of uranium miners, and was later confirmed more broadly. In 1999 it was concluded that residential radon, as well as smoking, were the most important contributors to the lung cancer. Note table 3-10, summed "total male" and "total female" for both "ever-smokers" and "never-smokers" Actual value in table is 21,800, but is rounded to 21,000.

3) "Canadian Lung Cancer Relative Risk from Radon Exposure for Short Periods in Childhood Compared to a Lifetime" International Journal of Environmental Research and Public Health. 2013 May; 10(5): 1916-1926.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3709356/>

The study concluded: "... exposure to radon during childhood increases the lifetime risk of developing lung cancer ... if a child lived in a home with very high radon concentration for only a few years, the risk of developing lung cancer later in the life could be equivalent to a lifetime exposure to moderate radon concentration."

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The cost of three test kits with prepaid analysis and prepaid postage is less than \$100, probably less than \$70 in builder quantity including tax. Where there were multiple spaces that are physically separated and served by different HVAC systems each space would incur that cost.

The cost of the radon mitigation measures in the building varies widely with building size. Many elements of the radon resistant features are already required by code; for example, the base course under the foundation, and air tightness for the building; these would not add cost for the radon system.

G135-18

G136-18

IBC: 202, 503.1.4, 1510.2.2

Proposed Change as Submitted

Proponent: Ed Kulik, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Building Code

SECTION 202 DEFINITIONS

Revise as follows

[BG] PENTHOUSE. An enclosed, unoccupied rooftop structure used for sheltering mechanical and electrical equipment, tanks, elevators and related machinery, stairways and vertical shaft openings.

503.1.4 Occupied roofs. A roof level or portion thereof shall be permitted to be used as an occupied roof provided the occupancy of the roof is an occupancy that is permitted by Table 504.4 for the story immediately below the roof. The area of the occupied roofs shall not be included in the *building area* as regulated by Section 506. An occupied roof shall not be included in the building height or number of stories as regulated by Section 504 provided the penthouses and other enclosed roof structures comply with Section 1510.

Exceptions:

1. The occupancy located on an occupied roof shall not be limited to the occupancies allowed on the *story* immediately below the roof where the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2 and occupant notification in accordance with Section 907.5 is provided in the area of the occupied roof.
2. Assembly occupancies shall be permitted on roofs of open parking spaces of Type I or Type II construction, in accordance with the exception to Section 903.2.1.6.

SECTION 1510 ROOFTOP STRUCTURES

[BG] 1510.1 General. The provisions of this section shall govern the construction of rooftop structures.

1510.1.1 Area limitation. The aggregate area of penthouses and other enclosed rooftop structures shall not exceed one-third the area of the supporting roof deck. Such penthouses and other enclosed rooftop structures shall not be required to be included in determining the building area or number of stories as regulated by Section 503.1. The area of such penthouses shall not be included in determining the fire area specified in Section 901.7.

[BG] 1510.2 Penthouses. Penthouses in compliance with Sections 1510.2.1 through 1510.2.5 shall be considered as a portion of the story directly below the roof deck on which such penthouses are located. Other penthouses shall be considered as an additional story of the building.

[BG] 1510.2.1 Height above roof deck. Penthouses constructed on buildings of other than Type I construction shall not exceed 18 feet (5486 mm) in height above the roof deck as measured to the average height of the roof of the penthouse. Penthouses located on the roof of buildings of Type I construction shall not be limited in height.

Exception: Where used to enclose tanks or elevators that travel to the roof level, penthouses shall be permitted to have a maximum height of 28 feet (8534 mm) above the roof deck.

[BG] 1510.2.2 Use limitations. Penthouses shall not be used for purposes other than the shelter of mechanical or electrical equipment, tanks, elevators and related machinery, stairways or vertical shaft openings in the roof ~~assembly~~assembly, including ancillary spaces used to access elevators and stairways.

Reason: This is part of a series of 3 proposals dealing with occupied roofs. See BCAC proposals to Section 1006 and 1009.

Although it was felt the original intent of the egress associated with occupied roofs was clear, we felt there were a few remaining provisions that left doubt as to what was intended. It had been reported that some code officials had interpreted the existing code provision to treat an unoccupied roof as an additional story so as to decrease the actual allowable stories in Chapter 5. To clarify that occupied roofs are not considered stories and are permitted to be used

provide that egress is provided in accordance with all applicable sections of the IBC and IFC purposes in a manner “as if they were a story” without applying other “story” requirements like those associated with height and area limitations in Chapter 5 or fire area provisions of Chapter 9, we propose the above modifications as summarized below:

In Section 202, the definition of “PENTHOUSE” is proposed to be modified by adding the word “stairway”. This reinforces the existing and proposed language in Section 1510 that excludes certain allowable rooftop structures from being considered additional stories. The definition was not modified to include vestibule type areas as this is addressed in the proposed change to Section 1510.2.2.

The proposal in Section 503.1.4 Occupied roofs, adds a clarifying statement to support the concept that occupied roofs and other enclosed structures in Section 1510 are not an additional story.

Proposed modifications to Section 1510 Rooftop Structures include the additions of the word “Stairways” and the term, including ancillary spaces used to access elevators and stairways.” to Section 1510.2.2. Use Limitations.

As flat/ low-slope rooftops are increasingly, and intentionally, being designed and utilized for occupancies similar to those on occupied floor levels below, modifications to the current code are necessary to define *rooftop structures* that are occupied and ancillary to approved occupied roof uses and to clarify that these structures must comply with means of egress requirements, but are not a story for height and area limitations. In addition, the proposed modifications described above align the limitations for *Occupied roof ancillary structures* with those for penthouses as a reasonable approach based upon the shared characteristics of the two structure types.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal is a clarification reminder of the scope of requirements included in the identified sections.

G136-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This is an excellent clarification of the code and is coordinated with what was done in the last cycle. (Vote: 14-0)

Assembly Action:

None

G136-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Woestman, Kellen Company, representing Extruded Polystyrene Foam Association (XPSA) (jwoestman@kellencompany.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

Occupied Roof An unenclosed roof or area of a roof designed for human occupancy in which individuals congregate for amusement, educational or similar purposes or in which occupants are engaged at labor, and which is equipped with means of egress meeting the requirements of this code.

Commenter's Reason: There needs to be a clear definition of an occupied roof to help alleviate confusion with the definition of occupiable space. A roof is not an enclosed space, therefore the thermal barrier requirements, smoke development index, etc., used with interior finishes in an enclosed space does not apply. Rather, the occupied roof is constructed as a roof meeting the Occupancy Classification and Use in Section 302.1, height and area limitations in Section 503.1, as well as structural and egress requirements as specified by the code. The existing roof fire requirements in IBC Sections 1505.1, 1508.1, 2603.3 Exception 3, 2603.4.1.5 and 2603.6 also apply to occupied roofs.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Adding a definition should not increase or decrease the cost of construction.

G136-18

G137-18

IBC: 2703 (New), 2703.1 (New), 2703.2 (New), 2703.3 (New), 2703.4 (New), Chapter 35

Proposed Change as Submitted

Proponent: Jonathan Roberts, UL LLC, representing UL LLC (jonathan.roberts@ul.com)

2018 International Building Code

Add new text as follows

SECTION 2703 LIGHTNING PROTECTION SYSTEMS

2703.1 General. Where provided, lightning protection systems shall comply with Sections 2703.2 through 2703.4

2703.2 Installation. Lightning protection systems for all new buildings and additions shall be installed in accordance with one of the following methods:

1. NFPA 780.
2. UL 96A.
3. Other approved methods.

UL 96A shall not be utilized for structures used for the production, handling, or storage of ammunition, explosives, flammable liquids or gases, and other explosive ingredients including dust.

2703.3 Additions to existing systems. Where additions are constructed to a building containing a lightning protection system and the existing building's lightning protection system is connected to the new lightning protection system, the entire system shall be inspected and brought into compliance with current standards.

2703.4 Surge protection. Surge protection devices shall be installed for all normal and emergency electrical systems and all communications systems in accordance with Section 2703.2 and NFPA 70.

Add new standard(s) follows

UL

UL LLC
333 Pfingsten Road
Northbrook IL 60062-2096

96A-2016:

Standard for Installation Requirements for Lightning Protection Systems

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy MA 02169-7471

780-17:

Standard for the Installation of Lightning Protection Systems

Reason: Requirements pertaining to Lightning Protection Systems are not currently found within the building code. This code change does not require the installation of lightning protection systems, but simply provides guidance to those that are installing and inspecting lightning protection. NFPA 780 and UL 96A are two standards that are widely used within the industry, but are not very well known to code officials. These standards are in harmony with the provisions of the National Electrical Code, NFPA 70. UL 96A can be used for the installation and inspection of many lightning protection systems but the standard has limitations that are identified in this proposal. This proposal also recognizes the existence of other approved methods currently used, and thus this proposal is not intended to limit these installations. This proposal is intended to provide the code official with help in addressing the installation of these types of systems.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The cost will not increase since these requirements are being used today to install and inspect lightning protection systems.

Analysis: A review of the standards proposed for inclusion in the code, NFPA 780-17 and UL 96A-2016, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

G137-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: When you have a non-mandatory requirement, it should be in an appendix or a standard. If someone wanted to do something less than this, they should not be mandated to do this unless a specific code requirement drives it. NFPA 70 already addresses this. It has not been demonstrated that there is a real problem. (Vote: 9-4)

Assembly Action:

None

G137-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jonathan Roberts, UL LLC, representing UL LLC (jonathan.roberts@ul.com) requests As Submitted.

Commenter's Reason: Lightning protection systems, though not required by the building or electrical code, if installed incorrectly can pose a significant hazard to persons and property and be ineffective in providing protection from lightning. **There are potential safety hazards if a lightning protection system is installed incorrectly:**

The installation of lightning protection systems is much different from the installation of general electrical wiring. This is due to the high current densities, high rates of current rise, and resulting mechanical forces that happen during a lightning event. For these reasons, specialized material and installation methods such as those specified in NFPA 780 and UL 96A should be followed and the installation should only be installed by qualified personnel trained and certified in the installation of lightning protection systems. Some of the hazards that can arise during a lightning event from an incorrectly installed lightning protection system are:

- Side flashing between lightning conductors and conductive objects within the building resulting in a potential fire.
- Increased shock hazards from a rise in step and touch potential around lightning conductors and grounding electrodes.
- Damage to building structural components such as concrete foundations and steel columns and beams.

With this in mind a building with an incorrectly installed lightning protection system can pose a greater hazard than one without a lightning protection system.

Comprehensive lightning protection system installation is not adequately addressed in building and electrical codes:

While NFPA 70, the National Electrical Code references NFPA 780 it does so only in non-enforceable informational notes. Those informational notes referencing NFPA 780 only follow grounding and bonding requirements found in Article 250 and Chapter 8 for communications systems. The NEC contains some general grounding and bonding requirements for lightning protection systems but does not contain requirements such as, material, air terminal placement, or conductor routing found in the standards that are critical for a safe and effective system.

Lightning protection systems are not required, but if installed should be installed to the appropriate standards:

This proposal does not require the installation of a lightning protection system but will provide guidance to the code official and installer for the appropriate safety standards for installation of these systems if they are installed. NFPA 780 and UL 96A are two standards that are widely used within the industry, but are not well known to code officials.

Including requirements in Chapter 27 will ensure safety of lightning protection systems:

Including this new Section in Chapter 27 instead of an Appendices will make the necessary requirements readily available for the code official to enforce without the jurisdiction having to take additional steps to adopt an Appendix for such a critical issue. There are numerous examples of ICC codes sections that provide mandatory requirements for non-required equipment and systems. For example IBC 3110.3 does not require a vehicular gate opener but when one is provided it shall be listed in accordance with UL 325. Another example is IFC 901.4.2. This section addresses the installation of nonrequired fire sprinkler systems and requires that they meet the applicable parts of the IFC and IBC.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
NFPA 780 and UL 96A are two standards that are already widely used within the lightning protection industry therefore the cost of construction would not increase as a result of this code change.

G137-18

G139-18

IBC: 3001.2, DOJ

Proposed Change as Submitted

Proponent: Kevin Brinkman, representing National Elevator Industry, Inc. (klbrinkman@neii.org)

2018 International Building Code

Revise as follows

3001.2 Emergency elevator communication systems for the deaf, hard of hearing and speech impaired. ~~An emergency two-way communication system shall be provided that:~~

- ~~1: Is a visual and text-based and a video-based 24/7 live interactive system.~~
- ~~2: Is fully-The elevator emergency communication shall provide effective communication as required by Section 36.303 of ADA Title III. The emergency communication shall be installed in accordance with the provisions of ASME A17.1/CSA B44 and NFPA 72 and shall be accessible by the deaf, hard of hearing and speech impaired, and shall include voice-only options for hearing individuals.~~
- ~~3: Has the ability to communicate with emergency personnel utilizing existing video conferencing technology, chat/text software or other approved technology available twenty-four hours a day, seven days a week, as a live interactive system.~~

Add new standard(s) follows

DOJ United States Department of Justice Civil Rights Division

ADA Title III Regulations - Americans with Disabilities Act, Public Accommodations and Commercial Facilities

Reason: Section 3001 defines the scope and reference standards for elevator Emergency Communication design requirements. This proposal removes an elevator design requirements from the building code, restoring it to the reference standards. The added reference to the ADA Title III is the regulation specifically for effective communication with the deaf, hard of hearing and speech impaired.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The proposal will neither increase or decrease the cost of construction because it is simply restoring the technical requirements to the reference standards as opposed to including them in the IBC.

Analysis:

A review of DOJ ADA Title III Regulations, as proposed for inclusion in the code, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

ASME A17.1/CSA B44 and NFPA 72, as referenced in this proposal, are currently referenced in the code.

G139-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: G138-18 and G139 are trying to accomplish the same thing. The G138-18 approach is the correct approach. There is an agreement that if this criteria may be added to A117.1 in time. This can be addressed in in public comment period. However, it should be noted that, if this was approved and there were no public comments, this could trump the previous committee action to approve G138-18. (Vote: 14-0)

Assembly Action:

None

G139-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Kevin Brinkman, representing National Elevator Industry, Inc. (klbrinkman@neii.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

3001.2 Emergency elevator communication systems for the deaf, hard of hearing and speech impaired.

The elevator emergency communication shall provide effective communication ~~as required by Section 36.303 of ADA Title III. The emergency communication,~~ shall be installed in accordance with the provisions of ASME A17.1/CSA B44 and NFPA 72 and shall be accessible by the deaf, hard of hearing and speech impaired, and be available twenty-four hours a day, seven days a week, as a live interactive system.

Commenter's Reason: Section 3001 defines the scope and reference standards for elevators and other conveyance systems. Technical requirements are found in the ASME A17.1/CSA B44 Safety Code for Elevators and Escalators. New detailed technical requirements for Emergency Communication design have been approved for the 2019 edition of A17.1/B44 to address. This proposal retains the base requirement for the system in the IBC but references the technical requirements being adding in the A17/B44 elevator code to provide guidance for designers and enforcement authorities. The requirements in A17.1/B44 were developed for consistency with the guidelines in the ADA Title III which is the regulation specifically for effective communication with the deaf, hard of hearing and speech impaired. The requirements in A17.1/B44 were developed through a rigorous consensus process and the working group included the proponent of the original IBC proposal, Mr. Cid, as well as other representatives with extensive accessibility experience.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposal will neither increase nor decrease the cost of construction because it is simply referencing the technical requirements in the ASME A17.1/CSA B44 standards as opposed to including them in the IBC.

Public Comment 2:

Proponent: Andrew Cid, representing Barrier Free Solutions For The Deaf and Hard of Hearing requests Disapprove.

Commenter's Reason: ONLINE COMMENT IN OPPOSITION TO #139-18 THAT WAS SUBMITTED BY INDUSTRY

First off, I want to say that I have been encouraged by the continuing cooperation provided by the elevator industry, the A17 ASME professionals and industry representatives in communicating with me, the accessibility community and its supporters, in striving to improve accessibility in elevators for millions of U.S. citizens and for the Deaf and Hard of Hearing, Speech Impaired and the Visually Challenged communities. Thank you to all of you who are working on this important issue. There are no adversaries on either side, only cooperating professionals who endeavor to improve safety in the U.S.

There was a comment provided in the Analysis section in proposal G139-18, submitted by the elevator industry, that referenced the ICC criteria for reference standards in CP#28. It is noted that this particular ICC document appears to be for the reference to the DOJ ADA Title III Regulation in the proposal G139-18, but in reviewing the provisions of Section 3.6 would appear to be applicable to an existing referenced standard only if technical revisions are being made. **In 3.6.3.1.2 it is noted that code change proposals which include technical revisions to the code text to coordinate with a proposed update of an existing referenced standard shall include the submission of the proposed**

update to the standard in at least a consensus draft form in accordance with Section 3.4. If the proposed update of the existing standard is not submitted in at least consensus draft form, the code change proposal shall be considered incomplete and shall not be processed on this procedural technicality.

Therefore, based on the lack of the elevator industry providing technical revisions to the existing A17.1 standard for emergency communication system in their proposal under #139-18 or even a particular reference to future activities on possible revisions to capture the intent of the recent provisions adopted in 3001.2 in the IBC further demonstrates that there is no specific support to incorporate the provisions of the IBC 3001.2 into the A17.1 document with their intent to retain the current provisions as found in the A17.1 document.

Based on the first paragraph, please note that since the draft / proposed standard language to A17 was not submitted in #139-18, then #139-18 should not proceed on an ICC technicality.

It may also appear that industry, despite the hard work of task force efforts to draft appropriate language to fully capture the spirit of 3001.2 (effective 2018), may not yet want to provide full explicit and clear provisions that can be fully utilized by the general public, especially the 75 million of the general population that may be (50M) deaf, hard of hearing and (25M) speech impaired.

To date, I do admit that I am very encouraged that industry is willing to provide, albeit small, incremental steps to improve access in elevators through their efforts and cooperation with us. However, industry has not yet agreed to a standard that captures the full intent and spirit of the new IBC code 3001.2 for 2018, which is to provide emergency use of full two-way face to face video (between both authorized personnel and the entrapped occupant), pre-programmed text questions/replies (no typing required on either end), or even the use of a qualified Sign Language Interpreter, as needed (which would be a very infrequent or rare occurrence, in an emergency).

A point of clarification as I am continuing my learning of the overall process of the relationship between codes and referenced standards that it would be acceptable to have a direct reference to a standard for particular provisions if the standard contains the fully relevant requirements. At this time, it does not appear that there have been any provisions offered by the A17.1 committee which would capture the FULL spirit and intent of the provisions of 3001.2 which has been accepted by the ICC membership.

This is in line with the ICC committee statement on my proposal that noted certain actions with this proposal could be taken if the A17.1 standard incorporated the desired language through it may simply be a duplication of the language, not a conflict which at this time does not appear to be in the offering.

I look forward to continue working with industry on a standard that captures the full spirit and intent of 2018 3001.2. I commend industry s cooperation and of its representatives and colleagues thus far, in working with the accessibility community, in striving to improve the lives of millions of U.S. citizens through an assurance of complete safety and accessibility in public spaces.

Bibliography: There is no attachment provided for this.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There is no cost impact of this Public Comment.

G139-18

G140-18

IBC: 3002.3, 3002.3.1

Proposed Change as Submitted

Proponent: Ed Kulik, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Building Code

Revise as follows

3002.3 Emergency signs for other than occupant evacuation elevators... Where other than occupant evacuation elevators are provided, an *approved* pictorial sign of a standardized design shall be posted adjacent to each elevator call station on all floors instructing occupants to use the ~~exit stairways~~ ~~exits~~ and not to use the elevators in case of fire. The sign shall read: IN CASE OF FIRE, ELEVATORS ARE OUT OF SERVICE. USE EXIT ~~STAIRS~~.

Exceptions-Exception:

1. The emergency sign shall not be required for elevators that are part of an accessible *means of egress* complying with Section 1009.4.
2. ~~The emergency sign shall not be required for elevators that are used for occupant self-evacuation in accordance with Section 3008.~~

Add new text as follows

3002.3.1 Emergency signs for occupant evacuation elevators. Where occupant evacuation elevators are provided, an approved pictorial sign of a standardized design shall be posted adjacent to each elevator call station on all floors instructing occupants to use occupant evacuation elevators in the event of fire. The sign shall read: IN CASE OF FIRE, THIS OCCUPANT EVACUATION ELEVATOR IS AVAILABLE FOR EXITING THE BUILDING.

Analysis: Duplicated text in the International Fire Code not shown for brevity.

Reason: This is one of 17 proposals being submitted as a package relating to technical and organizational changes proposed for Chapter 6 of the Fire Code. While the Code Committees will consider each proposal independently, the intent is for approval of all proposals in this package which have been submitted as a correlated set of companion code change proposals.

This proposal correlates with the series of proposals to the IFC Chapter 6 submitted by the F-CAC for correlation of Elevator requirements and specification of required signage for all elevators.

This proposal addresses the emergency signage for the elevators in the IBC and the IFC. The changes are reflected in the IBC as these are the parent sections for these requirements. If approved this language will be duplicated in Chapter 6 of the IFC. This also correlates with the signage requirements in ASME A17.1. Exit stairways were changed to "exits" because there could be ramps instead of stairways.

Two distinct sections are established between occupant evacuation elevators and other than those elevators.

This proposal also adds standardized language to both the IBC and the IFC for occupant evacuation elevator signage to ensure consistency between codes and to provide clear and concise building occupant instruction for their use.

This proposal is submitted by the ICC Building Code Action Committee (BCAC) in support of the FCAC's efforts. BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>.

Cost Impact: The code change proposal will decrease the cost of construction

By providing standardized language for the emergency signs for occupant evacuation elevators, and correlating for consistency the standardized language for other elevators.

G140-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: There is confusion regarding cueing at elevator lobbies and whether the elevator is available or not. The proposal doesn't specify clearly. The code official may enforce the requirement at all elevator call stations, not just occupant elevators. The flaw in this proposal is dealing with the typical highrise situations. It is should not be every elevator in every lobby. The use of the term "is" will create a situation where occupants may wait for an elevator that never comes. Tinker with the words "is" and "may" and possibly "pictorial." There may be a way to link the signage to the visual requirement that is going to be part of the A117.1 automated system.....so that when someone goes to an elevator lobby they would know whether the elevator will come or not....or when to go to the stairs. There is a need to identify the elevators, but this is not the way to do it. Maybe simple a sign saying "evacuation elevator, "occupant elevator," "when directed," or "this elevator available...: (Vote: 14-0)

Assembly Action:

None

G140-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ed Kulik, representing ICC Building Code Action Committee (bcac@iccsafe.org)requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

3002.3 Emergency signs for other than occupant evacuation elevators... Where other than occupant evacuation elevators are provided, an *approved* pictorial sign of a standardized design shall be posted adjacent to each elevator call station on all floors instructing occupants to use the exits and not to use ~~the these~~ elevators in case of fire. The sign shall read: IN CASE OF FIRE, ELEVATORS ARE OUT OF SERVICE. USE AVAILABLE EXIT.

Exception:

The emergency sign shall not be required for elevators that are part of an accessible *means of egress* complying with Section 1009.4.

-

3002.3.1 Emergency signs for occupant evacuation elevators. Where occupant evacuation elevators are provided in accordance with Section 3008, an approved pictorial sign of a standardized design shall be posted adjacent to each elevator call station ~~on all floors instructing notifying~~ occupants to use occupant evacuation elevators in the event of fire. The sign shall read: ~~IN CASE OF FIRE, THIS THESE OCCUPANT EVACUATION ELEVATOR IS AVAILABLE FOR EXITING THE BUILDINGELEVATORS ARE AVAILABLE AS AN EXIT.~~

Commenter's Reason: IBC Section 3008.1.1 requires that "signage shall be provided to denote which elevators are available for occupant evacuation." However, the code does not provide standardized language for that signage. Requiring standardized language would reduce confusion for the occupants regarding the use of these elevators, by providing consistency and clarity for the required signage.

As noted in the proposed new text for Section 3002.3.1, the standardized language for these occupant elevators is only applicable to the elevator call stations serving those elevators designated as occupant elevators in accordance with the requirements in IBC Section 3008.

Modifications have been made to the original proposal to address the specific direction from the code development committee.

The proposed standardized language for the sign is in alignment with ASME A17.1.

This text is repeated in IFC Section 606.3.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction

This would require a sign at occupant evacuation elevators. A sign was already required at other elevators.

G140-18

G149-18

IBC: 3112, 3112.1, 3112.2

Proposed Change as Submitted

Proponent: Steve Martin, Florida Division of Emergency Management, representing Florida Division of Emergency Management (steve.martin@em.myflorida.com); Douglas Wise, Building Officials Association of Florida, representing Building Officials Association of Florida (douglaswise@att.net)

2018 International Building Code

Add new text as follows

3112 PUBLIC USE RESTROOM BUILDINGS IN FLOOD HAZARD AREAS

3112.1 General. Public use restroom buildings that contain toilet rooms, bathrooms, showers and changing rooms, and those portions of buildings that contain toilet rooms, bathrooms, showers and changing rooms, and where such buildings and portions of buildings are intended for public use and located on publicly owned lands in flood hazard areas, shall comply with the requirements of this section. Public use restrooms that are not elevated or dry floodproofed in accordance with Section 1612 shall comply with Section 3112.2. Portions of buildings that include uses other than public use toilet rooms, bathrooms, showers and changing rooms shall comply with Section 1612.

3112.2 Flood resistance. Public use restrooms that are located in flood hazard areas shall comply with the requirements of ASCE 24, except for elevation requirements, and shall comply with all of the following criteria:

1. The building footprint is not more than 1,500 square feet.
2. Located, designed and constructed to resist the effects of flood hazards and flood loads to minimize flood damage from a combination of wind and water loads associated with the base flood.
3. Anchored to prevent flotation, collapse or lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy during conditions of the base flood.
4. Constructed of flood damage-resistant materials.
5. Where enclosed by walls, the walls have flood openings.
6. Mechanical and electrical systems are located above the base flood elevation.
7. Plumbing fixtures and plumbing connections are located above the base flood elevation.
8. An emergency plan, approved by the jurisdiction, is submitted to the building official where the building design specifies implementation of protection measures prior to the onset of flooding conditions.

Exceptions:

1. Minimum electric service required to address life safety and electric code requirements is permitted below the base flood elevation.
2. Plumbing fixtures and connections are permitted below the base flood elevation provided the fixtures and connections are designed and installed to minimize or eliminate infiltration of floodwaters into the sanitary sewage system and discharges from sanitary sewage systems into floodwaters.

Reason: Thousands of communities and state agencies have public open space and parks along rivers and shorelines. Many communities experience economic value from tourism and public access to areas that feature water resources. Under the current requirements of the IBC, restrooms for public use that are located in flood hazard areas must meet the same requirements as residential and commercial buildings. In flood hazard areas other than coastal high hazard areas and Coastal A Zones (i.e., in flood zones identified on Federal Emergency Management Agency Flood Insurance Rate Maps with the letter "A"), restroom buildings must either be elevated or dry floodproofed to or above the elevations required by the IBC/ASCE 24. In coastal high hazard areas (flood Zone V) and Coastal A Zones, restroom buildings must be elevated to or above the elevations required by the IBC/ASCE 24.

In Florida and other coastal states, this has resulted in construction of public use restrooms as high as 6 to 18 feet above grade. This poses many challenges, not the least of which is access. Figures 1, 2, 3 and 4 (below) illustrate elevated restrooms with long ramps. While ramps can be built to meet ADA requirements, to reach some heights required in some flood hazard areas the ramps may be as long as 300 feet. In coastal high hazard areas, such ramps likely conflict with the NFIP requirements that elevated buildings be "free of obstruction," and the presence of such ramps would likely interfere with the ability of walls around enclosures to break away under flood conditions. Those same provisions are required by IBC Section 1612, Flood Loads, which references ASCE 24, Flood Resistant Design and Construction.

Long ramps defeat accessibility when the distance of travel still renders restroom facilities inaccessible to many persons with disabilities or limited mobility. Although the IBC (and FEMA) permits elevators to extend below the base flood elevation, installing elevators to provide access to elevated public use restrooms is expensive and creates many maintenance issues, and a high rate of failure to function, especially in beach areas where blowing sand and windborne salt aerosols create corrosive conditions.

This proposal creates a new section in IBC Chapter 31, Special Construction to limit the scope to public use restrooms that include public use toilet rooms, bathrooms, showers and changing rooms and spaces. Portions of such buildings that include other uses would have to fully comply with the elevation and other flood resistant requirements of IBC Section 1612, Flood Loads, which references ASCE 24, Flood Resistant Design and Construction.

In recognition that most public use restrooms are built on public land using public funds, the proposal is to limit the potential financial losses associated with flooded public facilities in two ways: by limiting the footprint to not more than 1,500 square feet and by specifying design requirements that minimize or eliminate physical damage when flooding occurs. Enabling public use restrooms to be designed to withstand the hydrodynamic and hydrostatic loads below the base flood elevation is an appropriate alternative to the extremely high cost for design, construction and maintenance of highly elevated public restrooms and their required access ramps or elevators.

Although the proposed design requirements are intended to preclude significant damage during flood conditions up to and including conditions of the design flood (e.g., the base or 100-year flood), more severe floods can and do occur. Figure 5 (below) illustrates one modest design option that demonstrates the feasibility of the proposal. It shows a small masonry restroom on a beach after Hurricane Irma pushed onshore. The drawings for the building show below-grade piling support and it appears the masonry units were filled. Despite approximately 6-8 feet of flooding (including waves), there is no evidence of structural damage and the non-structural damage appears readily repairable.

The proposal includes requirements for flood resistance similar to those found in IBC Appendix G, Section G1001 for Utility and Miscellaneous Group U and similar to the requirements of ASCE 24-14 for Flood Design Class 1 (which is essentially equivalent to Structure/Risk Category I). Those requirements effectively are the same as the NFIP requirements in 44 Code of Federal Regulations Section 60.3(a)(3)(ii), (iii), and (iv). FEMA deems the flood provisions of the I-Codes, with reference to ASCE 24, to meet or exceed the requirements of the National Flood Insurance Program (NFIP).

The intent is to allow public use restrooms to be at-grade or above-grade but below the base flood (partially elevated), provided they meet the design requirements listed in 3112.2. The proponent acknowledges that, at present, FEMA guidance states that restroom buildings and comfort stations in coastal high hazard areas must be elevated and meet the same design and construction requirements as other buildings. This proposal is intended to meet the intent of all NFIP requirements, except elevation requirements, to minimize flood damage, while acknowledging the special needs and access required or appropriate for public use restrooms. The Florida Floodplain Management Association prepared a white paper on this subject: Policy and Design Options for Public Restrooms in Special Flood Hazard Areas (2014), www.FLfloods.org/ffmawhitepaper.



Figure 1. Florida, flood Zone V. Ramp wraps around entire building. Has composting toilets, battery and solar electric system, emergency plan requires pumping out tank and filling with clean water.



Figure 2. Coastal Mississippi, flood Zone V. This facility cost \$1.1 million.



Figure 3. Florida, Gulf Coast, flood Zone V. Ramp built after original elevator determined to be unsustainable due to significant maintenance problems.



Figure 4. Southwest Florida, flood Zone V. Extensive ramp wraps around three sides.



Figure 5. Florida, after Hurricane Irma, flood Zone V. No evidence of structural damage after estimated 5 ft stillwater plus waves. From upper left: facing beach, side, interior, rear.

Bibliography: Policy and Design Options for Public Restrooms in Special Flood Hazard Areas, Florida Floodplain Management Associations, 2014. 55 pages. www.FLfloods.org/ffmawhitepaper

Cost Impact: The code change proposal will decrease the cost of construction. The proposal will lower the initial cost of construction and lower routine and long-term facility maintenance. The cost to construct as specified in this proposal to resist the effects of flood hazards and flood loads may be somewhat higher than a typical non-elevated restroom building that is not designed to resist flood loads and flood damage (not currently allowed). However, the cost for construction under the proposal will be less than the cost to elevate and provide and maintain elevators and extensive ramp systems (current method of compliance).

G149-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal has some merit, but the language is too loose. "Public" could mean any building that is considered public in the Americans with Disabilities Act. "Governmental entities" may be a better term. (Vote: 9-5)

Assembly Action:

As Submitted

G149-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Steven Martin, Florida Division of Emergency Management, representing Florida Division of Emergency Management (steve.martin@em.myflorida.com); Douglas Wise, Palm Beach County, representing Building Officials Association of Florida (douglaswise@att.net) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

3101.1 Scope. The provisions of this chapter shall govern special building construction including *membrane structures*, temporary structures, *pedestrian walkways* and tunnels, automatic vehicular gates, awnings and *canopies*, marquees, signs, towers, antennas, relocatable buildings, swimming pool enclosures and safety devices, ~~and solar energy systems,~~ and public use restroom buildings on publicly owned lands in flood hazard areas.

~~3112~~3114 PUBLIC USE RESTROOM BUILDINGS IN FLOOD HAZARD AREAS

~~3112~~3114.1 General. ~~Public use restroom buildings that contain toilet rooms, bathrooms, showers and changing rooms, and those portions of buildings that contain~~ For the purpose of this section, public restroom buildings are located on publicly owned lands in flood hazard areas and intended for public use. Public restroom buildings and portions of other buildings that contain public restrooms, are limited to toilet rooms, bathrooms, showers and changing rooms, and where such, Public restroom buildings and portions of buildings are intended for public use and located on publicly owned lands in flood hazard areas, that contain public restrooms shall comply with the requirements of this section. Public use restrooms that are not elevated or dry floodproofed in accordance with Section 1612 shall comply with Section ~~3112~~3114.2. Portions of buildings that include uses other than public use toilet rooms, bathrooms, showers and changing rooms shall comply with Section 1612.

~~3112-2~~3114.2 Flood resistance. ~~Public use restrooms that are located on publicly owned lands in flood hazard areas shall comply with the requirements of ASCE 24, except for elevation requirements, and shall comply with all of the following criteria:~~

1. The building footprint is not more than 1,500 square feet.
2. Located, designed and constructed to resist the effects of flood hazards and flood loads to minimize flood damage from a combination of wind and water loads associated with the base flood.
3. Anchored to prevent flotation, collapse or lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy during conditions of the base flood.
4. Constructed of flood damage-resistant materials.
5. Where enclosed by walls, the walls have flood openings.
6. Mechanical and electrical systems are located above the base flood elevation.
7. Plumbing fixtures and plumbing connections are located above the base flood elevation.
8. An emergency plan, approved by the jurisdiction, is submitted to the building official where the building design ~~specifies~~ documents specify implementation of protection measures prior to the onset of flooding conditions.

Exceptions:

1. Minimum necessary electric service equipment required to address health, life safety and electric code requirements is permitted below the base flood elevation in accordance with ASCE 24 provisions for electric elements installed below the minimum elevations.

2. Plumbing fixtures and connections are permitted below the base flood elevation provided the fixtures and connections are designed and installed to minimize or eliminate infiltration of floodwaters into the sanitary sewage system and discharges from sanitary sewage systems into floodwaters.

Commenter's Reason: This public comment addresses issues raised by committee members at the March 13, 2018 Committee Action Hearing by clarifying that this new section applies to public restroom buildings and portions of other buildings that contain public restrooms in flood hazard areas located only on publicly-owned land. The intent is to provide an alternative to elevating public restrooms in publicly-owned open spaces and parks along rivers and shorelines which otherwise may be challenging to access for persons with limited mobility because of excessively long ramps. Restrooms designed and constructed in accordance with this section, which references ASCE 24, Flood Resistant Design and Construction, will be minimal in nature and designed to resist flooding with minimal, if any damage.

FEMA deployed a Mitigation Assessment Team after Hurricane Irma to investigate damage, including how public restrooms were affected. The results of that field work were not released as of the deadline for submission of this public comment. Florida Division of Emergency Management staff participated in the field work and, along with the other team members, observed some below-BFE small public restrooms designed to resist flood loads that sustained superficial damage (finishes and fixtures) and were readily repairable. At a June 2018 meeting between the Florida Division of Emergency Management and senior management officials with the FEMA Flood Insurance and Mitigation Administration, FEMA concurred with the public comment and indicated the agency would work to achieve consistency across agency programs to develop guidance or procedures based on the proposed amendment. No opposition to the proposal was expressed during that meeting.

Another clarification to the proposal is to specify the minimum necessary "electric equipment" (rather than "electric service") that may be below the base flood elevation. ASCE 24 specifies requirements for electric elements installed below minimum required elevations, including conduits and cables; lighting circuits, switches, receptacles, and fixtures; wiring and splices suitable for submergence; and energizing from distribution panels located above and accessible from above flood elevation supplied by branch circuits originating from ground-fault circuit-interrupter breakers. ASCE 24 also requires installations to be in accordance with NFPA 70, National Electric Code. The proponents will submit to ICC proposed text for the commentary volume that describes allowances for light switches and fixtures, GFCI receptacles, exhaust fans, and electrical equipment and attendant utilities that are the minimum necessary to meet health and life safety requirements.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This public comment clarifies the intent and does not change the cost impact submitted as part of the original proposal.

Public Comment 2:

Proponent: Assembly Action requests As Submitted.

Commenter's Reason: This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action. The assembly action for Disapprove was successful by a vote of 53% (71) to 47% (63) by eligible members online during the period of May 9 - May 23, 2018.

G149-18

G151-18

IBC: (New), 3101.1, 3114 (New), 3114.1 (New), 3114.2 (New), 3114.3 (New), 3114.4 (New), 3114.5 (New), 3114.6 (New), 3114.7 (New), 3114.8 (New), 3114.8.1 (New), 3114.8.1.1 (New), 3114.8.2 (New), 3114.8.3 (New), 3114.8.4 (New), 3114.8.4.1 (New), 3114.8.4.2 (New), 3114.8.4.3 (New), 3114.8.5 (New), 3114.8.5.1 (New), 3114.8.5.2 (New), 3114.8.5.3 (New), 3114.8.5.3(1) (New), 3114.8.5.3(2) (New), 3114.8.5.3(4) (New), 3114.8.5.3(3) (New), 3114.8.5.3 (New), Chapter 35

Proposed Change as Submitted

Proponent: Ed Kulik, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Building Code

Add new definition as follows

INTERMODAL SHIPPING CONTAINER. A six-sided steel unit originally constructed as a general cargo container used for the transport of goods and materials.

Revise as follows

3101.1 Scope. The provisions of this chapter shall govern special building construction including *membrane structures*, temporary structures, *pedestrian walkways* and tunnels, automatic vehicular gates, awnings and *canopies*, marquees, signs, towers, antennas, relocatable buildings, swimming pool enclosures and safety devices, ~~and solar energy systems.~~ ~~systems and intermodal shipping containers.~~

Add new text as follows

SECTION 3114 INTERMODAL SHIPPING CONTAINERS

3114.1 General. The provisions of Section 3114 and other applicable sections of this code, shall apply to intermodal shipping containers that are repurposed for use as buildings or structures or as a part of buildings or structures.

Exceptions:

1. Intermodal shipping containers previously approved as existing relocatable buildings complying with Chapter 14 of the International Existing Building Code.
2. Stationary storage battery arrays located in intermodal shipping containers complying with Chapter 12 of the International Fire Code.
3. Intermodal shipping containers that are listed as equipment complying with the standard for equipment, such as air chillers, engine generators, modular data centers, and other similar equipment.

3114.2 Construction Documents. The construction documents shall contain information to verify the dimensions and establish the physical properties of the steel components, and wood floor components, of the intermodal shipping container in addition to the information required by Sections 107 and 1603.

3114.3 Intermodal shipping container information. Intermodal shipping containers shall bear an existing data plate containing the following information as required by ISO 6346 and verified by an approved agency. A report of the verification process and findings shall be provided to the building owner.

1. Manufacturer's name or identification number
2. Date manufactured.
3. Safety approval number.
4. Identification number.
5. Maximum operating gross mass (kg) (Lbs)
6. Allowable stacking load for 1.8G (kg) (lbs)
7. Transverse racking test force (Newtons)
8. Valid maintenance examination date

Where approved by the building official, the markings and existing data plate are permitted to be removed from the intermodal shipping containers before they are repurposed for use as buildings or structures or as a part of buildings or structures.

3114.4 Protection against decay and termites. Wood structural floors of intermodal shipping containers shall be protected from decay and termites in accordance with the applicable provisions of Section 2304.12.1.1.

3114.5 Under-floor ventilation. The space between the bottom of the floor joists and the earth under any intermodal shipping container, except spaces occupied by basements and cellars, shall be provided with ventilation in accordance with Section 1202.4.

3114.6 Roof assemblies. Intermodal shipping container roof assemblies shall comply with the applicable requirements of Chapter 15.

Exception: Single-unit stand-alone intermodal shipping containers not attached to, or stacked vertically over, other intermodal shipping containers, buildings or structures.

3114.7 Joints and voids. Joints and voids that create concealed spaces between intermodal shipping containers, that are connected or stacked, at fire-resistance-rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies shall be protected by an approved fire-resistant joint system in accordance with Section 715.

3114.8 Structural. Intermodal shipping containers which conform to ISO 1496-1 that are repurposed for use as buildings or structures, or as a part of buildings or structures, shall be designed in accordance with Chapter 16 and this section.

3114.8.1 Foundations. Intermodal shipping containers repurposed for use as a permanent building or structure shall be supported on foundations or other supporting structures designed and constructed in accordance with Chapters 16 through 23 of this code.

3114.8.1.1 Anchorage. Intermodal shipping containers shall be anchored to foundations or other supporting structures as necessary to provide a continuous load path for all applicable design and environmental loads in accordance with Chapter 16.

3114.8.2 Welds. All new welds and connections shall be equal to or greater than the original connections.

3114.8.3 Structural design. The structural design for the intermodal shipping containers repurposed for use as a building or structure, or as part of a building or structure, shall comply with Section 3114.8.4 or 3114.8.5.

3114.8.4 Detailed design procedure. A structural analysis meeting the requirements of this section shall be provided to the building official to demonstrate the structural adequacy of the intermodal shipping containers.

Exception: Intermodal shipping containers designed in accordance with Section 3114.8.5.

3114.8.4.1 Material properties. Structural material properties for existing intermodal shipping container steel components shall be established by material testing where the steel grade and composition cannot be identified by the manufacturer's designation as to manufacture and mill test.

3114.8.4.2 Seismic design parameters. The appropriate detailing requirements of ASCE 7; response modification coefficient, R ; overstrength factor, δ_{10} ; deflection amplification factor, C_d ; and limits on structural height, h_n , for the corrugated shear wall is permitted to be developed in accordance with generally accepted procedures where approved by the building official in accordance with Section 104.11. The seismic force-resisting system shall be designed and detailed in accordance with one of the following:

1. Where all or portions of the corrugated steel container sides are considered to be the seismic force-resisting system, design and detailing shall be in accordance with the ASCE 7 Table 12.2-1 requirements for light-frame bearing-wall systems with shear panels of all other materials, occupancies with an occupant load of 50 or less.
2. Where portions of the corrugated steel container sides are retained, but are not considered to be the seismic force-resisting system, an independent seismic force-resisting system shall be selected, designed and detailed in accordance with ASCE 7 Table 12.2-1, or
3. Where portions of the corrugated steel container sides are retained and integrated into a seismic force-resisting system other than as permitted by Section 3114.4.2 Item 1, seismic design parameters shall be developed from testing and analysis in accordance with Section 104.11 and ASCE 7 Section 12.2.1.1 or 12.2.1.2.

3114.8.4.3 Allowable shear value. The allowable shear values for the intermodal shipping container corrugated steel sheet panel side walls and end walls shall be demonstrated by testing and analysis in accordance with Section 104.11.

Where penetrations are made in the side walls or end walls designated as part of the lateral force-resisting system, the penetrations shall be substantiated by rational analysis.

3114.8.5 Simplified structural design of single-unit containers. Single-unit intermodal shipping containers conforming to the limitations of Section 3114.8.5.1 shall be permitted to be designed in accordance with the simplified structural design provisions of Section 3114.8.5.

3114.8.5.1 Limitations. Use of Section 3114.8.5 is subject to all the following limitations:

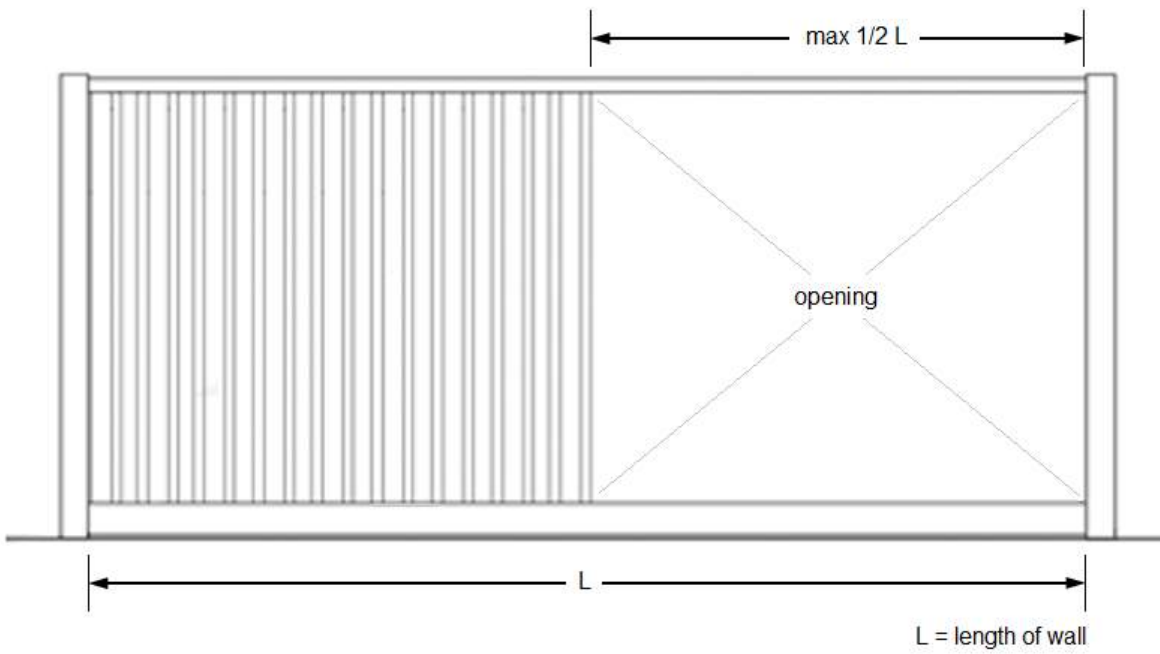
1. The intermodal shipping container shall be a single-unit, stand-alone unit supported on a foundation and shall not be in contact with or supporting any other shipping container or other structure.
2. The intermodal shipping container top and bottom rails, corner castings, and columns or any portion thereof shall not be notched, cut, or removed in any manner.
3. The intermodal shipping container shall be erected in a level and horizontal position with the floor located at the bottom.
4. The intermodal shipping container shall be located in Seismic Design Category A, B, C or D.

3114.8.5.2 Simplified structural design. Where permitted by Section 3114.8.5.1, single-unit, stand-alone intermodal shipping containers shall be designed using the following assumptions for the corrugated steel shear walls:

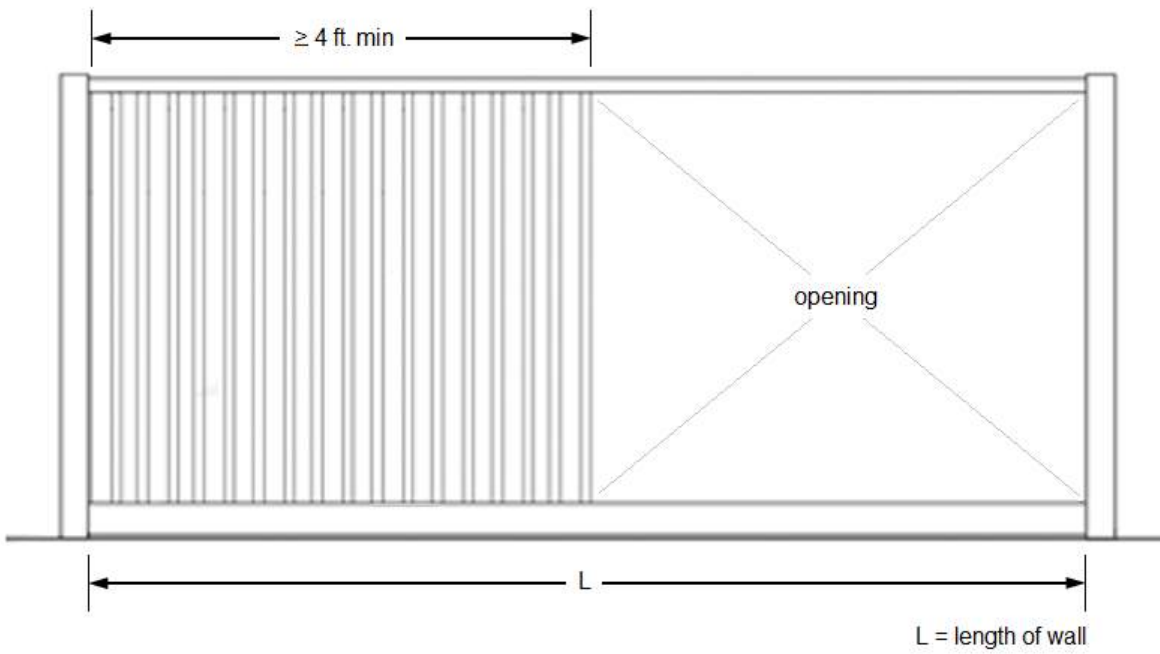
1. The appropriate detailing requirements contained in Chapters 16 through 23.
2. Response modification coefficient, $R=2$.
3. Overstrength factor, $\Omega_0=2.5$.
4. Deflection amplification factor, $C_d=2$, and
5. Limits on structural height, $h_n=9.5$ feet (2,900 mm).

3114.8.5.3 Allowable shear. The allowable shear for the corrugated steel side walls (longitudinal) and end walls (transverse) for wind design and for seismic design using the coefficients of Section 3114.8.5.2 shall be permitted to have the allowable shear values set forth in Table 3114.8.5.3 provided that all of the following conditions are met:

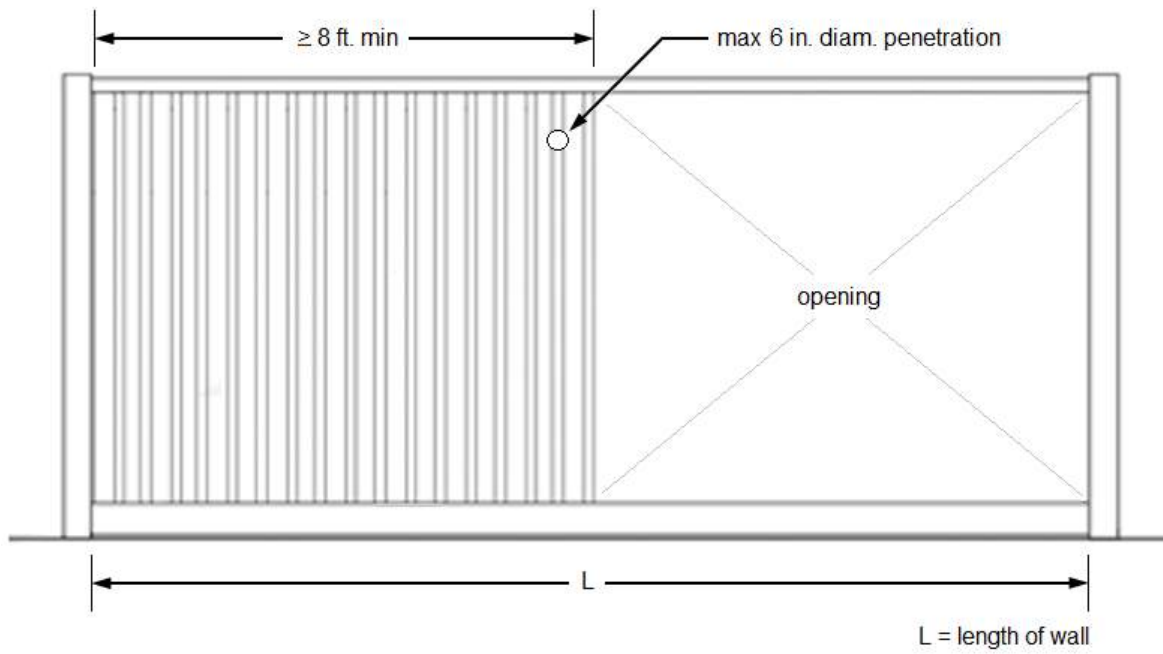
1. The total linear length of all openings in any individual side walls or end walls shall be limited to not more than 50% of the length of that side walls or end walls, as shown in Figure 3114.8.5.3(1).
2. Any full height wall length, or portion thereof, less than 4 feet (305 mm) long shall not be considered as a portion of the lateral force-resisting system, as shown in Figure 3114.8.5.3(2).
3. All side walls or end walls used as part of the lateral force-resisting system shall have an existing or new boundary element on all sides to form a continuous load path, or paths, with adequate strength and stiffness to transfer all forces from the point of application to the final point of resistance, as shown in Figure 3114.8.5.3(3).
4. Where openings are made in container walls, floors, or roofs for doors, windows and other openings:
 - 4.1 The openings shall be framed with steel elements that are designed in accordance with Chapter 16 and Chapter 22.
 - 4.2 The cross section and material grade of any new steel element shall be equal to or greater than the steel element removed.
5. A maximum of one penetration not greater than a 6-inch (152 mm) diameter hole for conduits, pipes, tubes or vents, or not greater than 16 square inches (10,322 sq mm) for electrical boxes, is permitted for each individual 8 foot length (2,438 mm) lateral force resisting wall. Penetrations located in walls that are not part of the wall lateral force resisting system shall not be limited in size or quantity. Existing intermodal shipping container vents shall not be considered a penetration, as shown in Figure 3114.8.5.3(4).
6. End wall door or doors designated as part of the lateral force-resisting system shall be welded closed.



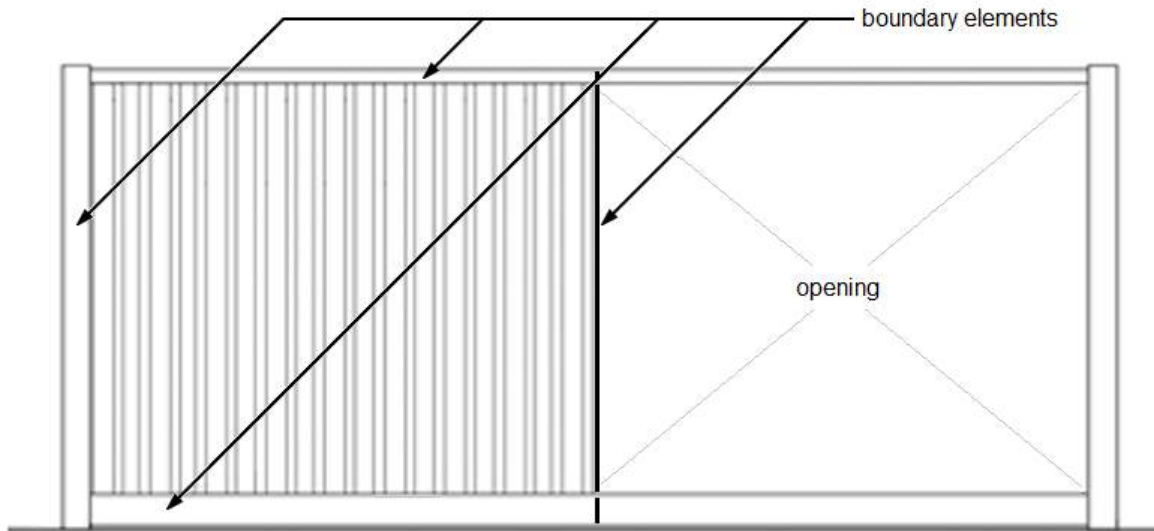
3114.8.5.3(1)
Bracing Unit Distribution--Maximum Linear Length



3114.8.5.3(2)
Bracing Unit Distribution -- Minimum Linear Length



3114.8.5.3(4)
Bracing Unit Distribution -- Penetration Limitations



3114.8.5.3(3)
Bracing Unit Distribution -- Boundary Elements

TABLE 3114.8.5.3
Allowable Strength Values for Intermodal Shipping Container Corrugated Steel Siding Shear Walls
for Wind or Seismic Loading

CONTAINER DESIGNATION ²	CONTAINER DIMENSION (Nominal Length)	CONTAINER DIMENSION (Nominal Height)	ALLOWABLE SHEAR VALUES (PLF) ^{1,3}	
			Side Wall	End Wall
1EEE	45 feet (13.7 M)	9.5 feet (2896 mm)	75	843
1EE		8.6 feet (2591 mm)		
1AAA	40 feet (12.2 M)	9.5 feet (2896 mm)	84	
1AA		8.5 feet (2592 mm)		
1A		8.0 feet (2438 mm)		
1AX		< 8.0 feet (2438 mm)		
1BBB	30 feet (9.1 M)	9.5 feet (2896 mm)	112	
1BB		8.5 feet (2591 mm)		
1B		8.0 feet (2438 mm)		
1BX		< 8.0 feet (2438 mm)		
1CC	20 feet (9.1 M)	8.5 feet (2591 mm)	168	
1C		8.0 feet (2438 mm)		
1CX		< 8.0 feet (2438 mm)		
1D	10 feet (3.0 M)	8.0 feet (2438 mm)	337	
1DX		< 8.0 feet (2438 mm)		

1. The allowable strength shear for the side walls and end walls of the intermodal shipping containers are derived from ISO 1496-1 and reduced by a factor of safety of 5.
2. Container designation type is derived from ISO 668.
3. Limitations of Sections 3114.8.5.1 shall apply.

Add new standard(s) follows

ISO

International Organization for
Standardization
Chemin de Blandonnet 8 CP 401
1214 Vernier

ISO 668: 2013:**Series 1 Freight Containers - Classifications, dimensions and ratings**
ISO 1496-1: 2013:**Series 1 Freight Containers - Specification and Testing - Part 1: General Cargo Containers for General Purposes****ISO 6346: 1995, with Amendment 3: 2012:****Freight Containers - Coding, Identification and marking**

Reason: This code change purpose is to introduce intermodal shipping containers into the International Building Code based on requests by code officials in the U.S. Prior to this proposal, several jurisdictions had created their own individual regulations or ordinances, or had administered additional requirements beyond the code (e.g. Section 104.11 "Alternative materials, design and methods of construction and equipment") so as to be comfortable to ensure a safe structure. This code change proposal is in response to those requests to develop a set of consistent code provisions which cover the minimum safety requirements, but which do not duplicate existing code provisions.

This proposal covers:

- Creation of a new definition in order to separate the container from other I-code sections which refer to, but intentionally do not define, shipping containers,
- Creating exceptions so to differentiate the intermodal shipping container from other code sections which could be interpreted as applying to intermodal shipping containers under other applications (e.g. temporary storage, relocatable buildings, energy storage facilities, and listed equipment),
- Verification of containers construction, condition, and structural integrity to assist the structural engineer in the evaluation for building construction,
- References to other sections concerning foundations, decay and termite control, crawlspace ventilation, roof assemblies, interior finishes, and joints/intersections.
- Introduction of structural provisions unique to intermodal shipping containers and which do not duplicate the existing structural requirements, and
- Addition of three ISO standards for reference.

Chapter 2 - New definition - A new definition has been created in order that these provisions can be adequately enforced and not confused the other multiple varieties of definitions of containers currently in the market.

Section 3114.1 - This represents the charging statement that outlines the requirements for containers, and list the appropriate exceptions with the I-codes in order to coordinate with other provisions that may appear similar in nature and where intermodal shipping containers could possibly be used in those other applications.

Section 3114.2 - Construction documents - These provision emphasize the material requirements as specified in this section.

Section 3114.3 - Verification - These provisions focus on the characteristics of the intermodal shipping container prior to it being repurposed. In this case the provisions require a straight forward inspection by an approved agency, and verification of the data plate which is normally found on intermodal shipping containers. There was an intent not to specify who the approved agency would be for two reasons; 1) so as to allow the code official or state law(s) to handle this aspect recognizing that in each jurisdiction their requirements may be different, and 2) to avoid dictating an international agreement onto jurisdictions that are currently employed by the shipping and container manufacturers worldwide today. In this case, the standards are regulated by the International Convention of Safe Containers (CSC) that have policies and procedures for inspecting containers worldwide. These procedures include policies for Approved Continuous Examination Program (ACEP) at the time the container is used in production, and policies for third party inspection agencies. The list shown in this section is a extract from the ISO standard and serves as a reference of items to be verified in order to validate the type of container.

3114.4 through 3114.6 - While we have strived to focus on only those provisions that recognize the unique aspects of intermodal shipping containers, we felt that some direction references were appropriate. In this case specific pointers are provided to foundations, decay and termite control, crawlspace ventilation, and roof requirements addressing drainage and weather protection.

3114.7 - Joints and voids - This provision is provided to address the interstitial spaces that may be created when multiple intermodal shipping containers are connected or stacked, whereby that concealed space between the containers is protected to prevent fire and hot gasses from passing between containers.

Section 3114.8 - Structural - The structural provisions are divided into multiple categories, as follows: 1) the general characteristics for all containers; 2) engineered structural design; and 3) simplified method for single-unit stand-alone container.

3114.8.1 - Foundations or supports - Provisions have been included to outline the two options for securing the container; a foundation or the connection to another structure. This provision makes it clear that the load path anchorage is required for all containers and to ensure the designed performance provided by the remainder of the structural provisions.

3114.8.2 - Welds - An additional provision has been added to require that any new welds be designed and installed with welds of greater structural capabilities.

Section 3114.8.4 - Detailed structural analysis - The detailed analysis engineering approach represents the general engineering practice allowed for all other types of building constructions. For this section the engineer of record is allowed to practice as they normally would for any other building type. As may be noted much of this section requires submission through the alternative means and methods provisions in order to obtain a permit as information about intermodal shipping containers is not readily listed in the IBC provisions or referenced standards.

Section 3114.8.5 - Simplified analysis - The concept for the single container approach is to make the design and construction process simpler. The provisions include a strict listing of limitations for use of these provisions. The proposal also provides structural design information, and pre-established shear wall information that is contained in the ISO 1496-1 standard, which is used to design and construct intermodal shipping containers. The shear wall values were obtained from the ISO 1496-1 standard through engineering analysis using a factor of safety of 5. In addition, a provision was installed to limit the number and size of openings and service holes within the container, as well as to prevent building owners or designers from embellishing the size to something most engineers would define as an opening. This method is intended to address the simple structure approach and provide available information for use by the structural engineer to supplement their work.

Chapter 35 - Referenced Standards - Included with this proposal are three ISO standards which are relevant to the intermodal shipping container's construction. These standards are part of the industry standards regulated by the International Convention of Safe Containers (CSC) that have policies and procedures for inspecting containers worldwide.

BCAC - The International Code Council's Building Code Action Committee (BCAC) was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes and the public comments. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

The ICC Building Code Action Committee created a task group to facilitate the development of this proposal. Members of the assigned task group included representatives from: City of Long Beach, CA; County of Mecklenburg, NC; Modular Building Institute; American Iron and Steel Institute; Underwriters Laboratories; and the Portland Cement Association. Additional contacts included the State of California (Division of State Architect, Housing and Community Development), City of San Diego; City of Los Angeles, CA; City of Seattle; Clark County, NV; Falcon Structures, RADCO a Twining Company, SEABOX Company, FEMA ATC Seismic Code Support Committee, and other guests who provided their individual expertise.

Cost Impact: The code change proposal will decrease the cost of construction. The code change proposal will decrease the cost of construction. This new code section will provide clarity on how to consistently design with, permit, and field inspect shipping containers that are repurposed for building construction. Current use of repurposed intermodal shipping containers requires the building owner or designee to submit through the alternative means and methods administrative provisions.

Analysis: A review of the standards proposed for inclusion in the code, ISO 668, ISO 1496-1 and ISO 6346, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

G151-18

Public Hearing Results

Errata: The proposed table has been corrected.

Committee Action:

As Modified

Committee Modification: 3114.1 General. The provisions of Section 3114 and other applicable sections of this code, shall apply to intermodal shipping containers that are repurposed for use as buildings or structures or as a part of buildings or structures.

Exceptions:

Intermodal shipping containers previously approved as existing relocatable buildings complying with Chapter 14 of the International Existing Building Code.

Stationary storage battery arrays located in intermodal shipping containers complying with Chapter 12 of the International Fire Code.

Intermodal shipping containers that are listed as equipment complying with the standard for equipment, such as air chillers, engine generators, modular data centers, and other similar equipment.

Intermodal shipping containers used as experimental equipment or apparatuses.

3114.3 Intermodal shipping container information. Intermodal shipping containers shall bear an existing data plate containing the following information as required by ISO 6346 and verified by an approved agency. A report of the verification process and findings shall be provided to the building owner.

Manufacturer's name or identification number

Date manufactured.

Safety approval number.

Identification number.

Maximum operating gross mass or weight (kg) (Lbs)

Allowable stacking load for 1.8G (kg) (lbs)

Transverse racking test force (Newtons)

Valid maintenance examination date

Where approved by the building official, the markings and existing data are permitted to be removed from the intermodal shipping containers before they are repurposed for use as buildings or structures or as a part of buildings or structures.

3114.8.4.2 Seismic design parameters. ~~The appropriate detailing requirements of ASCE 7; response modification coefficient, R; overstrength factor; deflection amplification factor, C_d; and limits on structural height, h_n, for the corrugated shear wall is permitted to be developed in accordance with generally accepted procedures where approved by the building official in accordance with Section 104.11. The seismic force-resisting system shall be designed and detailed in accordance with one of the following:~~

Where all or portions of the corrugated steel container sides are considered to be the seismic force-resisting system, design and detailing shall be in accordance with the ASCE 7 Table 12.2-1 requirements for light-frame bearing-wall systems with shear panels of all other materials.

Where portions of the corrugated steel container sides are retained, but are not considered to be the seismic force-resisting system, an independent seismic force-resisting system shall be selected, designed and detailed in accordance with ASCE 7 Table 12.2-1, or

Where portions of the corrugated steel container sides are retained and integrated into a seismic force-resisting system other than as permitted by Section 3114.4.2 Item 1, seismic design parameters shall be developed from testing and analysis in accordance with Section 104.11 and ASCE 7 Section 12.2.1.1 or 12.2.1.2.

3114.8.5.3 Allowable shear. The allowable shear for the corrugated steel side walls (longitudinal) and end walls (transverse) for wind design and for seismic design using the coefficients of Section 3114.8.5.2 shall be ~~permitted to have the allowable shear values set forth in~~ in accordance with Table 3114.8.5.3 provided that all of the following conditions are met:

The total linear length of all openings in any individual side walls or end walls shall be limited to not more than 50% of the length of that side walls or end walls, as shown in Figure 3114.8.5.3(1).

Any full height wall length, or portion thereof, less than 4 feet (305 mm) long shall not be considered as a portion of the lateral force-resisting system, as shown in Figure 3114.8.5.3(2).

All side walls or end walls used as part of the lateral force-resisting system shall have an existing or new boundary element on all sides to form a continuous load path, or paths, with adequate strength and stiffness to transfer all forces from the point of application to the final point of resistance, as shown in Figure 3114.8.5.3(3).

Where openings are made in container walls, floors, or roofs for doors, windows and other openings: 4.1. The openings shall be framed with steel elements that are designed in accordance with Chapter 16 and Chapter 4.2. The cross section and material grade of any new steel element shall be equal to or greater than the steel element removed.

5. A maximum of one penetration not greater than a 6-inch (152 mm) diameter hole for conduits, pipes, tubes or vents, or not greater than 16 square inches (10,322 sq mm) for electrical boxes, is permitted for each individual 8 foot length (2,438 mm) lateral force resisting wall. Penetrations located in walls that are not part of the wall lateral force resisting system shall not be limited in size or quantity. Existing intermodal shipping container vents shall not be considered a penetration, as shown in Figure 3114.8.5.3(4).

6. End wall door or doors designated as part of the lateral force-resisting system shall be welded closed.

TABLE 3114.8.5.3

Allowable ~~Strength~~ Shear Values for Intermodal Shipping Container Corrugated Steel Siding Shear Walls for Wind or Seismic Loading

(No changes to body of table)

The allowable ~~strength~~ shear for the side walls and end walls of the intermodal shipping containers are derived from ISO 1496-1 and reduced by a factor of safety of 5.

Container designation type is derived from ISO 668.

Limitations of Sections 3114.8.5.1 shall apply

(Portions of proposal not shown are not modified)

Committee Reason: The modifications add clarifications that will help the approval process go smoothly, but the committee would like to see a public comment to change the term "corrugated" container to "intermodal" container to be consistent with other language in the proposal. Other discrepancies in the modifications are minor and could also be cleaned up in the public comment process. The proposal addresses a need for guidance regarding the approval of intermodal shipping containers in the context of the building code. (Vote: 14-0)

Assembly Action:

None

G151-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ed Kullik, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

3114.1 General. The provisions of Section 3114 and other applicable sections of this code, shall apply to intermodal shipping containers that are repurposed for use as buildings or structures or as a part of buildings or structures.

Exceptions:

1. Intermodal shipping containers previously approved as existing relocatable buildings complying with Chapter 14 of the International Existing Building Code.
2. Stationary storage battery arrays located in intermodal shipping containers complying with Chapter 12 of the International Fire Code.
3. Intermodal shipping containers that are listed as equipment complying with the standard for equipment, such as air chillers, engine generators, modular data centers, and other similar equipment.
4. Intermodal shipping containers housing or supporting experimental equipment are exempt from the requirements of Section 3114 provided they comply with all of the following:
 - 4.1. Such units shall be single stand-alone units supported at grade level and used as experimental equipment or apparatuses, only for occupancies as specified under Risk Category I in Table 1604.5;
 - 4.2. Such units are located a minimum of 8 feet from adjacent structures, and are not connected to a fuel gas system or fuel gas utility; and
 - 4.3. In hurricane-prone regions and flood hazard areas, such units are designed in accordance with the applicable provisions of Chapter 16.

Commenter's Reason: Without scoping limits, this exception could permit varying uses and locations in which the container could pose substantial earthquake safety hazard to surrounding structures and persons. This could include containers located in or on structures, where container shifting could damage the structure, or fall and injure persons in the vicinity. This could also include fire hazard if a container shifts and gas lines are damaged. This safety concern is addressed by the public comment language which provides scoping limits defining conditions under which risk is minimal such that regulation of the structural design and anchorage is not needed. The proposed language addresses:

- Occupancies that represent low risk to human life,
- Supported at grade where the risk of damage or injury due to falling is minimal,
- Eight foot distance to surrounding structures provides a zone for container shifting without causing damage to other structures,
- Prohibition of fuel gas intends to avoid fire ignition hazards should the container shift under seismic or wind loading,
- For hurricane prone and flood hazard areas, Chapter 16 will trigger requirements to reduce hazard.

These are believed to be scoping limits that can be readily screened for, permitting true low-hazard uses to occur with minimal regulation.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The net effect of the public comment and code change proposal will not increase or decrease the cost of construction. The resulting new provisions will provide clarity on how to consistently design with, permit, and field inspect shipping containers that are repurposed for building construction. Current use of repurposed intermodal shipping containers requires the building owner or designee to submit through the alternative means and methods administrative provisions.

Public Comment 2:

Proponent: Ed Kullik, representing ICC Building Code Action Committee (bcac@icc-safe.org) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

**TABLE 3114.8.5.3
Allowable Shear Values for Intermodal Shipping Container Corrugated Steel Siding Shear-Walls
for Wind or Seismic Loading**

CONTAINER DESIGNATION ²	CONTAINER DIMENSION (Nominal Length)	CONTAINER DIMENSION (Nominal Height)	ALLOWABLE SHEAR VALUES (PLF) ^{1,3}	
			Side Wall	End Wall
1EEE	45 feet (13.7 M)	9.5 feet (2896 mm)	75	843
1EE		8.6 feet (2591 mm)		
1AAA	40 feet (12.2 M)	9.5 feet (2896 mm)	84	
1AA		8.5 feet (2592 mm)		
1A		8.0 feet (2438 mm)		
1AX				
1BBB	30 feet (9.1 M)	9.5 feet (2896 mm)	112	
1BB		8.5 feet (2591 mm)		
1B		8.0 feet (2438 mm)		
1BX				
1CC	20 feet (9.1 M)	8.5 feet (2591 mm)	168	
1C		8.0 feet (2438 mm)		
1CX				
1D	10 feet (3.0 M)	8.0 feet (2438 mm)	337	
1DX				

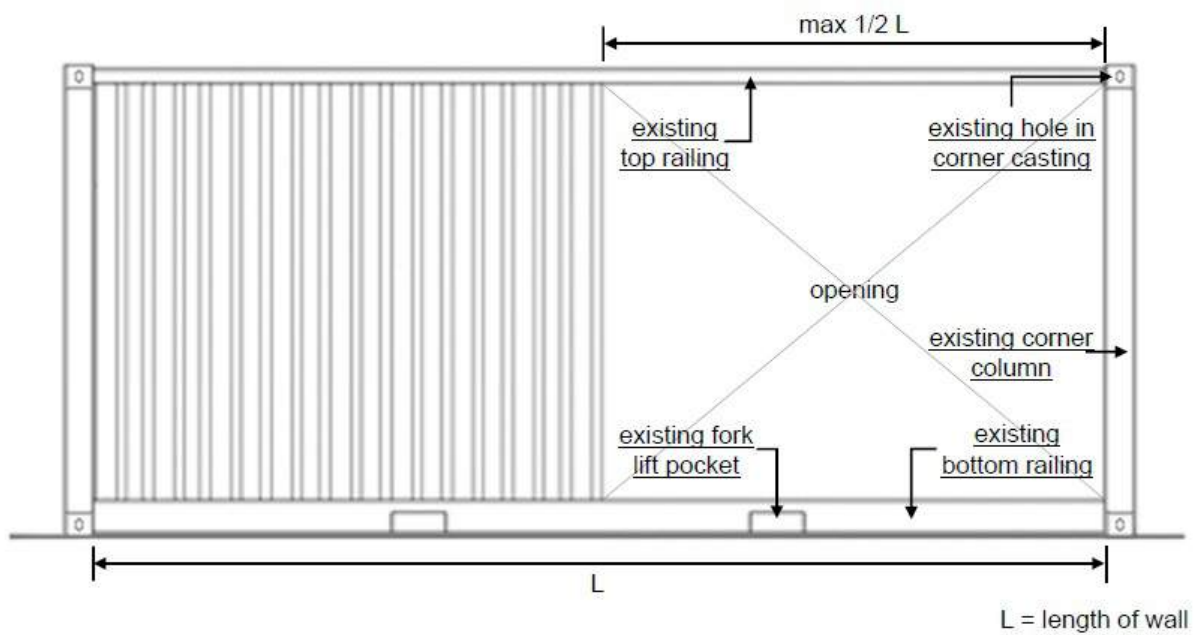
1. The allowable shear for the side walls and end walls of the intermodal shipping containers are derived from ISO 1496-1 and reduced by a factor of safety of 5.
2. Container designation type is derived from ISO 668.
3. Limitations of Sections 3114.8.5.1 shall apply

3114.8.4.2 Seismic design parameters. The seismic force-resisting system shall be designed and detailed in accordance with one of the following:

1. Where all or portions of the corrugated steel container sides are considered to be the seismic force-resisting system, design and detailing shall be in accordance with the ASCE 7 Table 12.2-1 requirements for light-frame bearing-wall systems with shear panels of all other materials,
2. Where portions of the corrugated steel container sides are retained, but are not considered to be the seismic force-resisting system, an independent seismic force-resisting system shall be selected, designed and detailed in accordance with ASCE 7 Table 12.2-1, or
3. Where portions of the corrugated steel container sides are retained and integrated into a seismic force-resisting system other than as permitted by Section 3114.4.2 Item 1, seismic design parameters shall be developed from testing and analysis in accordance with Section 104.11 and ASCE 7 Section 12.2.1.1 or 12.2.1.2.



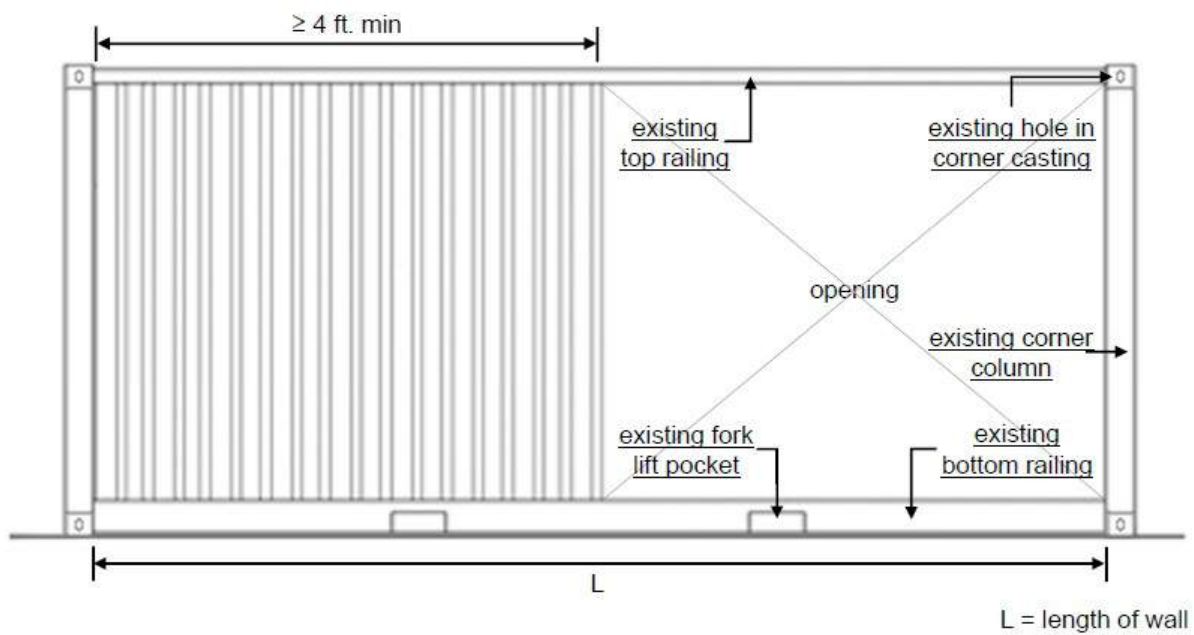
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3114.8.5.3(1)
Bracing Unit Distribution--Maximum Linear Length



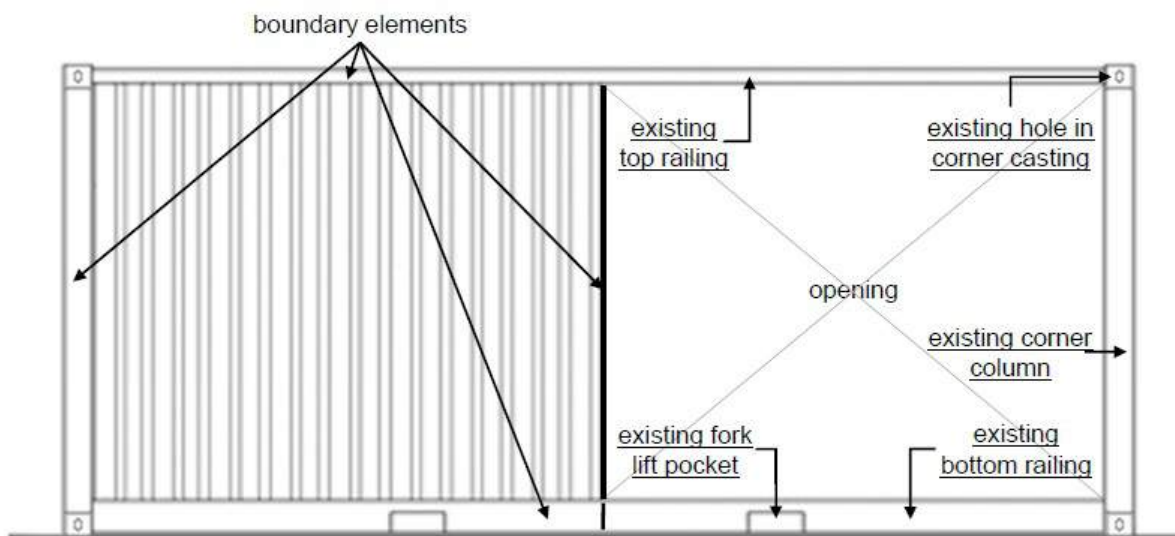
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3114.8.5.3(2)
Bracing Unit Distribution -- Minimum Linear Length



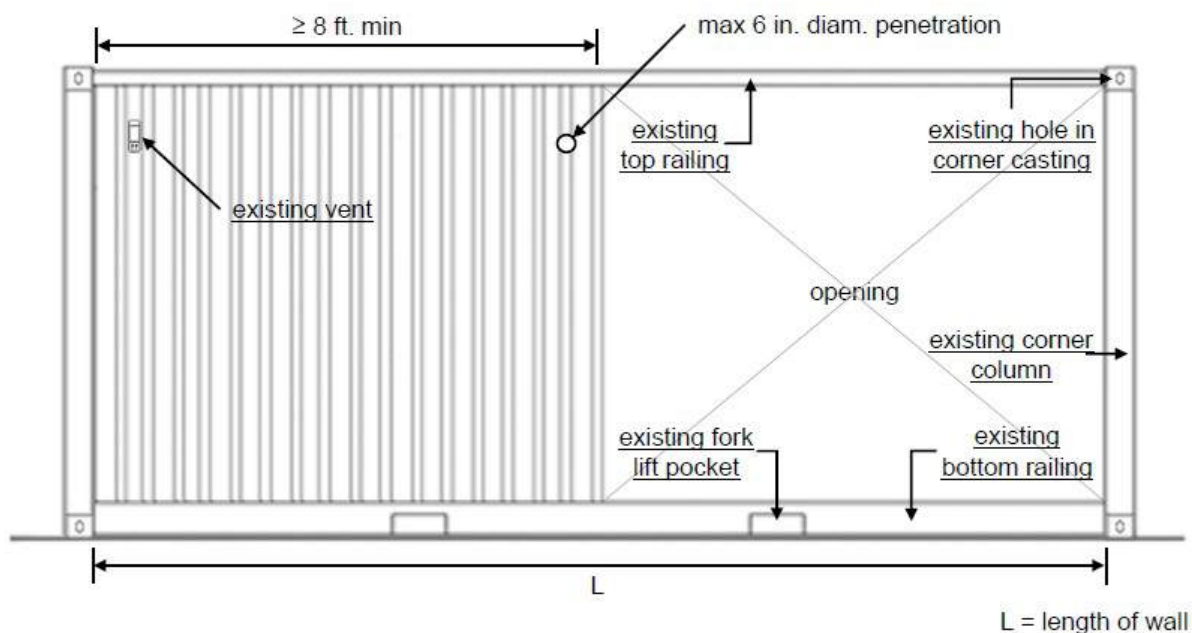
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3114.8.5.3(3)
Bracing Unit Distribution -- Boundary Elements



NO IMAGE
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3114.8.5.3(4) Bracing Unit Distribution -- Penetration Limitations

Commenter's Reason: Section 3114.8.4.2 - This is an editorial correction in order to cite the correct section number. Table 3114.8.5.3 title - This represents a change to heading to delete "siding shear". The change is based on public testimony and comments received during the committee action hearing to keep terms consistent throughout the code change proposal.

Figures 3114.8.5.3 (1) through (4) - It was brought to our attention that it may be beneficial to identify parts of the intermodal shipping container more clearly rather than use a simple line drawing figure. This is for the benefit of the user to more readily recognize existing conditions versus the permissible cut-aways as allowed by Section 3114.8.5.3. In response we are proposing to add identifying text (the rails, lift slots, and holes) to illustrate those existing elements that are part of the manufacture of intermodal shipping containers.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The net effect of the public comment and code change proposal will not increase or decrease the cost of construction. The resulting new provisions will provide clarity on how to consistently design with, permit, and field inspect shipping containers that are repurposed for building construction. Current use of repurposed intermodal shipping containers requires the building owner or designee to submit through the alternative means and methods administrative provisions.

FS3-18

IBC: 703.5.1, Chapter 35

Proposed Change as Submitted

Proponent: Tony Crimi, A.C. Consulting Solutions Inc., representing North American Insulation Manufacturers Association (NAIMA)

2018 International Building Code

Revise as follows

703.5.1 Elementary materials. Materials required to be noncombustible shall be tested in accordance with ASTM E136, or ASTM E2652, using the acceptance criteria prescribed by ASTM E136.

Add new standard(s) follows

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box
C700
West Conshohocken PA 19428-2959

E2652-16:

Standard Test Method for Behavior of Materials in a Tube Furnace with a Cone-shaped Airflow Stabilizer at 750oC

Reason: Several of the I-Codes have varying definitions of the term “non-combustible material”, each based upon the way in which the concept of “non-combustible” is used within that Code. Throughout the ICC code system, the concept of “noncombustible material” is based on the idea that the material should not ignite or burn when subjected to fire or heat. Our intent is to require the same pass/fail criteria as currently exists in ASTM E136, using all fo the thermocouples required by ASTM E136, but using the ASTM E2652 apparatus. When ASTM E2652 is used, the pass/fail criteria and methodology are those required by ASTM E136.

The concept of “noncombustible materials” and “noncombustibility” in terms of types of construction is widely used throughout the International Codes. The IBC, IFC, IEBC and IFGC do not contain a separate definition of “noncombustible”, even though they use the terminology “non-combustible materials”.

In common usage, the term “noncombustible” is used to denote materials which do not ignite or are not capable of sustaining combustion. The common Dictionary definitions for “noncombustible” are typically as follows:

Noncombustible, adj - incapable of being burned

(Merriam -Webster’s International Dictionary of the English Language, Unabridged, 2013)

In the traditional use of the terminology and concept of “non-combustible” in the Codes has been based on acceptable performance when tested in accordance with ASTM E136, Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C. Materials passing the test are permitted limited flaming and other indications of combustion. However, these have traditionally been acceptable. Understandably, ASTM E136 does not replicate the full spectrum of actual building fire exposure conditions. However, this test method does provide an assessment indicating those materials which do not act to aid combustion or add appreciable heat to an ambient fire.

ASTM has published another standard ASTM E2652-16, entitled Standard Test Method for Behavior of Materials in a Tube Furnace with a Cone-shaped Airflow Stabilizer, at 750°C. This test method is similar to ASTM E136, but based on the international standard for Noncombustibility. The key difference between the two standards is in the equipment. The apparatuses in this test method and in Test Method E 136 is that the furnace tube in this test method has a conical air-flow stabilizer section attached at its bottom. Both test methods use cylindrical furnace tubes. Like ASTM E136, the test Standard does not include mandatory pass/fail criterion. It allows those criteria to be determined by the Codes or other users. Appendix X3 also contains a comparison of results obtained from this apparatus versus ASTM E136. ASTM E136 has already been revised to include ASTM E2652 as an alternate methodology.

Bibliography: ASTM E2652-16 - *Standard Test Method for Behavior of Materials in a Tube Furnace with a Cone- shaped Airflow Stabilizer, at 750°C*.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is an additional option only.

Analysis: A review of the standard proposed for inclusion in the code, ASTM E2562-16, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

FS3-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The proposal brings in a new standard as an option to ASTM E136. The two standards reference each other and are considered equivalent for testing materials. The committee expressed concern about the integration of FS2 and FS3, urging a public comment be submitted to meld FS3 revision into the format of the FS2 approved change. (Vote 14-0)

Assembly Action:

None

FS3-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Marcelo Hirschler, representing GBH International (mmh@gbhint.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

703.5 Noncombustibility tests. The tests indicated in ~~Sections~~ Section 703.5.1 and 703.5.2.1 shall serve as criteria for acceptance of building materials as set forth in Sections 602.2, 602.3 and 602.4 in Types I, II, III and IV construction. The term ~~"noncombustible"~~ "noncombustible" does not apply to the flame spread characteristics of *interior finish* or *trim* materials. A material shall not be classified as a noncombustible building construction material if it is subject to an increase in combustibility or flame spread beyond the limitations herein established through the effects of age, moisture or other atmospheric conditions.

703.5.1 Elementary ~~Noncombustible~~ materials. Materials required to be noncombustible shall be tested in accordance with ASTM E136. Alternately, materials required to be noncombustible shall be tested in accordance with ASTM E2652 using the acceptance criteria prescribed by ASTM E136.

Exception: Materials having a structural base of noncombustible material as determined in accordance with ASTM E136, or with ASTM E2652 using the acceptance criteria prescribed by ASTM E136, with a surfacing of not more than 0.125 inch (3.18 mm) thick that has a flame spread index not greater than 50 when tested in accordance with ASTM E84 or UL 723 shall be acceptable as non-combustible.

~~**703.5.2 Composite materials.** Materials having a structural base of noncombustible material as determined in accordance with Section 703.5.1 with a surfacing not more than 0.125 inch (3.18 mm) thick that has a *flame spread index* not greater than 50 when tested in accordance with ASTM E84 or UL 723 shall be acceptable as noncombustible materials.~~

Commenter's Reason: This public comment incorporates into FS3 the changes accepted by the technical committee for both FS2 and FS3. This complies with the request of the technical committee. In the absence of this public comment, there may be a conflict between the code text approved in FS2 and FS3. This public comment uses the language accepted for FS2 and for FS3 and blends it.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment (and the public proposal) simply adds an alternate test method for assessing noncombustibility.

FS3-18

FS5-18

IBC: 703.8

Proposed Change as Submitted

Proponent: Stephen DiGiovanni, representing ICC Ad Hoc Committee on Tall Wood Buildings (TWB) (TWB@iccsafe.org)

THIS CODE CHANGE WILL BE HEARD BY THE IBC GENERAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

2018 International Building Code

Add new text as follows

703.8 Determination of noncombustible protection time contribution. . The time, in minutes, contributed to the fire resistance rating by the noncombustible protection of mass timber building elements, components, or assemblies, shall be established through a comparison of assemblies tested using procedures set forth in ASTM E 119 or UL 263. The test assemblies shall be identical in construction, loading, and materials, other than the noncombustible protection. The two test assemblies shall be tested to the same criteria of structural failure.

1. Test Assembly 1 shall be without protection.
2. Test Assembly 2 shall include the representative noncombustible protection. The protection shall be fully defined in terms of configuration details, attachment details, joint sealing details, accessories and all other relevant details.

The noncombustible protection time contribution shall be determined by subtracting the fire resistance time, in minutes, of Test Assembly 1 from the fire resistance time, in minutes, of Test Assembly 2.

Reason: The Ad Hoc Committee on Tall Wood Buildings (TWB) was created by the ICC Board to explore the science of tall wood buildings and take action on developing code changes for tall wood buildings. The TWB has created several code change proposals with respect to the concept of tall buildings of mass timber and the background information is at the end of this Statement. Within the statement are important links to information, including documents and videos, used in the deliberations which resulted in these proposals.

The TWB determined that the fire resistance rating of mass timber structural elements, embodied in a series of proposals including this one, shall consist of the inherent fire resistance rating of the mass timber and the additional fire resistance rating of the *Noncombustible Protection* described in new definitions proposals. The TWB determined that at least 2/3 of the required fire resistance rating should come from the *Noncombustible Protection*. The TWB decided to provide both a performance path, as embodied in this proposal, and a prescriptive path, embodied in another proposal for Section 722.7.

This proposal constitutes the performance path for determining the contribution of noncombustible protection for mass timber elements. The proposal outlines a protocol to accomplish this. This proposal should be considered as a companion proposal to the proposals creating new types of mass timber construction in Section 602.4 and the code proposal in Section 722.7. The proposed new Section 602.4 requires the use of noncombustible protection on most mass timber elements in most of the proposed new types of construction.

This proposal, new section 703.8, is created to provide the method by which any material not contained in the prescriptive Table in Section 722.7 may be tested to show the time, in minutes, which it contributes as *noncombustible protection*. This procedure is representative of the procedure used in the past to determine the protection times for various membranes in Section 722.6 Component Additive Method for wood construction. It is neither new nor ambiguous in its use. Recent testing by AWC confirms the values derived from historic testing. A report is available at the following link: <http://bit.ly/WFC-firetestofGWBonCLT> . This link was confirmed active on 12/27/17.

This procedure should not be confused with “membrane protection” which is based on temperature rise on the unexposed side of a membrane attached to construction elements. Noncombustible construction is, instead, noncombustible material meeting the requirements of Section 703.5. Its contribution to the fire resistance rating of any building element is determined by this proposed new section. Simply put, it is determined by measuring the fire resistance time, in minutes and determined by structural failure, of a mass timber building element and then conducting a second test measuring the fire resistance time, in minutes and determined by structural failure, of the identical mass timber element with identical load, construction and condition, but with the proposed noncombustible protection applied to it. The difference in time between the two samples is the contribution, in minutes, of the noncombustible protection.

Background information: The ICC Board approved the establishment of an ad hoc committee for tall wood buildings in December of 2015. The purpose of the ad hoc committee is to explore the science of tall wood buildings and to investigate the feasibility and take action on developing code changes for tall wood buildings. The committee is comprised of a balance of stakeholders with additional opportunities for interested parties to participate in the four Work Groups established by the ad hoc committee, namely: Code; Fire; Standards/Definitions; and Structural. For more information, be sure to visit the ICC website <https://www.iccsafe.org/codes-tech-support/cs/icc-ad-hoc-committee-on-tall-wood-buildings/> (link active and up to date as of 12/27/17). As seen in the "Meeting Minutes and Documents" and "Resource Documents" sections of the committee web page, the ad hoc committee reviewed a substantial amount of information in order to provide technical justification for code proposals.

The ad hoc committee developed proposals for the followings code sections. The committee believes this package of code changes will result in regulations that adequately address the fire and life safety issues of tall mass timber buildings.

IBC Code Section	Description
403.3.2	Water supply requirements for fire pumps in high rise buildings of Type IVA and IVB construction.
504.3	Allowable building height (feet) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT construction.
504.4	Allowable building height (stories) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
506.2	Allowable building area for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
508.4.4.1 509.4.1.1 (new)	Requirements for mass timber building elements serving as fire barriers or horizontal assemblies in buildings of Type IVB or IVC construction.
602.4	Type of Construction requirements for new proposed types of construction: Types IVA, IVB and IVC. No changes to Type IV HT construction. Includes definitions for new terms: Mass timber and Noncombustible protection (mass timber). THIS IS THE KEY CODE CHANGE PROPOSAL WHICH OUTLINES THE CONSTRUCTION REQUIREMENTS FOR THE PROPOSED NEW TYPE OF MASS TIMBER BUILDINGS. THE PROPOSAL ALSO ADDRESSES CONCEALED SPACES, ADHESIVE PERFORMANCE AND EXTERIOR WALL PROTECTION.
703.8 (new)	The performance method to determine the increase to the fire resistance rating provided by noncombustible protection applied to the mass timber building element.
703.9 (new)	Requirements for sealants and adhesives to be placed at abutting edges and intersections of mass timber building elements. The reason statement references a Group B proposal to Chapter 17 for special inspection requirements of sealants and adhesives.
718.2.1	Requirements on the use of mass timber building elements used for Fireblocking.
722.7 (new)	Requirements for the fire resistance rating of mass timber elements, including minimum required protection and gypsum board attachment requirements.
3102	Requirements for membrane structures using Type IV HT construction.
3314.7 (new)	New special precautions during construction of buildings of Types IVA, IVB and IVC construction: Standpipes; Water supply for fire department connections; Noncombustible protection required for mass timber elements as construction height increases.
Appendix	Requirements for walls, floors and roofs of Type IV HT construction in buildings located in Fire Districts.
IFC Code Section	Description
701.6	Requirements which stipulate the owner's responsibility to maintain inventory of all required fire resistance rated construction in buildings of Types IVA and IVB construction. This includes an annual inspection and proper repair where necessary.
Proposed changes to be submitted in 2019 Group B	
IBC Chapter 17	Required special inspections of mass timber construction <ul style="list-style-type: none"> • Structural • Sealants and adhesives (see IBC 703.8)
IBC Chapter 23	An update to referenced standard APA PRG 320 Standard for Performance –rated Cross-laminated Timber which is currently undergoing revision to ensure the adequacy of the adhesives under fire conditions.

In addition, fire tests designed to simulate the three new construction types (Types IVA, IVB and IVC) in the ad hoc committee proposals were conducted at the Alcohol Tobacco and Firearms test lab facility. The TWB was involved in the design of the tests, and many members witnessed the test in person or online. The results of the series of 5 fire tests provide additional support for these proposals, and validate the fire performance for each of the types of construction proposed by the committee. The fire tests consisted of one-bedroom apartments on two levels, with both apartments having a corridor leading to a stair. The purpose of the tests was to address the contribution of mass timber to a fire, the performance of connections, the performance of through-penetration fire stops, and to evaluate conditions for responding fire personnel.

To review a summary of the fire tests, please visit:

<http://bit.ly/ATF-firetestreport>

To watch summary videos of the fire tests, which are accelerated to run in 3 ½ minutes, please visit:

<http://bit.ly/ATF-firetestvideos>

Both of these links were confirmed active on 12/27/17.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This section provides information that was not previously set forth in the code, and does not change the requirements of current code, thus there is no cost impact when compared with present requirements.

FS5-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The proponents have done their homework. This is how heavy timber should be done. The western fire test validated this approach and that should be taken into consideration. (Vote: 14-0)

Assembly Action:

None

FS5-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jonathan Humble, American Iron and Steel Institute, representing American Iron and Steel Institute (jhumble@steel.org)requests Disapprove.

Commenter's Reason: We recommend disapproval of this code change proposal. The proposal uses the phrase noncombustible protection time contribution which is misleading because the test process described allows both the contribution of the non-combustible protection in addition to the mass timber (wood) behind the protection to determine protection time.

This represents re-writing of an existing standard through the ICC code development process, which has historically been rejected in the past. This work should first be evaluated by the standard writing organizations.

Neither ASTM E119 or UL 263 contain criteria of structural failure (in those exact words) that FS5-18 suggests where it states, in part, "The two test assemblies shall be tested to the same criteria of structural failure ". As a result, because of use this different terminology from the test standards it is not clear what criteria should be used.

Bibliography: ASTM-E119, "Standard Test Methods for Fire Tests of Building Construction and Materials", ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959
www.astm.org

UL-263, "Standard for Safety Fire Tests of Building Construction and Materials", UL Headquarters, 333 Pfingsten Road, Northbrook, IL 60062, USA

<http://www.ul.com>

https://www.standardsportal.org/usa_en/sdo/ul.as

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There will be no cost impact because if disapproved the materials in question will have to follow the current IBC requirements for fire resistance.

Public Comment 2:

Proponent: Dan Nichols, representing ICC Code Correlation Committee (ccc@iccsafe.org).

Commenter's Reason: The Code Correlation Committee (CCC) is not taking a position on this code change. The CCC submitted this public comment in order to bring a correlation issue to the attention of the full voting membership for the Public Comment Hearings and the Online Governmental Consensus Vote to allow the voting membership to coordinate actions on a package of code changes submitted dealing with tall wood buildings of mass timber construction. This package includes the parent proposal G108-18; if disapproved, the related proposals G28-18, G75-18, G80-18, G84-18, G89-18, FS5-18, FS6-18, FS73-18, FS81-18 and F266-18, will not be correlated with any existing code text if they are approved.

The Code Correlation Committee is a standing committee of the International Code Council whose objectives, procedures and organization are set forth in Council Policy CP#44-13. The objective of the Code Correlation Committee is to maintain technical and editorial consistency among the International Codes and to assist staff in the evaluation and processing of code change proposals and comments that are exclusively editorial.

FS5-18

FS6-18

IBC: 703.9 (New), Chapter 35

Proposed Change as Submitted

Proponent: Stephen DiGiovanni, representing ICC Ad Hoc Committee on Tall Wood Buildings (TWB) (TWB@iccsafe.org)

THIS CODE CHANGE WILL BE HEARD BY THE IBC GENERAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

2018 International Building Code

Add new text as follows

703.9 Sealing of adjacent mass timber elements. In buildings of Type IVA, IVB, and IVC construction, sealant or adhesive shall be provided to resist the passage of air in the following locations:

1. At abutting edges and intersections of mass timber building elements required to be fire resistance-rated
2. At abutting intersections of mass timber building elements and building elements of other materials where both are required to be fire resistance-rated.

Sealants shall meet the requirements of ASTM C920. Adhesives shall meet the requirements of ASTM D3498.

Exception:Where sealant or adhesive is not a required component of a fire resistance-rated assembly.

Add new standard(s) follows

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box
C700
West Conshohocken PA 19428-2959
US

D3498-03(2011):

Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems

Reason: The Ad Hoc Committee on Tall Wood Buildings (TWB) was created by the ICC Board to explore the science of tall wood buildings and take action on developing code changes for tall wood buildings. The TWB has created several code change proposals with respect to the concept of tall buildings of mass timber and the background information is at the end of this Statement. Within the statement are important links to information, including documents and videos, used in the deliberations which resulted in these proposals.

Mass timber has inherent properties of fire resistance, serving both to provide structural fire resistance and to safeguard against the spread of fire and smoke within a building or the spread of fire between structures.

When mass timber panels are connected together, fire tests have demonstrated that it is important for the abutting edges and intersections in the plane of and between the different planes of panels that form a separation to be sealed. The structures tested as part of the fire tests supporting this submittal were constructed with this sealing.

To review a summary of the fire tests, please visit:

<http://bit.ly/ATF-firetestreport>

To watch summary videos of the fire tests, which are accelerated to run in 3-1/2 minutes each, please visit:

<http://bit.ly/ATF-firetestvideos>.

Both of these links were confirmed active on 12/27/17.

The US CLT manual recommends a bead of construction adhesive. Construction adhesive or other sealant can be used to prevent air flow. When a wall or horizontal assembly serves as the separation between two atmospheres, a fire creates differential pressure where heated gasses raise the pressure and work to drive fire and hot gasses through the structure. Voids that are not properly sealed can serve as a conduit for air movement during a fire, so abutting edges and intersections are recommended to be sealed.

Periodic special inspections during construction are required to make sure it is clear that the appropriate sealant or

adhesive is used and to establish inspections to verify for ongoing quality control. However, Chapter 17 is a Group B topic. It will be taken up then. It is shown below for clarity and to emphasize the importance the TWB places on proper application of sealants and adhesives in mass timber construction.

1705.19 Sealing of Mass Timber. Periodic special inspections of sealants or adhesives shall be conducted where sealant or adhesive required by Section 703.9 is applied to mass timber building elements as designated in the approved construction documents.

Some panels are manufactured under proprietary processes to ensure there are no voids at these intersections. Where this proprietary process is incorporated and tested, there is no requirement for sealant or adhesive and an exception is provided for this instance. Where the sealant is not required and is not specifically excluded it is still considered to be a good practice covered by this section.

This code change proposal does not apply to “joints” as defined in Section 202 of the IBC as joints have their own requirements for the placement and inspection of fire resistant joint systems in IBC Section 715. Joints are defined as having an opening that is designed to accommodate building tolerances or to allow independent movement. Panels and members that are connected together as covered by this code change proposal do not meet the definition of a joint since they are rigidly connected and do not have an opening.

Background information: The ICC Board approved the establishment of an ad hoc committee for tall wood buildings in December of 2015. The purpose of the ad hoc committee is to explore the science of tall wood buildings and to investigate the feasibility and take action on developing code changes for tall wood buildings. The committee is comprised of a balance of stakeholders with additional opportunities for interested parties to participate in the four Work Groups established by the ad hoc committee, namely: Code; Fire; Standards/Definitions; and Structural. For more information, be sure to visit the ICC website <https://www.iccsafe.org/codes-tech-support/cs/icc-ad-hoc-committee-on-tall-wood-buildings/> (link active and up to date as of 12/27/17). As seen in the “Meeting Minutes and Documents” and “Resource Documents” sections of the committee web page, the ad hoc committee reviewed a substantial amount of information in order to provide technical justification for code proposals.

The ad hoc committee developed proposals for the followings code sections. The committee believes this package of code changes will result in regulations that adequately address the fire and life safety issues of tall mass timber buildings.

IBC Code Section	Description
403.3.2	Water supply requirements for fire pumps in high rise buildings of Type IVA and IVB construction.
504.3	Allowable building height (feet) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT construction.
504.4	Allowable building height (stories) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
506.2	Allowable building area for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
508.4.4.1 509.4.1.1 (new)	Requirements for mass timber building elements serving as fire barriers or horizontal assemblies in buildings of Type IVB of IVC construction.
602.4	Type of Construction requirements for new proposed types of construction: Types IVA, IVB and IVC. No changes to Type IV HT construction. Includes definitions for new terms: Mass timber and Noncombustible protection (mass timber). THIS IS THE KEY CODE CHANGE PROPOSAL WHICH OUTLINES THE CONSTRUCTION REQUIREMENTS FOR THE PROPOSED NEW TYPE OF MASS TIMBER BUILDINGS. THE PROPOSAL ALSO ADDRESSES CONCEALED SPACES, ADHESIVE PERFORMANCE AND EXTERIOR WALL PROTECTION.
703.8 (new)	The performance method to determine the increase to the fire resistance rating provided by noncombustible protection applied to the mass timber building element.
703.9 (new)	Requirements for sealants and adhesives to be placed at abutting edges and intersections of mass timber building elements. The reason statement references a Group B proposal to Chapter 17 for special inspection requirements of sealants and adhesives.
718.2.1	Requirements on the use of mass timber building elements used for Fireblocking.
722.7 (new)	Requirements for the fire resistance rating of mass timber elements, including minimum required protection and gypsum board attachment requirements.
3102	Requirements for membrane structures using Type IV HT construction.
3314.7 (new)	New special precautions during construction of buildings of Types IVA, IVB and IVC construction: Standpipes; Water supply for fire department connections; Noncombustible protection required for mass timber elements as construction height increases.
Appendix	Requirements for walls, floors and roofs of Type IV HT construction in buildings located in Fire Districts.
IFC Code Section	Description
701.6	Requirements which stipulate the owner's responsibility to maintain inventory of all required fire resistance rated construction in buildings of Types IVA and IVB construction. This includes an annual inspection and proper repair where necessary.
Proposed changes to be submitted in 2019 Group B	
IBC Chapter 17	Required special inspections of mass timber construction <ul style="list-style-type: none"> • Structural • Sealants and adhesives (see IBC 703.8)
IBC Chapter 23	An update to referenced standard APA PRG 320 Standard for Performance –rated Cross-laminated Timber which is currently undergoing revision to ensure the adequacy of the adhesives under fire conditions.

In addition, fire tests designed to simulate the three new construction types (Types IVA, IVB and IVC) in the ad hoc committee proposals were conducted at the Alcohol Tobacco and Firearms test lab facility. The TWB was involved in the design of the tests, and many members witnessed the test in person or online. The results of the series of 5 fire tests provide additional support for these proposals, and validate the fire performance for each of the types of construction proposed by the committee. The fire tests consisted of one-bedroom apartments on two levels, with both apartments having a corridor leading to a stair. The purpose of the tests was to address the contribution of mass timber to a fire, the performance of connections, the performance of through-penetration fire stops, and to evaluate conditions for responding fire personnel.

To review a summary of the fire tests, please visit:

<http://bit.ly/ATF-firetestreport>

To watch summary videos of the fire tests, which are accelerated to run in 3 ½ minutes, please visit:

<http://bit.ly/ATF-firetestvideos>

Both of these links were confirmed active on 12/27/17.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This section provides information that was not previously set forth in the code, and does not change the requirements of current code, thus there is no cost impact when compared with present requirements.

Analysis: A review of the standard proposed for inclusion in the code, ASTM D3498-03(2011), with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

FS6-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This is necessary to maintain the integrity of the system. It was suggested that a public comment related to the proposed modification may be in order. (Vote: 14-0)

Assembly Action:

None

FS6-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Stephen DiGiovanni, representing Ad Hoc Committee for Tall Wood Buildings (sdigiovanni@clarkcountynv.gov) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

703.9 Sealing of adjacent mass timber elements. In buildings of Type IVA, IVB, and IVC construction, sealant or adhesive shall be provided to resist the passage of air in the following locations:

1. At abutting edges and intersections of mass timber building elements required to be fire resistance-rated
2. At abutting intersections of mass timber building elements and building elements of other materials where both are required to be fire resistance-rated.

Sealants shall meet the requirements of ASTM C920. Adhesives shall meet the requirements of ASTM D3498.

Exception: ~~Where sealant or adhesive is not~~ Sealants or adhesives need not be provided where they are not a required component of a tested fire resistance-rated assembly.

1705.19 Sealing of mass timber Periodic special inspections of sealants or adhesives shall be conducted where sealant or adhesive required by Section 703.9 is applied to mass timber building elements as designated in the approved construction documents.

Commenter's Reason: There are two changes proposed. The first change is to the exception for proposed Section 703.9. The original wording of the exception was not clear as to whether it exempted sealants from meeting the ASTM standards, or whether it was intended to exempt the sealant altogether. This exception is expanded to clarify that sealants and adhesives are not required where voids are a part of a tested fire assembly, when such assembly is tested without the use of sealants and adhesives in the void space. The second change adds a special inspection requirement to address sealants and adhesives that are a part of the required design. There is a need to ensure that the details of construction are adhered to, and the special inspection is seen as a means to ensure that these construction details are adequately emphasized during the construction process. This change was proposed as a modification during code hearings and ruled out of order at that time, and in doing so the committee suggested that the appropriate path for adding the special inspection requirement was to submit this public comment.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This section provides information that was not previously set forth in the code, and does not change the requirements of current code, thus there is no cost impact when compared with present requirements.

Public Comment 2:

Proponent: Dan Nichols, representing ICC Code Correlation Committee (ccc@iccsafe.org).

Commenter's Reason: The Code Correlation Committee (CCC) is not taking a position on this code change. The CCC submitted this public comment in order to bring a correlation issue to the attention of the full voting membership for the Public Comment Hearings and the Online Governmental Consensus Vote to allow the voting membership to coordinate actions on a package of code changes submitted dealing with tall wood buildings of mass timber construction. This package includes the parent proposal G108-18; if disapproved, the related proposals G28-18, G75-18, G80-18, G84-18,

G89-18, FS5-18, FS6-18, FS73-18, FS81-18 and F266-18, will not be correlated with any existing code text if they are approved.

The Code Correlation Committee is a standing committee of the International Code Council whose objectives, procedures and organization are set forth in Council Policy CP#44-13. The objective of the Code Correlation Committee is to maintain technical and editorial consistency among the International Codes and to assist staff in the evaluation and processing of code change proposals and comments that are exclusively editorial.

FS6-18

FS8-18

IBC: 704.6.1 (New)

Proposed Change as Submitted

Proponent: Crystal Sujeski, representing Crystal Sujeski (crystal.sujeski@fire.ca.gov)

2018 International Building Code

704.6 Attachments to structural members. The edges of lugs, brackets, rivets and bolt heads attached to structural members shall be permitted to extend to within 1 inch (25 mm) of the surface of the fire protection.

Add new text as follows

704.6.1 Secondary (non-structural) attachments to structural members. Where primary and secondary structural steel members require fire protection, secondary (non-structural) tubular steel attachments to those structural members shall be protected with the same fire resistive rating as required for the structural member. The protection shall extend from the structural member a distance of not less than 12 inches. An open tubular attachment shall be filled with an equivalent fire protection method for a distance of 12-inch length from the structural member, or the entire length of the open tube, whichever is less.

Reason: Primary structural frame members shall comply with Table 601 for fire resistance rating. Secondary (non-structural) steel tubes provide support for a building's exterior curtain wall and are thereby considered to be unrated members that do not require any fire protection. The connection of non-structural tubes to primary structural members has potentially adverse thermal effects on the required fire resistance rating of the primary steel frame members.

Building attachments for miscellaneous non-structural items (hangers, braces, framing tracks, erection lifting lugs, wall supports, etc.) are typically not required to be individually fire protected. In addition, fire resistance rated assemblies are tested without attachments, and with a homogeneous and continuous protection system or material. Thus, rated assemblies are explicitly limited to only the tested or approved components given in the published listing, which does not include bare steel attachments or discontinuous member protection. If such secondary steel attachments are connected to a fire resistance rated steel assembly, they may jeopardize the assembly's rating and protection system by the introduction of "thermal shorts", which can cause unexpected and excessive heat conduction, convection, or radiation through the attachment or its connection to the primary assembly.

The proposal to require a 12-inch extension of fireproofing on all non-structural attachments is based on a general industry practice as described in ANSI/UL 263 BXUV (exhibit C). Attached in the documentation is exhibit A, a letter from Steve Unser, a chief building official from the City of Creve Coeur, MO stating a policy to address the "12- inch rule" of fireproofing structural attachments to fireproofed beams and columns.

Moreover, in cases where an open tubular steel connection is utilized it is vital that the interior surfaces of the tube walls are fireproofed and the bottom ends of the tubes are closed. Without this protection, this condition results in bare (unprotected) steel areas at the attachment that could be directly exposed to radiant and convective heat from a fire source.

Attached (exhibit B1 and B2) is a modeling analysis of a high-rise project in Stockton, CA prepared by Jensen Hughes Senior Engineers Nestor Iwankiw and Thomas Forsythe. Their analysis further supports the proposed code change that would require fire proofing of secondary non-structural attachments.

Under the current code, fire-proofing requirements for non-structural attachments and their connections remain ambiguous. This lack of clarity makes fire protection enforcement difficult due to increased construction costs for contractors, builders and owners. Furthermore, special inspectors, fire and building officials are not taught to look for these deficiencies, resulting in numerous buildings with unprotected steel that can potentially have serious implications on public safety and welfare.

The proposal establishes a legal basis for requiring the additional fire protection as described herein.

The 'attached' documentation can be viewed at this link established 2/21/18

https://www.dropbox.com/sh/t0hlmrxf63gejfh/AABEvqgYih_QPK928kuUwazKa?dl=0

Cost Impact: The code change proposal will increase the cost of construction

This code change will increase the cost of construction; however, without additional fire protection the structural integrity of the building may be compromised.

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 704.6.1 Secondary ~~(non-structural)~~ attachments to structural members.

Where primary and secondary structural steel members require fire protection, secondary ~~(non-structural)~~ tubular steel attachments to those structural members shall be protected with the same fire resistive ~~rating material and thickness~~ as required for the structural member. The protection shall extend away from the structural member a distance of not less than 12 inches, or shall be applied to the entire length when the attachment is less than 12 inches long. ~~When the ends are open, the fire resistive material and thickness shall be applied to both exterior and interior of the tubular steel attachment. shall be filled with an equivalent fire protection method for a distance of 12-inch length from the structural member, or the entire length of the open tube, whichever is less.~~

Committee Reason: The modification refines the language to better reflect the intent of the proposal. The change clarifies an area of framing and the appropriate level of protection. Structural tubing has been a question of the years and there is evidence of heat transferring into the structure from such tubing. Perhaps a public comment expanding this solution to other attachments of shapes other than tubular. (Vote 11-3)

Assembly Action:

None

FS8-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Crystal Sujeski, representing Crystal Sujeski (crystal.sujeski@fire.ca.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

704.6.1 Secondary attachments to structural members. Where primary and secondary structural members require fire protection, secondary ~~tubular~~ steel attachments to those structural members shall be protected with the same fire resistive material and thickness as required for the structural member. The protection shall extend away from the structural member a distance of not less than 12 inches, or shall be applied to the entire length when the attachment is less than 12 inches long. When an attachment is hollow and the ends are open, the fire resistive material and thickness shall be applied to both the exterior and interior of the ~~tubular~~ hollow steel attachment.

Commenter's Reason: This public comment has modified the proposal FS-8 to address the committee comments to expand the requirements for fire protection to be all inclusive of secondary steel attachments and not just limited to tubular steel.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The cost of construction will be increased minimally, however without additional fire protection the structural integrity of the building may be compromised.

FS8-18

FS10-18

IBC: 202, 202, 704.14, 603.1, 722.5.2.2, 722.5.2.3

Proposed Change as Submitted

Proponent: Bill McHugh, The McHugh Company, representing National Fireproofing Contractors Association (Bill@mc-hugh.us)

2018 International Building Code

SECTION 202 DEFINITIONS

Revise as follows

~~**[BF] INTUMESCENT FIRE-RESISTANT COATINGS-MATERIALS.** Thin film liquid mixture applied to substrates by brush, roller, spray or trowel which, intumescent fire-resistive material expands into a protective foamed layer to provide fire-resistant protection of the substrates when exposed to flame or intense heat.~~

Add new text as follows

704.14 Intumescent fire-resistant materials (IFRM). Intumescent fire-resistant materials (IFRM) shall be consistent with the fire-resistance rating, the listing and manufacturers installation instructions. The instructions shall include, but are not limited to, substrate condition, application temperatures, surface conditions and IFRM handling, storage, mixing, conveyance, method of application, curing and ventilation. The finished condition of IFRM applied to structural members or horizontal assemblies shall not, upon complete drying or curing, exhibit delamination.

Revise as follows

603.1 Allowable materials. Combustible materials shall be permitted in buildings of Type I or II construction in the following applications and in accordance with Sections 603.1.1 through 603.1.3:

1. *Fire-retardant-treated wood* shall be permitted in:
 - 1.1. Nonbearing partitions where the required *fire-resistance rating* is 2 hours or less.
 - 1.2. Nonbearing *exterior walls* where fire-resistance-rated construction is not required.
 - 1.3. Roof construction, including girders, trusses, framing and decking.

Exception: In buildings of Type IA construction exceeding two *stories above grade plane*, *fire-retardant-treated wood* is not permitted in roof construction where the vertical distance from the upper floor to the roof is less than 20 feet (6096 mm).
 - 1.4. Balconies, porches, decks and exterior stairways not used as required exits on buildings three *stories* or less above grade plane.
2. Thermal and acoustical insulation, other than foam plastics, having a *flame spread index* of not more than 25.

Exceptions:

1. Insulation placed between two layers of noncombustible materials without an intervening airspace shall be allowed to have a *flame spread index* of not more than 100.
2. Insulation installed between a finished floor and solid decking without intervening airspace shall be allowed to have a *flame spread index* of not more than 200.
3. Foam plastics in accordance with Chapter 26.
4. Roof coverings that have an A, B or C classification.
5. *Interior floor finish* and floor covering materials installed in accordance with Section 804.
6. Millwork such as doors, door frames, window sashes and frames.
7. *Interior wall and ceiling finishes* installed in accordance with Section 803.
8. *Trim* installed in accordance with Section 806.
9. Where not installed greater than 15 feet (4572 mm) above grade, show windows, nailing or furring strips and wooden bulkheads below show windows, including their frames, aprons and show cases.
10. Finish flooring installed in accordance with Section 805.
11. Partitions dividing portions of stores, offices or similar places occupied by one tenant only and that do not establish a *corridor* serving an *occupant load* of 30 or more shall be permitted to be constructed of *fire-retardant-treated wood*, 1-hour fire-resistance-rated construction or of wood panels or similar light construction up to 6 feet (1829 mm) in height.
12. Stages and platforms constructed in accordance with Sections 410.2 and 410.3, respectively.
13. Combustible *exterior wall coverings*, balconies and similar projections and bay or oriel windows in accordance with Chapter 14 and Section 705.2.3.1.
14. Blocking such as for handrails, millwork, cabinets and window and door frames.
15. Light-transmitting plastics as permitted by Chapter 26.
16. Mastics and caulking materials applied to provide flexible seals between components of *exterior wall* construction.
17. Exterior plastic veneer installed in accordance with Section 2605.2.
18. Nailing or furring strips as permitted by Section 803.15.
19. Heavy timber as permitted by Note c to Table 601 and Sections 602.4.3 and 705.2.3.1.
20. Aggregates, component materials and admixtures as permitted by Section 703.2.2.
21. Sprayed fire-resistant materials and intumescent and mastic fire-resistant coatings materials, determined on the basis of *fire resistance* tests in accordance with Section 703.2 and installed in accordance with Sections 1705.14 and 1705.15, respectively.
22. Materials used to protect penetrations in fire-resistance-rated assemblies in accordance with Section 714.
23. Materials used to protect joints in fire-resistance-rated assemblies in accordance with Section 715.
24. Materials allowed in the concealed spaces of buildings of Types I and II construction in accordance with Section 718.5.
25. Materials exposed within plenums complying with Section 602 of the International Mechanical Code.
26. Wall construction of freezers and coolers of less than 1,000 square feet (92.9 m²), in size, lined on both sides with noncombustible materials and the building is protected throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

722.5.2.2 Sprayed fire-resistant materials. The provisions in this section apply to structural steel beams and girders protected with sprayed fire-resistant materials. Larger or smaller beam and girder shapes shall be permitted to be substituted for beams specified in *approved* unrestrained or restrained fire-resistance-rated assemblies, provided that the thickness of the fire-resistant material is adjusted in accordance with the following expression:

$$h_2 = h_1 [(W_1 / D_1) + 0.60] / [(W_2 / D_2) + 0.60]$$

(Equation 7-17)

where:

h = Thickness of sprayed fire-resistant material in inches.

W = Weight of the structural steel beam or girder in pounds per linear foot.

D = Heated perimeter of the structural steel beam in inches.

Subscript 1 refers to the beam and fire-resistant material thickness in the *approved* assembly. Subscript 2 refers to the substitute beam or girder and the required thickness of fire-resistant material. The *fire resistance* of structural steel beams and girders protected with intumescent or mastic fire-resistant ~~coatings~~ materials shall be determined on the basis of fire-resistance tests in accordance with Section 703.2.

722.5.2.3 Structural steel trusses. The *fire resistance* of structural steel trusses protected with fire-resistant materials sprayed to each of the individual truss elements shall be permitted to be determined in accordance with this section. The thickness of the fire-resistant material shall be determined in accordance with Section 722.5.1.3. The weight-to-heated-perimeter ratio (W/D) of truss elements that can be simultaneously exposed to fire on all sides shall be determined on the same basis as columns, as specified in Section 722.5.1.1. The weight-to-heated-perimeter ratio (W/D) of truss elements that directly support floor or roof assembly shall be determined on the same basis as beams and girders, as specified in Section 722.5.2.1. The *fire resistance* of structural steel trusses protected with intumescent or mastic fire-resistant ~~coatings~~ materials shall be determined on the basis of *fire resistance* tests in accordance with Section 703.2.

Reason: There has been a section in the IBC that refers to Sprayed Fire-Resistant Materials (SFRM) for many years. Currently is no section in the IBC for a different type of material that produces the same result, Intumescent Fire-Resistant Materials (IFRM). The requirements for IFRM are as important as those for SFRM. Therefore, this section should be added to the code. The language is taken from the SFRM section and modified to fit IFRM's.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Adding this section to the code brings another option for fire-resistance in buildings.

FS10-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: While there was support from committee members to change the terminology from 'coatings' to 'materials', the overall proposal was not ready for approval. The definition was found to be confusing. The wording of Section 704.14 implies that the IFRM meets the fire resistance rating where is the IFRM and the base to which it is applied that is meeting the rating. Section 705.15 should also be revised to correlate with the new definition. Committee encouraged the proponent to fix the various issues and bring a public comment to the Richmond hearing. (Vote 8-6)

Assembly Action:

None

FS10-18

Individual Consideration Agenda

Public Comment 1:

Proponent: William McHugh, The McHugh Company, representing National Fireproofing Contractors Association (billmchugh-jr@att.net) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

SECTION 202 DEFINITIONS

INTUMESCENT FIRE-RESISTANT MATERIALS. Thin film liquid mixture applied to substrates, intumescent fire-resistant material expands into a protective layer to provide fire-resistant protection of the substrates when exposed to flame or intense heat.

603.1 Allowable materials. Combustible materials shall be permitted in buildings of Type I or II construction in the following applications and in accordance with Sections 603.1.1 through 603.1.3:

1. *Fire-retardant-treated wood* shall be permitted in:
 - 1.1. Nonbearing partitions where the required *fire-resistance rating* is 2 hours or less.
 - 1.2. Nonbearing *exterior walls* where fire-resistance-rated construction is not required.
 - 1.3. Roof construction, including girders, trusses, framing and decking.

Exception: In buildings of Type IA construction exceeding two *stories above grade plane*, *fire-retardant-treated wood* is not permitted in roof construction where the vertical distance from the upper floor to the roof is less than 20 feet (6096 mm).
 - 1.4. Balconies, porches, decks and exterior stairways not used as required exits on buildings three *stories* or less above grade plane.
2. Thermal and acoustical insulation, other than foam plastics, having a *flame spread index* of not more than 25.

Exceptions:

1. Insulation placed between two layers of noncombustible materials without an intervening airspace shall be allowed to have a *flame spread index* of not more than 100.
2. Insulation installed between a finished floor and solid decking without intervening airspace shall be allowed to have a *flame spread index* of not more than 200.
3. Foam plastics in accordance with Chapter 26.
4. Roof coverings that have an A, B or C classification.
5. *Interior floor finish* and floor covering materials installed in accordance with Section 804.
6. Millwork such as doors, door frames, window sashes and frames.
7. *Interior wall and ceiling finishes* installed in accordance with Section 803.
8. *Trim* installed in accordance with Section 806.
9. Where not installed greater than 15 feet (4572 mm) above grade, show windows, nailing or furring strips and wooden bulkheads below show windows, including their frames, aprons and show cases.
10. Finish flooring installed in accordance with Section 805.
11. Partitions dividing portions of stores, offices or similar places occupied by one tenant only and that do not establish a *corridor* serving an *occupant load* of 30 or more shall be permitted to be constructed of *fire-retardant-treated wood*, 1-hour fire-resistance-rated construction or of wood panels or similar light construction up to 6 feet (1829 mm) in height.
12. Stages and platforms constructed in accordance with Sections 410.2 and 410.3, respectively.
13. Combustible *exterior wall coverings*, balconies and similar projections and bay or oriel windows in accordance with Chapter 14 and Section 705.2.3.1.
14. Blocking such as for handrails, millwork, cabinets and window and door frames.
15. Light-transmitting plastics as permitted by Chapter 26.
16. Mastics and caulking materials applied to provide flexible seals between components of *exterior wall* construction.
17. Exterior plastic veneer installed in accordance with Section 2605.2.
18. Nailing or furring strips as permitted by Section 803.15.
19. Heavy timber as permitted by Note c to Table 601 and Sections 602.4.3 and 705.2.3.1.
20. Aggregates, component materials and admixtures as permitted by Section 703.2.2.
21. Sprayed fire-resistant materials and intumescent ~~and mastic~~ fire-resistant materials, determined on the basis of *fire resistance* tests in accordance with Section 703.2 and installed in accordance with Sections 1705.14 and 1705.15, respectively.
22. Materials used to protect penetrations in fire-resistance-rated assemblies in accordance with Section 714.
23. Materials used to protect joints in fire-resistance-rated assemblies in accordance with Section 715.
24. Materials allowed in the concealed spaces of buildings of Types I and II construction in accordance with Section 718.5.
25. Materials exposed within plenums complying with Section 602 of the International Mechanical Code.
26. Wall construction of freezers and coolers of less than 1,000 square feet (92.9 m²), in size, lined on both sides with noncombustible materials and the building is protected throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

704.14 Intumescent fire-resistant materials (IFRM). Intumescent fire-resistant materials (IFRM) shall be consistent with the fire-resistance rating, the listing and manufacturers installation instructions. The instructions shall include, but are not limited to, substrate condition, application temperatures, surface conditions and IFRM handling, storage, mixing, conveyance, method of application, curing and ventilation. The finished condition of IFRM applied to structural members or horizontal assemblies shall not, upon complete drying or curing, exhibit delamination. comply with Section 704.14.1

704.14.1 Intumescent fire-resistant materials (IFRM). Intumescent fire-resistant materials (IFRM) shall be installed in accordance with the listing and the manufacturers installation instructions.

722.5.1.3 Sprayed fire-resistant materials. The *fire resistance* of wide-flange structural steel columns protected with sprayed fire-resistant materials, as illustrated in Figure 722.5.1(5), shall be permitted to be determined from the following expression:

$$R = [C_1(W/D) + C_2]h$$

where:

(Equation 7-13)

R = Fire resistance (minutes).

h = Thickness of sprayed fire-resistant material (inches).

D = Heated perimeter of the structural steel column (inches).

C_1 and C_2 = Material-dependent constants.

W = Weight of structural steel columns (pounds per linear foot).

The *fire resistance* of structural steel columns protected with ~~intumescent or mastic fire-resistant coatings materials~~ shall be determined on the basis of *fire-resistance* tests in accordance with Section 703.2.

722.5.2.2 Sprayed fire-resistant materials. The provisions in this section apply to structural steel beams and girders protected with sprayed fire-resistant materials. Larger or smaller beam and girder shapes shall be permitted to be substituted for beams specified in *approved* unrestrained or restrained fire-resistance-rated assemblies, provided that the thickness of the fire-resistant material is adjusted in accordance with the following expression:

$$h_2 = h_1 [(W_1 / D_1) + 0.60] / [(W_2 / D_2) + 0.60]$$

where:

(Equation 7-17)

h = Thickness of sprayed fire-resistant material in inches.

W = Weight of the structural steel beam or girder in pounds per linear foot.

D = Heated perimeter of the structural steel beam in inches.

Subscript 1 refers to the beam and fire-resistant material thickness in the *approved* assembly.

Subscript 2 refers to the substitute beam or girder and the required thickness of fire-resistant material.

The *fire resistance* of structural steel beams and girders protected with ~~intumescent or mastic fire-resistant coatings materials~~ shall be determined on the basis of fire-resistance tests in accordance with Section 703.2.

722.5.2.3 Structural steel trusses. The *fire resistance* of structural steel trusses protected with fire-resistant materials sprayed to each of the individual truss elements shall be permitted to be determined in accordance with this section. The thickness of the fire-resistant material shall be determined in accordance with Section 722.5.1.3. The weight-to-heated-perimeter ratio (W/D) of truss elements that can be simultaneously exposed to fire on all sides shall be determined on the same basis as columns, as specified in Section 722.5.1.1. The weight-to-heated-perimeter ratio (W/D) of truss elements that directly support floor or roof assembly shall be determined on the same basis as beams and girders, as specified in Section 722.5.2.1. The *fire resistance* of structural steel trusses protected with ~~intumescent or mastic fire-resistant materials~~ shall be determined on the basis of *fire resistance* tests in accordance with Section 703.2.

[BF] 1705.15 ~~Mastic and intumescent~~ Intumescent fire-resistant coatings materials. *Special inspections* and tests for ~~mastic and intumescent fire-resistant coatings materials~~ applied to structural elements and decks shall be performed in accordance with AWCI 12-B. *Special inspections* and tests shall be based on the fire-resistance design as designated in the *approved construction documents*.

Commenter's Reason: The concept of defining Intumescent fire-resistant Materials (IFRM) in the context of fireproofing had very positive comments from the Fire-Safety Committee. This public comment is submitted to address the objections of the opponents and suggestions from the committee to modify the sections 714, 722.5.1.3, 722.5.2.2, 722.5.2.3 and 1705.15, to make the definition clearer, and coordinate the new definition in other areas of the code that were not in the original proposal. Additionally, for additional clarity, section 714 was broken into two sections, with an installation section added for consistency among the material categories.

The key change was moving the term from Mastic and intumescent fire-resistant coatings to to the term Intumescent fire-resistant materials (IFRM). These IFRM s are defined and scoped for use as materials used with structural building elements and or assemblies. The IFRM s are not meant to be used to fill gaps at doors, windows, or used as firestopping.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This is a terminology change and not a technical change and does not increase costs.

FS10-18

FS15-18

IBC: 202, 202, 705.2, Table TABLE 705.2, 705.2.1, 705.2.2, 705.2.3, 705.2.3.1, 705.3

Proposed Change as Submitted

Proponent: Stephen Thomas, Colorado Code Consulting, LLC, representing Himself (sthomas@coloradocode.net)

2018 International Building Code

SECTION 202 DEFINITIONS

Add new definition as follows

BUILDING PROJECTION. An unenclosed floor, roof or appendage extending beyond the exterior wall of a building such as, but not limited to cornices, eave overhangs, exterior decks or balconies, porte cocheres and similar protrusions.

Revise as follows

705.2 ~~Projections.~~ Building projections. ~~Cornices, eave overhangs, exterior balconies and similar projections extending beyond the exterior wall.~~ Building projections shall conform to the requirements of this section and Section 1405. Exterior egress balconies and exterior exit stairways and ramps shall comply with Sections 1021 and 1027, respectively. ~~Projections.~~ Building projections shall not extend any closer to the line used to determine the *fire separation distance* than shown in Table 705.2.

Exception: Buildings on the same lot and considered as portions of one building in accordance with Section 705.3 are not required to comply with this section for projections between the buildings.

**TABLE 705.2
MINIMUM DISTANCE OF BUILDING PROJECTION**

FIRE SEPARATION DISTANCE-FSD (feet)	MINIMUM DISTANCE FROM LINE USED TO DETERMINE FSD
0 to less than 2	Projections not permitted
2 to less than 3	24 inches
3 to less than 5	24 inches plus 8 inches for every foot of FSD beyond 3 feet or fraction thereof
5 or greater	40 inches

For SI: 1 foot = 304.8 mm; 1 inch = 25.4 mm.

705.2.1 Types I and II construction. ~~Projections.~~ Building projections from walls of Type I or II construction shall be of noncombustible materials or combustible materials as allowed by Sections 705.2.3.1 and 705.2.4.

705.2.2 Type III, IV or V construction. ~~Projections.~~ Building projections from walls of Type III, IV or V construction shall be of any *approved* material.

705.2.3 Combustible building projections. Combustible building projections extending to within 5 feet (1524 mm) of the line used to determine the *fire separation distance* shall be of not less than 1-hour *fire-resistance-rated* construction, heavy timber construction, complying with Section 2304.11, *fire-retardant-treated wood* or as permitted by Section 705.2.3.1.

Exception: Type VB construction shall be allowed for combustible projections in Group R-3 and U occupancies with a *fire separation distance* greater than or equal to 5 feet (1524 mm).

705.2.3.1 Balconies and similar projections. Balconies, decks and similar building projections of combustible construction other than fire-retardant-treated wood shall be fire-resistance rated where required by Table 601 for floor construction or shall be of heavy timber construction in accordance with Section 2304.11. The aggregate length of the projections shall not exceed 50 percent of the building's perimeter on each floor.

Exceptions:

1. On buildings of Types I and II construction, three stories or less above grade plane, fire-retardant-treated wood shall be permitted for balconies, porches, decks and exterior stairways not used as required exits.
2. Untreated wood and plastic composites that comply with ASTM D7032 and Section 2612 are permitted for pickets, rails and similar guard components that are limited to 42 inches (1067 mm) in height.
3. Balconies, decks and similar projections on buildings of Types III, IV and V construction shall be permitted to be of Type V construction and shall not be required to have a *fire-resistance rating* where sprinkler protection is extended to these areas.
4. Where sprinkler protection is extended to the balcony or deck areas, the aggregate length of the balcony on each floor shall not be limited.

705.3 Buildings on the same lot. For the purposes of determining the required wall and opening protection, building projections and roof-covering requirements, buildings on the same lot shall be assumed to have an imaginary line between them.

Where a new building is to be erected on the same lot as an existing building, the location of the assumed imaginary line with relation to the existing building shall be such that the *exterior wall* and opening protection of the existing building meet the criteria as set forth in Sections 705.5 and 705.8.

Exceptions:

1. Two or more buildings on the same lot shall be either regulated as separate buildings or shall be considered as portions of one building if the aggregate area of such buildings is within the limits specified in Chapter 5 for a single building. Where the buildings contain different occupancy groups or are of different types of construction, the area shall be that allowed for the most restrictive occupancy or construction.
2. Where an S-2 parking garage of Construction Type I or IIA is erected on the same lot as a Group R-2 building, and there is no *fire separation distance* between these buildings, then the adjoining *exterior walls* between the buildings are permitted to have occupant use openings in accordance with Section 706.8. However, opening protectives in such openings shall only be required in the exterior wall of the S-2 parking garage, not in the exterior wall openings in the R-2 building, and these opening protectives in the exterior wall of the S-2 parking garage shall be not less than 1¹/₂-hour *fire protection rating*.

Reason: The committee felt that a definition for building projections would be helpful in the administering of the code. We submitted a public comment and received opposition to the revised language. We have taken the comments from the committee hearing and the public comment hearing and created this proposal. There is quite a bit of confusion as to what a projection is. We have provided guidance and examples of what we feel are projections. The term unenclosed floors is intended to keep from having a upper story that is enclosed from being called a projection. Decks and balconies would be examples of unenclosed floors.

We have also changed the term 'Projection' to 'Building Projection' to differentiate this definition from other sections of the code that uses similar language. For example projection rooms and projections into ramps. It is not our intent to apply this definition to those sections of the code. The rest of the change involves coordinating the existing language with the new definition.

The fire characteristics are different for projections than they are for horizontal assemblies within a building. First there is no enclosed space above the projection. The second is that the heat and smoke from a fire under a projection will go up and then out to the atmosphere. The heat and smoke is not trapped within a room like it is within a building. That is why I believe projections are handled differently in the code.

The photo below is the porte cochere entry at the City Center project in Clark County, Nevada. The question is what is this structure. Is it a projection that is regulated by Section 705.2 or is a building element regulated by Table 601. That is the question I am trying to clarify in the code. This change would clarify that this structure would be a projection and would need to comply with Section 705.2



Cost Impact: The code change proposal will not increase or decrease the cost of construction. This is a clarification of the current code.

FS15-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposal had merit but still had issues that need resolution. The definition should be refined. There needs to be a selection of term - architectural vs building. The issue of unenclosed elements needs to be better addressed. (Vote 9-5)

Assembly Action:

None

FS15-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Stephen Thomas, Colorado Code Consulting, LLC, representing Colorado Chapter ICC (stthomas@coloradocode.net) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

~~BUILDING-ARCHITECTURAL PROJECTION.~~ ~~An unenclosed~~ A floor, roof or other appendage extending outward from and beyond the exterior wall of a building such as, but not limited to cornices, eave overhangs, exterior decks or balconies, porte cocheres and similar protrusions.

705.2 ~~Building Architectural projections.~~ ~~Building Architectural~~ projections shall conform to the requirements of this section and Section 1405. Exterior egress balconies and exterior exit stairways and ramps shall comply with Sections 1021 and 1027, respectively. ~~Building Architectural~~ projections shall not extend any closer to the line used to determine the *fire separation distance* than shown in Table 705.2.

Exception: Buildings on the same lot and considered as portions of one building in accordance with Section 705.3 are not required to comply with this section for projections between the buildings.

705.2.1 Types I and II construction. ~~Building Architectural~~ projections from walls of Type I or II construction shall be of noncombustible materials or combustible materials as allowed by Sections 705.2.3.1 and 705.2.4.

705.2.2 Type III, IV or V construction. ~~Building Architectural~~ projections from walls of Type III, IV or V construction shall be of any *approved* material.

705.2.3 Combustible ~~building architectural~~ projections. Combustible ~~building architectural~~ projections extending to within 5 feet (1524 mm) of the line used to determine the *fire separation distance* shall be of not less than 1-hour *fire-resistance-rated* construction, heavy timber construction, complying with Section 2304.11, *fire-retardant-treated wood* or as permitted by Section 705.2.3.1.

Exception: Type VB construction shall be allowed for combustible architectural projections in Group R-3 and U occupancies with a *fire separation distance* greater than or equal to 5 feet (1524 mm).

705.2.3.1 Balconies and similar architectural projections. Balconies, decks and similar ~~building architectural~~ projections of combustible construction other than fire-retardant-treated wood shall be fire-resistance rated where required by Table 601 for floor construction or shall be of heavy timber construction in accordance with Section 2304.11. The aggregate length of the architectural projections shall not exceed 50 percent of the building's perimeter on each floor.

Exceptions:

1. On buildings of Types I and II construction, three stories or less above grade plane, fire-retardant-treated wood shall be permitted for balconies, porches, decks and exterior stairways not used as required exits.
2. Untreated wood and plastic composites that comply with ASTM D7032 and Section 2612 are permitted for pickets, rails and similar guard components that are limited to 42 inches (1067 mm) in height.
3. Balconies, decks and similar projections on buildings of Types III, IV and V construction shall be permitted to be of Type V construction and shall not be required to have a *fire-resistance rating* where sprinkler protection is extended to these areas.
4. Where sprinkler protection is extended to the balcony or deck areas, the aggregate length of the balcony on each floor shall not be limited.

705.3 Buildings on the same lot. For the purposes of determining the required wall and opening protection, ~~building architectural~~ projections and roof-covering requirements, buildings on the same lot shall be assumed to have an imaginary line between them.

Where a new building is to be erected on the same lot as an existing building, the location of the assumed imaginary line with relation to the existing building shall be such that the *exterior wall* and opening protection of the existing building meet the criteria as set forth in Sections 705.5 and 705.8.

Exceptions:

1. Two or more buildings on the same lot shall be either regulated as separate buildings or shall be considered as portions of one building if the aggregate area of such buildings is within the limits specified in Chapter 5 for a single building. Where the buildings contain different occupancy groups or are of different types of construction, the area shall be that allowed for the most restrictive occupancy or construction.
2. Where an S-2 parking garage of Construction Type I or IIA is erected on the same lot as a Group R-2 building, and there is no *fire separation distance* between these buildings, then the adjoining *exterior walls* between the buildings are permitted to have occupant use openings in accordance with Section 706.8. However, opening protectives in such openings shall only be required in the exterior wall of the S-2 parking garage, not in the exterior wall openings in the R-2 building, and these opening protectives in the exterior wall of the S-2 parking garage shall be not less than 1¹/₂-hour *fire protection rating*.

**TABLE 705.2
MINIMUM DISTANCE OF ~~BUILDING~~ ARCHITECTURAL PROJECTION**

FIRE SEPARATION DISTANCE-FSD (feet)	MINIMUM DISTANCE FROM LINE USED TO DETERMINE FSD
0 to less than 2	Projections not permitted
2 to less than 3	24 inches
3 to less than 5	24 inches plus 8 inches for every foot of FSD beyond 3 feet or fraction thereof
5 or greater	40 inches

For SI: 1 foot = 304.8 mm; 1 inch = 25.4 mm.

Commenter's Reason: The code needs to have a definition of a projection. There is too much confusion on what a projection is or is not. This proposal attempts to define what a projection is to make it easier for the user of the code. This public comment addresses the committee's comments during the Columbus hearings. We have changed the term Building Projection to Architectural Projection as requested throughout the code. There was also confusion on what we meant by unenclosed. So we have removed that term from the definition as well. The intent of the public comment is to just change the definition and no other technical requirements in the code. We believe the public comment addresses the Committee's concerns and reason for disapproval.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction. This is just a definition to clarify the code.

FS19-18

IBC: 705.6, 705.7

Proposed Change as Submitted

Proponent: Stephen Thomas, Colorado Code Consulting, LLC, representing Colorado Chapter ICC (stthomas@coloradocode.net)

2018 International Building Code

Add new text as follows

705.6 Continuity. The fire-resistance rating of exterior walls shall extend from the top of the foundation or floor/ceiling assembly below to one of the following:

1. The underside of the floor or roof sheathing, deck or slab above.
2. The underside of a floor/ceiling or roof/ceiling assembly having a fire-resistance rating that is not less than the fire-resistance rating of the exterior wall.

Parapets shall be provided as required by Section 705.11.

Revise as follows

~~**705.6**~~**705.7 Structural stability.** ~~Exterior walls shall extend to the height required by Section 705.11.~~ Interior structural elements that brace the exterior wall but that are not located within the plane of the exterior wall shall have the minimum *fire-resistance rating* required in Table 601 for that structural element. Structural elements that brace the exterior wall but are located outside of the exterior wall or within the plane of the exterior wall shall have the minimum *fire-resistance rating* required in Tables 601 and 602 for the exterior wall.

Reason: The current code language provides continuity language for other fire-resistant rated wall assemblies, but not exterior walls. Therefore, there is confusion in the design and construction community on how to build the exterior walls. The proposal provides such language and clarifies the intent of the code for exterior walls. The language is similar to that of a fire partition.

Current Section 705.6 includes language regarding parapets that really doesn't belong in a structural requirement. Therefore, we have relocated language regarding parapets to the new Section for Continuity. It is better located there.

Cost Impact: The code change proposal will decrease the cost of construction

The proposal will reduce the cost because the confusion will be eliminated and people will not be making things up.

FS19-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposal raised as many issues as it was solving on the topic of wall continuity. Is the continuity just for the wall, or does it include the foundation that might be exposed above grade? What is impact on floors which support the walls, do they need the same rating? (Vote 14-0)

Assembly Action:

None

FS19-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Stephen Thomas, Colorado Code Consulting, LLC, representing Colorado Chapter ICC (stthomas@coloradocode.net) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

705.6 Continuity. The fire-resistance rating of exterior walls shall extend from the top of the foundation or floor/ceiling assembly below to one of the following:

1. The underside of the floor or roof sheathing, deck or slab above.
2. ~~The underside of a one-hour fire-resistant rated floor/ceiling or roof/ceiling assembly having a fire-resistance rating that is not less than the fire-resistance rating of the exterior wall.~~

Parapets shall be provided as required by Section 705.11.

705.7 Structural stability. Interior structural elements that brace the exterior wall but that are not located within the plane of the exterior wall shall have the minimum *fire-resistance rating* required in Table 601 for that structural element. Structural elements that brace the exterior wall but are located outside of the exterior wall or within the plane of the exterior wall shall have the minimum *fire-resistance rating* required in Tables 601 and 602 for the exterior wall.

Commenter's Reason: The IBC has continuity requirements for many different types of wall assemblies including fire walls, fire barriers, etc. However, there is no language for the continuity of exterior walls. This has created issues over the past few years as Type III Construction has become so popular. We had the same language issue with Type VA construction in the past, but it didn't seem to be a problem for many people. The original intent of our proposal was to clarify the continuity requirements for exterior walls. This public comment is intended to provide a more reasonable requirement than the original proposal. It requires fire-resistant rated exterior walls to either continue to the underside of the floor sheathing or to the bottom of a one-hour fire-resistant rated floor/ceiling or roof/ceiling assembly. The extension to the fire-resistant rated horizontal assembly is consistent with the AWC Pamphlet DCA-3 on Fire-Resistance-Rated Wood-Frame Wall and Floor/Ceiling Assemblies. The document provides several tested assemblies where the floor systems are one-hour fire-resistant rated. We believe this is sufficient protection of the floor framing located at the exterior wall plane.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This is intended to be a clarification of the code requirements.

FS19-18

FS20-18

IBC: 202 (New), 705.6.1 (New), 707.5.2 (New)

Proposed Change as Submitted

Proponent: Paul Coats, American Wood Council, representing American Wood Council (pcoats@awc.org)

2018 International Building Code

SECTION 202 DEFINITIONS

Add new definition as follows

PLATFORM CONSTRUCTION. A system of construction where the floor structure is supported by the bearing exterior and interior walls below, and supports the exterior walls and interior partitions above it.

SECTION 705 EXTERIOR WALLS

Add new text as follows

705.6.1 Platform framing. Where floors connect to exterior walls in platform construction, the structural framing shall be protected at the intersection to maintain the continuity of the fire-resistance rating required of the wall, as required by Section 704.1. The fire-resistance rating shall be maintained through the use of materials permitted by the type of construction, but not limited to, one or more of the following: the ceiling membrane, solid blocking, solid wood elements, the rim board, protection by noncombustible materials, or other features or protection deemed to achieve the required fire-resistance rating. The requirements of Section 703.2.5 and 705.7 shall apply. The material requirements for the portion of the floor in the plane of the exterior wall shall be as for floor construction in accordance with the type of construction.

SECTION 707 FIRE BARRIERS

707.5.2 Platform framing. Where floors or roofs connect to fire barriers in platform construction, the structural framing shall be protected at the intersection to maintain the continuity of the required fire resistance rating for the fire barrier, and the support of the fire barrier in accordance with Section 704.1. The fire-resistance rating shall be maintained through the use of materials permitted by the type of construction, including but not limited to, one or more of the following: solid blocking, solid wood elements, the rim board, protection by noncombustible materials, or other features or protection deemed to achieve the required fire-resistance rating.

Reason: This code change provides improved continuity of protection when exterior walls and fire barriers intersect with floors in buildings using platform construction.

Ratings required for exterior walls by either Table 602 or Table 601 may be greater than the rating required for the floors. As a result, questions arise about the protection of the wall/floor intersection in platform construction where differently rated elements come together. The protection of the intersection should be in accordance with the underlying principles of continuity and support for the rated wall construction. There are many practical solutions being used currently that would comply with this proposed code change. They involve the use of solid wood blocking or other protection to provide the continuity in fire resistance rating for the construction supporting the wall. AWC has developed details that may be approved by the code official for the exterior wall/floor intersection which can be found in the AWC Design for Code Acceptance (DCA) No. 3, Fire Rated Wood Wall and Floor Assemblies. They can be viewed and downloaded here: <http://awc.org/codes-standards/publications/dca3>. Link established 2.21.18.

The same questions arise for platform-framed fire barriers protecting shafts and interior stair enclosures, which often are required to be two-hour rated while the supporting floor construction is one-hour, therefore similar provisions were added to 707.5 for fire barriers.

Fire retardant treated wood (FRTW) is permitted for exterior walls of Type III and IV construction. Some code officials have required the floor construction in the plane of the exterior wall (the end of the floor in platform construction) to be FRTW, which is costly and burdensome and provides very little safety advantage since the intersection is already protected by FRTW or noncombustible cladding on the exterior. The proposal clarifies that for exterior wall intersections, the elements of the floor construction (joists, rim board, floor sheathing, and blocking if used) can be in accordance with the materials requirements for floors. The cladding component of the wall would need to be fire retardant treated or noncombustible as for the exterior wall framing itself.

Cost Impact: The code change proposal will not increase or decrease the cost of construction

There are a variety of current interpretations and applications for fire resistance in platform construction involving exterior walls and fire barriers. This proposed change may slightly reduce or slightly increase construction costs, depending on the current approach of individual jurisdictions.

FS20-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This is so specific to wood construction that there will be unintended consequences for other materials. Language is confusing and would be difficult to enforce. Introducing wood into a non-combustible wood changes the nature of that wall. This needs refinement before it clearly address the issues raised by the opponents. (Vote 13-1)

Assembly Action:

None

FS20-18

Individual Consideration Agenda

Public Comment 1:

Proponent: James Smith, American Wood Council, representing American Wood Council (jsmith@awc.org); Paul Coats, American Wood Council, representing American Wood Council (pcoats@awc.org); SAM W FRANCIS, AWC, representing AWC (sfrancis@awc.org) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

705.6 Structural stability. *Exterior walls* shall extend to the height required by Section 705.11. Interior structural elements that brace the exterior wall but that are not located within the plane of the exterior wall shall have the minimum *fire-resistance rating* required in Table 601 for that structural element. Structural elements that brace the exterior wall but are located outside of the exterior wall or within the plane of the exterior wall shall have the minimum *fire-resistance rating* required in Tables 601 and 602 for the exterior wall. The supporting construction needed to provide vertical support of the exterior wall shall be protected to afford the required fire resistance of the wall being supported.

Commenter's Reason: Our original proposal included modifications dealing with both the materials used in the exterior walls (the FRT wood exception) and the fire resistive integrity (the 2-hour rating) of horizontal building elements (floors) that support the walls. The committee disapproved the proposal because, among other things, they felt the language was confusing and, for that reason, difficult to enforce. They indicated the proposal needed refinement to more clearly address the issues raised by the opponents. In an effort to provide that clarity, we have chosen to submit two separate PC s: one comment on the materials and this comment dealing with only the fire resistive integrity. Some jurisdictions have prohibited traditional platform construction details in attempts to enhance the fire resistance continuity of exterior walls, requiring alternative connections that may actually decrease fire safety for building occupants. Though well intentioned, alternative connections that protect the exterior wall end up sacrificing the inherent strength of the platform intersection for both structural and fire performance. We believe this pared-back public comment still makes it clear that floors can support exterior walls per traditional platform design without jeopardizing the fire performance of the building, and that the fire resistance of the intersection will be maintained.

In our effort to maintain clarity while also keeping it simple we chose language that is already in use and familiar to code officials. That similar language can be found in sections 707.5.1, 709.4, 711.2, 712.1.15 & 716.3.3.1 of the IBC.

The American Wood Council has published fire resistance guidelines for the materials used for the fire resistance of traditional platform construction in Design for Code Acceptance No. 3, Fire-Resistance-Rated Wood-Frame Wall and Floor/Ceiling Assemblies, which can be downloaded here: <http://www.awc.org/codes-standards/publications/dca3>. Although not referenced standards, the Design for Code Acceptance (DCA) series of AWC documents are intended to assist users of the codes and our standards in understanding how the codes and standards can be used together to meet the intent of the code. We included the link to DCA 3 within this reason statement for use as a tool that we feel will help those considering this public comment understand how this complicated issue can be satisfied with our proposed simplified language.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction. The public comment clarifies what the code already requires, and therefore there is no increase or decrease of construction costs.

Public Comment 2:

Proponent: Paul Coats, PE, CBO, American Wood Council, representing American Wood Council (pcoats@awc.org) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

705.4 Materials. *Exterior walls* shall be of materials permitted by the building type of construction. The material requirements for portions of floor or roof assemblies in the plane of the exterior wall shall be as required for interior building elements according to the building type of construction.

Commenter's Reason: The original proposal included modifications dealing with both the materials issues and the continuity of the fire resistance of the floor/wall intersection in platform construction. In response to committee concerns, we have submitted two simplified public comments: one public comment on the fire resistance issue and this one dealing with only the materials question.

Some jurisdictions have required floor or roof elements that intersect with the exterior wall to comply with the materials requirements for the wall. For instance, in Type III platform construction where the exterior walls are fire retardant treated wood (FRTW), some jurisdictions have required the floor sheathing, floor joists, or rim board to be fire retardant treated wood where they extend into the plane of the exterior wall. This is impractical and costly in relation to any real safety benefit.

The requirement for FRTW addresses ignition resistance and flame spread in the exterior wall, and FRTW in the floor adds nothing to the fire resistance of the intersection, which can be provided by any number of means. It seems practical that as long as the wood elements germane to the wall are FRTW (such as studs, sills, plates, exterior wall sheathing, etc.), and the ends of floors or roofs are protected for the required fire resistance when supporting the exterior wall (rim boards, floor or roof sheathing, joists and rafters, etc.), the intent of the code is met. The use of the words "interior building elements" in this public comment means floor or roof assemblies in the same way that Section 602.3 refers to "interior building elements" as being interior to the exterior walls. This public comment is consistent with common interpretations regarding materials requirements for floors and roofs in Type III construction.

The American Wood Council has published fire resistance guidelines for the materials and fire resistance of traditional platform construction in Design for Code Acceptance No. 3, Fire-Resistance-Rated Wood-Frame Wall and Floor/Ceiling Assemblies, which can be downloaded here: <http://www.awc.org/codes-standards/publications/dca3>.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Because floor and roof structures are not currently required to comply with materials requirements for walls, this is a clarification of current requirements and will not increase or decrease the cost of construction.

FS20-18

FS21-18

IBC: 705.10

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Building Code

Add new text as follows

705.10 Penetrations. Penetrations of exterior walls required by this section to have a fire-resistance rating shall comply with Section 714.

Exception: Penetrations in exterior walls that are permitted to have unprotected openings.

Reason: Protection of penetrations through fire-resistance-rated assemblies is a fundamental feature of compartmentation and the need to prevent fire and smoke spread. The IBC requires penetrations to be protected in fire walls (706.9), fire barriers (707.7), fire partitions (708.7), smoke barriers (709.6), smoke partitions (710.6), and vertical openings (712.1.4). The IBC distinguishes between openings and penetrations. In the context of IBC section 705.8, openings are not penetrations. So in the IBC, exterior wall penetrations (e.g. for pipes, ducts, and other services) do not require opening protectives. They are separate and distinct. Consequently, the IBC does not require protection of through-penetrations through exterior walls, even when they are fire-resistance-rated, and regardless of the limiting distance. Conversely, joints in exterior walls are already required to be protected in Section 705.9, and ducts & air transfer openings are required to be protected in Section 705.10.

The IBC does not currently limit the size, type, or number of unprotected penetrations in exterior walls. Tables 601 and 602 require exterior walls to have a fire-resistance rating under some circumstances. Further, Chapter 7 also requires fire rated opening protectives, rated joints, and ducts and transfer openings to be protected depending upon the limiting distance. This proposal would treat penetrations through rated exterior walls in the same manner as fire-resistant joints in exterior walls. It would require penetrations in exterior walls to be firestopped only when protected openings are required based on Chapter 6 and Chapter 7 limiting distance requirements.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will increase the cost of construction. Where unprotected openings are not permitted, penetrations which could previously be left unprotected will now require protection in accordance with Section 714.

FS21-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: No history of building to building fires resulting from small 'penetrations'. Creates a lot of design problems without providing clear solutions. Section 714 is clear, the solutions should be there. There is support for regulating penetrations. After a certain distance there can be unrated openings. The proposal was unclear how this threshold of allowing unrated openings works with this proposal. (Vote 9-4)

Assembly Action:

None

FS21-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

714.4 Fire-resistance-rated walls. Penetrations into or through exterior walls, fire walls, fire barriers, smoke barrier walls and fire partitions shall comply with Sections 714.4.1 through 714.4.3. Penetrations in *smoke barrier walls* shall also comply with Section 714.5.4.

Commenter's Reason: The intent of this proposal is to add a new requirement to protect penetrations in exterior wall in the same manner as the existing requirements to protect joints, openings, and duct and air transfer openings in exterior walls. New Section 705.10 was developed to accomplish that goal. The intent was subsequent sections would be renumbered.

During the Committee Action Hearings, the Fire Safety Committee rightfully pointed out that FS21-18 failed to update Section 714.4 to add exterior walls to the list of wall types where the protection of penetrations is required. This Public Comment corrects that oversight.

The Fire Safety Committee also questioned the threshold at which penetrations need to be protected. The threshold is stated in the Exception in exactly the same manner as currently specified for Joints in Section 707.9. If unprotected openings are permitted by Table 705.8, then penetrations do not require protection.

During testimony on FS21-18, confusion arose between the new proposed requirement for penetrations and existing Section 705.10 covering the protection of ducts and air transfer opening. That confusion resulted from 1) the new provision covering penetrations was identified as Section 705.10 as was the existing provision for ducts and air transfer openings, and 2) both provisions used the word penetrations. Just to be clear, the new requirement for penetrations relates to Section 714 whereas the existing requirement for ducts and air transfer openings relates to Section 717.

In an effort to respond to the Committee's comments, we are offering two Public Comments. Public Comment 1 accomplishes the following:

- Updates Section 714.4 to include exterior walls as requested by the Committee.
- Changes the Section Number of the new requirement covering penetrations so as to avoid confusion with the existing section covering ducts and air transfer openings.

Public Comment 2 accomplishes the following:

- Eliminates the words Penetrations by from the existing Section 705.10 covering ducts and air transfer openings.
- Changes the Section Number of the new requirements covering penetrations so as to avoid confusion with the existing section covering ducts and air transfer openings.
- Renumbers the existing Section 705.10 in recognition of the addition of the new provision relating to penetrations.

Public Comment 1 is essential to provide a technically viable code change. Public Comment 2 provides additional clarity to differentiate a penetration from a duct and air transfer opening, but is not essential to the proposal. Through the voting process the membership can decide whether only Public Comment 1 is needed or whether the additional clarity provided by Public Comment 2 is desirable.

This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction Where unprotected openings are not permitted, penetrations which could previously be left unprotected will now require protection in accordance with Section 714.

Public Comment 2:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

705.109 Penetrations. Penetrations of exterior walls required by this section to have a fire-resistance rating shall comply with Section 714.

Exception: Penetrations in exterior walls that are permitted to have unprotected openings.

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705.910 Joints. Joints made in or between *exterior walls* required by this section to have a *fire-resistance rating* shall comply with Section 715.

Exception: Joints in *exterior walls* that are permitted to have unprotected openings.

705.910.1 Voids. The void created at the intersection of a floor/ceiling assembly and an exterior curtain wall assembly shall be protected in accordance with Section 715.4.

705.1011 Ducts and air transfer openings. ~~Penetrations by air~~ Air ducts and air transfer openings in fire-resistance-rated *exterior walls* required to have protected openings shall comply with Section 717.

Exception: Foundation vents installed in accordance with this code are permitted.

Commenter's Reason: The reason statement for Public Comment 1 recaps the intent of this proposal, the Fire Safety Committee's comments during the Committee Action Hearing and intent of the two Public Comments being proposed. Public Comment 1 is essential to provide a technically viable code change. Public Comment 2 provides additional clarity to differentiate a penetration from a duct and air transfer opening, but is not essential to the proposal. Through the voting process the membership can decide whether only Public Comment 1 is needed or whether the additional clarity provided by Public Comment 2 is desirable.

This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction Where unprotected openings are not permitted, penetrations which could previously be left unprotected will now require protection in accordance with Section 714.

FS22-18

IBC: 706.1.1

Proposed Change as Submitted

Proponent: Jeffrey Shapiro, representing Self (jeff.shapiro@intlcodeconsultants.com)

2018 International Building Code

Revise as follows

706.1.1 Party walls. Any wall located on a *lot line* between adjacent buildings, which is used or adapted for joint service between the two buildings, shall be constructed as a *fire wall* in accordance with Section 706. Party walls shall be constructed without openings and shall create separate buildings.

Exceptions:

1. Openings in a party wall separating an *anchor building* and a mall shall be in accordance with Section 402.4.2.2.1.
2. ~~Fire-Party walls~~ and fire walls are not required on lot lines dividing a building for ownership purposes where the aggregate height and area of the portions of the building located on both sides of the lot line do not exceed the maximum height and area requirements of this code. For the code official's review and approval, he or she shall be provided with copies of dedicated access easements and contractual agreements that permit the owners of portions of the building located on either side of the lot line access to the other side for purposes of maintaining fire and life safety systems necessary for the operation of the building.

Reason: This section mixes use of the terms fire wall and party wall, and both should be mentioned in Exception 2 to make it clear that walls constructed in accordance with Exception 2 are allowed to have penetrations in accordance with the restrictions stated in the exception.

Cost Impact: The code change proposal will not increase or decrease the cost of construction Intended as a clarification of existing provisions.

FS22-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The intent of the section is clearer with the added text. (Vote 9-5.)

Assembly Action:

None

FS22-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Gregory Keith, representing The Boeing Company (grkeith@mac.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

706.1.1 Party walls. ~~Any~~ A party wall is any wall located on a *lot line* between adjacent buildings, which is used or adapted for joint service between the two buildings ~~and shall be constructed as a fire wall~~ in accordance with Section 706. Party walls shall be constructed without openings and shall create separate buildings.

Exceptions:

1. Openings in a party wall separating an *anchor building* and a mall shall be in accordance with Section 402.4.2.2.1.
2. ~~Party walls and fire walls~~ are not required on lot lines dividing a building for ownership purposes where the aggregate height and area of the portions of the building located on both sides of the lot line do not exceed the maximum height and area requirements of this code. For the code official's review and approval, he or she shall be provided with copies of dedicated access easements and contractual agreements that permit the owners of portions of the building located on either side of the lot line access to the other side for purposes of maintaining fire and life safety systems necessary for the operation of the building.

Commenter's Reason: In the proponent's reason statement he notes, This section mixes use of the terms fire wall and party wall... He goes on to say that, ...walls constructed in accordance with Exception 2 are allowed to have penetrations... He is correct that the terms "party wall" and "fire wall" are mixed in Section 706.1.1. Since Section 706.1.1 is titled Party walls, the fix is to delete the term fire wall in Exception 2. His concern about allowance for penetrations (and openings) is not necessary. Exception 2 states that party walls are not required under prescribed ownership conditions. Accordingly, if there is no party wall, there are no openings or penetrations to protect. In addition to deleting the term fire wall from Exception 2, Section 706.1.1 has been clarified to provide for an implied definition of party wall.

The original proposal confused the construction requirements for party walls and further confusion could result if a code practitioner was looking to the published reason statement to provide logic for the code change. This public comment clarifies the provision while addressing the proponent's original concern.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment is essentially editorial in nature.

FS22-18

FS23-18

IBC: 706.5, 706.5.1, 706.5.2

Proposed Change as Submitted

Proponent: Ronald Clements Jr, representing Chesterfield County Building Inspection Department
(clementsro@chesterfield.gov)

2018 International Building Code

Revise as follows

706.5 Horizontal continuity. *Fire walls shall be continuous from exterior wall to exterior wall and shall terminate in accordance with this section extend not less than 18 inches (457 mm) beyond the exterior surface of exterior walls.*

Exceptions:

- ~~1. Fire walls shall be permitted to terminate at the interior surface of combustible exterior sheathing or siding provided that the exterior wall has a fire-resistance rating of not less than 1 hour for a horizontal distance of not less than 4 feet (1220 mm) on both sides of the fire wall. Openings within such exterior walls shall be protected by opening protectives having a fire protection rating of not less than $\frac{3}{4}$ hour.~~
- ~~2. Fire walls shall be permitted to terminate at the interior surface of noncombustible exterior sheathing, exterior siding or other noncombustible exterior finishes provided that the sheathing, siding or other exterior noncombustible finish extends a horizontal distance of not less than 4 feet (1220 mm) on both sides of the fire wall.~~
- ~~3. Fire walls shall be permitted to terminate at the interior surface of noncombustible exterior sheathing where the building on each side of the fire wall is protected by an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.~~

Add new text as follows

706.5.1 Termination at 180 degree or greater exterior wall angle. Where the angle between the exterior walls on either side of the fire wall is equal to or greater than 180 degrees (3.14 rad), the fire wall termination shall comply with one of the following:

1. The fire wall shall terminate at the interior surface of any exterior sheathing or siding permitted by this code provided that the exterior wall has a fire-resistance rating of not less than 1 hour for a horizontal distance of not less than 4 feet (1220 mm) on both sides of the fire wall. Openings within such exterior walls within 4 feet (1220 mm) of the fire wall shall be protected by opening protectives having a fire protection rating of not less than $\frac{3}{4}$ hour.
2. The fire wall shall terminate at the interior surface of noncombustible exterior sheathing with non-combustible exterior siding or other noncombustible exterior finishes provided that the non-combustible sheathing and siding or other exterior noncombustible finish extends a horizontal distance of not less than 4 feet (1220 mm) on both sides of the fire wall. Openings within such exterior walls within 4 feet (1220 mm) of the fire wall shall be protected by opening protectives having a fire protection rating of not less than $\frac{3}{4}$ hour.
3. The fire wall shall terminate at the interior surface of noncombustible exterior sheathing with any siding or exterior finish materials permitted by this code provided that the non-combustible sheathing extends a horizontal distance of not less than 4 feet (1220 mm) on both sides of the fire wall and the buildings on each side of the fire wall are protected by an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2. Openings within such exterior walls within 4 feet (1220 mm) of the fire wall shall be protected by opening protectives having a fire protection rating of not less than $\frac{3}{4}$ hour.
4. The fire wall shall terminate at the interior surface of masonry or concrete exterior walls where the masonry or concrete exterior walls extend a horizontal distance of not less than 4 feet (1220 mm) on both sides of the fire wall. Openings within such exterior walls within 4 feet (1220 mm) of the fire wall shall be protected by opening protectives having a fire protection rating of not less than $\frac{3}{4}$ hour.
5. The fire wall shall terminate at the interior surface of any exterior sheathing or siding permitted by this code provided the buildings on each side of the fire wall are protected by an automatic sprinkler system installed in accordance with Section 903.3.1.1.
6. The fire wall shall extend not less than 18 inches (457 mm) beyond the exterior surface of the exterior wall.

706.5.2 Termination at less than 180 degree exterior wall angle. Where the angle between the exterior walls on either side of the fire wall, within 4 feet (1220 mm) of the fire wall, is less than 180 degrees (3.14 rad), the fire wall termination shall extend to the plane of the exterior sheathing or surface of one of the exterior walls on either side of the fire wall. An imaginary line shall be established extending out from the fire wall termination point between the exterior walls on both sides of the fire wall for the purpose of establishing the fire separation distance for the exterior walls. The fire-resistance rating and opening protection requirements for the exterior walls shall meet Sections 705.5 and 705.8 based on the fire separation distance established by the imaginary line.

Delete without substitution

~~**706.5.1 Exterior walls.** Where the fire wall intersects exterior walls, the fire-resistance rating and opening protection of the exterior walls shall comply with one of the following:~~

- ~~1. The exterior walls on both sides of the fire wall shall have a 1-hour fire-resistance rating with $\frac{3}{4}$ -hour protection where opening protection is required by Section 705.8. The fire-resistance rating of the exterior wall shall extend not less than 4 feet (1220 mm) on each side of the intersection of the fire wall to exterior wall. Exterior wall intersections at fire walls that form an angle equal to or greater than 180 degrees (3.14 rad) do not need exterior wall protection.~~
- ~~2. Buildings or spaces on both sides of the intersecting fire wall shall assume to have an imaginary lot line at the fire wall and extending beyond the exterior of the fire wall. The location of the assumed line in relation to the exterior walls and the fire wall shall be such that the exterior wall and opening protection meet the requirements set forth in Sections 705.5 and 705.8. Such protection is not required for exterior walls terminating at fire walls that form an angle equal to or greater than 180 degrees (3.14 rad).~~

Reason: The fire wall horizontal termination provisions are set up with section 706.5 providing the termination methods for fire wall terminations where the exterior walls on either side are at an angle of 180 degrees or greater and section 706.5.1 providing the termination methods for fire wall termination where the exterior walls on either side are at an angle less than 180. 706.5.1 is an additional requirement, when the angle is less than 180, to the base requirement in 706.5. This does not work in practice. If a fire wall terminates at the vertex of a 90 degree angle between the two exterior walls on either side the fire wall cannot extend 18 inches beyond the surface of the exterior wall nor can the fire wall extend to the surface of the exterior sheathing so the sections cannot build on one another. Section 706.5.1 refers to conditions when a fire wall intersects the exterior wall. Geometrically an intersection is a point common to two lines so the condition detailed in 706.5 for a 180 termination is an intersection of the exterior wall by the fire wall so one could argue that the last sentence of 706.5.1 items 1 and 2 override the requirements of 706.5 when the exterior walls are at 180 to each other. That is not the intent. This code change fixes the problem by separating out the termination requirements based on the angle between the exterior walls. The 706.5.1 method applies when the angle between exterior walls is 180 degrees or greater and the 706.5.2 method applies when the angle between exterior walls is less than 180 degrees. Additionally the base requirement for the 18" extension is the exception, not the rule, so the exceptions have been re-organized into options and the 18 inch exception is now another option. The termination methods that allow termination at sheathing have opening protection requirements added since the code is currently silent on this fact. Current code would allow the entire 4 foot to be open. New option 4 was added to allow termination of the fire wall at an exterior masonry or concrete wall, this is currently not addressed. New option 5 was added to allow for a full NFPA 13 sprinkler to count as equivalent to 4 feet on non-combustible siding.

Section 706.5.2 addresses the firewall termination where the exterior walls on either side are at an angle less than 180 degrees. The first exception was removed because it makes no sense to allow this method when it would not be allowed if the buildings were separated by an inch. If two adjacent buildings are separated and joined by a fire wall and they have exterior walls that are exposed to each other at angles less than 180 degrees they should be treated as separate buildings for exposure purposes just as any two separate buildings would be treated. Current exception 1 gives you a less restrictive method when the building are touching; that makes no sense. The imaginary line exception is now a single requirement. The section was also cleaned up so it is clear how to apply the imaginary line. The current text literally states that the wall itself will assume to have an imaginary line. Walls cannot assume things. The current text also does not clearly state that the imaginary line is to be used to establish fire separation distances. Since that is not provided based on current text there is no protection requirement because section 705.5 and 705.8 are based on fire separation distance defined in chapter 2.

Example of less than 180 termination

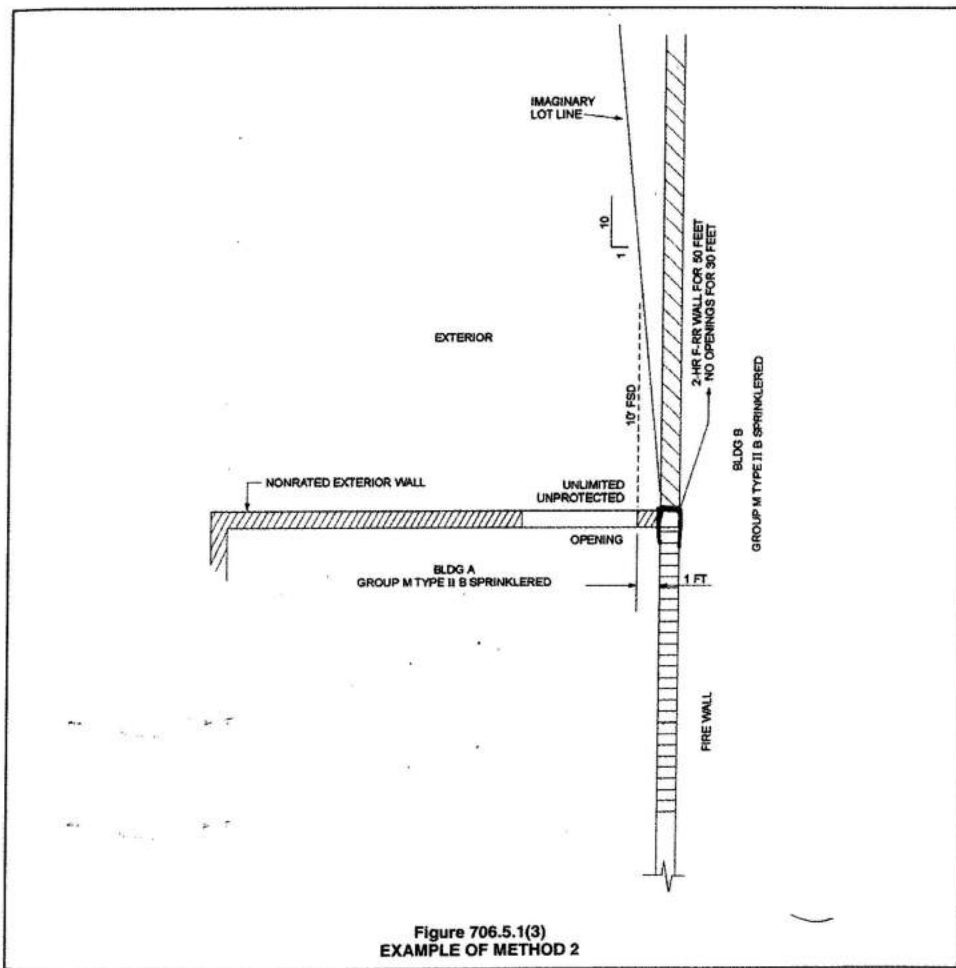


Figure 706.5.1(3)
EXAMPLE OF METHOD 2

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This is a clarifying code change.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee felt that the current text is clear and doesn't need change. The proposed text is confusing (Vote 14-0)

Assembly Action:

None

FS23-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ronald Clements Jr, representing Chesterfield County Building Inspection Department (clementsro@chesterfield.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

706.5.1 Termination at 180 degree or greater exterior wall angle. Where the angle between the exterior walls on either side of the fire wall is equal to or greater than 180 degrees (3.14 rad), the fire wall termination shall comply with one of the following:

1. The fire wall shall terminate at the interior surface of any exterior sheathing or siding permitted by this code provided that the exterior wall has a fire-resistance rating of not less than 1 hour for a horizontal distance of not less than 4 feet (1220 mm) on both sides of the fire wall. Openings within such exterior walls within 4 feet (1220 mm) of the fire wall shall be protected by opening protectives having a fire protection rating of not less than 3/4 hour.
2. The fire wall shall terminate at the interior surface of noncombustible exterior sheathing with non-combustible exterior siding or other noncombustible exterior finishes provided that the non-combustible sheathing and siding or other exterior noncombustible finish extends a horizontal distance of not less than 4 feet (1220 mm) on both sides of the fire wall. Openings within such exterior walls within 4 feet (1220 mm) of the fire wall shall be protected by opening protectives having a fire protection rating of not less than 3/4 hour.
3. The fire wall shall terminate at the interior surface of noncombustible exterior sheathing with any siding or exterior finish materials permitted by this code provided that the non-combustible sheathing extends a horizontal distance of not less than 4 feet (1220 mm) on both sides of the fire wall and the buildings on each side of the fire wall are protected by an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2. Openings within such exterior walls within 4 feet (1220 mm) of the fire wall shall be protected by opening protectives having a fire protection rating of not less than 3/4 hour.
4. The fire wall shall terminate at the interior surface of masonry or concrete exterior walls where the masonry or concrete exterior walls extend a horizontal distance of not less than 4 feet (1220 mm) on both sides of the fire wall. Openings within such exterior walls within 4 feet (1220 mm) of the fire wall shall be protected by opening protectives having a fire protection rating of not less than 3/4 hour.
5. ~~The fire wall shall terminate at the interior surface of any exterior sheathing or siding permitted by this code provided the buildings on each side of the fire wall are protected by an automatic sprinkler system installed in accordance with Section 903.3.1.1.~~
6. The fire wall shall extend not less than 18 inches (457 mm) beyond the exterior surface of the exterior wall.

706.5.2 Termination at less than 180 degree exterior wall angle. Where the angle between the exterior walls on either side of the fire wall, within 4 feet (1220 mm) of the fire wall, is less than 180 degrees (3.14 rad), the fire wall termination shall extend to the plane of the outermost exterior wall sheathing or surface of one of the exterior walls on either side of the fire wall. An imaginary line shall be established extending out from the fire wall termination point between the exterior walls on both sides of the fire wall for the purpose of establishing the fire separation distance for the exterior walls. The fire-resistance rating and opening protection requirements for the exterior walls shall meet Sections 705.5 and 705.8 based on the fire separation distance established by the imaginary line.

Commenter's Reason: The original code change has a very detailed and technically sound reason statement that fully explains why this code change is needed both to address structural issues with text and section organization, and to correct technical issues with the code provisions. No individual, organization or industry spoke in opposition to the code

change. The committee did not provide any technical justification for their action to deny the code change. Regarding the modification proposed, Steve Skalko representing MACS suggested two minor modifications to proposed section 706.5.1 exception #5 and section 706.5.2. Exception #5 is a new exception so to simplify the code change and address Steve's issue my modification removes exception #5, simplifying the code change. Section 706.5.2 has been clarified to address the condition where the exterior walls on either side of the fire wall termination point are offset; with the revised text it is clear that the fire wall terminates at the outermost of the two offset walls.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
See original.

FS23-18

FS24-18

IBC: 706.6.1

Proposed Change as Submitted

Proponent: Lee Kranz, representing Washington Association of Building Officials Technical Code Development Committee (lkranz@bellevuewa.gov)

2018 International Building Code

Revise as follows

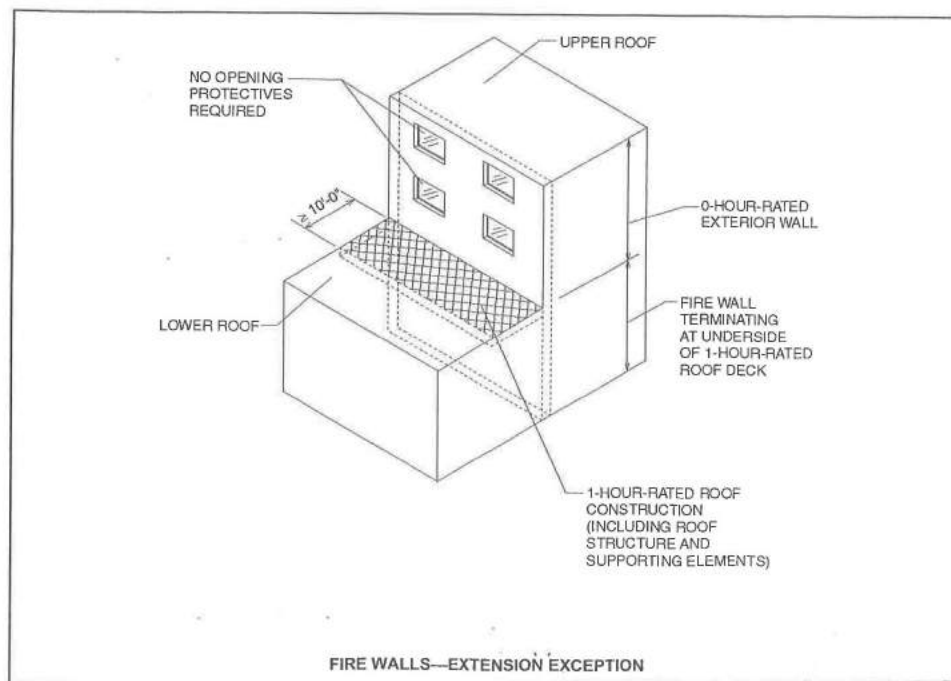
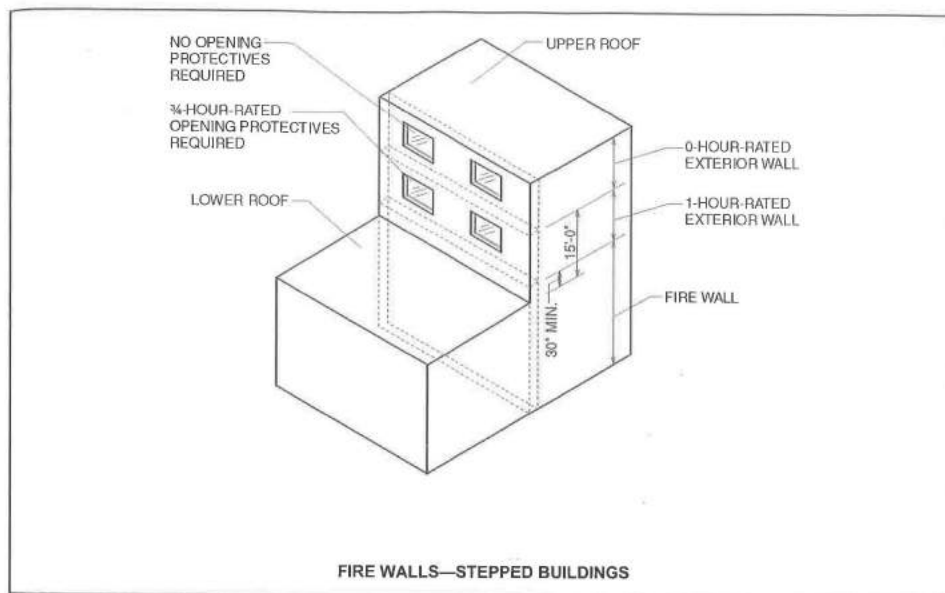
706.6.1 Stepped buildings. Where a *fire wall* also serves as an *exterior wall* for a building and separates buildings having different roof levels, such wall shall terminate at a point not less than 30 inches (762 mm) above the lower roof level, provided the exterior wall for a height of 15 feet (4572 mm) level. Exterior walls above the fire wall extending more than 30 inches (762 mm) above the lower roof is shall be of not less than 1-hour fire-resistance-rated construction from both sides with openings protected by fire assemblies having a fire protection rating of not less than 3/4 hour. Portions of the exterior walls greater than 15 feet (4572 mm) above the lower roof shall be of non-fire-resistance rated construction unless otherwise rated construction is required by other provisions of this code.

Exception: Where the A fire wall terminates serving as part of an exterior wall for a building that separates buildings having different roof levels shall be permitted to terminate at the underside of the roof sheathing, deck or slab of the lower roof, provided that all of the following requirements are met:

1. The lower roof assembly within 10 feet (3048 mm) of the fire wall has not less than a 1-hour *fire-resistance* rating, and the
2. The entire length and span of supporting elements for the rated roof assembly has shall have a fire-resistance rating of not less than 1-hour.
- ~~2-3.~~ Openings in the lower roof shall not be located within 10 feet (3048 mm) of the *fire wall*.
4. 1-hour fire- resistance rated exterior wall protection above the lower roof, as specified in this section, is not required unless fire resistance rated construction is required by other provisions of this

Reason: Section 706.6.1 is confusing as currently written. It is intended to regulate the design of fire walls and exterior walls above and in-line with the fire walls for buildings having stepped roof levels. The intent of this section is to maintain adequate separation between the two portions of the same building so that one side will not be damaged for the time required by Section 706.4. This is done by extending the fire wall to at least 30" above the lower roof and rating the exterior wall above and in-line to not less than 1-hour up to 15' above the lower roof. The second option is to provide a 1-hour rated roof assembly extending not less than 10' over from the fire wall with no openings permitted within the 10' portion of the roof adjacent to the fire wall.

This proposal does not change the requirements of the section. Rather, the text has been re-written to clarify the expectations for the exterior wall located above the lower roof and sets clear expectations in the exception for horizontal protection by itemizing these requirements.



Cost Impact: The code change proposal will not increase or decrease the cost of construction. This code change is being made in an attempt to clarify the code. It will not change the cost of construction of fire walls.

FS24-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The committee found the overall proposal provides better and more understandable text. This is not a technical change. The committee encouraged the proponent to submit a public comment to further refine the language. They noted extra words at the end of item 1; a conflict in style between the 4 items and finally a suggestion that part 4 of the exception may not be a requirement of the exception but rather an allowance of the exception. (Vote 13-1)

Assembly Action:

None

FS24-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Lee Kranz, representing Washington Association of Building Officials Technical Code Development Committee (lkranz@bellevuewa.gov) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

706.6.1 Stepped buildings. Where a *fire wall* also serves as an *exterior wall* for a building and separates buildings having different roof levels, such wall shall terminate at a point not less than 30 inches (762 mm) above the lower roof level. Exterior walls above the fire wall extending more than 30 inches (762 mm) above the lower roof shall be of not less than 1-hour fire-resistance-rated construction from both sides with openings protected by fire assemblies having a *fire protection rating* of not less than $\frac{3}{4}$ hour. Portions of the exterior walls greater than 15 feet (4572 mm) above the lower roof shall be of non-fire-resistance rated construction unless otherwise rated construction is required by other provisions of this code.

Exception: A *fire wall* serving as part of an exterior wall ~~for a building~~ that separates buildings having different roof levels shall be permitted to terminate at the underside of the roof sheathing, deck or slab of the lower roof, provided items 1, 2, and 3 below are met. The exterior wall above the *fire wall* is not required to be of fire-resistance rated construction, unless required by other provisions of this code ~~all of the following requirements are met:~~

1. The lower roof assembly within 10 feet (3048 mm) of the fire wall has not less than a 1-hour *fire-resistance* rating, and the
2. The entire length and span of supporting elements for the rated roof assembly ~~shall have~~ has a *fire-resistance rating* of not less than 1-hour.
3. Openings in the lower roof ~~shall be~~ are not be located within 10 feet (3048 mm) of the *fire wall*.
4. ~~1-hour fire-resistance-rated exterior wall protection above the lower roof, as specified in this section, is not required unless fire-resistance-rated construction is required by other provisions of this~~

Commenter's Reason: This public comment addresses recommendations made by members of the Fire Safety Committee at the Group A Committee Action Hearings in Columbus, OH. The Committee approved the proposed changes 13 to 1 but felt there was even more improvements that could be made to this otherwise very confusing code language dealing with regulating fire walls at stepped roof buildings.

In this Public comment we have relocated some of the language in item #4 to the beginning of the exception because, as one of the Committee members said, "Item #4 is not a requirement, as specified in the beginning of the exception; it's more something you're allowed to do". To correct this, we have indicated in the beginning of the exception that if you comply with the requirements, then the portion of the exterior wall above the *fire wall* is not required to be of fire-resistance rated construction unless required by other provisions of the code. This adds clarity for the reader trying to interpret the provision.

The changes in requirements 2 and 3 create grammatical consistency in relation to the charging language at the beginning of the exception. This public comment includes all recommendations made by the Fire Safety Committee members who commented on the proposal.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of

construction

This code change is for clarification only. There is no cost impact for construction.

FS24-18

FS29-18

IBC: 707.8, 707.9

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Building Code

Revise as follows

~~**707.8 Joints, joints and voids.** Joints made in or between fire barriers, and joints made at the intersection of fire barriers with underside of a fire-resistance-rated floor or roof sheathing, slab or deck above, and the exterior vertical wall intersection shall comply with Section 715.~~

~~The following joints and voids shall be protected in accordance with Section 715.~~

- ~~1. Joints in or between fire barriers.~~
- ~~2. Joints between fire barriers and fire-resistance-rated wall assemblies.~~
- ~~3. Joints between fire barriers and the underside of fire-resistance-rated floors or floor/ceiling assemblies.~~
- ~~4. Joints between fire barriers and the underside of fire-resistance-rated roofs or roof/ceiling assemblies.~~
- ~~5. Voids at the intersection of fire barriers and nonfire-resistance-rated exterior curtain wall assemblies.~~
- ~~6. Voids between fire barriers and the underside of nonfire-resistance-rated roofs or roof/ceiling assemblies.~~
- ~~7. Voids between fire barriers and the underside of nonfire-resistance-rated floors or floor/ceiling assemblies.~~

Delete without substitution

~~**707.9 Voids at intersections.** The voids created at the intersection of a *fire barrier* and a nonfire-resistance-rated roof assembly or a nonfire-resistance-rated exterior wall assembly shall be filled. An approved material or system shall be used to fill the void, and shall be securely installed in or on the intersection for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to retard the passage of fire and hot gases.~~

Reason: Other FCAC proposals reorganize and make changes to Section 715, including adding protection requirements for voids, so Section 707.9 is no longer needed. This proposal simplifies the references to Section 715 and includes all of the joints and voids that require protection. Depending on the action on the other proposals Item (7) may need to be deleted from this proposal.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The changes are editorial and do not add new construction requirements.

FS29-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Based on the proponent's testimony, without FS30 and FS31-18, this proposal is incomplete. The committee expressed concern whether the list is complete and clear between joints and voids. For example if two rated assemblies adjoin each other and that 'intersection' doesn't need to accommodate movement, how is it classified? (Vote 13-0)

Assembly Action:

None

FS29-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Gregory Keith, representing The Boeing Company (grkeith@mac.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

707.8 Joints and voids.

The following joints and voids shall be protected in accordance with Section 715.

1. Joints in or between fire barriers.
2. Joints between fire barriers and fire-resistance-rated wall assemblies.
3. Joints between fire barriers and the underside of fire-resistance-rated floors or floor/ceiling assemblies.
4. Joints between fire barriers and the underside of fire-resistance rated roofs or roof/ceiling assemblies.
5. Voids at the intersection of fire barriers and nonfire-resistance-rated exterior curtain wall assemblies.
- ~~6. Voids between fire barriers and the underside of nonfire-resistance-rated roofs or roof/ceiling assemblies.~~
- ~~7. Voids between fire barriers and the underside of nonfire-resistance-rated floors or floor/ceiling assemblies.~~

Commenter's Reason: The ICC Fire Code Action Committee (FCAC) developed a number of proposals intended to reorganize and make changes to Section 715. Item FS29-18 created the Section 707.8 charging language and cross-reference for the various Section 715 technical requirements. In the proposal reason statement, the proponent states, This proposal simplifies the references to Section 715 and includes all of the joints and voids that require protection. Depending on the action on the other proposals Item (7) may need to be deleted from the proposal. As regards the last sentence, this turned out to be a bait and switch proposal. The Fire Safety Committee disapproved both Items FS30-18 and FS31-18. Both proposals dealt with Continuity Head of Wall Joint Systems in buildings with nonfire-resistance-rated construction. The need for such a joint fire protection system in building on non-rated construction has long been questioned. If a chain is only as strong as its weakest link, the Continuity Head of Wall Joint System is the strongest link and serves no logical purpose. There should be no reference to such systems when associated with nonfire-resistance-rated construction. If an owner/architect/developer wishes to exceed the minimum provisions of the code, they may certainly do so. More stringent options should not be specified within given technical requirements.

When Items FS30-18 and FS31-18 were disapproved by the committee, the proponents testified that FS29-18 was incomplete and recommended disapproval. This action was contrary to the statement in their initial reason statement: Depending on the action on the other proposals Item (7) may need to be deleted from the proposal. Based on that proponent statement, FS30-18 and FS31-18 were disapproved and their reference in Section 707.8 should be deleted. Accordingly, the public comment deletes Items 6 and 7 from the list of joints and voids. This is consistent with the actions of the committee and the reason statement of the proponent.

More importantly, it will reverse the attempts to expand the use of fire rated joint systems to buildings of nonrated construction. Although in the cost impact statement for FS31-18 the proponent declared that the requirement would not increase the cost of construction, such systems are very expensive and are out of technical context in buildings of more

economic construction. It should be remembered that buildings of IIB, IIIB and VB construction are limited in height and area and such exotic joint protection methods are of questionable benefit.

Approval of this public comment is consistent with logic, fire protection philosophy, the Fire Safety Committee's actions and the proponent's published reason statement.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This public comment eliminates the suggestion that more expensive joint protection systems should be used.

FS29-18

FS31-18

IBC: 202 (New), 202, 707.9, 715.6 (New), Chapter 35

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Building Code

SECTION 202 DEFINITIONS

Add new definition as follows

CONTINUITY HEAD-OF-WALL JOINT SYSTEM. An assemblage of specific materials or products that are designed to resist the passage of fire through voids created at the intersection of fire barriers and the underside of nonfire-resistance-rated roofs for a prescribed period of time.

Revise as follows

~~**[BF] F RATING.** The time period that the through-penetration firestop system or continuity head-of-wall joint system limits the spread of fire through the penetration ~~when tested in accordance with ASTM E814 or UL 1479 or void.~~~~

~~**[BF] T RATING.** The time period that the penetration firestop system, including the penetrating item, or the continuity head-of-wall joint system limits the maximum temperature rise to 325°F (163°C) above its initial temperature through the penetration or void on the nonfire side ~~when tested in accordance with ASTM E814 or UL 1479 side.~~~~

~~**707.9 Voids at intersections.** The voids created at the intersection of a *fire barrier* and a nonfire-resistance-rated roof assembly or a nonfire-resistance-rated exterior wall assembly shall be filled. ~~An approved material or system shall be used to fill the void, and shall be securely installed in or on the intersection for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to retard the passage of fire and hot gases protected with a material or system which complies with Section 715.~~~~

Add new text as follows

715.6 Voids at intersections of fire barriers and underside of nonfire-resistance-rated roofs. The voids created at the intersection of a fire barrier and the underside of a nonfire-resistance-rated roof sheathing, slab or deck above shall be protected by an approved continuity head-of-wall joint system installed as tested in accordance with ASTM E2837 to provide an F rating/T rating for a time period not less than the required fire-resistance rating of the wall assembly in which it is installed or be filled with an approved material or system. Such materials or systems shall be securely installed in accordance with the manufacturer's installation instructions in or on the void for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to resist the passage of fire and hot gases. Continuity head-of-wall joint systems shall also be installed in accordance with the listing criteria.

Add new standard(s) follows

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box
C700
West Conshohocken PA 19428-2959
US

E2837-17:

Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies

Reason: This proposal clarifies language for protecting voids at the intersection of a fire barrier and the underside of a nonfire-resistance-rated roof assembly as follows:

- Section 707.9 was revised to follow the format of Section 707.8, and the protection requirements were moved to Section 715.

- A new Section 715.5 includes the protection requirements previously in Section 707.9 for voids at intersections of fire barriers and the underside of nonfire-resistance-rated roofs. In addition, Section 715.5 includes an option for protecting this void with a continuity head-of-wall joint system.
- A definition of continuity head-of-wall joint system was provided.
- The definitions of F rating and T rating were revised to reference continuity head-of-wall joint systems. In addition, reference to the two firestop test standards was removed from the definitions.
- The definition of T rating was revised to correct an error in the metric conversion of the temperature rise criteria. When converting a **temperature rise**, the equation is $^{\circ}\text{C} = 5/9(^{\circ}\text{F})$. The 32°F portion of the equation for converting actual temperatures falls out of the equation.
- ASTM E2837 was added as new referenced standard.
- There are currently approximately 20 continuity head-of-wall joint system tested and certified by UL meeting an F rating/T rating.
- This proposal to include ASTM E2837 test aligns with the requirements added in the 2018 edition of NFPA 101.

The proposal compliments a proposal which reorganizes Section 715.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal simply provides another option for demonstrating code compliance.

Analysis: A review of the standard proposed for inclusion in the code, ASTM E2837-17, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

FS31-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee found this proposal to be unnecessary. The existing provisions are adequate. The proponent may wish to restructure as an alternate method. (Vote 11-2)

Assembly Action:

None

FS31-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Tony Crimi, representing International Firestop Council (tcrimi@sympatico.ca) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

715.6-715.5 Voids at intersections of fire barriers and underside of nonfire-resistance-rated roofs. The voids created at the intersection of a fire barrier and the underside of a nonfire-resistance-rated roof sheathing, slab or deck above shall be protected by one of the following methods:

1. By filling with an approved material or system to retard the interior spread of fire and hot gases.
2. By an approved continuity head-of-wall joint system installed as tested in accordance with ASTM E2837 to provide an F rating/T rating for a time period not less than the required fire-resistance rating of the wall assembly in which it is installed or be filled with an approved material or system. Such materials or systems shall be securely installed in accordance with the manufacturer's installation instructions in or on the void for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to resist the passage of fire and hot gases. Continuity head-of-wall joint systems shall also be installed in accordance with the listing criteria.

Commenter's Reason: The original intent of this proposal was two-fold. First, it moved the requirements on how to protect the void between a fire barrier and the underside of a non fire-resistance-rated roof from Section 707 covering fire barriers to Section 715 covering joints and voids, leaving just a pointer in Section 707, and second, it added the option of protecting this void with a material or system tested to a new ASTM Standard. During the Committee Action Hearing, the discussion centered on whether a tested system was needed to evaluate the method of protecting this void. Ultimately, the Fire Safety Committee decided the current method of filling the void with an approved material was adequate and disapproved this proposal. This public comment is an attempt to reconsider that decision in light of the following:

The order of reference to the two types of protection has been change to place the traditional requirement to fill the void first, followed by the use of a tested system.

The use of a tested system is an option, not a requirement. Even if this Public Comment is approved, filling the void will still be an option.

The requirement that the materials and systems shall be securely installed in accordance with the manufacturer's instruction in or on the void for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to resist the passage of fire and hot gases has been deleted from this proposed Section in recognition of FS52-18 which added same language for all joints and voids. FS52-18 was Approved as Submitted 13-0.

When the void is filled with an approved material or system, the code official must evaluate the acceptability of the material and method of filling the void, including whether or not the material or system will dislodge, loosen or otherwise impair the ability of the void to accommodate expected building movements and resist the passage of fire and hot gases. On what basis will the code official make this decision? With a tested system that evaluation has already been made through the cycling and fire testing in accordance with ASTM E2837. With a tested system, it is just a matter of verifying the material or system used was installed in accordance with the requirements of the tested system.

This Public Comment addresses both the original intents of the proposal; those being moving the protection requirements for how to protect this void to Section 715, and introducing the use of materials or system tested to ASTM E2837.

Also note that the section number is being revised as it is desired to have these provisions before the section on spandrels which is currently Section 715.5.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal simply provides another option for demonstrating code compliance.

Public Comment 2:

Proponent: Michael O'Brian, representing FCAC (fcac@iccsafe.org) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

707.9 Voids at intersections. The voids created at the intersection of a *fire barrier* and a nonfire-resistance-rated roof assembly or a nonfire-resistance-rated exterior wall assembly shall be filled. ~~An approved material or system shall be used to fill the void, and shall be securely installed in or on the intersection for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to retard the passage of fire and hot gases protected with a material or system which complies with Section 715.~~

715.5 Voids at intersections of fire barriers and underside of nonfire-resistance-rated roofs. Voids created at the intersection of a fire barrier and the underside of a nonfire-resistance-rated roof sheathing, slab or deck above shall be filled with an approved material or system to retard the interior spread of fire and hot gases.

Commenter's Reason: The original intent of this proposal was two-fold. First, move the requirements on how to protect the void between a fire barrier and the underside of a non fire-resistance-rated roof from Section 707 covering fire barriers to Section 715 covering joints and voids, leaving just a pointer in Section 707, and second, adding the option of protecting this void with a material or system tested to a new ASTM Standard.

During the Committee Action Hearing, the discussion centered on whether a tested system was needed to evaluate the method of protecting this void. Ultimately, the Fire Safety Committee decided the current method of filling the void with an approved material was adequate and disapproved this proposal.

This Public Comment was prepared to only address moving the protection requirements to Section 715. Note it was prepared as a complete replacement of the original proposal. The language used in new Section 715.5 is identical to that Approved under FS52-18 and FS53-18 for protecting other voids using an approved material and system. If successful, the requirements for how to protect all joints and voids will be in one place, that being Section 715.

Also note that the section number being proposed is intended to come before the section on spandrels which is currently Section 715.5.

This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal simply provides another option for demonstrating code compliance.

FS31-18

FS34-18

IBC: 708.3, 708.3.1, 708.4.1, 711.2.3, 711.2.4, 711.2.4.1, 711.2.4.1.1, 711.2.4.3, 711.2.4.3.1

Proposed Change as Submitted

Proponent: Stephen Skalko, Stephen V. Skalko, P.E. & Associates, LLC, representing Masonry Alliance for Codes and Standards (svskalko@svskalko-pe.com); William Hall, Portland Cement Association, representing Alliance For Concrete Codes and Standards (jhall@cement.org)

2018 International Building Code

Revise as follows

708.3 Fire-resistance rating. Except as provided in Section 708.3.1 *Fire partitions shall have a fire-resistance rating of not less than 1 hour.*

Add new text as follows

708.3.1 Group I-1, R-1 and R-2 buildings. For Group I-1, R-1 and R-2 occupancies in buildings of Type III, IV and V construction that are more than two stories in height or that have dwelling or sleeping units located on a floor level that is more than 25-feet above the grade plane, the separation walls required by Section 420.2 shall be fire barriers that comply with Section 707 and shall have a 2-hour fire resistance rating. In addition, any load bearing walls shall meet the requirements of Section 1604 without sheathing.

Exceptions:

1. Corridor walls permitted to have a $1/2$ -hour fire-resistance rating by Table 1020.1.
2. Dwelling unit and sleeping unit separations in buildings of Types IIB, IIIB and VB construction shall have fire-resistance ratings of not less than ~~1/2~~ 1-hour in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

Revise as follows

708.4.1 Supporting construction. The supporting construction for a *fire partition* shall have a *fire-resistance rating* that is equal to or greater than the required fire-resistance rating of the supported *fire partition*.

Exception: In buildings of Types IIB, IIIB and VB construction, the supporting construction requirement shall not apply to 1-hour fire partitions separating tenant spaces in covered and open mall buildings, *fire partitions* separating dwelling units, *fire partitions* separating sleeping units and *fire partitions* serving as corridor walls.

711.2.3 Supporting construction. The supporting construction shall be protected to afford the required *fire-resistance rating* of the *horizontal assembly* supported.

Exception: In buildings of Type IIB, IIIB or VB construction, the construction supporting the *horizontal assembly* is not required to be fire-resistance rated at the following:

1. *Horizontal assemblies* at the separations of incidental uses as specified by Table 509 provided that the required *fire-resistance rating* does not exceed 1 hour.
2. ~~Horizontal~~ One-hour fire resistance rated horizontal assemblies at the separations of *dwelling units* and *sleeping units* as required by Section 420.3.

711.2.4 Fire-resistance rating. The *fire-resistance rating* of *horizontal assemblies* shall comply with Sections 711.2.4.1 through 711.2.4.6 but shall be not less than that required by the building type of construction.

711.2.4.1 Separating mixed occupancies. Except as provided in Section 711.2.4.1.1, Where the *horizontal assembly* separates mixed occupancies, the assembly shall have a *fire-resistance rating* of not less than that required by Section 508.4 based on the occupancies being separated.

Add new text as follows

711.2.4.1.1 Group I-1, R-1 and R-2 buildings. For Group I-1, R-1 and R-2 occupancies in buildings of Type III, IV and V construction that are more than two stories in height or that have dwelling or sleeping units located on a floor level that is

more than 25-feet above grade plane, the horizontal assemblies providing the separations of dwelling and sleeping units as required by Section 420.3 shall have a 2-hour fire resistance rating. In addition, any load bearing walls supporting the horizontal assembly shall comply with the requirements of Section 1604 without the use of sheathing.

711.2.4.3 Dwelling units and sleeping units. Except as provided in Section 711.2.4.3.1, Horizontal assemblies serving as dwelling or sleeping unit separations in accordance with Section 420.3 shall be not less than 1-hour fire-resistance-rated construction.

711.2.4.3.1 Group I-1, R-1 and R-2 buildings. For Group I-1, R-1 and R-2 occupancies in buildings of Type III, IV and V construction that are more than two stories in height or that have dwelling or sleeping units located on a floor level that is more than 25-feet above grade plane, the horizontal assemblies at the separation of dwelling and sleeping units as required by Section 420.3 shall have a 2-hour fire resistance rating. In addition, any load bearing walls supporting the horizontal assemblies shall meet the requirements of Section 1604 without the use of sheathing.

Exception: Horizontal assemblies separating dwelling units and sleeping units shall be not less than 1-hour fire-resistance-rated construction in a building of Types IIB, IIIB and VB construction, where the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

Reason: The changing construction methods and the noticeable shift to light weight materials for Group I-1, R-1 and R-2 occupancy buildings; and the continued national trend in reducing fire department staffing numbers, this proposed code language provides for two distinct safety provisions. The first is the increased compartmentalization of the building to reduce fire spread and damage using passive fire protection methods. The second safety provision is the ability of the structure to be constructed in such a way that it retains its structural integrity after being subject to a fire. The provisions of **Section 101.3 Intent**, state:

"The purpose of this code is to establish the minimum requirements to safeguard the public health, safety and general welfare through structural strength, means of egress facilities, stability, sanitation, adequate light and ventilation, energy conservation, and safety to life and property from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations."

Currently many of these load bearing walls are constructed in such a way that the wall sheathing is a critical part of the structural integrity of the wall. The sheathing is used for localized member stability, global stability, and in many cases the lateral load resisting system for the entire building. During an adverse event, such as a fire this sheathing can be compromised by fire damage, mechanical damage, and water damage compromising the overall structural integrity of the building. Where the current standard test used for fire resistance is the ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials, in practice this test does not account for the reduction in strength and stiffness that results from fire and water damage. It is not practical to think that every assembly would be tested at designed load levels and the resulting strength and stiffness data used in design, as a result the proposed provisions would provide for the structure to rely on the sheathing only as a fire resistive element and would allow the structure to maintain its design strength after the sheathing was compromised or removed for any reason.

The proposed story level and floor height is based on the ability for a fire department to make a rescue from the exterior of the structure using the equipment commonly found on an NFPA 1901 equipped motorized fire engine, this using the most common extension ladder size, being a 24 foot long extension ladder which can easily reach a second floor window. In addition, for structures three stories or greater in height, the level of vertical load and potential lateral load on these walls increases and as a result an additional level of safety is needed.

The success of NFPA 13 & 13R sprinkler systems to manage and control fire is acknowledged however, the provisions of this code change are designed to assist those active fire protection systems in effectively doing their job and to provide structural stability and strength that is dictated under the provisions of Section 101.3.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Based on an independent third-party study of rectangular 4-story Type V multi-family dwellings if constructed in three different cities, this code change proposal may or may not increase the cost of construction, depending on location and material costs at the time of the construction.

A multi-family residential structure must be schematically designed to meet all of the requirements of the 2015 International Building Code to accurately evaluate the relative construction cost. Once designed, the cost comparison buildings were reviewed for code compliance, and cost estimates prepared. The study was prepared by Walter G. M. Schneider III, Ph.D., P.E., MCP, CBO, CFO and Ryan L. Solnosky, Ph.D., P.E.

The building model chosen for the project was a 4 story multi-family residential structure encompassing approximately 25,000 gross square feet of building area per floor. The cost comparisons are based on the proposed target building assembled using a mixed bedroom scheme for residential occupancies.

The following construction types were included in the evaluation:

- Conventional wood framing with floor system (Type VA construction)
- Light gauge steel framing with concrete slab floor on steel deck (Type IIB construction)
- Load bearing concrete masonry with precast concrete floor (Type IIB construction)
- Load-bearing precast concrete walls and precast concrete floor (Type IIB construction)
- Load-bearing insulated concrete form (ICF) walls* and precast concrete floor (Type IIB construction)
- Load-bearing insulated concrete form (ICF) walls* and ICF concrete floor (Type IIB construction)

* For the ICF systems walls separating dwelling units were specified as concrete masonry.

The cost estimate for each building model included the complete fit out of each building with the exception of movable appliances and furniture.

From the cost estimates for the 3-city study, the report concluded that the compartmentalized construction method utilizing concrete based construction materials was cost competitive with light weight conventional wood frame construction.

Copies of the study are available on request.

FS34-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The increases required by this proposal are unwarranted. The cost impact statement is not credible. We always seek a balance when increasing protections and the practical. This proposal does not balance. (Vote 14-0)

Assembly Action:

None

FS34-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Douglas Schreffler, Logan Fire Company, representing selfrequests As Submitted.

Commenter's Reason: The purpose of this code is to establish the minimum requirements to safeguard the public health, safety and general welfare through structural strength, means of egress facilities, stability, sanitation, adequate light and ventilation, energy conservation, and safety to life and property from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations. It has been well documented by NIST and UL that the fire loads in modern buildings are higher than historically has been the case, and the heat release rates are higher as well, leading to hotter, more aggressive fires. With the ASTM E-119 test reaching its one hundredth birthday this year and the basis of testing being changed very little over the years, including the all-important time temperature curve, the level of safety for firefighters and first responders has deteriorated since the test has not kept current with current fire trends.

The first part of this proposal seeks to maintain a minimum level of safety for our firefighters and first responders who have to enter buildings during fire conditions, to perform searches and conduct fire suppression activities. This is being accomplished in FS34-18 by the increase in fire rating of assemblies to increase the level of safety to make up for the change in fire intensity, compared to the 100 year old calibrated time-temperature curve in ASTM E-119.

The second part of the FS34-18 proposal addresses the change in how buildings are being constructed under the code. While it has been an option to use load bearing studs to carry high vertical loads in buildings, the way this is being accomplished is changing. Traditionally, the lateral bracing for the studs was provided by bracing elements within the wall like wood or metal blocking based on the type of construction that was being used. In addition, the lateral loads were being resisted by either discrete strapping, wood based panel sheathing, or by a discrete lateral force resisting system. This has also changed with a trend in utilizing the sheathing product as the lateral force resisting system and the element to provide the lateral support to the individual studs. The problem with this approach is that during a fire these materials are compromised or destroyed and the structural integrity is lost. The fire department applies water as part of the extinguishing effort and many of the interior sheathing products partially or completely lose their stiffness and strength as a result. After the initial extinguishment effort, the fire department then actively removes much of the remaining sheathing as part of a process called overhaul. The overhaul process is designed to identify the extent of the fire activity and ensure complete extinguishment. The result is further deterioration of the structural stability of the building and may result in a sudden collapse occurring.

One of the primary issues is that these walls are not easily identified in the field. As a result, firefighters and workers are not aware of what sheathing is acceptable to remove and what sheathing is critical for the stability of the building. The result of which will be the reduction of safety to the point where firefighters and first responders are injured or killed as a result.

The proposal helps address this issue, by requiring that the load carrying capabilities of the structural elements be accomplished without the use of sheathing and would require that positive blocking or strapping be used. These are readily identifiable and seldom removed without conscious thought.

I would like to respond to the committees comment that the increases required by this proposal are unwarranted. The nature of this proposal is seeking to balance the safety of the firefighters and first responders as required by the scope of the code with an identified shortcoming. This proposal allows the code to possibly achieve a similar level of safety that was previously enjoyed and expected prior to the move to leaning down the building to the point where a single issue could produce catastrophic failure. I would contend that this proposal does provide a level of balance that is consistent with the code process.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
See original proposal.

FS36-18

IBC: 708.4

Proposed Change as Submitted

Proponent: Paul Battaglia, STC Sound Control, representing STC Sound Control, President (paul@stcsoundcontrol.com)

2018 International Building Code

Revise as follows

708.4 Continuity. Fire partitions shall extend from the top of the foundation or floor/ceiling assembly below and be securely attached to one of the following:

1. The underside of the floor or roof sheathing, deck or slab above.
2. The underside of a floor/ceiling or roof/ceiling assembly having a fire-resistance rating that is not less than the fire-resistance rating of the fire partition.

Exceptions:

1. Fire partitions shall not be required to extend into a crawl space below where the floor above the crawl space has a minimum 1-hour fire-resistance rating.
2. Fire partitions serving as a corridor wall shall not be required to extend above the lower membrane of a corridor ceiling provided that the corridor ceiling membrane is equivalent to corridor wall membrane, and either of the following conditions is met:
 - 2.1. The room-side membrane of the corridor wall extends to the underside of the floor or roof sheathing, deck or slab of a fire-resistance-rated floor or roof above.
 - 2.2. The building is equipped with an automatic sprinkler system installed throughout in accordance with Section 903.3.1.1 or 903.3.1.2, including automatic sprinklers installed in the space between the top of the fire partition and underside of the floor or roof sheathing, deck or slab above.
3. Fire partitions serving as a corridor wall shall be permitted to terminate at the upper membrane of the corridor ceiling assembly where the corridor ceiling is constructed as required for the corridor wall.
4. Fire partitions separating tenant spaces in a covered or open mall building complying with Section 402.4.2.1 shall not be required to extend above the underside of a ceiling. Such ceiling shall not be required to be part of a fire-resistance-rated assembly, and the attic or space above the ceiling at tenant separation walls shall not be required to be subdivided by fire partitions.
5. Fire partitions shall be permitted to extend from the top of a floor underlayment system that is not a component of the floor/ceiling assembly where the building is equipped with an automatic sprinkler system installed throughout in accordance with Section 903.3.1.1 or 903.3.1.2.

Reason: This proposal is intended to allow *continuous* installation of floor underlayment systems, such as those required for impact noise isolation, without compromise to fire safety in buildings. Continuous installation will save 13% of system cost and speed construction. It will also provide isolation of structure-borne sound not possible with discontinuous underlayment installation.

Acoustical underlayment systems are required by IBC 1207.3 to attain high Impact Isolation Classification (IIC) ratings for floors in facilities with dwelling units and sleeping rooms. Continuous installation of underlayment is currently an integral part of many fire-rated floor/ceiling systems that include gypsum cement poured over acoustical mats, recycled newspaper mats, and plywood panels installed over rubber pads (ex: UL Design L563).

Fire partitions may be placed directly on top of these fire-rated floor/ceiling systems under the current IBC 708.4 since they are part of the fire-resistance rated floor/ceiling assembly. *There is no difference in construction details or fire behavior between adjacent rooms when fire partitions are placed on top of the underlayment systems whether the underlayment system is integral to the floor/ceiling system or it isn't.*

We propose that fire partitions should be allowed to be placed directly on these underlayment systems where they are *not* a part of the fire-rated system, especially where automatic sprinkler systems are installed. Furthermore, an underlayment system that performs as a component of a fire-rated floor/ceiling assembly will provide additional fire safety when added to an otherwise complete assembly.

Continuous installation of underlayment provides the additional benefit of structure-borne sound isolation between floors by creating a discontinuous path for sound and vibration between the underlayment and the subfloor.

Cost Impact: The code change proposal will decrease the cost of construction

Under current Code requirements a fire-rated partition must be installed on the top of the floor/ceiling assembly prior to placing the additional underlayment. The proposal will allow installation of underlayment systems over an entire building floor system prior to construction of any partitions, thus eliminating additional cutting and fitting around in-place partitions that add 13% to the system cost. It will also eliminate interruptions in the installation process and the related and unnecessary costs of remobilization.

	Fire Partitions in Place	Continuous Installation
Total Floor Area of Underlayment	11,240	11,586
Perimeter Length	1,943	564
Full Panels @ 4x8	352	363
Pads in Field @ 10 per panel	3,520	3,630
Pads at Perimeter @ 2'	972	282
Total Pads	4,492	3,912
Panel Cuts (feet) @ perimeter	1,943	564
Manhours for cuts @ 1.2 minutes/foot	39	11
Perimeter panels installed @ 4'	486	141
Material cost of pads @ \$0.9556	\$ 4,292.08	\$ 3,738.31
Material cost of panels @ \$31.16	\$ 10,968.32	\$ 11,311.08
Manhours: Pads @ 80/hour	56	49
Manhours: Panels @ 15/hour	56	34
Total Manhours	151	94
Total Material Costs	\$ 15,260.40	\$ 15,049.39
Total Labor Costs @ \$32/hour	\$ 4,827.32	\$ 3,000.96
Total Cost per Square Foot	\$ 1.79	\$ 1.56
Savings for continuous (%)	13%	
Per square foot savings	\$ 0.23	

FS36-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The provisions were found to be vague. What is meant by the phrase 'not a component'. The term 'underlayment' is not intended the same as one might use for the underlayment of flooring, and therefore should be defined, or a different word used. Overall there is insufficient information to guide the code user (Vote 12-2)

Assembly Action:

None

FS36-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Paul Battaglia, representing STC Sound Control, President (paul@stcsoundcontrol.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

SECTION 202 DEFINITIONS

Floor/Ceiling Assembly Floor construction with required fire protective materials that provide a fire-resistance rating.

Interior Floor Underlayment

Material or system of materials that is adhered, fastened, or placed on floor construction for patching, leveling, or acoustical purposes, including any supporting materials of 1/2-inch height or less such as sleepers, mats, spacers, or pads.

603.1 Allowable materials. Combustible materials shall be permitted in buildings of Type I or II construction in the following applications and in accordance with Sections 603.1.1 through ~~603.1.3~~603.1.27:

1. *Fire-retardant-treated wood* shall be permitted in:
 - 1.1. Nonbearing partitions where the required *fire-resistance rating* is 2 hours or less.
 - 1.2. Nonbearing *exterior walls* where fire-resistance-rated construction is not required.
 - 1.3. Roof construction, including girders, trusses, framing and decking.

Exception: In buildings of Type IA construction exceeding two *stories above grade plane*, *fire-retardant-treated wood* is not permitted in roof construction where the vertical distance from the upper floor to the roof is less than 20 feet (6096 mm).
 - 1.4. Balconies, porches, decks and exterior stairways not used as required exits on buildings three *stories* or less above grade plane.
2. Thermal and acoustical insulation, other than foam plastics, having a *flame spread index* of not more than 25.

Exceptions:

 1. Insulation placed between two layers of noncombustible materials without an intervening airspace shall be allowed to have a *flame spread index* of not more than 100.
 2. Insulation installed between a finished floor and solid decking without intervening airspace shall be allowed to have a *flame spread index* of not more than 200.
3. Foam plastics in accordance with Chapter 26.
4. Roof coverings that have an A, B or C classification.
5. *Interior floor finish* and floor covering materials installed in accordance with Section 804.
6. Millwork such as doors, door frames, window sashes and frames.
7. *Interior wall and ceiling finishes* installed in accordance with Section 803.
8. *Trim* installed in accordance with Section 806.
9. Where not installed greater than 15 feet (4572 mm) above grade, show windows, nailing or furring strips and wooden bulkheads below show windows, including their frames, aprons and show cases.
10. Finish flooring installed in accordance with Section 805.
11. Partitions dividing portions of stores, offices or similar places occupied by one tenant only and that do not establish a *corridor* serving an *occupant load* of 30 or more shall be permitted to be constructed of *fire-retardant-treated wood*, 1-hour fire-resistance-rated construction or of wood panels or similar light construction up to 6 feet (1829 mm) in height.
12. Stages and platforms constructed in accordance with Sections 410.2 and 410.3, respectively.
13. Combustible *exterior wall coverings*, balconies and similar projections and bay or oriel windows in accordance with Chapter 14 and Section 705.2.3.1.
14. Blocking such as for handrails, millwork, cabinets and window and door frames.
15. Light-transmitting plastics as permitted by Chapter 26.
16. Mastics and caulking materials applied to provide flexible seals between components of *exterior wall* construction.
17. Exterior plastic veneer installed in accordance with Section 2605.2.
18. Nailing or furring strips as permitted by Section 803.15.
19. Heavy timber as permitted by Note c to Table 601 and Sections 602.4.3 and 705.2.3.1.
20. Aggregates, component materials and admixtures as permitted by Section 703.2.2.
21. Sprayed fire-resistant materials and intumescent and mastic fire-resistant coatings, determined on the basis of *fire resistance* tests in accordance with Section 703.2 and installed in accordance with Sections 1705.14 and 1705.15, respectively.
22. Materials used to protect penetrations in fire-resistance-rated assemblies in accordance with Section 714.
23. Materials used to protect joints in fire-resistance-rated assemblies in accordance with Section 715.
24. Materials allowed in the concealed spaces of buildings of Types I and II construction in accordance with Section 718.5.
25. Materials exposed within plenums complying with Section 602 of the International Mechanical Code.
26. Wall construction of freezers and coolers of less than 1,000 square feet (92.9 m²), in size, lined on both sides with noncombustible materials and the building is protected throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.
27. Interior floor underlayment.

708.4 Continuity. Fire partitions shall extend from the top of the foundation or floor/ceiling assembly below and be securely attached to one of the following:

1. The underside of the floor or roof sheathing, deck or slab above.
2. The underside of a floor/ceiling or roof/ceiling assembly having a fire-resistance rating that is not less than the fire-resistance rating of the fire partition.

Exceptions:

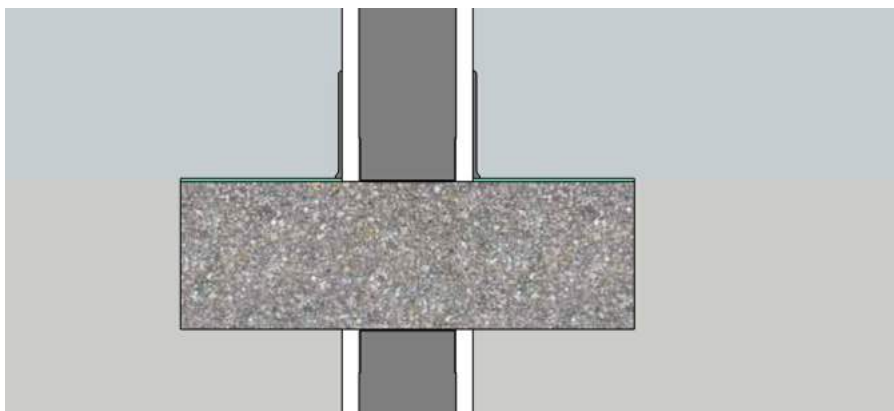
1. Fire partitions shall not be required to extend into a crawl space below where the floor above the crawl space has a minimum 1-hour fire-resistance rating.
2. Fire partitions serving as a corridor wall shall not be required to extend above the lower membrane of a corridor ceiling provided that the corridor ceiling membrane is equivalent to corridor wall membrane, and either of the following conditions is met:
 - 2.1. The room-side membrane of the corridor wall extends to the underside of the floor or roof sheathing, deck or slab of a fire-resistance-rated floor or roof above.
 - 2.2. The building is equipped with an automatic sprinkler system installed throughout in accordance with Section 903.3.1.1 or 903.3.1.2, including automatic sprinklers installed in the space between the top of the fire partition and underside of the floor or roof sheathing, deck or slab above
3. Fire partitions serving as a corridor wall shall be permitted to terminate at the upper membrane of the corridor ceiling assembly where the corridor ceiling is constructed as required for the corridor wall.
4. Fire partitions separating tenant spaces in a covered or open mall building complying with Section 402.4.2.1 shall not be required to extend above the underside of a ceiling. Such ceiling shall not be required to be part of a fire-resistance-rated assembly, and the attic or space above the ceiling at tenant separation walls shall not be required to be subdivided by fire partitions.
5. Fire partitions shall be permitted to extend from the top of ~~a~~ an interior floor underlayment system ~~that is not a component of the floor/ceiling assembly~~ where the building is equipped with an automatic sprinkler system installed throughout in accordance with Section 903.3.1.1 or 903.3.1.2.

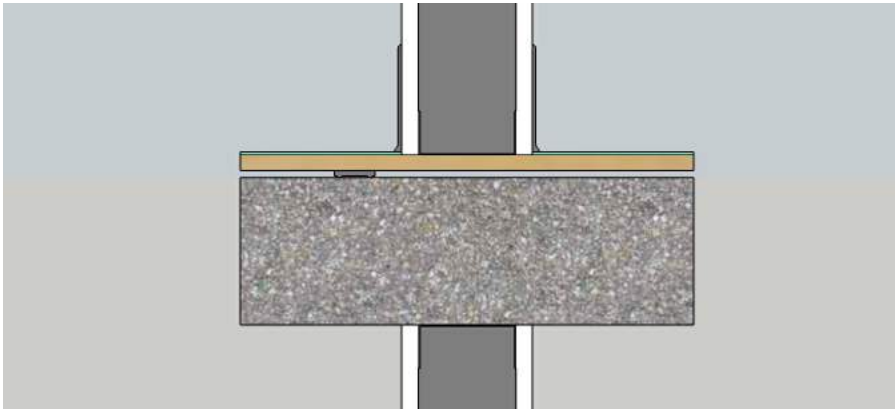
Commenter's Reason: This Public Comment supplements the Proposal and answers concerns raised at the Committee Hearings in April 2018. A definition of “interior floor underlayment” has been included. Also, a definition of “floor/ceiling assembly” is proposed since it has not yet been included in the Codes. “Interior floor underlayment” is included in the list of materials permitted in Construction Types I & II. The original proposal regarding continuity of fire partitions remains as an Exception, and includes fire protection.

Floor underlayment is not well-represented in the Codes. These commonly include luan plywood, recycled newspaper panels (Homasote), gypsum cement (Gypcrete) over polymeric filament mats (Acousti-mat), cork, recycled rubber mats (Regupol), and rubber pads supporting wood panels (Acoustic Sleeper). The majority of these systems are combustible, and they are not tested for critical radiant flux as are interior floor finishes (IBC 804).

Most of the interior floor underlayments that are commonly used in *non-combustible* construction have been tested and listed by Underwriters Laboratories as components of floor/ceiling assemblies in *combustible* construction. The details of fire partitions mounted on underlayment systems is a common occurrence with these UL Designs, and should be extended to non-combustible construction.

The Purpose of this proposal remains the same – eliminate an acoustical structure-borne sound flanking path that occurs as a result of the current Code language while retaining fire safety. The most effective example is a wall-mounted television set on a fire partition that is required to extend from the top of a concrete deck to the bottom of the deck above, with repetitious floor plans -- neighbors hear each others TV's quite efficiently. If the same partition were to be mounted on top of an acoustical underlayment system rather than directly on the deck, the sound path would be interrupted and privacy obtained.





Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Cost savings can be expected, approximately 13% of the underlayment system cost due to continuous installation as indicated in the proposal.

FS36-18

FS39-18

IBC: 710.5, 710.5.3

Proposed Change as Submitted

Proponent: John Williams, Chair, representing Healthcare Committee (AHC@iccsafe.org)

2018 International Building Code

Revise as follows

710.5 Openings. Openings in smoke partitions shall comply with Sections 710.5.1 and ~~710.5.2~~, through 710.5.3

Add new text as follows

710.5.3 Pass through openings in Group I-2 Condition 2. Where pass through openings are provided in smoke partitions in Group I-2, Condition 2 occupancies, such openings shall comply with the following:

1. Smoke compartment in which the pass through openings occur do not contain a patient care suite or sleeping room.
2. Pass through openings are installed in a door or vision panel that is not required to have a fire protection rating.
3. The top of the pass through opening is located a maximum of 48 inches above the floor.
4. The aggregate area of all such pass through openings within a single room shall not exceed 80 square inches (0.05m²).

Reason: At Section 710.5.3, the addition of pass through openings is to recognize important operational functions in the context of the corridor wall. There are several examples of this operational practice. Hospital pneumatic tube delivery systems cannot handle some materials and others where the shaking of the material compromises its effectiveness. In particular, chemotherapy, gross lab materials (tissue biopsy, small organ, etc.) and cash / checks are restricted from being delivered via pneumatic tube system, which is why walk-up pickup and delivery is still an important operational feature of some areas.

First, in a hospital pharmacy, air pressure relationships are established to keep a safe environment. From an operational standpoint, there are frequent pickups by patient care staff from an in-house pharmacy that require direct hand-off and signing of forms. In addition, there are basic security requirements from DEA and state pharmacy boards that require the pharmacy material to be secured, whether it is narcotics, opioids or chemotherapy materials. Opening and closing the door compromises the air relationships prescribed by the IMC Section 407.1, as well as security.

In a laboratory setting, air pressure relationships are critical, and many samples get delivered by hand through a pass-through. Cashier areas are set like a secured bank windows, due to the co-payment cash being delivered by staff, or a patient with a financial issue to be discussed.

This concept has existed in hospitals for a long time, because it has been allowed by the federal standard (K364). This code changes seeks to establish the same criteria to respond to the operational need of the corridor, while maintaining its integrity.

This proposal is submitted by the ICC Committee on Healthcare (CHC). The CHC was established by the ICC Board to evaluate and assess contemporary code issues relating to healthcare facilities. This is a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. In 2017 the CHC held 2 open meetings and numerous conference calls, *which included members of the committees as well as any interested parties, to discuss and debate the proposed changes.* Information on the CHC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CHC effort can be downloaded from the CHC website at: <https://www.iccsafe.org/codes-tech-support/cs/icc-committee-on-healthcare/>.

Cost Impact: The code change proposal will increase the cost of construction. Costs will increase with this change because it allows extra features to be added to an opening. However, it does not add cost to the healthcare industry because we already follow these requirements in the context of the federal standard.

FS39-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: We do need to coordinate with the federal standards, yet there was a concern that the openings are too large and perhaps shutter to reduce actual leakage. The committee suggested a modification to clarify that all 4 items must be complied with. (Vote 13-1)

Assembly Action:

None

FS39-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Williams, representing Healthcare Committee (ahc@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

710.5.3 Pass through openings in Group I-2 Condition 2. Where pass through openings are provided in smoke partitions in Group I-2, Condition 2 occupancies, such openings shall comply with all of the following:

1. The smoke ~~Smoke~~ compartment in which the pass through openings occur do not contain a patient care suite or sleeping room.
2. Pass through openings are installed in a wall, door or vision panel that is not required to have a fire ~~protection-resistance~~ rating.
3. The top of the pass through opening is located a maximum of 48 inches above the floor.
4. The aggregate area of all such pass through openings within a single room shall not exceed 80 square inches (0.05m²).

Commenter's Reason: The modification is in response to the improvements suggested by the committee and will provide greater clarification of the requirements.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. Costs will increase with this change because it allows extra features to be added to an opening. However, it does not add cost to the healthcare industry because we already follow these requirements in the context of the federal standard.

FS39-18

FS46-18

IBC: 202, 202, 714.2.1

Proposed Change as Submitted

Proponent: William Koffel, representing Firestop Contractors International Association (wkoffel@koffel.com)

2018 International Building Code

SECTION 202 DEFINITIONS

Add new definition as follows

FIRESTOP IDENTIFICATION DEVICE A label or placard, of any type, that identifies the firestop system.

Add new text as follows

714.2.1 Firestop identification devices. Penetration firestop systems shall be permanently identified with a device, label or other method. The device shall be handwritten with permanent ink, or pre-printed, legible tag or label, or format readable by an electronic device. The device shall be located on both sides of the fire barrier, smoke barrier or fire wall. The device shall at a minimum have the following information:

1. Listing system number or engineering judgement number.
2. Date of Installation
3. Installing company name, contact information.
4. Manufacturer name of the firestop system.
5. "Warning, Penetration Firestop System - Do Not Remove or Tamper."

Adhesive or mechanically attached identification devices shall be located within 6 inches (150 mm), of the penetration firestop system edge, on top of the horizontal assembly, 6 inches (150 mm) below or beside the firestop system. For multiple penetrations of the same listing number arranged within 6 inches (150 mm) of each other, the device shall be located centered under or within 6 inches (150 mm) to either side of the grouping. Hanging tags shall be attached to the penetrating item with permanent wire, string or plastic tie, within 6 inches (150 mm) of the assembly.

Reason: Installing penetration firestop systems looks as easy as applying red caulk to an assembly. Firestop systems are not easy to install. Firestop systems are very complex, detailed listed systems that take understanding of the tolerances so they work when called upon by fire.

This proposal adds a requirement to identify the firestop system used to maintain fire-resistance at the assembly. This is a way for the special inspection agency inspector, during construction, and building owner and manager, during the life of the building, to understand quickly what listing has been used. The listing has the information needed to evaluate the installation and maintain compliance during construction and through the building life cycle. It's not red caulk that's been installed. It's an assemblage of materials designed to keep fire from spreading outside the room of origin. The identification device makes the verification process much more efficient and effective.

Cost Impact: The code change proposal will increase the cost of construction

The cost of an identification device will add a very small amount to the cost of construction, but will decrease the cost of inspection and maintenance. The identification device cost per penetration firestop system is approximately \$0.10US per penetration.

FS46-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee, in part, saw the value of such systems, but not everyone. In addition the committee expressed a number of concerns. This doesn't help improper installations, field changes not reflected on plans and then changed again in the field. Nothing prohibits improper labelling. The contractors should provide this as part of showing their compliance with the code. The label on the wall of 1 or 2 hours, etc, should be enough to indicate the type of penetration protection. (Vote 8-6)

Assembly Action:

None

FS46-18

Individual Consideration Agenda

Public Comment 1:

Proponent: William Koffel, representing Firestop Contractors International Association (wkoffel@koffel.com) requests As Submitted.

Commenter's Reason: Clearly the Fire Safety Committee was split on the benefit of this change as evidenced by an 8-6 vote.

While the use of a firestop identification device does not, in and of itself, prevent incorrect installations, it certainly enhances the likelihood of proper oversight and enforcement. Providing the required marking on the wall simply identifies the assembly as have a certain characteristic, such as being a fire barrier. It does not provide any information regarding the protection of the penetrations of the assembly. With over 9,000 listed firestop systems in the UL s directory and thousands more in the FM Approval Guide and Intertek s directory, it s not easy to identify the system that was installed. The identification device provides an efficient method for the code official, owner s representative, and/or special inspection agency to identify what system was supposedly installed and whether the system is appropriate for the specific application. It also allows such individuals to then verify that the system was installed in accordance with the listing criteria and the manufacturer s installation instructions. Lastly, it provides the building owner with the system information so that the systems can be properly identified in the inventory required by the IFC and so that the proper maintenance and repair procedures, as identified in the manufacturer s installation instructions, can be identified and followed.

The Committee Reason states the contractors should provide such information as part of their way of demonstrating compliance with the code requirements. The FCIA membership agrees and the practice is common amongst many contractors. However, unless firestop identification systems are required by the Code, they will not be provided by all contractors.

The following photograph shows one application that would comply with the proposed language. It should be noted that there are other systems that utilize other technologies, such as bar coding, that would also provide the information and would be far less obvious to the occupants within the area.



Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. Some contractors provide the identification devices already and do it with competitive pricing such that one could say there is no increase in cost. The actual cost of the identification device is approximately \$0.10 US per penetration. Even if there is a small increase in the cost of construction, providing the information will most likely decrease the cost of inspection and maintenance.

FS46-18

Proposed Change as Submitted

Proponent: Homer Maiel, representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay) (hmaiel@gmail.com)

2018 International Building Code

Revise as follows

714.4.2 Membrane penetrations. *Membrane penetrations* shall comply with Section 714.4.1. Where walls or partitions are required to have a *fire-resistance rating*, recessed fixtures shall be installed such that the required *fire resistance* will not be reduced.

Exceptions:

1. *Membrane penetrations* of maximum 2-hour fire-resistance-rated walls and partitions by steel electrical boxes that do not exceed 16 square inches (0.0103 m²) in area, provided that the aggregate area of the openings through the membrane does not exceed 100 square inches (0.0645 m²) in any 100 square feet (9.29 m²) of wall area. The *annular space* between the wall membrane and the box shall not exceed 1/8 inch (3.2 mm). Such boxes on opposite sides of the wall or partition shall be separated by one of the following:
 - 1.1. By a horizontal distance of not less than 24 inches (610 mm) where the wall or partition is constructed with individual noncommunicating stud cavities.
 - 1.2. By a horizontal distance of not less than the depth of the wall cavity where the wall cavity is filled with cellulose loose-fill, rockwool or slag *mineral wool* insulation.
 - 1.3. By solid *fireblocking* in accordance with Section 718.2.1.
 - 1.4. By protecting both outlet boxes with *listed* putty pads.
 - 1.5. By other *listed* materials and methods.
2. *Membrane penetrations* by *listed* electrical boxes of any material, provided that such boxes have been tested for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing. The *annular space* between the wall membrane and the box shall not exceed 1/8 inch (3.2 mm) unless *listed* otherwise. Such boxes on opposite sides of the wall or partition shall be separated by one of the following:
 - 2.1. By the horizontal distance specified in the listing of the electrical boxes.
 - 2.2. By solid *fireblocking* in accordance with Section 718.2.1.
 - 2.3. By protecting both boxes with *listed* putty pads.
 - 2.4. By other *listed* materials and methods.
3. *Membrane penetrations* by electrical boxes of any size or type, that have been *listed* as part of a wall opening protective material system for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing.
4. *Membrane penetrations* by boxes other than electrical boxes, provided that such penetrating items and the *annular space* between the wall membrane and the box, are protected by an *approved membrane penetration firestop system* installed as tested in accordance with ASTM E814 or UL 1479, with a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water, and shall have an F and T rating of not less than the required *fire-resistance rating* of the wall penetrated and be installed in accordance with their listing.
5. The *annular space* created by the penetration of an automatic sprinkler, provided that it is covered by a metal escutcheon plate.
6. *Membrane penetrations* of maximum 2-hour fire-resistance-rated walls and partitions by steel electrical boxes that exceed 16 square inches (0.0103 m²) in area, or steel electrical boxes of any size having an aggregate area through the membrane exceeding 100 square inches (0.0645 m²) in any 100 square feet (9.29 m²) of wall area, provided that such penetrating items are protected by *listed* putty pads or other *listed* materials and methods, and installed in accordance with the listing.
7. The wall membrane of 1- or 2-hour fire-resistance-rated wall assemblies is permitted to be interrupted with a double wood end stud at the intersection of light frame wood wall assemblies provided: the intersecting wall has a membrane of 5/8 inch Type X gypsum, all penetrating items through the double wood stud are protected in accordance with Section 714.4.1.1 or 714.4.1.2, and the interrupted membrane is tight to the double wood stud. The cavity of the 1- or 2- hour fire-resistance-rated wall assembly shall be blocked solid with material suitable as a fire block in Section 718.2 if the wall membrane is interrupted on both sides of the wall within a single stud space.

Reason: This proposal provides an exception for wall assemblies similar to exception 7 currently in Section 714.5.2 for membrane penetrations of a horizontal assembly. Additional material suitable as a fire block is added to the wall cavity if a similar condition occurs on both sides of the 1- or 2- hour rated wall into the same stud cavity. Double studs at the intersection have an intrinsic fire resistance rating greater than the layer of 5/8" gypsum board and is suitable in this wall application similar to the horizontal assembly found in section 714.5.2.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal is merely guiding the user as to how to treat the intersection of two fire rated walls. In the absence of any current guidelines, this could potentially increase the cost of construction.

FS48-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approved based on proponent's reason statement. The new text parallels horizontal assembly protections. (Vote 11-2)

Assembly Action:

None

FS48-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Stephen Thomas, Colorado Code Consulting, LLC, representing Himself (stthomas@coloradocode.net)requests Disapprove.

Commenter's Reason: This proposal is trying to say that a wall intersection is a penetration. This is a bad precedent to set. They are trying to compare this to the case where a wall intersects a floor- or roof-ceiling assembly. That change was based on language in the UL Directory regarding non-rated walls intersecting rated horizontal assemblies. There is no similar language in the UL Directory regarding walls intersecting other walls. The proponent has not provided any documentation to show that this has been problem. Many UL Designs include the wall intersection in their tested assembly listing. No information was provided regarding the rating of the two walls. Is there a difference between a non-rated wall intersecting a rated wall and a rated wall intersecting a rated wall? There was also no information provided to show that there is a problem with wood, but not for steel stud walls. Is there a difference between the two types of materials? This language is not needed in the code. The only justification is that we do it for horizontal assemblies, so we should do the same for walls. There needs to be more technical justification to show the need for this change.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

If the item is disapproved, there will be no change to the cost of construction.

FS48-18

FS49-18

IBC: 714.4.3, 714.5.3

Proposed Change as Submitted

Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development Committee (lkranz@bellevuewa.gov)

2018 International Building Code

Revise as follows

714.4.3 Dissimilar materials. Noncombustible penetrating items shall not connect to combustible items beyond the point of firestopping unless it can be demonstrated that the *fire-resistance* integrity of the wall is maintained.

Exceptions:

1. Where dissimilar materials are used and the portion of the penetrating material extending into or through the fire-resistance rated assembly is combustible, the combustible material shall extend not less than 6 inches past both sides of the approved penetration firestop system before transitioning to non-combustible materials. The 6 inches shall be measured as the developed length and shall be continuous through all fittings and transitions.
2. Where dissimilar materials are used and the portion of the penetrating material extending into or through the fire-resistance rated assembly is non-combustible, the non-combustible material shall extend not less than 36 inches past both sides of the approved penetration firestop system before transitioning to combustible materials. The 36 inches shall be measured as the developed length and shall be continuous through all fittings and transitions.

714.5.3 Dissimilar materials. Noncombustible penetrating items shall not connect to combustible materials beyond the point of firestopping unless it can be demonstrated that the *fire-resistance* integrity of the *horizontal assembly* is maintained.

Exceptions:

1. Where dissimilar materials are used and the portion of the penetrating material extending into or through the fire-resistance rated assembly is combustible, the combustible material shall extend not less than 6 inches past both sides of the approved penetration firestop system before transitioning to non-combustible materials. The 6 inches shall be measured as the developed length and shall be continuous through all fittings and transitions.
2. Where dissimilar materials are used and the portion of the penetrating material extending into or through the fire-resistance rated assembly is non-combustible, the non-combustible material shall extend not less than 36 inches past both sides of the approved penetration firestop system before transitioning to combustible materials. The 36 inches shall be measured as the developed length and shall be continuous through all fittings and transitions.

Reason: Many plumbing system installations involve the combined use of combustible and noncombustible piping, drains, waste and vents. For example, cast iron (noncombustible) drains may be used for sound control but plastic (combustible) vents are combined on each story for cost savings. The reason for these designs is understandable but the integrity of fire-resistive rated construction may be compromised as a result of mixing these materials. The 6" and 36" dimensions are drawn from Section 8.3.5.5 of the 2015 edition of NFPA 101, which provides a method that maintains the integrity of the fire-resistive rated assembly as reflected in this proposal. This code change will also reduce delays and the cost of construction by eliminating the need for testing.

8.3.5.5 Transitions.

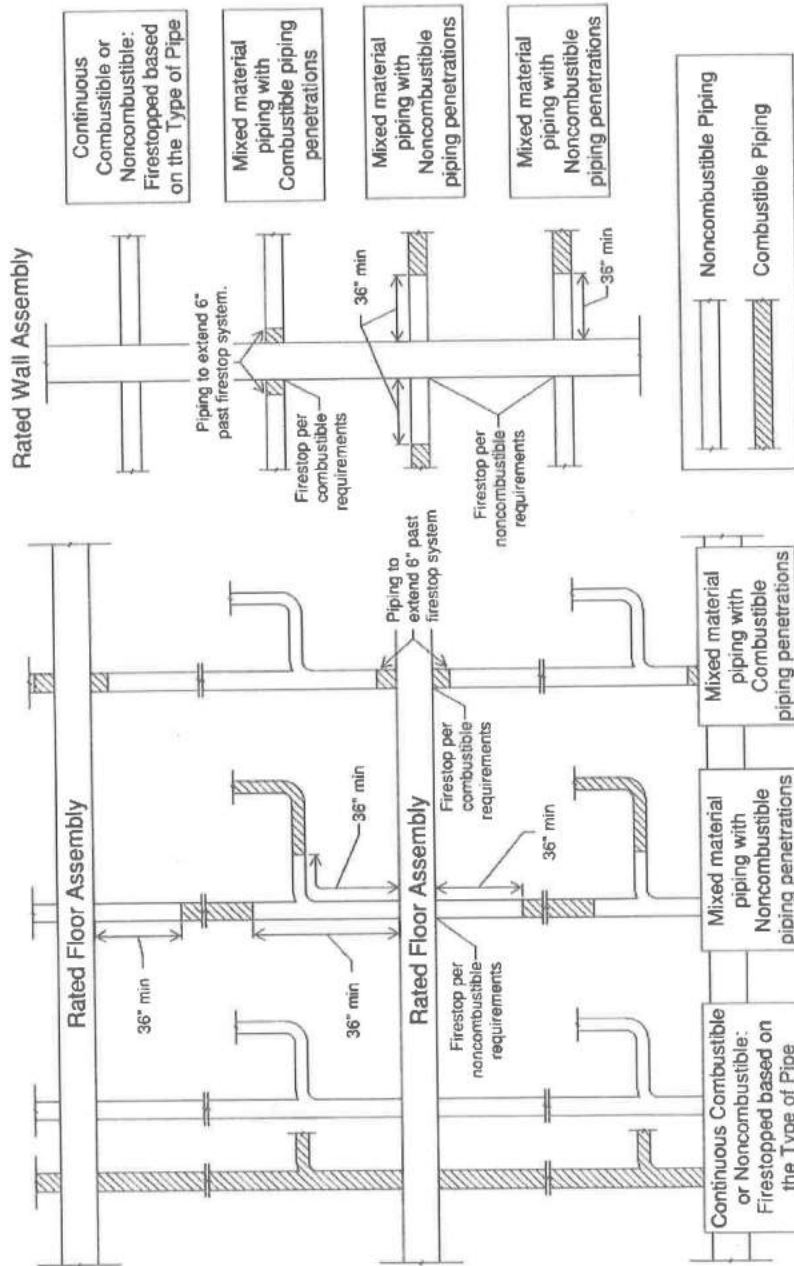
8.3.5.5.1

Where piping penetrates a fire resistance-rated wall or floor assembly, combustible piping shall not connect to noncombustible piping within 36 in. (915 mm) of the firestop system or device without demonstration that the transition will not reduce the fire resistance rating, except in the case of previously approved installations.

8.3.5.5.2

Unshielded couplings shall not be used to connect noncombustible piping to combustible piping unless it can be demonstrated that the transition complies with the fire-resistive requirements of [8.3.5.1](#).

Dissimilar Materials Penetrating a Rated Assembly
 IBC 714.3.3 & 714.4.3 and NFPA 101 8.3.5.5



Bibliography: 2015 Edition of NFPA 101, Section 8.3.5.5.1 and 8.3.5.5.2.

Cost Impact: The code change proposal will decrease the cost of construction

This code change will reduce the cost of construction by eliminating the need for testing.

FS49-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposal is not providing the clarity it seeks. There is concern about the insufficient testing. What is the science behind the 36 inch distance. Perhaps a more specific exception to the pipes which were the focus of the debate. (Vote 14-0)

Assembly Action:

None

FS49-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Lee Kranz, representing Washington Association of Building Officials Technical Code Development Committee (lkranz@bellevuewa.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

714.4.3 Dissimilar materials. Noncombustible penetrating items shall not connect to combustible items beyond the point of firestopping unless it can be demonstrated that the *fire-resistance* integrity of the wall is maintained:

Exception:

~~1. Where dissimilar materials are used and the portion of the penetrating material extending into or through the fire-resistance rated assembly is combustible, the combustible material shall extend not less than 6 inches past both sides of the approved penetration firestop system before transitioning to non-combustible materials. The 6 inches shall be measured as the developed length and must be continuous through all fittings and transitions.~~

~~2. Where dissimilar materials are used and the portion of the penetrating material extending into or through the fire-resistance rated assembly is non-combustible, the~~ Non-combustible materials shall be permitted to connect to combustible materials ~~shall extend not less than 36 inches past both sides of an the approved through-penetration firestop system before transitioning to combustible materials that has a T rating or is exempted from a T rating, in accordance with Section 714.4.1.2.~~ The 36 inches shall be measured as the developed length and must be continuous through all fittings and transitions.

714.5.3 Dissimilar materials. Noncombustible penetrating items shall not connect to combustible materials beyond the point of firestopping unless it can be demonstrated that the *fire-resistance* integrity of the *horizontal assembly* is maintained.

Exception:

- ~~1. Where dissimilar materials are used and the portion of the penetrating material extending into or through the fire-resistance rated assembly is combustible, the combustible material shall extend not less than 6 inches past both sides of the approved penetration firestop system before transitioning to non-combustible materials. The 6 inches shall be measured as the developed length and shall be continuous through all fittings and transitions.~~
- ~~2. Where dissimilar materials are used and the portion of the penetrating material extending into or through the fire-resistance rated assembly is non-combustible, the~~ Non-combustible material shall be permitted to connect to combustible materials ~~extend not less than 36 inches past both sides of the an approved penetration firestop system before transitioning to combustible materials that has a T-rating or is exempted from a T-rating, in accordance with Section 714.5.1.2.~~ The 36 inches shall be measured as the developed length and shall be continuous through all fittings and transitions.

Commenter's Reason: At the Committee Action Hearings in Columbus, it was pointed out that our original code change was flawed because it included an exception for combustible materials penetrating a fire-resistance rated floor or wall assembly but the charging language in both IBC Sections 714.4.3 and 714.5.3 applies only to noncombustible materials transitioning to combustible.

This Public Comment modifies the original code change to be consistent with NFPA 101, Section 8.3.5.5 which requires noncombustible materials to extend at least 36" past the membrane of a fire-resistance rated floor or wall assembly before transitioning to combustible materials. We presume this is to allow for conductive heat found in noncombustible materials to dissipate before the transition to combustible materials are made thereby reducing the potential for fire spread.

In this Public Comment, all references to combustible materials have been deleted. When combustible materials penetrate a fire-resistance rated floor or wall assembly conductive heat is not an issue and the code does not regulate the distance before a transition from combustible to noncombustible materials is made. The breach made in the fire-resistance rated wall or floor for combustible penetrating items will be protected by listed fire-stop assemblies which will "choke-off" the opening through the use of intumescent materials. The combustible materials will readily burn-away in a fire but the fire should not spread if an approved fire stop assembly is installed.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. If approved this code change will reduce the cost of construction by allowing for combustible and non-combustible transitions to occur without the need for tests to be required.

FS49-18

FS53-18

IBC: 202 (New), 202, 715.4, 715.4.1 (New), 715.5, 715.6, 715.7, 715.8, 1705.17

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Building Code

SECTION 202 DEFINITIONS

Add new definition as follows

PERIMETER FIRE CONTAINMENT SYSTEM. An assemblage of specific materials or products that are designed to resist for a prescribed period of time the passage of fire through voids created at the intersection of exterior curtain wall assemblies and fire-resistance-rated floor or floor/ceiling assemblies.

Revise as follows

~~[BF]~~ **F RATING.** The time period that the through-penetration firestop system or perimeter fire containment system limits the spread of fire through the penetration ~~when tested in accordance with ASTM E814 or UL 1479 or void.~~

~~**715.4 Exterior curtain wall/fire-resistance-rated floor intersection-intersections.** Where fire-resistance-rated floor or floor/ceiling assemblies are required, voids ~~voids~~ created at the intersection of the exterior curtain wall assemblies and ~~such floor fire-resistance-rated floor or floor/ceiling assemblies~~ shall be ~~sealed~~ protected with an approved perimeter fire containment system to prevent the interior spread of fire. Such systems shall ~~be securely installed and tested in accordance with ASTM E2307 to provide an F rating for a time period not less than the fire-resistance rating of the floor or floor/ceiling assembly.~~ Height and *fire-resistance* requirements for curtain wall spandrels shall comply with Section 705.8.5. **Exception:** ~~Voids created at the intersection of the exterior curtain wall assemblies and such floor assemblies where the vision glass extends to the finished floor level shall be permitted to be sealed with an approved material to prevent the interior spread of fire. Such material shall be securely installed and capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E119 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (0.254 mm) of water column (2.5 Pa) for the time period not less than the fire-resistance rating of the floor assembly.~~
705.8.5.~~

Add new text as follows

715.4.1 Fire test criteria. Perimeter fire barriers shall be tested in accordance with the requirements of ASTM E2307.

Exception: Voids created at the intersection of the exterior curtain wall assemblies and floor assemblies where the vision glass extends to the finished floor level shall be permitted to be protected with an approved material to prevent the interior spread of fire. Such material shall be securely installed and capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E119 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (0.254 mm) of water column (2.5 Pa) for the time period not less than the *fire-resistance rating* of the floor assembly.

Revise as follows

~~**715.4.1-715.5 Exterior curtain wall/nonfire-resistance-rated floor assembly intersections.** Voids created at the intersection of exterior curtain wall assemblies and nonfire-resistance-rated floor or floor/ceiling assemblies shall be ~~sealed~~ filled with an approved material or system to retard the interior spread of fire and hot gases between stories.~~

~~**715.4.2-715.6 Exterior curtain wall/vertical fire barrier intersections.** Voids created at the intersection of nonfire-resistance-rated exterior curtain wall assemblies and vertical fire barriers shall be filled. An approved material or system shall be used to fill the void and shall be securely installed in or on the intersection for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to retard the passage of fire and hot gases.~~

~~**715.5-715.7 Spandrel wall.** Height and *fire-resistance* requirements for curtain wall spandrels shall comply with Section 705.8.5. Where Section 705.8.5 does not require a fire-resistance-rated spandrel wall, the requirements of Section 715.4 shall still apply to the intersection between the spandrel wall and the floor.~~

~~715.6-715.8 Fire-resistant joint systems~~ **715.8 Fire-resistant joints and voids in smoke barriers.** *Fire-resistant joint systems protecting joints* in smoke barriers, and ~~joints~~ *perimeter fire containment systems protecting voids* at the intersection of a horizontal *smoke barrier* and an exterior curtain wall, shall be tested in accordance with the requirements of UL 2079 for air leakage. The L rating of the joint system shall not exceed 5 cfm per linear foot (0.00775 m³/s m) of joint at 0.30 inch (7.47-74.7 Pa) of water for both the ambient temperature and elevated temperature tests.

[BF] 1705.17 Fire-resistant penetrations and joints. In high-rise buildings or in buildings assigned to *Risk Category III or IV, special inspections for through-penetrations*, membrane penetration firestops, *fire-resistant joint systems* and ~~perimeter fire barrier containment systems~~ that are tested and *listed* in accordance with Sections 714.4.1.2, 714.5.1.2, 715.3 and 715.4 shall be in accordance with Section 1705.17.1 or 1705.17.2.

Reason: The primary intent of this proposal is to introduce the phrase “Perimeter Fire Containment Systemr” to describe the method of protecting the void at the intersection of an exterior curtain wall assembly and a fire-resistance-rated floor or floor/ceiling assembly. Having such a phrase simplifies the code language by having a short and concise phrase to describe such intersections. This proposal also creates consistency with other provisions of Section 715 which states voids which are not required to be tested to any particular fire test standards are to be “filled”, and joints and voids which are required to be tested to a specific standard are to be “protected”. The revisions to Section 715.8 are intended to update the section heading to include both types of joints and voids referenced in the body of the Section and include the new language perimeter fire barrier.

The proposal compliments a proposal which reorganizes Section 715.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will not increase or decrease the cost of construction. All changes are editorial in nature and as such will not change construction practices.

FS53-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: Modify proposal as follows:

715.4.1 Fire test criteria.

Perimeter fire ~~barriers~~containment systems shall be tested in accordance with the requirements of ASTM E2307.

Exception: Voids created at the intersection of the exterior curtain wall assemblies and floor assemblies where the vision glass extends to the finished floor level shall be permitted to be protected with an approved material to prevent the interior spread of fire. Such material shall be securely installed and capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E119 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (0.254 mm) of water column (2.5 Pa) for the time period not less than the fire-resistance rating of the floor assembly.

Committee Reason: Through the new term and its definition, we now have a common method of identifying what is needed to address voids created by the intersection of exterior curtain wall assemblies and the rated floor/ceiling assemblies. (Vote 13-0)

Assembly Action:

None

FS53-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Dustin J. Wakefield, PE, LEED AP, Virginia Department of General Services, representing Bureau of Capital Outlay Management requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

715.4 Exterior curtain wall/fire-resistance-rated floor intersections. Voids created at the intersection of exterior curtain wall assemblies and fire-resistance-rated floor or floor/ceiling assemblies shall be protected with an *approved* perimeter fire ~~containment system~~barrier to prevent the interior spread of fire. Such systems shall provide an *F rating* for a time period not less than the *fire-resistance rating* of the floor or floor/ceiling assembly. Height and *fire-resistance* requirements for curtain wall spandrels shall comply with Section 705.8.5.

715.4.1 Fire test criteria. *Perimeter fire* ~~containment systems~~barriers shall be tested in accordance with the requirements of ASTM E2307.

Exception: Voids created at the intersection of the exterior curtain wall assemblies and floor assemblies where the vision glass extends to the finished floor level shall be permitted to be protected with an approved material to prevent the interior spread of fire. Such material shall be securely installed and capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E119 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (0.254 mm) of water column (2.5 Pa) for the time period not less than the *fire-resistance rating* of the floor assembly.

715.8 Joints and voids in smoke barriers. *Fire-resistant joint systems protecting joints in smoke barriers, and perimeter fire* ~~containment systems~~barriers protecting voids at the intersection of a horizontal *smoke barrier* and an exterior curtain wall, shall be tested in accordance with the requirements of UL 2079 for air leakage. The L rating of the joint system shall not exceed 5 cfm per linear foot (0.00775 m³/s m) of joint at 0.30 inch (74.7 Pa) of water for both the ambient temperature and elevated temperature tests.

[BF] 1705.17 Fire-resistant penetrations and joints. In high-rise buildings or in buildings assigned to *Risk Category* III or IV, *special inspections for through-penetrations, membrane penetration firestops, fire-resistant joint systems* and perimeter fire ~~containment systems~~barriers that are tested and *listed* in accordance with Sections 714.4.1.2, 714.5.1.2, 715.3 and 715.4 shall be in accordance with Section 1705.17.1 or 1705.17.2.

PERIMETER FIRE CONTAINMENT SYSTEM-BARRIER. An assemblage of specific materials or products that are designed to resist for a prescribed period of time the passage of fire through voids created at the intersection of exterior curtain wall assemblies and fire-resistance-rated floor or floor/ceiling assemblies.

F RATING. The time period that the through-penetration firestop system or perimeter fire ~~containment system barrier~~ limits the spread of fire through the penetration or void.

Commenter's Reason: We do not believe the proposed change of terminology is appropriate. These listed joint systems at the intersection of rated floor assemblies and exterior curtain wall systems are tested in accordance with ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-Story Test Apparatus.

The proposal to change the name of these joint systems to Perimeter Fire Containment Systems does not appear to be supported by the code or the referenced standards, rather, this terminology tends to show up in various product manufacturers brochures and literature. Industry terminology should be aligning with the available technical data and governing codes - not the other way around.

It is therefore our opinion that the language in the IBC currently referencing Perimeter Fire Barriers should remain unchanged for consistency throughout the code and with the governing test standards.

Bibliography: <https://www.astm.org/Standards/E2307.htm>
Link created on 07/12/2018

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Since this is solely a terminology issue, there is no anticipated cost impact on the design or construction process.

FS53-18

FS54-18

IBC: 715.4, 715.5

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Building Code

Revise as follows

715.4 Exterior curtain wall/floor intersection. Where fire-resistance-rated floor or floor/ceiling assemblies are required, voids created at the intersection of the exterior curtain wall assemblies and such floor assemblies shall be sealed with an *approved* system to prevent the interior spread of fire. Such systems shall be securely installed and tested in accordance with ASTM E2307 to provide an *F rating* for a time period not less than the *fire-resistance rating* of the floor assembly. ~~Height and fire-resistance requirements for curtain wall spandrels shall comply with Section 705.8.5.~~

Exception: Voids created at the intersection of the exterior curtain wall assemblies and such floor assemblies where the vision glass extends to the finished floor level shall be permitted to be sealed with an approved material to prevent the interior spread of fire. Such material shall be securely installed and capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E119 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (0.254 mm) of water column (2.5 Pa) for the time period not less than the *fire-resistance rating* of the floor assembly.

715.5 Spandrel wall.~~Curtain wall spandrels.~~ Height and *fire-resistance* requirements for curtain wall spandrels shall comply with Section 705.8.5. Where Section 705.8.5 does not require a fire-resistance-rated spandrel wall, the requirements of ~~Section~~ Sections 715.4 and 715.4.1 shall still apply to the intersection between the spandrel wall and the floor.

Reason: This proposal accomplishes several goals. First, it deletes a redundant reference to Section 705.8.5 from Section 715.4. The same reference is also in Section 715.5 covering curtain wall spandrels. Second, it cleans up inconsistent references to the curtain wall spandrels between the title and the body of Section 715.5. Third, it clarifies that this requirement applies to both the void at the intersection of a fire-resistance-rated floor and the curtain wall, covered in Section 715.4, and the void at the intersection of a nonfire-resistance-rated floor and the curtain wall, covered in Section 715.4.1.

The proposal compliments a proposal which reorganizes Section 715.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will not increase or decrease the cost of construction. All changes are editorial in nature and as such will not change construction practices.

FS54-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The intent of the proposal was for consistent use of the term 'curtain wall spandrel'. There were at least 2 locations where the needed amendment was not proposed. The proponent is urged to return with a public comment. (Vote 12-1)

Assembly Action:

None

FS54-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

715.4 Exterior curtain wall/floor intersection. Where fire-resistance-rated floor or floor/ceiling assemblies are required, voids created at the intersection of the exterior curtain wall assemblies and such floor assemblies shall be sealed with an *approved* system to prevent the interior spread of fire. Such systems shall be securely installed and tested in accordance with ASTM E2307 to provide an *F rating* for a time period not less than the *fire-resistance rating* of the floor assembly.

Exception: Voids created at the intersection of the exterior curtain wall assemblies and such floor assemblies where the vision glass extends to the finished floor level shall be permitted to be sealed with an approved material to prevent the interior spread of fire. Such material shall be securely installed and capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E119 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (0.254 mm) of water column (2.5 Pa) for the time period not less than the *fire-resistance rating* of the floor assembly.

715.5 Curtain wall spandrels.. Height and *fire-resistance* requirements for curtain wall spandrels shall comply with Section 705.8.5. Where Section 705.8.5 does not require a fire-resistance-rated ~~spandrel~~ curtain wall spandrels, the requirements of Sections 715.4 and 715.4.1 shall still apply to the intersection between the ~~spandrel~~ curtain wall spandrels and the floor.

Commenter's Reason: During the Committee Action Hearings the Fire Safety Committee rightfully pointed out that FS54-18 failed to update two references to curtain wall spandrels in Section 715.5. As such, the proposal was disapproved. This Public Comment corrects those oversights.

This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

All changes are editorial in nature and as such will not change construction practices.

FS54-18

FS56-18

IBC: Table TABLE 716.1(2)

Proposed Change as Submitted

Proponent:

Kellie Saylor, OZ Architecture, representing Code Change Committee of Colorado Chapter of the International Code Council (ksaylor@ozarch.com)

2018 International Building Code

Revise as follows

TABLE 716.1(2)

OPENING FIRE PROTECTION ASSEMBLIES, RATINGS AND MARKINGS

TYPE OF ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING (hours)	DOOR VISION PANEL SIZE ^b	FIRE-RATED GLAZING MARKING DOOR VISION PANEL ^{c, e}	MINIMUM SIDELIGHT/TRANSOM ASSEMBLY RATING (hours)		FIRE-RATED GLAZING MARKING SIDELIGHT/TRANSOM PANEL	
					Fire protection	Fire resistance	Fire protection	Fire resistance
Fire walls and fire barriers having a required fire-resistance rating greater than 1 hour	4	3	See Note b	D-H-W-240	Not Permitted	4	Not Permitted	W-240
	3	3a	See Note b	D-H-W-180	Not Permitted	3	Not Permitted	W-180
	2	1½	100 sq. in.	≤100 sq. in. = D-H-90 >100 sq. in.=D-H-W-90	Not Permitted	2	Not Permitted	W-120
	1½	1½	100 sq. in.	≤100 sq. in. = D-H-90 >100 sq. in.= D-H-W-90	Not Permitted	1½	Not Permitted	W-90
Enclosures for shafts, interior exit stairways and interior exit ramps.	2	1½	100 sq. in. ^c	≤100 sq. in. = D-H-90 > 100 sq. in.= D-H-T-W-90	Not Permitted	2	Not Permitted	W-120

Horizontal exits in fire walls ^d	4	3	100 sq. in.	≤100 sq. in. = D-H-180 > 100 sq. in.=D-H-W-240	Not Permitted	4	Not Permitted	W-240	
	3	3 ^a	100 sq. in.	≤100 sq. in. = D-H-180 > 100 sq. in.=D-H-W-180	Not Permitted	3	Not Permitted	W-180	
Fire barriers having a required fire-resistance rating of 1 hour: Enclosures for shafts, exit access stairways, exit access ramps, interior exit stairways and interior exit ramps; and exit passageway walls	1	1	100 sq. in.	≤100 sq. in. = D-H-60 > 100 sq. in.=D-H-T-W-60	Not Permitted	1	Not Permitted	W-60	
Fire protection									
Other fire barriers	1	3/4	Maximum size tested	D-H	3/4	D-H			
Fire partitions: Corridor walls	1 0.5	1/3 ^b 1/3 ^b	Maximum size tested Maximum size tested	D-20 D-20	3/4 ^b 1/3	D-H-OH-45 D-H-OH-20			
Other fire partitions ^f	1 0.5	3/4 ^{1/3}	Maximum size tested Maximum size tested	D-H-45 D-H-20	3/4 ^{1/3}	D-H-45 D-H-20			
Exterior walls	3	1 1/2	100 sq. in. ^b	≤100 sq. in. = D-H-90 > 100 sq. in. = D-H-W-90	Not Permitted	3	Not Permitted	W-180	
	2	1 1/2	Maximum size tested	D-H 90 or D-H-W-90	1 1/2	2	D-H-OH-90	W-120	
	Fire protection								
	1	3/4	Maximum size tested	D-H-45	3/4	D-H-45			
Smoke barriers	Fire protection								
	1	1/3	Maximum size tested	D-20	3/4	D-H-OH-45			

For SI: 1 square inch = 645.2 mm.

- a. Two doors, each with a fire protection rating of 1½ hours, installed on opposite sides of the same opening in a fire wall, shall be deemed equivalent in fire protection rating to one 3-hour fire door.
- b. Fire-resistance-rated glazing tested to ASTM E119 in accordance with Section 716.1.2.3 shall be permitted, in the maximum size tested.
- c. Under the column heading "Fire-rated glazing marking door vision panel," W refers to the fire-resistance rating of the glazing, not the frame.
- d. See Section 716.2.5.1.2.1.
- e. See Section 716.1.2.2.1 and Table 716.1(1) for additional permitted markings.
- f. Two doors installed on opposite sides of the same opening in a fire partition shall both comply with the requirements in Table 716.1(2).

Reason:

Two doors installed on opposite sides of the same opening in a fire partition are common in adjoining hotel rooms. Currently the code is silent on the requirements for this type of "communicating" door. NFPA 101 states that only one door must be rated at a guest-to-guest room opening and some AHJ's rely on this as an interpretation since the IBC is silent. However, if only one door were rated and it was open when a fire started then the fire partition separating the rooms would be compromised. This code change proposal adds a footnote to Table 716.1(2) to indicate that both doors must be rated when installed on opposite sides of the same opening. This footnote is applied in the table under the Type of Assembly column at the row for "Other fire partitions".

Cost Impact: The code change proposal will not increase or decrease the cost of construction

The code change proposal will not increase or decrease the cost of construction. This code change proposal is only making a requirement more clear for a specific application. It is reasonable to assume that this is how the code is typically enforced for this application anyways so there will likely not be an increase or decrease in the cost of construction. .

FS56-18

Public Hearing Results

Errata:

A clearer version of the table was provided.

Committee Action:

Disapproved

Committee Reason:

There is no documentation of the two door design being an issue in the field. As the design is usually limited to connection just 2 guest rooms, the concern over fire spread is exaggerated. (Vote 8-6)

Assembly Action:

None

FS56-18

Individual Consideration Agenda

Public Comment 1:

Proponent:

Matt Archer, City of Lone Tree, representing City of Lone Tree (matt.archer@cityoflonetree.com) requests As Modified by This Public Comment

Replace as follows:

2018 International Building Code

TABLE 716.1(2)

OPENING FIRE PROTECTION ASSEMBLIES, RATINGS AND MARKINGS

TYPE OF ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING (hours)	DOOR VISION PANEL SIZE ^b	FIRE-RATED GLAZING MARKING DOOR VISION PANEL ^{c, e}	MINIMUM SIDELIGHT/TRANSOM ASSEMBLY RATING (hours)		FIRE-RATED GLAZING MARKING SIDELIGHT/TRANSOM PANEL	
					Fire protection	Fire resistance	Fire protection	Fire resistance
Fire walls and fire barriers having a required fire-resistance rating greater than 1 hour	4	3	See Note b	D-H-W-240	Not Permitted	4	Not Permitted	W-240
	3	3a	See Note b	D-H-W-180	Not Permitted	3	Not Permitted	W-180
	2	1½	100 sq. in.	≤100 sq. in. = D-H-90 >100 sq. in.=D-H-W-90	Not Permitted	2	Not Permitted	W-120
	1½	1½	100 sq. in.	≤100 sq. in. = D-H-90 >100 sq. in.= D-H-W-90	Not Permitted	1½	Not Permitted	W-90
Enclosures for shafts, interior exit stairways and interior exit ramps.	2	1½	100 sq. in. ^c	≤100 sq. in. = D-H-90 > 100 sq. in.= D-H-T-W-90	Not Permitted	2	Not Permitted	W-120

TYPE OF ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING (hours)	DOOR VISION PANEL SIZE ^b	FIRE-RATED GLAZING MARKING DOOR VISION PANEL ^c _e	MINIMUM SIDELIGHT/TRANSOM ASSEMBLY RATING (hours)		FIRE-RATED GLAZING MARKING SIDELIGHT/TRANSOM PANEL	
					Fire protection	Fire resistance	Fire protection	Fire resistance
Horizontal exits in fire walls ^d	4	3	100 sq. in.	≤100 sq. in. = D-H-180 > 100 sq. in.=D-H-W-240	Not Permitted	4	Not Permitted	W-240
	3	3 ^a	100 sq. in.	≤100 sq. in. = D-H-180 > 100 sq. in.=D-H-W-180	Not Permitted	3	Not Permitted	W-180
Fire barriers having a required fire-resistance rating of 1 hour: Enclosures for shafts, exit access stairways, exit access ramps, interior exit stairways and interior exit ramps; and exit passageway walls	1	1	100 sq. in.	≤100 sq. in. = D-H-60 > 100 sq. in.=D-H-T-W-60	Not Permitted	1	Not Permitted	W-60
					Fire protection			
Other fire barriers	1	3/4	Maximum size tested	D-H	3/4		D-H	
Fire partitions: Corridor walls	1 0.5	1/3b 1/3b	Maximum size tested Maximum size tested	D-20 D-20	3/4b 1/3		D-H-OH-45 D-H-OH-20	
Other fire partitions ^f	1 0.5	3/4 1/3	Maximum size tested Maximum size tested	D-H-45 D-H-20	3/4 1/3		D-H-45 D-H-20	
Exterior walls	3	1 1/2	100 sq. in. ^b	≤100 sq. in. = D-H-90 > 100 sq. in. = D-H-W-90	Not Permitted	3	Not Permitted	W-180
	2	1 1/2	Maximum size tested	D-H 90 or D-H-W-90	1 1/2	2	D-H-OH-90	W-120
						Fire protection		

TYPE OF ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING (hours)	DOOR VISION PANEL SIZE ^b	FIRE-RATED GLAZING MARKING DOOR VISION PANEL ^{c, e}	MINIMUM SIDELIGHT/TRANSOM ASSEMBLY RATING (hours)		FIRE-RATED GLAZING MARKING SIDELIGHT/TRANSOM PANEL	
					Fire protection	Fire resistance	Fire protection	Fire resistance
	1	3/4	Maximum size tested	D-H-45	3/4		D-H-45	
Smoke barriers					Fire protection			
	1	1/3	Maximum size tested	D-20	3/4		D-H-OH-45	

For SI: 1 square inch = 645.2 mm.

- a. Two doors, each with a fire protection rating of 1½ hours, installed on opposite sides of the same opening in a fire wall, shall be deemed equivalent in fire protection rating to one 3-hour fire door.
- b. Fire-resistance-rated glazing tested to ASTM E119 in accordance with Section 716.1.2.3 shall be permitted, in the maximum size tested.
- c. Under the column heading Fire-rated glazing marking door vision panel, W refers to the fire-resistance rating of the glazing, not the frame.
- d. See Section 716.2.5.1.2.1.
- e. See Section 716.1.2.2.1 and Table 716.1(1) for additional permitted markings.
- f. [Two doors, each with a fire rating of 20 minutes, installed on opposite sides of the same opening in a fire partition, shall be deemed equivalent in fire protection rating to one 45 minute fire door.](#)

Commenter's Reason:

This is to add clarification to existing text for situations when you have a series of doors in a rated partition, like you would see in a pass between shared hotel rooms. Based on the committee comments, they felt that if you had two 20 minute rated doors in the single frame in one hour fire partition between hotel rooms they would be equivalent to the 45 minute rated door assembly that is required in Table 716.1 (2). This new footnote would take the place of the new footnote language in the original proposal which would require both doors to be 45 minute rated.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This code change proposal is only making a requirement more clear for a specific application. It is reasonable to assume that this is how the code is typically enforced for this application anyways so there will likely not be an increase or decrease in the cost of construction.

Public Comment 2:

Proponent:

Timothy Pate, representing Colorado Chapter Code Change Committee (tpate@broomfield.org) requests As Submitted

Commenter's Reason:

This public comment is to request membership to overturn the committee and approve the original proposal. The proposal was to add clarification to the existing code to show that when you have a set of connector doors between adjoining hotel rooms they both need to be 45 minute rated. These walls are fire partitions and the only time you can have 20 minute rated doors is when they open into the fire rated corridor. All other doors in one hour rated fire partitions as per Table 716.1 (2) are required to be 45 minute rated. Some of the committee statements were that these doors are typically both closed when rooms are not rented together so if both were 20 minute rated then it would still provide adequate protection. I have researched and not been able to find any rated door and frame assemblies that have two 20 minute rated doors in a single frame that would get a 45 minute rating. I believe that it is important to provide the proper fire protected separation between hotel rooms especially considering the transient population that uses these rooms and are not familiar with their surroundings. It is always possible that one of these doors could be left open even though the other door is locked from the other side. In these cases you would only get the 20 minute rated separation at this opening. I have reviewed many hotel plans and they always show these connector doors to both be 45 minute rated so it is apparent that these national architects believe that is what the code intends.

I urge the membership to overturn the committee and approve the original proposal as submitted.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This is just to clarify the existing code requirements

FS56-18

FS60-18

IBC: 202, 202, 716.2.2.1.1

Proposed Change as Submitted

Proponent: John Woestman, Kellen Co., representing Builders Hardware Manufacturers Association (BHMA)
(jwoestman@kellencompany.com)

2018 International Building Code

SECTION 202 DEFINITIONS

Add new definition as follows

TERMINATED STOPS. Factory feature of a door frame where the stops of the door frame are terminated not more than 6 inches from the bottom of the door frame. Terminated stops are also known as "hospital stops" or "sanitary stops".

Revise as follows

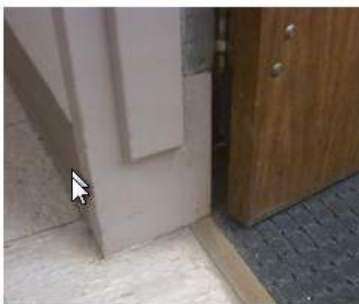
716.2.2.1.1 Smoke and draft control. The air leakage rate of the door assembly shall not exceed 3.0 cubic feet per minute per square foot ($0.01524 \text{ m}^3/\text{s} \times \text{m}^2$) of door opening at 0.10 inch (24.9 Pa) of water for both the ambient temperature and elevated temperature tests. Louvers shall be prohibited. Terminated stops shall be prohibited on doors required by Section 405.4.3 to comply with Section 716.2.2.1 and prohibited on doors required by Section 3006.3 Item 3, 3007.6.3, or 3008.6.3 to comply with Section 716.2.2.1.1.

Reason: The code today is silent regarding door frames with terminated stops. Interior door frames in many buildings have terminated stops, especially – but not only in – health care facilities. Some interior door frames in business occupancies, and other occupancies, may also have terminated stops.

Unfortunately, the IBC currently does not include an important requirement that door assemblies required to meet the testing requirements of UL1784 when tested without an artificial bottom seal, as required in IBC Sections 405.4.3, 3006.3(3), 3007.6.3, and 3008.6.3, should be prohibited from using door frames with terminated stops. This proposal addresses this oversight.

For other smoke and draft control door assemblies required to be tested to UL1784, this proposal is consistent with the testing requirements of UL 1784.

Terminated stops are a factory feature of a door frame, where the stops are terminated above the floor. The bottom of the stop is closed at a 45-degree or 90-degree angle. The purpose of terminated stops is to make it easier to clean that area of the floor without the extra corners to catch debris or pathogens, and to avoid getting moveable items caught on the stop. Terminated stops are also known as "hospital stops" or "sanitary stops."



Door frame with terminated stop.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal addresses what is currently allowed and prohibited in the code, but not explicitly "spelled out".

FS60-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The committee was convinced by the proponent's reasons statement. In addition, the doors are seeing wide ranging use in health care occupancies without documented issued. (Vote 11-3)

Assembly Action:

None

FS60-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Keith Pardoe, representing Pardoe Consulting, LLC (kpardoe@pardoeconsultingllc.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

SECTION 202 DEFINITIONS

TERMINATED STOPS. Factory feature of a door frame where the stops of the door frame are terminated not more than 6 inches from the bottom of the door frame. Terminated stops are also known as "hospital stops" or "sanitary stops".

716.2.2.1.1 Smoke and draft control. The air leakage rate of the door assembly shall not exceed 3.0 cubic feet per minute per square foot ($0.01524 \text{ m}^3/\text{s}\cdot\text{m}^2$) of door opening at 0.10 inch (24.9 Pa) of water for both the ambient temperature and elevated temperature tests. Louvers shall be prohibited.

Exceptions:

1. Doors ~~Terminated stops shall be prohibited on doors~~ required by Section 405.4.3 shall not be permitted to have door frames with terminated stops.
2. Doors required by Sections ~~to comply with Section 716.2.2.1 and prohibited on doors required by Section 3006.3 Item 3, 3007.6.3, or 3008.6.3 to comply with Section 716.2.2.1.1~~ shall not be permitted to have door frames with terminated stops.

Commenter's Reason: See Public Input 257, regarding FS60-18.

I recommend the committee consider approving the changes presented in this public input for the following reasons:

1) The change presented in FS60-18 is intended to address exceptions to the standard method of testing the air leakage-rate around swinging doors. That is to say, that in most applications the doors are permitted to be tested with an artificial door bottom that can extend up as much as 6 inches from the bottom of the door frames. When tested with an artificial door bottom seal, the door frames can have terminated stops.

2) There are several conditions where smoke and draft controls doors are used that require the air leakage-rate tests to be performed WITHOUT the artificial door bottom seal. Such conditions are elevator shafts, elevator lobby doors, etc. as pointed to by the references to sections 405.4.3, 3006.3 Item 3, 3007.6.3, and 3008.6.3 that specifically state the UL 1784 test shall be conducted WITHOUT an artificial door bottom seal.

3) Since above referenced sections are exceptions to the standard method of testing, they should be separated from the main provision of 716.2.2.1.1 and appropriately listed as being exceptions.

4) Another reason for separating terminated stops from the main provision is that terminated stops are not referenced in UL 1784, and it would likely create confusion among users in the field; leading to misapplication of these limited exceptions.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Approving this modification will not have a cost impact.

Public Comment 2:

Proponent: Keith Pardoe, Pardoe Consulting, LLC, representing Pardoe Consulting, LLC requests Disapprove.

Commenter's Reason: Please refer to PC 305 regarding FS60-18.

I recommend the committee disapprove this proposed change in its current form for the following reasons:

1) The placement and phrasing of the proposed change might create confusion as to where door frames of smoke and draft controls doors are permitted to have terminated stops. The proposed change addresses an exception to 716.2.2.1.1, which relies on users of the code to lookup the referenced sections. Some users of the code might assume the prohibition of terminated stops applies to all smoke and draft control doors, which is not the intent of this proposal.

2) NFPA 105, Standard for Smoke Door Assemblies and Other Opening Protectives (2016) edition, specifically section 6.3.2.2 permits the door frames to have terminated stops.

6.3.2.2 Door frames with terminated stops shall be permitted, provided the lowest portion of the terminated stops is not greater than 6 in. (152 mm) above the bottom of the frame.*

A.6.3.2.2 Door stops in the door frames are necessary elements that provide support for the installation of gasketing materials. Door frames with terminated stops are sometimes used in rooms or spaces where the floors are subject frequent cleaning. Terminated stops convert the lowest portion of the door frames to flat profile, eliminating corners where dirt and debris might be trapped. In these cases, smoke and draft control gasketing should extend the full height of the shortened frame soffit or door stop. See Figure A.6.3.2.2.

3) NFPA 105 requires smoked door assemblies to be tested in accordance with UL 1784, which apply to fire rated and non-fire rated smoke door assemblies. Where the IBC or other building codes reference the UL 1784 test do not prohibit the use of an artificial door bottom during the tests the door frames are permitted to have terminated stops. The artificial door bottom referred to in the proposal's reason statement, is a device that is used during the UL 1784 test to seal the bottom of the door assembly in order to more accurately measure the air-leakage rate along the vertical and top edges of the doors. (It is a piece of duct tape, in many cases.) More importantly, it is not a physical component that is installed on doors in the field.

4) Smoke and Draft Control doors do not require any type of gasketing or seal at door bottoms unless the doors are installed in a pressurized area (e.g., stair tower with smoke evacuation systems) as specified in NFPA 105 (See item 5.2.4.4.2 (6) and 6.7.1.4). In the case of swinging doors installed in elevator shafts and elevator lobbies, the neutral plane of a fire within the shafts might be below the floor level of doors serving these areas. Consequently, the IBC requires smoke and draft control doors in these applications to be tested without an artificial bottom seal, which means that door frames with cannot have terminated stops; and, the gasketing materials must form a continuous seal the along the full height of the doors.

5) An alternate version of this change is presented in PC 305.

FS60-18

FS73-18

IBC: 718.2.1

Proposed Change as Submitted

Proponent: Stephen DiGiovanni, representing ICC Ad Hoc Committee on Tall Wood Buildings (TWB) (TWB@iccsafe.org)

THIS CODE CHANGE WILL BE HEARD BY THE IBC GENERAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

2018 International Building Code

Revise as follows

718.2.1 Fireblocking materials. *Fireblocking* shall consist of the following materials:

1. Two-inch (51 mm) nominal lumber.
2. Two thicknesses of 1-inch (25 mm) nominal lumber with broken lap joints.
3. One thickness of 0.719-inch (18.3 mm) wood structural panels with joints backed by 0.719-inch (18.3 mm) wood structural panels.
4. One thickness of 0.75-inch (19.1 mm) particleboard with joints backed by 0.75-inch (19 mm) particleboard.
5. One-half-inch (12.7 mm) gypsum board.
6. One-fourth-inch (6.4 mm) cement-based millboard.
7. Batts or blankets of mineral wool, mineral fiber or other *approved* materials installed in such a manner as to be securely retained in place.
8. Cellulose insulation installed as tested for the specific application.
9. Mass timber complying with Section 2304.11.

Reason: The Ad Hoc Committee on Tall Wood Buildings (TWB) was created by the ICC Board to explore the science of tall wood buildings and take action on developing code changes for tall wood buildings. The TWB has created several code change proposals with respect to the concept of tall buildings of mass timber and the background information is at the end of this Statement. Within the statement are important links to information, including documents and videos, used in the deliberations which resulted in these proposals.

The purpose of this code change proposal is to recognize that mass timber as a suitable fireblocking material. The current list of acceptable materials lists “nominal lumber”, therefore since mass timber (e.g. Sawn, glued-laminated, and cross laminated timbers) are of greater mass the correlation from single nominal lumber to mass timber was determined to be of equal or greater blocking resistance to reduce the ability of fire, smoke and gasses from moving to different part of the building through combustible concealed spaces.

Background information: The ICC Board approved the establishment of an ad hoc committee for tall wood buildings in December of 2015. The purpose of the ad hoc committee is to explore the science of tall wood buildings and to investigate the feasibility and take action on developing code changes for tall wood buildings. The committee is comprised of a balance of stakeholders with additional opportunities for interested parties to participate in the four Work Groups established by the ad hoc committee, namely: Code; Fire; Standards/Definitions; and Structural. For more information, be sure to visit the ICC website <https://www.iccsafe.org/codes-tech-support/cs/icc-ad-hoc-committee-on-tall-wood-buildings/> (link active and up to date as of 12/27/17). As seen in the “Meeting Minutes and Documents” and “Resource Documents” sections of the committee web page, the ad hoc committee reviewed a substantial amount of information in order to provide technical justification for code proposals.

The ad hoc committee developed proposals for the followings code sections. The committee believes this package of code changes will result in regulations that adequately address the fire and life safety issues of tall mass timber buildings.

IBC Code Section	Description
403.3.2	Water supply requirements for fire pumps in high rise buildings of Type IVA and IVB construction.
504.3	Allowable building height (feet) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT construction.
504.4	Allowable building height (stories) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
506.2	Allowable building area for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
508.4.4.1 509.4.1.1 (new)	Requirements for mass timber building elements serving as fire barriers or horizontal assemblies in buildings of Type IVB of IVC construction.
602.4	Type of Construction requirements for new proposed types of construction: Types IVA, IVB and IVC. No changes to Type IV HT construction. Includes definitions for new terms: Mass timber and Noncombustible protection (mass timber). THIS IS THE KEY CODE CHANGE PROPOSAL WHICH OUTLINES THE CONSTRUCTION REQUIREMENTS FOR THE PROPOSED NEW TYPE OF MASS TIMBER BUILDINGS. THE PROPOSAL ALSO ADDRESSES CONCEALED SPACES, ADHESIVE PERFORMANCE AND EXTERIOR WALL PROTECTION.
703.8 (new)	The performance method to determine the increase to the fire resistance rating provided by noncombustible protection applied to the mass timber building element.
703.9 (new)	Requirements for sealants and adhesives to be placed at abutting edges and intersections of mass timber building elements. The reason statement references a Group B proposal to Chapter 17 for special inspection requirements of sealants and adhesives.
718.2.1	Requirements on the use of mass timber building elements used for Fireblocking.
722.7 (new)	Requirements for the fire resistance rating of mass timber elements, including minimum required protection and gypsum board attachment requirements.
3102	Requirements for membrane structures using Type IV HT construction.
Appendix	Requirements for walls, floors and roofs of Type IV HT construction in buildings located in Fire Districts.
IFC Code Section	Description
701.6	Requirements which stipulate the owner's responsibility to maintain inventory of all required fire resistance rated construction in buildings of Types IVA and IVB construction. This includes an annual inspection and proper repair where necessary.
3308.4 (new)	New special precautions during construction of buildings of Types IVA, IVB and IVC construction: Standpipes; Water supply for fire department connections; Noncombustible protection required for mass timber elements as construction height increases.
Proposed changes to be submitted in 2019 Group B	
IBC Chapter 17	Required special inspections of mass timber construction <ul style="list-style-type: none"> • Structural • Sealants and adhesives (see IBC 703.8)
IBC Chapter 23	An update to referenced standard APA PRG 320 Standard for Performance –rated Cross-laminated Timber which is currently undergoing revision to ensure the adequacy of the adhesives under fire conditions.

In addition, fire tests designed to simulate the three new construction types (Types IVA, IVB and IVC) in the ad hoc committee proposals were conducted at the Alcohol Tobacco and Firearms test lab facility. The TWB was involved in the design of the tests, and many members witnessed the test in person or online. The results of the series of 5 fire tests provide additional support for these proposals, and validate the fire performance for each of the types of construction proposed by the committee. The fire tests consisted of one-bedroom apartments on two levels, with both apartments having a corridor leading to a stair. The purpose of the tests was to address the contribution of mass timber to a fire, the performance of connections, the performance of through-penetration fire stops, and to evaluate conditions for responding fire personnel.

To review a summary of the fire tests, please visit <http://bit.ly/ATF-firetestreport>

To watch summary videos of the fire tests, please visit <http://bit.ly/ATF-firetestvideos>

Both of these links were confirmed active on 12/27/17.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This section provides information that was not previously set forth in the code, and does not change the requirements of current code, thus there is no cost impact when compared with present requirements.

FS73-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Mass timber is acceptable for fire blocking given the other materials on the list. (Vote: 14-0)

Assembly Action:

None

FS73-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Dan Nichols, representing ICC Code Correlation Committee (ccc@iccsafe.org).

Commenter's Reason: The Code Correlation Committee (CCC) is not taking a position on this code change. The CCC submitted this public comment in order to bring a correlation issue to the attention of the full voting membership for the Public Comment Hearings and the Online Governmental Consensus Vote to allow the voting membership to coordinate actions on a package of code changes submitted dealing with tall wood buildings of mass timber construction. This package includes the parent proposal G108-18; if disapproved, the related proposals G28-18, G75-18, G80-18, G84-18, G89-18, FS5-18, FS6-18, FS73-18, FS81-18 and F266-18, will not be correlated with any existing code text if they are approved.

The Code Correlation Committee is a standing committee of the International Code Council whose objectives, procedures and organization are set forth in Council Policy CP#44-13. The objective of the Code Correlation Committee is to maintain technical and editorial consistency among the International Codes and to assist staff in the evaluation and processing of code change proposals and comments that are exclusively editorial.

FS73-18

FS74-18

IBC: 718.2.6, 1402.5, 1406,1406.10.4, 1408.10.4, 2603.5.5, Chapter 35

Proposed Change as Submitted

Proponent: John Harrington, FM Global, representing FM Global (john.harrington@fmglobal.com)

2018 International Building Code

Revise as follows

718.2.6 Exterior wall coverings. *Fireblocking* shall be installed within concealed spaces of exterior wall coverings and other exterior architectural elements where permitted to be of combustible construction as specified in Section 1405 or where erected with combustible frames. *Fireblocking* shall be installed at maximum intervals of 20 feet (6096 mm) in either dimension so that there will be no concealed space exceeding 100 square feet (9.3 m²) between *fireblocking*. Where wood furring strips are used, they shall be of *approved* wood of natural decay resistance or preservative-treated wood. If noncontinuous, such elements shall have closed ends, with not less than 4 inches (102 mm) of separation between sections.

Exceptions:

1. *Fireblocking* of cornices is not required in single-family dwellings. *Fireblocking* of cornices of a two-family dwelling is required only at the line of dwelling unit separation.
2. *Fireblocking* shall not be required where the exterior wall covering is installed on noncombustible framing and the face of the exterior wall covering exposed to the concealed space is covered by one of the following materials:
 - 2.1. Aluminum having a minimum thickness of 0.019 inch (0.5 mm).
 - 2.2. Corrosion-resistant steel having a base metal thickness not less than 0.016 inch (0.4 mm) at any point.
 - 2.3. Other *approved* noncombustible materials.
3. *Fireblocking* shall not be required where the exterior wall covering has been tested in accordance with, and complies with the acceptance criteria of, NFPA 285, or the 16 foot parallel panel test as described in ANSI/FM 4880. The exterior wall covering shall be installed as tested in accordance with NFPA 285, or the 16 foot parallel panel test per ANSI/FM 4880.

1402.5 Vertical and lateral flame propagation. *Exterior walls* on buildings of Type I, II, III or IV construction that are greater than 40 feet (12 192 mm) in height above grade plane and contain a combustible *water-resistive barrier* shall be tested in accordance with and comply with the acceptance criteria of NFPA 285, or the 16 foot (4877 mm) parallel panel test as described in ANSI/FM 4880. For the purposes of this section, *fenestration* products, flashing of *fenestration* products and *water-resistive-barrier* flashing and accessories at other locations, including through wall flashings, shall not be considered part of the *water-resistive barrier*.

Exceptions:

1. Walls in which the *water-resistive barrier* is the only combustible component and the *exterior wall* has a wall covering of brick, concrete, stone, terra cotta, stucco or steel with minimum thicknesses in accordance with Table 1404.2.
2. Walls in which the *water-resistive barrier* is the only combustible component and the *water-resistive barrier* has a peak heat release rate of less than 150 kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354 and has a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².

1406.10.4 Full-scale tests. The MCM system shall be tested in accordance with, and comply with, the acceptance criteria of either NFPA-285, or the 16 foot parallel panel test as described in ANSI/FM 4880. Such testing shall be performed on the MCM system with the MCM in the maximum thickness intended for use.

1408.10.4 Full-scale tests. The HPL system shall be tested in accordance with, and comply with, the acceptance

criteria of either NFPA 285 or the 16 foot parallel panel test as described in ANSI/FM 4880. Such testing shall be performed on the HPL system with the HPL in the minimum and maximum thicknesses intended for use.

2603.5.5 Vertical and lateral fire propagation. The exterior wall assembly shall be tested in accordance with and comply with the acceptance criteria of either NFPA 285 or the 16 foot parallel panel test as described in ANSI/FM 4880.

Exceptions:

1. One-story buildings complying with Section 2603.4.1.4.
2. Wall assemblies where the foam plastic insulation is covered on each face by not less than 1-inch (25 mm) thickness of masonry or concrete and meeting one of the following:
 - 2.1. There is no airspace between the insulation and the concrete or masonry.
 - 2.2. The insulation has a flame spread index of not more than 25 as determined in accordance with ASTM E84 or UL 723 and the maximum airspace between the insulation and the concrete or masonry is not more than 1 inch (25 mm).

Update standard(s) as follows

CHAPTER **35 REFERENCED STANDARDS**

FM

FM Approvals
Headquarters Office 1151 Boston-
Providence Turnpike P.O. Box 9102
Norwood MA 02062

4880-~~2015~~2017:

Approval Standard for Class 1 Fire Rating of Building Panels or Interior Finish Materials

Reason: ANSI/FM 4880 is a consensus fire test standard that can be used to test fire exposure to the interior side or exterior side of exterior walls. The 16 ft parallel panel test is described in ANSI/FM 4880. The 16 ft parallel panel test as an alternative to the NFPA 285 test will not result in a related cost increase.

Bibliography: Agarwal, Gaurav, "Evaluation of the Fire Performance of Aluminum Composite Material (ACM) Assemblies using ANSI/FM 4880, FM Global Research Technical Report, December 20017.
Nam, Soonil and Bill, Robert G Jr. "A New Intermediate-scale Fire Test for Evaluating Building Material Flammability", SFPE Journal of Fire Protection Engineering, Feb 2009

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The proposal offers another method to determine use of the exception. No affect on cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, FM 4880-2017, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018. The 2015 edition of the standard is currently referenced. This proposal increases the use of the standard as well as proposes to go to the 2017 edition.

FS74-18

Public Hearing Results

Errata: The published proposal failed to include Section 1406.10.4 which was part of the proponent's submittal.

1406.10.4 Full-scale tests.

The MCM system shall be tested in accordance with, and comply with, the acceptance criteria of either NFPA-285, or the 16 foot parallel panel test as described in ANSI/FM 4880. Such testing shall be performed on the MCM system with the MCM in the maximum thickness intended for use.

Committee Action:

Disapproved

Committee Reason: There has not been sufficient testing of the new standard to provide clear answers. It is not equivalent to NFPA 285. The criteria in NFPA are clear and understood. There needs to be a broader range of testing. (Vote 14-0)

Assembly Action:

None

FS74-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Harrington, representing FM Global (john.harrington@fmglobal.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

1406.10.4 Full-scale tests. The MCM system shall be tested in accordance with, and comply with, the acceptance criteria of either NFPA 285, or the 16 foot parallel panel test as described in ANSI/FM 4880. Such testing shall be performed on the MCM system with the MCM in the maximum thickness intended for use.

1408.10.4 Full-scale tests. The HPL system shall be tested in accordance with, and comply with, the acceptance criteria of either NFPA 285 or the 16 foot parallel panel test as described in ANSI/FM 4880. Such testing shall be performed on the HPL system with the HPL in the minimum and maximum thicknesses intended for use.

Commenter's Reason: 4880 is a consensus fire that can be used to test fire exposure to the interior or exterior side of exterior walls. ANSI/FM 4881 is also a standard that refers to just exterior panels and within FM 4881 it points to ANSI/FM 4880 for the fire test requirements. ANSI/FM 4881 is a standard that will be introduced during this cycle with the Group B code proposals for reference standards to be included within ICC. The 16 ft parallel panel fire test is correlated to the 50 ft FM corner test and tests an inside re-entrant corner of the wall configuration. It uses a larger heat flux consistent for external fire exposures and also covers the lesser heat flux from an interior fire exposure. The parallel panel test does not look like a building configuration because it is a smaller scale test designed to recreate fire exposure created in a large scale fire with inside corners and larger heat flux exposure, and when you scale it down you need to modify the panels arrangement to recreate the needed heat flux. ANSI/FM 4880 and ANSI/FM 4881 can be run by any testing lab. The 16 ft parallel panel test is not a replacement for NFPA 285, it is another tool for the code to use to ensure buildings are built to limit fire spread when conditions beyond a flat exterior wall may exist.

Bibliography: No cost impact from this proposal.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposal offers another method to determine use of the exception. No affect on cost of construction.

Public Comment 2:

Proponent: Justin Koscher, Polyisocyanurate Insulation Manufacturers Association (jkoscher@pima.org); John Woestman, Kellen Company, representing Extruded Polystyrene Foam Association (jwoestman@kellencompany.org); Jay Crandell, ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council

(jcrandell@aresconsulting.biz)requests Disapprove.

Commenter's Reason: Please uphold the unanimous ICC Fire Safety Code Committee action for disapproval. In reaching its decision, the Committee cited the need for more research to fully assess the equivalency of NFPA 285 and the FM 4880 16-foot Parallel Panel Test (FM 4880 16' PPT). The proponent fails to provide sufficient supporting evidence and test data in order to prove that the FM 4880 16' PPT should be approved as an alternative method to the NFPA 285 test standard in the IBC. For example, the submitted justification contained a technical report that described only seven wall assemblies tested in accordance with FM 4880 16' PPT. The review then compared these results to similar assemblies evaluated using NFPA 285. Only four of these assemblies were actually tested to the NFPA 285 standard. The other three assemblies were evaluated by the proponent using data from engineering analyses.

Additionally, in June 2018, the NFPA Standards Council approved the NFPA Fire Test Committee's request to establish a new project to evaluate the suitability of the FM 4880 16' PPT as an alternative to NFPA 285, subject to two conditions: (1) window openings - or the lack thereof within the FM 4880 16' PPT - will need to be addressed; and (2) whether the application of any new document will be mandated by the Codes. Given these developments, the NFPA Fire Test Committee should be allowed to complete its work before ICC voting members give further consideration to this concept. Therefore, the proposal should be disapproved.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
None.

FS74-18

FS78-18

IBC: 722.2.3

Proposed Change as Submitted

Proponent: Michael Hill, representing Self

2018 International Building Code

Revise as follows

722.2.3 Concrete cover over reinforcement. The minimum thickness of concrete cover over reinforcement in concrete slabs, reinforced beams and prestressed beams shall comply with this section. The structural capacity of concrete slabs, reinforced beams and prestressed beams at elevated temperatures shall be determined by calculation.

Reason: Many engineers, architects and building officials do not fully understand the difference between the tables in sections 721 and 722. The proposed addition of text to this section will reinforce the requirement for the design professional to determine the capacity of the concrete members at elevated temperatures by engineering calculations.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Clarification only

FS78-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposal appears to be addressing structural capacity in the provisions regarding fire resistance. It adds an analysis that is not now required. This will add costs. It appears to be located in the wrong location of the code.. The existing section is about concrete cover, the code change is about structural strength. (Vote 14-0)

Assembly Action:

None

FS78-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael Hill, City of San Diego, representing City of San Diego requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

722.2.3 Concrete cover over reinforcement. The minimum thickness of concrete cover over reinforcement in concrete slabs, reinforced beams and prestressed beams shall comply with this section. The structural capacity of concrete slabs, reinforced beams and prestressed beams at elevated temperatures shall be determined by calculation as required by Section 722.1 and ACI 216.1/TMS 0216.

Commenter's Reason: The two measures for designing structural elements for fire resistance are limiting heat transmission and provide sufficient strength to prevent collapse in fire conditions. These measures are known as the heat transmission endpoint and the structural endpoint. The methods in Chapter 722 consider heat transmission endpoint by requiring sufficient mass (thickness) to prevent heat transmission to the opposite side of the element, but the structural endpoint is not considered in the minimum cover tables. This proposal would provide a pointer to the designer to address the structural requirements.

In response to the committee's opinion that the proposal should be located in a structural section, the provisions and procedures in ICC Section 722 including Tables 722.2.3(1) and 722.2.3(2) can be used to establish the fire resistance rating of materials and assemblies by calculation in lieu of the prescriptive requirements of ICC Section 721. Although structural requirements are usually found in the material chapters, the structural requirements for fire rated construction are not addressed in any other section of the ICC.

In response to the committee's opinion that this proposal will increase construction costs, the proposal is revised to provide additional reference to existing structural requirements. The proposal does not require any additional analysis above what is already required by ICC Section 722.1. ICC Section 722.1 permits the calculated fire resistance of concrete, concrete masonry and clay masonry in accordance with ACI 216.1/TMS 0216.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposed code change is for clarification only. The proposal does not require any analysis beyond what is already required by ICC Section 722.1.

Public Comment 2:

Proponent: Michael Hill, representing City of San Diego (mik1lyn@earthlink.net) requests As Submitted.

Commenter's Reason: The two measures for designing structural elements for fire resistance are limiting heat transmission and provide sufficient strength to prevent collapse in fire conditions. These measures are known as the heat transmission endpoint and the structural endpoint. The methods in Chapter 722 consider heat transmission endpoint by requiring sufficient mass (thickness) to prevent heat transmission to the opposite side of the element, but the structural endpoint is not considered in the minimum cover tables. This proposal would provide a pointer to the designer to address the structural requirements.

In response to the committee's opinion that the proposal should be located in a structural section, the provisions and procedures in ICC Section 722 including Tables 722.2.3(1) and 722.2.3(2) can be used to establish the fire resistance rating of materials and assemblies by calculation in lieu of the prescriptive requirements of ICC Section 721. Although structural

requirements are usually found in the material chapters, the structural requirements for fire rated construction are not addressed in any other section of the ICC.

In response to the committee's opinion that this proposal requires additional analysis that will increase construction costs, the proposal does not require any additional analysis above what is already required by ICC Section 722.1. ICC Section 722.1 permits the calculated fire resistance of concrete, concrete masonry and clay masonry in accordance with ACI 216.1/TMS 0216. The provisions and procedures in ICC Section 722 including Tables 722.2.3(1) and 722.2.3(2) can be used to establish the fire resistance rating of materials and assemblies by calculation in lieu of the prescriptive requirements of ICC Section 721.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposed code change is for clarification only. The proposal does not require any additional analysis.

FS78-18

FS81-18

IBC: 722.7, 722.7.1, Table TABLE 722.7.1(1), Table TABLE 722.7.1(2), 722.7.2, 722.7.2.1, 722.7.2.2

Proposed Change as Submitted

Proponent: Stephen DiGiovanni, representing ICC Ad Hoc Committee on Tall Wood Buildings (TWB) (TWB@iccsafe.org)

THIS CODE CHANGE WILL BE HEARD BY THE IBC GENERAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

2018 International Building Code

Add new text as follows

722.7 Fire resistance rating of mass timber. The required fire resistance of mass timber elements in Section 602.4 shall be determined in accordance with Section 703.2 or Section 703.3. The fire resistance rating of building elements shall be as required in Tables 601 and 602 and as specified elsewhere in this code. The fire resistance rating of the mass timber elements shall consist of the fire resistance of the unprotected element added to the protection time of the noncombustible protection.

722.7.1 Minimum required protection. Where required by Sections 602.4.1 through 602.4.3, noncombustible protection shall be provided for mass timber building elements in accordance with Table 722.7.1(1). The rating, in minutes, contributed by the noncombustible protection of mass timber building elements, components, or assemblies, shall be established in accordance with Section 703.8. The protection contributions indicated in Table 722.7.1(2) shall be deemed to comply with this requirement when installed and fastened in accordance with Section 722.7.2.

TABLE 722.7.1(1)
PROTECTION REQUIRED FROM NONCOMBUSTIBLE COVERING MATERIAL

<u>Required Fire Resistance Rating of Building Element per Tables 601 and 602 (hours)</u>	<u>Minimum Protection Required from Noncombustible Protection (minutes)</u>
<u>1</u>	<u>40</u>
<u>2</u>	<u>80</u>
<u>3 or more</u>	<u>120</u>

TABLE 722.7.1(2)
PROTECTION PROVIDED BY NONCOMBUSTIBLE COVERING MATERIAL

<u>Noncombustible Protection</u>	<u>Protection Contribution (minutes)</u>
<u>1/2 inch Type X Gypsum Board</u>	<u>30</u>
<u>5/8 inch Type X Gypsum Board</u>	<u>40</u>

722.7.2 Installation of gypsum board noncombustible protection. Gypsum board complying with Table 722.7.1(2) shall be installed in accordance with this section.

722.7.2.1 Interior surfaces. Layers of Type X gypsum board serving as noncombustible protection for interior surfaces of wall and ceiling assemblies determined in accordance with Table 722.7.1(1) shall be installed in accordance with the following:

1. Each layer shall be attached with Type S drywall screws of sufficient length to penetrate the mass timber at least 1 inch when driven flush with the paper surface of the gypsum board.

Exception: The third layer, where determined necessary by Section 722.7, shall be permitted to be attached with 1 inch #6 Type S drywall screws to furring channels in accordance with ASTM C645.

2. Screws for attaching the base layer shall be 12 inches on center in both directions.
3. Screws for each layer after the base layer shall be 12 inches on center in both directions and offset from the screws of the previous layers by 4 inches in both directions.
4. All panel edges of any layer shall be offset 18 inches from those of the previous layer.
5. All panel edges shall be attached with screws sized and offset as in items 1 through 4 above and placed at least 1 inch but not more than 2 inches from the panel edge.
6. All panels installed at wall-to-ceiling intersections shall be installed such that ceiling panels are installed first and the wall panels are installed after the ceiling panel has been installed and is fitted tight to the ceiling panel. Where multiple layers are required, each layer shall repeat this process.
7. All panels installed at a wall-to-wall intersection shall be installed such that the panels covering an exterior wall or a wall with a greater fire resistance rating shall be installed first and the panels covering the other wall shall be fitted tight to the panel covering the first wall. Where multiple layers are required, each layer shall repeat this process.
8. Panel edges of the face layer shall be taped and finished with joint compound. Fastener heads shall be covered with joint compound.
9. Panel edges protecting mass timber elements adjacent to unprotected mass timber elements in accordance with Section 602.4.2.2 shall be covered with 1-1/4 inch metal corner bead and finished with joint compound.

722.7.2.2 Exterior surfaces. Layers of Type X gypsum board serving as noncombustible protection for the outside of the exterior heavy timber walls determined in accordance with Table 722.7.1(1) shall be fastened 12 inches on center each way and 6 inches on center at all joints or ends. All panel edges shall be attached with fasteners located at least 1 inch but not more than 2 inches from the panel edge. Fasteners shall comply with one of the following:

1. Galvanized nails of minimum 12 Gage with a 7/16 inch head of sufficient length to penetrate the mass timber a minimum of 1 inch.
2. Screws which comply with ASTM C1002 (Type S, Type W, or Type G) of sufficient length to penetrate the mass timber a minimum of 1 inch.

Reason: The Ad Hoc Committee on Tall Wood Buildings (TWB) was created by the ICC Board to explore the science of tall wood buildings and take action on developing code changes for tall wood buildings. The TWB has created several code change proposals with respect to the concept of tall buildings of mass timber and the background information is at the end of this Statement. Within the statement are important links to information, including documents and videos, used in the deliberations which resulted in these proposals.

Typically, mass timber elements will be large due to structural requirements. In addition, CLT panels typically are utilized in odd number laminations. This typically results in excess capacity which means better fire endurance. Thus, mass timber elements are conservative in their fire resistance rating. Furthermore, the TWB decided to provide both a prescriptive path, as embodied in this proposal, and a performance path, embodied in another proposal.

This proposal outlines a method to calculate the fire resistance rating of a protected wood element by adding the fire resistance rating of the unprotected wood member together with the protection time provided by the noncombustible protection applied to the exposed wood.

This proposal should be considered as a companion proposal to the proposals creating new types of mass timber construction in Section 602.4 and the code proposal for Section 703.8 outlining a testing protocol to determine the contribution of noncombustible protection. This code proposal allows the user to select a prescriptive solution utilizing Type X gypsum wall board, which is deemed to comply with the basic requirements of this section and those of the proposed Section 602.4. Since this is a prescriptive solution, conditions of use such as attachment, finishing and edge treatment when bordering exposed mass timber areas, are also included in this section.

A proposal in Section 703.8 both forms the performance path for this determination and is the basis by which the contribution of the *Noncombustible Protection* to the fire resistance rating is determined. Testing of beams, columns, walls and ceiling panels has been used to establish the values found in table 722.7.1(b) for 1/2-inch Type X and 5/8-inch Type X gypsum board as well. Recent testing by AWC confirms the values derived from historic testing. A report is available at the following link: <http://bit.ly/WFC-firetestofGWBonCLT> . This link was confirmed active on 12/27/17.

Tests proposed in Section 703.8 may be used in the future to justify additional materials added to this table and should not be confused with "membrane protection" which is based on temperature rise on the unexposed side of a membrane attached to construction elements. Noncombustible construction is, instead, noncombustible material meeting the requirements of Section 703.5. Its contribution to the fire resistance rating of any building element is determined by this proposed new section. Simply put, it is determined by measuring the fire resistance time in minutes to the point of structural failure of a mass timber building element and then conducting a second test measuring the fire resistance time in minutes taken to the same point of structural failure. Each test is to be conducted with identical mass timber element

with identical load, construction and condition, but with the proposed noncombustible protection applied to the second assembly. The difference in time between the two samples is the contribution, in minutes, of the noncombustible protection.

Background information: The ICC Board approved the establishment of an ad hoc committee for tall wood buildings in December of 2015. The purpose of the ad hoc committee is to explore the science of tall wood buildings and to investigate the feasibility and take action on developing code changes for tall wood buildings. The committee is comprised of a balance of stakeholders with additional opportunities for interested parties to participate in the four Work Groups established by the ad hoc committee, namely: Code; Fire; Standards/Definitions; and Structural. For more information, be sure to visit the ICC website <https://www.iccsafe.org/codes-tech-support/cs/icc-ad-hoc-committee-on-tall-wood-buildings/> (link active and up to date as of 12/27/17). As seen in the “Meeting Minutes and Documents” and “Resource Documents” sections of the committee web page, the ad hoc committee reviewed a substantial amount of information in order to provide technical justification for code proposals.

The ad hoc committee developed proposals for the followings code sections. The committee believes this package of code changes will result in regulations that adequately address the fire and life safety issues of tall mass timber buildings.

IBC Code Section	Description
403.3.2	Water supply requirements for fire pumps in high rise buildings of Type IVA and IVB construction.
504.3	Allowable building height (feet) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT construction.
504.4	Allowable building height (stories) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
506.2	Allowable building area for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
508.4.4.1 509.4.1.1 (new)	Requirements for mass timber building elements serving as fire barriers or horizontal assemblies in buildings of Type IVB or IVC construction.
602.4	Type of Construction requirements for new proposed types of construction: Types IVA, IVB and IVC. No changes to Type IV HT construction. Includes definitions for new terms: Mass timber and Noncombustible protection (mass timber). THIS IS THE KEY CODE CHANGE PROPOSAL WHICH OUTLINES THE CONSTRUCTION REQUIREMENTS FOR THE PROPOSED NEW TYPE OF MASS TIMBER BUILDINGS. THE PROPOSAL ALSO ADDRESSES CONCEALED SPACES, ADHESIVE PERFORMANCE AND EXTERIOR WALL PROTECTION.
703.8 (new)	The performance method to determine the increase to the fire resistance rating provided by noncombustible protection applied to the mass timber building element.
703.9 (new)	Requirements for sealants and adhesives to be placed at abutting edges and intersections of mass timber building elements. The reason statement references a Group B proposal to Chapter 17 for special inspection requirements of sealants and adhesives.
718.2.1	Requirements on the use of mass timber building elements used for Fireblocking.
722.7 (new)	Requirements for the fire resistance rating of mass timber elements, including minimum required protection and gypsum board attachment requirements.
3102	Requirements for membrane structures using Type IV HT construction.
3314.7 (new)	New special precautions during construction of buildings of Types IVA, IVB and IVC construction: Standpipes; Water supply for fire department connections; Noncombustible protection required for mass timber elements as construction height increases.
Appendix	Requirements for walls, floors and roofs of Type IV HT construction in buildings located in Fire Districts.
IFC Code Section	Description
701.6	Requirements which stipulate the owner's responsibility to maintain inventory of all required fire resistance rated construction in buildings of Types IVA and IVB construction. This includes an annual inspection and proper repair where necessary.
Proposed changes to be submitted in 2019 Group B	
IBC Chapter 17	Required special inspections of mass timber construction <ul style="list-style-type: none"> • Structural • Sealants and adhesives (see IBC 703.8)
IBC Chapter 23	An update to referenced standard APA PRG 320 Standard for Performance –rated Cross-laminated Timber which is currently undergoing revision to ensure the adequacy of the adhesives under fire conditions.

In addition, fire tests designed to simulate the three new construction types (Types IVA, IVB and IVC) in the ad hoc committee proposals were conducted at the Alcohol Tobacco and Firearms test lab facility. The TWB was involved in the design of the tests, and many members witnessed the test in person or online. The results of the series of 5 fire tests provide additional support for these proposals, and validate the fire performance for each of the types of construction proposed by the committee. The fire tests consisted of one-bedroom apartments on two levels, with both apartments having a corridor leading to a stair. The purpose of the tests was to address the contribution of mass timber to a fire, the performance of connections, the performance of through-penetration fire stops, and to evaluate conditions for responding fire personnel.

To review a summary of the fire tests, please visit:

<http://bit.ly/ATF-firetestreport>

To watch summary videos of the fire tests, which are accelerated to run in 3 ½ minutes, please visit:

<http://bit.ly/ATF-firetestvideos>

Both of these links were confirmed active on 12/27/17.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This section provides information that was not previously set forth in the code, and does not change the requirements of current code, thus there is no cost impact when compared with present requirements.

Analysis: The referenced standards, ASTM C645 and ASTM C1002, are currently referenced in 2018 I-codes.

FS81-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: In the column of TABLE 722.7.1(2) that addresses 1/2 inch Type X Gypsum Board, change the protection contribution value (in minutes) to 25 instead of 30.

Committee Reason: The modification coordinates well with the existing language in the code. The committee recommends approval based upon the proponent's reason statement. (Vote: 14-0)

Assembly Action:

None

FS81-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael Kerner, ClarkDietrich Buildings Systems, representing ClarkDietrich Building Systems requests Disapprove.

Commenter's Reason: There are incorrect references to the types of screws to be used as well as an incorrect specification reference.

Paragraph 7.22.7.2.1, Item 1: Delete type S screws. These are not the type of screw for attaching gypsum board to wood members.

Under the "Exemption" the wrong ASTM specification is referenced. ASTM C645 should be deleted. This is a product specification, not an installation specification.

Paragraph 7.22.7.2.2, Item 2: Delete any reference to Type S and Type G screws. These are not the appropriate screws for attaching gypsum board to wood member. Type S screws are for attachment to cold-formed steel framing members and Type G screws are for attaching gypsum board to gypsum board.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There is no cost impact to disapproving the original proposal. See the cost impact statement contained in the proposal.

Public Comment 2:

Proponent: Adam Shoemaker, representing ClarkDietrich (adam.shoemaker@clarkdietrich.com) requests Disapprove.

Commenter's Reason: Proposed section 722.7.2.1 references the wrong type of screw for this application per ASTM standards, and C645 is not the correct reference for furring channel installation.

Proposed section 722.7.2.2 references the wrong type of screw for this application per ASTM standards.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

No cost impact.

Public Comment 3:

Proponent: Dan Nichols, representing ICC Code Correlation Committee (ccc@iccsafe.org).

Commenter's Reason: The Code Correlation Committee (CCC) is not taking a position on this code change. The CCC submitted this public comment in order to bring a correlation issue to the attention of the full voting membership for the Public Comment Hearings and the Online Governmental Consensus Vote to allow the voting membership to coordinate actions on a package of code changes submitted dealing with tall wood buildings of mass timber construction. This package includes the parent proposal G108-18; if disapproved, the related proposals G28-18, G75-18, G80-18, G84-18, G89-18, FS5-18, FS6-18, FS73-18, FS81-18 and F266-18, will not be correlated with any existing code text if they are approved.

The Code Correlation Committee is a standing committee of the International Code Council whose objectives, procedures and organization are set forth in Council Policy CP#44-13. The objective of the Code Correlation Committee is to maintain technical and editorial consistency among the International Codes and to assist staff in the evaluation and processing of code change proposals and comments that are exclusively editorial.

FS82-18

IBC: 803.9, IFC 803.9

Proposed Change as Submitted

Proponent: Marcelo Hirschler, GBH International, representing GBH International (gbhint@aol.com)

2018 International Building Code

Revise as follows

803.9 High-density polyethylene (HDPE) and polypropylene (PP)-Solid thermoplastics.. Where solid thermoplastics that melt and drip when exposed to flame, including but not limited to, polypropylene (PP), high-density polyethylene or polypropylene is (HDPE), solid polycarbonate, solid polystyrene, and solid acrylic materials, are used as an interior finish, ~~it~~they shall comply with Section 803.1.1.

2018 International Fire Code

[BF] 803.9 High-density polyethylene (HDPE) and polypropylene (PP)-Solid thermoplastics.. Where solid thermoplastics that melt and drip when exposed to flame, including but not limited to, polypropylene (PP), high-density polyethylene or polypropylene is (HDPE), solid polycarbonate, solid polystyrene, and solid acrylic materials, are used as an interior finish, ~~it~~they shall comply with Section 803.1.1.

Reason: The same reason that HDPE and PP are not permitted to be used as interior finish simply based on testing to ASTM E84 also applies to some solid thermoplastics that melt and drip when exposed to flame. For proper fire safety they should be tested to NFPA 286.

Note that this applies purely to interior finish and that it does not cover foam plastics, which are already required to be tested to NFPA 286 if used as interior finish.

Cost Impact: The code change proposal will increase the cost of construction. This will require more materials to be tested in accordance with a more rigorous (and more reliable) but more costly fire test.

FS82-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee determined there was no data presented to indicate there was a problem, the committee was unclear what the proposal applied to, and they had concerns for potential unintended consequences. (Vote 14-0).

Assembly Action:

None

FS82-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Marcelo Hirschler, representing GBH International (mmh@gbhint.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

803.9 High-density polyethylene (HDPE) and polypropylene (PP). Where high-density polyethylene or polypropylene is used as an *interior finish*, it shall comply with Section 803.1.1.

803.10 Thermoplastics other than foam plastics Where a thermoplastic material, other than a foam plastic, is used as an interior finish, it shall comply with Section 803.1.1.

Exception: Where a thermoplastic material, other than a foam plastic, is tested in accordance with ASTM E84 or UL 723 and the test report states that all portions of the test specimen ahead of the flame front remained in position during the test.

2018 International Fire Code

[BF] 803.9 High-density polyethylene (HDPE) and polypropylene (PP). Where high-density polyethylene or polypropylene is used as an interior finish, it shall comply with Section 803.1.1.

[BF] 803.10 Thermoplastics other than foam plastics Where a thermoplastic material, other than a foam plastic, is used as an interior finish, it shall comply with Section 803.1.1.

Exception: Where a thermoplastic material, other than a foam plastic, is tested in accordance with ASTM E84 or UL 723 and the test report states that all portions of the test specimen ahead of the flame front remained in position during the test.

Commenter's Reason: This public comment addresses the concerns expressed by the committee and commenters. The following has been changed: instead of talking about "solid" thermoplastics it talks about thermoplastics that are not foam plastics. It also replaces the terms "melt and drip" by the actual performance during the fire test, using language similar to that used elsewhere in the code, such as in sections on polypropylene siding and plastic composites. In ASTM E84 (Steiner tunnel) the material is exposed to a flame from below the test specimen. It is well known that some rigid thermoplastics (also known in the plastics industry as solid thermoplastics, as opposed to foamed thermoplastics) will melt when exposed to a flame from below. The result may be (if the test specimen melts and falls to the floor before the flame front reaches it) misleading because the test specimen is not actually exposed. The code recognizes that this behavior is typical of PP and HDPE, which is why the section requires that they be tested to NFPA 286 and not to ASTM E84 when used as interior finish. Therefore, the code change proposal (with the modifications) is intended to treat other rigid (not foamed) thermoplastics the same way as PP and HDPE. This code proposal does not affect foam plastics, which are properly covered by chapter 26.

Instead of placing the item in the same section a new section is proposed to be created. This proposal does not replace any code section but adds a new code section, both to the IBC and to the IFC.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction

This code proposal will require some plastic materials to be tested to a more expensive fire test (NFPA 286 instead of ASTM E84) because the test results from using ASTM E84 for those materials are inappropriate.

FS82-18

FS83-18

IBC: 803.9 (IFC [BF] 803.9)

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Bradley Corporation (JBENGINEER@aol.com)

2018 International Building Code

Revise as follows

803.9 High-density polyethylene (HDPE) and polypropylene (PP). Where high-density polyethylene or polypropylene is used as an *interior finish*, it shall comply with Section 803.1.1. Where high-density polyethylene toilet and urinal partitions are used, they shall comply with Section 1209 and the interior finish requirements of Section 803.1.1 or 803.1.2.

Reason: This proposal adds a requirement indicating that toilet and urinal partitions made of HDPE or PP are not regulated by this section. The interior finish requirements for toilet and urinal partitions would still apply, however, the Class of material in Table 803.3 would be the applicable requirements. The interior finish requirements are concerned with the fire aspects of a building component. However, there is no history of a fire concern with HDPE water closet and urinal. A study was completed by NFPA Research entitled, "Non-Residential Structure Fires That Originated in Lavatories, Locker Rooms or Coat Check Rooms," dated November 2017, authored by Marty Ahrens. The report shows no fire issue with water closet or urinal partitions. There are no fire deaths reported from fires originating in a commercial toilet room. The results are not surprising.

HDPE partition manufacturers have a framing system that protects the edges of the HDPE material. As a result, the HDPE partitions cannot readily ignite. The typical cause of a fire origin in a toilet room is the waste basket or electrical appliance. There is no fire ignition source in the vicinity of a water closet or urinal partition.

What must be understood is that while fire-retardant chemicals can be added to HDPE used for water closet and urinal partitions, however, the chemicals change the exterior surface requirements of the partitions. The fire-retardant chemicals make the surface more porous. It also makes the surface less scratch resistant. As a result, the partitions would no longer have the same cleanliness and sanitation aspect required for a water closet or urinal partition. This would in effect eliminate the acceptance of HDPE partitions.

The NFPA study clearly establishes that a fire hazard with HDPE water closet or urinal partitions does not exist. It is more important to emphasize the sanitary and health issues as identified in Section 1209.

Cost Impact: The code change proposal will decrease the cost of construction. The change will remove an unnecessary requirement for water closet and urinal partitions.

FS83-18

Public Hearing Results

Errata: Section numbers shown to indicate the coordinating section in the IFC that will change.

Committee Action:

Disapproved

Committee Reason: The committee did not find adequate fire issues associated with bathrooms to warrant the proposed requirements, and desired consistency with the G-7 decision, which was disapproval of a proposal to eliminate toilet room privacy partitions from the definition of Interior Wall and Ceiling Finish. (Vote 14-0)

Assembly Action:

None

FS83-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing American Society of Plumbing Engineers - Sr. Director of Technical and Regulatory Affairs (jbeengineer@aol.com); Andrew Klein, representing Building Owners and Managers Association International (andrew@asklein.com); Matt Sigler, Plumbing Manufacturers International, representing Plumbing Manufacturers International (msigler@safeplumbing.org); Ramiro Mata, representing American Society of Plumbing Engineers - Sr. Director of Technical and Regulatory Affairs (rmata@aspe.org)requests As Submitted.

Commenter's Reason: This change will allow toilet and urinal partitions to be evaluated in accordance with ASTM E84 or UL 723, as well as, NFPA 286. The current requirement only allow testing in accordance with NFPA 286. NFPA 286 is not an appropriate test for determining the viability of plastic toilet and urinal partitions. NFPA 286, often referred to as the room corner fire test, is a standard for fire testing of interior wall finish material and/or ceiling finish material to determine equivalency to a Class A material.

The intent of the standard is to evaluate the flammability characteristics of wall and ceiling finish material. The room size for the fire test is 8 feet wide by 12 feet long by 8 feet high. In order to perform this evaluation, wall finish material being tested is applied to the entire wall surface of three walls. The fire source for the test is a 12 inch by 12 inch by 6 inch high burner that is located in the corner against the two walls. The heat output of the burner is 40 kW (136,485 Btu/hr) for the first 5 minutes and 160 kW (549,942 Btu/hr) for the next 10 minutes. The burner is designed to have the flame reach the ceiling during the last 10 minutes of the test.

When testing interior wall finish material, the total amount of wall area covered by the material is 256 square feet. A toilet or urinal partition is not applied to a wall as an interior finish material. Furthermore, toilet and urinal partitions do not account for 256 square feet of surface area in a toilet room that is 8 feet by 12 feet in area. Toilet partitions are not even installed against a wall, they are installed out from a wall to provide a privacy barrier around a water closet. The wall serves as the privacy barrier for a corner or rear section of a water closet compartment. In a room 8 feet by 12 feet, only one water closet compartment would typically be installed based on ADA dimensional requirements. If a second water closet compartment was installed, there would not be adequate space, based on the Plumbing Code requirements, for the two lavatories that would also be required.

An ADA compartment would measure 56 inches by 60 inches. Partitions are 56 inches in height, typically installed 12 inches from the finished floor. The total square footage of the toilet partition would be 45 square feet; NOT 256 square feet of material.

The fire test required by NFPA 286 would require 5.7 times the surface area or material volume to be tested compared to what could possibly be installed in the test size room. Increasing the volume of material is a simple means of causing a failure during a fire test by adding an unrealistic fuel load. A more appropriate fire test would be of the anticipated volume of the material, as well as, anticipating the fire source.

Another fallacy of applying NFPA 286 to toilet partitions is the burner requirements during the test. The burner must provide a heat output of 40 kW or 136,485 Btu/hr for the first five minutes. For the remaining 10 minutes, the heat output must be 160 kW or 549,942 Btu/hr. This heat output requires an extensive fuel load to generate the equivalent heat release in an actual fire in a commercial toilet room.

Toilet partitions are only located in commercial toilet rooms or bathrooms. There is no fuel load of any significance in a commercial toilet room. There is no fuel source under a toilet partition, whereas the burner is applied directly to the toilet partition in the NFPA 286 test. Within the confines of a toilet partition is a water closet. The water closet is made of

vitreous china and filled with water. There is no fuel source. If a flush valve is connected to the water closet, the flush valve is made of brass, which is not a fuel source. The floors in commercial toilet rooms are ceramic tile, which do not burn.

The only fuel load associated with a commercial toilet room is typically a trash container and paper dispenser. However, both are located a distance away from a toilet partition. Other possible fuel loads in a commercial toilet room could be a baby changing station, which is made of the same material as a toilet partition but is not required to comply with NFPA 286. A plastic shower enclosure is another fuel load, which also is not required to comply with NFPA 286.

Hence, there is no fuel load in a commercial toilet room that can generate a heat release of 160 kW or 549,942 Btu/hr near a plastic toilet partition.

When a new fire test is added to the Building Code, a full analysis should be performed to determine its applicability. No such analysis was performed on plastic toilet partitions. If a proper fire analysis was performed, it would clearly show that NFPA 286 should not apply to toilet or urinal partitions. There is no fire concern with plastic toilet and urinal partitions.

Plastic toilet and urinal partitions have been installed for more than 25 years. NFPA Research, Data and Analytics Division prepared a report entitled, "Non-Residential Structure Fires That Originated in Lavatories, Locker Rooms or Coat Check Rooms," dated November 2017. Not one fire death was reported involving a plastic toilet or urinal partition. This is not surprising since there is no recorded fire problem associated with plastic toilet partitions.

The more important requirements for toilet and urinal partitions relate to sanitation and performance. Plastic toilet and urinal partitions do not facilitate the growth of bacteria. This is important in a toilet room environment to maintain proper sanitation. They are also readily cleanable.

Plastic toilet partitions are low maintenance and moisture resistant, even in extreme wet or humid environments. Plastic toilet and urinal partitions are fabricated from high density polyethylene (HDPE). Many manufacturers use an advanced formula of at least 30% pre-consumer recycled HDPE in their partitions.

From a performance standpoint there is a concern with toilet room partitions being subjected to vandalism, graffiti, and scratching. Plastic partitions are hard to scratch. This is verified by testing to ASTM D2197. Graffiti is easily removed. This is verified by testing to ASTM D6578. They are also hard to dent, which is verified by testing to ASTM D2794.

Based on performance and the lack of a fire problem, plastic toilet and urinal partitions should be permitted to be tested in accordance with ASTM E84 or UL 723 as a Class C interior finish material, not mandated to be a Class A material tested to NFPA 286.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This will lower the cost of construction by allowing Class C HDPE toilet and urinal partitions. There is no justification for prohibiting these partitions that have been successfully installed and used for more than 25 years.

FS83-18

FS85-18

IBC: Table TABLE 803.13

Proposed Change as Submitted

Proponent: Gregory Nicholls, representing The American Institute of Architects (gnicholls@preview-group.com)

2018 International Building Code

Revise as follows

**TABLE 803.13
INTERIOR WALL AND CEILING FINISH REQUIREMENTS BY OCCUPANCY**

GROUP	SPRINKLERED ¹			NONSPRINKLERED		
	Interior exit stairways and ramps and exit passageways ^{a, b}	<u>Enclosures for fire-resistive rated corridors, and enclosure for surfaces adjacent to exit access stairways and ramps, and unenclosed exit discharge elements</u> ^{a, n}	Rooms and enclosed spaces ^c	Interior exit stairways and ramps and exit passageways ^{a, b}	<u>Enclosures for fire-resistive rated corridors, and enclosure for surfaces adjacent to exit access stairways and ramps, and enclosed portions of exit discharge elements</u> ^{a, n}	Rooms and enclosed spaces ^c
A-1 & A-2	B	B	C	A	A ^d	B ^e
A-3 ^f , A-4, A-5	B	B	C	A	A ^d	C
B, E, M, R-1	B	C ^m	C	A	B	C
R-4	B	C	C	A	B	B
F	C	C	C	B	C	C
H	B	B	C ^g	A	A	B
I-1	B	C	C	A	B	B
I-2	B	B	B ^{h, i}	A	A	B
I-3	A	A ^j	C	A	A	B
I-4	B	B	B ^{h, i}	A	A	B
R-2	C	C	C	B	B	C
R-3	C	C	C	C	C	C
S	C	C	C	B	B	C
U	No restrictions			No restrictions		

For SI: 1 inch = 25.4 mm, 1 square foot = 0.0929 m².

a. Class C interior finish materials shall be permitted for wainscotting or paneling of not more than 1,000 square feet of applied surface area in the grade lobby where applied directly to a noncombustible base or over furring strips applied to a noncombustible base and fireblocked as required by Section 803.15.1.

- b. In other than Group I-3 occupancies in buildings less than three stories above grade plane, Class B interior finish for nonsprinklered buildings and Class C interior finish for sprinklered buildings shall be permitted in interior exit stairways and ramps.
- c. Requirements for rooms and enclosed spaces shall be based on spaces enclosed by partitions. Where a fire-resistance rating is required for structural elements, the enclosing partitions shall extend from the floor to the ceiling. Partitions that do not comply with this shall be considered to be enclosing spaces and the rooms or spaces on both sides shall be considered to be one room or space. In determining the applicable requirements for rooms and enclosed spaces, the specific occupancy thereof shall be the governing factor regardless of the group classification of the building or structure.
- d. Lobby areas in Group A-1, A-2 and A-3 occupancies shall be not less than Class B materials.
- e. Class C interior finish materials shall be permitted in places of assembly with an occupant load of 300 persons or less.
- f. For places of religious worship, wood used for ornamental purposes, trusses, paneling or chancel furnishing shall be permitted.
- g. Class B material is required where the building exceeds two stories.
- h. Class C interior finish materials shall be permitted in administrative spaces.
- i. Class C interior finish materials shall be permitted in rooms with a capacity of four persons or less.
- j. Class B materials shall be permitted as wainscoting extending not more than 48 inches above the finished floor in corridors and exit access stairways and ramps.
- k. Finish materials as provided for in other sections of this code.
- l. Applies when protected by an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.
- m. Corridors in ambulatory care facilities shall be provided with Class A or B materials.
- n. Unenclosed exit discharge elements include those providing the fire-resistive rated floors below

Reason: The current table does not clearly or adequately address what should be done with exit discharge elements allowed by Section 1028.1 exception 1. The reference to "lobbies" appears to be an antiquated reference to the older versions of the legacy codes that used that term in the exit discharge description. But the problem is that the intermediate space (such as a lobby or vestibule) allowed by the exception does not have to be enclosed when certain conditions are met, and is not an interior exit stairway, ramp or passageway.

This proposal seeks to revise the table to provide clear direction on where these exit discharge elements belong, and provide those spaces with requirements less restrictive than enclosed exit elements but more restrictive than typical spaces. Experience seeing numerous office and hotel lobbies used as an exit discharge element would lead us to believe that this table has not been applied to the finishes in exit discharge spaces, so this change also attempts to remain in focus to actual construction.

With these areas such as corridors, exit access elements and discharges which are often open to the rest of the floor, where does the authority of this table stop and start? For corridors that are not required to be rated, what difference is there between the spaces they can and often are open to and the corridor itself? So the proposal delineates fire-resistive corridors from others that can be treated as rooms and spaces. For the unenclosed exit access stairs and ramps and the unenclosed exit discharge elements, the new text provides some clarity that the limits of the finish ratings would only apply to the walls and ceilings by the ramps, stairs, vestibules and lobby/exit discharge path. The addition of footnote n provides for the rated floor below these elements required by the conditions in the exception to Section 1028.1.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The current code is not clear on what is required for finishes in exit discharge elements, so there is no comparative cost.

FS85-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee determined the current table is understandable and not in need of clarification. Furthermore they concluded corridors should not be split between sprinkled and non-sprinkled as proposed. (Vote 14-0)

Assembly Action:

None

FS85-18

Individual Consideration Agenda

Public Comment 1:

Proponent: David Collins, representing The American Institute of Architects (dcollins@preview-group.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

**TABLE 803.13
INTERIOR WALL AND CEILING FINISH REQUIREMENTS BY OCCUPANCY^k**

GROUP	SPRINKLERED ^l			NONSPRINKLERED		
	Interior exit stairways and ramps and exit passageways ^b	Enclosures for fire-resistive-rated corridors Corridors, and enclosure for surfaces adjacent to exit access stairways and ramps, and unenclosed exit discharge elements ^{a,n}	Rooms and enclosed spaces ^c	Interior exit stairways and ramps and exit passageways ^{a,b}	Enclosures for fire-resistive-rated corridors Corridors, and enclosure for surfaces adjacent to exit access stairways and ramps, and enclosed portions of exit discharge elements ^{a,n}	Rooms and enclosed spaces ^c
A-1 & A-2	B	B	C	A	A ^d	B ^e
A-3 ^f , A-4, A-5	B	B	C	A	A ^d	C
B, E, M, R-1	B	C ^m	C	A	B	C
R-4	B	C	C	A	B	B
F	C	C	C	B	C	C
H	B	B	C ^g	A	A	B
I-1	B	C	C	A	B	B
I-2	B	B	B ^{h, i}	A	A	B
I-3	A	A ^j	C	A	A	B
I-4	B	B	B ^{h, i}	A	A	B
R-2	C	C	C	B	B	C
R-3	C	C	C	C	C	C
S	C	C	C	B	B	C
U	No restrictions			No restrictions		

For SI:

1 inch = 25.4 mm, 1 square foot = 0.0929 m².

a. Class C interior finish materials shall be permitted for wainscotting or paneling of not more than 1,000 square feet of applied surface area in the grade lobby where applied directly to a noncombustible base or over furring strips applied to a noncombustible base and fireblocked as required by Section 803.15.1.

- b. In other than Group I-3 occupancies in buildings less than three stories above grade plane, Class B interior finish for nonsprinklered buildings and Class C interior finish for sprinklered buildings shall be permitted in interior exit stairways and ramps.
- c. Requirements for rooms and enclosed spaces shall be based on spaces enclosed by partitions. Where a fire-resistance rating is required for structural elements, the enclosing partitions shall extend from the floor to the ceiling. Partitions that do not comply with this shall be considered to be enclosing spaces and the rooms or spaces on both sides shall be considered to be one room or space. In determining the applicable requirements for rooms and enclosed spaces, the specific occupancy thereof shall be the governing factor regardless of the group classification of the building or structure.
- d. Lobby areas in Group A-1, A-2 and A-3 occupancies shall be not less than Class B materials.
- e. Class C interior finish materials shall be permitted in places of assembly with an occupant load of 300 persons or less.
- f. For places of religious worship, wood used for ornamental purposes, trusses, paneling or chancel furnishing shall be permitted.
- g. Class B material is required where the building exceeds two stories.
- h. Class C interior finish materials shall be permitted in administrative spaces.
- i. Class C interior finish materials shall be permitted in rooms with a capacity of four persons or less.
- j. Class B materials shall be permitted as wainscotting extending not more than 48 inches above the finished floor in corridors and exit access stairways and ramps.
- k. Finish materials as provided for in other sections of this code.
- l. Applies when protected by an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.
- m. Corridors in ambulatory care facilities shall be provided with Class A or B materials.
- n. Unenclosed exit discharge elements include those providing the fire-resistive rated floors below

Commenter's Reason: The committee rejected the portion of the proposal to have separate requirements for sprinkled and unsprinkled corridors, so that has been eliminated by this modification.

But, although the committee did indicate the existing table is understandable, they missed the problem of it being incomplete. The current Table 803.13 IBC does not tell the user what is required for unenclosed exit discharge elements, such as the exit discharge options in Section 1028.1, exceptions 1 and 2. Here the code allows exits to discharge to interior spaces without any classification in the current table. These level of exit discharge areas and vestibules are not: Interior exits or passageways, corridors, exit access stairways or ramps. They should not have the lowest level of finish materials, as allowed for typical rooms and enclosed spaces.

This proposed code change provides the appropriate compromise position between exits and rooms, and clarifies the code to prevent both too restrictive or too loose an interpretation of how to regulate finishes in exit discharge areas and vestibules.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

As the code currently is silent on this question, this should make it easier for the user to understand and apply the code.

FS85-18

Proposed Change as Submitted

Proponent: Theresa Weston, representing Air Barrier Association (theresa.a.weston@dupont.com)

2018 International Building Code

Revise as follows

1402.2 Weather protection. *Exterior walls* shall provide the building with a weather-resistant *exterior wall envelope*. The *exterior wall envelope* shall include flashing, as described in Section 1404.4. The *exterior wall envelope* shall be designed and constructed in such a manner as to prevent the accumulation of water within the wall assembly by providing a *water-resistive barrier* behind the exterior veneer, as described in Section 1403.2, and a means for draining water that enters the assembly to the exterior. Protection against condensation in the *exterior wall* assembly shall be provided in accordance with Section 1404.3 and Section C402.5 of the International Energy Conservation Code.

Exceptions:

1. A weather-resistant *exterior wall envelope* shall not be required over concrete or masonry walls designed in accordance with Chapters 19 and 21, respectively.
 2. Compliance with the requirements for a means of drainage, and the requirements of Sections 1403.2 and 1404.4, shall not be required for an *exterior wall envelope* that has been demonstrated through testing to resist wind-driven rain, including joints, penetrations and intersections with dissimilar materials, in accordance with ASTM E331 under the following conditions:
 - 2.1. *Exterior wall envelope* test assemblies shall include not fewer than one opening, one control joint, one wall/eave interface and one wall sill. Tested openings and penetrations shall be representative of the intended end-use configuration.
 - 2.2. *Exterior wall envelope* test assemblies shall be not less than 4 feet by 8 feet (1219 mm by 2438 mm) in size.
 - 2.3. *Exterior wall envelope* assemblies shall be tested at a minimum differential pressure of 6.24 pounds per square foot (psf) (0.297 kN/m²).
 - 2.4. *Exterior wall envelope* assemblies shall be subjected to a minimum test exposure duration of 2 hours.
- The *exterior wall envelope* design shall be considered to resist wind-driven rain where the results of testing indicate that water did not penetrate control joints in the *exterior wall envelope*, joints at the perimeter of openings or intersections of terminations with dissimilar materials.
3. *Exterior insulation and finish systems* (EIFS) complying with Section 1407.4.1.

Reason: Air leakage control is currently dealt with in the I-codes based on energy efficiency considerations, but it is also critical to protection against moisture condensation. Air leakage can move 100x more moisture than vapor diffusion, and vapor retarders will not work properly without air leakage control. As stated in the Whole Building Design Guide: *“Moisture contributed by air leakage is a significant source and should be a serious concern in the design of the wall system. In fact, the design of the building envelope for minimizing air leakage is more critical than the design of the vapor barrier.*

To illustrate this point, consider that the amount of moisture contributed to a building by the air that flows through a crack 1/16th inch thick by 1 foot long is just over 5 pints per day in a light breeze. In contrast, the amount of moisture contributed by vapor diffusion through a 10 foot by 50-foot painted block wall over the same period equals just under 1/3 of a pint (about 5 ounces).”

It is important to include air leakage control in Section 1402.2 as it will highlight its importance to moisture management and facilitate the inclusion of air leakage control in water management details.

Cost Impact: The code change proposal will increase the cost of construction. For jurisdictions that adopt both the IBC and IECC, there will be no cost impact as this proposed provision is already in existing code provisions. For jurisdictions that do not adopt the IECC, there will be increased cost of incorporating air barriers into the construction, but that cost will be offset by reducing air infiltration related condensation moisture issues and associated liability.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee determined the proposed requirements needs to be in the IBC, not provided as a reference to the IECC, and a limitation to the prescriptive approach was not desirable. (Vote 10-4).

Assembly Action:

None

FS91-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Theresa Weston, representing Air Barrier Association (theresa.a.weston@dupont.com)requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

1404.3 Vapor retarders. Vapor retarders as described in Section 1404.3.3 shall be provided in accordance with Sections 1404.3.1 and 1404.3.2, or an approved design using accepted engineering practice for hygrothermal analysis. Vapor retarders shall be installed in accordance with 1404.3.3

1404.3.3 Installation Vapor retarders shall be installed in accordance with the manufacturer s instructions or an approved design. Where a vapor retarder also functions as an air barrier, the vapor retarder shall be installed as a continuous air barrier in accordance with the International Energy Conservation Code.

Commenter's Reason: The committee appeared to agree with the concept that vapor retarders needed to be installed as or in conjunction with an air barrier, but was uncomfortable with a specific reference to the IECC sections. This public comment clarifies and focuses the original intent of the proposal to be specific the vapor barrier installation and only references the IECC so that a conflict will not occur between the IBC and the IECC.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This should not cause any cost increase, as it does not add new requirements. Rather it clarifies the installation of already required components.

FS91-18

FS93-18

IBC: 202 (New), 1402.2, 1404.5 (New), 1404.5.1 (New), 1404.5.2 (New), Chapter 35

Proposed Change as Submitted

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council (jcrandell@aresconsulting.biz)

2018 International Building Code

Add new definition as follows

WIND-DRIVEN RAIN INDEX. A representation of the combined climate effects of wind and rain which affect the magnitude and frequency of rain deposition on building exterior surfaces.

Revise as follows

1402.2 Weather protection. *Exterior walls* shall provide the building with a weather-resistant *exterior wall envelope*. The *exterior wall envelope* shall include flashing, as described in Section 1404.4. The *exterior wall envelope* shall be designed and constructed in such a manner as to prevent the accumulation of water within the wall assembly by providing a *water-resistive barrier* behind the exterior veneer, as described in Section 1403.2, and a means for draining water that enters the assembly to the exterior. Protection against condensation in the *exterior wall* assembly shall be provided in accordance with Section 1404.3. Where required by Section 1404.5, additional provisions for weather protection shall be provided.

Exceptions:

1. A weather-resistant *exterior wall envelope* shall not be required over concrete or masonry walls designed in accordance with Chapters 19 and 21, respectively.
2. Compliance with the requirements for a means of drainage, and the requirements of Sections 1403.2 and 1404.4, shall not be required for an *exterior wall envelope* that has been demonstrated through testing to resist wind-driven rain, including joints, penetrations and intersections with dissimilar materials, in accordance with ASTM E331 under the following conditions:
 - 2.1. *Exterior wall envelope* test assemblies shall include not fewer than one opening, one control joint, one wall/eave interface and one wall sill. Tested openings and penetrations shall be representative of the intended end-use configuration.
 - 2.2. *Exterior wall envelope* test assemblies shall be not less than 4 feet by 8 feet (1219 mm by 2438 mm) in size.
 - 2.3. *Exterior wall envelope* assemblies shall be tested at a minimum differential pressure of 6.24 pounds per square foot (psf) (0.297 kN/m²).
 - 2.4. *Exterior wall envelope* assemblies shall be subjected to a minimum test exposure duration of 2 hours.

The *exterior wall envelope* design shall be considered to resist wind-driven rain where the results of testing indicate that water did not penetrate control joints in the *exterior wall envelope*, joints at the perimeter of openings or intersections of terminations with dissimilar materials.

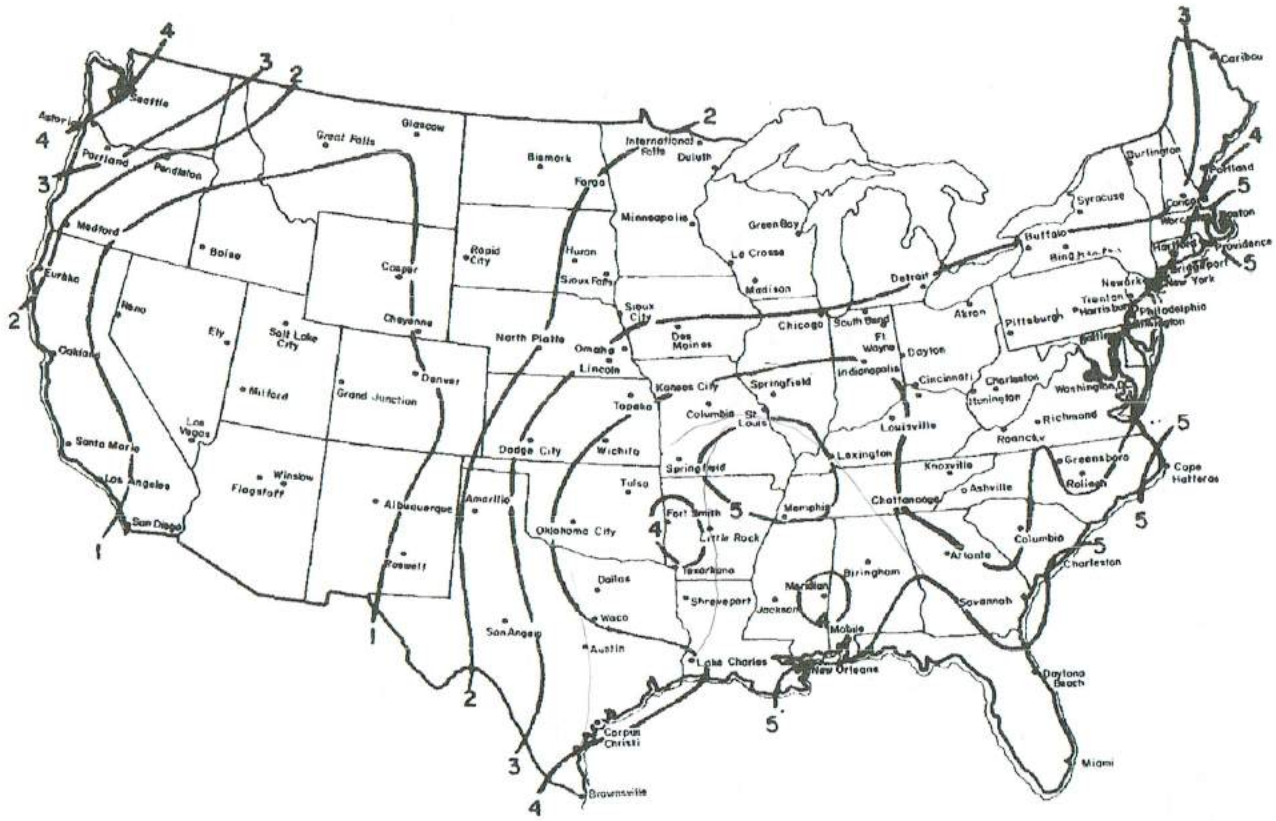
3. *Exterior insulation and finish systems* (EIFS) complying with Section 1407.4.1.

Add new text as follows

1404.5 Additional provisions for weather protection. The provisions of Section 1404.5.1 and 1404.5.2 shall apply in the required wind-driven rain index and climate zones and, where not required, shall be permitted.

1404.5.1 Enhanced drainage. Where the wind-driven rain index of Figure 1404.5.1 is 4 or greater, the means of drainage required by Section 1402.2 shall be satisfied by one of the following:

1. A drained air space not less than nominal 3/16-inch deep behind the cladding,
2. An open drainage material, not less than nominal 1/4-inch thick and with a cross-section area that is not less than 80 percent open, installed between the cladding and backing,
3. Hollow-backed metal or vinyl siding installed in accordance with the manufacturer's instructions, or
4. An approved drainage design with drainage performance at least equivalent to Items 1, 2, or 3, or not less than 90 percent drainage efficiency as measured in accordance with ASTM E 2273 or Annex A2 of ASTM E 2925.



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1404.5.1
WIND-DRIVEN RAIN INDEX

1404.5.2 Protection against inward vapor drive. Where claddings addressed in Sections 1404.10 and 1404.15 are used in Climate Zones 1A, 2A, or 3A in accordance with Chapter 3 of the International Energy Conservation Code and installed over wood-based or gypsum-based sheathing, a ventilated air space shall be provided in accordance with Exception 2 in Section 2510.6 and drainage shall be provided in accordance with Items 1, 2, or 4 of Section 1404.5.1.

Exceptions:

1. An approved drainage and ventilation design, including vent inlets and outlets, with ventilation performance at least equivalent to Items 1 or 2 of Section 1404.5.1 as measured in accordance with Annex A1 of ASTM E 2925.
2. An air space for ventilation shall not be required where foam plastic insulating sheathing complying with ASTM C 578 or ASTM C 1289 is located between the cladding and the wood-based or gypsum-based sheathing.

Add new standard(s) follows

CHAPTER 35 REFERENCED STANDARDS

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box
C700
West Conshohocken PA 19428-2959
US

E2925-17:

Standard Specification for Manufactured Polymeric Drainage and Ventilation Materials Used to Provide a Rainscreen Function

Reason: Proposed new Section 1404.5 is needed to provide adequate moisture performance for exterior wall coverings

and vulnerable wall materials in hazardous climate conditions that are prone to cause moisture problems. In these cases, the generic minimum weather protection practices in the code are unreliable and increase the risk of moisture durability problems including material degradation, rot, and mold. This proposal will serve to address this problem and provide risk-consistent solutions in coordination with climate hazards (e.g., wind-driven rain) as they vary across the U.S. In regions of low-to-moderate hazard, this proposal requires no change in practice but permits the enhanced provisions to be used.

First, the existing exceptions in Section 1402.2 are unchanged. Therefore, where these existing exceptions apply, the enhanced requirements of proposed Section 1404.5 would not apply because the charging language for use of Section 1404.5 is located in Section 1402.2.

Second, the provisions of proposed Section 1404.5 are required only in the more extreme climates of the U.S. with regard to moisture effects on exterior walls of buildings. However, the practices employed are beneficial in all climates; therefore, they are permitted to be used in other climate conditions.

Within Section 1404.5, proposed Section 1404.5.1 addresses drainage for exterior wall coverings in climates with significant wind-driven rain hazard. In these climates, the need for enhanced drainage is well understood from experience and research. For example, these provisions are modeled very closely after provisions found in the National Building Code of Canada (Section 9.27) as applied to climates with significant wind-driven rain. The NBC provisions were necessitated by wide-spread water intrusion problems and are based on research, field studies, and expert judgment. In the U.S. similar problems are occurring, particularly with conventional stucco installations on wood frame construction. These provisions will also help mitigate risk of water intrusion damage related to normal imperfections in exterior wall covering installation.

Also within Section 1404.5, proposed Section 1404.5.2 addresses inward vapor drives which present a well-known cause of moisture problems for walls clad with "reservoir claddings" such as adhered veneer (1404.10) and stucco (1404.15). These cladding types absorb water rainwater and then while drying (particularly with impinging energy from the sun) create significant inward vapor drives, forcing water vapor through underlying layer(s), such as the water resistive barrier, and into moisture sensitive materials within the wall assembly (such as wood-based and gypsum-based sheathings). Moisture sensitive materials such as wood-based and gypsum-based sheathings backing stucco and adhered veneers are particularly vulnerable if not adequately protected. Other reservoir claddings, like anchored masonry veneer (i.e., not adhered), already comply with Section 1404.5.2 due to the presence of a nominal 1-inch or greater vented air space behind the veneer.

The proposed provisions of Section 1404.5.2 coordinate with changes made last code cycle for Section 2510.6, exception 2. However, these requirements are broadly applicable and, thus, are best located in Chapter 14 and not hidden in an incomplete exception statement back in Chapter 25. More importantly, Section 1404.5.2 ensures the ventilated air space required in Exception 2 of Section 2510.6 also complies with the drainage requirements of Section 1404.5.1 and this serves to define a minimum size or effectiveness of the ventilated air space. Additionally, the charging language for Section 1404.5 permits these enhanced practices or options to be used in any climate zone, not just those limited conditions addressed in Exception 2 of Section 2510.6.

The exceptions in Section 1404.5.2 provide useful alternative means of addressing inward vapor drives from reservoir claddings. The first exception provides a means to justify use of alternative drainage and ventilation designs. The second exception provides a means to avoid use of a ventilated air space. It works by way of blocking the inward movement of water vapor from the reservoir cladding by use of lower permeance foam plastic insulating sheathing behind the cladding. This practice has been used successfully to prevent inward vapor drives from reservoir claddings and protect underlying moisture sensitive wall materials. It is also commonly used with 1-coat stucco systems. The drainage requirements of Section 1404.5.1 would still apply where applicable.

The provisions of Section 1404.5 are supported by various sources as documented in the research report ("Moisture Control Guide") referenced in the bibliography. The wind-driven rain map provided as new Figure 1404.5.1 is based on an ASTM paper as noted as the source for the figure. It is also very consistent with a more recent wind-driven rain climatology study by the University of Georgia.

From a resiliency perspective, it is no less appropriate to consider actions to address variation of building durability climate hazards across the U.S. as it is to consider variation in structural hazards such as wind, snow, and earthquake loads as they also vary across the U.S. In fact, durability problems related to climate-driven moisture effects and associated vulnerabilities of construction materials and methods often contribute to damages from structural hazards. Thus, this proposal will help ensure intended structural performance for the service life of a building.

Bibliography: Model Moisture Control Guidelines for Light-Frame Walls: A Building Code Supplement for Builders, Designers, and Code Officials, ABTG Research Report No. 1701-01, 2017, Applied Building Technology Group LLC, <https://www.appliedbuildingtech.com/rr/1701-01>

Cost Impact: The code change proposal will increase the cost of construction
cdpACCESS does not provide a option to declare "The code change proposal will increase and decrease cost of

construction" (which is perhaps a more appropriate description of the cost impact of this proposal for reasons that follow).

For most of the U.S. these provisions do not apply and there is no cost impact. However, proposed Section 1404.5.1 will increase costs for cladding installation on some types of construction in the more hazardous wind-driven rain climates by requiring provision of adequate drainage behind claddings. However, there is no change or cost impact for claddings that already meet the requirements (e.g., anchored brick veneer) or which are already inherently drained (e.g., vinyl siding). There also is no change or cost impact for walls of concrete or masonry construction per Section 1402.2, Exception 1, or for claddings meeting the existing performance requirement of Section 1402.2, Exception 2 (e.g., barrier EIFS).

Proposed Section 1404.5.2 would appear to increase cost for stucco and adhered veneer installations that are in hot-humid climates and which do not already address inward driven moisture, but the drainage and ventilation requirements are already vaguely required (complete in concept but not in detail) in Exception 2 of Section 2510.6 of the code. Also, Exception 1 of Section 1402.2 prevents any cost impact to installations on concrete or masonry construction. Finally, proposed Section 1404.5.2 includes additional options for compliance (e.g., exceptions) that may actually reduce cost of compliance for some stucco and adhered veneer installations.

Without robust data on the variation in construction types and cladding types by regional climate conditions, it is difficult to determine the magnitude of cost impact and whether or not it is a net increase or decrease in cost for a population of buildings representative of those built using the IBC. But, it is clear in some specific cases there could be a cost increase. In these specific cases, one conventional solution that would satisfy both Sections 1404.5.1 and 1404.5.2 would be to provide furring behind the cladding (and this is not necessarily the low-cost solution). The total cost of furring including overhead and profit per the 2017 RS Means Open Shop Building Construction Costs manual ranges from about \$0.60/SF (\$1.17/LF 1x3 wood furring pneumatically nailed to wood framing at 24"oc) to \$2.22/SF (metal furring at 16"oc). Considering the many cases where there is no cost impact, this proposal will range in cost impact of \$0/SF to as much as \$2.22/SF depending on a number of factors. It is likely that the net impact is closer to \$0/SF than \$2.22/SF.

FS93-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proponent requested disapproval after he had tabled the item. He was unable to address the concerns with the proposal in the time frame of the day. (Vote 13-0).

Assembly Action:

None

FS93-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jay Crandell, representing Foam Sheathing Committee of the American Chemistry Council (jcrandell@aresconsulting.biz) requests As Modified by This Public Comment.

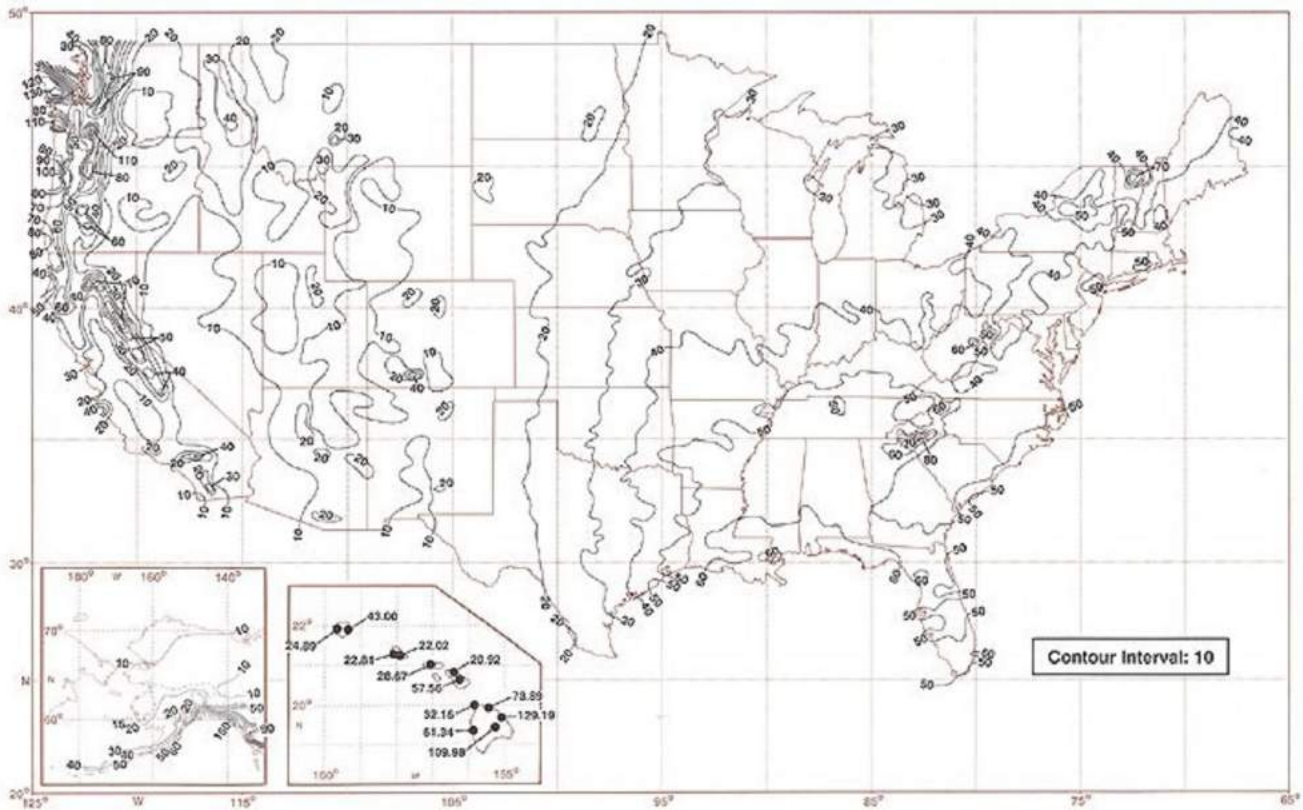
Replace as follows:

2018 International Building Code

1402.2.1 Extreme precipitation regions. Where the average annual precipitation amount is 50 inches (1270 mm) or greater as determined in accordance with Figure 1402.2.1 or local climate data, the means of drainage required by Section 1402.2 shall comply with one of the following:

1. An air space for drainage not less than 3/16-inch (4.7 mm) deep behind the cladding.
2. An *approved* exterior wall covering assembly, cladding, drainage material or design with drainage efficiency of 90 percent or greater as measured in accordance with ASTM E 2273 or Annex A2 of ASTM E 2925.

Exception: An *approved* design based on site-specific conditions including wind-driven rain exposure, building height, and use of overhangs or other methods of protecting walls from water intrusion caused by wind-driven rain.



Source: National Oceanic and Atmospheric Administration, National Climate Data Center, Asheville, NC

1402.2.1

AVERAGE ANNUAL PRECIPITATION AMOUNT (INCHES)

CHAPTER 35 REFERENCED STANDARDS

ASTM

E2925 - 17: Standard Specification for Manufactured Polymeric Drainage and Ventilation Materials Used to Provide a Rainscreen Function 1402.2.1

Commenter's Reason: This public comment represents an attempt to address constructive feedback from the FS committee and various commenters on the original FS93 proposal, focusing on the wind-driven rain provisions. All those who testified at the committee hearing have been provided opportunity to review and comment as was intended by the proponent's request to disapprove at the first hearing as a result of insufficient time to develop an appropriate modification. This public comment is a result of that outreach, but should not be taken as having achieved complete unanimity.

It is well-known that wind-driven rain is the primary hazard related to water-intrusion in building walls; therefore, it is important to recognize appropriate risk-consistent practices in the code to address areas subject to known and extreme rain exposure, especially on a routine annual basis. Where applicable, this proposal will also help address areas with extreme, but lower-frequency events such as tropical storms and hurricanes. A well-known and commonly employed technique is to use a rainscreen cladding system which this proposal supports in a manner that is broadly inclusive of various materials and methods.

Specifically, this proposal responds to the various comments from the committee and floor testimony as documented by video footage at the committee hearing:

1. Precipitation map: This PC replaces the originally proposed wind-driven rain index map because it did not cover all U.S. states (e.g., AK and HI) and wind-driven rain index data is not readily available. The proposed new U.S. map is an average annual precipitation map produced by NOAA and includes contours showing variation in precipitation at a national scale, including AK and HI. However, on a county-by-county basis, appropriate micro-scale data is best sourced from local climate data because rainfall amounts can vary significantly in some states or even counties. Such local data and state/local maps are readily available. Thus, the proposal allows the proposed national map or local climate data to be used as similarly done for other climatic criteria in the IBC (see several examples from IBC listed below).

2. Criteria Impact: Several commenters also were concerned with the original proposal impacting too large an area of the U.S. This map reduces the extent of areas affected by use of 50 inches of average annual rainfall as the trigger for the enhanced drainage provisions. To relax this criteria any further would begin to remove areas with a known history of

problems that have been or can be resolved with enhanced drainage requirements. Based on a University of Georgia study of wind-driven rain climatology, this rainfall region also aligns reasonably well with regions that routinely experience significant wind-driven rain and, therefore, the 50" annual precipitation criteria reasonably isolates the most extreme wind-driven rainfall locations of the U.S. Finally, localities may adopt or amend this criteria based on local experience as commonly done through the local adoption process. For example, states or counties within hurricane prone regions (that are not otherwise captured by the 50 annual average precipitation region) may consider these enhanced drainage (rainscreen) provisions to help address concern with water intrusion during more extreme (and less routine) wind-driven rain conditions.

3. Compliance Options: There was disagreement on creating a laundry list as originally proposed and, therefore, this PC has shortened the list of compliance options to two simple conditions: (1) provide a minimum drainage space or (2) an assembly with a drainage material or method that meets currently accepted and widely used standardized performance testing requirements for drainage. Many (if not all) existing drainage materials and drainable wraps comply with the cited ASTM test standards and 90% drainage efficiency criteria. Thus, this PC is inclusive and will help support a level playing field and provide market assurances for materials and methods providing enhanced drainage capabilities. The 90% drainage efficiency is also consistent with current requirements in the IBC (Section 1407.4.1) and IRC (Section R703.9.2) for drainable EIFS.

4. An exception is provided to allow the flexibility to use alternative site-specific designed solutions to mitigate wind-driven rain effects. This recognizes that designers may use features such as overhangs to protect walls or portions of walls from wind-driven rain.

5. Specifying a minimum drainage space also will help address one committee member's concern with control of exterior fire propagation by avoiding drainage spaces that are larger than necessary to provide adequate drainage and also provide guidance in configuring wall assemblies (where a drainage space is provided) for NFPA 285 assembly testing to ensure fire performance and drainage needs are coordinated for durability and safety.

6. Finally, the provision is moved to a more appropriate location as a subsection of 1402.2 (rather than being a separate section referenced from Section 1402.2) which simplifies the proposal and code organization.

It should be noted that the approach taken in this proposal and its allowance to use local climatic or hazard conditions is consistent with several other similar applications in the IBC as follows:

[From 1609.3] *In nonhurricane-prone regions, when the basic design wind speed, V , is estimated from regional climatic data, the basic design wind speed, V , shall be determined in accordance with Chapter 26 of ASCE 7.*

[From 1611.1] *The design rainfall shall be based on the 100-year hourly rainfall rate indicated in Figure 1611.1 or on other rainfall rates determined from approved local weather data.*

[From 1612.3.1] *Obtain and reasonably utilize any design flood elevation and floodway data available from a federal, state or other source.*

[From 2304.12.4] *In geographical areas where hazard of termite damage is known to be very heavy,*

[From 2304.12.2.3] *Supporting member for permanent appurtenances. Naturally durable or preservative treated wood shall be utilized for those portions of wood members that form the structural supports of buildings, balconies, porches or similar permanent building appurtenances where such members are exposed to the weather without adequate protection from a roof, eave, overhang or other covering to prevent moisture or water accumulation on the surface or at joints between members. Exception: Buildings located in a geographical region where experience has demonstrated that climatic conditions preclude the need to use durable materials where the structure is exposed to the weather.*

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The first cost impact is limited to only those regions with high exposure to rain and, within those regions, only to cases where rainscreen claddings or drainage systems are not already employed that meet the requirements. This proposal will serve to decrease cost and improve resiliency over the life-cycle of a building in these high hazard areas. See the original proposal's cost impact statement for more detail.

Public Comment 2:

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council (jcrandell@aresconsulting.biz) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

1402.2.1 Moist climate zones. Where adhered masonry veneer or cement plaster are used on frame walls in Climate Zones 1A, 2A, or 3A, a ventilated air space shall be provided between the cladding and a water-resistive barrier applied over wood-based sheathing in accordance with Section 2510.6 in addition to a means for draining water to the exterior.

Exception: An air space for ventilation shall not be required where foam plastic insulating sheathing complying with ASTM C 578 or ASTM C 1289 is located between the cladding and the frame wall assembly.

Commenter's Reason: This public comment focuses on the "moist climate zone" portion of the original FS93 proposal. This portion of the original proposal did not receive any opposition at committee hearing. It is consistent with provisions already included in Section 2510.6 of the IBC last code cycle. However, this proposal places these requirements more prominently within the weather protection provisions of Chapter 14. A coordinating change will be made to Section 2510.6 in the Group B hearing cycle.

The only technical change represented in this PC (and also in the original proposal's treatment of moist climate zones) is the exception statement which recognizes an accepted and successful practice for use of foam plastic insulating sheathing behind adhered veneers and stucco cement plaster. The foam sheathing creates a block to inward water vapor drives from reservoir claddings such that a ventilated air-space is not required. Drainage is still required because the exception only applies to the airspace for ventilation.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This proposal is based on language currently on Section 2510.6 (see Exception 2), so there is no cost impact in regard to the existing provisions. However, the exception statement provides potential for cost decrease for assemblies that employ foam plastic insulating sheathing as an alternative means to control inward vapor drives (without eliminating the need to provide a means for drainage).

FS93-18

FS94-18

IBC: 1402.3

Proposed Change as Submitted

Proponent: David Collins, The American Institute of Architects, representing The American Institute of Architects (dcollins@preview-group.com)

2018 International Building Code

Add new text as follows

1402.3 Fenestration. Vertical fenestration and skylights, including windows and doors, shall comply with the International Energy Conservation Code, as applicable.

Reason: The IECC contains detailed requirements regarding doors, windows and skylights which apply to all buildings. Primarily fenestration is located in the exterior walls of the building. Obviously skylights are located in the roof. The IBC already addresses the quantity and fire resistance of openings in Chapter 7. Chapter 14 addresses the overall integrity of exterior walls. Providing energy efficient fenestration is part of the design consideration of exterior walls. The fenestration requirements are somewhat complex and should remain in the IECC, but the existence of the IECC provisions need to be referenced in the IBC to reduce the possibility of them being overlooked. This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This requirement already exists in the IECC. Inclusions in the IBC doesn't result in any construction not already anticipated.

FS94-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee deemed the proposed pointer not necessary, indicating users should know to use all the codes. (Vote 14-0).

Assembly Action:

None

FS94-18

Individual Consideration Agenda

Public Comment 1:

Proponent: David Collins, representing The American Institute of Architects (dcollins@preview-group.com) requests As Submitted.

Commenter's Reason: Criteria for exterior openings in the ICC family of codes address various elements of regulation of openings. The IBC includes limitations for the number and percentage of area permitted in a wall based on the location of the building on a site. The IECC limits the area of the openings based on exposure and the energy efficiency of the opening device (window, door, etc.). It is the responsibility of the designer to determine the implications of these two distinct sets of criteria. All too often the user of the code (designer and code official) over look one in favor of the other. This change is a simple effort to remind all users of the code what the limitations are for fenestrations within the family of codes so that errors will not occur costing loss of important features of code compliance that must be rectified, or worse the owner/user of the facility is impacted by costly failures of the building to perform.

The ICC family of codes includes various pointers to other provisions within its codes or even literally duplicates them to assure their use and appropriate application. This change does the same. We urge your approval of this simple code change.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction This change will reduce the cost of redesign or changes during the construction process due to inadvertant oversight of important provisions in the ICC Codes.

FS94-18

FS95-18

IBC: 1402.5

Proposed Change as Submitted

Proponent: Tim Earl, GBH International, representing self (tearl@gbhinternational.com)

2018 International Building Code

Add new text as follows

1402.5 Exterior wall envelope. Exterior walls on buildings of Type I, II, III, or IV construction that are greater than 40 feet (12,192 mm) in height above grade plane where the exterior wall envelope contains a combustible material, the complete exterior wall envelope shall be tested as a system in accordance with and comply with the acceptance criteria of NFPA 285 unless compliance with NFPA 285 is specifically exempted elsewhere in this Chapter.

Exception: An exterior wall envelope where the only combustible component is a water-resistive barrier in compliance with section 1402.6.

Reason: This code change proposal is a generic requirement that ensures that all exterior wall envelope systems containing combustible materials must be tested to NFPA 285 as a complete system (if they exceed 40 ft. in height) unless otherwise exempted by other provisions of Chapter 14.

This proposal is followed by a series of proposals addressing various issues associated with combustible materials in exterior walls. The intent of these proposals is to provide a reasonable set of code requirements to ensure fire safety and weather protection for buildings that utilize combustible materials and/or assemblies for the building exterior wall envelope. Just as at present, no testing of completely non-combustible exterior walls would be required.

An alternate proposal addresses added requirements in the case of the presence of projections or interior corners.

The issue of wind effects has been raised but no standard test (or standardized variations of a standard test) exists that can address that.

The definition of "exterior wall envelope" in the IBC makes it clear that it is the "product" that needs to be tested because the fire performance of any system is affected by the fire performance of all its components. Therefore, if each component is fire tested individually and they all meet the requirements, there is no assurance that the entire system (meaning the exterior wall envelope) will perform adequately and meet the requirements.

This was always the intent for fire performance testing and minimum fire safety requirements of the chapter, but the section as currently written is not as clear as it should be. This is intended to address concerns with current language and requirements that could ultimately lead to tragic fires like the one in Grenfell Tower(London, England).

Note: The current definition for EXTERIOR WALL ENVELOPE in the IBC follows:

A system or assembly of exterior wall components, including exterior wall finish materials, that provides protection of the building structural members, including framing and sheathing materials, and conditioned interior space, from the detrimental effects of the exterior environment.

Cost Impact: The code change proposal will increase the cost of construction

While it was always the intent that systems be tested, if users were not testing the entire exterior wall system, they will now be required to do so.

FS95-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee indicated the proposal was difficult to understand and the issue should be addressed in Section 1405. (Vote 9-5)

Assembly Action:

None

FS95-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1402.5 Exterior wall envelope. Exterior walls on buildings of Type I, II, III, or IV construction that are greater than 40 feet (12,192 mm) in height above grade plane where the exterior wall envelope contains a combustible material other than a water resistive barrier in compliance with Section 1402.6, the complete exterior wall envelope shall be tested as a system in accordance with and comply with the acceptance criteria of NFPA 285 ~~unless compliance with NFPA 285 is specifically exempted elsewhere in this Chapter.~~ **Exception:** ~~An exterior wall envelope where the only combustible component is a water resistive barrier in compliance with section 1402.6~~. Exterior wall systems containing foam plastic insulation shall comply with Section 2603.

SECTION 1405 COMBUSTIBLE MATERIALS ON THE EXTERIOR SIDE OF EXTERIOR WALLS EXTERIOR WALL COVERINGS

Commenter's Reason: This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

This public comment addresses the Committee concerns to make the requirement clearer and more concise that exterior wall systems with combustible components be tested to NFPA 285. The use of the term exterior wall envelope (as opposed to system or other terminology) is consistent with the current definitions (See Below). Any combustible electrical, plumbing or mechanical components would not be included in the NFPA 285 full envelope test, as these are not included the definition of the exterior wall envelope.

This requirement to test the complete exterior wall system is essential to ensure that any wall design with a combination of combustible and noncombustible building components is tested to NFPA 285 in a fashion to ensure the system will appropriately limit fire spread along the outside surface or within the exterior wall envelope. This requirement would prohibit separate testing of individual components which may perform very differently from the complete exterior wall envelope or system.

Current IBC definitions:

EXTERIOR WALL ENVELOPE. A system or assembly of exterior wall components, including exterior wall finish materials, that provides protection of the building structural members, including framing and sheathing materials, and conditioned interior space, from the detrimental effects of the exterior environment.

EXTERIOR WALL COVERING. A material or assembly of materials applied on the exterior side of exterior walls for the purpose of providing a weather-resisting barrier, insulation or for aesthetics, including but not limited to, veneers, siding, exterior insulation and finish systems, architectural trim and embellishments such as cornices, soffits, facias, gutters and leaders.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. While it was always the intent that systems be tested, if users were not testing the entire exterior wall system, they will now be required to do so.

FS95-18

FS96-18

IBC: 1402.6 (New), 1402.6.1 (New), 1402.6.2 (New), 1402.6.3 (New), 1402.6.4 (New), 1402.6.5 (New), 1402.6.6 (New), 1402.6.7 (New), 1402.6.8 (New), 1402.6.9 (New), 1402.6.10 (New), 1402.6.11 (New), 1402.6.12 (New), 1402.6.13 (New), 1402.6.14 (New), 1402.6.15 (New), 1402.6.16 (New), 1402.6.17 (New), 1402.6.18 (New), 1402.6.19 (New), 1402.6.20 (New), 1402.6.21 (New), 1402.6.22 (New), 1402.6.23 (New), Chapter 35

Proposed Change as Submitted

Proponent: Ronald Nickson, Nickson Code Consulting, representing Rockwool (nicksongcodeconsulting@gmail.com)

2018 International Building Code

Add new text as follows

1402.6 Flame spread of wall and attic protection. Where a building is not required to comply with NFPA 285, the exterior walls, or combination of exterior walls and eaves shall comply with Section 1402.6.20 when subject to fire testing in accordance with Sections 1402.6.2 through 1402.6.23.

Exceptions:

1. When there is or no observed flame spread above the lower 8 feet of the 16-foot test assembly, the wall assembly being tested is considered to have passed the test and is acceptable for use on the exterior of buildings.
2. Where eaves are located at a height greater than 8 feet above grade, the wall includes a gable vent or the building is designed with a parapet and low sloped roof, the exterior wall system above 8 feet from grade can be constructed using any alternative approved materials, provided the assembly of the lower 8 feet above grade of the wall assembly is permitted in accordance with Exception 1 to Section 1402.6.

1402.6.1 Wall sections deemed to comply. Wall assemblies listed below are deemed to comply with Section 1402.6 when the water-resistant barrier is the only combustible component and the water-resistive barrier has a peak heat release rate of less than 150 kW/m², a total peak heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354 and has a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².

1. The following wall assemble is deemed to comply with Section 1402.6 and is acceptable for use on the exterior wall of buildings when the attic space, exterior wall with gable vents, or parapet with low sloped roofs are more than 16 feet above grade plane. The wall assembly is required on the lower portion of the wall to a height of 16-feet above grade plane.
 - 1.1. Vinyl siding over water-resistant barrier and 1/2 inch plywood.
2. The following wall assemblies are deemed to comply with the Exception to Section 1402.6 and are acceptable for use on all exterior walls. The wall assembly is required on the lower portion of the wall to a height of 8-feet above grade plane.
 - 2.1. Fiber cement siding over water-resistant barrier and 1-inch R-5 EPS.
 - 2.2. 3/8-inch base coat stucco over water-resistant barrier and 1/2-inch plywood.
 - 2.3. 3/8-inch base coat stucco over water-resistant barrier, 1-inch R-5 EPS and 1/2-inch plywood.
 - 2.4. EIFS with 3/16-inch base coat of fiberglass mesh w/acrylic finish over water-resistant barrier and 1/2-inch plywood.
 - 2.5. EIFS with 3/16-inch base coat of fiberglass mesh w/acrylic finish over water-resistant barrier 1.5-inches EPS and 1/2-inch plywood.
 - 2.6. Vinyl siding over water-resistant barrier, mineral wool boards and 1/2-inch OSB.

1402.6.2 Fire test. This fire-test-response procedure prescribes a method to assess the fire performance of a vertically oriented specimen, eave projection and roof that encloses an attic space, exposed to direct flame impingement in a simulated external fire. When tested in accordance with 1402.6, when present, the eave construction shall be uniform and continuous around the perimeter of the test specimen.

1402.6.3 Test assembly. The test assembly wall dimensions shall be 16 feet wide and 16 feet high and have a supporting wall on each end that extends back 8 feet at a 90-degree angle to the 16-foot wall. The eave shall be

constructed as an 18-inch projection, extending horizontally from the top of the 16-foot wall section. The roof and attic spaces shall be constructed such that the roof extends from the projection's fascia at an angle of 6:12. The roof shall be covered with 5/8-inch OSB roof sheathing and roofing materials. The roof members shall have an intermediate supporting vertical member extending from the top of the 16-foot wall as well as at the ends of the 8 foot walls.

1402.6.4 Joint detail. The test assembly shall incorporate joint detail(s) representative of actual installation.

1402.6.5 Wall detail. The wall assembly used as the test specimen shall include sheathing, weather barrier and cladding attached to the exterior surface of the structural support elements.

1402.6.6 Wall material. For wall assemblies composed of layered materials, such as sheathing, water-resistive barrier, continuous exterior insulation and siding (cladding), the installation of such layered materials shall be in accordance with the manufacturer's instructions, or in the absence of such instructions, applicable building code requirements. In the absence of manufacturer's specifications, the wall assembly shall include the following minimum components: nominal 2x4 studs spaced 16 in (410 mm) on center, and the desired exterior siding material. If sheathing is used, tests shall be run on typical 7/16 in. oriented strand board (OSB) of Exposure 1 rating. Where specified by the manufacturer, sheathing materials and installation shall be in accordance with the manufacturer's instructions. The type, thickness, and installation method of any sheathing method of any sheathing shall be included in the report.

1402.6.7 Accelerated aging/weathering and pre-test conditions of test material. When required by a regulatory or other agency a pre-test accelerated aging/weathering of the samples shall be completed. The manufacturer shall have the option to conduct such weathering. Weathering shall be conducted as specified by the regulatory agency or applicable methods as specified for the product. Details of the weathering method used, or reference to a standard test method, shall be included in the report.

1402.6.8 Test samples. Two hygroscopic samples of each materials from the same stock from which the test assembly was constructed shall be tacked to the test assembly during construction in such a manner that they are easily removed. These pieces shall be conditioned with the completed test specimen.

1402.6.9 Storage. The completed test assemblies and samples shall be stored indoors at temperatures not lower than 60°F (16°C) nor higher than 90°F (32°C) for the period of time necessary to cure the assembly components. Test assemblies are to be stored so that each will be surrounded by freely circulating air.

1402.6.10 Sample testing. Just prior to the assembly testing, the pieces of hygroscopic materials prepared in 705.2.5.2.1 shall be tested for moisture content.

1402.6.11 Moisture determination. Samples of like materials shall be reported as the average. For lumber and other wood-based materials, use Test Method ASTM D4442. Alternatively, the moisture content for lumber and other wood-based materials is permitted to be measured using a moisture meter. For other hygroscopic materials, use test methods appropriate for those materials.

1402.6.12 Lumber used in the construction of the supporting wall structure. The moisture content shall not be more than 12 percent. For wood sheathing, the moisture content shall not exceed 8%. For other hygroscopic materials, the moisture shall be within ranges specified by the manufacturer before the assembly is constructed. These specified ranges shall be typical for exposure.

1402.6.13 Burner details. The ignition source for the test shall be gas diffusion burner with a nominal 4 in. wide by 39 in. (100 mm wide by 1000 mm) long porous top surface of a refractory material. With the exception of top surface dimensions, the essential configuration of the burner is comparable to the burner design describe in Test Method E2257.

1402.6.14 Burner enclosure. The burner enclosure shall be positioned so that it is centered relative to the width of the 16-foot test wall. The distance from the bottom of the test assembly to the top surface of the burner shall be 12 plus or minus 2 inches. (300 plus or minus 50 mm). The bottom of the test assembly shall be protected from burner fire exposure by the placement of a 4 foot (1220 mm) wide thermal barrier.

1402.6.15 Procedure. The ambient temperature in the test room shall be above 60°F (15°C) and the relative humidity shall be less than 75 percent. The test room shall be draft-protected and equipped with an exhaust hood system for removal of products of combustion during the test.

1402.6.16 Horizontal air flow. The horizontal air flow, measured at a horizontal distance of 20 inches. (0.5m) from the edge of the wall assembly, shall not exceed 1.64 feet per second (0.5 m/s).

1402.6.17 Test assembly position. Prior to testing position the test assembly under the exhaust hood and set the gas burner for the prescribed level of output.

1402.6.18 Burner output. Once the burner output is verified, position the specimen holder assembly at the desired test location under the collection hood.

1402.6.19 Burner ignition. Simultaneously ignite the gas burner and start the timer marking the beginning of the test. Control the burner to a constant 100 kw output. Control the hood duct flow to collect all products of combustion.

1402.6.20 Flame exposure. Continue the flame exposure for a period of 20 minutes, or until such time that observations of flames in the attic space have been made. The specimen will have passed the test if no flame intrusion was observed into the attic space.

1402.6.21 Documentation. Perform photographic or video documentation, or both, before, during and after each test.

1402.6.22 Report. The report shall include the following:

1. Name and address of the testing laboratory.
2. Name and address of test sponsor.
3. Description of the test assembly including construction details of the wall system, details of individual components and the manufacturer's installation details and limitations as applicable.
4. Number of specimens tested.
5. Conditioning of test assemblies.
6. Pre-test accelerated aging/weathering exposure, as applicable.
7. Moisture content of hygroscopic elements of the wall system construction at the time of testing.
8. Details of the calibration including heat supply rate.
9. Date of test, identification number and date of report.

1402.6.23 Test Results. The test results shall include:

1. A notation of the time and location of the breach of the flame into the attic space.
2. A determination of the presence of glow on the unexposed side of the assembly at the end of the 60-minute observation period.
3. Observations of the burning characteristics of the exposed surface of the test during and after the test exposure.

Add new standard(s) follows

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box
C700
West Conshohocken PA 19428-2959
US

D4442-16:

Standard Test method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter

E2257-17:

Standard Test Method for Room Fire Test of Wall and Ceiling Materials and Assemblies

Reason: The proposed change establishes a material-neutral, engineering solution, that allows for a wide range of options and design solutions to address the issue of fire spreading across the exterior wall and breaching the attic space, from fires that originate on the exterior of a building. The risks associated to exterior fires of this type have been rising dramatically due to changes in the energy code that require more wall insulation. The increased insulation can be accommodated by increasing the wall thickness and installing more insulation in the wall cavity or by adding continuous insulation to the exterior of the more typical 2x4 or 2x6 wall. The exterior insulation does not present a fire hazard if it is non-combustible or protected in a way to prevent the insulation from being involved in a fire originating near the exterior wall from fires in nearby buildings, landscaping and in some cases radiative heat from the windows of a nearby building. This code proposal incorporated into the IBC is a means to evaluate the spread of fire on the exterior of buildings that also includes testing to determine if the fire spreads into the attic. The provisions in the proposal are based on fire

testing research performed at UL, Fire Service Summary Report: Study of Residential Attic Fire Mitigation Tactics and Exterior Fire Spread Hazards on Firefighter Safety, funded by the Department of Homeland Security, and UL fire test, Verification Services Project for Exterior Wall Mock-up Fire Demonstration with Comfortboard 80 Insulation Products. Work is now underway with UL/ANSI to develop a standard that can be referenced in future editions of the ICC Codes. Section 1402.6.1 adding the list of wall configurations deemed to comply includes wall assemblies that were tested in the above referenced test by UL. Based on that testing the listed wall assemblies would comply with the test procedure proposed by this code change. The section is based on provisions in the IECC that lists materials and assemblies that are deemed to comply with the IECC requirements for air leakage.

A report from NFPA Research entitled, Residential Structure Fires Originating On Outer Walls, Spreading On Exterior Walls Or Trim, and Beginning On An Outer Wall with Plastic, January 2018, identifies the problem that now exists because of the increased use of unprotected combustible products used to meet the current energy code requirements. The report documents the number of residential fires where the item contributing most flame spread was exterior sidewall covering and surface finish. From 2005 to 2015, this type of fire occurs on average 7663 times per year, causing an annual average of 50 casualties, 345 injuries and \$539 million in property loss.

UL fire test, Verification Services Project for Exterior Wall Mock-up Fire Demonstrations with Comfortboard 80 Insulation Products has shown that a fire can reach the attic in a building through the soffit in 2-3 minutes in buildings with unprotected combustible products in the exterior wall. In buildings with light siding and non-combustible insulation, tested using the same procedure, the exterior of the building does not catch on fire and thus the issue of the fire getting into the attic never happens.

The methodology proposed for fire testing in this proposal, assess the flame spread of the exterior wall and the time it takes for a fire to breach the attic space. To have a complete solution to the spread of fire into the attic it is imperative that the exterior wall meet the criteria in Section 1405.1 concerning Combustible Materials on the Exterior Side of Exterior Walls. A companion change has been submitted to add Type V construction to the section.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The cost impact if any is minor. Some cost will be incurred by material manufacturers to determine compliance with the required test procedure. Material and installation cost are basically natural.

Analysis: A review of the standard proposed for inclusion in the code, ASTM E2257-17 and ASTM D4442-16, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

FS96-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee determined the modification (Nickson 8) was out of order, upon which the proponent requested disapproval. The committee disapproved, noting the language was cumbersome and complex, and there was no merit without the modification. (Vote 14-0)

Assembly Action:

None

FS96-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ronald Nickson, representing Rockwool (nicksoncodeconsulting@gmail.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

1402.6 Flame spread up the exterior wall surface. Where a building is not required to comply with NFPA 285, exterior walls and exterior walls with eaves shall comply with Section 1402.6.1.

1402.6.1 Wall sections deemed to comply. Wall assemblies specified in Sections 1402.6.1.1 and 1402.6.1.2 are deemed to comply with Section 1402.6 where the water-resistant barrier is the only combustible component provided the water-resistant barrier complies with both of the following:

1. A peak heat release rate of 150 kW/m, a total peak heat release of less than 20 MJ/m and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354.
2. A flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723.

The ASTM E1354 test shall be conducted on a specimen at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².

1402.6.1.1 Wall Assembly The following wall assembly, with no external insulation, is deemed to comply with Section 1402.6 and is acceptable for use on the exterior wall of buildings when the attic space, exterior wall with gable vents, or parapet with low sloped roof is more than 16 feet (4880 mm) above grade plane:
Vinyl siding over water-resistant barrier and 1/2 inch wood structural panel.

1402.6.1.2 Deemed to comply wall assemblies. The following wall assemblies are deemed to comply with Section 1402.6 and are acceptable for use on the lower 8 feet (2440 mm) of all exterior walls. The materials of exterior wall systems shall not be limited above the lower 8 feet above grade where eaves are located at a height greater than 8 feet (2440 mm) above grade, where the wall includes a gable vent, or where the building is designed with a parapet and a low sloped roof, provided the wall assembly of the lower 8 feet (2440 mm) above grade consists with one of the following:

1. Fiber cement siding over 1 inch polystyrene water-resistant barrier and 1/2 inch wood structural panel.
2. Fiber cement siding over mineral wool insulation, water-resistant barrier and 1/2 inch wood structural panel.
3. 3/8 inch base coat stucco over water-resistant barrier and 1/2 inch wood structural panel.
4. 3/8 inch base coat stucco over 1 inch polystyrene water-resistant barrier and 1/2 inch wood structural panel.
5. Any thickness base coat stucco over mineral wool insulation, water-resistant barrier and 1/2 inch structural panel.
6. EIFS with 3/16 inch base coat of fiberglass mesh with acrylic finish over 1.5 inch EPS, water-resistant barrier and 1/2 inch structural panel.
7. EIFS with any thickness of base coat and finish coat over mineral wool insulation, water-resistant barrier and 1/2 inch wood structural panel.
8. Vinyl siding over mineral wool insulation, water-resistant barrier and 1/2 inch wood structural panel.
9. 8 inch wood lap siding over water-resistant barrier and 1/2 inch wood structural panel.
10. 8 inch wood lap siding over mineral wool insulation, water-resistant barrier and 1/2 inch wood structural panel.
11. Wall assemblies where the foam plastic insulation is covered on each face by not less than 1-inch (25mm) thickness of masonry or concrete and meeting one of the following:
 - 11.1. There is no airspace between the insulation and the concrete, masonry or thermal barrier.
 - 11.2. The insulation has a flame spread index of not more than 25 as determined in accordance with ASTM E84 or UL 723 and the maximum airspace between the insulation and the concrete, masonry or thermal barrier is not more than 1 inch (25 mm).

Commenter's Reason: The public comment, supported by the ICC Fire Code Action Committee (FCAC) and the National Association of State Fire Marshals (NASFM), simplifies and revises the original proposal to a listing of the wall configurations that are acceptable when the exterior wall is not required to comply with IBC Section 1402.5, which requires walls greater than 40 feet in height to be tested in accordance with NFPA 285. The proposal is in response to the recent changes in the IECC for increased insulation, which in some cases is installed on the exterior of the wall and can contribute to the spread of fire up the exterior wall. This concern is documented by NFPA and the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS 5.0) which documents that there is an annual average of 7645 residential fires that spread on the exterior wall surface with 50 casualties, 345 injuries and \$539M in property damage.

The deemed to comply wall configurations are based on testing completed by UL following the procedures of ASTM E2707 with various burner flame ignitions ranging from 50 kW - 300 kW. Of the 32 test completed, 20 were with a flame ignition of 100 kW. The 100 kW flame was selected as the basis for the original proposal, this public comment and the deem to comply wall configurations because it allows for testing of the flame spread up the exterior of the wall as compared to the 150 kW basis for ASTM E2707 which is designed for flame penetrations thru the wall. The tests completed by UL were either 2x4 or 2x6 walls with structural wood panels (plywood or OSB) and different exterior materials. Walls with non-combustible siding, such as EIFS, stucco, fiber cement over no insulation or a combustible insulation had no sustained ignition when exposed to the 100 kW fire in the UL testing. Walls with no sustained ignition are included in the proposal as deemed to comply wall configurations. Other wall configurations with mineral wool exterior insulation are also included as deemed to comply based on testing done on walls with mineral wool exterior insulation which also had no flame spread up the exterior surface of the wall. Walls with siding that melted (vinyl) and mineral wool insulation also passed the test. Walls with a siding that melted with foam plastic insulation failed the test. Vinyl siding over structural wood panels (no exterior insulation) passed the test when the wall was 16 feet high.

The UL testing is reported in two reports: (1) Study of Residential Attic Fire Mitigation Tactics and Exterior Fire Spread Hazards on Fire Fighter Safety (available at: <https://ulfirefightersafety.org/docs/Attic-Final-Report-Online.pdf>), and (2) Verification Services Project for Exterior Wall Mock-up Fire Demonstration with Comfortboard 80 Insulation (available by request from proponent).

The deemed to comply wall sections include the majority of current wall configurations. Other wall configurations can be approved by the code official per IBC Section 104.11 Alternative materials, designs and methods of construction and equipment.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. In zones 6-7 there could be a cost increase depending upon the design and the basis for cost consideration. However, in zones 1-5 and 8 design using the U-value configuration for solution and code compliance as compared to the R-value code solution are available that will reduce the cost of construction.

Public Comment 2:

Proponent: John Woestman, Kellen Company, representing Extruded Polystyrene Foam Association (jwoestman@kellencompany.org); Justin Koscher, Polyisocyanurate Insulation Manufacturers Association (jkoscher@pima.org); Jay Crandell, ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council (jcrandell@aresconsulting.biz) requests Disapprove.

Commenter's Reason: Please support the Committees unanimous vote for disapproval. In the original proposal, the proponent created a fire test to address a problem that was not substantiated. The proponent then attempted to move a floor modification and described a substantial change to an existing consensus-based standard (ASTM E2707) using the code development process. Although his request was ruled out of order, the proponent stated he would bring it back in Public Comment.

In both cases, Section 3.6.3.2 of ICC CP-28 states that the standards referenced by the ICC codes shall be developed and maintained through a consensus process such as ASTM or ANSI. The modifications to the ASTM standard have not been vetted through a consensus process by a balanced group of stakeholders, as evidenced by the significant alterations and scope of the public comment.

Although the original FS96-18 cited a number of citations justifying the need for and providing a fire test as a response, for this change, no details have been submitted. One of these reports included a UL research program which was to develop improved firefighter tactics by providing the fire service with scientific knowledge on the dynamics of attic and exterior fires. The applicability of this work to FS96-18 is unknown.

This topic belongs in a consensus standard setting organization such as ASTM and should not be included in the IBC until this work is completed.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment requests disapproval - the code will not be changed with support of this public comment.

FS96-18

FS99-18

IBC: 1402.5, 1402.5.1, Table Table 1402.5

Proposed Change as Submitted

Proponent: Jeffrey Shapiro, Lake Travis Fire Rescue, representing Lake Travis Fire Rescue (jshapiro@ltfr.org)

2018 International Building Code

Revise as follows

1402.5 Vertical and lateral fire testing of exterior walls for flame propagation. *Exterior walls* on buildings of Type I, II, III or IV construction that are greater than 40 feet (12 192 mm) in height above grade plane ~~and contain a combustible water-resistive barrier shall be tested that include combustible components shall be tested for flame propagation~~ in accordance with and comply with the acceptance criteria of ~~NFPA 285~~ the test methods in Table 1402.5. The complete exterior wall envelope shall be tested. For the purposes of this section, fenestration products, flashing of fenestration products and water-resistive-barrier flashing and accessories at other locations, including through wall flashings, shall not be considered part of the water-resistive ~~barrier~~ barrier.

Exceptions:

1. Walls in which the *water-resistive barrier* is the only combustible component and the *exterior wall* has a wall covering of brick, concrete, stone, terra cotta, stucco or steel with minimum thicknesses in accordance with Table 1404.2.
2. Walls in which the *water-resistive barrier* is the only combustible component and the *water-resistive barrier* has a peak heat release rate of less than 150 kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354 and has a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².

Add new text as follows

1402.5.1 Supplemental requirements for test method. Where compliance with this section is required by Table 1402.5, the following shall apply:

1. Where an exterior wall will include one or more horizontal projections, the wall assembly shall be tested in accordance with NFPA 285 using a test sample that incorporates a horizontal projection that extends 5 feet from the exterior wall surface and is located 36 inches above the window opening. The tested assembly shall be required to comply with the acceptance criteria of NFPA 285.
2. Where an exterior wall will include one or more interior corners, the wall assembly shall be tested in accordance with one of the following options:
 - 2.1 NFPA 285 using a test sample that incorporates a corner that is located at the left or right edge of the window opening and extends an exterior wall surface at a right angle to the plane of the window that creates a 5 foot deep interior corner. The tested assembly shall be required to comply with the acceptance criteria of NFPA 285.
 - 2.2 NFPA 285 using the standard wall assembly and an additional test using the 16 foot parallel panel test specified in FM 4880. The tested assembly shall be required to comply with the acceptance criteria of both NFPA 285 and FM 4880.
3. Where an exterior wall will include both horizontal projections and interior corners, the wall shall be tested in accordance with both Item 1 and Item 2.
4. Tests in Item 1 and Item 2.1 shall be conducted with wind applied at 60 second intervals, accomplished by cycling the fan or fans on and off for the duration of the test. Fans shall apply a uniformly distributed wind speed of 30 feet per second to the face of the test assembly when running at full speed.

**Table 1402.5
REQUIRED EXTERIOR WALL FIRE TEST METHOD**

Exterior Wall Configuration^a	Required Test Method
<u>Flat wall surface</u>	<u>NFPA 285</u>
<u>Projections or interior corners</u>	<u>See Section 1402.5.1</u>

a. Where no projections or interior corners exceed 12 inches, measured perpendicular to the wall surface, the wall is considered to be a flat wall surface

Reason: For the past year, I have been attempting to get the NFPA 285 committee to consider adjustments to the NFPA 285 test procedure to address the issues of building geometry and wind. My approach has been to fight attempts to expand the use of NFPA 285 to include any wall assembly until changes are made to the standard to address these concerns. The development process for NFPA 285 has been very contentious on this issue, with the committee completely reversing course from one meeting to the next, and ultimately, the NFPA Standards Council refused to issue the latest update and returned the entire document to the technical committee.

The fire service has very little voice in the NFPA 285 process compared to industry interests, and it has been very difficult to get the committee to give these concerns due consideration, and on this issue, I am representing the perspective of the fire service and a code official. Lacking the ability to get appropriate consideration from the NFPA 285 technical committee, I am seeking to get the IBC to establish parameters for exterior wall tests that would be dictated to anyone writing test protocols for IBC buildings with walls regulated by this section.

The fire service is well aware of the effects of wind driven fires and of building geometry when it comes to fire behavior, and we can ill afford the risk of catastrophic high-rise fires involving exterior walls. While it has been claimed that there have been no such documented losses involving NFPA 285 compliant panels on buildings, the lack of a bad fire does not equate to a conclusion that everything is fine. Instead, numerous catastrophic exterior fires that have occurred just happened to occur on buildings with non-compliant walls assemblies. What would have happened if NFPA 285 compliant panels were used? Nobody can say for certain.

The current NFPA 285 test method is scoped to ONLY include non-bearing geometrically flat curtain walls attached to buildings, and I have no issue with the current test method continuing for this application. However, the effectiveness of this test method for assemblies with overhangs and inside corners that can intensify the fire exposure needs to be known before these untested geometric variations should be permitted by NFPA 285 or the IBC. UL's mantra is "know by test." We haven't tested, therefore, we don't know.

The addition of a wind application to the proposed samples with overhangs and/or corners recognizes that wind turbulence is likely to further increase fire intensity. Inside corners will form a flame vortex, and overhangs are expected to concentrate heat beneath the overhang. Either could cause an assembly that might pass the basic NFPA 285 test to fail.

The suggested parameters for the depth of extensions and wind speed (which approximately equates to 20 mph) are my best estimate, as a fire protection engineer and former firefighter, at a reasonable test. I have asked a variety of individuals involved in this issue to offer suggestions or run sample tests and got nowhere.

The fire service would be unwise to accept the risk of catastrophic high-rise fires by knowingly standing by while the NFPA 285 test method is exploited. Without knowing the fire performance consequences of stretching the test method to allow assemblies that are not well represented in the test, we cannot reasonably assure public safety or firefighter safety. We must do a better job of making sure we get this issue right because Grenfell Tower was a wake up call with respect to the consequences of inadequate testing. Do we really want to allow buildings to be built with untested wall configurations only to later learn that we screwed up and created a large pool of dangerous existing buildings? The time to address these concerns is now, before NFPA 285 loses its current scoping constraints and before tall wood buildings gain access to a test method that wasn't designed for that application.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Currently, NFPA 285's scope is limited to not include all types of wall assemblies that are being addressed by this proposal. Compliance with additional tests being proposed may or may not have an impact on the cost of construction, depending on whether existing assemblies and materials are able to pass the proposed test protocols.

Public Hearing Results

Errata: The table did not appear in the CAH.

Committee Action:

Disapproved

Committee Reason: The committee concluded there are too many questions of how wall geometry and wind are considerations in the testing procedures, there is no standardized method for measuring the effects of wind on fire, and it is not known how wind will effect buildings over 40'. (Vote 14-0).

Assembly Action:

None

FS99-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Stephen DiGiovanni, representing self (sdigiovanni@clarkcountynv.gov) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

1402.5 Vertical and lateral flame propagation. *Exterior walls* on buildings of Type I, II, III or IV construction that are greater than 40 feet (12 192 mm) in height above grade plane ~~and contain a combustible water-resistive barrier that include combustible components~~ shall be tested ~~in~~ for flame propagation in accordance with and comply with the acceptance criteria of NFPA 285. For the purposes of this section, *fenestration* products, flashing of *fenestration* products and *water-resistive-barrier* flashing and accessories at other locations, including through wall flashings, shall not be considered part of the *water-resistive barrier*.

Exceptions:

1. Walls in which the *water-resistive barrier* is the only combustible component and the *exterior wall* has a wall covering of brick, concrete, stone, terra cotta, stucco or steel with minimum thicknesses in accordance with Table 1404.2.
2. Walls in which the *water-resistive barrier* is the only combustible component and the *water-resistive barrier* has a peak heat release rate of less than 150 kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354 and has a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².

1402.5.1 Supplemental tests for exterior walls with projections. Where an exterior wall includes projections that exceed 24 inches as measured from the exterior wall, the complete exterior envelope shall be tested in accordance with one of the following options:

1. NFPA 285 using a standard wall assembly, and additional that incorporates a wing wall that is located at the edge of the window opening and extends 5 feet perpendicularly from the plane of the wall and the full height of the test sample, and is constructed with identical materials and methods as the test sample. The heat flux specified at a height of 2.0 ft above the window opening shall be increased by 100% to double the heat flux from that prescribed by NFPA 285. The tested assembly shall be required to comply with the acceptance criteria of NFPA 285.
2. NFPA 285 using the standard wall assembly and an additional test using the 16 foot parallel panel test specified in FM 4880. The tested assembly shall be required to comply with the acceptance criteria of both NFPA 285 and FM 4880.

Commenter's Reason: Exterior wall fire spread is an ongoing concern in the fire safety community. During code hearings, there were a variety of proposals intended to bolster the exterior wall testing requirements from the IBC. These proposals addressed a variety of issues, such as projections and wind. Of the many proposals, only FS98-18 and

FS105-18 were approved. FS98 changed the title to Section 1402.5 to “Water Barriers” and FS105 added an exception to allow additional materials to be water-resistive barriers; essentially, none of the approved proposals addressed exterior flame spread of other materials or address projections or wind.

As both FS98 and FS105 reinforce the use of Section 1402.5 as a means to address combustibility of the water resistive barrier, this proposal seeks to separate the issue of exterior wall flame spread. As such, this proposal is submitted to change the existing code section 1402.5, and then add a subsection thereto. In addition, this proposal can work with any other public comments that may clarify the language from the 2018 Section 1402.5, as the true technical change is added as a standalone subsection. Regardless of whether solely through this public comment or in conjunction with others, by having new code sections, the code is clear in requiring exterior wall tests be conducted for the purpose of exterior flame spread analysis, separate from those requirements to address the water barrier material.

The original proposal addressed both vertical (i.e. re-entrant angle wall) and horizontal (i.e. balconies) projections. This comments seeks to maintain the vertical projection by the addition of the wing wall. The balcony style horizontal projection is not addressed, as there is concern that the balcony feature would act as a fire block material that could potentially allow a wall assembly to pass, when it otherwise would not.

The wing wall is substantiated by observation of other international exterior wall test standards. For instance, the wing wall is a feature that is already incorporated into standards such as ISO 13785 and BS 8414. Please note that the proposed NFPA 285 wing wall requirements for 5 feet depth and alignment with a window edge are similar features to those present in the aforementioned international standards.

For the issue of wind, there are two impacts to consider. First, wind is expected to change the geometry of the flame front by moving the flame around, and potentially away from, the wall. While there are scenarios where the geometry effects would increase flame spread, there are just as likely scenarios where the geometry changes would allow a wall to pass, when it otherwise would not. Second, wind is expected to increase fire intensity. While the issue of geometry yields an inconclusive effect, there is no doubt that an increase in fire intensity during testing will result in a more rigorous test procedure.

Again, in observing the international tests, the exterior heat flux immediately above the window opening (0.6 m above) are somewhat greater than that provided for in NFPA 285. In time increments, the NFPA 285 heat flux requirements at 2 feet (610 mm) above the window opening range up to a maximum of 3.8w/cm². However, the heat flux for BS 8414, for instance, is approximately 7.5 w/cm² at a height of 0.6 m above the window opening. This represents an increased heat flux of approximately double the heat flux requirement of NFPA 285. As a 100% increase is seen as a significant increase in heat flux, the proposal seeks to require that this increased heat flux be used for the option that utilizes NFPA 285 testing only.

As provided in the original proposal, this comment provides an option to use a standard NFPA 285 test, and associate this with the FM 4880 parallel panel test. As FM 4880 has increased heat flux, and addresses the issue of projections by facing the panels to each other, this comment agrees that the FM 4880 test is a suitable option for this purpose.

In summary, the issue of exterior wall flame spread is current and present, and there is a need to bolster our requirements. This proposal seeks to provide reasonable increases to current acceptance criteria, which are already present in other test standards, in order to address the current exterior wall flame spread issues.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. Currently, NFPA 285 (without modification) is accepted for all wall assemblies. This proposal will require additional testing for wall assemblies, which will likely result in construction cost increases as these additional test costs and passed on.

Public Comment 2:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org); Jeffrey Shapiro, Lake Travis Fire Rescue (jshapiro@lfr.org) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

1410 VERTICAL AND LATERAL FLAME PROPAGATION FIRE TEST

1410.1 General. Where another section of this code requires fire testing to comply with this section, testing to determine the fire propagation characteristics shall comply with Sections 1410.1.1 through 1410.1.3

1410.1.1 Test Procedure. Testing shall be conducted in accordance with NFPA 285.

1410.1.2 Acceptance criteria. The test specimen shall comply with the NFPA 285 acceptance criteria.

1410.1.3 Application of test results. Test results shall be applied in accordance with one of the following:

1. NFPA 285 Test results shall be directly applicable to exterior wall assemblies and panels used as components of curtain wall assemblies, which are installed without interior corners or horizontal projections that exceed 12 inches as measured perpendicular to the wall surface.
2. For conditions not covered by Item 1, application of the NFPA 285 test results shall be subject to the approval of the building official based on the recommendation of a registered design professional prepared in accordance with Section 104.11.

Evaluation of the suitability of the proposed exterior wall for the intended installation shall include the possible need for: testing an assembly with interior corners and horizontal projections, increasing the severity of the NFPA 285 fire exposure, and conducting additional tests using other approved exterior wall test methods.

718.2.6 Exterior wall coverings. *Fireblocking* shall be installed within concealed spaces of exterior wall coverings and other exterior architectural elements where permitted to be of combustible construction as specified in Section 1405 or where erected with combustible frames. *Fireblocking* shall be installed at maximum intervals of 20 feet (6096 mm) in either dimension so that there will be no concealed space exceeding 100 square feet (9.3 m²) between *fireblocking*. Where wood furring strips are used, they shall be of *approved* wood of natural decay resistance or preservative-treated wood. If noncontinuous, such elements shall have closed ends, with not less than 4 inches (102 mm) of separation between sections.

Exceptions:

1. *Fireblocking* of cornices is not required in single-family dwellings. *Fireblocking* of cornices of a two-family dwelling is required only at the line of dwelling unit separation.
2. *Fireblocking* shall not be required where the exterior wall covering is installed on noncombustible framing and the face of the exterior wall covering exposed to the concealed space is covered by one of the following materials:
 - 2.1. Aluminum having a minimum thickness of 0.019 inch (0.5 mm).
 - 2.2. Corrosion-resistant steel having a base metal thickness not less than 0.016 inch (0.4 mm) at any point.
 - 2.3. Other *approved* noncombustible materials.
3. *Fireblocking* shall not be required where the exterior wall covering has been tested in accordance with ~~and complies with the acceptance criteria of, NFPA 285~~Section 1410. The exterior wall covering shall be installed as tested in accordance with ~~NFPA 285~~Section 1410.

1402.5 Vertical and lateral flame propagation. *Exterior walls* on buildings of Type I, II, III or IV construction that are greater than 40 feet (12 192 mm) in height above grade plane and contain a combustible *water-resistive barrier* shall be tested in accordance with ~~and comply with the acceptance criteria of NFPA 285~~Section 1410. For the purposes of this section, *fenestration* products, flashing of *fenestration* products and *water-resistive-barrier* flashing and accessories at other locations, including through wall flashings, shall not be considered part of the *water-resistive barrier*.

Exceptions:

1. Walls in which the *water-resistive barrier* is the only combustible component and the *exterior wall* has a wall covering of brick, concrete, stone, terra cotta, stucco or steel with minimum thicknesses in accordance with Table 1404.2.
2. Walls in which the *water-resistive barrier* is the only combustible component and the *water-resistive barrier* has a peak heat release rate of less than 150 kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354 and has a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².

1406.10.4 Full-scale tests. The MCM system shall be tested in accordance with ~~and comply with, the acceptance criteria of NFPA 285~~Section 1410. Such testing shall be performed on the MCM system with the MCM in the maximum thickness intended for use.

1408.10.4 Full-scale tests. The HPL system shall be tested in accordance with ~~and comply with, the acceptance criteria of NFPA 285~~Section 1410. Such testing shall be performed on the HPL system with the HPL in the minimum and

maximum thicknesses intended for use.

[BG] 1510.6.2 Type I, II, III or IV construction. Regardless of the requirements in Section 1510.6, *mechanical equipment screens* that are located on the roof decks of buildings of Type I, II, III or IV construction shall be permitted to be constructed of combustible materials in accordance with any one of the following limitations:

1. The fire separation distance shall be not less than 20 feet (6096 mm) and the height of the mechanical equipment screen above the roof deck shall not exceed 4 feet (1219 mm) as measured to the highest point on the *mechanical equipment screen*.
2. The fire separation distance shall be not less than 20 feet (6096 mm) and the *mechanical equipment screen* shall be constructed of fire-retardant-treated wood complying with Section 2303.2 for exterior installation.
3. Where exterior wall covering panels are used, the panels shall have a flame spread index of 25 or less when tested in the minimum and maximum thicknesses intended for use, with each face tested independently in accordance with ASTM E84 or UL 723. The panels shall be tested in the minimum and maximum thicknesses intended for use in accordance with ~~Section 1410~~ and shall ~~comply with the acceptance criteria of, NFPA 285 and shall~~ be installed as tested. Where the panels are tested as part of an exterior wall assembly in accordance with ~~NFPA 285~~Section 1410, the panels shall be installed on the face of the *mechanical equipment screen* supporting structure in the same manner as they were installed on the tested exterior wall assembly.

2603.5.5 Vertical and lateral fire propagation. The exterior wall assembly shall be tested in accordance with ~~and comply with the acceptance criteria of NFPA 285~~Section 1410.

Exceptions:

1. One-story buildings complying with Section 2603.4.1.4.
2. Wall assemblies where the foam plastic insulation is covered on each face by not less than 1-inch (25 mm) thickness of masonry or concrete and meeting one of the following:
 - 2.1. There is no airspace between the insulation and the concrete or masonry.
 - 2.2. The insulation has a flame spread index of not more than 25 as determined in accordance with ASTM E84 or UL 723 and the maximum airspace between the insulation and the concrete or masonry is not more than 1 inch (25 mm).

Commenter's Reason: At the committee hearing, there was broad support for the idea of limiting application of NFPA 285 test results to installations that are consistent with what is actually tested. NFPA 285 ONLY tests flat, vertical wall assemblies (see first photo below for an illustration of the test setup and fire exposure). It does not evaluate the ability of assemblies to survive increased fire exposure (heat flux) caused by inside corners; it does not evaluate the risk of fire penetration into wall assemblies at intersections with horizontal overhangs; and it does not evaluate the ability of horizontally installed assemblies to resist fire penetration (conditions such as those shown in the third photo below). Even without those variables, the fire exposure used in the test is questionably inadequate to judge performance in a realistic fire exposure (such as the one shown in the second photo below, which was taken during the American Wood Council's recent demonstrations of new Type IV construction methods). But with the added variables, which will certainly increase the exposure and risk of assembly failure, it is clearly inappropriate to allow NFPA 285 assemblies to be applied carte blanche under the IBC without further consideration of the fire risk.

Objections to the original proposal primarily focused on the difficulty of determining suitable prescriptive code-based modifications to a referenced fire test method. This public comment resolves that concern by limiting application of the NFPA 285 test method to what is tested and requiring that any other application of the test results be dealt with as an alternative method of compliance because it would involve using the test method beyond its historic scope limitations and the test setup.

The scope of NFPA 285 currently states:

This standard provides a test method for determining the fire propagation characteristics of exterior non-load-bearing wall assemblies and panels used as components of curtain wall assemblies, that are constructed using combustible materials or that incorporate combustible components, and that are intended to be installed on buildings required to have exterior walls of noncombustible construction.

Ignoring the aforementioned concerns and the fact that the current test method has not been publicly vetted for expanded applications, issues raised multiple times during the current NFPA 285 development cycle, the NFPA 285 Technical Committee recently acted without legitimate justification to remove the scope restrictions that limit the test method to non-bearing assemblies. They also expanded applications to include combustible structures, such as mass

timber high-rise buildings, in the next edition. That increases the possibility for an exterior wall fire to directly involve structural elements of a combustible high-rise building outside of the sprinklered envelope and above the height limit of fire department master streams.

The intent of this public comment is assuring that any application of the NFPA 285 test that goes beyond the standardized test method or what is actually tested must be treated as an alternative method of compliance (not unlike the approach approved by the Fire Safety Code Development Committee for Proposal FS1-2018). This will assure that the code official will have input into the process of determining whether the NFPA 285 test results are being appropriately applied, based on the recommendation and analysis of a recognized design professional, and whether additional testing or analysis may be necessary to gain approval. Like all alternative method proposals, each instance will require individual analysis, and the same solution may not be appropriate in all cases.

Given recent major fires involving exterior wall fire propagation, and particularly the Grenfell incident, it is unconscionable to not have the next edition of the IBC establish a reasonable limit on the use of NFPA 285 test results equating to conditions that are actually tested. This is especially important given the irresponsible action of the NFPA 285 committee to propose a scope expansion without first reviewing and reconsidering the suitability of the current test parameters for real-life applications, especially those involving combustible structures. Although catastrophic fires to date have not been documented as NFPA 285 examples, that certainly does not equate to a conclusion that such fires could not occur. Case-in-point, where are the fire incidents demonstrating NFPA 285 successes?

In conclusion, when NFPA 285 tested assemblies are installed outside of the tested configuration, the performance of the tested assembly is currently entirely unknown. Therefore, the supplemental analysis and code official approval required by this public comment is appropriate to ensure that the potential dangers to the public and to firefighters will not be overlooked or ignored.

NOTE: Other than the addition of Section 1410, the remaining portions of this public comment simply change the reference pointers from NFPA 285 to the new Section 1410. The revision shown for Section 1402.5 is NOT intended to override the outcome on Proposal FS99-18. The only Section 1402.5 change to be made by this public comment is revising the NFPA 285 reference that ends up in this section so that it points to the new Section 1410.





This public comment is also submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Currently, NFPA 285's scope is limited to not include all types of wall assemblies that are being addressed by this proposal. Compliance with additional technical analysis as proposed may have an impact on the cost of construction as it may require additional tests.

Public Comment 3:

Proponent: Jesse Beitel, Jensen Hughes representing XPSA, representing Extruded Polystyrene Foam Association (jbeitel@haifire.com); Jay Crandell (jcrandell@aresconsulting.biz); Richard Justin Koscher (jkoscher@pima.org) requests Disapprove.

Commenter's Reason: Please uphold the unanimous ICC Fire Safety Code Committee action for disapproval. The proposal intended to add modifications in the NFPA 285 test method such as changes in test wall configuration(s) and requirements for the application of a wind exposure to the test wall.

The Committee, unanimously voted disapproval of this proposal due to questions concerning how proposed test details would be performed, their impact on performance of the test and the capability of the test laboratories to carry out the proposed test modifications in a manner that would ensure reproducible and repeatable test results.

The use of a wind exposure has many potential problem. In fact, the NFPA 285 test was developed so that the test can be conducted indoors and eliminate the non-reproducibility caused by winds during the outdoor two-story building test (UBC26-4).

The proposed change to add a corner configuration or add other wall features, presents some of the same issues with respect to how to build these features, how does this change the test and does other items such as instrumentation, pass/fail criteria, etc. need to be changed as well.

Additionally, any changes to the applicability of the test standard or its scope will change the use of the standard and because significant issues with respect to previously tested assemblies and how new assemblies are to be tested.

These types of changes are significant and must be properly vetted and discussed by the Committee responsible for the test standard and go through the standard revision process so it will meet the requirements for use in ICC Codes. Additionally it is imperative to have exploratory, reproducibility and repeatability testing performed (as was done with the current NFPA 285) before the changes are incorporated into the test method.

The NFPA 285 is under the purview of the NFPA Technical Committee on Fire Tests. The Committee in June, 2018 discussed these potential changes as well as others to the scope of the standard and determined that they would be discussed in the next revision cycle of NFPA 285. Currently, there is no data to demonstrate the need for these changes, no data to show the effect of these changes on tested wall assemblies etc. Thus, it was not possible to include these items in the test method at this point in time.

Finally, NFPA 285 is an excellent test to determine vertical and horizontal flame-spread on or with exterior walls. The actual real world fires that have involved NFPA complying wall assemblies, the wall assemblies have performed as predicted by the NFPA 285 test.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
None

FS99-18

FS103-18

IBC: 1402.5

Proposed Change as Submitted

Proponent: Thomas Meyers, Building Intuition, LLC, representing Self (codeconsultant@gmail.com)

2018 International Building Code

Revise as follows

1402.5 Vertical and lateral flame propagation. *Exterior walls* on buildings of Type I, II, III or IV construction that are greater than 40 feet (12 192 mm) in height above grade plane and contain a combustible *water-resistive barrier* shall be tested in accordance with and comply with the acceptance criteria of NFPA 285. For the purposes of this section, *fenestration* products, flashing of *fenestration* products and *water-resistive-barrier* flashing and accessories at other locations, including through wall flashings, shall not be considered part of the *water-resistive barrier*.

Exceptions:

1. Walls in which the *water-resistive barrier* is the only combustible component and the *exterior wall* has a wall covering of brick, concrete, stone, terra cotta, stucco or steel with minimum thicknesses in accordance with Table 1404.2.
2. Walls in which the *water-resistive barrier* is the only combustible component and the *water-resistive barrier* has a peak heat release rate of less than 150 kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354 and has a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².
3. Walls in which the water-resistive barrier is applied over pressure-impregnated, fire-retardant-treated-wood complying with Section 2303.2 and the water-resistive barrier complies with Exception 1 or Exception 2.

Reason: Recent building cladding fires, such as the Grenfell Tower fire in London, have prompted review of the application of the NFPA 285 test standard to identify potential existing conflicts and areas of needed improvement or clarification.

Section 1402.5 appears to create a conflict resulting in significant industry confusion regarding the use of *fire-retardant-treated wood* (FRTW) in Types I, II, III, & IV construction as allowed by Section 602 and 603. This section suggests that FRTW cannot be used with a NFPA 285 compliant water-resistive barrier beyond 40 feet in height. The code currently allows FRTW used in Type III construction to extend to 85 feet in height. As FRTW does not meet the definition of “noncombustible” per Section 703.5, Exceptions 1 and 2 cannot be applied. This change provides for the needed clarification to permit FRTW to be used as permitted in Section 602 and 603 in conjunction with a NFPA 285 compliant water-resistive barrier.

Cost Impact: The code change proposal will not increase or decrease the cost of construction Potential construction savings where FRTW use was denied due to existence of a combustible water-resistive barrier.

FS103-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee determined there was no technical justification to introduce fire retardant treated wood. (Vote 12-2)

Assembly Action:

None

FS103-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Thomas Meyers, Building Intuition, LLC, representing Self (codeconsultant@gmail.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1402.5 Vertical and lateral flame propagation. *Exterior walls* on buildings of Type I, II, III or IV construction that are greater than 40 feet (12 192 mm) in height above grade plane and contain a combustible *water-resistive barrier* shall be tested in accordance with and comply with the acceptance criteria of NFPA 285. For the purposes of this section, *fenestration* products, flashing of *fenestration* products and *water-resistive-barrier* flashing and accessories at other locations, including through wall flashings, shall not be considered part of the *water-resistive barrier*.

Exceptions:

1. Walls in which the *water-resistive barrier* is the only combustible component and the *exterior wall* has a wall covering of brick, concrete, stone, terra cotta, stucco or steel with minimum thicknesses in accordance with Table 1404.2.
2. Walls in which the *water-resistive barrier* is the only combustible component and the *water-resistive barrier* has a peak heat release rate of less than 150 kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354 and has a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².
3. Walls in which the *water-resistive barrier* is applied over ~~pressure-impregnated~~, fire-retardant-treated-wood complying with Section 2303.2 and the *water-resistive barrier* complies with Exception 1 or Exception 2.

Commenter's Reason: This section specifically addresses the use of water resistive barriers on buildings of Type I, II, III, and IV construction. During testimony on this item, the following issues were raised:

1. The proposed exception's limitation to only pressure preservative fire retardant materials is too restrictive. This public comment removes that restriction.

2. There is no technical justification for the change. Testimony was provided showing that at least one fire retardant treated wood manufacturer has multiple assemblies that pass this standard using combustible insulative and water resistive materials within the assembly. Unfortunately, most of the testimony focused on the NFPA 285 and considerable disagreement on its validity for testing certain materials and assemblies used on building exteriors. Regardless, this is the test standard that was approved in a previous code cycle and compliance is required until either the standard is revised or until a new standard is proposed as a replacement.

Meanwhile, Type III buildings are being constructed across the United States using a combination of fire retardant treated wood in conjunction with thin water resistive barriers. This code section has caused considerable problems in approvals processes as projects are stalled and subject to engineering judgments and other "alternates" justifications to carry on construction that has otherwise been safely demonstrated for decades.

Approval of the public comment will allow the continued successful practice of using combustible water resistive barriers in conjunction with fire retardant treated wood.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. The current confusion caused by this code section has added performance documentation costs for project approvals.

Staff Analysis: If approved, these changes would be applied to the section as approved by FS98.

FS103-18

FS104-18

IBC: 1402.5

Proposed Change as Submitted

Proponent: Ali Fattah, City of San Diego, representing City of San Diego (afattah@sandiego.gov)

2018 International Building Code

Revise as follows

1402.5 Vertical and lateral flame propagation. *Exterior walls* on buildings of Type I, II, III or IV construction that are greater than 40 feet (12 192 mm) in height above grade plane and contain a combustible *water-resistive barrier* shall be tested in accordance with and comply with the acceptance criteria of NFPA 285. For the purposes of this section, *fenestration* products, flashing of *fenestration* products and *water-resistive-barrier* flashing and accessories at other locations, including through wall flashings, shall not be considered part of the *water-resistive barrier*.

Exceptions:

1. Walls in which the *water-resistive barrier* is the only combustible component and the *exterior wall* has a wall covering of brick, concrete, stone, terra cotta, stucco or steel with minimum thicknesses in accordance with Table 1404.2.
2. Walls in which the *water-resistive barrier* is the only combustible component and the *water-resistive barrier* has a peak heat release rate of less than 150 kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354 and has a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².
3. Exterior walls on buildings of Type III construction in which the water-resistive barrier is installed directly on exterior gypsum sheathing and the exterior wall has a wall covering of adhered veneer or stucco applied directly to the water-resistive barrier.

Reason: The IBC requires that exterior walls incorporating combustible water-resistive barriers in buildings higher than 40 ft and constructed of Type I, I, III or IV construction be tested to NFPA 285. Grade building paper has not been tested, Type V buildings can have a height that exceeds 40 ft and are not addressed. All the wall assemblies listed do not incorporate wood studs. The proposed code change ensures that the ignition of the water resistive barrier will not be caused by ignition of the combustible sheathing such as OSB or plywood. Section 703.5.2 conceptually addresses this issue similarly to that where a thin material is laminated on a non-combustible material can be considered non-combustible if it meets a flame spread rating. Exception 1 in Section 1402.5 also recognizes the benefit of the combustible water resistive barrier in a non-combustible wall. Similarly this code change recognize that the ignition potential for a combustible water resistive barrier sandwiched between two non-combustible sheathing materials or plaster without flue space is very limited. While there may be drainage planes between the stucco and the water resistive barrier the flue space is small enough to be negligible.

We have received several alternate methods and materials requests to utilize Grad D paper in lieu of listed proprietary water resistive barriers since the generic legacy material has not been tested ad all the listed wall assemblies are listed on metal framing. We have also reviewed fire analysis of heat release rates, time to ignition and various other parameters comparing the legacy material to the proprietary materials and they appear to have comparable properties and as a result chose to not include Type V buildings permitted to have a height in excess of 40 ft to this code change.

Cost Impact: The code change proposal will not increase or decrease the cost of construction

This proposed code change provides an option that does not require the use of proprietary water resistive barriers.

FS104-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee concluded the proposal did not contribute to improved fire safety, it did not clarify the properties of first resistant barriers, nor did it define adhered veneer. (Vote 13-1).

Assembly Action:

None

FS104-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ali Fattah, City of San Diego, representing San Diego Area Chapter of ICCrequests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

1402.5 Vertical and lateral flame propagation. Exterior walls on buildings of Type I, II, III or IV construction that are greater than 40 feet (12 192 mm) in height above grade plane and contain a combustible *water-resistive barrier* shall be tested in accordance with and comply with the acceptance criteria of NFPA 285. For the purposes of this section, *fenestration* products, flashing of *fenestration* products and *water-resistive-barrier* flashing and accessories at other locations, including through wall flashings, shall not be considered part of the *water-resistive barrier*.

Exceptions:

1. Walls in which the *water-resistive barrier* is the only combustible component and the *exterior wall* has a wall covering of brick, concrete, stone, terra cotta, stucco or steel with minimum thicknesses in accordance with Table 1404.2.
2. Walls in which the *water-resistive barrier* is the only combustible component and the *water-resistive barrier* has a peak heat release rate of less than 150 kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354 and has a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².
3. Exterior walls on buildings of Type III construction in which the *water-resistive barrier* is installed directly on exterior gypsum sheathing and the exterior wall has a wall covering of adhered veneer or stucco applied directly to the *water-resistive barrier*. The *water-resistive barrier* shall have a peak heat release rate of less than 150 kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354 and a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².

Commenter's Reason: This public comment has been submitted in response to feedback from the committee and speakers that spoke in opposition to the proposal. Persons in opposition were supposed of the concept where exterior walls utilizing wood framing is addressed in the exceptions. Code requirements that can not be enforced, whether because the requirements conflict with a referenced standard, or whether tested assemblies do not exist to implement a code requirement are not enforced.

When combustible water resistive barriers were first regulated in chapter 14 the main impetus was due observations made when testing wall assemblies utilizing claddings and foam plastic insulation. Cladding systems typically include void spaces that create a flue effect up behind the cladding that allows fire to spread vertically within the way assembly. At the time of the original code change conventional methods typical for installation of stucco used as an exterior wall covering were not evaluated nor were exterior wall assemblies incorporating wood. Only proprietary materials incorporating plastics have been tested and they are popular in exterior wall assemblies including claddings such as siding products, MCM, stone veneers, etc. have been tested to demonstrate compliance with IBC Section 1402.5 and the assembly listings list them for use in metal framed exterior walls.

Type V construction is excluded due the height limit imposed on the type of construction and since the entire exterior wall assembly is permitted to be combustible. Missed in the code requirement when Section 1402.5 were first developed is the reality that:

The height Type V construction can be extended up to 60 feet; and
That Type III construction when incorporating fire retardant treated wood (FRTW) within the exterior wall is original. While incorporating better protected exterior load bearing walls and FRTW Type III construction is still combustible.

A further complication is the fact that as presently written NFPA 285 requires testing of cladding assemblies attached to non-combustible framing presumably to verify the behavior of the cladding alone knowing that the exterior wall assembly might fail the test sooner.

During testimony a misunderstanding of Type III construction was evident. The construction is limited to a height of up to 85 ft and that the exterior wall covering is always required to be non-combustible. Furthermore the WRB is not the only combustible element so exception 1 to Section 1402.5 can not apply to Type III construction. We also learned from the testimony that exception # 1 ad 2 were developed based on observations in testing and that justification was not provided in the code change as initially proposed to effectively extend the applicability of exception 1 to Type III construction.

We have become aware of listing agencies, and agencies producing research reports, that evaluate exterior wall assemblies incorporating WRB for conformance with IBC Section 1402.5 have begun to recognize comparisons of WRB not tested in a particular assembly in listing wall assemblies that have not been tested to NFPA 285. Furthermore, these agencies are producing engineering judgements addressing the use of wood framing in wall assemblies that have been tested with non-combustible framing. That was the spirit of the original code change where we sought to justify the omission of testing in cases where both interior and exterior exposure to the WRB are eliminated and thus the possibility of ignition diminished. Furthermore, the original code change also recognized the limited ability for fire to spread within the wall assembly de a lack of flue space in stucco assemblies for example.

The public comment recognizes that there should be a limit to the combustibility of the WRB so proposed exception # 3 incorporates the limitations in exception 2.

We hope that the membership of ICC will help jurisdictions in the southwest better enforce Chapter 14 of the IBC and allow the use of combustible WRB materials in combustible wall assemblies and assemblies that incorporate WRB materials such as Grade D paper that comply with the flammability limits of exception 2.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. The code change will reduce the need for costly full exterior wall assemblies or the need for engineering judgement and the processing of Code Modifications or Alternate Methods and Materials applications all of which require additional processing costs.

FS104-18

FS108-18

IBC: 1403.2

Proposed Change as Submitted

Proponent: Joseph Lstiburek, representing Self (joe@buildingscience.com)

2018 International Building Code

Revise as follows

1403.2 Water-resistive barrier. Not fewer than one layer of No.15 asphalt felt, complying with ASTM D226 for Type 1 felt or other *approved* materials with a water resistance complying with ASTM E2556, Type I, shall be attached to the studs or sheathing, with flashing as described in Section 1404.4, in such a manner as to provide a continuous *water-resistive barrier* behind the *exterior wall* veneer.

Reason:

The existing code language gives insufficient guidance for other approved materials. The added language addresses this issue and provides a specific performance requirement for water resistance and provides consistency with other sections of the code that relate specifically to water-resistive barriers.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This change gives better guidance for water resistance.

FS108-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 1403.2 Water-resistive barrier.

Not fewer than one layer of water-resistive barrier material ~~No. 15 asphalt felt, complying with ASTM D226 for Type 1 felt or other approved materials with a water resistance complying with ASTM E2556, Type I,~~ shall be attached to the studs or sheathing, with flashing as described in Section 1404.4, in such a manner as to provide a continuous water-resistive barrier behind the exterior wall veneer. Water-resistive barriers shall comply with one of the following:

(1) No. 15 felt complying with ASTM D226, Type 1,

(2) ASTM E2556, Type I or II,

(3) ASTM E331 in accordance with Section 1402.2, or

(4) other approved materials installed in accordance with the manufacturer's installation instructions.

Committee Reason: The committee determined the proposal clarifies the intent of the section, the modification addresses all material types, allows for innovation, and is consistent with appropriate standard references. (Vote 14-0)

Assembly Action:

None

FS108-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Richard Popp, Meyer Concrete Pumping & Conveyor Service, LLC., representing Meyer Concrete Pumping & Conveyor Service, LLC.requests Disapprove.

Commenter's Reason: Allowing wood structures to be built above the level of fire department access is a serious mistake. Wood does not offer the resilience and fire protection of non-combustible alternatives like concrete and steel. Cross-Laminated Timber chars in a fire; however, charring is not equivalent to noncombustible. Note: if the char rate is 1" per hour in a fire, then after 2 hours in a fire, a 6" thick CLT wood load bearing wall will only have 2" of structural material left. This is not acceptable and is not addressed in the code change proposals. Should you pass this, you are putting countless lives and making an even larger impact on the generations to come as the world's forests are being depleted. Be smart about this and do not pass this.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The code change will not increase or decrease the cost of construction

FS108-18

FS110-18

IBC: 1403.8

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (FCAC@iccsafe.org)

2018 International Building Code

Revise as follows

1403.8 ~~Plastics.~~ Plastic construction elements. ~~Plastic panel, apron or spandrel walls as defined in this code construction elements of the exterior wall envelope, including aprons, panels and spandrels shall not be limited in thickness, provided that such plastics and their assemblies conform to the applicable requirements of Chapter 26 and are constructed of approved weather-resistant materials of adequate strength to resist the wind loads for cladding specified in Chapter 16. Plastic spandrel walls shall also comply with the applicable requirements of section 715.5. Light transmitting plastic wall panels shall comply with Section 2607.~~

Reason: This code change proposal is intended to clarify the requirements for plastic construction elements in exterior walls. This section is confusing as currently written.

Section 1404.8 does not address plastics in general, but does contain some requirements for specific plastic construction elements on exterior walls. The following terms are not defined in the IBC code: plastic panels, plastic aprons and plastic spandrel walls. The only reference to spandrel walls (and not specifically to plastic spandrel walls) is in section 715.5. Plastic panels are not mentioned in the code, except for light transmitting plastic wall panels that are referenced in section 2607.

In view of the fact that the section as written is confusing, this proposal will serve to clarify the requirements for better understanding by designers and building code officials, without changing requirements.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

This proposal is one in a series of related proposals intended to address different technical changes to Chapter 14. While the Fire Code Committee will consider each proposal independently, the intent is for approval of all proposals in this package which have been submitted as a correlated set of companion code change proposals.

The FCAC analyzed several fatal fires related to exterior façade/curtain wall fires in the development of these new code requirements. The intent of these proposals is to provide a reasonable set of code requirements to ensure fire safety and weather protection for buildings that utilize combustible materials and/or assemblies for the building exterior wall envelope.

1. Grenfell fire, London England:

Buildings Across U.S. Are Wrapped in Same Panels That Fueled Deadly London Fire: <https://www.wsj.com/articles/built-to-burn-thousands-of-buildings-world-wide-are-wrapped-in-combustible-panels-1508858048>

Why Grenfell Tower Burned: Regulators Put Cost Before Safety
<https://www.nytimes.com/2017/06/24/world/europe/grenfell-tower-london-fire.html>

2. Torch Tower Fire, Dubai

https://en.wikipedia.org/wiki/The_Marina_Torch January 8th, 2018

3. Address Hotel Fire, Dubai https://en.wikipedia.org/wiki/The_Address_Downtown_Dubai January 8th, 2018

Bibliography:

Cost Impact: The code change proposal will not increase or decrease the cost of construction

This proposal simply clarifies the section for better use and understanding.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee concluded the existing language was clear without this change, and this broadened the scope of with regards to plastics. (Vote 14-0).

Assembly Action:

None

FS110-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

1403.8 Plastic construction elements panels, aprons or spandrel walls. Plastic construction elements of the exterior wall envelope, including aprons, panels and spandrels panels, aprons and spandrel walls shall not be limited in thickness, provided that such plastics and their assemblies conform to the applicable requirements of Chapter 26 and are constructed of *approved* weather-resistant materials of adequate strength to resist the wind loads for cladding specified in Chapter 16. Plastic spandrel walls shall also comply with the applicable requirements of section 715.5. Light transmitting plastic wall panels shall comply with Section 2607.

Commenter's Reason: This public comment is simply to delete confusing and incorrect language. This public comment addressed the other reasons the IBC-FS Committee voted for Disapproval by removing other language presented in the original proposal.

The terms plastic panels, plastic aprons and plastic spandrel walls are not defined in the IBC, so this proposal deletes the confusing language that states the terms are defined.

The IBC typically does not use language "as defined in this code".

This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal simply clarifies the section for better use and understanding.

FS110-18

FS111-18

IBC: 1403.12

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (FCAC@iccsafe.org)

2018 International Building Code

Revise as follows

1403.12 Polypropylene siding. *Polypropylene siding* shall be certified and labeled as conforming to the requirements of ASTM D7254 and those of Section 1403.12.1 or 1403.12.2 by an approved quality control agency. *Polypropylene siding* shall be limited to buildings of Type VB construction and shall be installed in accordance with the requirements of Section 1404.18 and ~~in accordance with~~ the manufacturer's instructions. *Polypropylene siding* shall be secured to the building so as to provide weather protection for the *exterior walls* of the building.

Reason: This proposal limits the use of Polypropylene siding to only buildings of Type VB construction and adds back language that was inadvertently removed during the last code cycle. Polypropylene siding is permitted in the code by section 1403.12, which requires it to meet ASTM D7254. The fire test in ASTM D7254 is ASTM E84 and polypropylene siding typically materials melt and fall to the floor of the tunnel during the test before the flame reaches the test specimen, which means that the flame spread index determined is not a valid test result.

Polypropylene siding is a product with very poor fire performance, something that has been demonstrated time after time. For example, the heat release rate of the polypropylene material typically used for polypropylene siding is about twice as high as that of typical wood siding and over twice as high as that of vinyl siding. The heat released by a material used in the outside of a building is an indication of the radiated heat to a nearby building.

Siding tests using ASTM E1354 fire test:

Wood (cedar) siding: peak heat release rate 309 kW/m - effective heat of combustion: 13 MJ/kg

Polypropylene siding 1: peak heat release rate 546 kW/m - effective heat of combustion: 25 MJ/kg

Polypropylene siding 2: peak heat release rate 878 kW/m - effective heat of combustion: 32 MJ/kg

Material tests using ASTM E1354 fire test:

Vinyl (PVC): peak heat release rate 190 kW/m - effective heat of combustion: 9 MJ/kg

For that reason, the use of this material has been limited to Type VB construction since it was first allowed into the IBC. When polypropylene siding burns it releases much more heat than any other siding material permitted by the code.

The difference between Type VB construction and no limits on the Type of construction, allows construction with greater heights, more stories above grade plane and larger allowable areas as well as allowing in buildings of Types I through IV construction. The text proposed to be added by this proposal was deleted at the last cycle with the rationale that this section simply addresses wind speeds. However, the permission for using polypropylene siding in any type of construction applies to the entire chapter.

Note also that the fire separation distance for polypropylene siding is 10 feet (as opposed to 5 feet for other materials) due to its poorer fire performance.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

This proposal is one in a series of related proposals intended to address different technical changes to Chapter 14. While the Fire Code Committee will consider each proposal independently, the intent is for approval of all proposals in this package which have been submitted as a correlated set of companion code change proposals.

The FCAC analyzed several fatal fires related to exterior façade/curtain wall fires in the development of these new code requirements. The intent of these proposals is to provide a reasonable set of code requirements to ensure fire safety and weather protection for buildings that utilize combustible materials and/or assemblies for the building exterior wall envelope.

1. Grenfell fire, London England:

Buildings Across U.S. Are Wrapped in Same Panels That Fueled Deadly London Fire: <https://www.wsj.com/articles/built-to-burn-thousands-of-buildings-world-wide-are-wrapped-in-combustible-panels-1508858048>

Why Grenfell Tower Burned: Regulators Put Cost Before Safety
<https://www.nytimes.com/2017/06/24/world/europe/grenfell-tower-london-fire.html>

2. Torch Tower Fire, Dubai

https://en.wikipedia.org/wiki/The_Marina_Torch January 8th, 2018

3. Address Hotel Fire, Dubai https://en.wikipedia.org/wiki/The_Address_Downtown_Dubai January 8th, 2018

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal corrects the removal of the limitation to Type VB buildings that was inadvertently removed from the code the last cycle.

FS111-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee indicated cladding is already addressed in Section 1405, and there is no data that it would be safe in Type V construction. The currently language has been vetted and was overwhelmingly approved in the last code change cycle. (Vote 10-4)

Assembly Action:

None

FS111-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Marcelo Hirschler, representing GBH International (mmh@gbhint.com) requests As Submitted.

Commenter's Reason: Committee statement: The committee indicated cladding is already addressed in Section 1405, and there is no data that it would be safe in Type V construction. The currently language has been vetted and was overwhelmingly approved in the last code change cycle. (Vote 10-4)

Three items are of interest there:

(1) Section 1405 applies only to buildings of Types I through IV construction.

(2) The committee stated that they had no information that PP siding was safe in type V construction. This is exactly what the proposal seeks to address. Restricting PP siding to Type VB will address the committee's concerns about the safety of this material. That is the reason that PP siding was restricted to Type VB construction when introduced in the IBC in the first place.

(3) The current language was vetted by the structural committee and not by the fire safety committee, which clearly had some significant reservations (note the multiple opponents to the action). The original restriction to Type VB construction was located in the section on wind requirements.

The proposed change was intended to place the restriction on PP siding application where it belongs, in a section dealing with fire safety.

Note that ASTM D7254 (which is what PP siding needs to conform to) requires testing of polypropylene to ASTM E84 (Steiner tunnel) and section 803.9 of the IBC does not allow polypropylene interior finish to be tested in accordance with ASTM E84. Thus means that polypropylene siding (meeting the requirements of ASTM D7254) would not be allowed as an interior finish material because the fire test is inappropriate for it.

In summary: a material that is known to exhibit very poor fire performance is being permitted in any type of construction based on a fire test requirement that is inappropriate (as evidenced by the prohibition to its use in a different section of the code) and based on the fact that a manufacturer showed a test result on a product for a section that applies to Types I-IV construction but not to Type V construction and with the background that the technical committee stated that its safety in Type V construction is not known.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal corrects the removal of the limitation to Type VB buildings that was inadvertently removed from the code the last cycle.

FS111-18

FS149-18

IBC: 1406.10.4.1(New), 1408.10.4.1 (New), 2603.5.5.1 (New), Chapter 35

Proposed Change as Submitted

Proponent: John Harrington, FM Global, representing FM Global (john.harrington@fmglobal.com)

2018 International Building Code

1406.10.4 Full-scale tests. The MCM system shall be tested in accordance with, and comply with, the acceptance criteria of NFPA 285. Such testing shall be performed on the MCM system with the MCM in the maximum thickness intended for use.

Add new text as follows

1406.10.4.1 Window protection. Where window openings are provided within the installed wall assembly, they shall be covered as follows:

1. Where the assembly was tested per NFPA 285, provide protection as provided in the actual test.
2. Where the assembly was tested per ANSI/FM 4880, provide minimum 20 ga. (0.03595 in, 0.9 mm) steel flashing around the window opening, fastened at a maximum spacing of 16 in. (406 mm) on center into the wall structure using no. 10 (5 mm) screws.

1408.10.4 Full-scale tests. The HPL system shall be tested in accordance with, and comply with, the acceptance criteria of NFPA 285. Such testing shall be performed on the HPL system with the HPL in the minimum and maximum thicknesses intended for use.

1408.10.4.1 Window Protection. Where window openings are provided within the installed wall assembly, they shall be covered as follows:

1. Where the assembly was tested per NFPA 285, provide protection as provided in the actual test.
2. Where the assembly was tested per ANSI/FM 4880, provide minimum 20 ga. (0.03595 in., 0.9 mm) steel flashing around the window opening, fastened at a maximum spacing of 16 inches. (406 mm) on center into the wall structure using minimum no. 10 (5 mm) screws.

2603.5.5 Vertical and lateral fire propagation. The exterior wall assembly shall be tested in accordance with and comply with the acceptance criteria of NFPA 285.

Exceptions:

1. One-story buildings complying with Section 2603.4.1.4.
2. Wall assemblies where the foam plastic insulation is covered on each face by not less than 1-inch (25 mm) thickness of masonry or concrete and meeting one of the following:
 - 2.1. There is no airspace between the insulation and the concrete or masonry.
 - 2.2. The insulation has a flame spread index of not more than 25 as determined in accordance with ASTM E84 or UL 723 and the maximum airspace between the insulation and the concrete or masonry is not more than 1 inch (25 mm).

2603.5.5.1 Window protection. Where window openings are provided within the installed wall assembly, they shall be covered as follows:

1. Where the assembly was tested per NFPA 285, provide protection as provided in the actual test.
2. Where the assembly was tested per ANSI/FM 4880, provide minimum 20 ga. (0.03595 in, 0.9 mm) steel flashing around the window opening, fastened at a maximum spacing of 16 in. (406 mm) on center into the wall structure using no. 10 (5 mm) screws.

Update standard(s) as follows

4880-20152017:

Approval Standard for Class 1 Fire Rating of Building Panels or Interior Finish Materials

Reason: Protection against fire exposure to the wall assembly cross-section around window openings must be provided in the installation to prevent fire spread within the cavity of the wall assembly.

Cost Impact: The code change proposal will increase the cost of construction
Minimal cost increase for additional materials in walls so as to prevent fire spread within the wall cavity.

FS149-18

Public Hearing Results

Errata: Adding Section 1406.10.4.1 was part of the proponent's original submittal.

Add the following text

1406.10.4.1 Window protection.

Where window openings are provided within the installed wall assembly, they shall be covered as follows:

1. Where the assembly was tested per NFPA 285, provide protection as provided in the actual test.

2. Where the assembly was tested per ANSI/FM 4880, provide minimum 20 ga. (0.03595 in. 0.9 mm) steel flashing around the window opening, fastened at a maximum spacing of 16 in. (406 mm) on center into the wall structure using no. 10 (5 mm) screws.

Committee Action:

Disapproved

Committee Reason: The committee disapproved based on the proponent's request, due to the disapproval of FS74.
(Vote 13-0)

Assembly Action:

None

FS149-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Harrington, representing FM Global (john.harrington@fmglobal.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

1406.10.4.1 Window protection Where window openings are provided within the installed wall assembly, they shall be covered as follows:

1. Where the assembly was tested per NFPA 285, provide protection as provided in the actual test.
2. Where the assembly was tested per ANSI/FM 4880, provide minimum 20 ga. (0.03595 in. 0.9 mm) steel flashing around the window opening, fastened at a maximum spacing of 16 inches (406 mm) on center into the wall structure using No. 10 (5 mm) screws.

1408.10.4.1 Window protection. Where window openings are provided within the installed wall assembly, they shall be covered as follows:

1. Where the assembly was tested per NFPA 285, provide protection as provided in the actual test.
2. Where the assembly was tested per ANSI/FM 4880, provide minimum 20 ga. (0.03595 in. 0.9 mm) steel flashing around the window opening, fastened at a maximum spacing of 16 inches (406 mm) on center into the wall structure using No. 10 (5 mm) screws.

Commenter's Reason: ANSI/FM 4880 is a consensus fire test that can be used to test fire exposure to the interior or exterior side of exterior walls. Justification for the ASNI/FM 4880 16 ft parallel panel; fire test has been included as part of the FS74 companion proposal. For the needed window protection accompanying the use of either NFPA 285 or ANSI/FM 4880, the windows must be designed prescriptively in accordance with 1406.10.4.1 or 1408.10.4.1. Protection against fire exposure to the wall assembly cross-section around window openings must be provided in the installation to prevent fire spread within the cavity of the wall assembly.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction Minimal cost increase for additional materials in walls so as to prevent fire spread within the wall cavity.

Public Comment 2:

Proponent: Justin Koscher, Polyisocyanurate Insulation Manufacturers Association (jkoscher@pima.org); John Woestman, Kellen Company, representing Extruded Polystyrene Foam Association (jwoestman@kellencompany.org); Jay Crandell, ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council (jcrandell@aresconsulting.biz) requests Disapprove.

Commenter's Reason: Please uphold the unanimous ICC Fire Safety Code Committee action for disapproval. This proposal is similar to proposal number FS74 also submitted by the same proponent. The same rationale for disapproval of FS74 applies here. In short, the proponent fails to provide sufficient supporting evidence and test data to establish that the FM 4880 16-foot Parallel Panel Test (FM 4880 16 PPT) is an equivalent and alternative method to the NFPA 285 test standard.

The proposal itself contains evidence that FM 4880 16 PPT is not equivalent to NFPA 285 because the consensus-version of the FM test standard does not require, or specify, a window opening in the tested assembly. The proponent attempts to correct this deficiency through this proposal. However, the ICC Council Policy No.28-05 (CP28) Section 3.6 Reference Standards relies on consensus standard setting organizations for such modifications. Therefore, the proposal should be rejected because it violates CP28 and attempts to reference a non-consensus version of a test standard.

Furthermore, in June 2018, the NFPA Standards Council approved the NFPA Fire Test Committee's request to establish a new project to evaluate the suitability of the FM 4880 16 PPT as an alternative to NFPA 285, subject to two conditions: (1) window openings or the lack thereof within the FM 4880 16 PPT will need to be addressed; and (2) whether the application of any new document will be mandated by the Codes. Given these developments, the NFPA Fire Test Committee should be allowed to complete its work before ICC voting members give further consideration to this concept. Therefore, the proposal should be disapproved.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
None.

FS149-18

FS155-18

IBC: 202, 2603.1.1, Chapter 35, ICC

Proposed Change as Submitted

Proponent: Brian Tollisen, representing ICC Foam Plastic Insulation Standard Committee (Brian.Tollisen@dos.ny.gov)

2018 International Building Code

Add new definition as follows

SPRAY-APPLIED FOAM PLASTIC. Single- and multi-component, spray-applied foam plastic insulation used in nonstructural applications which are installed at locations wherein the material is applied in a liquid or frothed state, permitted to free rise and cure in situ.

Add new text as follows

2603.1.1 Spray-applied foam plastic. Single- and multiple-component spray-applied foam plastic insulation shall comply with the provisions of Section 2603 and ICC 1100-2018.

Add new standard(s) follows

CHAPTER 35 REFERENCED STANDARDS

ICC

International Code Council, Inc.
500 New Jersey Ave NW 6th Floor
Washington DC 20001

1100-2018:

Standard for Spray-applied Foam Plastic Insulation

Reason: The IBC contains requirements for thermal resistance of insulating materials but currently includes limited material standards for certain types of insulating materials. The purpose of this proposal is to introduce a performance standard for spray-applied foam plastic insulation. The standard establishes the minimum physical and performance properties as well as application requirements for spray-applied foam plastic insulations. This standard will benefit Code officials, spray-applied foam plastic insulation manufacturers, design professionals, product testing and certification agencies.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal simply adds a material performance standard to the code that reflects the current industry and construction practices.

Analysis: A review of the standard proposed for inclusion in the code, ICC 1100-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

FS155-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The committee approved the proposal based on proponent's reason statement. (Vote 13-0).

Assembly Action:

None

FS155-18

Individual Consideration Agenda

Public Comment 1:

Proponent: CP28 Administration.

Commenter's Reason: The administration of ICC Council Policy 28 (CP28) is not taking a position on this code change. This public comment is being submitted to bring a procedural requirement to the attention of the ICC voting membership. In accordance with Section 3.6.3.1.1 of ICC Council Policy 28 (partially reproduced below), the new referenced standard ICC 1100-2018 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

(CP28) 3.6.3.1.1 Proposed New Standards. In order for a new standard to be considered for reference by the Code, such standard shall be submitted in at least a consensus draft form in accordance with Section 3.4. If the proposed new standard is not submitted in at least consensus draft form, the code change proposal shall be considered incomplete and shall not be processed. The code change proposal shall be considered at the Committee Action Hearing by the applicable code development committee responsible for the corresponding proposed changes to the code text. If the committee action at the Committee Action Hearing is either As Submitted or As Modified and the standard is not completed, the code change proposal shall automatically be placed on the Public Comment Agenda with the recommendation stating that in order for the public comment to be considered, the new standard shall be completed and readily available prior to the Public Comment Hearing

FS155-18

S6-18

IBC: , 1507.3.10, 1507.3.10.1, 1507.3.10.2, 1507.3.10.3, 1507.3.10.4

Proposed Change as Submitted

Proponent: Amanda Hickman, The Hickman Group, representing RIMA International (amanda@thehickmangroup.com)

THIS PROPOSAL WILL BE HEARD BY THE IBC FIRE SAFETY CODE COMMITTEE. SEE THE IBC-FS HEARING AGENDA.

2018 International Building Code

Delete without substitution

~~SECTION 1509 RADIANT BARRIERS INSTALLED ABOVE DECK~~

~~**[BF] 1509.1 General.** A radiant barrier installed above a deck shall comply with Sections 1509.2 through 1509.4.~~

~~**[BF] 1509.2 Fire testing.** Radiant barriers shall be permitted for use above decks where the radiant barrier is covered with an approved roof covering and the system consisting of the radiant barrier and the roof covering complies with the requirements of either FM 4450 or UL 1256.~~

~~**[BF] 1509.3 Installation.** The low emittance surface of the radiant barrier shall face the continuous airspace between the radiant barrier and the roof covering.~~

~~**[BF] 1509.4 Material standards.** A radiant barrier installed above a deck shall comply with ASTM C1313/1313M.~~

Add new text as follows

1507.3.10 Radiant barrier. Where a radiant barrier is installed above a roof deck under clay or concrete tile, it shall comply with Sections 1507.3.10.1 through 1507.3.10.4

1507.3.10.1 Installation. Radiant barriers shall only be installed between a batten and a counter batten. A low-emittance surface of the radiant barrier shall face the airspace between the radiant barrier and roof deck.

1507.3.10.2 Material fire testing. The radiant barrier material shall have a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723, with test specimen preparation and mounting in accordance with ASTM E2599.

1507.3.10.3 Assembly fire testing. The roof assembly, including the radiant barrier, shall comply with the requirements of a Class A, B, or C roof assembly when classified as required by Section 1505.1.

1507.3.10.4 Material standards. Radiant barrier materials shall comply with ASTM C1313/C1313M.

Reason: This proposal is submitted as a compromise between RIMA International and National Roofing Contractors Association (NRCA). NRCA approached RIMA with an interest to move section 1509 to 1507. The current language in 1509 is adequate; however, in the spirit of consensus, and because radiant barriers are often used in conjunction with concrete or clay tile, the proposed move of the radiant barrier language from 1509 to a new section in section 1507 Clay and Concrete Tile was developed.

The proposed new section 1507.3.10.2 was drafted based on the requirements in Chapter 14 for water resistive barriers: testing the radiant barrier (on its own) to both ASTM E1354 and ASTM E84 test standards. ASTM E2599 test standard is recommended as the test specimen preparation and mounting method since it is specific to radiant barriers (and some other materials); ASTM E2404 is applicable to water resistive barriers.

A fire classification is required for all roof assemblies per Section 1505. Adding the proposed Section 1507.3.10.3 requires assembly testing of the entire roof covering system. Therefore, the addition of the radiant barrier to any roof assembly will result in a fire classification for the roof assembly as required by Section 1505, just like all other roof assemblies.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This will neither increase or decrease construction costs as radiant barriers are not mandatory, the proposal only moves 1509 language to 1507; and the revisions are minor.

Staff Analysis: The referenced standards within this proposal are currently referenced in the I-Codes.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee determined this proposal would not correct the broken text. (Vote 10-3)

Assembly Action:

None

S6-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Amanda Hickman, representing RIMA International (amanda@thehickmangroup.com) requests As Submitted.

Commenter's Reason: This proposal should be approved as submitted because it adds clarity as to when and how radiant barriers can be used in roof assemblies. After many discussions with the National Roofing Contractors Association (NRCA) and others, this was the language that was agreed upon. This language gives the appropriate information for the proposal application and installation of this technology.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This will neither increase or decrease construction costs as radiant barriers are not mandatory, the proposal only moves 1509 language to 1507; and the revisions are minor.

S6-18

S7-18

IBC: 1508.1

Proposed Change as Submitted

Proponent: Bill McHugh, The McHugh Company, representing Chicago Roofing Contractors Association (Bill@mc-hugh.us)

THIS PROPOSAL WILL BE HEARD BY THE IBC FIRE SAFETY CODE COMMITTEE. SEE THE IBC-FS HEARING AGENDA.

2018 International Building Code

Revise as follows

[BF] 1508.1 General. The use of above-deck thermal insulation shall be permitted provided that such insulation is covered with an approved roof covering and passes the tests of NFPA 276 or UL 1256 when tested as an assembly.

Exceptions:

1. Foam plastic roof insulation shall conform to the material and installation requirements of Chapter 26 and separated by an assembly having a minimum 30 minute fire-resistance rating.
2. Where a concrete roof deck is used and the above-deck thermal insulation is covered with an approved roof covering.

Reason: The purpose of this proposal is to add safety for when foam plastic insulation is allowed to be used on roof assemblies. Foam plastic insulation is a great product but needs additional protection from fire, especially in roofing configurations. It seems in Chapter 26 that there is an exception that allows foam plastic insulation to be direct applied to wood sheathing but not metal decking. Regardless of roof deck type, it is important to protect the building with a 30 minute fire-resistance rated assembly as a thermal barrier.

Cost Impact: The code change proposal will increase the cost of construction
This proposal will increase the cost of construction by about \$1.00 - \$1.25US per square foot of roofing area.

S7-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee concluded this clarification should be made in Chapter 6, not as proposed. (Vote 13-0)

Assembly Action:

None

S7-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Bill McHugh, representing National Fireproofing Contractors Association (billmchugh-jr@att.net) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

603.1 Allowable materials. Combustible materials shall be permitted in buildings of Type I or II construction in the following applications and in accordance with Sections 603.1.1 through 603.1.3:

1. *Fire-retardant-treated wood* shall be permitted in:
 - 1.1. Nonbearing partitions where the required *fire-resistance rating* is 2 hours or less.
 - 1.2. Nonbearing *exterior walls* where fire-resistance-rated construction is not required.
 - 1.3. Roof construction, including girders, trusses, framing and decking.

Exception: In buildings of Type IA construction exceeding two *stories above grade plane*, *fire-retardant-treated wood* is not permitted in roof construction where the vertical distance from the upper floor to the roof is less than 20 feet (6096 mm).
 - 1.4. Balconies, porches, decks and exterior stairways not used as required exits on buildings three *stories* or less above grade plane.
2. Thermal and acoustical insulation, other than foam plastics, having a *flame spread index* of not more than 25.

Exceptions:

1. Insulation placed between two layers of noncombustible materials without an intervening airspace shall be allowed to have a *flame spread index* of not more than 100.
 2. Insulation installed between a finished floor and solid decking without intervening airspace shall be allowed to have a *flame spread index* of not more than 200.
3. Foam plastics in accordance with Chapter 26.
 - 3.1. Where foam plastics are included in a roof assembly, the assembly shall have a fire-resistance rating of not less than 30 minutes.
 4. Roof coverings that have an A, B or C classification.
 5. *Interior floor finish* and floor covering materials installed in accordance with Section 804.
 6. Millwork such as doors, door frames, window sashes and frames.
 7. *Interior wall and ceiling finishes* installed in accordance with Section 803.
 8. *Trim* installed in accordance with Section 806.
 9. Where not installed greater than 15 feet (4572 mm) above grade, show windows, nailing or furring strips and wooden bulkheads below show windows, including their frames, aprons and show cases.
 10. Finish flooring installed in accordance with Section 805.
 11. Partitions dividing portions of stores, offices or similar places occupied by one tenant only and that do not establish a *corridor* serving an *occupant load* of 30 or more shall be permitted to be constructed of *fire-retardant-treated wood*, 1-hour fire-resistance-rated construction or of wood panels or similar light construction up to 6 feet (1829 mm) in height.
 12. Stages and platforms constructed in accordance with Sections 410.2 and 410.3, respectively.
 13. Combustible *exterior wall coverings*, balconies and similar projections and bay or oriel windows in accordance with Chapter 14 and Section 705.2.3.1.
 14. Blocking such as for handrails, millwork, cabinets and window and door frames.
 15. Light-transmitting plastics as permitted by Chapter 26.
 16. Mastics and caulking materials applied to provide flexible seals between components of *exterior wall* construction.
 17. Exterior plastic veneer installed in accordance with Section 2605.2.
 18. Nailing or furring strips as permitted by Section 803.15.
 19. Heavy timber as permitted by Note c to Table 601 and Sections 602.4.3 and 705.2.3.1.
 20. Aggregates, component materials and admixtures as permitted by Section 703.2.2.
 21. Sprayed fire-resistant materials and intumescent and mastic fire-resistant coatings, determined on the basis of *fire resistance* tests in accordance with Section 703.2 and installed in accordance with Sections 1705.14 and 1705.15, respectively.
 22. Materials used to protect penetrations in fire-resistance-rated assemblies in accordance with Section 714.
 23. Materials used to protect joints in fire-resistance-rated assemblies in accordance with Section 715.
 24. Materials allowed in the concealed spaces of buildings of Types I and II construction in accordance with Section 718.5.
 25. Materials exposed within plenums complying with Section 602 of the International Mechanical Code.
 26. Wall construction of freezers and coolers of less than 1,000 square feet (92.9 m²), in size, lined on both sides with noncombustible materials and the building is protected throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

Commenter's Reason: The purpose of this public comment is to address the committee comments that the proposal belonged in Chapter 6 of the IBC.

This proposal brings greater safety to buildings that these foam plastics for roof insulation. While great on thermal resistance, these insulations are flammable when exposed to flame during roof construction or sparks, flame or heat during repairs and even heat transmission from under the decking.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction

Foam insulation requiring a fire-resistance-rating of 30 minutes could increase the cost of construction from \$1.00 to \$1.25 square foot. If other types of insulation are selected other than foam plastics, then the increase is much, much less.

Public Comment 2:

Proponent: Mike Fischer, Kellen Company, representing The Polyisocyanurate Insulation Manufacturers Association (mfischer@kellencompany.com); Jay Crandell, P.E., ARES Consulting (jcrandell@aresconsulting.biz); Richard Justin Koscher (jkoscher@pima.org); John Woestman (jwoestman@kellencompany.com); Marcin Pazera (mpazera@pima.org) requests Disapprove.

Commenter's Reason: S7-18 is one of three code proposals (along with FS156-18 and S8-18) that seek to modify the fire testing requirements of the IBC for all foam plastic insulation materials in roof assemblies. All three were recommended for disapproval by the Committee. We request Disapproval by the Public Comment Hearing attendees and the OGCV.

This proposal adds a requirement for foam plastic roof insulation to be separated by an "assembly" having a 30-min fire-resistance rating. IBC Chapter 26 (Section 2603.4) generally requires the use of a thermal barrier with foam plastic insulation so in those assemblies the additional language is unnecessary.

The proposal goes well beyond the requirements of Chapter 26 Section 2603.4.1.5 (1) and (2) by requiring an undefined 30-minute rating for an assembly with foam plastic that passes NFPA 276 or UL1256, or contains wood structural sheathing.

This creates a conflict with IBC Chapter 26 which conflicts with the User Note, "The use of plastics in building construction and components is addressed in Chapter 26". Therefore, in its proposed location and form the proposal would create confusion and potential non-compliance.

The proponent does not provide any supporting information that demonstrates the current approach to assembly fire testing is insufficient.

Additionally, a test method is not specified for the proposed fire-resistance rating, and the charging text requires separation of the foam plastic roof insulation but does not indicate what the separation actually entails.

The International Building Code (IBC) generally requires that a thermal barrier be installed when using foam plastic insulation. However, the IBC includes a number of exemptions to this requirement if products and systems are tested to rigorous fire safety standards. FM 4450 (NFPA 276) has been recognized by the building code for over 30 years as the standard for evaluating the fire performance of insulated roof systems installed on steel roof decks.

The development of FM 4450 was the result of a large industrial fire at the General Motor's factory in Livonia, Michigan. The event exposed the fire risk to roof decks when buildings have large, open interior spaces, such as a warehouse or manufacturing facility. The current version of FM 4450 relies on a calorimeter test that examines whether roof assembly components drip or pool and measures the tested assembly's fuel contribution over the duration of the 30-minute test.

In the 2000's, FM 4450 was reviewed through a consensus development process and published as NFPA 276 standard. Today, FM 4450 (NFPA 276) is referenced in the IBC and used by ISO/IEC 17065 Accredited Product Certification Bodies for evaluation reports. Data from FM Global reveals that over 800 manufacturers use the calorimeter test and approximately 423,000 roof assemblies have been approved using the consensus standard.

The proposal would add material costs, labor and roof assembly weight with no evidence of the added fire safety as alleged by the proponent, and with no evidence of a hazard from the current code requirements. The Committee reason statement for unanimous disapproval indicates they agree that these issues are currently addressed in Chapter 26.

The Polyisocyanurate Insulation Manufacturers Association (PIMA) is the national trade association representing Polyiso insulation manufacturers and suppliers to the Polyiso industry. PIMA advances the use of Polyiso insulation and is one of the nation's foremost industry advocates for energy-efficient practices and policies. In addition, PIMA has been recognized by both the Environmental Protection Agency (EPA) and the Sustainable Building Industries Council for advocacy and products.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The public comment maintains current requirements.

Public Comment 3:

Proponent: Mike Fischer, Kellen Company, representing The Center for the Polyurethanes Industry of the American Chemistry Council (mfischer@kellencompany.com) requests Disapprove.

Commenter's Reason: S7-18 is one of three code proposals (along with FS156-18 and S8-18) that seek to modify the fire testing requirements of the IBC for all foam plastic insulation materials in roof assemblies. All three were recommended for disapproval by the Committee. We request disapproval by the Public Comment Hearing attendees and the OGCV.

This proposal adds a requirement for roof assemblies containing foam plastic roof insulation to be separated by an assembly having a 30-min fire-resistance rating. These requirements are currently governed by IBC Section 2603.4.

The proponent does not provide any supporting information that demonstrates the current approach to assembly fire testing is insufficient. There are hundreds of approved roof assemblies containing foam plastic insulation materials including both rigid and spray polyurethane foam applications that meet the current test requirements. While some assemblies might require a thermal barrier to pass NFPA 276, there is no justification for adding in an extra requirement for assemblies that pass without need for thermal barrier protection.

The proposal does not specify a test method for the proposed fire-resistance rating, and as such is incomplete.

The proposal would add material costs, labor and roof assembly weight with no evidence of the added fire safety as alleged by the proponent, and with no evidence of a hazard from the current code requirements. The Committee reason statement for unanimous disapproval indicates they agree that these concerns are appropriately addressed in Chapter 26.

Please vote for disapproval of S7-18.

The ACC s Center for the Polyurethanes Industry (CPI) mission is to promote the growth of the North American polyurethanes industry through effective advocacy demonstrating how polyurethanes deliver sustainable outcomes, and creation of robust safety education and product stewardship programs.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The public comment makes no change to current code.

S7-18

S9-18

IBC: 1508.1

Proposed Change as Submitted

Proponent: Bill McHugh, representing Chicago Roofing Contractors Association (billmchugh-jr@att.net)

THIS PROPOSAL WILL BE HEARD BY THE IBC FIRE SAFETY CODE COMMITTEE. SEE THE IBC-FS HEARING AGENDA.

2018 International Building Code

Revise as follows

{BF} 1508.1 General. The use of above-deck thermal insulation shall be permitted provided that such insulation is covered with an approved roof covering and passes the tests of NFPA 276 or UL 1256 when tested as an assembly.

Exceptions:

1. Foam plastic roof insulation shall conform to the material and installation requirements of Chapter 26.
2. Where a concrete or composite metal and concrete roof deck is used and the above-deck thermal insulation is covered with an approved roof covering.

Reason: The purpose of this proposal is to add an option to the allowable exceptions in the code. Currently the exception is limited to concrete roof deck and does not include a composite metal and concrete roof deck.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal does not increase the cost of construction as it provides an alternative to the type of concrete roof deck used for foam plastic insulation.

S9-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The committee determined the proposed change made an excellent clarification. (Vote 12-1)

Assembly Action:

None

S9-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Mike Fischer, Kellen Company, representing The Center for the Polyurethanes Industry of the American Chemistry Council (mfischer@kellencompany.com) requests Disapprove.

Commenter's Reason: S9-18 seeks to add an additional option for acceptable assemblies that contain above-deck thermal insulation over concrete roof decks.

The proposed language adds composite metal and concrete roof deck, but does not define what is meant by the phrase composite metal. The 2018 IBC provision assumes a concrete deck that is subject to the current code requirements for roofing and structural provisions. Without proper definitions of what types of metals, and what specific types of concrete, are intended to be used, the proposal is incomplete and unenforceable. Please vote for disapproval of S9-18.

The ACC s Center for the Polyurethanes Industry (CPI) mission is to promote the growth of the North American polyurethanes industry through effective advocacy demonstrating how polyurethanes deliver sustainable outcomes, and creation of robust safety education and product stewardship programs.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The Public Comment makes no changes to current code.

S9-18

S17-18

IBC: 1705.14, 1705.14.1, 1705.14.2, 1705.14.3, 1705.14.4, 1705.14.4.1, 1705.14.4.2, 1705.14.4.3, 1705.14.4.4, 1705.14.4.5, 1705.14.4.6, 1705.14.4.7, 1705.14.4.8, 1705.14.4.9, 1705.14.5, 1705.14.6, 1705.14.6.1, 1705.14.6.2, 1705.14.6.3, Chapter 35, ASTM

Proposed Change as Submitted

Proponent: Bill McHugh, The McHugh Company, representing National Fireproofing Contractors Association (Bill@mc-hugh.us)

THIS PROPOSAL WILL BE HEARD BY THE IBC FIRE SAFETY CODE COMMITTEE. SEE THE IBC-FS HEARING AGENDA.

2018 International Building Code

Revise as follows

[BF] 1705.14 Sprayed fire-resistant materials. *Special inspections* and tests of sprayed fire-resistant materials applied to floor, roof and wall assemblies and structural members shall be performed in accordance with Sections 1705.14.1 through 1705.14.6. *Special inspections* shall be based on the fire-resistance design as designated in the *approved construction documents*. The tests set forth in this section shall be based on samplings from specific floor, roof and wall assemblies and structural members. *Special inspections* and tests shall be performed in accordance with ASTM XXXX after the rough installation of electrical, automatic sprinkler, mechanical and plumbing systems and suspension systems for ceilings, where applicable.

Delete without substitution

~~**[BF] 1705.14.1 Physical and visual tests.** The *special inspections* and tests shall include the following to demonstrate compliance with the listing and the *fire-resistance rating*:~~

- ~~1. Condition of substrates.~~
- ~~2. Thickness of application.~~
- ~~3. Density in pounds per cubic foot (kg/m³).~~
- ~~4. Bond strength adhesion/cohesion.~~
- ~~5. Condition of finished application.~~

~~**[BF] 1705.14.2 Structural member surface conditions.** The surfaces shall be prepared in accordance with the *approved fire-resistance design* and the written instructions of *approved manufacturers*. The prepared surface of structural members to be sprayed shall be inspected by the special inspector before the application of the sprayed fire-resistant material.~~

~~**[BF] 1705.14.3 Application.** The substrate shall have a minimum ambient temperature before and after application as specified in the written instructions of *approved manufacturers*. The area for application shall be ventilated during and after application as required by the written instructions of *approved manufacturers*.~~

~~**[BF] 1705.14.4 Thickness.** Not more than 10 percent of the thickness measurements of the sprayed fire-resistant materials applied to floor, roof and wall assemblies and structural members shall be less than the thickness required by the *approved fire-resistance design*, and none shall be less than the minimum allowable thickness required by Section 1705.14.4.1.~~

~~**[BF] 1705.14.4.1 Minimum allowable thickness.** For design thicknesses 1 inch (25 mm) or greater, the minimum allowable individual thickness shall be the design thickness minus 1/4 inch (6.4 mm). For design thicknesses less than 1 inch (25 mm), the minimum allowable individual thickness shall be the design thickness minus 25 percent. Thickness shall be determined in accordance with ASTM E605. Samples of the sprayed fire-resistant materials shall be selected in accordance with Sections 1705.14.4.2 and 1705.14.4.3.~~

~~**[BF] 1705.14.4.2 Floor, roof and wall assemblies.** The thickness of the sprayed fire-resistant material applied to floor, roof and wall assemblies shall be determined in accordance with ASTM E605, making not less than four measurements for each 1,000 square feet (93 m²) of the sprayed area, or portion thereof, in each story.~~

~~**[BF] 1705.14.4.3 Cellular decks.** Thickness measurements shall be selected from a square area, 12 inches by 12 inches (305 mm by 305 mm) in size. Not fewer than four measurements shall be made, located symmetrically within the square area.~~

[BF] 1705.14.4.4 Fluted decks. Thickness measurements shall be selected from a square area, 12 inches by 12 inches (305 mm by 305 mm) in size. Not fewer than four measurements shall be made, located symmetrically within the square area, including one each of the following: valley, crest and sides. The average of the measurements shall be reported.

[BF] 1705.14.4.5 Structural members. The thickness of the sprayed fire-resistant material applied to structural members shall be determined in accordance with ASTM E605. Thickness testing shall be performed on not less than 25 percent of the structural members on each floor.

[BF] 1705.14.4.6 Beams and girders. At beams and girders thickness measurements shall be made at nine locations around the beam or girder at each end of a 12-inch (305 mm) length.

[BF] 1705.14.4.7 Joists and trusses. At joists and trusses, thickness measurements shall be made at seven locations around the joist or truss at each end of a 12-inch (305 mm) length.

[BF] 1705.14.4.8 Wide-flanged columns. At wide-flanged columns, thickness measurements shall be made at 12 locations around the column at each end of a 12-inch (305 mm) length.

[BF] 1705.14.4.9 Hollow structural section and pipe columns. At hollow structural section and pipe columns, thickness measurements shall be made at not fewer than four locations around the column at each end of a 12-inch (305 mm) length.

[BF] 1705.14.5 Density. The density of the sprayed fire-resistant material shall be not less than the density specified in the approved fire-resistance design. Density of the sprayed fire-resistant material shall be determined in accordance with ASTM E605. The test samples for determining the density of the sprayed fire-resistant materials shall be selected as follows:

1. From each floor, roof and wall assembly at the rate of not less than one sample for every 2,500 square feet (232 m²) or portion thereof of the sprayed area in each story.
2. From beams, girders, trusses and columns at the rate of not less than one sample for each type of structural member for each 2,500 square feet (232 m²) of floor area or portion thereof in each story.

[BF] 1705.14.6 Bond strength. The cohesive/adhesive bond strength of the cured sprayed fire-resistant material applied to floor, roof and wall assemblies and structural members shall be not less than 150 pounds per square foot (psf) (7.18 kN/m²). The cohesive/adhesive bond strength shall be determined in accordance with the field test specified in ASTM E736 by testing in-place samples of the sprayed fire-resistant material selected in accordance with Sections 1705.14.6.1 through 1705.14.6.3.

[BF] 1705.14.6.1 Floor, roof and wall assemblies. The test samples for determining the cohesive/adhesive bond strength of the sprayed fire-resistant materials shall be selected from each floor, roof and wall assembly at the rate of not less than one sample for every 2,500 square feet (232 m²) of the sprayed area, or portion thereof, in each story.

[BF] 1705.14.6.2 Structural members. The test samples for determining the cohesive/adhesive bond strength of the sprayed fire-resistant materials shall be selected from beams, girders, trusses, columns and other structural members at the rate of not less than one sample for each type of structural member for each 2,500 square feet (232 m²) of floor area or portion thereof in each story.

[BF] 1705.14.6.3 Primer, paint and encapsulant bond tests. Bond tests to qualify a primer, paint or encapsulant shall be conducted where the sprayed fire-resistant material is applied to a primed, painted or encapsulated surface for which acceptable bond strength performance between these coatings and the fire-resistant material has not been determined. A bonding agent approved by the SFRM manufacturer shall be applied to a primed, painted or encapsulated surface where the bond strengths are found to be less than required values.

Add new standard(s) follows

CHAPTER 35 REFERENCED STANDARDS

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box
C700
West Conshohocken PA 19428-2959
US

Practice for the On-Site Inspection of Installed Fire Resistive Material with Annex and Appendix

Reason: Special inspection for sprayed fire-resistive materials (SFRM) fireproofing has been in the International Building Code for many years. To date, the requirements have been prescriptive and in the IBC, Chapter 17. Over the past few years, the contractors, manufacturers and consultants of SFRM Fireproofing have come together to build an inspection standard at ASTM. The document is the result of the industry efforts to come to consensus with this new standard. We respectfully submit this document for insertion into the 2021 IBC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The reason the proposal will not increase the cost of construction is that the methods used for inspection are the same as is in Chapter 17 of the IBC currently.

Analysis: A review of the standard proposed for inclusion in the code, ASTM - WK54567-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

S17-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee deemed it inappropriate to reference a draft standard. (Vote 13-0)

Assembly Action:

None

S17-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Bill McHugh, representing National Fireproofing Contractors Association (billmchugh-jr@att.net) requests As Submitted.

Commenter's Reason: The purpose of this public comment is to bring this topic up to the Public Comment Hearing Assembly. We hope that the ASTM Standard for SFRM Inspection is complete by hearing time. If not, we will withdraw the proposal based on the Fire-Safety Committee Action.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This proposal adds a new standard that brings an industry consensus document to this section of the International Building Code.

Staff Analysis: In order for the public comment to be considered, the new standard, ASTM - WK54567-2018, must be complete and readily available prior to October 24, 2018. (Section 3.6 of CP#28)

S17-18

S18-18

IBC: 1705.15, Chapter 35, ASTM

Proposed Change as Submitted

Proponent: Bill McHugh, The McHugh Company, representing National Fireproofing Contractors Association (Bill@mc-hugh.us)

THIS PROPOSAL WILL BE HEARD BY THE IBC FIRE SAFETY CODE COMMITTEE. SEE THE IBC-FS HEARING AGENDA.

2018 International Building Code

Revise as follows

~~{BF}~~ **1705.15 Mastic and intumescent fire-resistant coatings.** *Special inspections* and tests for mastic and intumescent fire-resistant coatings applied to structural elements and decks shall be performed in accordance with ~~AWCI 12-B, Draft ASTM Standard WK54767.~~ *Special inspections* and tests shall be based on the fire-resistance design as designated in the *approved construction documents*.

Add new standard(s) follows

CHAPTER 35 REFERENCED STANDARDS

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box
C700
West Conshohocken PA 19428-2959
US

Draft Standard WK54567 - 2018:

Practice for the On-Site Inspection of Installed Fire Resistive Material with Annex and Appendix

Reason: The Intumescent fire-resistant coatings industry - contractors, manufacturers and consultants - worked together at ASTM to build a new consensus standard for special inspection of mastic and intumescent fire-resistant coatings. We respectfully submit this standard for insertion into the International Building Code, Chapter 17.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal takes a new standard and improves on existing documents in the code resulting in uniform special inspection of fire-resistant coatings.

Analysis: A review of the standard proposed for inclusion in the code, ASTM - WK54567-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

S18-18

Public Hearing Results

Errata: Standard reference corrected to Draft ASTM Standard WK54767.

Committee Action:

Disapproved

Committee Reason: The committee disapproved based on the action taken on S17. (Vote 13-0)

Assembly Action:

None

S18-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Bill McHugh, representing National Fireproofing Contractors Association (billmchugh-jr@att.net) requests As Submitted.

Commenter's Reason: The purpose of this public comment is to bring this topic up to the Public Comment Hearing Assembly. We hope that the ASTM Standard for IFRM Inspection is complete by hearing time. If not, we will withdraw the proposal based on the Fire-Safety Committee Action.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The net effect of the public comment and code change proposal will not increase or decrease the cost of construction. This proposal adds a new standard that brings an industry consensus document to this section of the International Building Code.

Staff Analysis: In order for the public comment to be considered, the new standard, ASTM - WK54567-2018, must be complete and readily available prior to October 24, 2018. (Section 3.6 of CP#28)

S18-18

S20-18

IBC: 1705.15

Proposed Change as Submitted

Proponent: Bill McHugh, The McHugh Company, representing National Fireproofing Contractors Association (Bill@mc-hugh.us)

THIS PROPOSAL WILL BE HEARD BY THE IBC FIRE SAFETY CODE COMMITTEE. SEE THE IBC-FS HEARING AGENDA.

2018 International Building Code

Revise as follows

{BF} 1705.15 Mastic and intumescent fire-resistant coatings. *Special inspections* and tests for mastic and intumescent fire-resistant coatings applied to structural elements and decks shall be performed in accordance with AWCI 12-B. *Special inspections* and tests shall be based on the fire-resistance design as designated in the *approved construction documents*. Additional inspections and tests shall not exceed an additional amount of 10 percent than required in AWCI-12-B.

Reason: The code states that a minimum amount of inspection is to take place but not a maximum amount of inspection. The inspection agency has no limit to the amount of inspection that can be conducted if this is not added to this section on special inspections. The maximum number comes from another standard that has been in the IBC Special Inspection Section for the past code cycles, ASTM E 2174 for Firestop Special Inspection.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal limits the amount of inspection to a reasonable amount of maximum inspection to the code. It changes a variable expense to the building owner into a more fixed cost item.

Staff Analysis: The referenced standard within this proposal, AWCI 12-B, is currently referenced in the I-codes.

S20-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee found the language unclear and confusing. (Vote 13-0)

Assembly Action:

None

S20-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Bill McHugh, representing National Fireproofing Contractors Association (billmchugh-jr@att.net) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1705.15 Mastic and intumescent fire-resistant coatings. *Special inspections* and tests for mastic and intumescent fire-resistant coatings applied to structural elements and decks shall be performed in accordance with AWCI 12-B. *Special inspections* and tests shall be based on the fire-resistance design as designated in the *approved construction documents*. Additional inspections and tests shall not exceed ~~an additional amount of 10 percent than required~~ 110 percent of that specified by the referenced standards in AWCI-12-B.

Commenter's Reason: This public comment is submitted to provide consistency to the spray fire-resistant materials and intumescent fire-resistant materials sections due to S16-18 which was approved by the Fire-Safety Committee in April, Columbus, OH. The percentages in S16 have been moved to S20 as approved by the committee.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This code proposal will not increase the cost of construction. The proposal attempts to contain costs of construction. It is difficult to calculate an exact cost savings due to variability in installation contractors and inspection agencies.

S20-18

S21-18

IBC: 1705.17

Proposed Change as Submitted

Proponent: William Koffel, representing Firestop Contractors International Association (wkoffel@koffel.com)

THIS PROPOSAL WILL BE HEARD BY THE IBC FIRE SAFETY CODE COMMITTEE. SEE THE IBC-FS HEARING AGENDA.

2018 International Building Code

Revise as follows

[BF] 1705.17 Fire-resistant penetrations and joints. In high-rise buildings ~~or~~ in buildings assigned to *Risk Category III or IV, or fire areas containing Group R occupancies with an occupant load greater than 250, special inspections for through-penetrations, membrane penetration firestops, fire-resistant joint systems and perimeter fire barrier systems* that are tested and *listed* in accordance with Sections 714.4.1.2, 714.5.1.2, 715.3 and 715.4 shall be in accordance with Section 1705.17.1 or 1705.17.2.

Reason: Fire resistance rated compartmentation is a critical fire protection feature in many buildings with Group R occupancies. When through penetration firestop systems and fire resistant joint systems are not properly installed, the integrity of the compartmentation is compromised. The existing requirement for special inspections is proposed to be expanded to include larger buildings with Group R occupancies. The occupant load of 250 is consistent with what is used to define Group E occupancies that are Category III. Without this change, the special inspection requirement would only apply to Group R occupancies in high-rise buildings.

Cost Impact: The code change proposal will increase the cost of construction. The addition of this special inspection requirement does increase the cost of construction which will vary based on the quality management system of the firestop contractor.

S21-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The committee determined the proposal offered a means to improve fire stopping. (Vote 13-0)

Assembly Action:

None

S21-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Margo Thompson, Newport Ventures, representing National Association of Home Builders (mthompson@newportventures.net); Dan Buuck, National Association of Home Builders (dbuuck@nahb.org)requests Disapprove.

Commenter's Reason: The Group E comparison in the reason statement of the proposal is invalid since the 250 person occupant load taken from Risk Category III in IBC Table 1604.5 applies to persons assembled in one room. The ASCE 7 rationale behind the Risk Category III classification added to the 2010 edition of the standard states, "Risk Category III includes buildings and structures that house a large number of persons in one place, such as theaters, lecture halls, and similar assembly uses and buildings with persons having limited mobility or ability to escape to a safe haven in the event of failure, including elementary schools, prisons, and small health-care facilities." Applying the same requirements to Group R occupancies as those listed is overly restrictive.

Risk Categories III and IV pertain to buildings that represent substantial hazard to human life in the event of failure or those designated as essential structures. They include structures associated with utilities required to protect the health and safety of a community, power-generating stations, water-treatment and sewage-treatment plants, structures housing hazardous substances, such as explosives or toxins, which if released in quantity could endanger the surrounding community, and petrochemical process facilities that contain large quantities of H25 or ammonia. Clearly, Group R occupancies do not correlate with either Category III or Category IV.

No documentation has been provided regarding either the number or percent of occurrences of improperly installed firestop penetrations or joint systems or consequences. No documentation has been provided regarding consequences such as increased fire spread due to improperly sealed penetrations.

NFPA data shows that apartment building fires, civilian deaths, and property damage have all steadily declined since 1980. Between 1980 and 2016, there has been a 34% drop in the number of apartment fires, a 70% drop in deaths, and a 79% drop in property damage. <https://www.nfpa.org/News-and-Research/Fire-statistics-and-reports/Fires-by-property-type/Residential/Apartment-structure-fires>

There are already adequate jurisdictional inspections of fire penetrations and joints. Currently, these areas are carefully inspected as part of the regular fire-proofing inspections and additional special inspections are unnecessary.

At occupancies greater than 250 people, this would mean multifamily buildings of approximately 50,000 sf and larger (assumes 250 persons * 200sf/person) and approximately 50-75 units. An analysis of Census data by NAHB showed that the size of multifamily buildings is increasing. Between 2010 and 2015, 48% of the multifamily buildings constructed had more than 50 units. <http://eyeonhousing.org/2015/10/rising-share-of-new-multifamily-units-in-large-buildings/> Thus, this proposal would impact a large number of the multifamily buildings being built. Special inspections for every pipe or conduit would have a significant negative impact on cost. The proponents have provided no quantification of the cost range for a typical building that would be affected.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. Average blanket costs per sf are difficult to quantify due to the large number of variables involved such as size of building, type of construction, number of different types of penetrations, etc. However, conversations with several inspectors (members of FCIA) indicated that for a hypothetical 50,000 sf 4-story apartment building with 50-75 units, a minimum cost range would be \$3,00-\$4,00 and could be much higher. Hourly rates of inspectors range from approximately \$100/hour for a qualified/experienced inspector to \$185/hour or more for a Professional Engineer - which many in this field are.

Allowable options for inspections per ASTM E2174 and ASTM E2393 include 1) 10% of each penetration type observed during installation or 2) 2% of each penetration type inspected post-construction via destructive methods. Either method will significantly impact schedule and thereby also increase costs.

E1-18

IBC: 1003.4, 1003.5, 1003.8 (New), (IFC[BE] 1003.4, 1003.5, 1003.8 (New))

Proposed Change as Submitted

Proponent: Jake Pauls, Jake Pauls Consulting Services, representing Jake Pauls Consulting Services (bldguse@aol.com)

2018 International Building Code

Revise as follows

1003.4 Slip-resistant surface. Circulation paths of the *means of egress* shall have a slip-resistant surface and be securely attached.

Exception: Walking surfaces of showers and bathtubs not required to be accessible are not required to be slip-resistant where grab bars or stanchions complying with Section 1003.8 are provided.

1003.5 Elevation change. Where changes in elevation of less than 12 inches (305 mm) exist in the *means of egress*, sloped surfaces shall be used. Where the slope is greater than one unit vertical in 20 units horizontal (5-percent slope), *ramps* complying with Section 1012 shall be used. Where the difference in elevation is 6 inches (152 mm) or less, the *ramp* shall be equipped with either *handrails* or floor finish materials that contrast with adjacent floor finish materials.

Exceptions:

1. A single step with a maximum riser height of 7 inches (178 mm) is permitted for buildings with occupancies in Groups F, H, R-2, R-3, S and U at exterior doors not required to be *accessible* by Chapter 11.
2. A *stair* with a single riser or with two risers and a tread is permitted at locations not required to be *accessible* by Chapter 11 where the risers and treads comply with Section 1011.5, the minimum depth of the tread is 13 inches (330 mm) and not less than one *handrail* complying with Section 1014 is provided within 30 inches (762 mm) of the centerline of the normal path of egress travel on the *stair*.
3. A step is permitted in *aisles* serving seating that has a difference in elevation less than 12 inches (305 mm) at locations not required to be *accessible* by Chapter 11, provided that the risers and treads comply with Section 1029.14 and the *aisle* is provided with a *handrail* complying with Section 1029.16.
4. Bathtubs required to be accessible and bathtubs with grab bars or stanchions complying with Section 1003.8 are permitted to have step-over bathtub walls.
5. Showers, not required to be accessible are permitted to have curbs 6 inches (152 mm) high maximum where grab bars or stanchions complying with Section 1003.8 are provided.

Throughout a story in a Group I-2 occupancy, any change in elevation in portions of the *means of egress* that serve nonambulatory persons shall be by means of a *ramp* or sloped walkway.

Add new text as follows

1003.8 Stanchions or Grab bars for Bathtubs, Bathtub-Shower Combinations and Showers.

1003.8.1 General. Bathtubs and bathtub-shower combinations not required to be accessible shall provide at least one stanchion complying with 1003.8.2 and one grab bar complying with Section 1003.8.3. Showers not required to be accessible shall provide at least one stanchion or grab bar complying with Section 1003.4. All stanchions and grab bars shall comply with Sections 1003.8.5 through 1003.8.7.

1003.8.2. Stanchion or Grab Bar. A vertical stanchion or grab bar complying with Sections 1003.8.2.1 through 1003.8.2.3 shall be provided.

1003.8.2.1 Approach. The stanchion or grab bar shall be located so that it is usable without any obstruction. An unobstructed clear floor space of 21 inches (535 mm) wide minimum and 21 inches (535 mm) deep minimum, measured from the tub wall shall be provided. The clear floor space shall be located outside the tub and be within 12 inches (305 mm) of the centerline of the stanchion or grab bar measured horizontally.

1003.8.2.2 Length. The stanchion or grab bar shall be 36 inches (914 mm) long minimum and shall extend to a height of 60 inches minimum above the finished floor or bathtub floor, as applicable.

1003.8.2.3 Position. The stanchion or grab bar shall be positioned in accordance with at least one of the following two options:

1. Stanchion or grab bar located inside the bathtub or combination bathtub-shower compartment. The space, measured horizontally from the centerline of the stanchion or grab bar shall be 12 inches (305 mm) maximum to the exterior wall of the bathtub and 6 inches (152 mm) minimum to a shower curtain rod.
2. Stanchion or grab bar located outside the bathtub or combination bathtub-shower compartment. The stanchion or grab bar shall be 6 inches (152 mm) maximum from the outer side of the bathtub wall, measured horizontally.

1003.8.3. Grab Bar. A 24-inch (610 mm) long minimum grab bar shall be provided on the non-entry (long) side of bathtubs and bathtub-shower combinations and shall be positioned in accordance with Sections 1003.8.3.1 or 1003.8.3.2.

1003.8.3.1 Horizontal Position. A grab bar shall be installed in a horizontal position and shall be centered, plus or minus two inches (51 mm), along the length of the bathtub. The grab bar shall be located 8 inches (205 mm) minimum and 10 inches (255 mm) maximum above the bathtub rim measured to the centerline of the grab bar.

1003.8.3.2 Diagonal Position. A grab bar shall be installed in a diagonal position with its higher end 25 inches (635 mm) high minimum and 27 inches (685 mm) high maximum above the bathtub rim. The higher end shall be located no more than 12 inches (305 mm) from the control wall measured horizontally. The lower end shall be 8 inches (203 mm) high minimum and 10 inches high (255 mm) maximum above the bathtub rim.

1003.8.4 Showers. A stanchion or grab bar shall be provided, located either interior to or outside of the shower compartment, within 3 inches (76 mm) of the adjacent face of the opening. The stanchion or grab bar shall be 24 inches (610 mm) long minimum with its lower end 39 inches (991 mm) maximum above the finished floor.

1003.8.5 Other Details. Grab bars and stanchions shall comply with Section 1003.8.5.

1003.8.5.1 Cross Section. Grab bars and stanchions shall be circular in cross section having an outside diameter of 1-1/4 inches (32 mm) minimum and 2 inches (51 mm) maximum.

1003.8.5.2. Spacing. The space between the stanchion or grab bar and adjacent surfaces, including controls or other fixtures, shall be 1-1/2 inches (38 mm) wide minimum.

1003.8.5.3. Surface Hazards. Stanchions, grab bars, and adjacent surfaces shall be free of sharp or abrasive elements. Edges shall be rounded with a minimum radius of 0.25 inch (6 mm).

1003.8.6. Structural Characteristics. Allowable stresses shall not be exceeded for materials used when a vertical or horizontal force of 250 pounds (1112 N) is applied at any point on the grab bar, stanchion, fastener, mounting device, or supporting structure. Grab bars and stanchions shall not rotate within their fittings.

1003.8.7. Design and Installation for Water. Grab bars, stanchions, fasteners, mounting devices, and supporting structure shall be composed of materials and installed to withstand damaging effects of water, including corrosion and other deterioration through their service life.

Reason:

Reason Statement (Justification) for Grab Bars

for Bathtubs, Bathtub-Shower Combinations and Showers (Proposal ID: 1066)

Complying with New Requirements in IBC Section 1003

Proposed by Jake Pauls, BArch, CPE, HonDSc

Introduction

Points of Control. Grab bars, handrails and stanchions are important building components providing—in combination with our hands and our feet—what are called (in ergonomics) “points of control” to maintain balance and aid in ambulation and other movement activities that are crucial to utilizing means of egress for safety generally (in both normal and emergency conditions) and which pose dangers of injurious falls, the leading source of injuries in most countries, including the USA.

A brief digression to explain “stanchions.” You see them routinely on transportation vehicles such as subway trains and city buses. They are the vertical assemblies of graspable tubing that are fixed between ceilings, horizontal handrails just above head height, seats, floors, etc. usually located between seating and passageways or aisles. The term, stanchions is used in ADA requirements for transportation vehicles and for this context Wikipedia has the following description: “On board most buses and trams/subways, vertical supports to provide stability when passengers are standing. They are located throughout most city buses and are connected to seats, floor, roof, etc.” This term is used in contexts similar to those for the “poles” referred to in NFPA’s recent adoption of new requirements for grab bars or poles for new bathtubs, bathtub-shower combinations and showers.

Examples of Points of Control in Specific Contexts. The starred, central cell of Table 1. shows the equity, with points of control— shown in bold italics—achieved with now-proposed grab bars, handrails and stanchions being required, in Section 1003, in the same way that handrails are required for stairs in the rest of the IBC.

Table 1.
Minimum Number of Points of Control Provided
with New (★) or Currently Imposed Rules or Practices

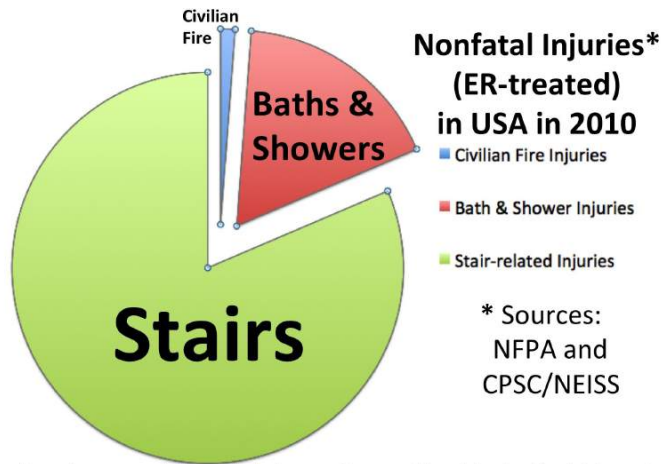
Number of Points of Control Via Hands or Feet	≤1	1	2	3	3-4
Standard walker for older adult with altered gait.					✓
Occupational settings with risk of worker falls from heights. Also, stairs where users can use two handrails simultaneously, one on each side.				✓	
Stairs where users have only a single handrail. <i>Grab bar(s) usable for bathtub/shower entry/egress.</i>			✓ ★		
Bathtubs/showers with slip resistant underfoot surfaces when wet.		✓			
Bathtubs/showers without slip resistant underfoot surfaces when wet, the common condition currently.	✓				

The Problems To Be Solved with A New Requirement for Grab Bars and Stanchions. The central and most important point of this code change proposal is to respond to the relatively high risk of injurious falls when entering and exiting bathing/showering facilities, in all new settings where they occur. Such risks exceed those for stairs on an exposure-adjusted basis. That is, the time during which one is stepping into or out of a bathtub or shower is more risky than a similar stepping behavior on a stair. The former result in about 25 percent of the injuries as do falls on stairs. This is based on about 300,000 US hospital emergency room visits per year for bathtubs and showers versus about 1.2 million US hospital emergency room visits per year for stairs, using comparably serious injury data for 2010 (discussed by Lawrence, et al., 2015 in the journal Injury Prevention). The societal cost of these injuries, plus about two and a half times additional, medically treated injuries, was (for 2010) about 20 billion dollars for US bathtubs and showers and about 93 billion dollars for US stairs with the greatest risk for both being in homes, where bathing/showering is a near daily activity for most people in the US (Lawrence, et al, 2015). (See also the annex to this justification for details of injuries documented by the US Consumer Product Safety Commission, CPSC.)

Table 1 depicts the current inequity as well as the increased equity that will be achieved when bathtubs and showers are subject to the same principle about availability of points of control (usable by ones hands or feet) that are crucial to our stability in utilizing those portions of the means of egress that entail elevation differences, changes of slope, and changes in slip resistance. The current—at best—one point of control provided with typical bathtubs and showers (i.e., one foot in a stable placement on a slip-resistant surface) would be augmented by one point of control available reliably to one hand. This achieves equity of safety with stairs where we can count on one foot planted on a tread and one hand on a handrail. For some situations, involving bathtubs used for immersion bathing (with occupants seated or lying on the bottom of the tub) two points of control, utilizing grab bars, or stanchions—one for each hand—are needed for this equity and, more practically, to accomplish the relatively difficult stand-to-sit and sit-to-stand transfers within the tub.

Size of the Problem with Bathtubs and Showers Compared to Other Large Problems. Figure 1, a pie chart, shows the approximate scales of the nonfatal injury problem for three dangers to building occupants. In the US, the traditional danger of fire-related injuries is far smaller than that from bathing/showering and even smaller in relation to stair-related injuries. Right now, in the I-Codes, the segment for bathing/showering is not addressed while many, many pages of the I-Codes deal with fire-related injury prevention. Again, the proposal for grab bars and other points of control to be provided equitably, will provide a major improvement to injury prevention that, heretofore, has been largely ignored in code development and in practice except in some hotel properties where no more than half of the grab bars or stanchions to be required under the new proposal are provided for bathtubs.

Figure 1.
Comparing three dangers resulting in injuries in buildings



There is an inverse relationship between these epidemiological insights and the extent of coverage of the great dangers of stairs and baths/showers in building codes and housing codes plus leading healthy homes literature.

International Codes, Scientific/Technical/Policy/Managerial Perspectives Precedent Set by NFPA Codes. The foregoing is the philosophical and epidemiological foundation for the proposed addition of requirements for grab bars, and stanchions in Section 1003 of the IBC and, in future or elsewhere, in the I-Codes generally. There is also the precedent taken in NFPA 101 and NFPA 5000 in their 2018 editions where grab bars (alternatively poles which are given the more-technical name “stanchions” in this IBC proposal) were proposed and almost completely adopted (with the exception of health care, discussed below) for new bathtubs and showers in buildings regulated by these codes. The new requirements were mostly noncontroversial and it is hoped that the same will be true with the proposals now submitted to the I-Codes.

The justification for the new requirements far outweigh the opposition to them as the ergonomic, biomechanics, epidemiological, etiological and economic aspects have been carefully considered and addressed to the satisfaction of many people who know building codes and safety standards well and whose votes on the many committees considering the issue attest to the multiple justifications for this new feature of building codes and safety standards.

Parallel Code Development Activity in Canada. A proposal, comparable to what NFPA has adopted, is being addressed by a Grab Bar Task Group for the National Building Code of Canada and, when its next cycle commences, will also be proposed for action by the ICC A117 Committee for a new section, on mainstreamed grab bar and stanchion features for the A117.1 standard. Leaders in the standards and codes field, conversant with the value of grab bars and stanchions have been discussing such mainstreaming since early 2016, at an international meeting of experts on bathing/showering safety held in Toronto and partly available for study in a free streaming video that is available with several other streaming videos addressing points of control, grab bars, cost-benefit issues, etc., that are all listed in the Bibliography provided with this proposal. So a lot of the groundwork has been laid and different perspectives have been elicited and discussed.

Survey of Existing Facilities. Centered on hotels, health care facilities**, airport airline club shower facilities*, and homes, the proponent for this code change has been conducting a personal, opportunity-based survey of bathing/showering facilities worldwide, including the following countries where his work on building use and safety has taken him in recent years or his work is followed by other professionals, including public health authorities.

- Canada**
- USA* **
- UK*
- Sweden**
- Finland
- Netherlands
- Italy
- Singapore*

- Australia**
- New Zealand
- Japan

The survey is documented in many hours of video and thousands of photographs plus many measurements of three-, four-, five-piece bathrooms ranging in size from a few square meters (20 square feet) to spaces big enough to park an automobile, occasionally with tubs and showers almost that big. Generally, the more compact the bathroom, the easier it is to provide the needed points of control—and with very substantial cost savings.

Detailed Justifications for Specific New Sections in IBC 1003.

1003.4 Slip Resistant Surface. Showers and bathtubs are part of the means of egress for a building as they form part of the “occupied portion of a building.” However, recognizing reality, due to the presence of water on standing and walking surfaces in and around showers and bathtubs, it is almost certain that those surfaces are not slip-resistant and thus an exception is needed to cover them. Therefore countermeasures, in the form of grab bars or stanchions are needed to mitigate these serious slip-and-fall risks. Thus, via a new exception, this is one of two scoping requirements triggering the mandatory provision of grab bars or stanchions found in a new section, 1003.8.

1003.5 Elevation Change. Bathtubs and most showers have elevation changes with various step-over and step-on surfaces, often exceeding 5 percent in slope, that greatly heighten the risk of missteps (such as tripping as well as slipping) and loss of balance that can result in injurious falls that are exacerbated by the typically hard, often projecting surfaces that are especially unforgiving if fall-related impacts occur. Grab bars and other points of control, like stanchions, have both prevention and mitigation roles, for such missteps and falls, that parallel what handrails do for stairs to prevent and mitigate missteps and falls. Thus, via a new exception, this is the second of two scoping requirements triggering the mandatory provision of grab bars found in a new section, 1003.8 as is demonstrated in Figure 2.

Figure 2.

Demonstration set up of both conventional grab bars (nominally meeting the length and location criteria of proposed IBC Section 1008) and heavy duty tubing, both horizontal and vertical—that latter being a stanchion (completely meeting the length, location and structural strength requirements of proposed IBC Section 1008)



1003.8.1 General. This sets out the scoping for the new section. In Figure 2, the photograph shows a demonstration bathtub-shower combination with a redundant set of both conventional (vertical and diagonal) grab bars and a vertical, floor-to-ceiling pole—technically termed a stanchion, the latter easily meeting the 250-pound structural load criterion. So does the full-length horizontal bar (a tube) at the back of the bathtub.

Section 1003.8.1 sets up a structure for the requirements; first addressed in 1003.8.2 for bathtubs and bathtub-shower combinations which require a vertical point of control for ambulatory entry to and egress from the bathtub that typically involves stepping over the bathtub wall and dealing with different, perhaps wet surfaces inside the tub and on the floor outside the tub. For some tubs there will also be an elevation difference between the tub bottom and the floor outside the tub that can be an additional danger. These are important ergonomic or biomechanics considerations for reasonably safe bathing and showering that will significantly reduce the large toll of falls and other injury events involving bathtubs and showers (as described for a few hundred cases in the Annexes accompanying this Reason statement).

Addressed second in 1003.8.1 is the need for a horizontal or diagonal point of control on the non-egress side of a bathtub that is covered by 1003.8.3. This addresses the need for a point of control that assists people who want to sit or lie down in the tub and have an immersion bath. This involves stand-to-sit and sit-to-stand transfers that will be facilitated with the bilateral support provided, on one side, by the vertical grab bar or stanchion required by 1003.8.2, on the other side, used in conjunction with the horizontal or diagonal grab bar required by 1003.8.3.

Addressed third in 1003.8.1 is ambulatory access into and egress from a stand-alone shower (not combined with a bathtub) addressed in 1003.8.4. While step-over heights are smaller than for bathtubs, there are still dangers in smaller heights of curbs needed for water control as well as in different elevations of the shower pan and the floor outside the shower. Again, a vertical point of control assists with such transfers.

The final scoping feature in 1003.8.1 is its reference to several details of the grab bars or stanchions dealing with their graspability, surroundings, structural characteristics, and long-term serviceability in the wet environment typical for baths and, more so, for showers.

1003.8.2. Stanchion or Grab Bar. This introduces the provision, approach, length, and position requirements for the required vertical point of control, a stanchion or a conventional, wall-mounted grab bar for bathtubs. Vertical grab bars were found to be especially useful in studies performed over the last two decades in Canada. (Bibliography: Items # 5, 23, 24, 29, 30 plus two reports, from 2017, by Novak & King and King & Novak.)

1003.8.2.1 Approach. The unobstructed clear floor space of 21 inches (535 mm) wide minimum and 21 inches (535 mm) deep minimum, measured from the tub wall, is based on the current space requirements of Section R307, including Figure R307, in the International Residential Code. Along with the 12-inch (305 mm) maximum horizontal distance between the point of control and the edge of the clear floor space, this provides reachability to the grab bar or stanchion for a user approaching, or stepping from a bathtub in a bathroom where there are other fixtures such as a water closet or lavatory.

1003.8.2.2 Length. The minimum length of 36 inches (914 mm) for the vertical grab bar or stanchion and minimum height of 60 inches serves ambulatory transfers by adults and children and provides a vertical point of control that extends low enough to serve bathers (children as well as adults) sitting or crouching in the bathtub.

1003.8.2.3 Position. The two options cover vertical, conventional, wall-mounted grab bars as well as stanchions (secured in place between, for example, the ceiling and the floor or the rim (top) of the tub wall) that can be located anywhere as they are not fastened to a wall, which for this requirement usually means one of the two end walls (control end wall and had end wall) for many bathtubs. (See Figure 2 above.) Note that, for option 1, a grab bar on an end wall, there is an important requirement to keep the grab bar at least 6 inches (horizontally) from shower curtain attachments so that there is no interference, from a grab bar, to the sealing of a shower curtain against a wall to prevent water from a shower getting on the floor outside the bathtub. Note that option 2 permits placing a stanchion outside the bathtub, within six inches of the outside bathtub wall; such a stanchion can serve stand-to-sit and sit-to-stand transfer functions for users of a water closet adjacent to the bathtub (as shown in Figure 2). This is a bonus benefit of such stanchions which, in this proposal, are already sufficiently justified for the bathing and showering functions alone. Such a benefit (for many users) will be gained several times a day, as opposed to once per day for a shower or bath and the value of such secondary benefits—to usability and safety. This dual use benefit should be considered in doing a cost impact analysis. The benefit is especially important for older users who are the most impacted, in terms of serious injuries requiring hospital admission, and for whom toileting is essential, unlike showering or bathing which can be avoided more often.

1003.8.3. Grab Bar. This addresses the need for a point of control, on the non-egress, long side side of the bathtub where there is usually a wall (except in the case of a free-standing tub. This assists people, after they have stepped into the tub and who want to sit or lie down in the tub for an immersion bath. Note that while useful for stand-to-sit and sit-to-stand transfers, this horizontal or diagonal point of control will not be very useful for ambulatory transfers to and from a bathtub as a person has to lean precariously, threatening balance, over the width of the tub to reach the point of control on the non-egress side. Such transfers rely on the vertical point of control required by 1003.8.2.

1003.8.3.1. This does not limit compliance to a conventional wall-mounted grab bar. See Figure 2 for a nonconventional point of control, in effect a stanchion, in a horizontal orientation, secured by end walls, and extending the full length of the bathtub thus providing extra usability to bathers (as well as serving as a longer rack for towels, laundry, etc.). For free-standing tubs, with no adjacent walls, the requirements permit other solutions for the horizontal grab bar, for example, a conventional grab bar mounted on a surround often provided for most new stand-alone tubs.

1003.8.3.2 Diagonal Position. The stated dimensions for this diagonal grab bar will result in an approximate 45-degree inclination of this point of control that combines versatility with height as well as horizontal reach. Of all of the point-of-control positioning options, this one will almost invariably require a backing wall and this one places the greatest demand on structural backing—in terms of its size in the wall—for the fastening, typically with screws, of conventional grab bars. Keep in mind that the diagonal grab bar is an option and there are less-costly ways of complying with 1003.8.3.

1003.8.4 Showers. The requirement is intended to serve entering and egressing users regardless of whether the point of control is located inside or outside the shower enclosure or compartment. For example, fixing a point of control inside a shower is often problematic due to the nature of shower enclosures/compartment and of shower pans, both of which are subject to important waterproofing requirements. Here a stanchion, fastened to the room floor and ceiling and located *just outside the entrance to a shower* can be a good solution. This is especially true for increasingly used fixed, sliding or pivoting glass screens, for water control (in place of a shower curtain) on the open side of showers. The floor and ceiling take the usage loads on the stanchion whereas a conventional grab bar relies on a wall or wall-like feature.

1003.8.5 Other Details. Related mostly to effective and safe graspability with one or both hands, these are largely based on requirements of ICC A117.1.

1003.8.5.1 Cross Section. Unlike ICC A117.1 only circular is addressed. This reflects the overwhelming provision of circular-section grab bars and stanchions in practice. Anyone wanting more flexibility with cross section could introduce, via an amendment to the proposal, a separate provision for noncircular sections also complying with ICC A117.1. The rationale for not including noncircular sections here is the overwhelming advantage of circular sections for hand approach from any direction, an important aspect of the more varied uses of points of control for bathing and showering facilities than is the case for handrails for stairs. Also, even for stairs, a large proportion of the railings installed—of decorative rather than reasonably functional, circular cross section—do not function sufficiently well for even the more-limited biomechanics of stair handrail use.

1003.8.5.2. Spacing. The 1.5 inches (38 mm) wide minimum space might not be adequate with some plumbing controls (e.g., water temperature), but it is a good starting point for adequate clearance.

1003.8.5.3. Surface Hazards. Impact against surfaces, including controls and spouts, in bathing and showering facilities is a major source injuries and the requirement are justified.

1003.8.6. Structural Characteristics. The minimum vertical or horizontal force of 250 pounds (1112 N)—applied at any point on the grab bar, stanchion, fastener, mounting device, or supporting structure—is commonly used in the US. There is a need for this to be maintained and confirmed through the life of the grab bars. (Canada has a somewhat higher load requirement, 290 pounds). The requirement that points of control will not rotate within their fittings is reasonable as it increases the effectiveness of a user's grasp and the users' stability generally.

1003.8.7. Design and Installation for Water. This is a relatively new requirement but it is very much needed, based on the proponent's checking of fixing quality of many grab bars in hotels around the world. *Many grab bars are not designed, installed and maintained for water!* Water might not only corrode the critical attachment screws of conventional, wall-mounted grab bars; water also causes deterioration of the backing materials for some badly installed and maintained grab bars. This one, relatively new requirement warrants extra explanation—which follows here.

Problems Found in the Field with Conventional Grab Bars

During the course of his opportunity-based survey of grab bars provided for bathrooms in hotel guest rooms, the proponent of this code change has found two problems with many installations.

The first, affecting over 50 percent of the surveyed bathtub-shower combinations in hotels, comes from placement of vertical grab bars underneath—and within a few inches horizontally of the end bracket for shower curtains. This makes sealing the shower curtain against the end wall of the bathtub-shower combination very difficult so that the danger of water getting outside the bathtub, on the adjacent floor is heightened unreasonably and needlessly. The proposed section 1003.8.2.1 addresses this problem in its last sentence, "Such grab bar shall be located a maximum of 12 inches (305 mm), measured horizontally, inside of the exterior approach side of the bathtub or bathtub-shower combination and no closer than 6 inches (150 mm), measured horizontally, to the end fixing of any shower curtain rod."

A much more worrying problem is found with a smaller percentage of conventional, wall-mounted grab bar installations, specifically grab bars which have cover plates over the screw plate onto which the tube of the grab bar is welded. There is invariably a space between the hole in the cover plate through which the tubing (grasped) portion of the grab bar passes and the tubing itself. Water can easily enter here and get trapped by the cover plate thus creating a pool of water and debris (hair, shampoo residue, etc.) from the showering process. Figure 3 provides an example photographed on the wall of a bathtub-shower combination in a hotel guest bathroom.

Figure 3. Corrosion behind grab bar cover plate



Aside from the hygiene problem here, there is a greatly heightened risk of two structural problems. One is water intrusion into the wall, around the fixing screws—typically two or three for each end of the grab bar, causing deterioration of the backing material so the screws become loose enough to be extractable with ones fingers. The second problem is equally worrisome, especially as the quality of the steel used in (off-shore) grab bars is relatively poor in terms of corrosion of the screws and, less often, the mounting plates. The worst case seen recently had the heads of all the screws holding a grab bar so corroded that their heads were completely deteriorated and the grab bar could be pulled away from the walls with little force by one hand—clearly far, far less than the stipulated load of 250 pounds that codes in the US stipulate for structural strength. The proponent has many photographs of these problems as well as a few videos showing how loose the grab bars have become due to corrosion as well as backing deterioration from water. One such photograph is provided in Figure 3; it is not the worst situation seen in the field.

Clearly such examples need to be addressed in several ways including stronger inspection by authorities and improved management of facilities. Improved design and manufacture of conventional grab bars would help too but, until that occurs, this proposal offers the pole options as well as mounting locations that keep the important “points of control” in relatively dry locations—for example at the exterior of a shower enclosure or outside of a shower curtain for tubs and showers—but still near enough to the entrance to be usable from both outside and inside the space where water sprays, deflects and flows freely.

Annexes

Annex 1: Representative sample of narratives of actual bathtub/shower-related injuries that led to US hospital emergency room (ER) visits and, for about one in ten of such visits, also led to hospital admission covered by **Annex 2**, (plus an additional 30 percent who went directly to hospital admission without an ER visit) in 2010. These are collected and published by the US Consumer Product Safety Commission (CPSC) National Electronic Injury Surveillance System (NEISS) and many more can be downloaded from the CPSC/NEISS Web site, <https://www.cpsc.gov/Research--Statistics/NEISS-Injury-Data>. Accessed January 8, 2018.

Annex 1: US CPSC NEISS: First 112 Sample Narratives (of 6,946 cases) for Product Code 0611 Injuries

in 2010 - ER released w/wo treatment (Product Code 611 covers bathtubs or showers including fixtures or accessories; excluding enclosures, faucets, spigots and towel racks)

41 YOM FRACTURED A RIB BY SLIPPING IN THE BATHTUB & FALLING AGAINST THE TOILET AT HOME.

53 YOF SUSTAINED A CONTUSION OF A SHIN BY BUMPING IT WHILE SHOWERING AT HOME.

18 YOF SPRAINED HER LOWER BACK BY FALLING IN THE SHOWER AT SCHOOL.

02 YOF SUSTAINED A LACERATION OF THE CHIN BY FALLING IN THE BATHTUB AT HOME.

18 YOF SUSTAINED A HEAD INJURY BY FALLING IN A SHOWER AT HOME.

80 YOM DISLOCATED A HIP BY LIFTING LEG IN SHOWER.

86 YOF SUSTAINED A LACERATION OF THE SCALP BY TRIPPING ON A RUG IN THE SHOWER AT HOME.

71 YOF SUSTAINED A HEAD INJURY BY FALLING FROM TOILET AGAINST THE BATHTUB AT HOME.

68 YOF SPRAINED AN ANKLE BY FALLING IN A SHOWER.

47 YOF FRACTURED A KNEE BY FALLING IN THE SHOWER AT HOME.

02 YOF SUSTAINED A LACERATION OF THE CHIN BY FALLING IN THE BATHTUB.

22 YOM SPRAINED A FOOT WHILE STEPPING OUT OF A SHOWER AT JAIL.

23 YOF SUSTAINED A CONTUSION OF A FOOT BY TRIPPING ON A RUG & STRIKING AGAINST A TUB AT HOME.

40 YOM SUSTAINED A LACERATION OF THE NOSE FROM BEING STRUCK BY THE SHOWER HEAD IN THE SHOWER AT HOME.

21 MOM RUPTURED AN EAR DRUM WITH A COTTON-TIPPED SWAB WHILE BATHING IN TUB AT HOME.

48 YOF SUSTAINED A CONTUSION OF THE NECK BY FALLING IN THE BATHTUB AT HOME.

04 YOF SLIPPED IN BATHTUB FELL AND INJURED FACE DX/ FACIAL LAC L KNEE STR

10 YOF FELL OUT OF SHOWER AND INJURED L KNEE. HAS ABRASION TO KNEE ALSO

80 YOF FELL IN SHOWER AT HOME HIT HEAD. DX/ HEAD INJURY

94 YOM SLIPPED AND FELL IN SHOWER AND HIT FACE ON FLOOR. DX/ FACIAL FX

55 YOM SLL LEG HEMATOMA

72 YOF CAUGHT FOOT IN TUB, INJURING LOWER LEG. NOW HAS HEMATOMA AND INCREASING PAIN.

22 YOF AT HOME FAINTED WHILE IN SHOWER AND FELL CUTTING FOREHEAD.

26 YOF SLIPPED AND FELL IN TUB DX: KNEE STRAIN

90 YOF GETTING OUT OF SHOWER WITH WALKER SLIPPED ON THE FLOOR AND HIT HEAD DX/ SCALP ABRASION

30 YOM SLIPPED AND FELL INTO TUB DX: CONTUSION TO BACK

51 YOF SLIPPED IN TUB AND HIT HEAD DX/ SCALP LAC

60 YOF SLIPPED AND FELL IN TUB DX: CONTUSION TO COCCYX

44 YOM FELL AND HIT ABDOMEN ON BATHTUB AT HOME. DX/ ABDOMINAL CONTUSION

04 YOM WITH CUT TO FACE FELL IN TUB DX: LACERATION TO FACE

51 YOF AT HOME FELL AT 5PM WHEN LOST BALANCE AND HIT L SIDE OF RIBS ON BATHTUB.

33 YOF SLIPPED AND FELL IN TUB DX: HEAD LACERATION

23 MOM FELL IN BATHTUB AT HOME AND HIT CHIN CAUSING LACERATION.

62 YOM WITH BACK PAIN FELL INTO TUB DX; CONTUSION TO LOWER BACK

63 YOF FELL INTO BATHTUB / NO INJURIES OR COMPLAINTS

54 YOM SLIPPED AND FELL IN TUB DX: RIB FRACTURE

02 YOM SLIPPED IN TUB AT HOME AND INJURED FACE DX/ CHIN LAC

25 YOF WITH CHEST PAIN AFTER FALL INTO TUB DX: CONTUSION TO CHEST

84 YOM FELL OUT OF SHOWER ON TO THE FLOOR AT HOME HIT HEAD DX/ HEAD INJURY

85 YOF SLIPPED AND FELL IN TUB AND HIT HEAD AT HOME DX/ HEAD INJURY

06 YOM AT HM WAS TAKING A BATH & SWIMMING IN TUB WHEN HE STRUCK HIS HEAD AGAINST FAUCET CAUSING HEAD LACERATION.

28 YOM AT HOME FELL IN SHOWER. WAS RESPONSIVE PER EMS.

26 YOF SLIPPED / FELL IN THE SHOWER DX: R EAR LAC. / HEAD & R SHOULDER CONTUSION

36 YOF THIS AM SLIPPED WHILE TRYING TO GET OUT OF BATHTUB AND LANDED ON BUTTOCKS.

28 YOF RIPPED FINGER NAIL OFF WHEN SLIPPED IN THE SHOWER AND THE NAIL BENT BACKWARDS.

26 YOF INJURED KNEE STEPPING OUT OF SHOWER DX/ RIGHT KNEE SPRAIN

50 YOM FELL IN BATHTUB AND HIT CHEST DX/ RIB FX

83 YOM CUT SCROTUM FELL IN TUB DX: LACERATION TO SCROTUM

71 YOF FELL OUT OF BATHTUB AT HOME AND HIT HEAD ON THE FLOOR DX/ HEAD INJURY

89 YOF FELL IN TUB HITTING HEAD DX: CLOSED HEAD INJURY

69 YOF WAS IN SHOWER AND FELL BACKWARDS STRIKING HER BACK.

08 YOF AT HOME LACERATED FACE ABOVE R ORBITAL. HIT HER HEAD ON SOAP DISH WHILE SHOWERING. NO LOC.

40 YOM SLIPPED AND FELL IN SHOWER AND INJURED CHEST. DX/ RIB FX

17 YOF FELL IN TUB HURT NECK DX: NECK STRAIN

23 YOM INJURED LOWER BACK BENDING OVER IN SHOWER AT HOME DX/ LUMBAR STRAIN

83 YOF FELL IN THE TUB AT ASSISTED LIVING AND INJURED SHOULDER DX/ RT SHOULDER CONTUSION

02 YOM HIT FACE ON BATHTUB AT HOME DX/ FACIAL LAC

74 YOM FELL AND HIT HEAD IN TUB DX: CONTUSION TO HEAD

85 YOF SLIPPED AND FELL GETTING OUT OF TUB DX: CONTUSION TO HIP

58 YOF SLIPPED AND FELL INTO TUB HIT HEAD DX: CLOSED HEAD INJURY

13 MOM AT HOME FELL IN BATHTUB AND HIT FOREHEAD AND MOUTH.

06 YOM SLIPPED IN BATHTUB AND HIT HEAD DX/ HEAD CONTUSION

78 YOM SLIPPED AND FELL IN TUB DX: LACERATION TO HEAD

08 YOM SLIPPED IN TUB TWISTED ANKLE DX: ANKLE STRAIN

51 YOF HIT HEAD ON SOAP DISH IN SHOWER 2 TIMES THIS WEEK HAS HEADACHE DX/ CONCUSSION

51 YOF SLIPPED IN SHOWER AND INJURED KNEE AT HOME DX/ RIGHT KNEE CONTUSION

83 YOM SLIPPED AND FELL IN THE SHOWER LAST NIGHT AND INJURED BACK DX/ BACK PAIN

31 YOM HIT EYE WITH TOWEL WHILE GETTING OUT OF THE SHOWER AT HOME DX/ RIGHT EYE CORNEAL ABRASION

24 YOF FELL GETTING OUT OF SHOWER HIT HEAD DX/ SCALP LAC

48 YOF SLIPPED IN SHOWER HIT HEAD + LOC DX/ HEAD INJURY

11 YOM SLIPPED IN SHOWER AND INJURED LEG. DX/ LEFT LEG CONTUSION

30 YOF SLIPPED AND FELL INTO TUB DX: CONTUSION TO HIP

18 MOM FELL IN TUB DX: LACERATION TO FACE

46 YOF SLIPPED AND FELL IN TUB DX: CONTUSION TO LOWER BACK

30 YOM CUT HAND ON BROKEN SOAP DISH AT HOME. DX// RIGHT HAND LAC

70 YOF SLIPPED AND FELL IN TUB DX: CONTUSION TO CHEST

31 YOM CUT THUMB ON SHOWER DRAIN THIS AM.

62 YOF SLIPPED IN THE SHOWER AND FELL ON THE FLOOR AT HOME DX/ LEFT WRIST SPRAIN

67 YOM FELL GETTING OUT OF SHOWER HIT HEAD ON TUB AT HOME DX/ SCALP CONTUSION

45 YOF PASSED OUT IN SHOWER AT GROUP HOME HIT HEAD. DX/ HEAD INJURY

04 YOF FELL IN BATHTUB AND HIT MOUTH DX/ LIP LAC

43 YOM SLIPPED IN BATHTUB AND INJURED KNEE DX/ LEFT KNEE CONTUSION

15 YOM TAKING SHOWER AND SHOWER DOOR SHATTERED AND PT FEET WERE CUT WITH THE GLASS AT HOME DX/ BILAT FOOT LAC

73 YOF AT 9AM TODAY WAS GETTING OUT OF TUB AND SLIPPED AND BUMPED L RIBS ON THE TUB. C/O RIB PAIN.

87 YOF BENT DOWN TO PUT SCALE AWAY FELL AND HIT INTO TUB AT HOME DX/ LEFT HIP CONTUSION22 YOM FELL IN TUB AT HOME AND INJURED CHEST DX/ RIB FX

40 YOF SLIPPED GETTING OUT OF BATHTUB AND INJURED LOWER BACK DX/ LOW BACK PAIN

34 YOM FELL AND HIT TUB DX: SHOULDER STRAIN

70 YOF SLIPPED FELL HIT CHEST ON SIDE OF TUB DX: CONTUSION TO CHEST

89 YOF SLIPPED AND FELL IN THE SHOWER LAST NIGHT AT NURSING HOME INJURED CHEST DX/ CHEST CONTUSION

44 YOM FELL IN TUB AND HIT CHEST DX.CHEST CONTUSION

36 YOF SLIPPED AND FELL IN TUB DX: LACERATION TO FACE

56 YOM CUT WRIST ON BROKEN SHOWER KNOB AT HOME DX/ LEFT WRIST LAC

88 YOF FELL AT HOME IN SHOWER AND HIT HEAD ON TUB DX/ SCALP CONTUSION

51 YOM SLIPPED AND FELL IN TUB DX: NECK STRAIN

23 YOM FELL IN BATH TUB AND INJURED CHEST DX/ CHEST CONTUSION

59 YOM FELL IN SHOWER AND INJURED SHOULDER DX/ LEFT SHOULDER FX
46 YOM HAD FALL HIT TUB DX: CONTUSION TO FACE
78 YOF FELL AT HOME AND HIT FACE ON BATHTUB DX/ FACIAL CONTUSION
29YOF WITH BACK PAIN AFTER FALL IN TUB DX: LOW BACK STRAIN
31 YOF FELL GETTING OUT OF TUB AT HOME INJURED FLANK DX/ FLANK CONTUSION
72 YOF AT HOME FELL WHEN SLIPPED ON URINE IN BATHROOM AND HIT HEAD ON SIDE OF BATH TUB.
19 YOF SLIPPED AND FELL INTO TUB DX: CONTUSION TO LOWER BACK
08 YOM FELL IN THE SHOWER AT HOME AND HIT EAR DX/ LEFT EAR LAC
62 YOM SLIPPED / FELL IN THE SHOWER. DX: RIB CONTUSION
09 YOF FELL IN TUB AND HIT LIP. DX/ LIP LAC
56 YOF WITH SHOULDER PAIN AFTER USING BATHBRUSH IN SHOWER DX: SHOULDER STRAIN
75 YOF AT HOME FELL OFF HASSECK APPROX 30 MIN AGO HITTING HEAD AND L ARM ON BATHTUB. DENIES LOC.
62 YOF SLIPPED IN TUB HITTING FOOT DX: CONTUSION TO FOOT
04 YOM SLIPPED IN THE BATHTUB AND HIT CHIN DX/ CHIN LAC
34 YOM FELL IN THE SHOWER AT HOME INJURED BACK DX/ BACK SPRAIN
25 YOF + ETOH BAL 313 FELL IN SHOWER AND HIT HEAD DX/ HEAD CONTUSION

Annex 2: US CPSC NEISS: First 48 Sample Narratives (of 630 cases) for Product Code 0611 Injuries in 2010 - ER treated & Then Admitted to Hospital (Product Code 611 covers bathtubs or showers including fixtures or accessories; excluding enclosures, faucets, spigots and towel racks)

89 YOF GETTING OUT OF THE SHOWER THE NEXT THING SHE KNEW SHE WAS ON THE FLOOR WITH HEAD AND SHOULDER INJURY; SHOULDER AND HEAD CONTUSION
69 YOM WAS WASHING HIMSELF IN SHOWER, FELL ONTO BLUNT PART OF BATHTUB, IMMEDIATELY HAD PAIN & TROUBLE BREATHING. DX - MULTIPLE RIB FXS
56 YOF SLIPPED IN THE SHOWER AND FELL FORWARD HITTING HER FACE & INJURING HER RT ARM- DX- MECHANICAL FALL W/ FRACTURE RT SHOULDER
78 YOF FAMILY FOUND HER ON THE FLOOR BETWEEN TOILET AND BATHTUB, SHE STATED SHE PASSED OUT WHEN SHE WAS IN SHOWER; SHOULDER INJURY
47 YOM HAD A WET SHEETROCK FALL ON HEAD WHILE IN SHOWER, +LOC, WAS CONFUSED. DX - BLUNT HEAD TRAUMA W/BRIEF LOC
62 YOM HAD A SYNCOPAL TODAY AT HOME IN THE SHOWER INJURING EYE AREA- DX- LACERATION TO FACE(EYE)
78 YOF PRESENT TO ER FROM HOME WHEN SHE WAS TAKING A BATH AND COLLAPSED - DX- CARDIAC ARREST, RESUSCITAED
43 YOM PRESENT TO ER AFTER HE WAS IN THE BATHTUB AND SLIP AND FELL GETTING OUT HITTING HEAD ON FLOOR- DX- BLUNT HEAD TRAUMA
81 YOM PRESENT TO ER AFTER A FALL IN THE SHOWER AT HOME TODAY INJURING THE HEAD AREA- DX- BLUNT HEAD TRAUMA
41 YOM FELL OUT OF SHOWER AT ASSISTED LIVING HOME YESTERDAY ONTO RT SIDE C/O RT HIP & RT LEG PAIN. DX - RT HIP FRACTURE
80 YOF TRYING TO GET OUT OF BATHTUB ACCIDENTLY FELL INJURED LOWER BACK; BACK CONTUSION AND AMBULATORY DYSFUNCTION

92 YOM PRESENT TO ER AFTER A FALL IN BATHTUB THIS MORNING INJURING RT HIP-DX- FRACTURE RT LOWER TRUNK (HIP)

88 YOF PRESENT TO ER AFTER A FAL IN BATH TUB AT SNF INJURING LT HIP- DX - FRACTURE LT LOWER TRUNK (HIP)

88 YOF WAS GETTING OUT OF SHOWER, FELT DIZZY & FELL STRIKING BACK OF HEAD ON FLOOR INJURING LT ARM. DX - SKIN TEAR LACERATION

88 YOF GETTING OUT OF BATHTUB THIS MORNING FELL TRIED TO BRACE HERSELF INJURED SHOULDER; SHOULDER FRACTURE

71 YOF WAS FOUND DOWN BY SON IN BATHTUB AT HOME, HAS INJURY TO LT EYE & FOREHEAD, IS REPETITIVE. DX - BLUNT HEAD TRAUMA, +ETOH

86 YOF LOST BALANCE WHEN SHE TURNED AROUND & FELL INTO BATHTUB C/O LOW BACK PAIN. DX - LOW BACK PAIN, POSS FX VS CONTUSION

80 YOF HUSBAND DID NOT WANT HER SMOKING IN HOUSE, WENT TO BATHROOM STOOD ON THE TOILET, OPENED WINDOW, SLIPPED BETWN TOILET/TUB; PELVIC FX

44 YOF FELL IN SHOWER TODAY SUSTAINING HEAD INJURY. DX - SCALP LACERATION

37 YOF SUSTAINED A MECHANICAL FALL IN SHOWER ONTO RT UPPER EXTREMITY, C/O RT SHOULDER PAIN. DX - RT DISTAL CLAVICLE FX

37 YOM HAD A GROUND LEVEL FALL IN BATHROOM STRIKING LOWER BACK ON BATHTUB. DX - SPINAL CONTUSION

84 YOF HAD SYNCOPAL EPISODE IN SHOWER AND FELL. DX: L 10TH RIB FX, INABILITY TO AMBULATE.

87 YOF FELL IN SHOWER. DX: RHABDOMYOLYSIS.

93 YOF FELL IN SHOWER AT ASSISTED LIVING. DX: L DISTAL HUMERUS FX.

79 YOM FELL IN SHOWER. DX: A FIB W/RAPID VENTRICULAR RESP, SYNCOPE, SDH, SAH, ELEVATED INR.

84 YOF FELL WHILE GETTING OUT OF BATHTUB SUSTAINING A FRACTURE TO HER LUMBAR SPINE

90 YOF SLIPPED IN BATHTUB AND GRAZED HEAD ON SHELF AT ASSISTED LIVING. DX: R KNEE STRAIN W/POSS INTERNAL DERANGEMENT, CLOSED HEAD INJURY.

82 YOF WITH NO INJ FROM FALL IN TUB

85 YOM WITH NO IN, FELL IN BATHTUB, ADMITTED FOR OTHER REASONS

52 YOM W/ALS FELL AND BECAME STUCK BETWEEN TOILET AND TUB. DX: RHABDOMYOLYSIS STATUS POST FALL, NASAL FX.

95 YOF FELL IN SHOWER SUSTAINING CHEST CONTUSION

71 YOF SLIPPED AND FELL IN SHOWER. DX: SYNCOPE, LARGE HEAD LAC, COAGULOPATHY, HYPOKALEMIA, LONT QT, ALCO

79 YOF FELL IN SHOWER SUSTAINING A FRACTURED KNEE

87 YOF WITH RIB FRACTURE FROM FALL IN TUB

79 YOM WITH LOWER BACK STRAIN FROM FALL IN SHOWER

81 YOF TURNED IN SHOWER AND FELL SUSTAINING A FRACTURED HIP

97 YOF FELL IN THE SHOWER AT NURSING HOME. DX: TRAUMATIC SDH, AGGITATION.

70 YOF FELL IN SHOWER AT HOME AND WAS UNABLE TO GET UP, SUSTAINED CHI, BACK CONTUSIONS

88 YOF FELL AGAINST BATHTUB AND WALL AT ASSISTED LIVING. DX: BACK/SHOUL PX, SYNCOPE, STAGE I THORACIC DECUBITUS ULCER, MULT OLD THORACIC FX'S.

88 YOF SLIPPED ON WET FLOOR GETTING OUT OF SHOWER AT NURSING HOME. DX: BACK CONT, PNEUMONIA, HYPOXEMIA, PLEURAL EFFUSION.

41YOF WITH NO INJURIES FROM FALL IN SHOWER, WAS ADMITTED

83 YOM FELL IN THE SHOWER. DX: TRAUMATIC ICH, FACIAL LAC, CONCUSSION W/O LOC, RENAL FAILURE.

94 YOM FELL GETTING OUT OF THE SHOWER AND HIT HEAD SUSTAINING A LACERATION

79 YOM FELL ON SIDE OF BATHTUB. DX: SYNCOPE, CHEST WALL CONT.

55 YOM SLIPPED AND FELL IN BATHTUB. DX: R HEMOTHORAX/PNEUMOTHORAX, MULT R RIB FX'S.

86 YOF FELL BACKWARDS INTO BATHTUB & HIT HEAD AT HOME DX: LACERATION TO SCALP/ ACUTE DEHYDRATED

95 YOF TRIPPED OVER THROW RUG WHILE GETTING INTO SHOWER AT HOME DX; AVULSION TO FACE/ MALIGNANT HYPERTENSION

53 YOF SLIPPED IN SHOWER AND FELL HITTING HIP ON TOILET AT HOME DX: STRA

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Bibliography for Jake Pauls Proposal for IBC Section 1003 on Grab Bars for Bathtubs, Bathtub-Shower Combinations and Showers

Approximately 50 internationally-produced scientific and technical references, on bathing/showering safety, were compiled by the proponent, in 2016, for an American Public Health Association (APHA) draft policy highlighting, especially two Canadian research studies that also are addressed in video presentations by Principal Investigators (Dr. Nancy Edwards, Dr. Alison Novak) for the research and posted, for free streaming viewing at, <https://vimeo.com/164239941> Accessed January 8, 2018. Additional videos covering technical aspects of bathing and showering safety (including cost impact and benefit issues*) are found at the following links (all of which are available, with descriptions, at www.bldguse.com, the proponent's Professional Practice Website, Accessed January 8, 2018.).

- <https://vimeo.com/237294479>
- <https://vimeo.com/239276202> *
- <https://vimeo.com/197742277>
- <https://vimeo.com/193507768>
- <https://vimeo.com/173883358>
- <https://vimeo.com/175101448> *
- <https://vimeo.com/117572176>

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Other items for the Proposal Bibliography (from post-2016 sources) and one earlier paper specific to (transfer) pole-type grab bars which are included in the IBC proposal.

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Cost Impact: The code change proposal will increase the cost of construction

The code change proposal will increase the cost of construction, but that increased cost pales in comparison to the benefits of enhanced usability and reduction of fall injuries.

The additional material in the form of conventional grab bars or poles plus their fixings is about 50 dollars per grab bar or pole (using *retail* prices for the components confirmed as recently as 2017) and with a conventional three-fixture bathroom with a bathtub there would be a need for two such grab bars or poles or one of each. Labor to install these would be about one hour for each. Thus an overall, installed cost is on the order of \$200 per bathroom. The service life would be on the order of two or more decades.

Against this added cost of an installed single grab bar or two per bathroom there are the ongoing benefits of enhanced normal (non-injury) uses which, for a typical US household for a 20-year period, for example, number about 7,000 per person or on the order of 20,000 per household. Those enhanced uses, with grab bars, have an economic value that is larger than the benefit of averted injuries from falls.

Currently without grab bars, our bathtubs and showers are the site of injuries serious enough to require professional medical attention at a rate, annually (using 2010 data) of about 1 million per 110 billion uses or about one in 110,000 uses. Every one of those non-injury uses has a value. By comparison, for stairs this ratio is about one professionally treated fall injury for every million flight uses in home settings and one such injury for every ten million flight uses in public settings where, under the IBC and more-detailed inspection procedures, stairs are nearly one order of magnitude safer than those nominally constructed under the IRC. See the video presentation by Jake Pauls to the April 2017 meeting, "The Impact of Building Codes and Standards in Public Health and Safety," held in Melbourne, Australia, in connection with the 15th World Congress on Public Health. The streaming video containing this presentation, which includes the "Injury Pyramids" used for the above stair safety calculation, is available freely at <https://vimeo.com/239276202> (as listed in the first part of the Bibliography accompanying this proposal) accessed Jan 8, 2018.

The injuries-averted benefit, over twenty years, has a value, in 2010 dollars, about 6.5 times greater than the installation cost, based on the very reasonable assumption that half the falls are averted with the specified grab bars or poles. For the vertical poles that also enhance and make safer the use of toilets that, being adjacent to a bathtub, can serve stand-to-sit and sit-to-stand transfers for toileting, this benefit increases by about 35 percent to nearly 9 times greater than the installation cost. These projections are based on the injury economic data provided by the 2015 paper in the respected journal, *Injury Prevention*, by Lawrence, Spicer and Miller (see Bibliography for details).

The bottom line is that the benefits of both enhanced normal uses, in the tens of thousands per household over a 20-year period, combined with the benefit of averted injuries, is on the order of at least 20 or more times the cost of providing the grab bars, especially if they take the form of vertical poles serving bathtub-shower combination users as well as toilet users in a three-piece bathroom provision that is very common in homes and hotels, for example. For hotels, while the lavatory sink(s) may be in a separate space, the toilet and bathtub-shower combination are usually close together so that a single pole can serve transfers for both. Thus the cost impact of grab bar or pole installations is very small in relation to the benefits and that cost of installation is very small in relation to the overall price of a dwelling unit or hotel guest room for example.

Finally, the choice of residential settings for the foregoing benefit-cost analyses, reflects the greater attention such occupancies often receive in code change deliberations. Healthcare occupancies could also have been chosen for analyses as estimates of fall-related injuries to patients are that about "one-third of reportable falls with injuries in hospitalized older adults are linked to bathroom use" (quoted from reference identified as number 47 in the Bibliography for this proposal). Notably, in the recent NFPA deliberations on installation of grab bars, only healthcare occupancies were not included due to healthcare industry and healthcare fire protection engineering consultants' opposition based on the claim that patients in healthcare were not permitted to use bathrooms without supervision. The personal, post-fall (with closed-head injuries) experience recently by the proponent of this code change in three hospitals in Sweden, Australia and the USA, seriously questions this industry claim as well as the implicit assumption that bathrooms in healthcare provide reasonable safety from falls suffered in the course of toileting as well as bathing. Too often, the wheeled stand (with the vertical pole holding fluid being administered intravenously) is the most reliable "point of control" such patients have between their beds and toileting/bathing facilities either in the patient bedrooms or "down the hall."

E1-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: There was an issue with the location in the code. Historically showers and tubs have not been considered part of the circulation path for means of egress as indicated in this proposal. The proposal should not include exceptions for slip resistance or stepping over the tub edge or shower threshold. It was suggested that perhaps a better place for a requirement for grab bars would be Section 1209 with the other interior wall requirements for toilet and bathing rooms.

From a scoping perspective, apartments and condominium already have Type A and Type B requirements for blocking for the future installation of grab bars, and these requirements may conflict with that. In nursing homes and hospitals these grab bars may conflict with the space needed for mobility equipment and transfers. In Accessible units, the vertical station would be an obstruction for transfer to the tub, and the grab bar requirements are not coordinated with ICC A117.1. It was suggested that the non-accessible bathrooms in hotels may be type of facility to start with to reduce slip and fall issues with grab bars at the tubs and showers.

Technical issues - What is the justification for the grab bar locations and lengths? How would the vertical station work with shower/bathtub doors or curtains? How would the ends of the vertical station attach to the floors, tub edge or ceiling? What happens at larger showers, gang showers, or showers with glass or no walls on some sides? (Vote 14-0)

Assembly Action:

None

E1-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jake Pauls, representing Jake Pauls Consulting Services (bldguse@aol.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

1209.4 Grab bars for bathtubs, bathtub-shower combinations and showers. At bathtubs and bathtub-shower combinations where grab bars complying with ICC A117.1 are not provided, a vertical grab bar complying with Section 1209.4.1 and a grab bar complying with Section 1209.4.2 shall be provided. At showers where grab bars complying with ICC A117.1 are not provided, a vertical grab bar complying with Section 1209.4.3 shall be provided. All grab bars required by this section shall comply with Sections 1209.4.4 through 1209.4.8. Nonconventional grab bars, such as stanchions, shall be permitted.

Exceptions:

- 1. Group I-2 occupancy where care recipient usage of bathing and showering facilities are assisted by staff.**
- 2. Group 1-3 occupancy where bathing and showering facilities serve inmates or detainees.**

1209.4.1 Vertical grab bar. A vertical grab bar shall complying with Sections 1209.4.1.1 through 1209.4.1.3.

1209.4.1.1 Approach An unobstructed clear floor space of 21 inches (535 mm) minimum in width and 21 inches (535 mm) minimum in depth, adjacent to the tub wall shall be provided. The clear floor space shall be located outside the tub and be within 12 inches (305 mm) of the center line of the vertical grab bar measured horizontally.

1209.4.1.2 Length The vertical grab bar shall be 36 inches (914 mm) minimum in length and with its upper end 60 inches (1525 mm) minimum above the floor.

1209.4.1.3 Position The vertical grab bar shall be positioned in accordance with one of the following:

1. Where the vertical grab bar is located inside the bathtub footprint, the center line of the vertical grab bar shall be 12 inches (305 mm) maximum from exterior wall of the bathtub and no closer than 6 inches (150 mm) to any shower curtain rod attachment.
2. Where the vertical grab bar is located outside the bathtub footprint, the center line of the vertical grab bar shall be 6 inches (152 mm) maximum from the exterior wall of the bathtub.
3. The vertical grab bar's lower attachment is on the rim of the bathtub.

1209.4.2 Rear wall grab bar. A grab bar shall be provided on the back wall of the bathtub or bathtub-shower combination and shall be positioned in accordance with Section 1209.4.2.1 or 1209.4.2.2.

1209.4.2.1 Horizontal Position The horizontal grab bar shall be located 8 inches (205 mm) minimum and 10 inches (255 mm) maximum above the rim of the bathtub. The grab bar shall be 24 inches (610 mm) minimum in length and extend to be 24 inches (610 mm) maximum from the head end wall and 12 inches (305 mm) maximum from the control end wall.

1209.4.2.2 Diagonal Position The diagonal grab bar shall be located with the lower end 8 inches (205 mm) minimum and 10 inches (255 mm) maximum above the rim of the bathtub and the higher end 25 inches (635 mm) minimum and 27 inches (685 mm) maximum above the bathtub rim. The grab bar shall be 24 inches (610 mm) minimum in length and extend to be 24 inches (610 mm) maximum from the head end wall and 12 inches (305 mm) maximum from the control end wall.

1209.4.3 Showers A vertical grab bar shall be provided to either side of the opening to the shower and located with the center line within 3 inches (76 mm) of the interior or exterior of the shower threshold, measured horizontally. The grab bar shall be 24 inches (610 mm) minimum in length with the lower end 39 inches (991 mm) maximum above the floor and the higher end a minimum of 61 inches (1550 mm) above the floor.

1209.4.4 Cross Section. Grab bars shall have a circular cross section with an outside diameter of 1-1/4 inches (32 mm) minimum and 2 inches (51 mm) maximum.

1209.4.5 Spacing The space between the grab bar and any adjacent surfaces or projecting objects shall be 1-1/2 inches (38 mm) minimum.

1209.4.6 Surface Hazards Grab bars and any walls or other surfaces adjacent to grab bars shall be free of sharp or abrasive elements. Edges shall be rounded with a minimum radius of 0.25 inch (6 mm).

1209.4.7 Structural Characteristics Allowable stresses shall not be exceeded for materials used when a vertical or horizontal force of 250 pounds (1112 N) is applied at any point on the grab bar, fastener, mounting device, or supporting structure. Grab bars shall not rotate within their fittings.

1209.4.8 Design and Installation for Water Grab bars, fasteners, mounting devices, and supporting structure shall be designed and installed to resist the damaging effects of water.

Commenter's Reason: (1) Committee Comments. First, I thank the IBC Egress Committee and staff for pointing out the preferred location in the IBC for a set of requirements on improved safety for bath and shower facilities. Especially appreciated was ICC Staff opining that a relocation of the proposed requirements to Section 1209 would be in order and facilitating my comment. My public comment accomplishes this preferred positioning of the requirements mostly as originally proposed with some edits and deletions described here.

(2) The matter of the original proposals suggested exception for "slip resistance" has been addressed completely. There is no reference to "slip resistant" or "means of egress" (Sections 1003.4 and 1003.5) in the re-positioned requirement.

(3) On blocking requirements, my testimony on the IRC and IBC proposals, made clear that blocking was not an effective solution or even a path to the solution. As a member of the ICC/ANSI A117 Committee, I intend to introduce a new requirement for mainstreamed grab bar (and stanchion) installations provided for the general population based on my proposals for the IBC and the already-adopted requirements, I had proposed a few years ago, to NFPA 101 and 5000. As part of that effort, the whole issue of blocking—the projected benefits of it and where it needs to go—will be addressed.

(4) Also, in relation to A117.1, the A117 Committee is between cycles and has not met during the time frame of my bath/shower safety proposals to both NFPA and ICC. However, three leading members of the Committee, beyond myself have been consulted throughout the last few years on the evidential bases for, and content of, new requirements for mainstreaming grab bars and stanchions. This has also been done with a dedicated Task Group on Grab Bars that has been considering parallel proposals (one from me and an earlier one from another top expert on falls in Canada) for changes to the National Building Code of Canada (NBCC). ICC committee criticism of my not consulting with other bodies

(more a matter of the IRC plumbing committee's criticism than the ICC Egress committee) is thus missing a lot of the collaboration with which I have approached this topic in recent years. (See my many video programs on bathroom safety posted at www.bldguse.com; they include a wide range of usability and safety professionals from both the USA and Canada.)

(5) Here I note the IRC Plumbing Committee's criticism that I had not worked with those involved with some plumbing standards committees whose work on the safety issues is not visible to me. Moreover, it is ironic that the IRC Plumbing Committee recommended that the issue of grab bars was not for the plumbing section of the IRC, but Chapter 3 on planning, something I can only pursue during 2019 within Group B hearings. This public comment on the IBC proposal is a precursor to a proposal for next year's Group B proposal for IRC's Chapter 3.

(6) Responding to the IBC Egress Committee Reason, the suggestion about restricting or prioritizing a requirement on grab bars to hotels misses the point that the vast majority of bath/shower-related injuries occur in non-hotel contexts. The suggestion also implies that too much faith is placed on the benefit, to safety, of being familiar with the bath/shower facility to reduce the risk of injurious falls. There is no good evidence supporting this and much evidence against it (just as the argument fails in relation to stairway safety). Here I need to disclose that, as an occupant of hotel guest rooms about 40 percent of the nights in a year, I would like to see all hotel rooms equipped with grab bars to the same extent as my home. My home installation, using stanchions, meets the proposed IBC requirements. No hotel I have stayed in around the world has provided safety to the level achievable with the proposed IBC requirements. Even the best of these hotels would get no better than a 40-percent grade in my experience, providing no more than 40 percent of what is now proposed for IBC Section 1209. A typical hotel installation, especially for the few hotel chains (including the largest) providing grab bars, consists of only a single grab bar serving either—not both—the in-tub bather or the shower taker. Research and experience show that each user group has different transfer needs; in-tub bathers need the vertical bar for stepping in and out (as do shower takers) but also need a second bar, positioned horizontally or diagonally, at the non-access side of the tub, to move into and out of a sitting position safely. Older, in-tub bathers will especially appreciate having bilateral support from the combination of (1) a non-access side grab bar and (2) an access side vertical grab bar, especially a stanchion mounted above or near the tub wall, about half-way along the tub wall length.

(7) Technical Issues Noted in the IBC Egress Committee Reason. The justifications for the "grab bar locations and lengths are based on the research literature, all listed in my proposal, especially the biomechanics studies performed over the last twenty years, largely in Canada. As these were done with bathtub entry and egress, I have augmented the findings with some observations of stanchion use in relation to human anthropometrics (ergonomics) where it is clear that people prefer to use vertical, conventional grab bars and stanchions at chest-to-eye height for best biomechanical advantage. Thus 60-inch to 63-inch top-end heights are specified for grab bar lengths when used in vertical orientation. Such heights, along with minimum lengths, are tempered by consideration of children's ergonomics, e.g., with handrails, a topic where I am a published authority based on decades of work. Vertical is the most effective orientation (according to extensive research with adult entry/exit of bathtubs used for showering).

(8) The Committee's question about how a vertical, conventional grab bar or stanchion relates to "shower/bathtub doors or curtains" has been considered extensively, especially in relation to the grab bar being placed where it is at least six inches from shower curtain rod fixing which is generally more or less over the front wall of the tub. This is also where fixed enclosures or doors are also generally located. The latter, doors, are either sliding or swinging and the latter sometimes swing both outward and inward. The Code cannot cover every detail and some intelligence should be exercised in the relatively extensive work required for enclosure installation to avoid interference between fixed and movable enclosure panels. Moreover, regarding the use of stanchions, such vertical grab bars can be located independent (structurally and spatially) of walls, for both tubs and showers; they can be positioned a few inches outside of enclosure panels and clear of any door swing and/or shower curtains. In addition to being very helpful in entry and egress from the facility the vertical stanchions provide a full-height backrest when standing on one foot and attempting to dry the other. (An example installation, shown in Figure 2 of my original proposal Reason Statement, utilizes the tub wall for a stanchion lower support.)

(9) The penultimate question in the Committee Reason asks about how the ends of the "vertical station" (sic), i.e., the stanchion is attached to the tub wall. It sits in a recess on the base plate (which is under a cover plate) which is held by industrial (automotive grade, for example) adhesive that can be removed with no damage to the tub wall but which, while held by the adhesive, has several times the shear area provided by conventional grab bar fixing with three screws at each end which are prone to corrosion and backing deterioration due to water entry into walls. The stanchion not only meets the load requirements, applied laterally in the test, of the ICC and NFPA codes (250 pounds) but the more stringent, higher-load requirements of the National Building Code of Canada (NBCC). At the ceiling, the vertical stanchion is also held with a small plate—matching the one on the tub wall) adhered to a solid ceiling. For other ceilings, this could be duplicated structurally, with a ceiling-mounted, nominal 1 by 6 piece of lumber, painted to match or complement the ceiling (e.g., a suspended ceiling) and distributing its almost exclusively horizontal load over many, many times the area of even the bottom fixing plate and also transmitting loads to the walls on either side of the typically small residential bathroom (60 inches across the short dimension based on a standard tub length).

(10) The bathroom installation shown in Figure 2 is in a rental apartment and no damaging hole is made in any wall or other surface holding both the vertical and horizontal stanchion elements in place to required strength standards of 250 pounds (or even 300 pounds in the case of the NBCC). In short the solution and answer to the Committee question is "Quite Easily Done" especially as many residential bathrooms have relatively low ceiling heights (by code) so that the vertical stanchion, resting on the tub wall only needs about a 66-inch length in the installation shown in Figure 2.

(11) The Committee's final question, a compound one, is relatively easy to answer in that there are solutions, in provision of useful "points of control," that are provided independent of the existence of walls or the size of the space. Taking "gang showers" first, it is assumed that such showers are designed with floor finishes that are slip resistant with water and soap contamination (to meet current IBC and NFPA requirements—the latter specifying "slip resistant under foreseeable conditions"). A single vertical, conventional grab bar or stanchion would meet the literal text proposed for the IBC, at the entry/egress point for the shower, presumably where there is a boundary between wet and dry conditions, e.g., a water dam or threshold to step over. Provision of additional points of control is beyond the proposed Code focus on safety of entry and egress.

(12) Regarding the second part to the Committee's final question, about glass walls or no walls, any glass wall has to meet stringent load human impact load requirements. While perhaps being comparable to loads on a glass-mounted grab bar, this does not mean that attachment to a glass panel is the only solution. It is increasingly common in hotel (and maybe other) renovations, for a bathtub, bounded by three walls, to be replaced with a walk-in shower of the same plan dimensions and either a half-length, heavy glass panel, at the shower head end of the space or some combination of fixed, hinged, and/or sliding, heavy glass panel(s)—the latter generally being superior in stopping adjacent floors from getting wet and slippery. In the typical small guest room bathroom in a hotel, there will also be a water closet adjacent to the shower. A single stanchion placed outside of the shower enclosure and a few inches clear of any permanent or hinged panel opening, and mounted between floor and ceiling serves both shower and toilet users with a highly effective point of control for transfers to and from both facilities. Note that the need to provide some lateral support for the top of the fixed glass panel, even with suspended ceilings, can serve adequately to brace the top of the stanchion for the lateral loads typically imposed predominantly on such a point of control.

(13) Thus the renovation of either hotel or dwelling unit bathtubs with dedicated showers would not only trigger a need (at least per NFPA codes) for a new stanchion or conventional grab bar, it would facilitate its installation as the ceiling structure needed for lateral support of both the glass wall and the stanchion is best done at the same time. I have a growing library of photographs of the many hotel rooms now being seen in Europe and North America of this situation.

(14) Finally, with dwelling units (and future IRC changes), we will need to address freestanding bathtubs returning after decades of bathtubs being tied to walls. The proposed IBC requirements do not explicitly cover this, except for vertical stanchions on a bathtub's access side. Other requirements are still tied to walls. So, as it is not a common issue in IBC installations, the topic of free-standing bathtubs is deferred to an IRC proposal in 2019. The creative skills of residential bathroom designers will have to be applied to making sure that such free-standing tubs are reasonably safe and usable by the majority of the population which is not only living longer but is losing mobility performance rapidly.

(15) Bottom line, my original proposal and the now to be relocated text in Section 1209, deal realistically with a major injury problem. Based on research evidence as well as extensive field experience I gain in my frequent international travel, this proposal is my small contribution to making the "International Codes" truly international in scope and justification. Proposal E1-2018, revised by this public comment, effectively addresses a major fall-injury problem costing tens of billions of dollars annually in societal injury costs in the US. Thank you to all making this possible in ICC's code development process.

(16) Postscript about Reason Statement. I am leaving my original proposal Reason Statement untouched from what was submitted in January. This means that "poles" are still referred to in some places where, now, the preferred standard term is "stanchions," for which a definition has been proposed for NFPA codes, as follows: "A fixed, generally upright bar or pole used as a support when grasped by a hand." Stanchions have a long history in transportation vehicles, dating back at least as long as conventional grab bars.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The cost impact originally submitted with the proposal is unchanged by this public comment which simply moves the core of the requirement to a more-appropriate section and the cost impact topic apparently was not an explicit issue in the Committee reason for disapproval.

E2-18

IBC: 1003.4.1 (New), Chapter 35, (IFC[BE] 1003.4.1, Chapter 80)

Proposed Change as Submitted

Proponent: Bill Griese, Tile Council of North America, representing Tile Council of North America (bgriese@tileusa.com); Todd Scharich, American Society of Concrete Contractors, representing American Society of Concrete Contractors (TScharich@ASCCONLINE.ORG); Charles Muehlbauer, Natural Stone Institute, representing Natural Stone Institute (Charles@naturalstoneinstitute.org); Katelyn Simpson, representing TCNA Laboratory (ksimpson@tileusa.com); Jennifer Ann Faller, representing Concrete Polishing Council (CPC) (concreteinsite@gmail.com); Mark Fowler, representing National Terrazzo & Mosaic Association (mark@ntma.com)

2018 International Building Code

1003.4 Slip-resistant surface. Circulation paths of the *means of egress* shall have a slip-resistant surface and be securely attached.

Add new text as follows

1003.4.1 Hard surface flooring. Hard surface flooring shall be slip-resistant in accordance with ANSI A326.3.

Add new standard(s) follows

ANSI

American National Standards
Institute
25 West 43rd Street, Fourth Floor
New York NY 10036
US

A326.3-18:

Test Method for Measuring Dynamic Coefficient of Friction for Hard Surface Floor Materials

Reason: Currently, Section 1003.4 requires that circulation path surfaces of the means of egress be “slip-resistant” with no method of measurement, quantitative threshold, or general principles to help the specifier, end-user and code official. Given the Code’s lack of criteria for “slip-resistant,” materials are sometimes being inappropriately specified, and accidents occur in areas of the means of egress. This can be especially dangerous for emergency responders who are entering a building for the first time, potentially under conditions with water and limited visibility (smoke). The purpose of this revision is to provide slip resistance criteria for hard surface flooring used in interior circulation paths. The proposed reference standard, ANSI A326.3, sets forth a quantitative minimum threshold, means of measurement, and general principles regarding slip resistance for hard surface flooring and is widely specified for ceramic tile, polished concrete, terrazzo, and natural stone. This would provide clarity, safety, and transparency with no increased cost of construction.

This proposal is being submitted by Tile Council of North America (TCNA), Natural Stone Institute, American Society of Concrete Contractors (ASCC), Concrete Polishing Council (CPC), and National Terrazzo and Mosaic Association (NTMA), with the support of many other organizations.

Previously, slip resistance for ceramic tile was standardized solely by ANSI A137.1 American National Standard Specifications for Ceramic Tile. In 2012, a proposal (S222-12) was approved which removed ANSI A137.1 from Section 2103 of the Code (previously, Section 2103.6) in an effort to consolidate masonry-based specification references. An unintended consequence of this change was that the Code was subsequently left with no slip resistance criteria for ceramic tile, much less stone, terrazzo, or concrete.

In 2015, a proposal (E3-15) was made to reintroduce the slip resistance provisions of ANSI A137.1 into the Code. Given that these provisions were being widely adopted and specified for flooring types beyond just ceramic tile, the scope of the proposal included other hard surface flooring types with the support of each respective industry. The proposal was met with positive feedback from the Means of Egress Committee, but was ultimately disapproved since the proposed reference standard was limited to ceramic tile. At the time, the Committee encouraged the proponents to collaborate on a stand-alone slip resistance specification which covered all hard surface flooring types and return in 2018 with a proposal.

Today, this work has been done for all hard surface flooring and is standardized in ANSI A326.3, including in the standard test sample size and testing in as-is conditions or under cleaned conditions. This standard is widely understood for hard surface flooring and specified throughout the architectural community with hard surface manufacturers/suppliers/installers regularly providing the information needed by code officials as part of standard product submittals and information. Revising Section 1003.4 to reference ANSI A326.3 for hard surface flooring would clear-up ambiguity around the requirement for “slip-resistant” circulation path surfaces, facilitate increased safety and ease-of-specification, and codify the slip resistance standard which is most predominately used today for hard surface flooring.

ANSI ASC A108, the committee which developed ANSI A326.3, represents a broad range of stakeholders, including the Construction Specifications Institute (CSI), Natural Stone Institute, National Association of Homebuilders (NAHB), Underwriter Laboratories (UL), National Tile Contractors Association (NTCA), Tile Council of North America (TCNA), and 58 additional stakeholders (for a total of 64).

A copy of ANSI A326.3 has been attached to this proposal and is also easily accessible for free online via www.TCNAtile.com.

Bibliography: [TCNA Tile Initiative] [Research Supporting an American National Standard for Slip Resistance] [Eric Astrachan] [2016] [Pages 2 - 9] [http://www.tcnatile.com/images/pdfs/Rsch_suptng_ANSI_std_slip_resist_TCNA_TI_Mar-2016.pdf]

[Slip and Fall Study Report: Enhancing Floor Safety Through Slip Resistance Testing, Maintenance Protocols and Risk Awareness] [CNA Financial Corporation] [2017]

[http://www.tcnatile.com/images/pdfs/CNA_Risk_Control_Slip_and_Fall_Report_Final.pdf]

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Hard surface flooring that meets or exceeds the criteria of the ANSI A326.3 standard is not different in price from hard surface flooring that is below the threshold criteria.

Analysis: A review of the standard proposed for inclusion in the code, ANSI A326.3-18, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

E2-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The referenced standard contains proprietary testing equipment. While this test can be performed consistently in a laboratory, it does not seem to be useable for concrete surfaces poured in the field. There were concerns for who would do field inspection, what information should be on the box of products that had been tested, how this would work for sloped surfaces, what slip resistance would be acceptable. This is proposed for all hard surface floors – perhaps it should only be required for higher risk areas. (Vote: 12-1)

Assembly Action:

None

E2-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Bill Griese, representing Tile Council of North America (bgriese@tileusa.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1003.4.1 Hard Interior hard surface flooring. ~~Hard surface flooring—Ceramic tile, terrazzo, natural stone, and polished concrete flooring used for circulation paths for the means of egress within the building shall be slip-resistant in accordance with ANSI A326.3. Conformance to ANSI A326.3 shall be indicated on product packaging, in product literature, on the construction documents, or by special inspection after flooring installation.~~

Commenter's Reason: In response to points raised by the Committee as reasoning for disapproval, further clarification and/or proposed modifications are provided as follows:

To address committee reason #1 (claim that the referenced standard contains proprietary testing equipment):

- Suggestions of ANSI A326.3 test equipment propriety are misguided and should be disregarded. The specified device is not patented, its design specifications are not copyrighted, and it was developed based on globally collaborative research of well-understood concepts relating to human ambulation and DCOF.
- There is clear precedent within the Code regarding reference standards which acknowledge specific testing devices. For example, UL 723 and ASTM E84, commonly known as the 'Steiner Tunnel' tests for surface burning characteristics, are widely adopted, well-understood and oriented around a specific testing device.
- In fact, unlike the Steiner Tunnel for UL 723 and ASTM E84, the specified DCOF testing device for ANSI A326.3 is not exclusively requisite to the standard as provisions for device equivalency are clearly indicated within the criteria of the standard.

To address committee reason #2 (concern regarding mechanisms for conformance communication, especially where product packaging or literature has been discarded or where flooring is manufactured in situ, as is the case for terrazzo or polished concrete):

- The proposal has been modified to specify acceptable means of ANSI A326.3 conformance indication, including declaration on product packaging, within product literature, within project documentation or per special inspection.

To address committee reason #3 (concern regarding whether or not the referenced standard, which is intended for interior flooring, would be applicable to all hard surfaces, as well as all circulation paths of the means of egress, including exit discharges to public ways which could consist of non-interior circulation paths):

- The proposal has been modified to specify the hard surface flooring types which are applicable--ceramic tile, terrazzo, natural stone, and polished concrete. These are the four flooring types for which there is broad industry adoption of ANSI A326.3, and listing them more accurately captures the original intent of the proposal.
- Additionally, the proposal has been modified to limit the applicability of ANSI A326.3 to interior walking surfaces of the means of egress. Limiting this subsection of slip resistant circulation paths to building interiors facilitates better alignment with the referenced standard.

To address committee reason #4 (concern regarding how the referenced standard could be applicable to sloped surfaces):

- It should be understood that a minimum DCOF value is not appropriate for such applications. Safety on ramps is a function of the ramp angle, cautionary marking, and the expected activity.

This proposal is about safety, first and foremost. Though it doesn't address every type of flooring, circulation path, or means of egress scenario, it establishes clear thresholds where possible, which in turn is a step forward in the realm of safety. Its approval with these modifications would clear-up a number of ambiguities pertaining to slip resistance and introduce a vastly improved way of specifying circulation paths, especially those involving flooring types for which slip resistance is of particular importance.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Hard surface flooring that meets or exceeds ANSI A326.3 is not different in price from hard surface flooring that does not.

E2-18

E13-18

IBC: 1006.2.2, (IFC[BE] 1006.2.2)

Proposed Change as Submitted

Proponent: Ed Kulik, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Building Code

Revise as follows

1006.2.2 Egress based on use. The numbers, types and locations of *exits* or access to *exits* shall be provided in the uses described in Sections 1006.2.2.1 through 1006.2.2.6.

Reason: The subsections of 1006.2.2 includes not only the number of exits and exit access doorways, but also requirements regarding the exit and exit access doors, types of exit access, and their locations. This provides clarity in the scoping of this section.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal is a clarification reminder of the scope of requirements included in the identified sections.

E13-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This addition provides clarity for the scoping of this section. (Vote: 13-1)

Assembly Action:

None

E13-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Gregory Keith, representing The Boeing Company (grkeith@mac.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1006.2.2 Egress based on use. The numbers, configuration and types and locations of components of exits or access to *exits* shall be provided in the uses described in Sections 1006.2.2.1 through 1006.2.2.6.

Commenter's Reason: The original proposal has merit, however the terminology is not consistent with Chapter 10 verbiage. Typically, Section 1006 addresses the required numbers of exits or exit access doorways. Section 1006.2.2 is titled Egress based on use and prescribes various means of egress design requirements for specified uses. The original proposal sought to clarify that fact. This public comment simply replaces some of the terminology with language typically used in Chapter 10. The word location has been replaced with the word configuration. Section 1007 deals with this issue and is titled Exit and exit access doorway configuration. This places the requirements in context and will assist in user comprehension. Also, the word types has been appropriately expanded to state types of components. Means of egress components are identified throughout Chapter 10 and several of these components are referenced in Section 1006.2.2. Approval of this public comment will provide more technically accurate verbiage thereby increasing user understanding and uniformity in the application of these provisions.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The public comment is editorial and will not affect the cost of design or construction.

E13-18

E15-18 Part I

PART 1 - IBC: 1006.2.2.2; (IFC[BE] 1006.2.2)

PART 2 - IMC: 1105.10 [BE] (New)

Proposed Change as Submitted

Proponent: Jeffrey Shapiro, representing International Institute of Ammonia Refrigeration (jeff.shapiro@intlcodeconsultants.com)

THIS IS A TWO PART CODE CHANGE. PART I WILL BE HEARD BY THE MEANS OF EGRESS COMMITTEE. PART II WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER OF THESE COMMITTEES.

2018 International Building Code

Revise as follows

1006.2.2.2 Refrigeration machinery rooms. Machinery rooms larger than 1,000 square feet (93 m²) shall have not less than two *exits* or *exit access doorways*. Where two *exit access doorways* are required, one such doorway is permitted to be served by a fixed ladder or an alternating tread device. *Exit access doorways* shall be separated by a horizontal distance equal to one-half the maximum horizontal dimension of the room.

All portions of machinery rooms shall be within 150 feet (45 720 mm) of an *exit* or *exit access doorway*. An increase in *exit access* travel distance is permitted in accordance with Section 1017.1.

Exit and *exit access doorways* shall swing in the direction of egress travel and shall be equipped with panic hardware, regardless of the *occupant load* served. *Exit* and *exit access doorways* shall be tight fitting and self-closing.

Reason: It is appropriate for refrigeration machinery rooms to have panic hardware on means of egress doors to protect occupants because of the risk of a rapid release of hazardous or asphyxiant gases. The need for rapid escape from refrigeration machinery rooms is not unlike what is needed for Group H Occupancies, which are required by Section 1010.1.10 to have panic hardware on all swinging doors. Likewise, IAR 2 includes this requirement for ammonia refrigeration machinery rooms.

It is also recommended that this section be duplicated in the IMC to ensure that the requirements are not overlooked by machinery room designers. The requirement in the IBC is not readily found as a refrigeration machinery room requirement since it is isolated in the means of egress chapter.

Cost Impact: The code change proposal will increase the cost of construction

For machinery rooms that would not already have been provided with panic hardware on means of egress doors, the requirement to have panic hardware will constitute an increased cost.

E15-18 Part I

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Adding panic hardware to refrigeration machinery rooms will improve safety for these rooms. There should be a public comment to add this to the list for panic hardware in Section 1010.1.10. (Vote: 14-0)

Assembly Action:

None

E15-18 Part I

Individual Consideration Agenda

Public Comment 1:

Proponent: Ed Kulik, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1010.1.10.1 Refrigeration machinery room Swinging doors in refrigeration machinery rooms, where required by Section 1006.2.2.2, shall not be provided with a latch or lock other than panic hardware or fire exit hardware.

Commenter's Reason: The formatting is to be consistent with E64-18 for panic hardware in electrical rooms. Panic hardware for electrical rooms in Section 1010.1.10 was moved into a new subsection. The new requirement for panic hardware in refrigeration machinery rooms should be addressed the same and included in Section 1010.10. This public comment is submitted by the ICC BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions there of. In 2017 and 2018 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes and public comments. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The modification is a pointer from the panic hardware section to the new section approved by the committee. The original proposal would add panic hardware in these spaces.

Public Comment 2:

Proponent: Timothy Pate, representing Colorado Chapter Code Change Committee (tpate@broomfield.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1010.1.10 Panic and fire exit hardware. Swinging doors serving a Group H occupancy and swinging doors serving rooms or spaces with an *occupant load* of 50 or more in a Group A or E occupancy shall not be provided with a latch or lock other than *panic hardware* or *fire exit hardware*.

Exceptions:

1. A main exit of a Group A occupancy shall be permitted to have locking devices in accordance with Section 1010.1.9.4, Item 2.
2. Doors provided with *panic hardware* or *fire exit hardware* and serving a Group A or E occupancy shall be permitted to be electrically locked in accordance with Section 1010.1.9.9 or ~~1010.1.9.10~~ 1010.1.9.10.

Electrical rooms with equipment rated 1,200 amperes or more and over 6 feet (1829 mm) wide, and that contain overcurrent devices, switching devices or control devices with exit or *exit access* doors, shall be equipped with *panic hardware* or *fire exit hardware*. The doors shall swing in the direction of egress travel.

Refrigeration machinery rooms larger than 1,000 square feet (93 m²) shall have not less than two exits or exit access doorways that swing in the direction of egress travel and are equipped with panic hardware or fire exit hardware.

Commenter's Reason: This proposed modification is to add a additional language in the code section that lists where you need panic hardware so code users will know that the requirement for panic hardware was added in the section for refrigeration machinery rooms.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This is to add language in separate section as a reminder of the new language in the original section

E15-18 Part I

E15-18 Part II

IMC: 1105.10 [BE]

Proposed Change as Submitted

Proponent: Jeffrey Shapiro, representing International Institute of Ammonia Refrigeration (jeff.shapiro@intlcodeconsultants.com)

2018 International Mechanical Code

Add new text as follows

1105.10 [BE] Means of egress. Machinery rooms larger than 1,000 square feet (93 m²) shall have not less than two exits or exit access doorways. Where two exit access doorways are required, one such doorway is permitted to be served by a fixed ladder or an alternating tread device. Exit access doorways shall be separated by a horizontal distance equal to one-half the maximum horizontal dimension of the room.

All portions of machinery rooms shall be within 150 feet (45 720 mm) of an exit or exit access doorway. An increase in exit access travel distance is permitted in accordance with Section 1017.1.

Exit and exit access doorways shall swing in the direction of egress travel and shall be equipped with panic hardware, regardless of the occupant load served. Exit and exit access doorways shall be tight fitting and self-closing.

Reason:

Cost Impact: The code change proposal will increase the cost of construction

E15-18 Part II

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval was based on the proponent's published reason statement. (Vote 11-0)

Assembly Action:

None

E15-18 Part II

E18-18

IBC: SECTION 1006.3, 1006.3.1, 1019.3 (IFC[BE] 1006.3, 1006.3.1, 1019.3)

Proposed Change as Submitted

Proponent: David Collins, representing The American Institute of Architects (dcollins@preview-group.com)

2018 International Building Code

SECTION 1006 NUMBER OF EXITS AND EXIT ACCESS DOORWAYS

1006.1 General. The number of *exits* or *exit access doorways* required within the *means of egress* system shall comply with the provisions of Section 1006.2 for spaces, including *mezzanines*, and Section 1006.3 for *stories* or occupied roofs.

Revise as follows

1006.3 Egress from stories or occupied roofs. The *means of egress* system serving any *story* or occupied roof shall be provided with the number of separate and distinct *exits* or access to *exits* based on the aggregate *occupant load* served in accordance with this section. ~~Where stairways serve more than one story, only the occupant load of each story considered individually shall be used in calculating the required number of exits or access to exits serving that story.~~

Add new text as follows

1006.3.1 Occupant load. Where stairways serve more than one story, or more than one story and an occupied roof, only the occupant load of each story or occupied roof, considered individually, shall be used in when calculating the required number of exits or access to exits serving that story.

Revise as follows

~~**1006.3.1-1006.3.2 Adjacent story-Path of egress travel.**~~ The path of egress travel to an *exit* shall not pass through more than one adjacent *story*.

Exception: The path of egress travel to an *exit* shall be permitted to pass through more than one adjacent *story* in any of the following:

1. In Group R-1, R-2 or R-3 occupancies, exit access stairways and *ramps* connecting four stories or less serving and contained within an individual dwelling unit, sleeping unit or live/work unit.
2. Exit access stairways serving and contained within a Group R-3 congregate residence or a Group R-4 facility.
3. Exit access stairways and ramps within an atrium comply with the provisions of Section 404.
4. Exit access stairways and *ramps* in open parking garages that serve only the parking garage.
- ~~5.4~~ Exit access stairways and *ramps* serving *open-air assembly seating* complying with the exit access travel distance requirements of Section 1029.7.
- ~~6.5~~ Exit access stairways and *ramps* between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, *places of religious worship*, auditoriums and sports facilities.
7. Exterior exit access stairways and ramps between occupied roofs.

~~**1006.3.2**~~**1006.3.3 Egress based on occupant load.** Each *story* and occupied roof shall have the minimum number of separate and distinct *exits*, or access to *exits*, as specified in Table 1006.3.2. A single *exit* or access to a single *exit* shall be permitted in accordance with Section 1006.3.3. The required number of *exits*, or *exit access stairways* or *ramps* providing access to *exits*, from any *story* or occupied roof shall be maintained until arrival at the *exit discharge* or a *public way*.

1019.3 Occupancies other than Groups I-2 and I-3. In other than Group I-2 and I-3 occupancies, floor openings containing *exit access stairways* or *ramps* that do not comply with one of the conditions *listed* in this section shall be enclosed with a shaft enclosure constructed in accordance with Section 713.

1. *Exit access stairways and ramps* that serve or atmospherically communicate between only two stories. Such interconnected stories shall not be open to other stories.
2. In Group R-1, R-2 or R-3 occupancies, *exit access stairways and ramps* connecting four stories or less serving and contained within an individual *dwelling unit or sleeping unit or live/work unit*.
3. *Exit access stairways* serving and contained within a Group R-3 congregate residence or a Group R-4 facility are not required to be enclosed.
4. *Exit access stairways and ramps* in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, where the area of the vertical opening between stories does not exceed twice the horizontal projected area of the *stairway or ramp* and the opening is protected by a draft curtain and closely spaced sprinklers in accordance with NFPA 13. In other than Group B and M occupancies, this provision is limited to openings that do not connect more than four stories.
5. *Exit access stairways and ramps* within an *atrium* complying with the provisions of Section 404.
6. *Exit access stairways and ramps* in *open parking garages* that serve only the parking garage.
7. *Exit access stairways and ramps* serving *smoke-protected or open-air assembly seating* complying with the *exit access* travel distance requirements of Section 1029.7.
8. *Exit access stairways and ramps* between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, *places of religious worship*, auditoriums and sports facilities.
9. Exterior exit access stairways or ramps between occupied roofs.

Reason: The title of this section includes stories and occupied roof, but the section gives no guidance regarding the occupied roof. This change will clarify the application of the provisions to an occupied roof and another story. As has been the practice, the occupant load of each story or with this change, the occupant load of the roof (which isn't a story) will be used to determine the required occupant load for the stair serving it.

In addition, the two exceptions will recognize an exit access stairway located in an atrium and an exit access stairway serving an occupied roof to pass through more than one story. This change will make it clear that a stair in an atrium that is NOT part of the means of egress is always acceptable and not limited to the one adjacent story criteria.

Cost Impact: The code change proposal will decrease the cost of construction. This change will simplify design decisions, review and approval of projects, reducing the cost of construction.

E18-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 1006.3.1 Occupant load. Where stairways serve more than one story, or more than one story and an occupied roof, only the occupant load of each story or occupied roof, considered individually, shall be used when calculating the required number of exits or access to exits serving that story.

1006.3.2 Path of egress travel. The path of egress travel to an exit shall not pass through more than one adjacent story.

Exception: The path of egress travel to an exit shall be permitted to pass through more than one adjacent story in any of the following:

In Group R-1, R-2 or R-3 occupancies, exit access stairways and ramps connecting four stories or less serving and contained within an individual dwelling unit, sleeping unit or live/work unit.

Exit access stairways serving and contained within a Group R-3 congregate residence or a Group R-4 facility.

Exit access stairways and ramps within an atrium comply with the provisions of Section 404.

Exit access stairways and ramps in open parking garages that serve only the parking garage.

Exit access stairways and ramps serving open-air assembly seating complying with the exit access travel distance requirements of Section 1029.7.

Exit access stairways and ramps between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, places of religious worship, auditoriums and sports facilities.

~~Exterior~~ Exit access stairways and ramps between serving occupied roofs.

1019.3 Occupancies other than Groups I-2 and I-3.

In other than Group I-2 and I-3 occupancies, floor openings containing *exit access stairways* or *ramps* that do not comply with one of the conditions *listed* in this section shall be enclosed with a shaft enclosure constructed in accordance with Section 713.

1. *Exit access stairways* and *ramps* that serve or atmospherically communicate between only two stories. Such interconnected stories shall not be open to other stories.
2. In Group R-1, R-2 or R-3 occupancies, *exit access stairways* and *ramps* connecting four stories or less serving and contained within an individual *dwelling unit* or *sleeping unit* or *live/work unit*.
3. *Exit access stairways* serving and contained within a Group R-3 congregate residence or a Group R-4 facility are not required to be enclosed.
4. *Exit access stairways* and *ramps* in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, where the area of the vertical opening between stories does not exceed twice the horizontal projected area of the *stairway* or *ramp* and the opening is protected by a draft curtain and closely spaced sprinklers in accordance with NFPA 13. In other than Group B and M occupancies, this provision is limited to openings that do not connect more than four stories.
5. *Exit access stairways* and *ramps* within an *atrium* complying with the provisions of Section 404.
6. *Exit access stairways* and *ramps* in *open parking garages* that serve only the parking garage.
7. *Exit access stairways* and *ramps* serving *smoke-protected* or *open-air assembly seating* complying with the *exit access travel distance* requirements of Section 1029.7.
8. *Exit access stairways* and *ramps* between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, *places of religious worship*, auditoriums and sports facilities.
9. ~~Exterior~~ Exit access stairways or ramps between serving occupied roofs.

Committee Reason: The modification to Section 1006.3.1 is an editorial correction for better English. The modification to Section 1006.3.2 will allow for the exit access stairways to move down from the occupied roof and into the building for means of egress from the roof. As a new exception, the exit access travel distance, not the number of stories, will be the limiting factor. Without the modification, Section 1006.3.2 Exception 7 would only be applicable if there were multiple roofs and it would limit the application to exterior exit access stairways.

This proposal separates out occupied roofs into a new Section 1006.3.1 which will clarify how egress is addressed for occupied roofs. There was no discussion on the new Exception 3 for Section 1006.3.2. (Vote: 9-5)

Individual Consideration Agenda

Public Comment 1:

Proponent: Lee Kranz, representing Washington Association of Building Officials Technical Code Development Committee (lkranz@bellevuewa.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

SECTION 1006 NUMBER OF EXITS AND EXIT ACCESS DOORWAYS

1006.1 General. The number of *exits* or *exit access doorways* required within the *means of egress* system shall comply with the provisions of Section 1006.2 for spaces, including *mezzanines*, and Section 1006.3 for *stories* or occupied roofs.

1006.3 Egress from stories or occupied roofs. The *means of egress* system serving any *story* or occupied roof shall be provided with the number of separate and distinct *exits* or access to *exits* based on the aggregate *occupant load* served in accordance with this section.

1006.3.1 Occupant load. Where stairways serve more than one story, or more than one story and an occupied roof, only the occupant load of each story or occupied roof, considered individually, shall be used when calculating the required number of exits or access to exits serving that story.

1006.3.2 Path of egress travel. The path of egress travel to an *exit* shall not pass through more than one adjacent *story*.

Exception: The path of egress travel to an *exit* shall be permitted to pass through more than one adjacent *story* in any of the following:

1. In Group R-1, R-2 or R-3 occupancies, exit access stairways and *ramps* connecting four stories or less serving and contained within an individual dwelling unit, sleeping unit or live/work unit.
2. Exit access stairways serving and contained within a Group R-3 congregate residence or a Group R-4 facility.
3. Exit access stairways and ramps within an atrium comply with the provisions of Section 404.
4. Exit access stairways and *ramps* in open parking garages that serve only the parking garage.
5. Exit access stairways and *ramps* serving *open-air assembly seating* complying with the exit access travel distance requirements of Section 1029.7.
6. Exit access stairways and *ramps* between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, *places of religious worship*, auditoriums and sports facilities.
7. ~~Exit access stairways and ramps serving occupied roofs.~~

1006.3.3 Egress based on occupant load. Each *story* and occupied roof shall have the minimum number of separate and distinct *exits*, or access to *exits*, as specified in Table 1006.3.2. A single *exit* or access to a single *exit* shall be permitted in accordance with Section 1006.3.3. The required number of *exits*, or *exit access stairways* or *ramps* providing access to *exits*, from any story or occupied roof shall be maintained until arrival at the *exit discharge* or a *public way*.

1019.3 Occupancies other than Groups I-2 and I-3. In other than Group I-2 and I-3 occupancies, floor openings containing *exit access stairways* or *ramps* that do not comply with one of the conditions *listed* in this section shall be enclosed with a shaft enclosure constructed in accordance with Section 713.

1. *Exit access stairways and ramps* that serve or atmospherically communicate between only two stories. Such interconnected stories shall not be open to other stories.
2. In Group R-1, R-2 or R-3 occupancies, *exit access stairways and ramps* connecting four stories or less serving and contained within an individual *dwelling unit or sleeping unit or live/work unit*.
3. *Exit access stairways* serving and contained within a Group R-3 congregate residence or a Group R-4 facility are not required to be enclosed.
4. *Exit access stairways and ramps* in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, where the area of the vertical opening between stories does not exceed twice the horizontal projected area of the *stairway or ramp* and the opening is protected by a draft curtain and closely spaced sprinklers in accordance with NFPA 13. In other than Group B and M occupancies, this provision is limited to openings that do not connect more than four stories.
5. *Exit access stairways and ramps* within an *atrium* complying with the provisions of Section 404.
6. *Exit access stairways and ramps* in *open parking garages* that serve only the parking garage.
7. *Exit access stairways and ramps* serving *smoke-protected or open-air assembly seating* complying with the *exit access* travel distance requirements of Section 1029.7.
8. *Exit access stairways and ramps* between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, *places of religious worship*, auditoriums and sports facilities.
9. ~~*Exit access stairways or ramps serving occupied roofs.*~~

Commenter's Reason: We have no objection to the new Exception 3 in Section 1006.3.2, and we agree with the grammatical edit to Section 1006.3.1. This public comment preserves those two features of the original code change proposal. However, we do not agree with the as-modified version of 1006.3.2.

The floor modification to Section 1006.3.2, changing "exterior exit access stairways or ramps between occupied roofs" to "exit access stairways and ramps serving occupied roofs" [emphasis ours] is flawed as it overly-broadened the scope of the original exception, and violated the intent of the charging language in 1006.3.2.

Section 1006.3.2 (in the new numbering scheme) essentially requires two enclosed exits be available in the adjacent story below, if a story is using an exit access stairway as its second means of egress. This principle has been debated in several cycles, and has been upheld by the membership despite several attempts to delete the requirement.

The as-modified exception will allow an occupied roof to be served only by one vertical exit enclosure, along with an unenclosed exit access stairway. For an office building, the unenclosed exit access stairway can pass through an unlimited number of stories. (An unlimited open exit access stairway is allowed in an M Occupancy, but a roof deck is not likely.) In the vast majority of cases, it is unlikely the exit travel distance down the unenclosed exit access stairway will be limited because exit travel distance is measured to the nearest exit—which will likely be the vertical exit enclosure.

Should this exception survive in the as-modified form, the next logical step would be deletion of the entire section in the next cycle. If an unoccupied roof is allowed to have one enclosed stair and one unenclosed stair as its means of egress, why require two enclosed stairs for any story? We believe this is a dangerous precedent to set, and ask for the membership's support in preventing any erosion of the principle stated above.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Corrects an egress issue created by a floor modification. There should be no impact on the cost of construction from the original proposal.

Public Comment 2:

Proponent: David Collins, representing The American Institute of Architects (dcollins@preview-group.com) requests As Submitted.

Commenter's Reason: As originally submitted I was simply trying to clarify in Sections 1006.3.2, exception 7 that if there were more than one occupied roof on a building that an exterior exit access stairways could be used for exit access off the roof(s). The modification, while originally seeming to be simple, complicated the exception by allowing the exit access stair from a roof to go any number of stories down through the building and not be limited by the "one adjacent story" limitation in the charging language since this is an exception.

That was not my intent and I do not believe it should be a part of this code change. Therefore I ask that the membership disapprove the change As Modified and instead approve it As Submitted.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

By not accepting the modification, the cost of construction will not be affected.

Public Comment 3:

Proponent: Jonathan Siu, City of Seattle Department of Construction and Inspections, representing City of Seattle Department of Construction and Inspections (jon.siu@seattle.gov) requests As Submitted.

Commenter's Reason: This public comment requests the proposal be returned to its originally-proposed text. Our main concern relates to the changes made by the Means of Egress Committee in Exception 7 to 1006.3.2 and Exception 9 to Section 1019.3. We fully support all of the language the proponent originally submitted. We do not support the Committee-approved floor modification submitted at the Committee Action Hearings in Columbus.

Once we had a chance to fully evaluate the effects of the modification introduced on the floor in Columbus and subsequently approved by the Committee, it became obvious to us that the modified text in the exceptions is not in keeping with the intent of the charging language in Section 1006.3.2, and sets a dangerous precedent.

The charging language in Section 1006.3.2 (using the numbering system proposed by this code change proposal) was originally introduced to prevent situations shown in Figure 1 below. This figure illustrates a multi-story building that has one (enclosed) interior exit stair and one (unenclosed) exit access stairway. Prior to the introduction of the code text in 1006.3.2, the code would have allowed this situation in a B or M occupancy. (Recall that in a B or M Occupancy, an unenclosed exit access stairway is not limited in height.)

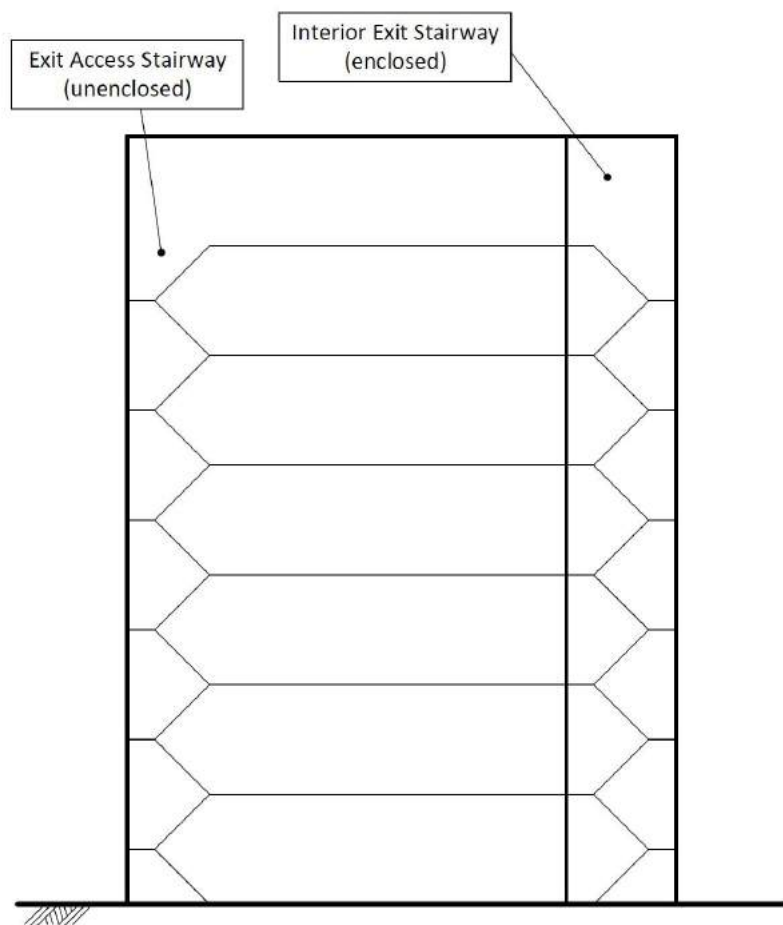


Fig. 1 – IBC Sec. 1006.3.2 prevents this configuration

Section 1006.3.2 essentially requires a path of egress to transition from an unenclosed exit access stairway to an interior exit stair within one story. Note that this principle of transitioning from an unenclosed exit access stairway to an (enclosed) interior exit stair in the adjacent story below was cited in the reason statement for Code Change Proposal E27-15, and was upheld by the Means of Egress Committee in Columbus in their disapproval of Code Change Proposal E20-18 by a 14-0 vote. The reason they gave for disapproval was, "The exceptions that permit the travel on exit access stairways to go more than one story were carefully considered. This should not be extended to stairways with draft curtains or atriums. This is too great of an opportunity for smoke migration within high rise buildings."

However, this proposal with the floor modification approved by the Committee would allow a similar, dangerous situation for a roof deck, as shown in Figure 2. This figure depicts a multi-story building with an occupied roof. All stories have access to the two interior exit stairs. The occupied roof is served by an interior exit stair (on the right), and an unenclosed exit access stairway. Because the modification introduced on the floor at the Committee Action Hearings in Columbus exempts stairs serving an occupied roof from the shall not pass through more than one adjacent story restriction, this means that the unenclosed exit access stairway is not required to transition to the enclosed exit stair on the left of the figure at the uppermost story. That is, the exit access stair could be isolated from the second enclosed exit stair. This is a dangerous precedent to set, as one could argue if an unenclosed exit access stairway of unlimited height (in a B or M occupancy) is allowed to be the second means of egress for an occupied roof, why should there be any restriction on using the same arrangement for a story?

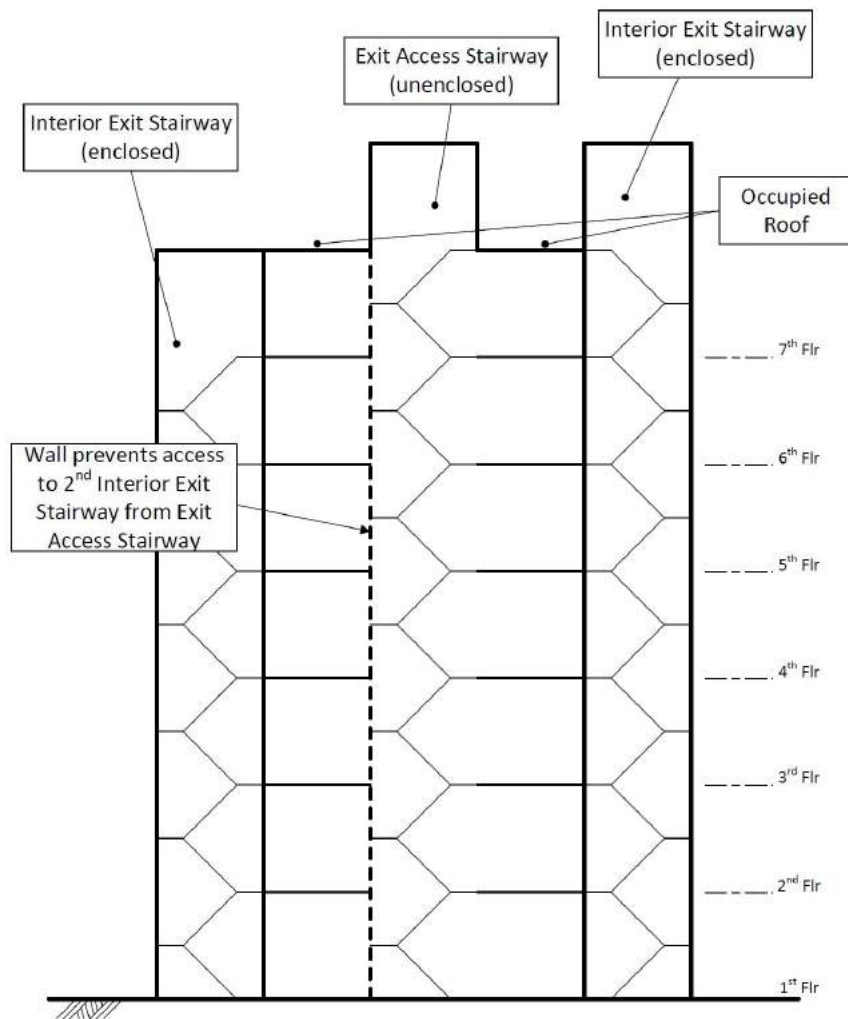


Fig. 2 - E18-18 As Modified – Occupied Roof Served by Exit Access Stairway

This is not a hypothetical issue, as we in Seattle have recently seen several applications for high rise office building tenants sporting unenclosed convenience stairs extending as many as 10 or 12 stories through the building. In those buildings, it can easily be conceived that the convenience stairs would become the only second means of egress for all the stories they serve. Extending the concept of unenclosed stairs serving an occupied roof to these stories would be done in a heartbeat, if this as-modified proposal were to survive.

This public comment returns to the originally proposed text of Section 1006.3.2, Exception 7, and Section 1019.3, Exception 9, and keeps them in alignment. We believe the proponent of the original code change had a legitimate issue that is addressed with his proposed language. There are cases of buildings with multiple roof levels with roof decks (Figure 3), or roofs with multiple levels of roof decks (Figure 4) where an exterior stair connecting the occupied roofs need not count toward the one adjacent story, as smoke will not accumulate at those levels.

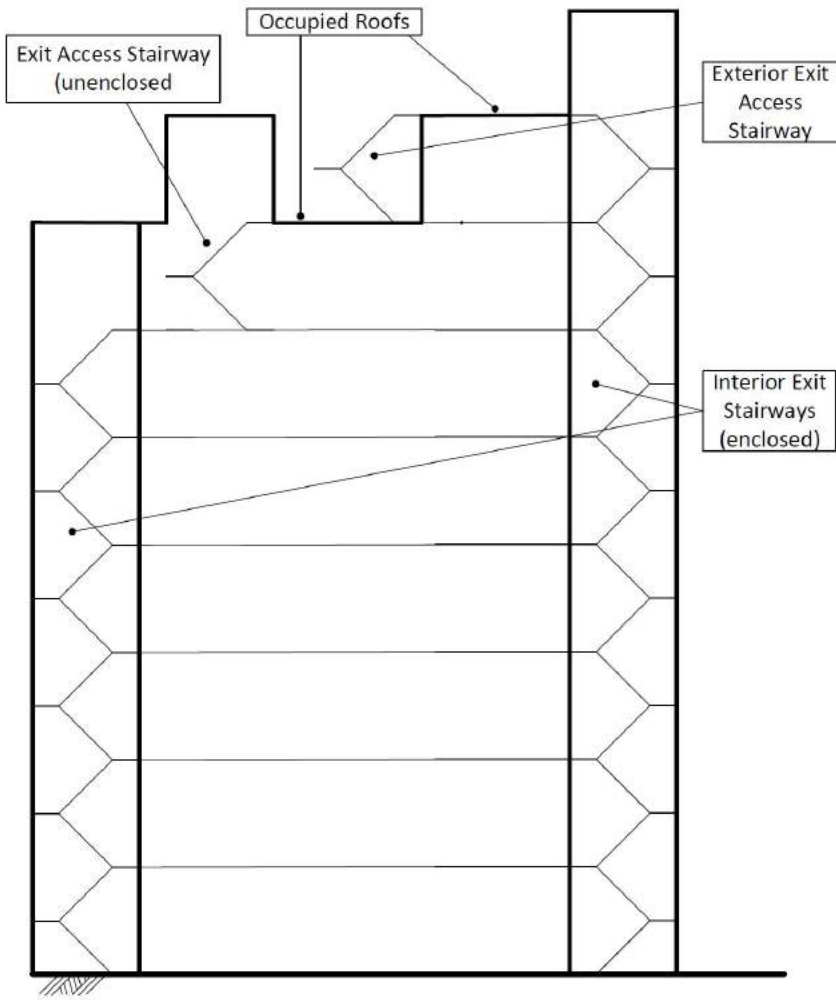


Fig. 3 - E18-18 As Submitted – Decks on Different Roof Levels

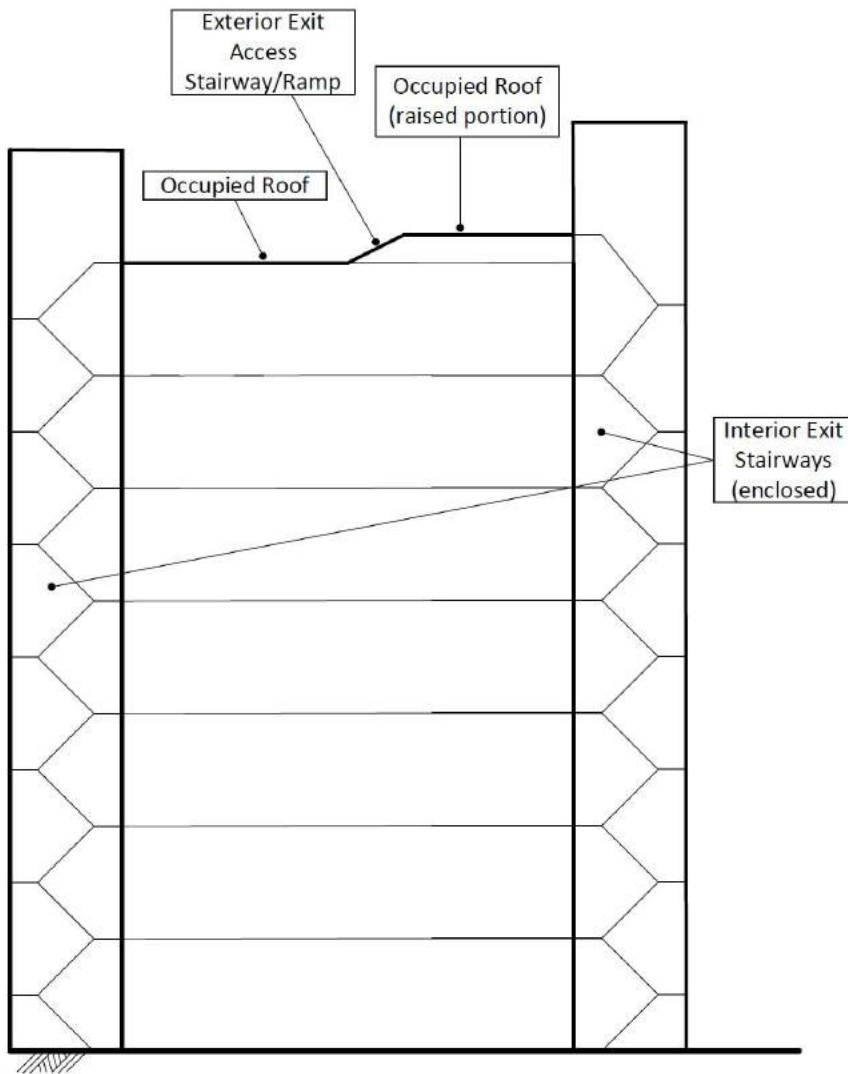


Fig. 4 - E18-18 As Submitted – Decks on Same Roof Level

We urge the ICC Governmental Voting Representatives to continue your support of the current requirements, and support this proposal As Submitted (AS). The current As Modified (AM) status cannot be allowed to carry into the 2021 IBC.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. Since this public comment returns the substantive portions of the proposal to its As Submitted status, the cost impact statement is unchanged from the statement submitted with the original code change proposal: "This change will simplify design decisions, review and approval of projects, reducing the cost of construction."

E18-18

E20-18

IBC: 1006.3.1, (IFC[BE] 1006.3.1)

Proposed Change as Submitted

Proponent: Ed Kulik, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Building Code

1006.3 Egress from stories or occupied roofs. The *means of egress* system serving any *story* or occupied roof shall be provided with the number of separate and distinct *exits* or access to *exits* based on the aggregate *occupant load* served in accordance with this section. Where *stairways* serve more than one *story*, only the *occupant load* of each *story* considered individually shall be used in calculating the required number of *exits* or access to *exits* serving that *story*.

Delete without substitution

~~**1006.3.1 Adjacent story.** The path of egress travel to an *exit* shall not pass through more than one adjacent *story*.~~

~~**Exception:** The path of egress travel to an *exit* shall be permitted to pass through more than one adjacent *story* in any of the following:~~

- ~~1. In Group R-1, R-2 or R-3 occupancies, exit access stairways and ramps connecting four stories or less serving and contained within an individual dwelling unit, sleeping unit or live/work unit.~~
- ~~2. Exit access stairways serving and contained within a Group R-3 congregate residence or a Group R-4 facility.~~
- ~~3. Exit access stairways and ramps in open parking garages that serve only the parking garage.~~
- ~~4. Exit access stairways and ramps serving open air assembly seating complying with the exit access travel distance requirements of Section 1029.7.~~
- ~~5. Exit access stairways and ramps between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, places of religious worship, auditoriums and sports facilities.~~

Reason: The current list of exceptions allows for exit access stairways within 5 of the 8 options to use travel distance without a story limitation (individual dwelling units (#2), Group R-3 and R-4 congregate residences (#3), open parking garages (#6), open air seating (#7) and balconies (#8)). The 3 options currently limited to one story are the 2 story configuration (#1), water curtains around stairways opening (#4) and atriums (#5). These exceptions were added to the code by E27-15.

Travel distance, rather than stories should be the controlling factor. There would be no impact on two story configurations. Deletion of the requirement would allow for exit access travel distance to be measured down the open exit access stairway, regardless of the number of stories. This would now include open exit access stairways that use water curtains around stairways opening (#4) and atriums with smoke protection (#5). With the removal of the limitation for one story, none of the exceptions are needed.

This would be consistent with the BCAC proposal to revise measurement for travel distance along open exit access stairways in atriums.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>.

Cost Impact: The code change proposal will decrease the cost of construction

This will reduce the cost in those situations where an enclosure would have been required for the stairway in buildings with more than two stories.

E20-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The exceptions that permit the travel on exit access stairways to go more than one story were carefully considered. This should not be extended to stairways with draft curtains or atriums. This is too great of an opportunity for smoke migration within high rise buildings. (Vote: 14-0)

Assembly Action:

None

E20-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Sarah Rice, representing Himself (srice@preview-group.com); Stephen Thomas, Colorado Code Consulting, LLC (sthomas@coloradocode.net); Wayne Jewell (wayne.jewell@greenoaktwp.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

1006.3.1 Adjacent story. The path of egress travel to an *exit* shall not pass through more than one adjacent *story*.

~~Exception~~Exceptions:

1. The path of egress travel to an *exit* shall be permitted to pass through more than one adjacent *story* in any of the following:

~~1.1.1.~~In Group R-1, R-2 or R-3 occupancies, exit access stairways and *ramps* connecting four stories or less serving and contained within an individual dwelling unit, sleeping unit or live/work unit.

~~2.1.2.~~Exit access stairways serving and contained within a Group R-3 congregate residence or a Group R-4 facility.

~~3.1.3.~~Exit access stairways and *ramps* in open parking garages that serve only the parking garage.

~~4.1.4.~~Exit access stairways and *ramps* serving *open-air assembly seating* complying with the exit access travel distance requirements of Section 1029.7.

~~5.1.5.~~Exit access stairways and *ramps* between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, *places of religious worship*, auditoriums and sports facilities.

2. The path of egress travel shall be permitted to pass through not more than three stories where not less than two exits can be entered within the exit access travel distances specified in Section 1017.2.

Commenter's Reason: The one story limitation for egress to an exit via an exit access stair/ramp was introduced in the 2012 IBC via Code Change E5-09/10, from the ICC Code Technology Committee. As the concept of allowing access to another exit via an exit access stair was previously limited to 2 stories in the 2009 IBC, it was consistent to incorporate that limitation. But as communities have fully embraced and adopted the 2012, 2015 and now the 2018 IBC and the design community is looking to utilize this design options, the constraints of trying to fully use the 1-story limitation are becoming visible. This is confirmed by the submittal of the code change itself - in that it has been brought forth by the ICC Building Code Action Committee (BCAC) which is comprised of a very knowledgeable group of enforcement official, industry representatives and code uses.

We the proponents agree with the BCAC that the 1-story limitation is too restrictive, but we feel that not having a limitation is too extreme. Our proposed modification seeks to allow the use of exit access stairs/ramps to access an exit on another story with 1) a three (3) story limit, and 2) a requirement that at least 2 exits be located within the exit access travel distances specified in Section 1017.

We reviewed the code related provisions to the location of exits (i.e., exit access travel distance), the enclosure of exits (i.e., fire rating) and for the protection methods required of exit access stairs in Section 1019.1 (i.e., configuration limits, draft curtains and closely spaced sprinklers). As the overarching requirement associated with the means of egress for a building is that an occupant can get to a protected location in the exit access travel distances in Section 1017, we examined how it can be complied with when both a horizontal and vertical path is available. We feel that the protection

method afforded a 3-story exit access stair using Item 4 in Section 1019.1 combined with the mandate that an occupant must be able to reach a minimum of 2 exits within the exit access travel distance specified in Section 1017 affords the intended safety to the building occupants and ask that you support this modification.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. The implementation of the concept outlined in this proposal will not increase the cost of construction, but may decrease the cost of construction.

E20-18

E21-18

IBC: 1006.3.1, (IFC[BE] 1006.3.1)

Proposed Change as Submitted

Proponent: Gregory Keith, representing The Boeing Company (grkeith@mac.com); Douglas Evans, representing DHE FPE LLC (dhefpe@gmail.com)

2018 International Building Code

Delete and substitute as follows

~~**1006.3.1 Adjacent story.** The path of egress travel to an exit shall not pass through more than one adjacent story.~~

~~**Exception:** The path of egress travel to an exit shall be permitted to pass through more than one adjacent story in any of the following:~~

- ~~1. In Group R-1, R-2 or R-3 occupancies, exit access stairways and ramps connecting four stories or less serving and contained within an individual dwelling unit, sleeping unit or live/work unit.~~
- ~~2. Exit access stairways serving and contained within a Group R-3 congregated residence or a Group R-4 facility.~~
- ~~3. Exit access stairways and ramps in open parking garages that serve only the parking garage.~~
- ~~4. Exit access stairways and ramps serving open air assembly seating complying with the exit access travel distance requirements of Section 1029.7.~~
- ~~5. Exit access stairways and ramps between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, places of religious worship, auditoriums and sports facilities.~~

1006.3.1 Access to exits at other levels. In other than Group I-2 and I-3 occupancies, access to exits at other building levels utilizing unenclosed exit access stairways and ramps shall be permitted. Such exit access stairways and ramps shall comply with one or more of the conditions listed in Section 1019.3. Regardless of the number of stories permitted to be served by the unenclosed exit access stairway or ramp, the exit access travel distance to the entrance to an exit shall not exceed the limitations set forth in Section 1017.2.

Reason:

This was the original intent of the ICC Code Technology Committee proposal E5-09/10 that was approved for the 2015 edition of the IBC. The logic was to allow the long established vertical opening exceptions to stand on their own merit. If these specific conditions have been deemed to provide acceptable fire migration limits, it stands to reason that exit access travel distance may occur within those tenable environments.

However, a separate proposal overlaid the E5 provisions in Section 1006.3 by limiting path of egress travel to an exit only from an adjacent level. This effectively rendered the CTC methodology as moot.

Realizing that the single adjacent story provision was overly restrictive and did not recognize former exit access provisions, five exceptions to the adjacent story requirement were created for the 2018 edition based on the conditions contained in Section 1019.3. Inexplicably, only five of the eight conditions were referenced.

This proposal completes the correction by eliminating the base restriction and the five accompanying exceptions. In doing so, it returns to the original CTC methodology and recognizes all empirical Section 1019.3 fire migration scenarios that have been contained in the IBC and legacy codes for decades. Additionally, it describes the procedure for determining how to access exits at other stories by way of exit access stairways or ramps. Approval of this proposal will allow for the more flexible design of the exit access portion of the means of egress system and achieve more consistent interpretations of the provision.

Cost Impact: The code change proposal will decrease the cost of construction. The proposal will allow for access to exits by unenclosed exit access stairways in atriums and buildings with specifically protected vertical openings.

Staff Note: Section 1006.3.1 was added to the 2018 IBC by code proposal E27-15.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The exceptions that permit the travel on exit access stairways to go more than one story were carefully considered. This should not be extended to stairways with draft curtains or atriums as permitted in Section 1019. This is too great of an opportunity for smoke migration within high rise buildings. The additional language adds no additional information. Disapproval would be consistent with the committee action on E20. (Vote: 14-0)

Assembly Action:

None

E21-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Gregory Keith, representing DHE FPE LLC (grkeith@mac.com); Douglas Harold Evans, DHE FPE LLC, representing DHE FPE LLC (dhefpe@gmail.com)requests As Submitted.

Commenter's Reason: Item E21-18 was intended to clarify provisions for access to exits at other levels and to make those provisions consistent with Section 1019.3 that permits unenclosed exit access stairways and ramps. The committee disapproved the proposal citing that Section 1019.3, Conditions 4 and 5 were potentially unsafe. In the committee's reason statement they noted that, "This should not be extended to stairways with draft curtains or atriums as permitted in Section 1019. This is too great of an opportunity for smoke migration in high rise buildings." The fact of the matter is that all of the conditions listed in Section 1019.3 have been long recognized as providing acceptable levels of control of smoke migration. Indeed, Conditions 4 and 5 were provisions that were permitted by all of the legacy codes for numerous decades. To now arbitrarily question their efficacy is inappropriate. There has been no life loss history resulting from the design conditions in question. Additionally, the committee should be reminded that the proposal limits occupant exposure within those areas based on the allowable travel distance. Regardless of the smoke migration potential, a given occupant will be limited to less than two minutes of travel time based on the permitted exit access travel distance. The committee thinking is also inconsistent in that they regard access to an exit within an atrium as a risk, yet at Item E96-18 they voted to retain Exception 2 to Section 1023.2 which permits an unenclosed stairway within an atrium (high rise or otherwise) to serve as a formal exit.

The concept of accessing exits at other building levels by way of exit access stairways was formalized in the International Code Council, Code Technology Committee's proposal E5-09/10. That proposal recognized that there were a number of currently permitted design conditions that allowed for vertical openings greater than a simple adjacent story. All of the conditions cited at Section 1019.3 are frequently utilized in building design and have been empirically validated for decades. The premise of the CTC Means of Egress Committee was that if a given opening was currently permitted based on fire and smoke migration concerns, it should be safe to allow for exit access travel in such areas within applicable exit access travel distance limitations.

The ICC Building Code Action Committee agrees with this approach. They submitted two proposals (E19-18 and E20-18) which accomplished essentially the same technical end as E21-18. The committee disapproved both of those proposals citing the same smoke development concerns. This public comment supports Item E21-18. E21 is preferred because it states the prescribed design conditions associated with the use of exit access stairways to access exits at other building levels so as to enhance user comprehension and uniformity of application. Included is the requirement that such exit access stairway or ramp meets one of the specific conditions detailed at Section 1019.3. Also, it stipulates that exit access travel on such stairways or ramps shall not exceed the limitations of Section 1017.2.

This concept has been well studied and supported by the ICC CTC and BCAC for almost a decade. This public comment will cause that vision to finally become reality. The lack of pertinent life loss history indicates that access to exits at other building levels in accordance with this public comment will be safe for building occupants.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This proposal will allow for access to exits by unenclosed exit access stairways and ramps in atriums and buildings with specifically protected vertical openings.

E21-18

E22-18

IBC: SECTION TABLE 1006.3.2, TABLE 1006.3.3(1), TABLE 1006.3.3(2), (IFC[BE] TABLE 1006.3.2, TABLE 1006.3.3(1), TABLE 1006.3.3(2))

Proposed Change as Submitted

Proponent: Ed Kulik, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Building Code

Revise as follows

SECTION 1006 NUMBER OF EXITS AND EXIT ACCESS DOORWAYS

1006.3 Egress from stories or occupied roofs. The *means of egress* system serving any *story* or occupied roof shall be provided with the number of separate and distinct *exits* or access to *exits* based on the aggregate *occupant load* served in accordance with this section. Where *stairways* serve more than one *story*, only the *occupant load* of each *story* considered individually shall be used in calculating the required number of *exits* or access to *exits* serving that *story*.

1006.3.2 Egress based on occupant load. Each *story* and occupied roof shall have the minimum number of separate and distinct *exits*, or access to *exits*, as specified in Table 1006.3.2. A single *exit* or access to a single *exit* shall be permitted in accordance with Section 1006.3.3. The required number of *exits*, or *exit access stairways* or *ramps* providing access to *exits*, from any *story* or occupied roof shall be maintained until arrival at the *exit discharge* or a *public way*.

**TABLE 1006.3.2
MINIMUM NUMBER OF EXITS OR ACCESS TO EXITS PER STORY OR OCCUPIED ROOF**

OCCUPIED LOAD PER STORY	MINIMUM NUMBER OF EXITS OR ACCESS TO EXITS FROM PER STORY <u>OR OCCUPIED ROOF</u>
1-500	2
501-1,000	3
More than 1,000	4

1006.3.3 Single exits. A single *exit* or access to a single *exit* shall be permitted from any *story* or occupied roof where one of the following conditions exists:

1. The *occupant load*, number of *dwelling units* and common path of egress travel distance do not exceed the values in Table 1006.3.3(1) or 1006.3.3(2).
2. Rooms, areas and spaces complying with Section 1006.2.1 with *exits* that discharge directly to the exterior at the *level of exit discharge*, are permitted to have one *exit* or access to a single *exit*.
3. Parking garages where vehicles are mechanically parked shall be permitted to have one *exit* or access to a single *exit*.
4. Group R-3 and R-4 occupancies shall be permitted to have one *exit* or access to a single *exit*.
5. Individual single-story or multistory *dwelling units* shall be permitted to have a single *exit* or access to a single *exit* from the *dwelling unit* provided that both of the following criteria are met:
 - 5.1. The *dwelling unit* complies with Section 1006.2.1 as a space with one *means of egress*.
 - 5.2. Either the exit from the *dwelling unit* discharges directly to the exterior at the *level of exit discharge*, or the *exit access* outside the *dwelling unit's* entrance door provides access to not less than two *approved independent exits*.

TABLE 1006.3.3(1)
STORIES AND OCCUPIED ROOFS WITH ONE EXIT OR ACCESS TO ONE EXIT FOR R-2 OCCUPANCIES

STORY AND OCCUPIED ROOF	OCCUPANCY	MAXIMUM NUMBER OF DWELLING UNITS	MAXIMUM COMMON PATH OF EGRESS TRAVEL DISTANCE
Basement, first, second or third story above grade plane	R-2 ^{a, b}	4 dwelling units	125 feet
<u>Occupied roof over the first, second or third story above grade plane</u>	R-2 ^{a, b}	NA	<u>125 feet</u>
Fourth story above grade plane and higher	NP	NA	NA

For SI: 1 foot = 3048 mm.

NP = Not Permitted.

NA = Not Applicable.

- a. Buildings classified as Group R-2 equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with *emergency escape and rescue openings* in accordance with Section 1030.
- b. This table is used for R-2 occupancies consisting of *dwelling units*. For R-2 occupancies consisting of *sleeping units*, use Table 1006.3.3(2).

TABLE 1006.3.3(2)
STORIES AND OCCUPIED ROOFS WITH ONE EXIT OR ACCESS TO ONE EXIT FOR OTHER OCCUPANCIES

STORY AND OCCUPIED ROOF	OCCUPANCY	MAXIMUM OCCUPANT LOAD PER STORY AND OCCUPIED ROOF	MAXIMUM COMMON PATH OF EGRESS TRAVEL DISTANCE (feet)
<u>First story above or below grade plane and occupied roofs over the first story above grade plane</u>	A, B ^b , E F ^b , M, U	49	75
	H-2, H-3	3	25
	H-4, H-5, I, R-1, R-2 ^{a, c}	10	75
	S ^{b, d}	29	75
<u>Second story above grade plane and occupied roof over the second story above grade plane</u>	B, F, M, S ^d	29	75
Third story above grade plane and higher	NP	NA	NA

For SI: 1 foot = 304.8 mm.

NP = Not Permitted.

NA = Not Applicable.

- a. Buildings classified as Group R-2 equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with *emergency escape and rescue openings* in accordance with Section 1030.
- b. Group B, F and S occupancies in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or on the roof of such buildings shall have a maximum *exit access* travel distance of 100 feet.
- c. This table is used for R-2 occupancies consisting of *sleeping units*. For R-2 occupancies consisting of *dwelling units*, use Table 1006.3.3(1).
- d. The length of *exit access* travel distance in a Group S-2 *open parking garage* shall be not more than 100 feet.

Reason: This is part of a series of 3 proposals dealing with occupied roofs. See BCAC proposals to the definition of penthouse and Section 1009.

The change to the title and heading in Table 1006.3.2 is for consistency with the text.

The proposed modifications to Section 1006 includes adding 'occupied roofs' to Table 1006.3.3(1) to clarify the conditions in which one exit or access to one exit is allowed for Group R-2 occupancies. The tables are modified to clarify that the occupied roofs are allowed 'over the allowable stories.'

Similarly this proposal adds 'occupied roofs' to Table 1006.3.3(2) to clarify the conditions in which one exit or access to one exit is allowed for the other occupancies. The table was also modified to clarify that the occupied roofs are allowed 'over the allowable stories.' A proposed modification to footnote b of the table clarifies that the allowable increase in exit access travel distance from 75 feet to 100 feet for properly sprinklered Group B, F and S occupancies also includes the roof area for these uses.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal provides clarification to a subject that was not previously addressed. The changes to the single occupant tables could allow for one exit stairway from an occupied roof instead of two.

E22-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Where an occupied roof can have a single exit is an issue that needs to be addressed, however, in Table 1006.3.3(1) and 1006.3.3(2) the proposal would allow a single exit roof over what was previously allowed as a single exit story. The roof should be treated as a story and limited as such for a single exit - match the current allowed height rather than exceed the current height limits. (Vote: 9-5)

Assembly Action:

None

E22-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ed Kulik, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

**TABLE 1006.3.3(1)
STORIES AND OCCUPIED ROOFS WITH ONE EXIT OR ACCESS TO ONE EXIT FOR R-2 OCCUPANCIES**

STORY AND OCCUPIED ROOF	OCCUPANCY	MAXIMUM NUMBER OF DWELLING UNITS	MAXIMUM COMMON PATH OF EGRESS TRAVEL DISTANCE
Basement, first, or second or third story above grade plane	R-2 ^{a, b}	4 dwelling units	125 feet
Occupied roof over the first, second or third story above grade plane	R-2 ^{a, b}	NA	125 feet
Fourth <u>story above grade plane and higher</u>	NP	NA	NA
<u>Occupied roof over third story above grade plane and higher</u>	<u>NP</u>	<u>NA</u>	<u>NA</u>

For SI:

1 foot = 3048 mm.

NP = Not Permitted.

NA = Not Applicable.

a. Buildings classified as Group R-2 equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with *emergency escape and rescue openings* in accordance with Section 1030.

b. This table is used for R-2 occupancies consisting of *dwelling units*. For R-2 occupancies consisting of *sleeping units*, use Table 1006.3.3(2).

**TABLE 1006.3.3(2)
STORIES AND OCCUPIED ROOFS WITH ONE EXIT OR ACCESS TO ONE EXIT FOR OTHER OCCUPANCIES**

STORY AND OCCUPIED ROOF	OCCUPANCY	MAXIMUM OCCUPANT	LOAD PER STORY AND OCCUPIED ROOF
First story above or below grade plane and occupied roofs over the first story above grade plane	A, B ^b , E F ^b , M, U	49	75
	H-2, H-3	3	25
	H-4, H-5, I, R-1, R-2 ^{a, c}	10	75
	S ^{b, d}	29	75
Second story above grade plane and occupied roof over the second story above grade plane	B, F, M, S ^d	29	75
Third story above grade plane and higher	NP	NA	NA

For SI:

1 foot = 304.8 mm.

NP = Not Permitted.

NA = Not Applicable.

a. Buildings classified as Group R-2 equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with *emergency escape and rescue openings* in accordance with Section 1030.

b. Group B, F and S occupancies in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or on the occupied roof of such buildings shall have a maximum *exit access* travel distance of 100 feet.

c. This table is used for R-2 occupancies consisting of *sleeping units*. For R-2 occupancies consisting of *dwelling units*, use Table 1006.3.3(1).

d. The length of *exit access* travel distance in a Group S-2 *open parking garage* shall be not more than 100 feet.

Commenter's Reason: Per Section 1006.3, and occupied roof is treated as a story for purposes of means of egress. The change to Table 1006.3.2 is needed for consistency with that text.

The revisions for the single exit tables is to clarify where a single exit is permitted from an occupied roof. The original proposal allowed for a single exit roof over any single exit story. The modification would allow for a single exit roof above a single story building since that is the same vertical travel distance as permitted for a basement. The upper limit for two and three story buildings has been revised to only allow for a single exit roof at the same height as currently permitted for a single exit story.

The revisions to the footnotes under Table 1006.3.3(2) is for consistent language.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This proposal provides clarification to a subject that was not previously addressed. The changes to the single occupant tables could allow for one exit stairway from an occupied roof instead of two.

E24-18

IBC: 1006.3.3, TABLE 1006.3.3(1), TABLE 1006.3.3(2), (IFC[BE] 1006.3.3, TABLE 1006.3.3(1), TABLE 1006.3.3(2))

Proposed Change as Submitted

Proponent: Ed Kulik, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Building Code

Revise as follows

1006.3.3 Single exits. A single *exit* or access to a single *exit* shall be permitted from any *story* or occupied roof where one of the following conditions exists:

1. The *occupant load*, number of *dwelling units* and ~~common path of egress~~ exit access travel distance do not exceed the values in Table 1006.3.3(1) or 1006.3.3(2).
2. Rooms, areas and spaces complying with Section 1006.2.1 with *exits* that discharge directly to the exterior at the *level of exit discharge*, are permitted to have one *exit* or access to a single *exit*.
3. Parking garages where vehicles are mechanically parked shall be permitted to have one *exit* or access to a single *exit*.
4. Group R-3 and R-4 occupancies shall be permitted to have one *exit* or access to a single *exit*.
5. Individual single-story or multistory *dwelling units* shall be permitted to have a single *exit* or access to a single *exit* from the *dwelling unit* provided that both of the following criteria are met:
 - 5.1. The *dwelling unit* complies with Section 1006.2.1 as a space with one *means of egress*.
 - 5.2. Either the exit from the *dwelling unit* discharges directly to the exterior at the *level of exit discharge*, or the *exit access* outside the *dwelling unit's* entrance door provides access to not less than two *approved independent exits*.

**TABLE 1006.3.3(1)
STORIES WITH ONE EXIT OR ACCESS TO ONE EXIT FOR R-2 OCCUPANCIES**

STORY	OCCUPANCY	MAXIMUM NUMBER OF DWELLING UNITS	MAXIMUM COMMON PATH OF EGRESS- <u>EXIT ACCESS</u> TRAVEL DISTANCE
Basement, first, second or third story above grade plane	R-2 ^{a, b}	4 dwelling units	125 feet
Fourth story above grade plane and higher	NP	NA	NA

For SI: 1 foot = 3048 mm.

NP = Not Permitted.

NA = Not Applicable.

- a. Buildings classified as Group R-2 equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with *emergency escape and rescue openings* in accordance with Section 1030.
- b. This table is used for R-2 occupancies consisting of *dwelling units*. For R-2 occupancies consisting of *sleeping units*, use Table 1006.3.3(2).

**TABLE 1006.3.3(2)
STORIES WITH ONE EXIT OR ACCESS TO ONE EXIT FOR OTHER OCCUPANCIES**

STORY	OCCUPANCY	MAXIMUM OCCUPANT LOAD PER STORY	MAXIMUM COMMON PATH OF EGRESS EXIT ACCESS TRAVEL DISTANCE (feet)
First story above or below grade plane	A, B ^b , E F ^b , M, U	49	75
	H-2, H-3	3	25
	H-4, H-5, I, R-1, R-2 ^{a, c}	10	75
	S ^{b, d}	29	75
Second story above grade plane	B, F, M, S ^d	29	75
Third story above grade plane and higher	NP	NA	NA

For SI: 1 foot = 304.8 mm.

NP = Not Permitted.

NA = Not Applicable.

- a. Buildings classified as Group R-2 equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with *emergency escape and rescue openings* in accordance with Section 1030.
- b. Group B, F and S occupancies in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 shall have a maximum *exit access* travel distance of 100 feet.
- c. This table is used for R-2 occupancies consisting of *sleeping units*. For R-2 occupancies consisting of *dwelling units*, use Table 1006.3.3(1).
- d. The length of *exit access* travel distance in a Group S-2 *open parking garage* shall be not more than 100 feet.

Reason: There is a conflict in terminology used for single exit criteria for stories/buildings in the IBC Section/Tables 1006.3.3 and IEBC Section/Tables 805.3.1.1. The intent of this proposal is a clarification, without technical revisions. Below is the definition for common path of egress travel and exit access and a graphic from the IBC commentary illustrating the terms. Single exit stories/buildings cannot have a common path of egress travel since two exits are not required. The correct term is “exit access travel distance”. This would match the terminology in the column headings for single exit tables with the footnotes for the single exit tables in the IBC and the table heading and footnotes in the IEBC.

If you look at the history for the single exit tables, until the reorganization that combined single exit spaces and stories, the term used was ‘exit access travel distance.’

With the text incorrectly used in IBC Section 1006.3.3, it could be interpreted that the travel distance has to be to a place where there are two exits - which is on the ground floor - regardless if the stairway is an exit access or exit stairway. Exit access travel distance should stop at the door to the exit stairway.

COMMON PATH OF EGRESS TRAVEL. That portion of the *exit access* travel distance measured from the most remote point within a *story* to that point where the occupants have separate access to two *exits* or *exit access* doorways.

EXIT ACCESS. That portion of a *means of egress* system that leads from any occupied portion of a building or structure to an *exit*.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>.

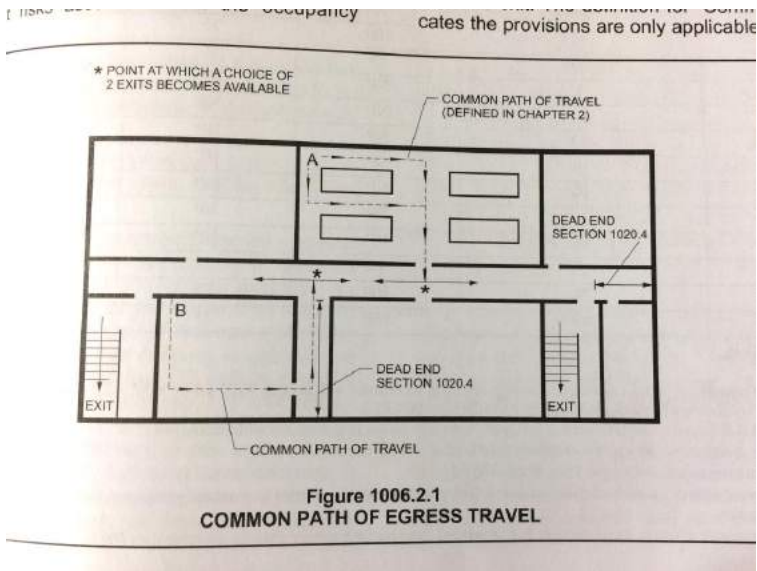


Figure 1006.2.1 from IBC Commentary

Cost Impact: The code change proposal will not increase or decrease the cost of construction
As the proposal essentially provides clarification to a subject that has created confusion.

E24-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This is a good clarification for a point that has been confusing users of the codes. "Common path of travel" is not the correct term for single exit conditions - it is for two exit conditions. "Exit access" is the correct term for single exit buildings and stories. This will coordinate the terminology in the table with the current footnotes and similar sections in the IEBC. (Vote: 11-3)

Assembly Action:

None

E24-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Gregory Keith, representing The Boeing Company (grkeith@mac.com) requests Disapprove.

Commenter's Reason: IBC common path of egress travel provisions have evolved over many code development cycles. Those provisions are currently comprehensive, understandable and uniformly applied. E24-18 which was approved by a vote of 11-3 represents a technical departure from current provisions. In the published reason statement justifying approval, the committee stated, "This is a good clarification for a point that has been confusing users of the codes." Perceived confusion results when current requirements are compared to former legacy code provisions. The reason statement continues, "Common path of travel is not the correct term for single exit conditions--it is for two exit conditions. Exit access is the correct term for single exit buildings and stories."

Presently, Section 1006.3.3 text and tables reference common path of egress travel as a qualifying criterion for the determination of multi-exit stories. Section 1006.3.3 establishes the single exit design condition as the default. Proposal E24-18 substitutes the term exit access travel distance in lieu of common path of egress travel for the previously stated reason. The proposal and its logic are severely flawed. In the published justification for approval the initial submittal states, "Single exit stories/buildings cannot have a common path of egress travel since two exits are not required." This statement is in direct contravention with the definition of common path of egress travel. That definition states, "That portion of exit access travel distance measured for the most remote point of each room, area or space to that point where the occupants have separate and distinct access to two exits or exit access doorways." By definition, all travel within a story served by a single exit is common path of egress travel as two exits are not available.

Section 1006 establishes the provisions for the determination of the required number of exits or exit access doorways from various building areas. As previously stated, the default is a single exit/exit access doorway design condition. A second exit is required when either of two considerations is exceeded. Those issues are occupant load and common path of egress travel. Specifically, when the common path of egress travel is exceeded (that is, occupants do not have separate and distinct access to two exits or exit access doorways) a second exit/exit access doorway becomes required. Accordingly, common path of egress travel is the correct term when referencing areas served by a single exit. Where E24 utilizes the term exit access travel distance, it should be noted that the definition of common path of egress travel states that common path of egress travel is that portion of exit access travel distance..... The specific term is appropriate.

Approval of E24-18 will create confusion among code practitioners. Table 1006.2.1 provides criteria for the determination of a second required exit/exit access doorway from individual rooms, areas or spaces. Those criteria are occupant load and common path of egress travel. Using a different criterion in Tables 1006.3.3.1 and 1006.3.3.2 for the determination of a second required exit from a given story begs the question: Why are there different terms used within the same section? The answer is that they should not be different.

There is no confusion if the code practitioner reads the definition of Section 202 and determines the applicable technical requirements of Section 1006. All provisions are in technical context. Approval of E24-18 will create confusion as opposed to providing clarification as hoped. The published reason statement also stated, "This will coordinate the terminology in the table with the current footnotes and similar sections in the IEBC." That coordination should occur as errata to current footnote and IEBC provisions so that they correctly reference common path of egress travel requirements in accordance with fundamental IBC provisions.

Approval of this public comment for disapproval of E24-18 will maintain current logical and understandable provisions for the determination of second exits from given building stories.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Approval of this public comment will retain current code provisions.

E24-18

E30-18

IBC: 1009.2.1, (IFC[BE] 1009.2.1)

Proposed Change as Submitted

Proponent: Micah Chappell, representing City of Seattle (micah.chappell@seattle.gov)

2018 International Building Code

Revise as follows

1009.2.1 Elevators required. In buildings where a required *accessible floor or occupied roof* is four or more stories above or below a *level of exit discharge*, not less than one required *accessible means of egress* shall be an elevator complying with Section 1009.4.

Exceptions:

1. In buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required on floors provided with a *horizontal exit* and located at or above the *levels of exit discharge*.
2. In buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required on floors provided with a *ramp* conforming to the provisions of Section 1012.

Reason: The code recognizes that there are practical limits to complete reliance on assisted evacuation of building occupants by fire personnel because of the limited availability of trained personnel or special devices. As a result, current ICC language requires an elevator be part of the accessible means of egress starting with the 4th story above the level of exit discharge (See 1009.2.1). Occupied roofs at the same level do not currently have this same requirement. The vertical travel distance encountered by a fire fighter performing an assisted rescue is the same whether the occupants are on an occupied roof on the 4th floor above the level of exit discharge or whether they are on the floor of the 4th story above the level of exit discharge within the building. As occupied roofs become more popular this becomes more of an issue for building departments around the country.

Occupied roofs at four or more stories above the level of exit discharge should be treated like occupied floors at the same level in the building. The occupant loads and hazards are similar between occupied roofs and occupied floors, the benefits to occupants and fire personnel from an elevator with emergency back-up power are similar, and a similar approach has been taken in other sections of the building code (see IBC Chapter 10 1006.3, 1006.3.2, and 1006.3.3). The 2018 IBC 1104.4 also requires at least one accessible route to each accessible story, mezzanine and occupied roof in multilevel buildings and facilities. If the requirements for an accessible route to the accessible level treat the occupied roof and accessible floor in the same manner, it is logical to conclude that the same level of protection for the accessible means of egress from an occupied roof should be required.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal clarifies the current intent of the accessible means of egress provisions of IBC 1009.2.1. The added language clarifies that an area of refuge and emergency power/legally required standby power must be provided per IBC 1009.4 for an occupied roof that is four or more stories above the level of exit discharge.

No fiscal impact.

E30-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This tells you when standby power is required for an elevator for building with an occupied roof. Occupied roofs are not currently addressed. The vertical distance for assisted rescue for a roof on the top of a 4 story building is the same as a 5th floor, so standby power should be required. Separate provisions for the occupied roof, to avoid confusion over if the occupied roof is a story, floor or level, would make this cleaner. There is an question with the current exception for horizontal exits as an alternative for standby power being permitted on lower floors, which would not be buildable on the roof. Occupied roofs, by being open to the outside air, may be safer than the floor with horizontal exits. See E29-18. (Vote: 8-7)

Assembly Action:

None

E30-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Micah Chappell, representing Seattle Department of Construction and Inspection (micah.chappell@seattle.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1009.2.1 Elevators required. In buildings where a required *accessible* floor or occupied roof is four or more stories above or below a *level of exit discharge*, not less than one required *accessible means of egress* shall be an elevator complying with Section 1009.4.

Exceptions:

1. In buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required on floors or occupied roof provided with a *horizontal exit* and located at or above the *levels of exit discharge*.
2. In buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required on floors provided with a *ramp* conforming to the provisions of Section 1012.

Commenter's Reason: Original proposal was approved by Committee. See 2018 Committee Action Hearing for original reason statement.

This modification coordinates the charging language change approved at the CAH with Exception 1.

Exception 1 acknowledges that a building that is fully sprinklered and a horizontal exit provides an acceptable level of protection. That level of protection is also achieved with an occupied roof meeting these criteria thus the exception should apply.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

No fiscal impact.

Public Comment 2:

Proponent: Micah Chappell, representing Seattle Department of Construction and Inspection (micah.chappell@seattle.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1009.2.1 Elevators required. In buildings where a required *accessible* floor or occupied roof is four or more stories above or below a *level of exit discharge*, not less than one required *accessible means of egress* shall be an elevator complying with Section 1009.4.

Exceptions:

1. In buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required on floors provided with a *horizontal exit* and located at or above the *levels of exit discharge*.
2. In buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required on floors or occupied roof provided with a *ramp* conforming to the provisions of Section 1012.

Commenter's Reason: Original proposal was approved by Committee. See 2018 Committee Action Hearing for original reason statement.

This modification coordinates the charging language change approved at the CAH with Exception 2.

Exception 2 applies where sprinklers are provided, and the ramp provides an adequate route down for assisted rescue. That level of protection is also achieved with an occupied roof meeting these criteria thus the exception should apply.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

No fiscal impact.

Public Comment 3:

Proponent: Ed Kulik, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1009.2.1 Elevators required. In buildings where a required *accessible* floor ~~or occupied roof~~ is four or more stories above or below a *level of exit discharge or where an accessible occupied roof is above a story that is three or more stories above the level of exit discharge*, not less than one required *accessible means of egress* shall be an elevator complying with Section 1009.4.

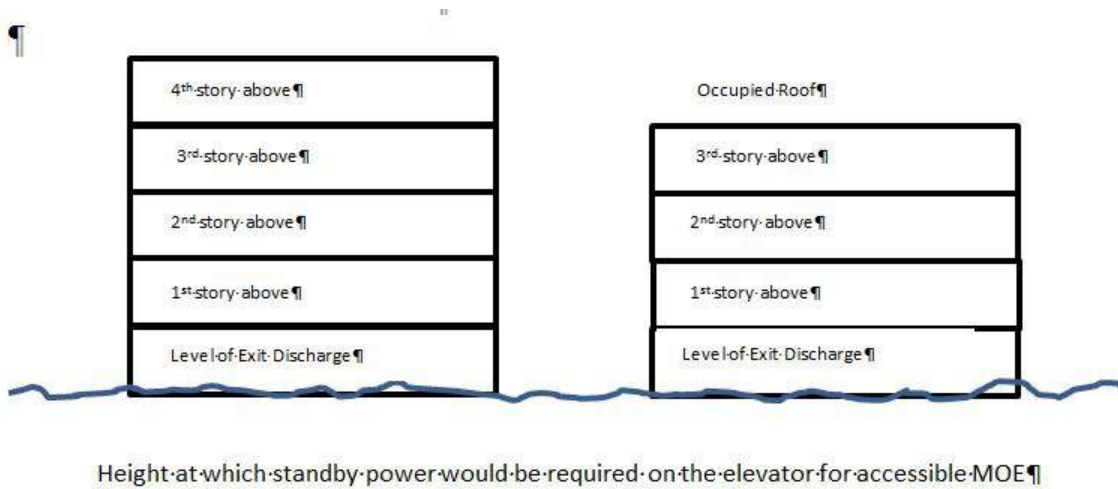
Exceptions:

1. In buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required on floors provided with a *horizontal exit* and located at or above the *levels of exit discharge*.
2. In buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required on floors provided with a *ramp* conforming to the provisions of Section 1012.

Commenter's Reason: The new language is confusing. An occupied roof is not a story. Therefore, to be clear, the requirement for an occupied roof should be dealt with separately. It is not the intent of this public comment to change to result of what was voted approved by the MOE Code Development Committee.

It is important to point out that the original change said that there was no fiscal impact. Since the occupied roof is not considered a story, with the 2018 text, it could have been interpreted that standby power was not required to an occupied roof on a 5 story building. Therefore, this does have a significant cost for a 4 story building that decides to have an occupied roof.

The result will be as follows:



This public comment is submitted by the ICC BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions there of. In 2017 and 2018 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes and public comments. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. This modification is a clarification of requirements, and will not change the requirement of the approved change. However, the original proposal claimed that there was no fiscal impact. Depending on how an occupied roof was interpreted, this could have significant fiscal impact by requiring standby power to the elevator in a 4 story building with an occupied roof.

Public Comment 4:

Proponent: Ed Kulik, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1009.2.1 Elevators required. In buildings where a required *accessible* floor or occupied roof is four or more stories above or below a *level of exit discharge*, not less than one required *accessible means of egress* shall be an elevator complying with Section 1009.4.

Exceptions:

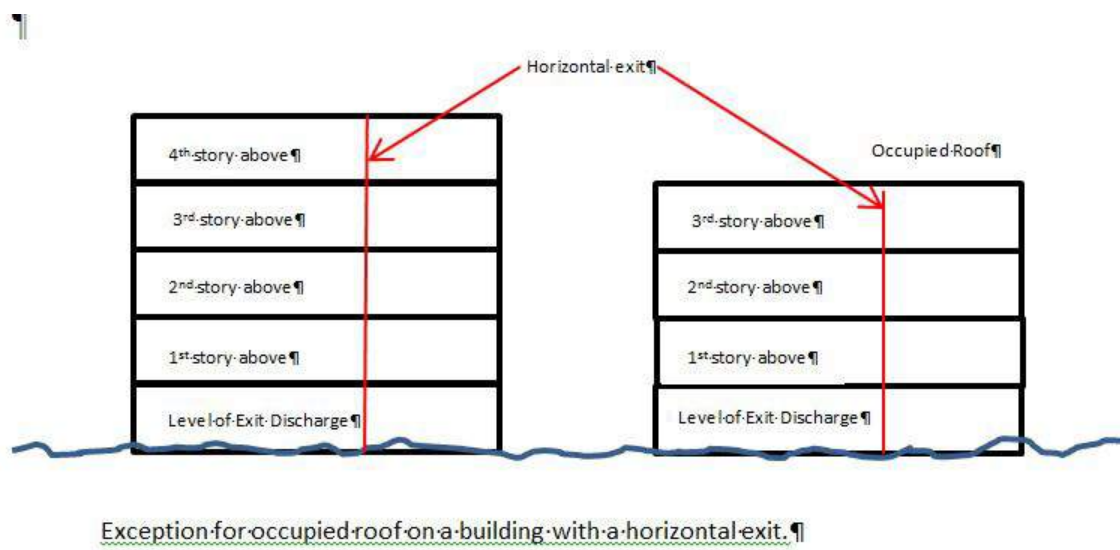
1. In buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required on floors provided with a *horizontal exit* and located at or above the *levels of exit discharge*.
2. In buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required on floors provided with a *ramp* conforming to the provisions of Section 1012.
3. In buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required for an occupied roof where the floors below are provided with a horizontal exit and located at or above the level of exit discharge.

Commenter's Reason: It is important to note that Section 1009.2.1 is for where an elevator is required for exiting, it is not the requirement for an accessible route to the roof (Section 1104.4). This requirement results in standby power to the elevator for fire department assisted rescue.

A building 5 stories or taller can use a horizontal exit so that the floors do not have to have standby power to the elevator. Protection for occupants is by moving from one smoke compartment to another. An occupied roof cannot provide a horizontal exit, but it is open to the outside air - which offers an equivalent or safer level of protection for occupants. The intent of the new exception 3 is that if someone has horizontal exits and a sprinkler system in the floors below the occupied roof, having an occupied roof would not then also trigger standby power. Very often the occupied roof area is smaller than the area of the floor below. Requiring standby power is a significant cost impact on a building. An example of application might be a 4 story or taller hospital that has a helicopter landing pad on the roof.

This will not change the original proposal, which will require standby power in a 4 story building with an occupied roof where the building does not have both sprinklers and horizontal exits.

The following is a diagram for illustration of this exception.



This public comment is submitted by the ICC BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 and 2018 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes and public comments. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. With the currently approved original proposal in place, this would be a cost savings for building with horizontal exits by not also requiring standby power to the elevator for just the occupied roof.

E30-18

E31-18

IBC: 1009.2.2 (New), (IFC[BE] 1009.2.2 (New))

Proposed Change as Submitted

Proponent: Gene Boecker, representing Code Consultants, Inc. (geneb@codeconsultants.com)

2018 International Building Code

Add new text as follows

1009.2.2 Separation of means of egress. Where more than one accessible means of egress is required, the entrance to at least two of the exits, stairways or elevators serving as part of the accessible means of egress shall be separated by a distance not less than 30 feet (9144 mm).

Reason: Because the elevator can serve as a component of the accessible means of egress, a standard core design with stairways at the opposite sides of the core and elevators in the middle will not allow a traditional remoteness application for the accessible means of egress. However, some separation should be required so that the possibility of a single event preventing egress is limited. The language is similar to that in Section 403.5.1 for remoteness of interior exit stairways in high rise buildings. In the case where multiple accessible means of egress are provided, the separation would apply to at least two of them.

Cost Impact: The code change proposal will increase the cost of construction. The possibility exists that some building configurations will need to be revised to accommodate this remoteness. In reality, it is unlikely that any measureable increase will exist for most buildings.

E31-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The 30 feet separation, where an elevator is required as one of the accessible means of egress may be too tough for small buildings. Section 403.5.1 was referenced for justification, but it is different - it allows for ¼ as well as 30 feet and it measures to the shafts instead of the entrances. In addition, this could be read as requiring elevators to be at least 30 feet apart. Two accessible means of egress next to each other would not meet the current criteria for independent means of egress, so this is already adequately addressed. (Vote: 8-5)

Assembly Action:

None

E31-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Gene Boecker, representing Code Consultants, Inc. (geneb@codeconsultants.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1009.2.2 Separation of means of egress. Where more than one accessible means of egress is required, the entrance to at least two of the exits, stairways or elevators serving as part of the accessible means of egress shall be separated by a distance that is not less than one-quarter of the length of the maximum overall diagonal of the building or area served, measured in a straight line between them; or, a minimum of 30 feet (9144 mm); whichever is less.

Commenter's Reason: The committee felt that the measurement based on a diagonal as well as a fixed dimension would be more appropriate and that the 30 feet separation could be onerous for small floor plate floors. The proposal addresses both of those by including the 1/4 diagonal criteria as well as the 30 feet but then allowing the lesser of the two to be used. This would address the condition where a core of the building has two stairways very near to one another and the elevators located between them. It is important that we have something in the code to address this separation. Right now there is nothing that prevents two elevators, side by side in teh same shat, from being used as both accessible means of egress. This addresses that need.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The net effect may increase costs. In most cases there will be no increase in cost but it would be foolish to expect there not being some condition, somewhere that would need to be adjusted to accommodate this criteria for separation.

E31-18

E32-18

IBC: 1009.4, 1009.4.3 (New), (IFC[BE] 1009.4, 1009.4.3)

Proposed Change as Submitted

Proponent: Gene Boecker, representing Code Consultants, Inc. (geneb@codeconsultants.com)

2018 International Building Code

Revise as follows

1009.4 Elevators. In order to be considered part of an *accessible means of egress*, an elevator shall comply with Sections 1009.4.1 and ~~1009.4.2~~ through 1009.4.3.

Add new text as follows

1009.4.3 Location. Where multiple elevators serve as more than one of the accessible means of egress, the elevators serving as different accessible means of egress must be provided with separate operating systems in accordance with Section 3003 and be located in separate elevator banks.

Reason: The provisions for elevators as accessible means of egress were written assuming only one group of elevators in a building. The second means of egress would always be a stairway. Literally, there is no limitation of how many elevators can be used to fulfil the requirement in Section 1009.1 for multiple accessible means of egress. It is reasonable to require some separation between elevators if the option selected is to use elevators for all the accessible means of egress. These elevators should not be in the same bank of elevators, but somewhere else in the building. This is a viable option in large building with banks of elevator spaced throughout the building.

Cost Impact: The code change proposal will increase the cost of construction. In the rare situation where multiple elevators are used, the increased cost would be that for the separation between hoistways.

E32-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The phrase ‘operating systems’ could be read to require a separate power source and standby power. This could conflict with the requirements for Occupant Evacuation Elevators. The term ‘banks’ is not currently defined – so this could be read differently than the intent of the proposal to use elevators in different part of the building rather than banks of elevators facing each other. There is no technical justification or identified issues to require this additional language. (Vote: 11-3)

Assembly Action:

None

E32-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Gene Boecker, representing Code Consultants, Inc. (geneb@codeconsultants.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1009.4 Elevators. In order to be considered part of an *accessible means of egress*, an elevator shall comply with Sections 1009.4.1 through 1009.4.3.

1009.4.3 Location. Where multiple elevators serve as ~~two or more~~ ~~than one~~ of the accessible means of egress, the elevators serving as different accessible means of egress ~~shall~~ ~~must~~ be provided in separate elevator banks, provided with separate ~~operating systems fire detection devices~~ in accordance with Section ~~3003~~ ~~and be located in separate~~ elevator banks ~~907.3.3~~.

Commenter's Reason: The committee felt that the language was overly complicated. Unfortunately the term "elevator bank" is not defined in the code, although it is used frequently. The language was changed from a reference to the emergency operating systems to instead rely on the smoke detector provided at the elevator lobby. Because one bank of elevator could be across the lobby from another, the reference would limit this to conditions where a multiple banks of elevators are provided or where a bank of passenger elevators and a separate service elevator are intended as the accessible means of egress.

There is no requirement that more than one levator be provided as part of the accessible means of egress. Certainly an elevator and a stairway could be used. This provision would only apply where elevators and not stairways are intended. It is a safety measure to prevent the condition where two elevators could be used, both within the same hoistway. There is nothing within the code to prohibit this currently. We need something to address that flaw.

This is offered as an alternative to E31.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. It is exceedingly unlikely that elevators will be used as the only accessible means of egress within a building. However, if such a condition would be created, this proposal would increase the cost by requiring a separation of elevators.

E32-18

E33-18

IBC:1009.6.2, (IFC[BE] 1009.6.2)

Proposed Change as Submitted

Proponent: Eirene Knott, BRR Architecture, representing Metropolitan Kansas City Chapter of the ICC
(Eirene.Knott@brrarch.com)

2018 International Building Code

Revise as follows

1009.6.2 Stairway or elevator access. Every required *area of refuge* shall have direct access to a *stairway* complying with Sections 1009.3 and 1023 or an elevator complying with Section 1009.4.

Exception: An interior area of refuge at the level of exit discharge that provides direct access to an exterior exit door.

Reason: While the code provides clear direction that areas of refuge in a multi story building must have direct access to an elevator or stairway, it is not clear on what qualifies as an interior area of refuge in a single story building. The purpose of this code change is to provide clear direction in the code that an interior area of refuge is permitted in a single story building, or in a multi-story building on the level of exit discharge, without a stairway or elevator which provides immediate access to the exterior of the building.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. If the code will now allow for an interior area of refuge in a single story building or on the level of exit discharge in a multi-story building, rather than require an exterior area of refuge in either situation, this may actually reduce the cost of construction as the exterior wall would no longer need to have a fire resistance rating.

E33-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: An interior area of refuge should be at a discoverable location, so having an area of refuge at a back door is not a good idea. You can do an exterior area of assisted rescue at the grade level back exit, which is preferred. (Vote: 13-1)

Assembly Action:

None

E33-18

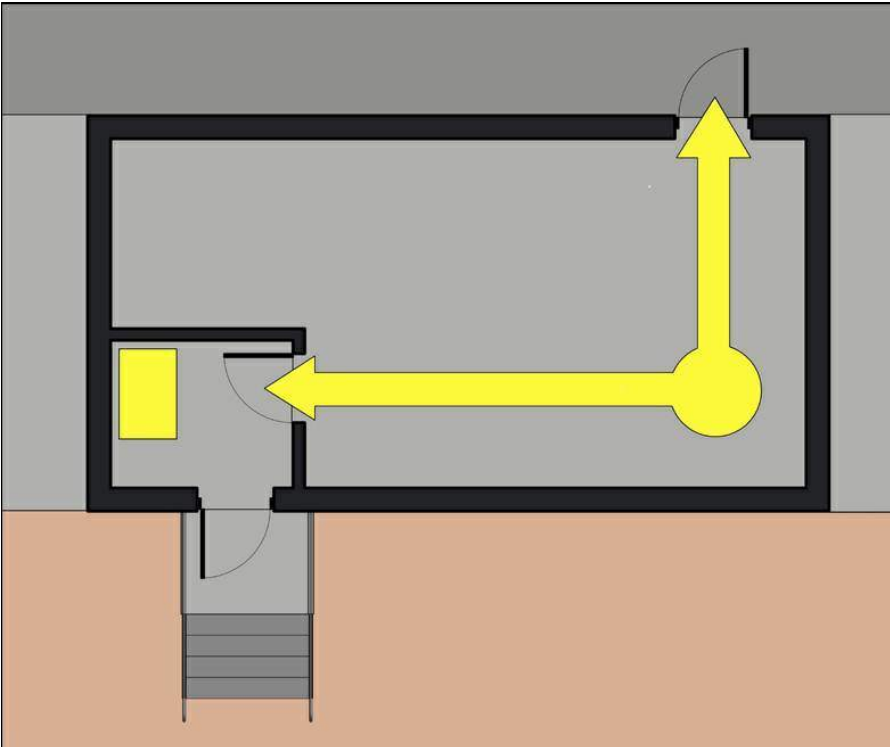
Individual Consideration Agenda

Public Comment 1:

Proponent: Eirene Knott, BRR Architecture, representing Metropolitan Kansas City Chapter of the ICC (eirene.knott@brrarch.com) requests As Submitted.

Commenter's Reason: The committee said that an interior area of refuge should be at a discoverable location. IBC Section 1009.9 and 1111.3 Item 3 require areas of refuge to be signed on the outside of the door leading to that area. That makes the area of refuge 'discoverable' by the occupants. The fire and safety plans in IFC 404.2.1 Item 4 and 404.2.2 Item 4.4.1 make sure the fire department knows where these areas are located. Currently the text does not address an area of refuge in a single story building at the second exit. It only addresses areas of refuge on upper floors. The proposed text fixes that technical glitch.

The image below represents what this proposed code change is attempting to allow, an interior area of refuge with direct access to the exterior of the building.



Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

If the code will now allow for an interior area of refuge in a single story building or on the level of exit discharge in a multi-story building, rather than require an exterior area of refuge in either situation, this may actually reduce the cost of construction as the exterior wall would no longer need to have a fire resistance rating in non-sprinklered buildings.

E33-18

E38-18

IBC: 1010.1, 1020.1 (New), 1024.1, 1026.1, 1027.1, 1028.4, 1028.4.1, 1028.4.2, 1029(New), (IFC[BE] 1010.1, 1020.1 (New), 1024.1, 1026.1, 1027.1, 1028.4, 1028.4.1, 1028.4.2, 1029(New))

Proposed Change as Submitted

Proponent: Gregory Keith, representing The Boeing Company (grkeith@mac.com)

2018 International Building Code

Revise as follows

1010.1 ~~Doors~~General. ~~Means of egress doors shall meet the requirements of this section. Doors, gates and turnstiles~~ serving a *means of egress* system shall meet the applicable requirements of this section and Section 1022.2. Doors provided for egress purposes in numbers greater than required by this code shall meet the requirements of this section. *Means of egress* doors shall be readily distinguishable from the adjacent construction and finishes such that the doors are easily recognizable as doors. Mirrors or similar reflecting materials shall not be used on *means of egress* doors. *Means of egress* doors shall not be concealed by curtains, drapes, decorations or similar materials.

Add new text as follows

1020.1 General. Corridors serving as an exit access component in a means of egress system shall comply with the requirements of this section.

Revise as follows

1024.1 ~~Exit passageways~~General. Exit passageways serving as an exit component in a *means of egress* system shall comply with the requirements of this section. An *exit passageway* shall not be used for any purpose other than as a *means of egress* and a *circulation path*.

1026.1 ~~Horizontal exits~~General. Horizontal *exits* serving as an exit in a *means of egress* system shall comply with the requirements of this section. A *horizontal exit* shall not serve as the only exit from a portion of a building, and where two or more *exits* are required, not more than one-half of the total number of *exits* or total exit minimum width or required capacity shall be horizontal *exits*.

Exceptions:

1. Horizontal *exits* are permitted to comprise two-thirds of the required *exits* from any building or floor area for occupancies in Group I-2.
2. Horizontal *exits* are permitted to comprise 100 percent of the *exits* required for occupancies in Group I-3. Not less than 6 square feet (0.6 m²) of *accessible* space per occupant shall be provided on each side of the *horizontal exit* for the total number of people in adjoining compartments.

1027.1 ~~Exterior exit stairways and ramps~~General. Exterior *exit stairways* and *ramps* serving as an ~~element of exit~~ component in a required means of egress system shall comply with the requirements of this section.

Add new text as follows

1029 EGRESS COURTS

Revise as follows

~~1028.4~~1029.1 Egress courtsGeneral. ~~Egress courts serving as a portion of the an exit discharge component in the means of egress system shall comply with the requirements of Sections 1028.4.1 and 1028.4.2 in this section.~~

~~1028.4.1~~1029.2 Width or capacity. The required capacity of *egress courts* shall be determined as specified in Section 1005.1, but the minimum width shall be not less than 44 inches (1118 mm), except as specified herein. *Egress courts* serving Group R-3 and U occupancies shall be not less than 36 inches (914 mm) in width. The required capacity and width of *egress courts* shall be unobstructed to a height of 7 feet (2134 mm). The width of the *egress court* shall be not less than the required capacity.

Exception: Encroachments complying with Section 1005.7.

1028.4.21029.3 Construction and openings. Where an *egress court* serving a building or portion thereof is less than 10 feet (3048 mm) in width, the *egress court* walls shall have not less than 1-hour *fire-resistance-rated* construction for a distance of 10 feet (3048 mm) above the floor of the *egress court*. Openings within such walls shall be protected by opening protectives having a fire protection rating of not less than $\frac{3}{4}$ hour.

Exceptions:

1. *Egress courts* serving an *occupant load* of less than 10.
2. *Egress courts* serving Group R-3.

Reason: This is a series of editorial revisions intended to formalize the charging language of several sections within Chapter 10. The International Building Code is a so-called model code. Once adopted by a given political subdivision it becomes law. Having proper enabling or charging provisions for various technical requirements is legally necessary. Presently, Section 1020 for corridors contains no charging language. A general section has been created using the same format as is currently used in Section 1018 for aisles and Section 1019 for exit access stairways and ramps.

Section 1010.1 has been improved by adding the "General" section title to be consistent with other means of egress component sections. Additionally, the first and second sentences of Section 1010.1 are redundant. The first sentence has been deleted. The second sentence now clarifies that the section is applicable to gates and turnstiles consistent with the Section 1010 heading.

The titles of Sections 1024.1, 1026.1 and 1027.1 have been changed to "General" to be consistent with other means of egress component sections.

Lastly, egress courts are a means of egress component. In the Chapter 10 format, individual means of egress components have their own section. Currently, egress court provisions are located in Section 1028.4 within the exit discharge section. This proposal simply relocates the egress court technical provisions to a new Section 1029 so as to be consistent with other Chapter 10 provisions.

This proposal establishes the proper legal charging language for lacking sections. In doing so, it provides consistency within the various Chapter 10 means of egress component sections. Some practitioners are given to assigning an importance factor between different terms and formats. Approval of this proposal will clarify these important means of egress provisions.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal is essentially editorial.

E38-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 1010.1 Doors General. ~~Means of egress doors shall meet the requirements of this section. Doors, gates and turnstiles serving a means of egress system shall meet the applicable requirements of this section and Section 1022.2. Doors provided for egress purposes in numbers greater than required by this code shall meet the requirements of this section.~~

Means of egress doors shall be readily distinguishable from the adjacent construction and finishes such that the doors are easily recognizable as doors. Mirrors or similar reflecting materials shall not be used on means of egress doors. Means of egress doors shall not be concealed by curtains, drapes, decorations or similar materials.

Committee Reason: The modification was to remove the change to Section 1010.1 from the proposal. The changes in E37-18 addressed this in a more comprehensive manner.

The revised language is consistent with the remainder of the sections in the code. There was concern about pulling Egress Courts out of the section for exit discharge without a general statement for this means of egress part as indicated in Sections 1003.1, 1014.1 and 1020.1. (Vote: 10-4)

Assembly Action:

None

E38-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Gregory Keith, representing The Boeing Company (grkeith@mac.com) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

1028.1 General. The exit discharge shall comply with Sections 1028 and 1029 and the applicable requirements of Sections 1003 through 1015.

Commenter's Reason: A committee comment was, "There was concern about pulling Egress Courts out of the section for exit discharge without a general statement for this means of egress part as indicated in Sections 1003.1, 1014.1 and 1020.1." This public comment creates appropriate charging language and cross references at Section 1028.1 so as to be consistent with other means of egress parts sections.

Approval of this public comment will clarify E38-18 in accordance with committee comments.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment is editorial in nature.

Public Comment 2:

Proponent: Ed Kulik, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

~~1029~~ EGRESS COURTS

~~1029.1-1028.4~~ General Egress courts. ~~Egress courts serving as an a portion of the exit discharge component in the means of egress system shall comply with the requirements in this section of Sections 1028.4.1 and 1028.4.2.~~

~~1029.2-1028.4.1~~ Width or capacity. The required capacity of *egress courts* shall be determined as specified in Section 1005.1, but the minimum width shall be not less than 44 inches (1118 mm), except as specified herein. *Egress courts* serving Group R-3 and U occupancies shall be not less than 36 inches (914 mm) in width. The required capacity and width

of egress courts shall be unobstructed to a height of 7 feet (2134 mm).
The width of the egress court shall be not less than the required capacity.

Exception: Encroachments complying with Section 1005.7.

~~1029.3-1028.4.2~~ Construction and openings. Where an egress court serving a building or portion thereof is less than 10 feet (3048 mm) in width, the egress court walls shall have not less than 1-hour fire-resistance-rated construction for a distance of 10 feet (3048 mm) above the floor of the egress court. Openings within such walls shall be protected by opening protectives having a fire protection rating of not less than $\frac{3}{4}$ hour.

Exceptions:

1. Egress courts serving an occupant load of less than 10.
2. Egress courts serving Group R-3.

Commenter's Reason: This proposal is to move the requirements for egress courts back into its current position as a part of Section 1028. Splitting exit discharge into 2 sections is adding confusion for users. Also, the scoping language for exit discharge in more than one section was not proposed - so this could be a conflict with the format of Chapter 10 in the scoping for general, exit access and exit language in Sections 1003.1, 1016.1 and 1022.1.

This public comment is submitted by the ICC BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 and 2018 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes and public comments. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This modification is returning existing text to its original location. There are no changes in requirements.

E38-18

E39-18

IBC: 1010.1.1, (IFC[BE] 1010.1.1)

Proposed Change as Submitted

Proponent: John Woestman, Kellen Co., representing Builders Hardware Manufacturers Association (BHMA) (jwoestman@kellencompany.com)

2018 International Building Code

Revise as follows

1010.1.1 Size of doors. The required capacity of each door opening shall be sufficient for the *occupant load* thereof and shall provide a minimum clear opening width of 32 inches (813 mm). The clear opening width of doorways with swinging doors shall be measured between the face of the door and the stop, with the door open 90 degrees (1.57 rad). Where this section requires a minimum clear opening width of 32 inches (813 mm) and a door opening includes two door leaves without a mullion, one leaf shall provide a minimum clear opening width of 32 inches (813 mm). In Group I-2, doors serving as *means of egress* doors where used for the movement of beds shall provide a minimum clear opening width of 41¹/₂ inches (1054 mm). ~~The maximum width of a swinging door leaf shall be 48 inches (1219 mm) nominal.~~ The minimum clear opening height of doors shall be not less than 80 inches (2032 mm).

Exceptions:

1. In Group R-2 and R-3 *dwelling and sleeping units* that are not required to be an Accessible unit, Type A unit or Type B unit, the minimum ~~and maximum~~ width shall not apply to door openings that are not part of the required *means of egress*.
2. In Group I-3, door openings to resident *sleeping units* that are not required to be an Accessible unit shall have a minimum clear opening width of 28 inches (711 mm).
3. Door openings to storage closets less than 10 square feet (0.93 m²) in area shall not be limited by the minimum clear opening width.
4. The maximum width of door leaves in revolving doors that comply with Section 1010.1.4.1 shall not be limited.
5. The maximum width of door leaves in *power-operated doors* that comply with Section 1010.1.4.2 shall not be limited.
6. Door openings within a *dwelling unit* or *sleeping unit* shall have a minimum clear opening height of 78 inches (1981 mm).
7. In *dwelling and sleeping units* that are not required to be Accessible, Type A or Type B units, exterior door openings other than the required *exit* door shall have a minimum clear opening height of 76 inches (1930 mm).
8. In Groups I-1, R-2, R-3 and R-4, in *dwelling and sleeping units* that are not required to be Accessible, Type A or Type B units, the minimum clear opening widths shall not apply to interior egress doors.
9. Door openings required to be *accessible* within *Type B units* intended for user passage shall have a minimum clear opening width of 31.75 inches (806 mm).
10. Doors to walk-in freezers and coolers less than 1,000 square feet (93 m²) in area shall have a maximum width of 60 inches (1524 mm) nominal.
11. The minimum clear opening width shall not apply to doors for nonaccessible shower or sauna compartments.
12. The minimum clear opening width shall not apply to the doors for nonaccessible toilet stalls.

Reason: This proposal deletes the 48" maximum width requirements for swinging doors.

From the IBC Commentary: The maximum width for a means of egress door leaf in a swinging door is 48 inches (1219 mm) because larger doors are difficult to handle and are of sizes that typically are not fire tested.

We somewhat agree with this statement in the IBC Commentary. However, it is the width plus the height and the construction of the door (i.e. weight) which results in a door which may be difficult to open and / or close. Our perspective is the performance requirements in IBC Section 1010.1.3 Door Opening Force and the Chapter 11 Accessibility requirements effectively result in the design and installation of appropriately-sized doors. Regarding fire tested doors (i.e. fire-rated doors) – the solution is simple – install fire-rated doors which meet the existing door opening force requirements of the IBC.

The revision in the 1st exception correlates with the proposed deleted text in the charging paragraph.

The revision in the 4th exception clarifies the exception.

From a different perspective, NFPA 101 has not had a requirement for maximum swinging door leaf width since the 1997 edition, stating there is insufficient reason to limit the maximum width of a door leaf provided the door is maintained in good working order. In addition, there is a trend in health-care occupancies for wider doorways to accommodate patient and equipment movement needs.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. We see no cost implications for the vast majority of buildings. However, this proposal may allow the use of a single door – that meets all IBC operational force requirements – where today the 48” width limit results in two doors in an opening. In these rare situations, the cost of construction may be reduced.

E39-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The committee agreed that there is no longer a need to regulate the maximum size of a door. The maximum size of a door is adequately addressed by the force requirements, closing speed and fire door testing. It was suggested that the maximum door size in Exception 10 should be deleted as part of a public comment for consistency. (Vote: 13-1)

Assembly Action:

None

E39-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Keith Pardoe, representing Pardoe Consulting, LLC (kpardoe@pardoeconsultingllc.com) requests Disapprove.

Commenter's Reason: I recommend the committee disapprove this proposal for the following reasons:

1) The proposal does not offer any technical justification that would compel this change to be approved. There are several reasons, as to why the 48-inch limitation be retained. First, the maximum size of fire rated swinging doors is 48 inches, and hardware components such as fire exit hardware are ONLY listed for use on doors up to 48 inches in width. In the case of fire rated doors, wide doors are more likely to fail fire door testing than doors of ordinary width (e.g., 36 inch-wide doors). In fact, some narrow (less than 32 inch-wide) steel stiffened doors have failed fire door tests due to their increased rigidity. Second, swinging doors are subject to encroachment limitations, wider doors are more likely to encroach on the path of egress. And, lastly, wider doors are less likely to comply with the opening forces in section 1010.1.3.

2) There are special circumstances where swinging doors, that are not in a required means of egress, are wider than 48 inches. For example, aluminum swinging doors in a car dealership showroom are usually 60-inches wide (or wider), but these doors are ONLY used for moving vehicles into or out of the showroom floor. In other words, these doors are NOT required or used for egress purposes. And, there are other special circumstances where wider doors of other construction might be needed; they are NOT in the required means of egress.

3) The proposal does not cite any technical justification for permitting doors in R-2 and R-3 occupancies to have wider doors.

4) The insertion of the word "maximum" as an adjective in item (4) is unnecessary and does not improve the section.

5) The reasoning statement is more a statement of opinion than fact. No technical justification is offered for removing the 48 inch-wide limitation for swinging doors. When wider door opening are needed, we simply use a pair of swinging doors, which can provide nearly 96 inches of clear opening width.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproving this proposal will not have a cost impact.

E39-18

E40-18

IBC: 1010.1.1 (IFC[BE] 1010.1.1)

Proposed Change as Submitted

Proponent: Eirene Knott, BRR Architecture, representing Metropolitan Kansas City Chapter of the ICC (Eirene.Knott@brrarch.com)

2018 International Building Code

Revise as follows

1010.1.1 Size of doors. The required capacity of each door opening shall be sufficient for the *occupant load* thereof and shall provide a minimum clear opening width of 32 inches (813 mm). The clear opening width of doorways with swinging doors shall be measured between the face of the door and the stop, with the door open 90 degrees (1.57 rad). Where this section requires a minimum clear opening width of 32 inches (813 mm) and a door opening includes two door leaves without a mullion, one leaf shall provide a minimum clear opening width of 32 inches (813 mm). In Group I-2, doors serving as *means of egress* doors where used for the movement of beds shall provide a minimum clear opening width of 41¹/₂ inches (1054 mm). The maximum width of a swinging door leaf shall be 48 inches (1219 mm) nominal. The minimum clear opening height of doors shall be not less than 80 inches (2032 mm).

Exceptions:

1. In Group R-2 and R-3 *dwelling and sleeping units* that are not required to be an Accessible unit, Type A unit or Type B unit, the minimum and maximum width shall not apply to door openings that are not part of the required *means of egress*.
2. In Group I-3, door openings to resident *sleeping units* that are not required to be an Accessible unit shall have a minimum clear opening width of 28 inches (711 mm).
3. Door openings to storage closets less than 10 square feet (0.93 m²) in area shall not be limited by the minimum clear opening width.
4. The width of door leaves in revolving doors that comply with Section 1010.1.4.1 shall not be limited.
5. The maximum width of door leaves in *power-operated doors* that comply with Section 1010.1.4.2 shall not be limited.
6. Door openings within a *dwelling unit* or *sleeping unit* shall have a minimum clear opening height of 78 inches (1981 mm).
7. In *dwelling and sleeping units* that are not required to be Accessible, Type A or Type B units, exterior door openings other than the required *exit* door shall have a minimum clear opening height of 76 inches (1930 mm).
8. In Groups I-1, R-2, R-3 and R-4, in *dwelling and sleeping units* that are not required to be Accessible, Type A or Type B units, the minimum clear opening widths shall not apply to interior egress doors.
9. Door openings required to be *accessible* within *Type B units* intended for user passage shall have a minimum clear opening width of 31.75 inches (806 mm).
10. Doors to walk-in freezers and coolers less than 1,000 square feet (93 m²) in area shall have a maximum width of 60 inches (1524 mm) nominal.
11. The minimum clear opening width shall not apply to doors for nonaccessible shower or sauna compartments.
12. The minimum clear opening width shall not apply to the doors for nonaccessible toilet stalls.
13. The minimum clear opening width shall not apply to the doors for nonaccessible dressing, fitting or changing rooms.

Reason: In the 2015/2016/2017 code development cycle, two changes, E47 and F243, were approved which added language in this section to allow for doors serving non-accessible saunas, shower compartments and toilet stalls to be less than 32 inches. The doors serving dressing/fitting/changing rooms serve the same purpose as these doors, which is to provide for access into and out of the room. If accessible dressing/fitting/changing rooms are provided per IBC 1109.12.1, the remaining dressing/fitting/changing rooms would meet the same requirements as those non-accessible sauna, shower compartment and toilet stall doors.

Cost Impact: The code change proposal will decrease the cost of construction. This proposal may decrease the cost of construction if a smaller door is permitted as less materials will be required.

E40-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This exception could be misapplied to the main door of a large dressing room, such as that used for a bridal fitting room where there would be multiple occupants. It was suggested to limit this to single-user dressing rooms. There should be a minimum size to forestall any size door being permitted. The term 'changing' rooms is not consistent with Section 1109.12.1 for accessibility requirements. (Vote: 9-5)

Assembly Action:

None

E40-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Eirene Knott, representing Metropolitan Kansas City Chapter of the ICC (eirene.knott@brrarch.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

The required capacity of each door opening shall be sufficient for the *occupant load* thereof and shall provide a minimum clear opening width of 32 inches (813 mm). The clear opening width of doorways with swinging doors shall be measured between the face of the door and the stop, with the door open 90 degrees (1.57 rad). Where this section requires a minimum clear opening width of 32 inches (813 mm) and a door opening includes two door leaves without a mullion, one leaf shall provide a minimum clear opening width of 32 inches (813 mm). In Group I-2, doors serving as *means of egress* doors where used for the movement of beds shall provide a minimum clear opening width of 41½ inches (1054 mm). The maximum width of a swinging door leaf shall be 48 inches (1219 mm) nominal. The minimum clear opening height of doors shall be not less than 80 inches (2032 mm);

Exceptions:

1. In Group R-2 and R-3 *dwelling and sleeping units* that are not required to be an Accessible unit, Type A unit or Type B unit, the minimum and maximum width shall not apply to door openings that are not part of the required *means of egress*.
2. In Group I-3, door openings to resident *sleeping units* that are not required to be an *Accessible unit* shall have a minimum clear opening width of 28 inches (711 mm).
3. Door openings to storage closets less than 10 square feet (0.93 m²) in area shall not be limited by the minimum clear opening width.
4. The width of door leaves in revolving doors that comply with Section 1010.1.4.1 shall not be limited.
5. The maximum width of door leaves in *power-operated doors* that comply with Section 1010.1.4.2 shall not be limited.
6. Door openings within a *dwelling unit* or *sleeping unit* shall have a minimum clear opening height of 78 inches (1981 mm).
7. In *dwelling and sleeping units* that are not required to be Accessible, Type A or Type B units, exterior door openings other than the required *exit door* shall have a minimum clear opening height of 76 inches (1930 mm).
8. In Groups I-1, R-2, R-3 and R-4, in *dwelling and sleeping units* that are not required to be Accessible, Type A or Type B units, the minimum clear opening widths shall not apply to interior egress doors.
9. Door openings required to be *accessible* within *Type B units* intended for user passage shall have a minimum clear opening width of 31.75 inches (806 mm).
10. Doors to walk-in freezers and coolers less than 1,000 square feet (93 m²) in area shall have a maximum width of 60 inches (1524 mm) nominal.
11. ~~The minimum clear opening width shall not apply to doors for nonaccessible shower or sauna compartments.~~
12. ~~The minimum clear opening width shall not apply to the doors for nonaccessible toilet stalls.~~
13. ~~The minimum clear opening width shall not apply to the doors for nonaccessible Doors serving nonaccessible single user shower or sauna compartments, toilet stalls or dressing, fitting or changing rooms shall have a minimum clear opening width of 20 inches (508 mm).~~

Commenter's Reason: The committee disapproved this code change as they felt that the original language was not specific enough to apply only to a single user dressing, fitting or changing room. There was discussion about bridal party changing rooms as an example. The committee also wanted the laundry list shortened so I have attempted to combine the last three items into one exception to address doors serving single user toilet rooms, shower or sauna compartments as well as the fitting, dressing or changing rooms. This code change is intended to allow for the reduction in door size serving individual compartments for these specific applications. It is not necessary to provide a 32 inch clear width on a non-accessible compartment that is intended to be used by one person.

I did research to determine if 20 inches would address doors serving these types of individual uses. On average, a door for a single user toilet compartment is 24 inches in width. Most fitting room doors are 32 inches in width. Most individual use saunas utilize a 24 inch door and most commercial showers utilize a minimum door of 22 inches. In an effort to cover all of these door sizes, I chose 20 inches as a minimum.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. If approved, this has the potential to decrease the cost of construction as smaller doors would be permitted.

E40-18

E41-18

IBC: 1010.1.1.1, (IFC[BE] 1010.1.1.1)

Proposed Change as Submitted

Proponent: John Woestman, representing Builders Hardware Manufacturers Association (BHMA)
(jwoestman@kellencompany.com)

2018 International Building Code

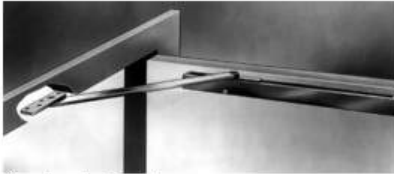
Revise as follows

1010.1.1.1 Projections into clear ~~width~~ opening. There shall not be projections into the required clear opening width lower than 34 inches (864 mm) above the floor or ground. Projections into the clear opening width between 34 inches (864 mm) and 80 inches (2032 mm) above the floor or ground shall not exceed 4 inches (102 mm).

Exception: Door closers, overhead door stops, power door operators, and electromagnetic door ~~stops~~ locks shall be permitted to be 78 inches (1980 mm) minimum above the floor.

Reason: Clarifying the “door stops” in the exception are overhead door stops. Also, proposing to include in the exception door operational hardware which is commonly installed and may project into the opening at the top of the doorway. And, it seems appropriate to revise the title of Section 1010.1.1.1.

Below are several pictures which illustrate these hardware items.



Overhead door stop.
Photo courtesy ASSA ABLOY



Power door operator.
Photo courtesy [domakaba](#)



Power door operators (left doors), door closer (right door).
Photo courtesy Hager Companies



Electromagnetic door lock (top-left corner of doorway) and door closer.
Photo courtesy Allegion

Cost Impact: The code change proposal will not increase or decrease the cost of construction. No cost implications identified with this proposal. This allows additional door operation with no increase in code requirements.

E41-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This proposal adds common use terminology for door hardware and clarifies allowances for other types of doors. (Vote: 14-0)

Assembly Action:

None

E41-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Keith Pardoe, representing Pardoe Consulting, LLC (kpardoe@pardoeconsultingllc.com) requests Disapprove.

Commenter's Reason: I recommend the committee disapprove this proposal for the following reasons:

- 1) The existing section is concerned with ensuring door openings provide sufficient clear opening width for egress purposes. The second statement in 1010.1.1.1 recognizes that certain arrangements of hardware could reduce the clear opening width.
- 2) The assertion in the reason statement that "...the 'door stops' in the exception are overhead stops" is incorrect. Doors with a nominal height of 80 inches have a actual clear opening height that is reduced by two elements; the height of the integral door stop of the frame, and the thickness of any floor covering material passing through the door opening. In the case of standard hollow metal door frames, the height of the integral door stop is 5/8-inch. And, when the door frame is aluminum, the height of the integral door stop is 1/2-inch. The exception refers to the integral door stops of the frames, it does not refer to overhead stops that are types of door hardware components.
- 3) Regarding the application of door closers, as covered in the exception, it is referring to the use of parallel arm brackets that are attached to the soffit of door frames—the soffit of a door frame is the raised flat surface between the door rabbet and the non-door rabbet of the frame. For this reason, the application of a parallel arm bracket in combination with the thickness of the floor covering material can reduce the clear opening height dimension of a door by 1 to 2 inches; ergo, the 78-inch exception for door closers and [the frame's integral] door stops.
- 4) The proposal does not include technical justification for adding the other hardware items to the exceptions.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Disapproving this proposal will not have a cost impact.

E41-18

E42-18

IBC: 1010.1.2, 1010.1.2.1, (IFC[BE] 1010.1.2, 1010.1.2.1)

Proposed Change as Submitted

Proponent: John Woestman, Kellen Co., representing Builders Hardware Manufacturers Association (BHMA)
(jwoestman@kellencompany.com)

2018 International Building Code

Revise as follows

1010.1.2 ~~Door swing.~~Egress door types. Egress doors shall be of the ~~pivoted or side-hinged swinging type door, pivoted door, or balanced door types.~~

Exceptions:

1. Private garages, office areas, factory and storage areas with an *occupant load* of 10 or less.
2. Group I-3 occupancies used as a place of detention.
3. Critical or intensive care patient rooms within suites of health care facilities.
4. Doors within or serving a single *dwelling unit* in Groups R-2 and R-3.
5. In other than Group H occupancies, revolving doors complying with Section 1010.1.4.1.
6. In other than Group H occupancies, special purpose horizontal sliding, accordion or folding door assemblies complying with Section 1010.1.4.3.
7. Power-operated doors in accordance with Section 1010.1.4.2.
8. Doors serving a bathroom within an individual *sleeping unit* in Group R-1.
9. In other than Group H occupancies, manually operated horizontal sliding doors are permitted in a *means of egress* from spaces with an *occupant load* of 10 or less.

1010.1.2.1 Direction of swing. ~~Pivot or side~~Side-hinged swinging doors, pivoted doors, and balanced doors shall swing in the direction of egress travel where serving a room or area containing an *occupant load* of 50 or more persons or a Group H occupancy.

Reason: Updating 1010.1.2 to add balanced doors to the other common types of swinging doors allowed and used in the means of egress. Also revising the title of the section. Requirements for panic hardware on balanced doors is addressed in 1010.1.10.2 (text pasted below) - thus it can be assumed the intent of the code is that balanced doors are OK for doors in the means of egress.

Also, revising 1010.1.2.1 for consistency.

2018 IBC 1010.1.10.2 Balanced doors. If *balanced doors* are used and *panic hardware* is required, the *panic hardware* shall be the push-pad type and the pad shall not extend more than one-half the width of the door measured from the latch side

Several pictures below illustrate these types of doors.



Side-hinged door.
Photo courtesy Allegion



Pivoted door
Photo courtesy Allegion



Balanced door.
Photo courtesy C. R. Laurence

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Proposal updates code technically to more closely match types of doors being installed in the means of egress.

E42-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This proposal specifically addresses balanced doors as a type of swinging door, which is consistent with the intent of the provisions. (Vote: 14-0)

Assembly Action:

None

E42-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Keith Pardoe, representing Pardoe Consulting, LLC (kpardoe@pardoeconsultingllc.com) requests Disapprove.

Commenter's Reason: I recommend the committee disapprove this proposal for the following reasons:

- 1) The proposed seems to distinguish balanced doors, which are a type of pivoted door, from other types of pivoted doors. It is a distinction without a difference. Balanced doors are hung on top and bottom center pivots that are inset from the "hinge" edge the doors. Generally, balanced doors are a minimum of 42 inches in width so that they provide the *required minimum width* when opened to 90 degrees. The offset pivot point of balanced doors allow doors to open and close more easily by leveraging the building stack pressure against the surface of the doors.
- 2) The reason statement in the proposal seems to imply that balanced doors are not permitted to be used in the means of egress, which is not the case. Balanced doors have been in use in high-rise buildings for decades.
- 3) The proposal does not cite any confusion from AHJs, architects, building owners, or the door industry regarding the use of balanced doors in the means of egress that would be resolved by the committee's approval of this proposal.
- 4) Regarding the proposal's cross reference to 1010.1.10.2, the reason the length of panic hardware devices is restricted to "...not more than one-half the width of the door measured from the latch side" is that body of the device could reduce the clear opening width of the opening. However, this condition was remedied in section 1010.1.1.1 Projections into Clear Width when the following provision was added to the code: "Projections into the clear opening width between 34 inches (864 mm) and 80 inches (2032 mm) above the floor or ground shall not exceed 4 inches (102 mm)." Most panic hardware devices are installed between 39 to 41 inches above the floor to the centerline of the actuating push pad or crossbar, and they do not project more than 4 inches into the clear opening width. In fact, the 4-inch projection was specifically allowed for the application of panic hardware and fire exit hardware devices to all types of swinging doors.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this proposal will not have a cost impact.

E42-18

E44-18

IBC: 1010.1.3, (IFC[BE] 1010.1.3)

Proposed Change as Submitted

Proponent: John Woestman, Kellen Co., representing Builders Hardware Manufacturers Association (BHMA)
(jwoestman@kellencompany.com)

2018 International Building Code

Delete and substitute as follows

~~**1010.1.3 Door opening force.** The force for pushing or pulling open interior swinging egress doors, other than fire doors, shall not exceed 5 pounds (22 N). These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position. For other swinging doors, as well as sliding and folding doors, the door latch shall release when subjected to a 15-pound (67 N) force. The door shall be set in motion when subjected to a 30-pound (133 N) force. The door shall swing to a full open position when subjected to a 15-pound (67 N) force.~~

1010.1.3 Forces to unlatch and open doors. The forces to unlatch and to open doors shall comply with the following:

1. Where door hardware operates by push or pull, the operational force to unlatch the door shall not exceed 15 pounds (66.7N). Where door hardware operates by rotation, the operational force to unlatch the door shall not exceed 28 inch-pounds (315 N-cm).
2. For manual interior swinging egress doors other than doors required to be fire rated, the force for pushing or pulling open the door shall not exceed 5 pounds (22 N).
3. For other swinging, sliding, or folding doors, and doors required to be fire-resistance-rated, the door shall require not more than a 30-pound (133 N) force to be set in motion and shall move to a full-open position when subjected to not more than a 15-pound (67 N) force.

Reason: Updating and clarifying the maximum forces allowed to unlatch and open doors and correlating requirements with A117.1.

Item 1: The current IBC requirements in 1010.1.3 for maximum unlatching forces could be considered somewhat ambiguous. The proposed requirements in Item 1 are consistent with the requirements in the latest edition of A117.1, Section 404.2.6 and consistent with other ANSI standards for door hardware operational forces.

Items 2 and 3: The revisions in Items 2 and 3 are intended to clarify existing requirements in 1010.1.3.

Item 2 is based on the first sentence of 1010.1.3. Item 3 is based on the last two sentences of 1010.1.3.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal clarifies this section of the code, and correlates the code requirements to current accessibility requirements and to current requirements in several ANSI standards for door hardware.

E44-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This updates and clarifies the requirements for door force and unlatching. This would coordinate with the 2017 edition of ICC A117.1. (Vote: 14-0)

Assembly Action:

None

E44-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Keith Pardoe, representing Pardoe Consulting, LLC (kpardoe@pardoeconsultingllc.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1010.1.3 Forces to unlatch and open doors. The forces to unlatch and to open doors shall comply with the following:

1. Where door hardware operates by push or pull, the operational force to unlatch the door shall not exceed 15 pounds (66.7N).
2. Where door hardware operates by rotation, the operational force to unlatch the door shall not exceed 28 inch-pounds (315 N-cm).

The forces to open doors shall comply with the following:

- ~~2-1.~~ For ~~manual~~ interior swinging egress doors that are manually operated, other than doors required to be fire rated, the force for pushing or pulling open the door shall not exceed 5 pounds (22 N).
- ~~3-2.~~ For other swinging doors, sliding doors, or folding doors, and doors required to be fire-resistance-rated-fire rated, the door shall require not more than a 30-pound (133 N) force to be set in motion and shall move to a full-open position when subjected to not more than a 15-pound (67 N) force.

Commenter's Reason: I recommend the committee consider revising this section, as shown above, for the following reasons:

This section addresses operating forces that are applied to A) release (unlatch) latching door hardware devices, and B) move door leaves to their full open position. Accordingly, it makes sense to separate these forces into subsections.

The existing language for this section focused on the requirements on interior doors. By striking out the phrase "...interior swinging..." the revised section now applies to all doors in the means egress, including exterior doors. The proposed revision clarifies that "interior" swinging doors, that are manually operated, are subject to the 5 lbf opening force—except for fire-rated doors.

In item (3) there is a reference to "...fire-resistance-rated doors..." Doors are fire protection-rated, not fire resistance-rated. The above-proposed revision resolves this issue by referencing "fire rated" doors.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal clarifies this section of the code, and correlates the code requirements to current accessibility requirements and to current requirements in several ANSI standards for door hardware

E44-18

E49-18

IBC: 202 (New), 1010.1.4.6 (New), (IFC[BE] 202 (New), 1010.1.4.6(New))

Proposed Change as Submitted

Proponent: John Woestman, Kellen Co., representing Builders Hardware Manufacturers Association (BHMA)
(jwoestman@kellencompany.com)

2018 International Building Code

Add new definition as follows

CONTROL VESTIBULE. A space with door locking arrangements of interlocked doors in series such that while one door of the control vestibule is open, the other door in series is temporarily locked.

Add new text as follows

1010.1.4.6 Control vestibule. Where doors in the means of egress are configured as a control vestibule, the door locking system shall provide for emergency egress and shall be subject to approval by the building official. A control vestibule in the means of egress shall comply with all of the following.

1. An approved override shall be provided on the egress side of each door of a control vestibule.
2. An approved override shall be provided on the ingress side of the outer door of a control vestibule.
3. Upon activation of the automatic sprinkler system or automatic fire detection system, the interlock function of the door locking system shall deactivate.
4. Upon loss of power to the interlock function of the doors, the interlock function of the door locking system shall deactivate.
5. The egress path from any point shall not pass through more than one control vestibule unless approved by the code official.
6. The door locking system units shall be listed in accordance with UL 294.

Reason: We are proposing a definition for “control vestibule” and proposing detailed requirements for control vestibules.

The significant difference between doors in series in the means of egress (i.e. one after the other) and doors in the means of egress configured as a control vestibule is the doors of a control vestibule are interlocked such that when one door of a control vestibule is open, the other door in series in the control vestibule is temporarily locked; and conversely, in the means of egress when all doors of a control vestibule are closed, any door may be opened.

Control vestibules are most commonly configured as a space with two doors in series. But, some control vestibules are configured with more than one inner door and / or more than one outer door. For example, where a control vestibule is required to help keep clean rooms clean, there may be inner doors from three different clean rooms opening into the control vestibule, and one outer door for leaving the control vestibule in the direction of egress.

The proposed requirements for control vestibules are for these reasons:

Item 1: A requirement to address the potential situation where one of the doors on the control vestibule is held open (example: a person faints in the outer doorway), other occupants may need to be able to egress through the control vestibule, especially in emergency situations. It is common the activation of an override would set off an alarm, and / or the activation of an override without a valid reason results in disciplinary action (i.e. employee gets fired).

Item 2: In the event the inner door of a control vestibule is held open (example: a person faints at the inner door), an override allows access into the control vestibule. The required override on the ingress side of the outer door allows for emergency access into the control vestibule, if needed. This override commonly requires a higher level of authorization for use and / or is provided for responding emergency crews.

Items 3 and 4: Requires the interlock function to be disabled in the event of fire, actuation of the fire detection system, or power loss to the interlock system rendering the control vestibule equivalent to two doors in the means of egress allowing unobstructed egress.

Item 5: Requires that egressing through the control vestibule involves no more than two doors, unless approved by the code official. While not common, there are situations where more than one control vestibule may be needed in the means of egress.

Item 6: Requires the units of the control vestibule locking system to be listed in accordance with UL 294, the same standard required for units for other electrical locking system units.

Together, the definition and proposed requirements provide for egress and emergency egress where control vestibules are installed.

Note: a control vestibule is different than a sallyport, which is defined in the IBC and permitted in Group I-3 occupancies. Group I-3 includes correction centers, detention centers, jails, prisons, and similar uses. A sallyport is a security vestibule which prevents unobstructed passage. A control vestibule is intended to allow unobstructed passage, but prevents more than one door of doors in series to be open at the same time.

Cost Impact: The code change proposal will decrease the cost of construction. Control vestibules are currently not addressed in the code. Where control vestibules are constructed, these requirements may include some locking requirements and interconnectedness currently not incorporated into some control vestibules.

E49-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: These provisions could conflict with sallyports for Group I-3. While this is needed for certain situations, as written this could be used in all occupancies for all doors – this should have limited application. Item #3 talks about the sprinkler system – is the intent to only allow this in sprinklered buildings, or is only where a sprinkler system is provided? The word ‘emergency’ is not needed. (Vote: 10-4)

Assembly Action:

None

E49-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Woestman, Kellen Company, representing Builders Hardware Manufacturers Association (BHMA) (jwoestman@kellencompany.com) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

1010.1.4.6 Control vestibule. Control vestibules shall be permitted in Groups B, F, H, I-1, I-2, M, and S. Where doors in the means of egress are configured as a control vestibule, the door locking system shall provide for emergency egress and shall be subject to approval by the building official. The control vestibule shall comply with all of the following unless otherwise approved based on occupancy and use. A control vestibule in the means of egress shall comply with all of the following.

1. An approved override shall be provided on the egress side of each door of a control vestibule.
2. An approved override shall be provided on the ingress side of the outer door of a control vestibule.
3. Upon activation of the ~~Where an~~ automatic sprinkler system or automatic fire detection system is provided, upon activation of such system the interlock function of the door locking system shall deactivate.
4. Upon loss of power to the interlock function of the doors, the interlock function of the door locking system shall deactivate.
5. The egress path from any point shall not pass through more than one control vestibule unless approved by the code official.
6. The door locking system units shall be listed in accordance with UL 294.

Commenter's Reason: To address the committee concern with occupancy groups where control vestibules may be installed. Proposing control vestibules to be permitted Group B for banks and laboratories. Group F for factories. Group H for operations where contamination or atmospheric control is vital. Groups I-1 and I-2 to facilitate patient care and patient security. Group M for sales rooms for jewelry, gems, drugs, and similar highly valuable items. Group S for storage of valuables.

To address the committee concern with activation of automatic sprinkler system or automatic fire detection system in Item 3 where one or both of these systems are provided.

And, to address concerns from stakeholders regarding needed flexibility, proposing revision to the charging language. For example, where casinos count money, accepted industry practices may not incorporate all of the requirements of Items 1 through 5 but may incorporate significant other security and safety provisions.

Note: a control vestibule is different than a sallyport, which is defined in the IBC and permitted in Group I-3 occupancies. Group I-3 includes correction centers, detention centers, jails, prisons, and similar uses. A sallyport is a security vestibule which prevents unobstructed passage. A control vestibule is intended to allow unobstructed passage, but prevents more than one door of doors in series to be open at the same time.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. Control vestibules are currently not addressed in the code. Today, alternative means and methods is the path to allowing control vestibules to be incorporated into buildings.

Where control vestibules are constructed, these requirements may include some locking requirements and interconnectedness currently not incorporated into some control vestibules.

Public Comment 2:

Proponent: Keith Pardoe, representing Pardoe Consulting, LLC (kpardoe@pardoeconsultingllc.com) requests Disapprove.

Commenter's Reason: I recommend the committee disapprove this proposal for the following reasons:

1) The proposal seeks to create a new type of special locking arrangement for control vestibules, but it neglects to recognize that where such specialized door systems are used they are not the sole means of egress from the controlled space. In other words, a control vestibule serves as the primary entry/exit point for the controlled space—for security and/or environmental control purposes—but they are not sole means of egress, typically. Other exit access doors or exit doors (e.g., stair tower doors) might be equipped with delayed egress locking systems or some form or alarmed exiting system (that permits free egress, but sounds an alarm) that are otherwise restricted (by the owner) to use in emergencies only.

2) The proposal neglects to recognize the security protocols instituted by the facility that might require persons entering these spaces to present some form of credential (e.g., proximity card, keypad, etc.) to enter such controlled spaces. Nor, does the proposal recognize that the persons occupying these spaces are trained and authorized to perform work in whatever conditions are within these spaces. In other words, only persons who are trained, authorized, and familiar with all safety protocols, including how to exit under emergency conditions, are permitted in these spaces; the general public cannot unknowingly wander into these spaces.

3) Each of the door assemblies used as part of a control vestibule system are already required to comply with one of the following sections: 1010.1.9.7, 1010.1.9.8, 1010.1.9.9, and 1010.1.10. Where these doors are required to be fire rated, they are tied into other building systems. The difference in this case is that the doors are designed to work in sequence as a system. Each control vestibule arrangement is unique to the nature of the controlled space to which it serves, and persons using these spaces. The prescribed conditions in the proposal might not be sufficient for certain applications, and might cause breaches in the facility's protocols in other cases.

4) The proposal does not limit the application of control vestibules to only certain occupancy groups, instead it places the responsibility for determining where such special locking arrangements might be used on the shoulders of the building code officials. Because control vestibules are a special locking arrangement, the code should restrict their use to specific occupancy groups.

5) The proposal does not include technical justification for adding this type of special locking arrangement to the code at this time. Nor, does the proposal cite specific points of confusion from building code officials or owners.

In my opinion, this proposal premature and needs further work before it can be considered appropriate to add to the code. Currently, when such specialized systems are used, they are reviewed and approved by the applicable building code officials on a case by case basis. For this reason alone, it is unnecessary for the code to address such specialized systems.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproving this proposal will not have a cost impact.

E49-18

E51-18

IBC: 1010.1.9 (New), (IFC[BE] 1010.1.9 (New))

Proposed Change as Submitted

Proponent: Ed Kulik, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Building Code

Add new text as follows

1010.1.9 Vestibules. Where required by a compliance path of the International Energy Conservation Code, building entrances shall be provided with vestibules.

Reason: The IECC requires vestibules to be provided at building entrances in all climate zones other than 1 and 2. In the design of buildings this can be a significant feature of entrances. The requirement can be overlooked by designers if they focus on the IBC during initial design and then are perhaps surprised by the requirement when adding the IECC to their construction documents. This proposal provides a direct reference to the compliance paths in the IECC for vestibules.

The proposal puts the reference for vestibules in Chapter 10 after the section for door arrangements (Section 1010.1.8). Since Section 1010.1.8 addresses doors in a series, this is the most logical place for designers to understand that a vestibule may be required by the IECC.

The BCAC developed this proposal with the SEHPCAC. This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This requirement already exists in the IECC. Inclusions in the IBC doesn't result in any construction not already anticipated.

E51-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This pointer for vestibules is not needed in IBC in areas where the Energy codes are adopted because it is already covered in the Energy Code. The term 'vestibule' could be confused with stairway vestibules. (Vote: 12-2)

Assembly Action:

None

E51-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ed Kulik, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1010.1.9 Vestibules. ~~Where in jurisdictions that have adopted the International Energy Conservation Code, where required by a compliance path of the International Energy Conservation Code,~~ building entrances shall be provided with vestibules.

Commenter's Reason: Unlike the IBC, the requirement in the IECC is a mandate for a building to have vestibules at most entrance doors. If a designer is unaware of this requirement, adding a vestibule, or in some cases several vestibules, into the design of a building after it has been through plan review can be a cause some major revisions to the building configuration.

The language being proposed is not in any way intended to mandate that a community must use the *International Energy Conservation Code* (IECC), but rather it is intended to give designers in those communities where the IECC is adopted, that vestibules may be required. The text below indicates the extent of the requirement.

C402.5.7 Vestibules. *Building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors.*

Exceptions: *Vestibules are not required for the following:*

- 1. Buildings in Climate Zones 1 and 2.*
- 2. Doors not intended to be used by the public, such as doors to mechanical or electrical equipment rooms, or intended solely for employee use.*
- 3. Doors opening directly from a sleeping unit or dwelling unit.*
- 4. Doors that open directly from a space less than 3,000 square feet (298 m²) in area.*
- 5. Revolving doors.*
- 6. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.*
- 7. Doors that have an air curtain with a velocity of not less than 6.56 feet per second (2 m/s) at the floor that have been tested in accordance with ANSI/AMCA 220 and installed in accordance with the manufacturer's instructions. Manual or automatic controls shall be provided that will operate the air curtain with the opening and closing of the door. Air curtains and their controls shall comply with Section C408.2.3*

In addition, the requirement in the IECC for vestibules is mirrored in ANSI/ASHRAE/IESNA 90.1, which is one of the compliance means the IECC allows for a commercial building (IECC - Commercial Provisions, Section C401.2)

With regard to the comment made by the IBC General Code Development Committee that “The term ‘vestibule’ could be confused with stairway vestibules.” As the term is not defined in any of the I-Codes, we must refer to the generally accepted term. The Merriam Webster dictionary defines a vestibule as “An antechamber, hall, or lobby next to the outer door of a building.” The term “vestibule,” while used in IBC Section 1028.1 is not always and only associated with a space into which an exit stair discharges, there are many architectural spaces in a building that are generically called vestibules.

This change will provide one additional aspect of coordination of the ICC model codes package for use by all designers and building officials where appropriate. We urge your overturning the Code Committee’s recommendation and approve this change.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This requirement already exists in the IECC. Inclusions in the IBC doesn t result in any construction not already anticipated.

Public Comment 2:

Proponent: Gene Boecker, representing Code Consultants, Inc. (geneb@codeconsultants.com)requests As Submitted.

Commenter's Reason: This is a necessary correlation between two codes. The vestibule is a building requirement based on specific conditions cited within the IECC. It is a necessary building component. Referring to another code for this is no different that referring to the IPC for plumbing fixture requirements. Given the choice between copying the requirements from the IECC or referencing the code, this is the superior option.

There should be no confusion regarding what type of vestibule this is because it is clearly described in the IECC.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This is a pointer to a code requirement that is often missed by designers and does not change any existing requirement.

Public Comment 3:

Proponent: David Collins, representing The American Institute of Architects (dcollins@preview-group.com)requests As Submitted.

Commenter's Reason: There really should not be any confusion on this topic as there are no requirements in the 2018 IBC that mandate the installation of vestibules - of any kind. The incorporation of vestibules is solely a designer’s choice. But WHEN a designer chooses to incorporate vestibules into a building, there are regulations, but only two; one that has its basis in the accessibility of doors in series and one for exit stairways that discharge into a vestibule which then leads to the exterior:

- 1010.1.8 Door arrangement; which mandates a there be minimum distance between doors when located in series – an enclosure often called out on plans as a “vestibule.”
- Section 1028.1, Exception 2 Exit discharge; which mandates the construction and size of a vestibule when an exit stair discharges into it.

Unlike the IBC, the requirement in the IECC is a mandate for a building to have vestibules at all entrance doors. Sadly in many cases, it is only after a set of plans has been submitted to the community for review (and who has adopted the IECC) does a designer find out that their building is required have vestibules at the entrance doors. Adding a vestibule, or in some cases several vestibules, into the design of a building after it has been through plan review can be a considerable chore on the part of designer, often forcing them to make some major revisions to the building configuration. Even worse is when the plan review fails to catch the need for a vestibule and the error it attempted to be corrected in the field.

The language being proposed is not in any way intended to mandate that a community must use the *International Energy Conservation Code* (IECC), but rather it is intended to give designers in those communities where the IECC is adopted, and in some cases the AHJ, a reminder that if the IECC has been adopted, then vestibules may be required. The need for this “pointer” to the IECC may not be so important if the IECC only required a single vestibule at the main entry door to a building, but for those of you who may not be familiar with the requirements of the 2018 IECC, the requirement is for a vestibule at **all** “building entrances,” not just for the “main” entry door (IECC – Commercial Provisions, Section C402.5.7). Simply put - the requirement for a vestibule is applicable to any door in a building that is an “entrance,” including those doors that are used as a delivery entrance, the staff/employee entrance, and even to those that are just convenience entry points into a building.

C402.5.7 Vestibules. *Building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in*

the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors.

Exceptions: Vestibules are not required for the following:

1. *Buildings in Climate Zones 1 and 2.*
2. *Doors not intended to be used by the public, such as doors to mechanical or electrical equipment rooms, or intended solely for employee use.*
3. *Doors opening directly from a sleeping unit or dwelling unit.*
4. *Doors that open directly from a space less than 3,000 square feet (298 m²) in area.*
5. *Revolving doors.*
6. *Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.*
7. *Doors that have an air curtain with a velocity of not less than 6.56 feet per second (2 m/s) at the floor that have been tested in accordance with ANSI/AMCA 220 and installed in accordance with the manufacturer's instructions. Manual or automatic controls shall be provided that will operate the air curtain with the opening and closing of the door. Air curtains and their controls shall comply with Section C408.2.3*

In addition, the requirement in the IECC for vestibules is mirrored in ANSI/ASHRAE/IESNA 90.1, which is one of the compliance means the IECC allows for a commercial building (IECC – Commercial Provisions, Section C401.2)

With regard to the comment made by the IBC General Code Development Committee that “The term ‘vestibule’ could be confused with stairway vestibules.” We do not disagree that the term “vestibule” is used in the IBC, but as the term is not defined in any of the I-Codes, we must refer to the generally accepted term, as specified in Chapter 2 of each I-Code. The Merriam Webster dictionary defines a vestibule as “An antechamber, hall, or lobby next to the outer door of a building.” The term “vestibule,” while used in IBC Section 1028.1 is not always and only associated with a space into which an exit stair discharges, there are many architectural spaces in a building that are generically called vestibules.

The AIA firmly believes that implementation of the criteria in the IECC is paramount to good design. Several of the Institutes’ policies call for increased energy efficiencies through the application of “Comprehensive, Coordinated and Contemporary Codes.” This change will provide one additional aspect of coordination of the ICC model codes package for use by all designers and building officials where appropriate. We urge your overturning the Code Committee’s recommendation and approve this change.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. If the design fails to include a vestibule it is a costly matter to add it at plan review. If plan review fails to catch the need for a vestibule, it is costly to try to resolve it in the field. If neither the design or the review catches the omission, then the loss is even larger to the building owner who now must pay for the energy loss attributed to a feature that should have been integrated into the building.

E51-18

E52-18

IBC: 1010.1.9.4, (IFC[BE] 1010.1.9.4)

Proposed Change as Submitted

Proponent: John Williams, Chair, representing Healthcare Committee (AHC@iccsafe.org)

2018 International Building Code

Revise as follows

1010.1.9.4 Locks and latches. Locks and latches shall be permitted to prevent operation of doors where any of the following exist:

1. Places of detention or restraint.
2. In Group I-1 Condition 2 and Group I-2 occupancies where the clinical needs of persons receiving care require containment or where persons receiving care pose a security threat, provided that clinical staff can readily unlock doors at all times, and all such locks are keyed to keys carried by clinical staff at all times or clinical staff have the codes or other means necessary to operate the locks at all times.
- ~~3.2.~~ In buildings in occupancy Group A having an *occupant load* of 300 or less, Groups B, F, M and S, and in *places of religious worship*, the main door or doors are permitted to be equipped with key-operated locking devices from the egress side provided:
 - ~~3.1.2.1.~~The locking device is readily distinguishable as locked.
 - ~~3.2.2.2.~~A readily visible durable sign is posted on the egress side on or adjacent to the door stating: THIS DOOR TO REMAIN UNLOCKED WHEN THIS SPACE IS OCCUPIED. The sign shall be in letters 1 inch (25 mm) high on a contrasting background.
 - ~~3.3.2.3.~~The use of the key-operated locking device is revocable by the *building official* for due cause.
4. ~~3.~~Where egress doors are used in pairs, *approved* automatic flush bolts shall be permitted to be used, provided that the door leaf having the automatic flush bolts does not have a doorknob or surface-mounted hardware.
5. ~~4.~~Doors from individual *dwelling* or *sleeping units* of Group R occupancies having an *occupant load* of 10 or less are permitted to be equipped with a night latch, dead bolt or security chain, provided such devices are openable from the inside without the use of a key or tool.
6. ~~5.~~*Fire doors* after the minimum elevated temperature has disabled the unlatching mechanism in accordance with *listed fire door* test procedures.
7. ~~6.~~Doors serving roofs not intended to be occupied shall be permitted to be locked preventing entry to the building from the roof.

Reason: This manual locking provision recognizes what is currently permitted under the Federal Standards and Centers for Medicaid and Medicare Services enforcement rules where the restraint of patients is allowed for the safety of the patient and/or the public (K222). This may be needed as part of the progression of treatment for patients. This proposal is submitted by the ICC Committee on Healthcare (CHC). The CHC was established by the ICC Board to evaluate and assess contemporary code issues relating to healthcare facilities. This is a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. In 2017 the CHC held 2 open meetings and numerous conference calls

Cost Impact: The code change proposal will not increase or decrease the cost of construction As a permitted condition the cost impact only occurs if the option is exercised.

E52-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The new Item 2 address security and dementia wandering issues for care recipients in assisted living, hospitals and nursing facilities where this is needed. It was suggested to provide a public comment to have keys for 'all' clinical staff. (Vote: 13-1)

Assembly Action:

None

E52-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Williams, representing Healthcare Committee (ahc@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1010.1.9.4 Locks and latches. Locks and latches shall be permitted to prevent operation of doors where any of the following exist:

1. Places of detention or restraint.
2. In Group I-1 Condition 2 and Group I-2 occupancies where the clinical needs of persons receiving care require containment or where persons receiving care pose a security threat, provided that all clinical staff can readily unlock doors at all times, and all such locks are keyed to keys carried by all clinical staff at all times or all clinical staff have the codes or other means necessary to operate the locks at all times.
3. In buildings in occupancy Group A having an *occupant load* of 300 or less, Groups B, F, M and S, and in *places of religious worship*, the main door or doors are permitted to be equipped with key-operated locking devices from the egress side provided:
 - 3.1. The locking device is readily distinguishable as locked.
 - 3.2. A readily visible durable sign is posted on the egress side on or adjacent to the door stating: THIS DOOR TO REMAIN UNLOCKED WHEN THIS SPACE IS OCCUPIED. The sign shall be in letters 1 inch (25 mm) high on a contrasting background.
 - 3.3. The use of the key-operated locking device is revocable by the *building official* for due cause.
4. Where egress doors are used in pairs, *approved* automatic flush bolts shall be permitted to be used, provided that the door leaf having the automatic flush bolts does not have a doorknob or surface-mounted hardware.
5. Doors from individual *dwelling or sleeping units* of Group R occupancies having an *occupant load* of 10 or less are permitted to be equipped with a night latch, dead bolt or security chain, provided such devices are openable from the inside without the use of a key or tool.
6. *Fire doors* after the minimum elevated temperature has disabled the unlatching mechanism in accordance with *listed fire door* test procedures.
7. Doors serving roofs not intended to be occupied shall be permitted to be locked preventing entry to the building from the roof.

Commenter's Reason: This proposal is in response to suggestion from the Means of Egress Code Development Committee to ensure that all clinical staff will have keys.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal is in response to suggestion from the Means of Egress Code Development Committee to ensure that all clinical staff will have keys.

Public Comment 2:

Proponent: Crystal Sujeski, representing Crystal Sujeski (crystal.sujeski@fire.ca.gov) requests Disapprove.

Commenter's Reason: Allowing locking of doors in I-1 condition 2 and I-2 occupancies without increasing safe guards for fire and life safety protections in chapter 4 has unintended consequences. When you lock persons in a space they are retrained, this creates an I-3 environment. Other safe guards should be considered before allowing any staff to detain any persons. Also, who is the decision maker of what is a security threat?
Further study and correlation with I-3 regulations should be considered before approval for these occupancies.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The net effect will not increase or decrease the cost of construction.

E52-18

E53-18

IBC: 1010.1.9.4, 1010.1.10, (IFC[BE] 1010.1.9.4, 1010.1.10); IFC 1031.8

Proposed Change as Submitted

Proponent: Lee Kranz, representing Washington Association of Building Officials Technical Code Development Committee (lkranz@bellevuewa.gov)

2018 International Building Code

Revise as follows

1010.1.9.4 Locks and latches. Locks and latches shall be permitted to prevent operation of doors where any of the following exist:

1. Places of detention or restraint.
2. In buildings in occupancy Group A having an *occupant load* of 300 or less, Groups B, F, M and S, and in *places of religious worship*, the main door or doors are permitted to be equipped with key-operated locking devices from the egress side provided:
 - 2.1. The locking device is readily distinguishable as locked.
 - 2.2. A readily visible durable sign is posted on the egress side on or adjacent to the door stating: THIS DOOR TO REMAIN UNLOCKED WHEN THIS SPACE IS OCCUPIED. The sign shall be in letters 1 inch (25 mm) high on a contrasting background.
 - 2.3. The use of the key-operated locking device is revocable by the *building official* for due cause.
3. Where egress doors are used in pairs, *approved* automatic flush bolts shall be permitted to be used, provided that the door leaf having the automatic flush bolts does not have a doorknob or surface-mounted hardware.
4. Doors from individual *dwelling* or *sleeping units* of Group R occupancies having an *occupant load* of 10 or less are permitted to be equipped with a night latch, dead bolt or security chain, provided such devices are openable from the inside without the use of a key or tool.
5. *Fire doors* after the minimum elevated temperature has disabled the unlatching mechanism in accordance with *listed fire door* test procedures.
6. Doors serving roofs not intended to be occupied shall be permitted to be locked preventing entry to the building from the roof.
7. Other than egress courts, where occupants must egress from an exterior space through the building for means of egress, exit access doors shall be permitted to be equipped with an approved locking device where installed and operated in accordance with all of the following:
 - 7.1. The maximum occupant load shall be posted where required by Section 1004.9. Such sign shall be permanently affixed inside the building and shall be posted in a conspicuous space near all the exit access doorways.
 - 7.2. A weatherproof telephone or two-way communication system installed in accordance with Sections 1009.8.1 and 1009.8.2 shall be located adjacent to not less than one required exit access door on the exterior side.
 - 7.3. The egress door locking device is readily distinguishable as locked and shall be a key-operated locking device.
 - 7.4. A clear window or glazed door opening, not less than 5 square feet (0.46 m²) sq. ft. in area, shall be provided at each exit access door to determine if there are occupants using the outdoor area.
 - 7.5. A readily visible durable sign shall be posted on the interior side on or adjacent to each locked required exit access door serving the exterior area stating: THIS DOOR TO REMAIN UNLOCKED WHEN THE OUTDOOR AREA IS OCCUPIED. The letters on the sign shall be not less than 1" high on a contrasting background.
8. Locking devices are permitted on doors to balconies, decks or other exterior spaces serving individual dwelling or sleeping units.
9. Locking devices are permitted on doors to balconies, decks or other exterior spaces of 250 square feet or less, serving a private office space.

1.

1010.1.10 Panic and fire exit hardware. Swinging doors serving a Group H occupancy and swinging doors serving rooms or spaces with an *occupant load* of 50 or more in a Group A or E occupancy shall not be provided with a latch or lock other than *panic hardware* or *fire exit hardware*.

Exceptions:

- 1. A main exit of a Group A occupancy shall be permitted to have locking devices in accordance with Section 1010.1.9.4, Item 2.
- 2. Doors provided with *panic hardware* or *fire exit hardware* and serving a Group A or E occupancy shall be permitted to be electrically locked in accordance with Section 1010.1.9.9 or 1010.1.9.10.
- 3. Exit access doors serving occupied exterior areas shall be permitted to be locked in accordance with Section 1010.1.9.4, Item 7.

Electrical rooms with equipment rated 1,200 amperes or more and over 6 feet (1829 mm) wide, and that contain overcurrent devices, switching devices or control devices with exit or *exit access doors*, shall be equipped with *panic hardware* or *fire exit hardware*. The doors shall swing in the direction of egress travel.

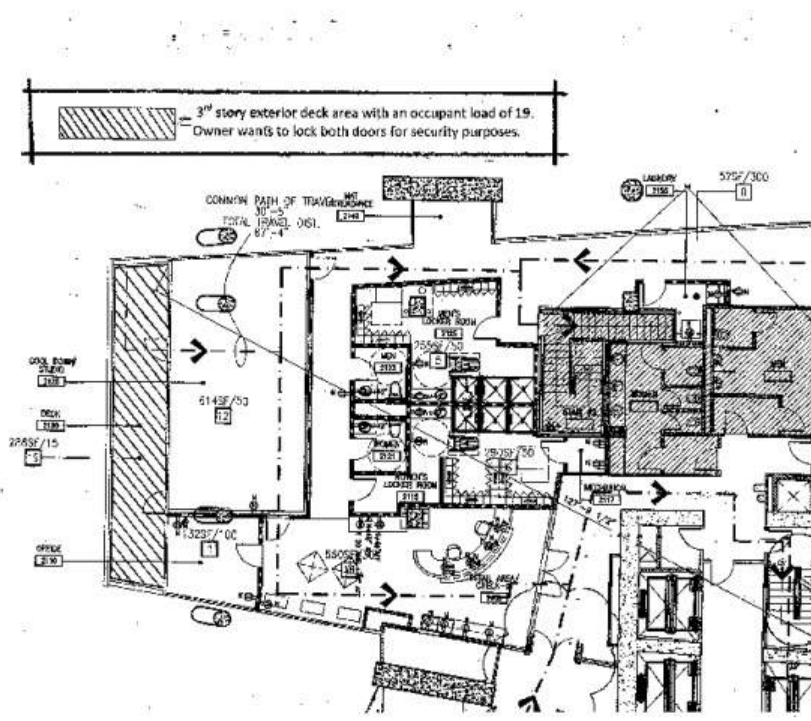
2018 International Fire Code

1031.8 Inspection, testing and maintenance. Two-way communication systems ~~for areas of refuge~~ shall be inspected and tested on a yearly basis to verify that all components are operational. Where required, the tests shall be conducted in the presence of the *fire code official*. Records of inspection, testing and maintenance shall be maintained.

Reason: IBC Section 1004.7 requires an unobstructed path of egress from outdoor areas where single or multiple paths of egress travel are required to pass back through the building. Currently egress doors serving outdoor areas are not permitted to have locks. For security purposes, building owners and tenants install locks on required egress doors from these areas in violation of the code. Many building officials and fire officials allow locks and latches on doors serving the outdoor areas using the modification provisions of Sections 104.10 & 104.11. Since installation of locks on egress doors occurs on a regular basis it makes sense to provide a safe, reasonable and consistent standard to follow for the safety of people occupying outdoor areas who must re-enter the building for egress.

Additional safety is provided by requiring a two-way communication system, allowing occupants to call for help if the egress door is accidentally locked. Two-way communication system requirements are currently found in IBC Section 1009.8.1 & 1009.8.2.

The sketch below illustrates an occupied exterior deck where occupants must egress through the building to reach the exit discharge. The deck shown is on the 3rd story of the building where the installation of an exterior stairway is not practical. The owner has requested to install security locks on the exit access doors but IBC Section 1004.5 clearly requires that occupants be able to egress from the deck at all times. This proposal would allow the doors to be locked if the specified safety measures are met.



IFC Section 1030.8 - If this proposal passes, the two-way communication system needs to be tested and maintained. The IFC language is currently only for systems in areas of refuge.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. It is hard to say if this code change will increase or decrease the cost of construction. Compliance with the proposed conditions of approval (2-way communication device, vision glass, signage, etc) would increase costs but many of these improvements are being required as a result of alternate means and methods of construction requirements that occur when violations are discovered by Fire Prevention Officers after the C of O is issued. In those cases the cost to make these improvements will be higher than if they had been made during the initial construction of the building.

E53-18

Public Hearing Results

Errata: Items 7, 8 and 9 are all new text and should be underlined.

Committee Action:

Disapproved

Committee Reason: There should be a maximum occupant load for where this should be permitted as an option. It was suggested that an over ride should be available to unlock the doors, but other committee members felt that this would be a security issues for buildings where someone could use this to break into a building during off hours. (Vote: 10-4)

Assembly Action:

None

E53-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Lee Kranz, representing Washington Association of Building Officials Technical Code Development Committee (lkranz@bellevuewa.gov); Jonathan Siu (jon.siu@seattle.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1010.1.9.4 Locks and latches. Locks and latches shall be permitted to prevent operation of doors where any of the following exist:

1. Places of detention or restraint.
2. In buildings in occupancy Group A having an *occupant load* of 300 or less, Groups B, F, M and S, and in *places of religious worship*, the main door or doors are permitted to be equipped with key-operated locking devices from the egress side provided:
 - 2.1. The locking device is readily distinguishable as locked.
 - 2.2. A readily visible durable sign is posted on the egress side on or adjacent to the door stating: THIS DOOR TO REMAIN UNLOCKED WHEN THIS SPACE IS OCCUPIED. The sign shall be in letters 1 inch (25 mm) high on a contrasting background.
 - 2.3. The use of the key-operated locking device is revocable by the *building official* for due cause.
3. Where egress doors are used in pairs, *approved* automatic flush bolts shall be permitted to be used, provided that the door leaf having the automatic flush bolts does not have a doorknob or surface-mounted hardware.
4. Doors from individual *dwelling* or *sleeping units* of Group R occupancies having an *occupant load* of 10 or less are permitted to be equipped with a night latch, dead bolt or security chain, provided such devices are openable from the inside without the use of a key or tool.
5. *Fire doors* after the minimum elevated temperature has disabled the unlatching mechanism in accordance with *listed fire door* test procedures.
6. Doors serving roofs not intended to be occupied shall be permitted to be locked preventing entry to the building from the roof.
7. Other than egress courts, where occupants must egress from an exterior space through the building for means of egress, exit access doors shall be permitted to be equipped with an approved locking device where installed and operated in accordance with all of the following:
 - 7.1. The maximum occupant load shall be posted where required by Section 1004.9. Such sign shall be permanently affixed inside the building and shall be posted in a conspicuous space near all the exit access doorways.
 - 7.2. A weatherproof telephone or two-way communication system installed in accordance with Sections 1009.8.1 and 1009.8.2 shall be located adjacent to not less than one required exit access door on the exterior side.
 - 7.3. The egress door locking device is readily distinguishable as locked and shall be a key-operated locking ~~device~~ device.
 - 7.4. A clear window or glazed door opening, not less than 5 square feet (0.46 m²) sq. ft. in area, shall be provided at each exit access door to determine if there are occupants using the outdoor area.
 - 7.5. A readily visible durable sign shall be posted on the interior side on or adjacent to each locked required exit access door serving the exterior area stating: THIS DOOR TO REMAIN UNLOCKED WHEN THE OUTDOOR AREA IS OCCUPIED. The letters on the sign shall be not less than 1 "high on a contrasting background.
 - 7.6. The occupant load of the occupied exterior area shall not exceed 300 in accordance with Section 1004.
8. Locking devices are permitted on doors to balconies, decks or other exterior spaces serving individual dwelling or sleeping units.
9. Locking devices are permitted on doors to balconies, decks or other exterior spaces of 250 square feet or less, serving a private office space.

Commenter's Reason: Outdoor occupied areas where occupants must re-enter the building to egress are considered by the current code to be the same as any room inside the building which means that unobstructed egress must be available from the outdoor area at-all-times. There currently are no exceptions to this rule but it is not unusual for these doors to have locks placed on them for security purposes after the C of O is issued. Locking these doors creates the potential for people to get locked out with no way to safely egress through the building in an emergency until rescued.

Most of the violations we find take place on upper level decks and occupied roofs where there isn't access to an exterior stair. We also find locks on doors serving grade-level outdoor areas where one or more of the required exit doors go through the building. It's understandable why owners put locks on these exterior required egress doors but we know it's not allowed in the current code and most owners do not get a permit to install the locks. When a permit is issued locks for these egress doors are typically approved as an alternate using most or all of the requirements in this proposal so it's clear that this exception is needed in the code.

At the Committee Action Hearings in Columbus, the Means of Egress Committee agreed that this change was needed in the code but had reservations about approving it without limiting the occupant load of the exterior area. This public comment modifies the original proposal to limit the occupant load of the outdoor area to 300 or less which is the same as Section 1010.1.9.4, #2 for Group A occupancies. This constitutes the "baby steps" that was suggested by one of the Committee members.

The remainder of the proposal is unchanged.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

It is hard to say if this code change will increase or decrease the cost of construction. Compliance with the proposed

conditions of approval (2-way communication device, vision glass, signage, etc) would increase costs but many of these improvements are being required as a result of alternate means and methods of construction requirements that occur when violations are discovered by Fire Prevention Officers after the C of O is issued. In those cases the cost to make these improvements will be higher then if they had been made during the initial construction of the building.

E53-18

E58-18

IBC: 1010.1.9.8, 1010.1.10, (IFC[BE] 1010.1.9.8, 1010.1.10)

Proposed Change as Submitted

Proponent: Ed Kulik, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Building Code

Revise as follows

1010.1.9.8 Delayed egress. Delayed egress locking systems shall be permitted to be installed on doors serving the following occupancies in buildings that are equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or an *approved automatic smoke or heat detection system* installed in accordance with Section 907.

1. Group B, F, I, M, R, S and U occupancies.
2. Group E classrooms with an *occupant load* of less than 50.

Exception: ~~Delayed~~

3. In a courthouse, delayed egress locking systems shall be permitted to be installed on exit or exit access doors, other than the main exit or exit access door, serving a Group A-3 courtroom in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

1010.1.10 Panic and fire exit hardware. Swinging doors serving a Group H occupancy and swinging doors serving rooms or spaces with an *occupant load* of 50 or more in a Group A or E occupancy shall not be provided with a latch or lock other than *panic hardware* or *fire exit hardware*.

Exceptions:

1. A main exit of a Group A occupancy shall be permitted to have locking devices in accordance with Section 1010.1.9.4, Item 2.
2. Doors provided with *panic hardware* or *fire exit hardware* and serving a Group A or E occupancy shall be permitted to be electrically locked in accordance with Section 1010.1.9.9 or 1010.1.9.10.
3. Courtrooms shall be permitted to be locked in accordance with Section 1010.1.9.8, Item 3.

Electrical rooms with equipment rated 1,200 amperes or more and over 6 feet (1829 mm) wide, and that contain overcurrent devices, switching devices or control devices with exit or *exit access* doors, shall be equipped with *panic hardware* or *fire exit hardware*. The doors shall swing in the direction of egress travel.

Reason: This is only a format issue resulting from the multiple changes last cycle to the delayed egress locks - E66-15 AMPC1, E68-15 AM/AMPC1, E69-15 AS. The allowance for courtrooms, while logical, is out of place as an exception to Items 1 and 2 in Section 1010.1.9.8.

Correlation with Section 1010.1.9.8 in Section 1010.1.10 is needed because this is Group A where panic hardware is otherwise required.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This is a format revision with no change to technical criteria.

E58-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: While it is appropriate to make the exception a third item, courtrooms are found in both office buildings (Group B) and courthouses (Group A-3). The proposal should be brought back with a public comment to address this issue. (Vote 13-1)

Assembly Action:

None

E58-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ed Kulik, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1010.1.9.8 Delayed egress. Delayed egress locking systems shall be permitted to be installed on doors serving the following occupancies in buildings that are equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or an *approved automatic smoke or heat detection system* installed in accordance with Section 907.

1. Group B, F, I, M, R, S and U occupancies.
2. Group E classrooms with an *occupant load* of less than 50.
3. In ~~a courthouse~~ courtrooms in Group A-3 and B occupancies, delayed egress locking systems shall be permitted to be installed on exit or *exit access* doors, other than the main exit or *exit access* door, ~~servicing a Group A-3 courtroom~~ in buildings that are equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

Commenter's Reason: This allowance is already permitted with the current text. The original proposal was editorial only.

The modification is because courtrooms can occur in government office buildings, such as traffic court. The same security concerns exist in all courtrooms, so it appropriate to include these facilities in the proposal. Unlike Section 1010.1.9.8, the new language in 1010.1.10 is a reference only, so no further revisions are needed.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This is a format revision with no change to technical criteria.

Public Comment 2:

Proponent: Crystal Sujeski, representing Crystal Sujeski (crystal.sujeski@fire.ca.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1010.1.9.8 Delayed egress. Delayed egress locking systems shall be permitted to be installed on doors serving the following occupancies in buildings that are equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or an *approved automatic smoke or heat detection system* installed in accordance with Section 907.

1. Group B, F, I, M, R, S and U occupancies..
2. Group E classrooms with an occupant load of less than 50.
3. In a ~~courthouse~~ Group A courthouses and court services within a Group B occupancy, delayed egress locking systems shall be permitted to be installed on exit or *exit* access doors, other than the main exit or exit access door, ~~serving a Group A-3 courtroom in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.~~

Commenter's Reason: The following modification has been proposed to E58-18 to clarify that courtrooms are not a B occupancy but there can be court services within a B occupancy building and shall be permitted to have delayed egress.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There will no cost effect

E58-18

E60-18

IBC: 1010.1.9.8.1, Chapter 35, (IFC[BE] 1010.1.9.8.1, Chapter 80)

Proposed Change as Submitted

Proponent: John Woestman, Kellen Co., representing Builders Hardware Manufacturers Association (BHMA)
(jwoestman@kellencompany.com)

2018 International Building Code

Revise as follows

1010.1.9.8.1 Delayed egress locking system. The delayed egress locking system shall be installed and operated in accordance with all of the following:

1. The delay electronics of the delayed egress locking system shall deactivate upon actuation of the *automatic sprinkler system* or *automatic fire detection system*, allowing immediate free egress.
2. The delay electronics of the delayed egress locking system shall deactivate upon loss of power controlling the lock or lock mechanism, allowing immediate free egress.
3. The delayed egress locking system shall have the capability of being deactivated at the *fire command center* and other *approved* locations.
4. An attempt to egress shall initiate an irreversible process that shall allow such egress in not more than 15 seconds when a physical effort to exit is applied to the egress side door hardware for not more than 3 seconds. Initiation of the irreversible process shall activate an audible signal in the vicinity of the door. Once the delay electronics have been deactivated, rearming the delay electronics shall be by manual means only.

Exception: Where *approved*, a delay of not more than 30 seconds is permitted on a delayed egress door.

5. The egress path from any point shall not pass through more than one delayed egress locking system.

Exceptions:

1. In Group I-2 or I-3 occupancies, the egress path from any point in the building shall pass through not more than two delayed egress locking systems provided that the combined delay does not exceed 30 seconds.
 2. In Group I-1 or I-4 occupancies, the egress path from any point in the building shall pass through not more than two delayed egress locking systems provided the combined delay does not exceed 30 seconds and the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.
6. A sign shall be provided on the door and shall be located above and within 12 inches (305 mm) of the door exit hardware:
 - 6.1. For doors that swing in the direction of egress, the sign shall read: PUSH UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 [30] SECONDS.
 - 6.2. For doors that swing in the opposite direction of egress, the sign shall read: PULL UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 [30] SECONDS.
 - 6.3. The sign shall comply with the visual character requirements in ICC A117.1.

Exception: Where *approved*, in Group I occupancies, the installation of a sign is not required where care recipients who because of clinical needs require restraint or containment as part of the function of the treatment area.

7. Emergency lighting shall be provided on the egress side of the door.
8. The delayed egress locking system units shall be *listed* in accordance with UL 294.
9. The delayed egress locking system shall comply with ANSI/BHMA A156.24.

Add new standard(s) follows

BHMA

Builders Hardware Manufacturers'
Association
355 Lexington Avenue, 15th Floor
New York NY 10017-6603
US

ANSI/BHMA A156.24-2018:

Delayed Egress Locking Systems

Reason: Delayed egress locking systems are a device, or a combination of devices, arranged to be locked in the direction of egress travel, and are intended to temporarily delay the egress of occupants.

Over the last two cycles of the IBC, delayed egress locking systems have been permitted in new occupancy groups and in some instances more than one delayed egress locking system is permitted in the egress path. These provisions were allowed in light of the increased need for security in E and I occupancies, as well as courtroom buildings.

In addition to the increase in allowed application of delayed egress, since 2012 the Code has evolved to recognize use of a 'delayed egress locking system' which is comprised of not just mechanical but electro-mechanical and electro-magnetic locking systems.

In light of the increased occupancy group allowance and application of more than one delayed egress locking system in the path of egress, requiring compliance to BHMA A156.24 Delayed Egress Locking Systems helps assure these locking systems will function reliably and as intended by the Code.

Cost Impact: The code change proposal will increase the cost of construction. Requiring delayed egress door locking hardware to comply with ANSI/BHMA A156.24 could be expected to increase the cost of the door hardware. But, recall that delayed egress locking systems are entirely optional (shall be permitted) and are not required by the IBC. Thus, the cost of construction may increase only where delayed egress locking systems are desired.

Also, many delayed egress door locking products are currently on the market today. Currently, the UL online certification directory for "Special Locking Arrangements" contains 23 unique files (23 manufacturers) in category code FWAX - Special Locking Arrangements - with over 100 product models listed for these applications. UL category FWAX includes many products for delayed egress door locking applications.

Analysis: A review of the standard proposed for inclusion in the code, ANSI/BMHA A156.24-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

E60-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposal was disapproved because the requirements delayed egress locking system should be in the code, not in a referenced standard. (Vote 9-5)

Assembly Action:

None

E60-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Woestman, Kellen Company, representing Builders Hardware Manufacturers Association (BHMA) (jwoestman@kellencompany.com) requests As Submitted.

Commenter's Reason: Addressing the committee reason for disapproval: we agree, requirements for delayed egress locking systems should be in the code. And they are. The proposed reference standard complements code requirements with technical requirements for operational testing, durability, and reliability to help ensure these delayed egress locking systems perform as expected.

Over the last two cycles of the IBC, delayed egress locking systems have been permitted in new occupancy groups and in some instances more than one delayed egress locking system is permitted in the egress path. These provisions were allowed in light of the increased need for security in E and I occupancies, as well as courtroom buildings. In addition to the increase in allowed application of delayed egress, since 2012 the Code has evolved to recognize use of a 'delayed egress locking system' which is comprised of not just mechanical but electro-mechanical and electromagnetic locking systems.

Requiring compliance to BHMA A156.24 Delayed Egress Locking Systems helps assure these locking systems will function reliably and as intended by the Code.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. Requiring delayed egress door locking hardware to comply with ANSI/BHMA A156.24 could be expected to increase the cost of the door hardware. But, recall that delayed egress locking systems are entirely optional (shall be permitted) and are not required by the IBC. Thus, the cost of construction may increase only where delayed egress locking systems are desired. Also, many delayed egress door locking products are currently on the market today. Currently, the UL online certification directory for Special Locking Arrangements contains 23 unique files (23 manufacturers) in category code FWAX Special Locking Arrangements with over 100 product models listed for these applications. UL category FWAX includes many products for delayed egress door locking applications.

E60-18

E62-18

IBC: 1010.1.9.12, (IFC[BE] 1010.1.9.12)

Proposed Change as Submitted

Proponent: John Woestman, Kellen Co., representing Builders Hardware Manufacturers Association (BHMA)
(jwoestman@kellencompany.com)

2018 International Building Code

Revise as follows

1010.1.9.12 Stairway doors. Interior *stairway means of egress* doors shall be openable from both sides without the use of a key or special knowledge or effort.

Exceptions:

1. *Stairway* discharge doors shall be openable from the egress side and shall only be locked from the opposite side.
2. This section shall not apply to doors arranged in accordance with Section 403.5.3.
3. *Stairway* exit doors are permitted to be locked from the side opposite the egress side, provided that they are openable from the egress side and capable of being unlocked simultaneously without unlatching upon a signal from the *fire command center*, if present, or a signal by emergency personnel from a single location inside the main entrance to the building. The door locking system units shall be listed in accordance with UL 294.
4. *Stairway exit* doors shall be openable from the egress side and shall only be locked from the opposite side in Group B, F, M and S occupancies where the only interior access to the tenant space is from a single *exit stairway* where permitted in Section 1006.3.3.
5. *Stairway* exit doors shall be openable from the egress side and shall only be locked from the opposite side in Group R-2 occupancies where the only interior access to the *dwelling unit* is from a single exit *stairway* where permitted in Section 1006.3.3.

Reason: Locks which are capable of being unlocked upon a signal from the fire command center (if present) or by a signal by emergency personnel from a single location inside the main entrance to the building would have to be electrified locks controlled by an electrical locking system. Consistent with other electrical locks and locking systems in the means of egress in Sections 1010.1.9.7 through 1010.1.9.10 (controlled egress doors, delayed egress doors, and electrically locked egress doors), it is appropriate to require these locking system units installed on stairway doors to be listed in accordance with UL 294.

Cost Impact: The code change proposal will increase the cost of construction

Explanation: The same locking devices available and used for the locks in Sections 1010.1.9.7 through 1010.1.9.10 (controlled egress doors, delayed egress doors, and electrically locked egress doors) would likely be used for stairway doors. These locks and locking systems are currently required by the code to be listed in accordance with UL 294 which does add to the cost of the product. However, Exception 3, where the new requirement is proposed is a "shall be permitted" provision, and only where this exception is voluntarily implemented would the potential cost increase be realized.

E62-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: There has been no justification, data or issue identified that would require UL listing for these stairway doors. These type of doors unlock with the loss of power. Adding the UL listing would increase the cost. (Vote 13-1)

Assembly Action:

None

E62-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Woestman, Kellen Company, representing Builders Hardware Manufacturers Association (BHMA) (jwoestman@kellencompany.com) requests As Submitted.

Commenter's Reason: Section 1010.1.9.12 requires interior stairway means of egress doors to be openable from both sides without the use of a key or special knowledge or effort to facilitate entrance into the stairway, and to facilitate leaving the stairway, should that be necessary during egress.

Exception 3 allows these stairways doors to be electrically locked from the stairway side (the side opposite egress) but must be unlockable electrically from the fire command center or by emergency personnel. Thus, the reliable operation of these electrical locks may be very important in egress situations.

Consistent with the current requirements for all electrical locking systems in the means of egress (see Sections 1010.1.9.7, 1010.1.9.8, 1010.1.9.9, and 1010.1.9.10), this proposal recommends requiring these electrical locking system units to be listed to UL 294

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
Explanation: The same locking devices available and used for the locks in Sections 1010.1.9.7 through 1010.1.9.10 (controlled egress doors, delayed egress doors, and electrically locked egress doors) would likely be used for stairway egress doors. These locks and locking systems are currently required by the code to be listed in accordance with UL 294 which does add to the cost of the product. However, Exception 3, where the new requirement is proposed is a shall be permitted provision, and only where this exception is voluntarily implemented would the potential cost increase be realized.

E62-18

E64-18

IBC: 1010.1.10, 1010.1.10.1 (New), (IFC[BE] 1010.1.10, 1010.1.10.1 (New))

Proposed Change as Submitted

Proponent: Ed Kulik, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Building Code

Revise as follows

1010.1.10 Panic and fire exit hardware. Swinging doors serving a Group H occupancy and swinging doors serving rooms or spaces with an *occupant load* of 50 or more in a Group A or E occupancy shall not be provided with a latch or lock other than *panic hardware* or *fire exit hardware*.

Exceptions:

1. A main exit of a Group A occupancy shall be permitted to have locking devices in accordance with Section 1010.1.9.4, Item 2.
2. Doors provided with *panic hardware* or *fire exit hardware* and serving a Group A or E occupancy shall be permitted to be electrically locked in accordance with Section 1010.1.9.9 or 1010.1.9.10.

~~Electrical rooms with equipment rated 1,200 amperes or more and over 6 feet (1829 mm) wide, and that contain overcurrent devices, switching devices or control devices with exit or exit access doors, shall be equipped with *panic hardware* or *fire exit hardware*. The doors shall swing in the direction of egress travel.~~

Add new text as follows

1010.1.10.1 Rooms with electrical equipment. Exit or exit access doors serving transformer vaults, rooms designated for batteries or energy storage systems, or modular data centers shall be equipped with panic hardware or fire exit hardware. Where rooms contain electrical rooms with equipment rated 800 amperes or more that contain overcurrent devices, switching devices or control devices and where the exit or exit access door is less than 25 feet from the equipment working space, shall be equipped with panic hardware or fire exit hardware. The doors shall swing in the direction of egress travel.

Reason: The current requirements in the International Building Code are not in alignment with the requirements in NFPA 70, the National Electrical Code. Section 110.26(C)(3) requires where there are exit or exit access doors serving a room with electrical equipment rated 800 amperes or more those doors shall be equipped with listed panic hardware. Equipment rated 1200 amperes or more is used to determine the number and locations of exits or exit access doorways, which is addressed in Section 1006.2.2. Also, NFPA 70 for transformer vaults (in Sections

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>.

Cost Impact: The code change proposal will not increase or decrease the cost of construction Chapter 27 of the IBC already requires electrical installations to comply with the provisions of NFPA 70. This proposal aligns the requirements in the IBC with NFPA 70.

E64-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 1010.1.10.1 Rooms with electrical equipment. Exit or exit access doors serving transformer vaults, rooms designated for batteries or energy storage systems, or modular data centers shall be equipped with panic hardware or fire exit hardware. Where rooms contain electrical rooms with equipment rated 800 amperes or more that contain overcurrent devices, switching devices or control devices and where the exit or exit access door is less than 25 feet from the equipment working space, shall be equipped with panic hardware or fire exit hardware. The doors shall swing in the direction of egress travel.

Committee Reason: By adding travel distance, the modification did add a missing part for coordination with the National Electrical Code. However, there is concern on if 'equipment work space' would be understood and how the distance should be measured.

This proposal would coordinate with the committee action on E17-18. The terms for what types of rooms are addressed is in the National Electrical Code, so which rooms should be understood. It was suggested that perhaps the NEC references in E17-18 should also be added into this section in a public comment. (Vote 10-3)

Assembly Action:

None

E64-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ed Kulik, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

1010.1.10.1 Rooms with electrical equipment. Exit or exit access doors serving transformer vaults, rooms designated for batteries or energy storage systems, or modular data centers shall be equipped with panic hardware or fire exit hardware. ~~Where rooms contain~~ Rooms containing electrical rooms with equipment rated 800 amperes or more and that contain overcurrent devices, switching devices or control devices and where the exit or exit access door is less than 25 feet from the equipment working space as required by NFPA 70, ~~shall be equipped with such doors shall not be provided with a latch or lock other than~~ panic hardware or fire exit hardware. The doors shall swing in the direction of egress travel.

Commenter's Reason: The change at the beginning of the sentence is editorial for better english. To assist the code user regarding the specific requirements for "working space", a further modification is proposed to reference NFPA 70, which contains those requirements. Also, clarification is proposed to ensure that no latch or lock is to be provided, other than the panic or fire exit hardware.

To coordinate with E17-18 it is the intent of the BCAC to direct the code user to the new requirements in Section 1006.2.2.4 for electrical rooms. The new Section 1006.2.2.4 directs the code user to the specific sections in NFPA 70 for the working space requirements, including the definition of these spaces. However, reference to this section cannot be made at this time because the section does not exist in the 2018 code.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Chapter 27 of the IBC already requires electrical installations to comply with the provisions of NFPA 70. This proposal aligns the requirements in the IBC with NFPA 70. Also, the clarification will assist the code user in locating the specific requirements.

E64-18

E67-18

IBC: 1011.5.5, (IFC[BE] 1011.5.5)

Proposed Change as Submitted

Proponent: David Cooper, representing Stairbuilders and Manufacturers Association (SMA) (coderep@stairways.org)

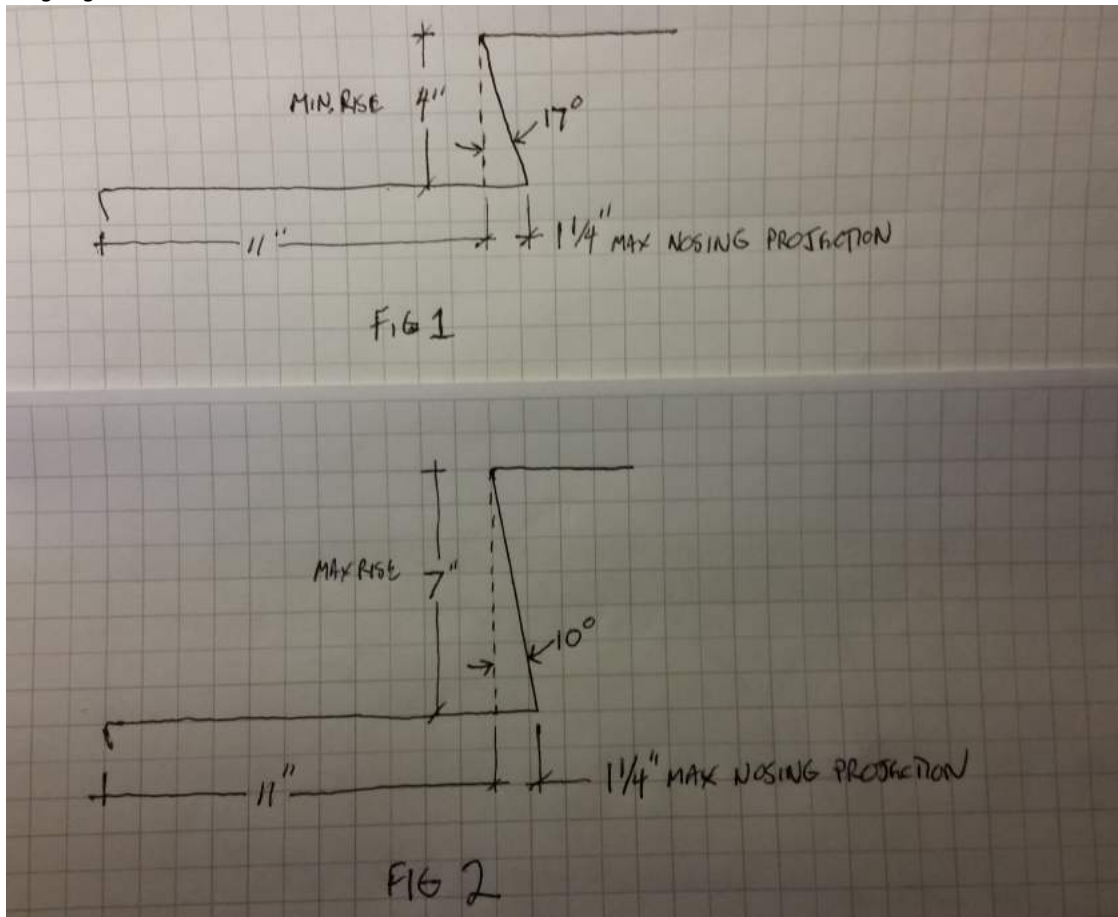
2018 International Building Code

Revise as follows

1011.5.5 Nosing and riser profile. *Nosings* shall have a curvature or bevel of not less than $\frac{1}{16}$ inch (1.6 mm) but not more than $\frac{9}{16}$ inch (14.3 mm) from the foremost projection of the tread. Risers shall be solid and vertical or sloped under the tread above from the underside of the *nosing* above ~~at an angle not more than 30 degrees (0.52 rad) from the vertical provided the nosing projection is in accordance with Section 1011.5.5.1.~~

1011.5.5.1 Nosing projection size. The leading edge (nosings) of treads shall project not more than $1\frac{1}{4}$ inches (32 mm) beyond the tread below.

Reason: Figure 1 illustrates the sloped riser angle at the minimum riser height and maximum nosing projection. Figure 2 illustrates the sloped riser angle at the maximum riser height and maximum nosing projection. The current language is confusing because it is impossible to slope the riser anywhere close to 30 degrees without greatly exceeding the maximum nosing projection. The proposed change correlates an appropriate limit and clarifies widely misunderstood code language.



Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal only clarifies the intent of the code and does not change materials or methods.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposal did not consider the idea of a compound slope for the riser. The original intent of the 30 degrees is to avoid a toe catch on the underside of the tread. There was no data provided on this being an issue. (Vote 14-0)

Assembly Action:

None

E67-18

Individual Consideration Agenda

Public Comment 1:

Proponent: David Cooper, representing Stairbuilders and Manufacturers Association (SMA) (coderep@stairways.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1011.5.5 Nosing and riser profile. *Nosings* shall have a curvature or bevel of not less than $\frac{1}{16}$ inch (1.6 mm) but not more than $\frac{9}{16}$ inch (14.3 mm) from the foremost projection of the tread. Risers shall be solid and vertical or sloped under the tread above from the underside of the *nosing* above at an angle not more than 30 degrees (0.52 rad) from the vertical provided the nosing projection is in accordance with Section 1011.5.5.1.

1011.5.5.1 Nosing projection size. The leading edge (nosings) of treads shall project not more than $1\frac{1}{4}$ inches (32 mm) beyond the tread below.

Commenter's Reason: This public comment addresses both the committee's concern and the intent of the proponent. The text deleted from the original proposal has been returned due to the concern for an angular limit on risers with compound slopes however the added text needs to remain.

If the face of the riser is angled at 30 degrees under the tread above unabated, especially at lower riser heights it can create a wedge for the toe of the shoe. I have listed the referenced section, **1011.5.5.1 Nosing projection size**, without change to aid understanding. By referencing this section it clarifies that the maximum projection of the nosing over the tread below is not to be exceeded regardless of the angle of the riser.

We request your approval of this public comment to clarify the code and resolve a common misunderstanding.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal only clarifies the code and will not affect labor or materials related to the cost of construction.

E67-18

E69-18

IBC: 1011.6, (IFC[BE] 1011.6)

Proposed Change as Submitted

Proponent: David Cooper, Stair Manufacturing and Design Consultants, representing Stairbuilders and Manufacturers Association (SMA) (coderep@stairways.org)

2018 International Building Code

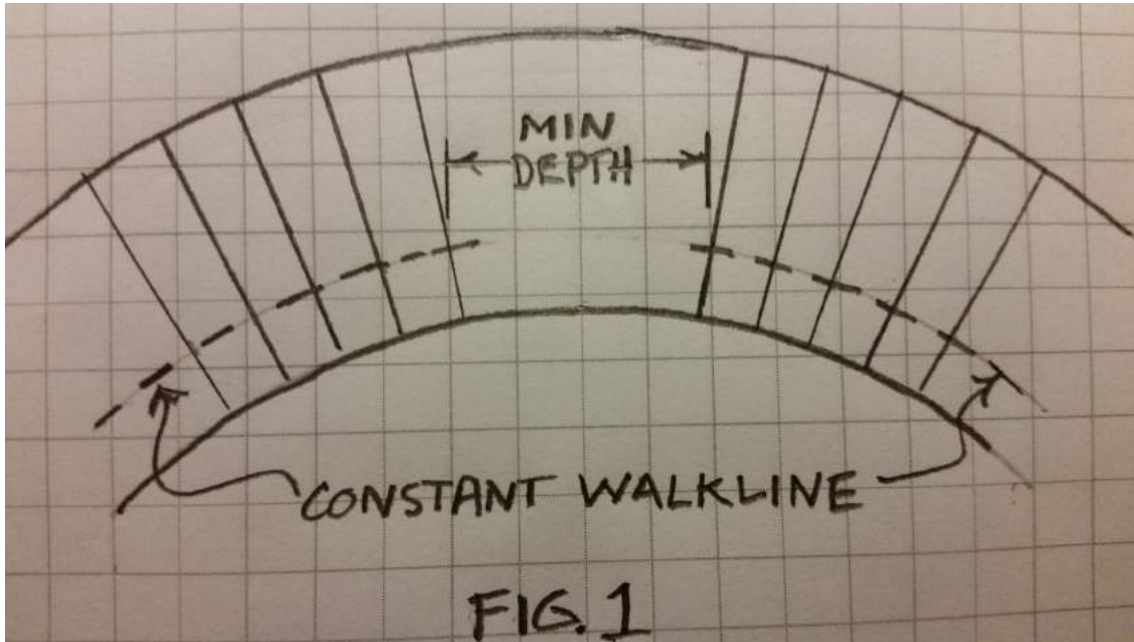
Revise as follows

1011.6 Stairway landings. There shall be a floor or landing at the top and bottom of each *stairway*. The width of landings, measured perpendicularly to the direction of travel, shall be not less than the width of *stairways* served. Every landing shall have a minimum depth, measured parallel to the direction of travel, equal to the width of the *stairway* or 48 inches (1219 mm), whichever is less. Doors opening onto a landing shall not reduce the landing to less than one-half the required width. When fully open, the door shall not project more than 7 inches (178 mm) into a landing. Where wheelchair spaces are required on the *stairway* landing in accordance with Section 1009.6.3, the *wheelchair space* shall not be located in the required width of the landing and doors shall not swing over the *wheelchair spaces*.

Exception-Exceptions:

1. Where *stairways* connect stepped *aisles* to cross *aisles* or concourses, *stairway* landings are not required at the transition between *stairways* and stepped *aisles* constructed in accordance with Section 1029.
2. At intermediate landings of curved stairways the landing depth shall be measured along the walkline radius between the nosings of the flights adjoining the landing.

Reason: Similar to a straight run stairway with a landing separating two flights aligned in a straight line the paths of travel on the stairway shown in figure 1 is a continuum. This new exception provides needed specification of where to regulate the landing depth. Due to the tapered shape of the landing similar to the treads of the adjoining flights it makes sense to regulate the depth like the treads at the walklines of the flights. This proposal will provide for consistent interpretation and enforcement.



Cost Impact: The code change proposal will not increase or decrease the cost of construction. Although the size of these landings are currently open to wide interpretation we feel that this change will not change the cost of construction.

E69-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: It is not clear how you would establish a walk line on a curved stairway. The current language for walk lines is only applicable to winder treads. The proposed language is a requirement, not an exception. (Vote 13-1)

Assembly Action:

None

E69-18

Individual Consideration Agenda

Public Comment 1:

Proponent: David Cooper, representing Stairbuilders and Manufacturers Association (SMA) (coderep@stairways.org) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

1011.6 Stairway landings. There shall be a floor or landing at the top and bottom of each *stairway*. The width of landings, measured perpendicularly to the direction of travel, shall be not less than the width of *stairways* served. Every landing shall have a minimum depth, measured parallel to the direction of travel, equal to the width of the *stairway* or 48 inches (1219 mm), whichever is less. Doors opening onto a landing shall not reduce the landing to less than one-half the required width. When fully open, the door shall not project more than 7 inches (178 mm) into a landing. Where wheelchair spaces are required on the *stairway* landing in accordance with Section 1009.6.3, the *wheelchair space* shall not be located in the required width of the landing and doors shall not swing over the *wheelchair spaces*.

~~Exception:~~ Exceptions

1. Where *stairways* connect stepped *aisles* to cross *aisles* or concourses, *stairway* landings are not required at the transition between *stairways* and stepped *aisles* constructed in accordance with Section 1029.
2. Where curved stairways of constant radius have intermediate landings, the landing depth shall be measured horizontally between the intersection of the walkline of the lower flight at the landing nosing and the intersection of the walkline of the upper flight at the nosing of the lowest tread of the upper flight.

Commenter's Reason: The committee's misinformed and unfounded reason for disapproval cites that walkline as in section **1011.4 Walkline** is only related to winders and not curved stairways. This is simply incorrect. The IBC definition of **Winder** is, *A tread with nonparallel edges.*

In fact this means that the treads in a curved stairway with edges that are not parallel are winder treads and are regulated for depth at the *walkline*. Furthermore the code recognizes this in the first sentence of the Curved stairway section

"1011.9 Curved stairways. *Curved stairways with winder treads shall have...*"

None of the committee recognized or corrected this misinformation that clearly influenced their discussion and vote.

I have taken the time to rewrite the language to more clearly identify this as an exception to measuring landing depth parallel to the direction of travel as stated in the requirement. This exception further provides needed direction as to where the measurement should be taken on the "pie" shaped landing. Currently where to measure the depth is open to wide interpretation. Winder tread depth is regulated at the walkline so it only seems logical to regulate the landing depth of curved stairways of constant radius between the intersections of the nosings and the walklines of the flights.

I urge you to approve this needed change to allow for consistent interpretation and enforcement of curved stairway landing depth.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. Certain unnecessary costs arising from rebuilding non-compliant stair structures will be eliminated.

E69-18

E70-18

IBC: 1011.6, (IFC[BE] 1011.6)

Proposed Change as Submitted

Proponent: David Cooper, Stair Manufacturing and Design Consultants, representing Stairbuilders and Manufacturers Association (SMA) (coderep@stairways.org)

2018 International Building Code

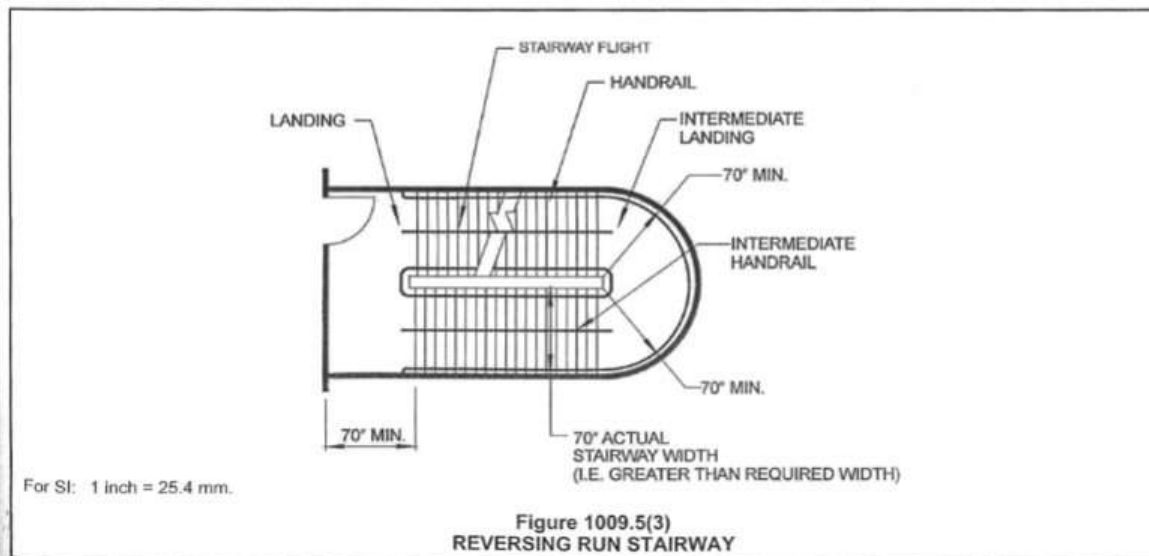
Revise as follows

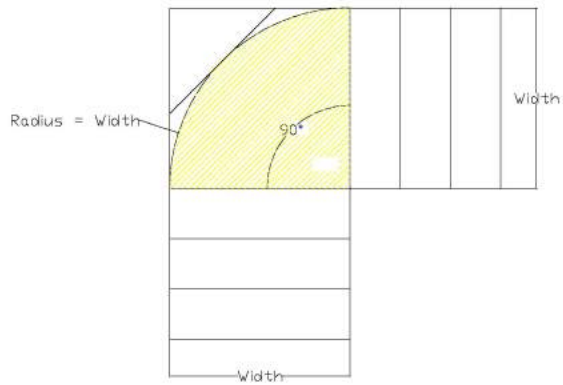
1011.6 Stairway landings. There shall be a floor or landing at the top and bottom of each *stairway*. The width of landings, measured perpendicularly to the direction of travel, shall be not less than the width of *stairways* served. Every landing shall have a minimum depth, measured parallel to the direction of travel, equal to the width of the *stairway* or 48 inches (1219 mm), whichever is less. Doors opening onto a landing shall not reduce the landing to less than one-half the required width. When fully open, the door shall not project more than 7 inches (178 mm) into a landing. Where wheelchair spaces are required on the *stairway* landing in accordance with Section 1009.6.3, the *wheelchair space* shall not be located in the required width of the landing and doors shall not swing over the *wheelchair spaces*.

Exception-Exceptions:

1. Where *stairways* connect stepped *aisles* to cross *aisles* or concourses, *stairway* landings are not required at the transition between *stairways* and stepped *aisles* constructed in accordance with Section 1029.
2. The landing at stairway turns of 90 degrees (1.57 rad) or more shall not be required to provide a minimum depth in accordance with this section where the corner of the landing on the outside of the turn in plan has been truncated and the area of the landing provided is not less than that described by an arc with a radius equal to the width of the flight served.

Reason: This proposal simply reiterates the interpretation found in the IBC commentary for more than a decade that has aptly provided guidance to the fact that landings of stairways need not be rectilinear in shape. Truncating the outside corner by rounding or beveling in plan without reduction of the effective width in the path of travel can actually improve compliant use of handrails when continuous handrails are optionally provided at landings by eliminating the need to unnaturally stray from the travel path into the corner to maintain a continuous grip on the handrail. A proposal with similar intent failed in the last cycle because the text was interpreted to allow a wall niche to be added to a landing to meet the minimum area requirement. This proposal clearly describes the condition under which the corner of a landing may be truncated in plan. In this proposal the turn is described as a turn in the “stairway”. By definition landings and flights of stairs compose stairways and thus the term “stairway turns” is appropriate.





Example of 90 degree stairway turn with minimum landing size.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal clarifies the code text to comply with the the most common interpretation and will not increase construction costs.

E70-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The new exception 2 is a run on sentence that should be simplified. The phrase "direction of travel" is confusing. The new exception is not needed as this landing shape can be done with current language. Stairway landing commonly have standpipes in the corner without any issues. The proposal does not address what do you do if there turn is less than 90 degrees. (Vote 14-0)

Assembly Action:

None

E70-18

Individual Consideration Agenda

Public Comment 1:

Proponent: David Collins, representing The American Institute of Architects (dcollins@preview-group.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1011.6 Stairway landings. There shall be a floor or landing at the top and bottom of each *stairway*. The width of landings, measured perpendicularly to the direction of travel, shall be not less than the width of *stairways* served. Every landing shall have a minimum depth, measured parallel to the direction of travel, equal to the width of the *stairway* or 48 inches (1219 mm), whichever is less. Doors opening onto a landing shall not reduce the landing to less than one-half the required width. When fully open, the door shall not project more than 7 inches (178 mm) into a landing. Where wheelchair spaces are required on the *stairway* landing in accordance with Section 1009.6.3, the *wheelchair space* shall not be located in the required width of the landing and doors shall not swing over the *wheelchair spaces*.

Exceptions:

1. Where *stairways* connect stepped *aisles* to cross *aisles* or concourses, *stairway* landings are not required at the transition between *stairways* and stepped *aisles* constructed in accordance with Section 1029.
2. ~~The Where a landing at stairway turns of 90 degrees (1.57 rad) or more shall not be required to provide a minimum, the minimum landing depth in accordance with this section where the corner of the landing on the outside of the turn in plan has been truncated and the area of shall not be required where~~ the landing provided is not less than that described by an arc with a radius equal to the width of the flight served.

Commenter's Reason: The committee rightly suggested that this exception should be rewritten to clearly state what is intended. As noted in the original supporting statement, the commentary on Section 1011.6 specifically states: *It is not the intent of this section to require that a stairway landing be shaped as a square or rectangle. A landing turning the stairway 90 degrees (1.57 rad) or more with a curved or segmented outside periphery would be permitted, as long as the landing provides an area described by an arc with a radius equal to the actual stairway width [see Commentary Figure 1011.6(3)]. In this case, the space necessary for means of egress will be available.*

The proposed modification will clarify that the landing may be configured to provide the minimum width on a landing by the arc at the minimum width of the stair. Figure 1011.6(3) describes a "reversing run stairway" which is reflected in the proposed code text.

We urge the membership to approve this change as modified by this proposal in order to make the code and the commentary clear.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. The revised language will clarify how a landing can be configured as discussed in the ICC Commentary on this section of the code. The clarity in the code will simplify design and review and save time and money in the process.

Public Comment 2:

Proponent: William Warlick, representing Salt Lake City Building Services requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

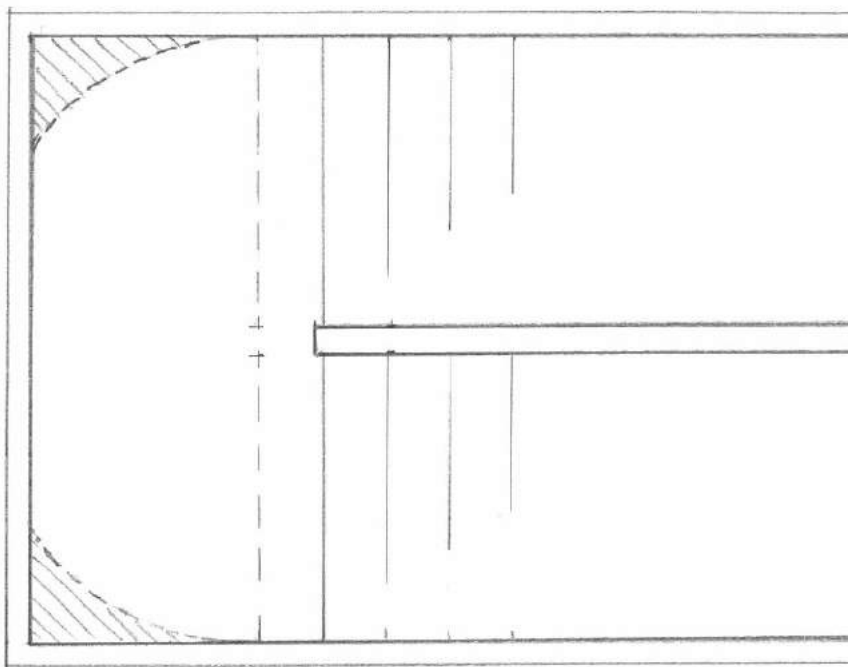
1011.6 Stairway landings. There shall be a floor or landing at the top and bottom of each *stairway*. The width of landings, measured perpendicularly to the direction of travel, shall be not less than the width of *stairways* served. Every landing shall have a minimum depth, measured parallel to the direction of travel, equal to the width of the *stairway* or 48 inches (1219 mm), whichever is less. Doors opening onto a landing shall not reduce the landing to less than one-half the required width. When fully open, the door shall not project more than 7 inches (178 mm) into a landing. Where wheelchair spaces are required on the *stairway* landing in accordance with Section 1009.6.3, the *wheelchair space* shall not be located in the required width of the landing and doors shall not swing over the *wheelchair spaces*.

Exceptions:

1. Where *stairways* connect stepped *aisles* to cross *aisles* or concourses, *stairway* landings are not required at the transition between *stairways* and stepped *aisles* constructed in accordance with Section 1029.
2. The landing at stairway turns of 90 degrees (1.57 rad) or more shall not be required to provide a minimum depth in accordance with this section where the corner of the landing on the outside of the turn in plan has been truncated and, provided the area of the landing provided is not less than that described by an arc with a radius equal to truncated area falls outside an arc whose radius equals the width of the flight served and which starts the depth of one tread beyond the riser.

Commenter's Reason: We are writing in support of the general intent of code change proposal E70-18. In addition, we offer an amendment that clarifies language and offers a more restrictive view of the minimum landing area. We believe this code change would be useful, for example, to allow standpipes, as required in 905.4, to be placed in the outside corners of landings (a common practice that is commonly allowed). The language is clarified by focusing the definition on limiting the area that may be "truncated" from the basic rectangular landing defined in 1011.6.

The more restrictive view of the minimum landing area is offered because we feel there is a need for a greater dimension in the direction of travel on a stair flight to provide adequate room on the landing for changing gait and changing direction. So, we add to the 'arc'-defined floor plan an area equal to the another stair tread. We took the dimension of handrail extensions (1014.6) as a model to define this floor space. The figure shows the area outside the arc which may be truncated.



Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Clarification - no cost impact.

E71-18

IBC: 1011.11, (IFC[BE] 1011.11)

Proposed Change as Submitted

Proponent: Don Birdsall, LIFT-U Division of Hogan Mfg., Inc., representing LIFT-U Division of Hogan Mfg., Inc. (donbirdsall@hoganmfg.com)

2018 International Building Code

Revise as follows

1011.11 Handrails. *Flights of stairways* shall have *handrails* on each side and shall comply with Section 1014. Where glass is used to provide the *handrail*, the *handrail* shall comply with Section 2407.

Exceptions:

1. *Flights of stairways* within *dwelling units* and *flights of spiral stairways* are permitted to have a *handrail* on one side only.
2. Decks, patios and walkways that have a single change in elevation where the landing depth on each side of the change of elevation is greater than what is required for a landing do not require *handrails*.
3. In Group R-3 occupancies, a change in elevation consisting of a single riser at an entrance or egress door does not require *handrails*.
4. Changes in room elevations of three or fewer risers within *dwelling units* and *sleeping units* in Group R-2 and R-3 do not require handrails.
5. Where a platform lift in the park position is accessed by a stairway with two or fewer risers, handrails are not required where handholds are provided that comply with the following:
 - 5.1 Handholds are provided on each side of the top landing.
 - 5.2. Handholds are provided vertically or horizontally with gripping surfaces 34 inches (864mm) high minimum and 42 inches (1066 mm) high maximum above the bottom landing.
 - 5.3. Handholds shall comply with the graspability provisions for handrails and have a length of not less than 4.5 inches (144 mm).

Reason: The primary intent of this new exception is to provide a safe alternative for a limited situation at platform lifts used to access small raised areas. Because of the movement of the lift, standard set handrails will not work. However, typically these lifts are surrounded by short walls that can serve as handholds for someone to grab to stop a possible fall. This condition frequently exists when a wheelchair lift is installed in a courtroom to provide access to the witness stand and judges' bench. The lift platform is the floor of the Witness Stand. The platform at the entrance to the Witness Stand is commonly parked at a height requiring a step to enter. The Witness Stand is surrounded by millwork low walls. A similar condition can exist in government meeting rooms, churches, and academic buildings. Section 1011.11 requires two handrails starting at a one riser stairway. The addition of handrails interferes with the vertical travel of the platform lift. The judges' bench and often the witness stand are required to be elevated for safety and court function. A platform lift is required to make these areas accessible by both the ADA and the IBC.

This additional exception provides and describes handholds for this limited situation that assist the person walking up and down the steps and do not interfere with the platform lift operation for persons with mobility issues.





Video of situation: <https://hoganmfg.sharefile.com/d-s7519e8a5a7148c48>

Bibliography: International Building Code 2015
ASME A18.1 Safety Standard for Platform Lifts and Stairway Chairlifts, 2014 Edition

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This revision will have minimal to no impact on the cost of the project and will allow access to the Justice System for all users - motion impaired and ambulatory. A barrier removal facilitation change.

E71-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal would be a compromise between accessibility and stairway safety requirements for this condition. However, there was a concern about the understanding of the terms “parked position” and “handhold”. What is the length and location of the handhold? It was suggested that “creates a stairway” would be more understandable than “accessed by a stairway.” (Vote 11-3)

Assembly Action:

None

E71-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Don Birdsall, representing LIFT-U Division of Hogan Mfg., Inc. (donbirdsall@hoganmfg.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

1011.11 Handrails. *Flights of stairways shall have handrails on each side and shall comply with Section 1014. Where glass is used to provide the handrail, the handrail shall comply with Section 2407.*

Exceptions:

1. Flights of stairways within dwelling units and flights of spiral stairways are permitted to have a handrail on one side only.
2. Decks, patios and walkways that have a single change in elevation where the landing depth on each side of the change of elevation is greater than what is required for a landing do not require *handrails*.
3. In Group R-3 occupancies, a change in elevation consisting of a single riser at an entrance or egress door does not require *handrails*.
4. Changes in room elevations of three or fewer risers within dwelling units and sleeping units in Group R-2 and R-3 do not require *handrails*.
5. Where a platform lift is in a stationary position and the floor of the platform lift serves as the upper landing of a stairway, handrails shall not be required on the stairway, provided that all of the following criteria are met:
 - 5.1. The stairway contains no more than two risers.
 - 5.2. A handhold, positioned horizontally or vertically, is located on one side of the stairway adjacent to the top landing.
 - 5.3. The handhold is located not less than 34 inches (864 mm) and not more than 42 inches (1066 mm) above the bottom landing of the stairway.
 - 5.4. The handhold gripping surface complies with Section 1014.3, and is not less than 4.5 inches (144 mm) in length.

Commenter's Reason: The Committee agreed that this proposal was reasonable, but need a few clarifications. The revised language clarifies the configuration where the exception would be applicable and better defines where the handhold should be placed.

The reference back to Section 1014.3 specifies the graspability requirements used for handrails to ensure safe use.

Bibliography: ASME A18.1 Safety Standard for Platform Lifts and Stairway Chairlifts, 2014 Edition
International Building Code 2015

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This revision will allow a handhold for this application that costs no more than a handrail and will permit the use of the wheelchair lift without interference.

E76-18

IBC: 1014.1, 1014.9(New), (IFC[BE] 1014.1, 1014.9(New))

Proposed Change as Submitted

Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development Committee (lkranz@bellevuewa.gov)

2018 International Building Code

Revise as follows

1014.1 Where required. *Handrails serving flights of stairways, ramps, stepped aisles and ramped aisles shall be adequate in strength and attachment in accordance with Section 1607.8. Handrails required for flights of stairways by Section 1011.11 shall comply with Sections 1014.2 through 1014.9-1014.10. Handrails required for ramps by Section 1012.8 shall comply with Sections 1014.2 through 1014.8. Handrails for stepped aisles and ramped aisles required by Section 1029.16 shall comply with Sections 1014.2 through 1014.8.*

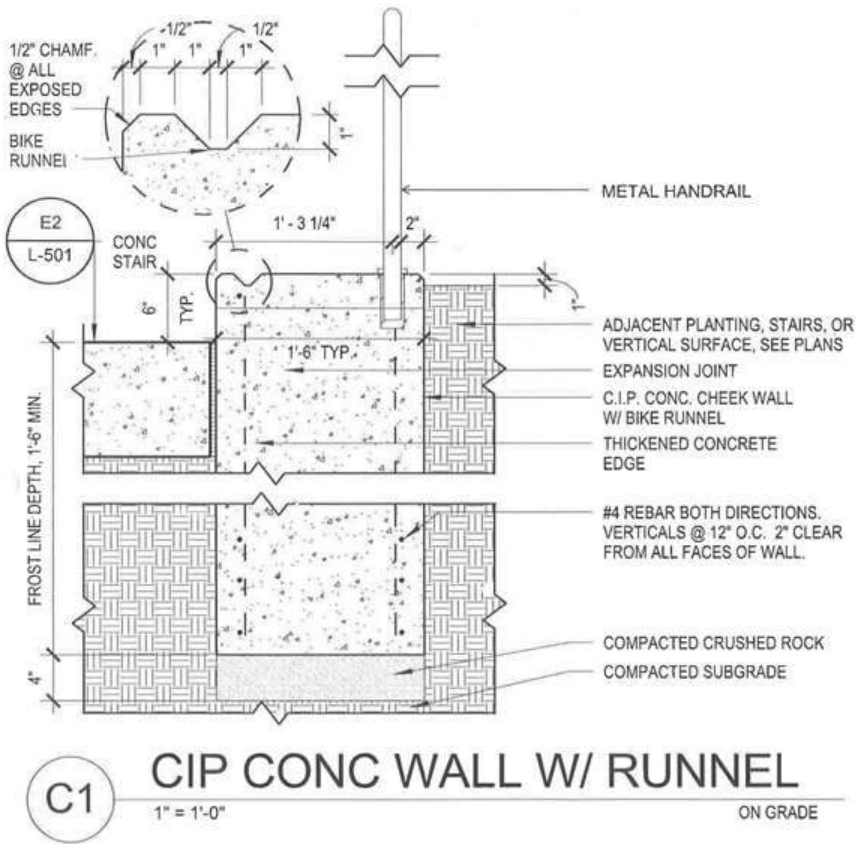
Add new text as follows

1014.9 Reach range. Handrails on the side of stairways shall be located not more than 12 inches (305 mm) laterally outward from the edge of stairway treads.

Revise as follows

~~1014.9-1014.10 Intermediate handrails.~~ *Stairways shall have intermediate handrails located in such a manner that all portions of the stairway minimum width or required capacity are within 30 inches (762 mm) of a handrail. On monumental stairs, handrails shall be located along the most direct path of egress travel.*

Reason: Recently I reviewed a stairway design that included a bicycle runnel. Runnels are typically a 15" to 20" wide sloped track that allows a rider to push a bicycle along the side of the stairway while traversing up or down. Currently the code does not limit the maximum distance that a handrail may be located from the edge of the stair treads. The 12" limitation was chosen to allow enough room for runnels while maintaining a comfortable distance for pedestrians to reach the handrail.



SDR - BIKE RUNNEL AND HANDRAIL EXHIBIT
GGLO, 02/23/2017

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This change will not affect the cost of construction one way or the other because no additional materials or labor are needed to make the installation.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: If this is just an issue for people carrying bikes down a stairway safely, perhaps this should be limited to exterior stairways only. Any protrusion that moves farther out than the handrail could be a hazard to the pedestrian on the stairways. (Vote 14-0)

Assembly Action:

None

E76-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Gene Boecker, representing Code Consultants, Inc. (geneb@codeconsultants.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1014.9 Reach range. ~~Handrails~~ The inner edge of handrails on the side of stairways shall be located not more than 12 inches (305 mm) laterally outward from the ~~further than the outer edge of stairway treads.~~

Commenter's Reason: During testimony it was discussed that, for safety reasons, the handrail should not be located too far from the side of the stairway. Curiously, no language exists to address what should be provided as a side reach to the handrails. The revised language is consistent with the information provided during testimony.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The proposed language is only a clarification of the intent.

E76-18

E79-18

IBC: 1015.4, (IFC[BE] 1015.4)

Proposed Change as Submitted

Proponent: David Cooper, Stair Manufacturing and Design Consultants, representing Stairbuilders and Manufacturers Association (SMA) (coderep@stairways.org)

2018 International Building Code

Revise as follows

1015.4 Opening limitations. Required *guards* shall not have openings that allow passage of a sphere 4 inches (102 mm) in diameter from the walking surface to the required *guard* height.

Exceptions:

1. From a height of 36 inches (914 mm) to 42 inches (1067 mm), *guards* shall not have openings that allow passage of a sphere $4\frac{3}{8}$ inches (111 mm) in diameter.
2. The triangular openings at the open sides of a stair, formed by the riser, tread and bottom rail shall not allow passage of a sphere 6 inches (152 mm) in diameter.
3. At elevated walking surfaces for access to and use of electrical, mechanical or plumbing systems or equipment, *guards* shall not have openings that allow passage of a sphere 21 inches (533 mm) in diameter.
4. In areas that are not open to the public within occupancies in Group I-3, F, H or S, and for *alternating tread devices* and ships ladders, *guards* shall not have openings that allow passage of a sphere 21 inches (533 mm) in diameter.
5. In assembly seating areas, *guards* required at the end of *aisles* in accordance with Section 1029.17.4 shall not have openings that allow passage of a sphere 4 inches (102 mm) in diameter up to a height of 26 inches (660 mm). From a height of 26 inches (660 mm) to 42 inches (1067 mm) above the adjacent walking surfaces, *guards* shall not have openings that allow passage of a sphere 8 inches (203 mm) in diameter.
6. ~~Within individual dwelling units and sleeping units in Group R-2 and R-3 occupancies, guards~~ Guards on the open sides of *stairs* shall not have openings that allow passage of a sphere $4\frac{3}{8}$ (111 mm) inches in diameter.

Reason: The $4\frac{3}{8}$ inch sphere rule for guards on stairs has been working well without issue and has proven to be effective in both IBC residential applications and IRC applications, where the susceptible, very- young-children, are far more prevalent than in commercial and public places. A 4" sphere rule requirement for stair guards is an unnecessary and excessive regulation. This change will increase the sphere rule limitation to $4\frac{3}{8}$ inches for all stair guards but will not affect other required guards.

Cost Impact: The code change proposal will decrease the cost of construction. Fewer balusters or less in-fill material will reduce both material and fabrication costs.

E79-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The original justification for this 4-3/8" was for residential tread sizes. While there were studies showing this spacing would address safety concerns, allowing the 4-3/8" openings for all occupancies seems too broad. (Vote 10-3)

Assembly Action:

None

E79-18

Individual Consideration Agenda

Public Comment 1:

Proponent: David Cooper, representing Stairbuilders and Manufacturers Association (SMA) (coderep@stairways.org)requests As Submitted.

Commenter's Reason: I must emphasize that this proposal does not affect all openings as the committee's reason for disapproval indicates. This only changes the openings in stair guards in occupancies other than within dwelling units where it is already allowed. This is an area of the code that could be simplified for enforcement. The issue of infants on public and commercial stairways is far less than that in the home where a 4 3/8 inch sphere rule has been the norm for many years in both the IBC and IRC. The 4 3/8 inch sphere rule was adopted because infants are not left alone on stairways and was justified by the work of the Climbable Guard Study Group of the CTC after 3 years devoted to the topics related to guard safety one of which was fall through accidents.

Bibliography: Review of Fall Safety of Children Between the Ages of 18 Months and 4 Years In Relation to Guards and Climbing in the Built Environment, 3720.001_20071204R20080506; Alan Hedge, Ph.D.; Thomas Kenney, P.E.; Phillip Davis, December 4, 2007; Prepared for the the National Ornamental and Miscellaneous Metals Association with peer review

<https://www.stairways.org/resources/Documents/NOMMA%20Final%20Report%2020080506R.pdf>

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction Fewer balusters in stair guards will save labor and materials.

E79-18

E81-18

IBC: 1015.8, (IFC[BE] 1015.8)

Proposed Change as Submitted

Proponent: Jim Tidwell, Tidwell Code Consulting, representing Self (jimtidwell@tccfire.com); Jim Graham, Self, representing National Association for Child Window Safety (jgraham@childwindowsafety.org)

2018 International Building Code

Revise as follows

1015.8 Window openings. 1015.8 Window openings. Windows in Group R-2 and R-3 buildings including dwelling units, where the top of the sill of an operable window opening is located ~~less than 36 inches above the finished floor and~~ more than 72 inches (1829 mm) above the finished grade or other surface below on the exterior of the building, shall comply with one of the following:

1. Operable windows where the top of the sill of the opening is located more than 75 feet (22 860 mm) above the finished grade or other surface below and that are provided with window fall prevention devices that comply with ASTM F2006.
2. Operable windows where the openings will not allow a 4-inch-diameter (102 mm) sphere to pass through the opening when the window is in its largest opened position.
3. Operable windows where the openings are provided with window fall prevention devices that comply with ASTM F2090.
4. Operable windows that are provided with window opening control devices that comply with Section 1015.8.1. .

Exception: Windows over counters, plumbing fixtures or doors.

Reason: This code change is intended to address the ongoing problem of children climbing onto and falling from windows. According to a report published in the Journal Pediatrics®, Official Journal of the American Academy of Pediatrics, "From 1990 through 2008, an estimated 98,415 children (95% CI: 82 416– 114 414 children) were treated in US hospital EDs for injuries attributable to a fall from a window, with an average of 5,180 patients (95% CI: 4828 -5531 patients) per year." This report is the most recent, comprehensive study to date on the problem.

There is a viable, inexpensive solution to this problem that has proven effective in the largest city in the United States, New York City. In the mid 1970's, New York City implemented a program they called "Children Can't Fly" in an effort to reduce injuries resulting from window falls. A center piece of that effort was a Local Law requiring window guards in every building with three or more apartments where children under 10 resided. Since then, injuries and deaths from window falls have been dramatically reduced. According to Barbara Barlow, MD, Chief of Pediatric Surgery, Harlem Hospital Center, "The 96% decrease in accidental falls from windows since 1979 demonstrates that the "Children Can't Fly" program in New York City has almost eliminated accidental falls from windows in our hospital population" [quote from report titled "Ten years of experience with falls from a height in children, Barlow B, Niemirska M, Gandhi R, Leblanc W (1983)].

Note that the New York City statute does not stipulate a minimum sill height, as they recognized the fact that children climb on windows; furniture placed near a window can provide a means to climb to the window; and children are inherently curious and will explore areas, such as windows, that have proven dangerous when not properly protected by child window fall protection devices. Using a sill height as a threshold to require fall protection is fallacious because the fall protection is necessary for climbing, exploring children, not just a child who happens to trip and fall near a window.

Also, New York City did not accept limiting devices as a solution. There is another proposal to address this issue separately.

This proposal is simple and straightforward. It removes the reference to a minimum sill height measured inside the room. The current 36" threshold isn't high enough to prevent many children from accidentally falling from a window even if the child is at floor level. For children climbing on the window or adjacent furniture (a significant portion of the problem), any sill height is simply a way around solving the problem, and will not have the desired effect.

Approving this code change will undoubtedly save thousands of children from serious injuries or death at a very low cost.

Cost Impact: The code change proposal will increase the cost of construction. Increased cost include the addition fall protection for windows not currently required to be equipped with such protection.

E81-18

Public Hearing Results

Errata: The exception is applicable to the entire section, not just Item 4.

Committee Action:

Disapproved

Committee Reason: While preventing falls for children is important, this proposal is too far reaching. This requirement for guards would conflict with emergency escape and rescue opening requirements. Window openings are not more hazardous than drop offs protected by guards – there needs to be some minimum height proposed. No limit on the bottom height of the window is too extensive – as written this would apply to windows at all heights. The fall statistics are based on building stock, not where the new limits are in place. The exception should be addressed in a more comprehensive manner. (Vote 12-2)

Assembly Action:

None

E81-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jim Tidwell, representing Self (jimtidwell@tccfire.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

1015.8 Window openings. Windows in Group R-2 and R-3 buildings including *dwelling units*, where the top of the sill of an operable window opening is located ~~less than 36 inches above the finished floor and~~ more than 72 inches (1829 mm) above the finished grade or other surface below on the exterior of the building, shall comply with one of the following:

1. Operable windows where the top of the sill of the opening is located more than 75 feet (22 860 mm) above the finished grade or other surface below and that are provided with window fall prevention devices that comply with ASTM F2006.
2. Operable windows where the openings will not allow a 4-inch-diameter (102 mm) sphere to pass through the opening when the window is in its largest opened position.
3. Operable windows where the openings are provided with window fall prevention devices that comply with ASTM F2090.
4. Operable windows that are provided with window opening control devices that comply with Section 1015.8.1.

Commenter's Reason: This public comment is intended to address some of the concerns from the committee. One concern was that the exception was counter to the intent of the change, as children can easily climb on counters and fixtures to get to windows; we agree, and have removed the exception. Another concern was windows that are high on a wall that no one can reach. Our position is that, if a window is so high on a wall that no one can reach it, it should be inoperable; however, if an adult can reach a window, a child can reach that same window by climbing on furniture, toys, or other devices. Operable windows that expose children to falls should be protected with passive window fall protection. The original code change with this comment is intended to address the ongoing problem of children climbing onto and falling from windows.

According to a report published in the Journal Pediatrics®, Official Journal of the American Academy of Pediatrics, "From 1990 through 2008, an estimated 98,415 children (95% CI: 82 416– 114 414 children) were treated in US hospital EDs for injuries attributable to a fall from a window, with an average of 5,180 patients (95% CI: 4828 –5531 patients) per year." This report is the most recent, comprehensive study to date on the problem.

There is a viable, inexpensive solution to this problem that has proven effective in the largest city in the United States, New York City. In the mid 1970's, New York City implemented a program they called "Children Can't Fly" in an effort to reduce injuries resulting from window falls. A center piece of that effort was a Local Law requiring window guards in every building with three or more apartments where children under 10 resided. Since then, injuries and deaths from window falls have been dramatically reduced. According to Barbara Barlow, MD, Chief of Pediatric Surgery, Harlem Hospital Center, "The 96% decrease in accidental falls from windows since 1979 demonstrates that the "Children Can't Fly" program in New York City has almost eliminated accidental falls from windows in our hospital population" [quote from report titled "Ten years of experience with falls from a height in children, Barlow B, Niemirska M, Gandhi R, Leblanc W (1983)].

Note that the New York City statute does not stipulate a minimum sill height, as they recognized the fact that children climb on windows; furniture placed near a window can provide a means to climb to the window; and children are inherently curious and will explore areas, such as windows, that have proven dangerous when not properly protected by child window fall protection devices. Using a sill height as a threshold to require fall protection is fallacious because the fall protection is necessary for climbing, exploring children, not just a child who happens to trip and fall near a window. The sill height threshold is a significant loophole in the regulations intended to prevent injuries to children falling from windows.

Also, New York City did not accept limiting devices as a solution. There is another proposal to address this issue separately.

This proposal is simple and straightforward. It removes the reference to a minimum sill height measured inside the room. The current 36" threshold isn't high enough to prevent many children from accidentally falling from a window even if the child is at floor level. For children climbing on the window or adjacent furniture (a significant portion of the problem), any sill height is simply a way around solving the problem, and will not have the desired effect.

Approving this code change will undoubtedly save thousands of children from serious injuries or death at a very low cost.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The cost of adding fall protection to windows that present a risk to children is very minor, and will likely be recouped by savings in medical treatment of children who will be prevented from falling from open windows.

Public Comment 2:

Proponent: Jan Berichon, Randall Children's Hospital, representing selfrequests As Submitted.

Commenter's Reason: I support changing the ICC code changes proposed in E81 and E-82 . The code changes that have been submitted to improve child window safety fix loopholes that result in child window falls. This is a companion comment to E-82.

Working in a children s hospital, all too often we treat children that have fallen from windows and see the devastating injuries or deaths repeated year after year.

I support adding passive window fall protection for windows, regardless of sill height, with protection in place that is not easily overridden. Children climb and are innovative, they find ways to access windows by moving items to climb to a window or as a child I worked with recently, climbed up the wall using a nearby built in floor to ceiling cabinet to access the higher window and fell - minimum height requirements will make little to no difference- if a window is accessible by an adult, a child would be able to access the window as well. Children imitate adults.

Improving this code change will prevent thousands of children from serious injury or death. Thank you for your consideration.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The cost of this code change would minimally increase the initial construction cost, however installation of child window fall prevention screens will decrease overall future costs of replacement screens while decreasing medical costs for the treatment of injuries or deaths prevented from potential window falls.

Public Comment 3:

Proponent: Lisa Dau, Keiki Injury Prevention Coalition, representing Keiki Injury Prevention Coalition (lisa.dau@kapiolani.org)requests As Submitted.

Commenter's Reason: I am wrtng to you in expressing my support to the proposed changes to codes E81-18 relating to child window safety and window fall prevention for children.

I believe there is a gap in the current ICC code that falls short on protection of our children from window falls. This code change addresses the problem of children climbing onto and falling from window. Children climb on window sills, especcally when furniture is place near windows. Children are curious and do not know the dangers of climbing. Regardless of the sill height, if an adult can reach a window opeining, so can a child.

I support the proposed ICC changes to E81-18, these changes will prevent serious injuries and deaths of young children from window falls

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The change proposal will increase the cost of the construction, however the added cost for fall protection and prevention to windows that present a risk to children is very minimal as compared the the devastating cost of the death a child, or the high cost of medical and mental health care, that could be easily prevention by supporting this proposed change.

Public Comment 4:

Proponent: Jim Graham, representing National Association for Child Window Safety (jgraham@childwindowsafety.org) requests As Submitted.

Commenter's Reason: The New York City code referenced no sill height and they had a 96% decrease in window falls. The 96% decrease in accidental falls from windows since 1979 demonstrates that the "Children Can't Fly" program in New York City has almost eliminated accidental falls from windows in our hospital population" [quote from report titled "Ten years of experience with falls from a height in children, Barlow B, Niemirska M, Gandhi R, Leblanc W (1983)]. Note that the New York City statute does not stipulate a minimum sill height, as they recognized the fact that children climb on windows; climb on furniture, and climb on beds near windows. It has been proven that even 12 and 13 month old babies are capable of climbing on the average couch or bed; and children are inherently curious and anxious to explore their world. From those pieces of furniture, found in every home, they have easy access to windows even higher than 36 inches.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The code change proposal will modestly increase the cost of construction. Benefit/Cost analysis has demonstrated that very quickly that modest increase in cost will be returned in property management savings. That B/C analysis demonstrated that in multi-unit affordable housing it saved up to 98% of window maintenance cost. And does not include savings on insurance costs due to lessening the exposure due to liability concerns.

Public Comment 5:

Proponent: Wayne Parsons, Wayne Parsons Law Office, representing Wayne Parsons Law Office (wparsons@hawaii.rr.com) requests As Submitted.

Commenter's Reason: I submit this comment in support of proposed ICC code change proposals E81-18 and E82-18 which seek to close loopholes in ICC 1015.8 - Window Openings. I am a lawyer who has spent the last few years studying the issues surrounding child window falls. I was involved in engineering and safety investigations surrounding the death of a 5-year-old boy who fell to his death through a window in a new home. Eighteen other children fell from windows in that same project over a over a three year period. The window fall protection system utilized was a window-opening limiting device (WOLD) also sometimes referred to as a "vent stop". It became apparent to all sides of the case (Plaintiffs, property managers, developer and the U.S. Government) that WOLDS do not work and can be easily defeated by a child. Flimsy window screens used throughout the projects easily popped out when even light pressure was applied. The existing ICC Code has a loophole that allows unsafe fall protection devices to be installed in vulnerable windows. Another loophole that must be corrected or more lives will be lost is the sill height limitation that excludes many windows through which young children will fall from any fall protection requirements. I support the Public Comments submitted by Jim Tidwell, and encourage passage of his proposed amendments to ICC 1015.8 Window Opening:

To require that all operable windows in residential occupancies have passive barriers - either window screens or window guards - that meet the ASTM standards for fall protection. (Public Comment E81-18).

To remove any reference to sill height (Public Comment E82-18).

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. Effective window fall protection devices such as window bars or safety screens cost more than ineffective window opening limiter devices (WOLDS). However the life cycle costs of safety screens dramatically reduce the cost of ownership over time, as well as reducing injury and deaths to children. The screens are made of stainless steel and do not need to be replaced. The initial costs are only incrementally greater than the flimsy aluminum or plastic screens that are normally used. By significantly increasing the life of the screen, the owner will save money over time. And no one would advocate accepting the death of a child in exchange for the increased cost of the screen, would they?

Public Comment 6:

Proponent: Jeff Inks, representing Window and Door Manufacturers Association (jinks@wdma.com) requests Disapprove.

Commenter's Reason: WDMA supports the Committee's action to disapprove this proposal. We agree that the proposed amendment is far too broad in scope, making the requirement applicable to all operable windows with sills higher than 72 inches above the exterior finished grade or surface without justification. This would apply to all of those windows regardless of size, dimensions, or height above the floor, e.g., operable windows installed over a fixed or stationary window, windows of all operability types that are installed four, five, six feet or more above the floor, operable clerestories, small bathroom windows, or any number of other windows where fall protection has never been needed. The New York City ordinance cited as justification for this amendment is far more limited in scope than this proposal. Specifically, it requires guards in just those operable windows in rental apartments where children 10 years old or younger reside, prohibits installation of them on windows required for emergency escape and rescue, and does not

require them for privately own apartments and condos.

In addition, as the Committee pointed out, the fall statistics cited in the proposal are based on building stock that predates the current requirements. There has not been adequate substantiation to show that the current requirements are deficient or inadequate to justify the significant increased construction costs that would result from requiring window fall protection devices where they are not needed.

For these and other reasons, WDMA urges the Committee's disapproval be upheld.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

N/A

Public Comment 7:

Proponent: Janice Yglesias, representing American Architectural Manufacturers Association (jyglesias@aamanet.org) requests Disapprove.

Commenter's Reason: E81-18 effectively results in numerous applications unnecessarily requiring window fall protection such as operable windows installed over fixed windows or in other likely unreachable locations high in the wall. The change also disregards the critical need to strike a balance between window fall protection and emergency escape and rescue. The work done by New York City in the 1970's, which is referenced as justification for this code change, was important but does not apply to openings required for emergency escape and rescue and it pre-dates development of the consensus-based ASTM F2006 and F2090 standards which are now widely used in compliance with the current code language in most states across the country. Therefore, AAMA urges disapproval of this proposal.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. Additional costs will be required to add window opening control devices in numerous applications unnecessarily requiring window fall protection such as operable windows installed over fixed windows or in other likely unreachable locations high in the wall.

E81-18

E82-18

IBC: 1015.8, 1015.8.1, (IFC[BE] 1015.8, 1015.8.1)

Proposed Change as Submitted

Proponent: Jim Tidwell, Tidwell Code Consulting, representing Self (jimtidwell@tccfire.com); Jim Graham, Self, representing National Association for Child Window Safety (jgraham@childwindowsafety.org)

2018 International Building Code

Revise as follows

1015.8 Window openings. Windows in Group R-2 and R-3 buildings including *dwelling units*, where the top of the sill of an operable window opening is located less than 36 inches above the finished floor and more than 72 inches (1829 mm) above the finished grade or other surface below on the exterior of the building, shall comply with one of the following:

- ~~1. Operable windows where the top of the sill of the opening is located more than 75 feet (22 860 mm) above the finished grade or other surface below and that are provided with window fall prevention devices that comply with ASTM F2006.~~
- ~~2.1. Operable windows where the openings will not allow a 4-inch-diameter (102 mm) sphere to pass through the opening when the window is in its largest opened position.~~
- ~~3. Operable windows where the openings are provided with window fall prevention devices that comply with ASTM F2090.~~
- ~~4. Operable windows that are provided with window opening control devices that comply with Section 1015.8.1.~~
2. Operable windows equipped with corrosion resistant screen capable of withstanding a minimum force of 60 pounds (27 kg) as a concentrated load applied to the center of the screen.
3. Operable windows equipped with barriers with openings that do not allow the passage of a sphere 4 inches (102 mm) in diameter and are capable of withstanding a minimum force of 60 pounds (27 kg) as a concentrated load applied at an location on the barrier.

Delete and substitute as follows

~~**1015.8.1 Window opening control devices.** Window opening control devices shall comply with ASTM F2090. The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by Section 1030.2.~~

1015.8.1 Operation during emergencies. Windows provided for emergency escape and rescue shall comply with Section 1015.8 and Section 1030.2 for operation during emergencies.

Reason: This code change is intended to address the ongoing problem of children climbing onto and falling from windows. According to a report published in the Journal Pediatrics®, Official Journal of the American Academy of Pediatrics, "From 1990 through 2008, an estimated 98,415 children (95% CI: 82 416– 114 414 children) were treated in US hospital EDs for injuries attributable to a fall from a window, with an average of 5,180 patients (95% CI: 4828 –5531 patients) per year." This report is the most recent, comprehensive study to date on the problem. There is a viable, inexpensive solution to this problem that has proven effective in the largest city in the United States, New York City. In the mid 1970's, New York City implemented a program they called "Children Can't Fly" in an effort to reduce injuries resulting from window falls. A center piece of that effort was a Local Law requiring window guards in every building with three or more apartments where children under 10 resided. Since then, injuries and deaths from window falls have been dramatically reduced. According to Barbara Barlow, MD, Chief of Pediatric Surgery, Harlem Hospital Center, "The 96% decrease in accidental falls from windows since 1979 demonstrates that the "Children Can't Fly" program in New York City has almost eliminated accidental falls from windows in our hospital population" [quote from report titled "Ten years of experience with falls from a height in children, Barlow B, Niemirska M, Gandhi R, Leblanc W (1983)].

Note that the New York City statute does not stipulate a minimum sill height, as they recognized the fact that children climb on windows; furniture placed near a window can provide a means to climb to the window; and children are inherently curious and will explore areas, such as windows, that have proven dangerous when not properly protected by child window fall protection devices. Using a sill height as a threshold to require fall protection is fallacious because the fall protection is necessary for climbing, exploring children, not just a child who happens to trip and fall near a window.

Also, New York City did not accept limiting devices as a solution. While those devices meet the criteria of ASTM standards, it is widely recognized that the devices are easily and regularly defeated by occupants in need of ventilation, especially during warm weather. When engaged, the limiting devices only allow the window to be opened four inches; however, they

are intentionally constructed to allow an adult to easily override the safety feature to fully open the window, thus exposing the child to the fall risk they're intended to address. There is no available data to indicate these devices are having the intended effect, thus the need for a passive physical barrier that allows the window to open to provide necessary ventilation in a space. Allowing these devices in lieu of a physical barrier as described in this proposal places those with the greatest need - the lower socioeconomic strata of our society who depend upon natural ventilation for comfort in warm weather - at the greatest risk.

This proposal is simple and straightforward. It will require all operable windows in residential occupancies to have passive barriers - either window screens or window guards - that meet the ASTM standards for fall protection (60 lbs. concentrated load). It does not recognize limiting devices, as these have shown to be easily overridden, and of limited value.

There is another proposal that addresses the sill height.

Approving this code change will undoubtedly save thousands of children from serious injuries or death at a very low cost.

Cost Impact: The code change proposal will increase the cost of construction
Potential increase in cost due to the difference in the cost of guards or screens in lieu of vent stops.

E82-18

Public Hearing Results

Errata: Current items 3 and 4 should have been shown as struck out.

Committee Action:

Disapproved

Committee Reason: There was no justification for removal of the current options for fall prevention devices. This proposal would conflict with the EERO requirements. The references to ASTM F2006 and F2090 should not be deleted from this section – they serve different purposes. The two new alternatives for window protection are overly prescriptive. The new #3 is a reduction in safely – screen should not be relied on and 60 pounds force is less than that required for guards. Regarding proposed Section 1015.8.1. The reference back to Section 1015.8 is confusing. The reference to Section 1030.2 is incorrect – Section 1030.2 is emergency escape and rescue opening size – Section 1030.1.1 is the reference to ASTM F2090. (Vote 14-0)

Assembly Action:

None

E82-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jim Tidwell, representing Self (jimtidwell@tccfire.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1015.8 Window openings. Windows in Group R-2 and R-3 buildings including *dwelling units*, where the top of the sill of an operable window opening is located less than 36 inches above the finished floor and more than 72 inches (1829 mm) above the finished grade or other surface below on the exterior of the building, shall comply with one of the following:

1. Operable windows where the ~~openings-top of the sill of the opening is located more than 75 feet (22860 mm) above the finished grade or other surface below shall be provided with one of the following:~~
 - 1.1. Corrosion resistant screens that comply with ASTM F2006.
 - 1.2. Barriers that do not allow the passage of a 4-inch diameter (102 mm) sphere and that comply with ASTM F2006.
 - 1.3. A window design that will not allow a 4-inch diameter (102 mm) sphere to pass through the opening when the window is in its largest opened position.
2. Operable windows ~~equipped with corrosion resistant screen capable of withstanding a minimum force of 60 pounds (27 kg) as a concentrated load applied to the center of the screen where the top of the sill of the opening is located 75 feet (22860 mm) or less above the finished grade or floor surface below shall be provided with one of the following:~~
 - 2.1. Corrosion resistant screens that comply with ASTM F2090.
 - 2.2. Barriers that do not allow the passage of a 4-inch diameter (102 mm) sphere and that comply with ASTM F2090.
 - 2.3. A window design that will not allow a 4-inch diameter (102 mm) sphere to pass through the opening when the window is in its largest opened position.
3. ~~Operable windows equipped with barriers with openings that do not allow the passage of a sphere 4 inches (102 mm) in diameter and are capable of withstanding a minimum force of 60 pounds (27 kg) as a concentrated load applied at an location on the barrier.~~

1015.8.1 ~~Operation during emergencies.~~Emergency Escape and Rescue. Windows ~~provided~~required for emergency escape and rescue shall comply with Section ~~1015.8 and Section 1030.2 for operation during emergencies.~~ 1030.

Commenter's Reason: This public comment revises the original submittal to address committee concerns that the ASTM standard was being omitted, and that the emergency rescue and escape provisions weren't clearly required. This is a companion comment to E-81.

The original code change and this comment are intended to address the ongoing problem of children climbing onto and falling from windows. According to a report published in the Journal Pediatrics®, Official Journal of the American Academy of Pediatrics, “From 1990 through 2008, an estimated 98,415 children (95% CI: 82 416– 114 414 children) were treated in US hospital EDs for injuries attributable to a fall from a window, with an average of 5,180 patients (95% CI: 4828 –5531 patients) per year.” This report is the most recent, comprehensive study to date on the problem. Unfortunately, earlier efforts to resolve this issue in the IBC left a loophole whereby the window opening limitations can be easily overridden. This override was included in response to concerns about conflicts with the criteria for emergency escape and rescue windows, so we’ve clarified in this code change that those criteria apply.

There is a viable, inexpensive solution to the problem that has proven effective in the largest city in the United States, New York City. In the mid 1970’s, New York City implemented a program they called “Children Can’t Fly” in an effort to reduce injuries resulting from window falls. A center piece of that effort was a Local Law requiring window guards in every building with three or more apartments where children under 10 resided. Since then, injuries and deaths from window falls have been dramatically reduced. According to Barbara Barlow, MD, Chief of Pediatric Surgery, Harlem Hospital Center, “The 96% decrease in accidental falls from windows since 1979 demonstrates that the “Children Can’t Fly” program in New York City has almost eliminated accidental falls from windows in our hospital population” [quote from report titled “Ten years of experience with falls from a height in children, Barlow B, Niemirska M, Gandhi R, Leblanc W (1983)].

Note that the New York City statute does not stipulate a minimum sill height, as they recognized the fact that children climb on windows; furniture placed near a window can provide a means to climb to the window; and children are inherently curious and will explore areas, such as windows, that have proven dangerous when not properly protected by child window fall protection devices. Using a sill height as a threshold to require fall protection is fallacious because the fall protection is necessary for climbing, exploring children, not just a child who happens to trip and fall near a window.

Also, New York City did not accept limiting devices as a solution (this is the previously mentioned loophole in the IBC). While those devices meet the criteria of ASTM standards, it is widely recognized that the devices are easily and regularly defeated by occupants in need of ventilation, especially during warm weather. When engaged, the limiting devices only allow the window to be opened four inches; however, they are intentionally constructed to allow an adult to easily override the safety feature to fully open the window, thus exposing the child to the fall risk they’re intended to address. There is no available data to indicate these devices are having the intended effect, thus the need for a passive physical barrier that allows the window to open to provide necessary ventilation in a space. Allowing these devices in lieu of a physical barrier as described in this proposal places those with the greatest need – the lower socioeconomic strata of our society who depend upon natural ventilation for comfort in warm weather – at the greatest risk.

This proposal is simple and straightforward. It will require all operable windows in residential occupancies to have passive barriers – either window screens or window guards – that meet the ASTM standards for fall protection. It does not recognize limiting devices, as these have shown to be easily overridden, and of limited value.

Approval of this change will undoubtedly save thousands of injuries to children, and give the jurisdictions using the IBC similar protection for their children as the local law in New York City.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. While documentation exists that at least one of the compliant solutions will result in a lower life cycle cost to windows, the initial installation of fall prevention devices will slightly increase the cost of construction.

Public Comment 2:

Proponent: Jan Berichon, representing self (jbericho@lhs.org)requests As Submitted.

Commenter's Reason: The code changes that have been submitted to improve child safety fix loopholes that result in child window falls. This is a companion comment to E-81

I’ve heard many heartbreaking stories over the past several years while working in a children’s hospital from families whose child fell from a window. Some of these falls are a result of having window opening limiting devices installed only to have someone override the product for ventilation resulting in a young child falling from the window. Some have thought they could override the device for just a few minutes while cleaning a room or cooking, only to have a child unexpectedly enter the room and fall. Others have thought they could override the device while the child was sleeping to cool the home, only to have the child awaken and fall. Window falls happen quickly and unexpectedly often while caregivers are in the same room.

Specialized, passive barriers such as child window fall prevention guards or robust child safety screens are designed for window fall prevention are now available. These are not typical insect screens, they allow windows to be fully opened for ventilation as intended while protecting children from falls. These products DO meet emergency escape and rescue requirements. They DO NOT conflict with emergency escape or rescue requirements.

Many homes and apartments, especially for higher risk populations with limited resources and/or living in affordable housing most often rely on window ventilation. Most often these families do not have access to air conditioning making it

unlikely that window openings will be kept at less than 4”.

Expecting families to limit window openings to less than 4” for ventilation in the heat is not realistic or a healthy option. This can and does cause other health risks. Passive barriers would allow windows to open fully for necessary ventilation as intended while protecting children at the same time.

These proposal changes will save thousands of children from injuries (or death) and decrease overall lifelong medical cost required to support a child throughout their life after a devastating window fall.

This code change will undoubtedly save thousands of children from serious injury or death. Thank you for your time and consideration of protecting our children from such a preventable tragedy as a window fall.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The cost of this code change will slightly increase initial construction costs, however the installation of passive window fall prevention barriers such as the robust, child window fall prevention screens will decrease costs of medical treatment incurred following a child falling from a window and will save thousands of children from injury or death as a result of a window fall. This will also decrease the need to repeatedly replace typical insect screens.

Public Comment 3:

Proponent: Lisa Dau, representing Keiki Injury Prevention Coalition requests As Submitted.

Commenter's Reason: I am writing to you in expressing my support to the proposed changes to codes E82-18 relating to child window safety and window fall prevention for children.

I support the proposed ICC changes to E82-18, these changes will prevent serious injuries and deaths of young children from window falls by disallowing the use of window fall opening devices or vent stops. These devices fall short for window fall protection by allowing any user to easily override it's use thereby creating an unsafe environment for children near windows.

The proposed code changes would require all operable windows to be equipped with passive restraint devices that cannot be over-ridden. These changes fix the gap in the current code that allows devices that don't work, or can be over-ridden.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The code changes will increase the cost of construction, however the cost is minimal compared to the extreme cost of the death or injury of a child falling out of a window that could easily, and affordably, be prevented.

Public Comment 4:

Proponent: Jim Graham, representing National Association for Child Window Safety (jgraham@childwindowsafety.org) requests As Submitted.

Commenter's Reason: The original code change and this comment are intended to address the problem of children climbing onto and falling from windows. According to a report published in the Journal Pediatrics, Official Journal of the American Academy of Pediatrics, From 1990 through 2008, an estimated 98,415 children (95% CI: 82 416 114 414 children) were treated in US hospital EDs for injuries attributable to a fall from a window, with an average of 5,180 patients (95% CI: 4828 5531 patients) per year. What was not addressed in the American Academy of Pediatrics report was consideration of the cost to children in later life from traumatic Brain Injury. Osha now requires that any adult worker who is working six feet or more above grade SHALL be equipped with Passive restraints from falls. It is the contention of many that small children and babies deserve at minimum that same protection. The AAP report is the most recent, comprehensive study to date on the problem. Unfortunately, earlier efforts to resolve this issue in the IBC left a serious loophole whereby the window opening limitations can be easily overridden. This concern has been dismissed by several State Fire Marshals during legislation actions in those states. Concerns regarding about egress and ingress from windows equipped with child safety screens by Firefighter have been dismissed by State Fire Marshals. New York City has proven that installing passive guards to windows will cause a decrease in window falls by 96%.

New York City did not accept limiting devices as a solution (this is the previously mentioned loophole in the IBC). While those devices meet ASTM standards, most serious people recognize that any window that can be opened will be opened especially during warm weather. There is a reasonable expectation that any child will be safe in its own home, and others have testified to that fact in many legal actions that resulted from adults defeating window limiters followed by a child fall. When engaged, the limiting devices only allow the window to be opened four inches; however desiring ventilation windows will be opened by adults and without some passive barrier children WILL be in danger and experience window falls. This particularly true for poor people with limited resources to spend for air-conditioning. Allowing window limiter devices rather than of a physical barrier does place those with the greatest need - poor people, at the greatest risk. This proposal is simple and straightforward. It will require all operable windows in residential occupancies to have passive barriers - either child safety window screens or window guards meeting ASTM standards for fall protection. It specifically does not recognize limiting devices, as these have shown to be easily overridden. Approval of this change

will undoubtedly come sooner or later. Please do not allow a "Loophole" in the previous good work of this Council to continue to endanger thousands of children. Give the jurisdictions adopting the IBC, similar protection for their children as the Military of the United States is now providing for military families as well as local law in New York City.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The code change proposal will modestly increase the cost of construction. Benefit/Cost analysis has demonstrated that very quickly that modest increase in cost will be returned in property management savings. That B/C analysis demonstrated that in multi-unit affordable housing it saved up to 98% of window maintenance cost. And does not include savings on insurance costs due to lessening the exposure due to liability concerns.

Public Comment 5:

Proponent: Brian Houlihan, representing National Association for Child Window Safety (brianlh@mchsi.com) requests As Submitted.

Commenter's Reason: I support this proposal as submitted by the National Association for Child Window Safety, James Graham, and Jim Tidwell to require passive barriers to prevent children from falling from windows and removing the loopholes that allow gadgets that prevent the normal use of the window.

Bibliography: <http://nebula.wsimg.com/2b4c64e9569d2c263a7a76a0a82e3d1d?AccessKeyId=F48BDA22447117F51206&disposition=0&alloworigin=1>

Page three of the attached link demonstrates the benefit cost study with the window safety screens. This study was done by the National Association for Child Window Safety.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. Although the initial construction cost will increase, a benefit cost study analysis on at least one of the passive barriers, the safety screens, proves a net cost savings in approximately five years when used in rental housing units.

Public Comment 6:

Proponent: Wayne Parsons, representing Wayne Parsons Law Office (wparsons@hawaii.rr.com) requests As Submitted.

Commenter's Reason: I submit this comment in support of proposed ICC code change proposal E82-18 which seeks to close a loophole in ICC 1015.8 - Window Openings that eliminates window fall protection devices on windows that children can and will fall out of, based upon sill height.

I support the Public Comments submitted by Jim Tidwell, and encourage passage of his proposed amendments to ICC 1015.8 Window Opening:

The loophole will be corrected by removing any reference to sill height (Public Comment E82-18). To suggest that no 5-year-old can climb up on a window sill that is 45-inches or 55-inches from the floor shows a lack of understanding of the capabilities of children. Setting any sill height limitation in the code suggests that a few children being seriously injured or dying is acceptable. Certainly no one would take such a position.

Despite parents' best efforts to restrict access to windows, 5-year-old boys and girls will get to the windows, and fall out, unless effective "passive" window fall protection devices are installed. Death and serious injury to children will and does occur because windows are unprotected. The existing code language, that this proposal attempts to fix, leaves many windows that children can get to, unprotected. OSHA requires effective passive fall protection devices to protect construction workers. That OSHA protection increases the cost of construction. Why wouldn't the ICC do the same for children?

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. More windows will require fall protection under this proposal. That is offset by a reduction in the death and permanent injury to children. Would anyone argue that the death of a child is worth a few dollars of savings in the cost of a home?

Public Comment 7:

Proponent: Jeff Inks, representing Window and Door Manufacturers Association (jinks@wdma.com) requests Disapprove.

Commenter's Reason: WDMA strongly supports the Committee's sound disapproval of this proposal. Eliminating requirements that window fall prevention devices must meet appropriate ASTM standards, and then replace those standards with only one or two criterion of the many requirements (performance, labeling, safety information, etc.) in the ASTM standards is a significant reduction in safety.

Both ASTM F2006 and ASTM F2090 are well reasoned, scientifically based sets of performance and testing requirements for window fall protection devices. They have been developed and are maintained by industry and safety experts, including the Consumer Product Safety Commission (CPSC), under ASTM's consensus process, and they are recommended by the National Safety Council. The proposed, lesser requirements, skirt most of what is required by the

F2006 and F2090 standards accordingly, and among other significant concerns, there are no provisions for how compliance is to be demonstrated or affirmed. This would place an undue burden on code officials to determine compliance as opposed to the current status where code officials can rely on labeling to the ASTM F2006 or F2090 standards as a means of determining compliance. In sum, no sound justification or other reasoning has been provided to show the standards or the IBC provisions that require them are deficient or inadequate.

In addition, there is significant concern that the proposed amendments will impede emergency escape and rescue as there are no provisions that the proposed corrosion resistant screens or barriers installed over required emergency escape and rescue windows be releasable as required by ASTM F2090, and that also in doing so, they do not reduce the minimum net clear opening area that is required for emergency escape and rescue openings by IBC section 1030.2. The proposed amendment to section 1015.8.1 simply point back to 1015.8, and IBC section 1030.2 only provides requirements for minimum egress opening dimensions. There is nothing about operation of the screens or barriers in case of emergency.

Furthermore, substantiation for the proposed amendment appears to rely heavily on the cited New York City ordinance, yet that ordinance was established well before the development of the existing ASTM standards and IBC provisions requiring them. It is also not as broad in scope, prohibits installation of guards on windows required for emergency escape and rescue, and requires guards to be approved by the NYC Health Department.

For these and other reasons, WDMA strongly urges the Committee's disapproval be upheld.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

NA

Public Comment 8:

Proponent: Janice Yglesias, representing American Architectural Manufacturers Association (jyglesias@aamanet.org) requests Disapprove.

Commenter's Reason: E82-18 seeks to replace a collection of comprehensive window fall prevention device requirements included in the consensus-based ASTM F2006 and F2090 standards with a single, poorly-defined criterion. This approach grossly over-simplifies the issue and, beyond circumventing the extensive vetting inherent to the consensus-based standards development process, it places the burden of performance verification with the code official.

Furthermore, this proposal eliminates Window Opening Control Devices (WOCD's) as a viable means of window fall prevention and limits the options to a screen, a window guard or a permanently limited opening, which are not compliant options for openings required for emergency escape and rescue. The ASTM F2006 and F2090 standards define criteria for window fall prevention devices that balance limiting a window opening to less than four inches, with the need to release such a device for egress, either through two independent actions or one dual action. By prescribing compliant devices, this proposed code change runs counter to the development of codes and standards that allow for more compliant devices to offer consumers more choices.

The work done by New York City in the 1970's, which is referenced as justification for this code change, was important but does not apply to openings required for emergency escape and rescue and it pre-dates development of the consensus-based ASTM F2006 and F2090 standards which are now widely used in compliance with the current code language in most states across the country. An additional shortcoming related to emergency escape and rescue requirements is that the proposed revisions to 1015.8.1 addressing "operation during emergencies" point back to 1015.8 which does not include provisions for emergency escape and rescue and also points to 1030.2 which only outlines minimum sizes for emergency escape and rescue openings resulting in insufficient guidance.

In addition, this proposal has the potential to create confusion among homeowners between an insect screen, which is designed to keep insects out, and a fall prevention screen, which is a wholly different product. This confusion between window screen products is potentially dangerous and could lead a consumer to incorrectly believe that an insect screen serves the purpose of a fall prevention device.

For these reasons, AAMA urges disapproval of this proposal.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction Potential increase in cost due to the difference in the cost of guards or screens in lieu of vent stops.

E82-18

E86-18

IBC: 1017.3, (IFC[BE] 1017.3)

Proposed Change as Submitted

Proponent: John Terry, self, representing self (John.Terry@dca.nj.gov)

2018 International Building Code

Revise as follows

SECTION 1017 EXIT ACCESS TRAVEL DISTANCE

1017.3 Measurement. *Exit access* travel distance shall be measured from the most remote point of each room, area or space along the natural and unobstructed path of horizontal and vertical egress travel to the entrance to an exit. Where more than one means of egress is required, exit access travel distance shall be measured to the nearest exit.

Exception: In open parking garages, *exit access* travel distance is permitted to be measured to the closest riser of an *exit access* stairway or the closest slope of an *exit access* ramp.

Reason: The text of this section is too subtle where it is stated that travel distance is measured to “an” exit. The added language makes clear the intent of the requirement.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The proposed change merely clarifies the intent of the current text and therefore has no impact on cost.

E86-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 1017.3 Measurement. Exit access travel distance shall be measured from the most remote point of each room, area or space along the natural and unobstructed path of horizontal and vertical egress travel to the entrance to an exit. Where more than one ~~means of egress~~ exit is required, exit access travel distance shall be measured to the nearest exit.

Exception: In open parking garages, exit access travel distance is permitted to be measured to the closest riser of an exit access stairway or the closest slope of an exit access ramp.

Committee Reason: The modification is for consistency within the sentence and the rest of Chapter 10. The code change will clarify that travel distance is to only one exit, not both. (Vote 14-0)

Assembly Action:

None

E86-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ed Kulik, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

1017.3 Measurement. *Exit access* travel distance shall be measured from the most remote point of each room, area or space along the natural and unobstructed path of horizontal and vertical egress travel to the entrance to ~~an exit. Where more than one exit is required,~~ exit access travel distance shall be measured to the nearest exit.

Exception: In open parking garages, *exit access* travel distance is permitted to be measured to the closest riser of an *exit access stairway* or the closest slope of an *exit access* ramp.

Commenter's Reason: The modification to the original proposal would be an issue for 2nd floors with open stairways or mezzanines – this is ‘access to an exit’ from that level. By combining the new sentence with the existing text, it clears this up in one sentence.

This public comment is submitted by the ICC BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions there of. In 2017 and 2018 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes and public comments. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposed change merely clarifies the intent of the current text and therefore has no impact on cost.

E86-18

E90-18

IBC: TABLE 1020.2, (IFC[BE] TABLE 1020.2)

Proposed Change as Submitted

Proponent: Homer Maiel, representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay) (hmaiel@gmail.com)

2018 International Building Code

Revise as follows

**TABLE 1020.2
MINIMUM CORRIDOR WIDTH**

OCCUPANCY	MINIMUM WIDTH (inches)
Any facility not <i>listed</i> in this table	44
Access to and utilization of mechanical, plumbing or electrical systems or equipment	24 <u>36</u>
With an <i>occupant load</i> of less than 50	36
Within a <i>dwelling unit</i>	36
In Group E with a <i>corridor</i> having an <i>occupant load</i> of 100 or more	72
In corridors and areas serving stretcher traffic in ambulatory care facilities	72
Group I-2 in areas where required for bed movement	96

For SI: 1 inch = 25.4 mm.

Reason: In order to be consistent with Section 306.2 of IMC and Section 1010.1.1 of IBC, this change is warranted.

Cost Impact: The code change proposal will increase the cost of construction. The change of corridor and door widths will increase the cost of construction.

E90-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The current text is to allow for access to something like a plumbing chase or around mechanical equipment. Aisles reference corridor widths in Section 1018.5. There is an allowance in the IMC for dwelling units for a 24" wide corridor, so the revision would be a conflict. (Vote 12-2)

Assembly Action:

None

E90-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Homer Maiel, PE, CBO, representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay) (hmaiel@gmail.com) requests As Submitted.

Commenter's Reason: In Columbus, there was a misunderstanding on the part of some committee members that question whether this change will have any effect on residential occupancies. This Table is only addressing corridor widths. urge to support approved as submitted.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The change of corridor and door width will increase the cost of construction.

E90-18

E92-18

IBC: 1020.5 (IFC[BE] 1020.5)

Proposed Change as Submitted

Proponent: John Williams, Chair, representing Healthcare Committee (AHC@iccsafe.org)

2018 International Building Code

Revise as follows

1020.5 Air movement in corridors. Corridors shall not serve as supply, return, exhaust, relief or ventilation air ducts.
Exceptions:

1. Use of a *corridor* as a source of makeup air for exhaust systems in rooms that open directly onto such corridors, including toilet rooms, bathrooms, dressing rooms, smoking lounges and janitor closets, shall be permitted, provided that each such *corridor* is directly supplied with outdoor air at a rate greater than the rate of makeup air taken from the corridor.
2. Where located within a *dwelling unit*, the use of *corridors* for conveying return air shall not be prohibited.
3. Where located within tenant spaces of 1,000 square feet (93 m²) or less in area, utilization of *corridors* for conveying return air is permitted.
4. ~~Incidental air movement from pressurized rooms within health care facilities, provided that the corridor is not the primary source of supply or return to the room.~~ Transfer air movement required to maintain pressurization difference within health care facilities in accordance with Section 407.1 of the International Mechanical Code.

Reason: This is a clarification for when the corridor can be used for air movement. ASHREA 170 was added in IMC which clarifies which rooms are pressurized. This makes that connection in the codes. This is intended to cover transfer air for both positive and negative charged rooms. We thought 'transfer' was a more descriptive word for the air movement. This proposal is submitted by the ICC Committee on Healthcare (CHC). The CHC was established by the ICC Board to evaluate and assess contemporary code issues relating to healthcare facilities. This is a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. In 2017 the CHC held 2 open meetings and numerous conference calls, *which included members of the committees as well as any interested parties, to discuss and debate the proposed changes.* Information on the CHC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CHC effort can be downloaded from the CHC website at: <https://www.iccsafe.org/codes-tech-support/cs/icc-committee-on-healthcare/>.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. ASHREA 170 is already required in the IMC for pressurized rooms, so there are no changes to construction requirements.

E92-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This proposal clarifies the intent by actually describing what incidental air movement is. There needs to be a public comment to coordinate this section with IMC 601.2. Rather than the IMC reference to Section 407.1 which then references ASHRAE 170, perhaps a straight reference to ASHRAE 170 would be more direct. (Vote 12-2)

Assembly Action:

None

Staff Analysis: This change will also apply to IMC Section 601.2.

E92-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Williams, representing Healthcare Committee (ahc@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1020.5 Air movement in corridors. Corridors shall not serve as supply, return, exhaust, relief or ventilation air ducts.
Exceptions:

1. Use of a *corridor* as a source of makeup air for exhaust systems in rooms that open directly onto such corridors, including toilet rooms, bathrooms, dressing rooms, smoking lounges and janitor closets, shall be permitted, provided that each such *corridor* is directly supplied with outdoor air at a rate greater than the rate of makeup air taken from the corridor.
2. Where located within a *dwelling unit*, the use of *corridors* for conveying return air shall not be prohibited.
3. Where located within tenant spaces of 1,000 square feet (93 m²) or less in area, utilization of *corridors* for conveying return air is permitted.
4. Transfer air movement required to maintain pressurization difference within health care facilities in accordance with ~~Section 407.1 of the International Mechanical Code.~~ ASHRAE 170.

Commenter's Reason: This proposal was intended as a clarification. A reference to ASHRAE 170 directly provides the same information as stated in IMC Section 407.1.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This is already required in the IMC, so there would be no cost increase.

E92-18

E96-18

IBC: 1023.2, (IFC[BE] 1023.2)

Proposed Change as Submitted

Proponent: Gregory Keith, representing The Boeing Company (grkeith@mac.com); Douglas Evans, representing DHE FPE LLC (dhefpe@gmail.com)

2018 International Building Code

Revise as follows

1023.2 Construction. Enclosures for interior exit *stairways* and *ramps* shall be constructed as *fire barriers* in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. *Interior exit stairway* and *ramp* enclosures shall have a fire-resistance rating of not less than 2 hours where connecting four stories or more and not less than 1 hour where connecting less than four stories. The number of stories connected by the interior exit *stairways* or *ramps* shall include any *basements*, but not any *mezzanines*. *Interior exit stairways* and *ramps* shall have a fire-resistance rating not less than the floor assembly penetrated, but need not exceed 2 hours.

Exceptions-Exception:

1. *Interior exit stairways* and *ramps* in Group I-3 occupancies in accordance with the provisions of Section 408.3.8.
2. ~~*Interior exit stairways* within an atrium enclosed in accordance with Section 404.6.~~

Reason:

Exception 2 to interior exit stairway enclosure construction within an atrium space was introduced in the 2015 Edition of the IBC. The proponent's published reason statement contended that the inherent one-hour atrium enclosure protection and required smoke control was equivalent to a one-hour interior exit stairway enclosure. Although equivalency to a one-hour enclosure can be debated, exit stairways serving four or more stories are required to be of 2-hour fire resistance-rated construction. The atrium enclosure protection is also exempted on three levels (404.6 Exception 3), which allows these stairs open to those levels.

This provision is also philosophically flawed on many levels. Interior exit stairway enclosures are to be used for no purpose other than as a means of egress. Opening and penetration protection requirements are intended to limit exposure of the enclosure.

The plural in Exception 2 (stairways) allows all required exits to be through the atrium. The current exception allows occupants unlimited egress travel distance down unenclosed stairways even if the stairs are within the smoke plume. Furthermore, compliance with Section 909 is typically reliant on fans, dampers, secondary power supplies and the ever changing fuel loading on the atrium floor. In high-rise buildings, such stairways are required to be within smokeproof enclosures.

Allowing unlimited travel distance on an unenclosed stairway is technically and philosophically inconsistent with the exit access travel distance limitations stated at Section 404.9. Those provisions allow for a maximum of 200 feet of travel at other than the level of exit discharge. The *IBC Code and Commentary, Volume I* states, "Since smoke is being drawn into the atrium, the time allotted to reach an exit through the atrium is limited." It would seem logical that that same thinking would apply to an unenclosed interior exit stairway.

Additionally, Section 905.4 requires a standpipe hose connection for each story in every required interior exit stairway since these enclosures provide a protected space for fire department operations. Obviously, there is no passive standpipe hose connection protection in an unenclosed interior exit stairway.

Traditionally, exit access stairways within atrium spaces have been allowed to be unenclosed (Section 1019.3, Condition 5). However, exit access travel distance limitations in Section 1017.2 apply. In fact, Table 1017.2 Footnote a, references Section 404.9 travel distance limitations through an atrium space. This minimally creates confusion, if not a contradiction.

This proposal restores the original ICC Code Technology Committee philosophy that interior exit stairways always be enclosed with no exceptions. Removal of the current exception ensures a protected path of means of egress travel for building occupants between the exit access and exit discharge portions of the means of egress system.

Cost Impact: The code change proposal will increase the cost of construction

Approval of this proposal will increase the cost of construction only in buildings having an atrium where an unenclosed interior exit stairway is desired. If the building otherwise has the required number of exits, such a stairway would be regarded as an exit access stairway and there would be no cost impact.

E96-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This is currently permitted. Additional protection items for exit stairways within an atrium was added by G35-18. There is no history of problems with exit stairways within atriums, so there is no reason to eliminate the option.

A portion of the committee felt that smoke protected atriums do not offer the same level of protection as an exit enclosure. If both exit stairways are within atriums this could be a serious issue. There was also a concern that there is no limit on the travel distance on an exit stairway in an atrium. (Vote 8-7)

Assembly Action:

None

E96-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Gregory Keith, representing DHE FPE LLC (grkeith@mac.com); Douglas Harold Evans, DHE FPE LLC, representing DHE FPE LLC (dhefpe@gmail.com) requests As Submitted.

Commenter's Reason: Code change proposal E96-18 attempted to remove Exception 2 of Section 1023.2. That exception was introduced into the 2015 Edition of the IBC. Section 1023 provides the requirements for interior exit stairways and ramps. By definition, exterior exit stairways and ramps are exit components. Components in the exit portion of the means of egress system are regarded as providing a highly protected environment for occupants as they egress a building. Typically, interior exit stairways and ramps are one- or two hour-rated assemblies with restricted opening protection. For this reason, occupants may travel unlimited distances in such exit components. Exception 2 permits an unenclosed stairway within an atrium to qualify as an interior exit stairway (exit component). Such a design is problematic. Clearly, occupants have no passive fire resistance-rated protection normally associated with exit components. The assumption is that the smoke control required within an atrium space will provide equivalent protection. Typically, atrium spaces employ the exhaust method of smoke control. This technique causes generated smoke to be exhausted vertically up through the atrium and exhausted from the top of the space. This could prove to compromise the exit path. Fundamentally, the provision violates numerous philosophical principals. One, an exit is to be used for no other purpose than a means of egress. The atrium is a fully functional area with associated fuel loads. And one, an exit is required to lead directly to the exterior of the building or shall be extended to the exterior of the building with an exit passageway. The unenclosed stairway would typically terminate within the lowest level of the atrium space. And one, Section 404.9.3 limits exit access travel distance within an atrium at other than the level of exit discharge to 200 feet. The allowance for unlimited travel distance on an unenclosed atrium stairway is in contravention with the fundamental atrium travel protection requirements. And one, the fire service typically uses enclosed interior exit stairways as staging areas and protected access to required standpipes. This ability is lost with an unenclosed stairway.

At the committee hearings in Columbus, Ohio, Item E96-18 proved to be very contentious. The committee vote was 7 to 7. The Chair voted against the proposal because it was felt that the provision should not be removed from the code based on the Chair's vote. In the committee's reason statement for disapproval of Item E96-18 it was stated that additional protective measures had been introduced with the approval of Item G35-18. In fact, none of those requirements address any of the concerns identified in the previous paragraph. That same reason statement noted that, A portion of the committee felt the smoke protected atriums do not offer the same level of protection as an exit enclosure. Additionally stated, There was also a concern that there is no limit on the travel distance on an exit stairway in an atrium. (Vote 8-7) If you believe that an unenclosed stairway within an atrium provides the same degree of occupant protection as a fire resistance-rated enclosure with commensurate opening and penetration protection, please do not support this public comment. If you believe that an exit component should provide for a reliably safe path of travel to the exterior of the building, please break the stalemate by supporting this public comment. Approval of this public comment will restore the appropriate level of occupant safety normally associated with an exit component.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. Approval of this public comment will increase the cost of construction only in buildings having an atrium where an unenclosed interior exit stairway is desired. If the building otherwise has the required number of exits, such a stairway would be regarded as an exit access stairway and there would be no cost impact.

E96-18

E106-18

IBC: 1029.16, 1029.16.1, (IFC[BE] 1029.16. 1029.16.1)

Proposed Change as Submitted

Proponent: Ed Kulik, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Building Code

Revise as follows

1029.16 Handrails. Ramped *aisles* having a slope exceeding one unit vertical in 15 units horizontal (6.7-percent slope) and stepped *aisles* shall be provided with *handrails* in compliance with Section 1014 located either at one or both sides of the *aisle* or within the *aisle* width. Where the stepped aisle have seating on one side and the aisle width is 74 inches (1880 mm) or greater, two handrails are required. Where two handrails are required, one of the handrails shall be within 30 inches horizontally of the end of the aisle accessways.

Exceptions:

1. *Handrails* are not required for ramped *aisles* with seating on both sides.
2. *Handrails* are not required where, at the side of the *aisle*, there is a *guard* with a top surface that complies with the graspability requirements of *handrails* in accordance with Section 1014.3.
3. *Handrail* extensions are not required at the top and bottom of stepped *aisles* and ramped *aisles* to permit crossovers within the *aisles*.

1029.16.1 Discontinuous handrails. Where there is seating on both sides of the *aisle*, the mid-*aisle handrails* shall be ~~discontinuous with discontinuous. Where the stepped aisle is required to have two handrails, handrails not located on a guard or wall shall be discontinuous.~~ The gaps or breaks at intervals ~~shall not exceeding~~ exceed five rows to facilitate access to seating and to permit crossing from one side of the *aisle* to the other. These gaps or breaks shall have a clear width of not less than 22 inches (559 mm) and not greater than 36 inches (914 mm), measured horizontally, and the mid-*aisle handrail* shall have rounded terminations or bends.

1029.16.2 Handrail termination. *Handrails* located on the side of stepped *aisles* shall return to a wall, *guard* or the walking surface or shall be continuous to the *handrail* of an adjacent stepped *aisle flight*.

1029.16.3 Mid-aisle termination. Mid-*aisle handrails* shall not extend beyond the lowest riser and shall terminate within 18 inches (381 mm), measured horizontally, from the lowest riser. *Handrail* extensions are not required.

Exception: Mid-*aisle handrails* shall be permitted to extend beyond the lowest riser where the *handrail* extensions do not obstruct the width of the cross *aisle*.

Reason: The social stairway is a new style being used in common areas of schools and multi-assembly buildings. It appears to fall somewhere between stairways and assembly seating. If this is considered a stairway next to platforms, the general requirement for handrails on both sides of the stairway prevents access to the platforms (Example 4). Considering this configuration as assembly seating would require one handrail with current text. This proposal considers this arrangement as a type of assembly seating. The width would have to be determined using both the general circulation number from the upper/lower floor and the seating in accordance with Section 1029.6.1, which requires extra width if a handrail is not with 30". By considering this assembly seating, accessible wheelchairs spaces would already be addressed. Drop offs along the top would have to meet guard provisions.

To address occupant safety, this proposal will require a mid-*aisle handrail* on wide stepped *aisles* in addition to the handrail on the wall. The reasoning for 74" was that we did not want either side of the handrails to create a width that was not readily useable (30" + 44" = 74"). The second handrail being within 30" of the edge of the platform allows flexibility in handrail placement, but still keeps the handrail within reach of persons moving off the platforms. Where there is not a cross *aisle*, the handrail would still have to have handrail extensions at the top and bottom, as well as meet all the other handrail provisions in Section 1014 and 1029.6. This 2nd handrails would typically not show up in stadium seating where *aisles* are typically less wide than specified here.

As you can see in the examples provided: Example 1 has two handrails, but with one on the far side of the platform. Example 4 a 2nd handrail blocks access to the platforms, so people either climb up the platforms, or go under the handrail. In example 2 and 3 a handrail is only provided on one side of the stairway, regardless of width. None of these configuration would address stairway safety and access to the platforms. Example 3 has an example handrail drawn in red of what these requirements would add.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>.



Figure 1



Figure 2

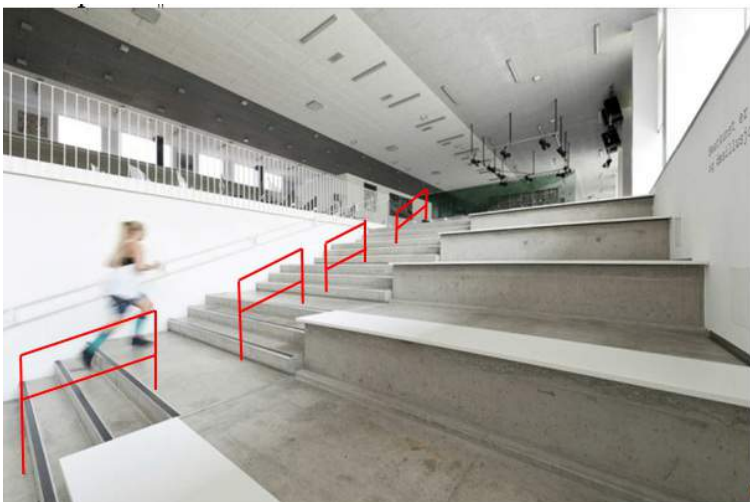


Figure 3



Figure 4

Cost Impact: The code change proposal will increase the cost of construction. In some situations, this could require a 2nd handrail for occupant safe egress on the stairways.

E106-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This is used in a variety of school environments so addressing this issue is needed. The handrail adjacent to this stairway seating arrangement should be the same as required for stepped aisles. Where the 2nd handrail is located needs to be clarified. There was a question on what was meant by the “handrail not located on a guard”. Perhaps a definition of “stepped aisle” is needed. There were a couple of grammar errors that need to be fixed. (Vote 9-5)

Assembly Action:

None

E106-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Gene Boecker, representing Code Consultants, Inc. (geneb@codeconsultants.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1029.16 Handrails. Ramped *aisles* having a slope exceeding one unit vertical in 15 units horizontal (6.7-percent slope) and stepped *aisles* shall be provided with *handrails* in compliance with Section 1014 located either at one or both sides of the *aisle* or within the *aisle* width. Where the stepped aisle have seating on one side and the aisle width is 74 inches (1880 mm) or greater, two handrails are required. Where two handrails are required, one of the handrails shall be within 30 inches horizontally of the ~~end of the stepped aisle accessways.~~

Exceptions:

1. *Handrails* are not required for ramped *aisles* with seating on both sides.
2. *Handrails* are not required where, at the side of the aisle, there is a *guard* with a top surface that complies with the graspability requirements of *handrails* in accordance with Section 1014.3.
3. *Handrail* extensions are not required at the top and bottom of stepped *aisles* and ramped *aisles* to permit crossovers within the *aisles*.

Commenter's Reason: The committee expressed a concern that guard and stepped aisle may not be understood. That is unlikely. A guard at the side of a stair is certainly something that has been provided as a part of the code for a long time. The only real concern was the language about how the location of the second handrail should be measured. That has been modified to address that concern.

This is a code change that needs to be addressed. The current provisions of the code do not address what to do for these types of stairways that are located all over the country; with more popping up everyday.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. As noted in the original proposal the cost will be increased where a second handrail is required.

Public Comment 2:

Proponent: Ed Kulik, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1029.16 Handrails. Ramped *aisles* having a slope exceeding one unit vertical in 15 units horizontal (6.7-percent slope) and stepped *aisles* shall be provided with *handrails* in compliance with Section 1014 located either at one or both sides of the *aisle* or within the *aisle* width. Where the stepped aisle ~~have~~ has seating on one side and the aisle width is 74 inches (1880 mm) or greater, two handrails are required. Where two handrails are required, one of the handrails shall be within

30 inches horizontally of the ~~end side of the tiered floor adjacent to the stepped aisle accessways.~~

Exceptions:

1. *Handrails* are not required for ramped *aisles* with seating on both sides.
2. *Handrails* are not required where, at the side of the aisle, there is a *guard* with a top surface that complies with the graspability requirements of *handrails* in accordance with Section 1014.3.
3. *Handrail* extensions are not required at the top and bottom of stepped *aisles* and ramped *aisles* to permit crossovers within the *aisles*.

1029.16.1 Discontinuous handrails. Where there is seating on both sides of the aisle, the mid-aisle *handrails* shall be discontinuous. Where the stepped aisle is required to have two handrails, ~~handrails not located on a guard or wall the mid-aisle handrails~~ shall be discontinuous. The gaps or breaks at intervals shall not ~~exceed five~~ exceed five rows to facilitate access to seating and to permit crossing from one side of the *aisle* to the other. These gaps or breaks shall have a clear width of not less than 22 inches (559 mm) and not greater than 36 inches (914 mm), measured horizontally, and the mid-aisle *handrail* shall have rounded terminations or bends.

1029.16.2 Handrail termination. *Handrails* located on the side of stepped *aisles* shall return to a wall, *guard* or the walking surface or shall be continuous to the *handrail* of an adjacent stepped *aisle flight*.

1029.16.3 Mid-aisle termination. Mid-aisle *handrails* shall not extend beyond the lowest riser and shall terminate within 18 inches (381 mm), measured horizontally, from the lowest riser. *Handrail* extensions are not required.

Exception: Mid-aisle *handrails* shall be permitted to extend beyond the lowest riser where the *handrail* extensions do not obstruct the width of the cross *aisle*.

Commenter's Reason: This new style of assembly seating is very common in schools and libraries. It is an important safety issue that needs to be addressed. It is hoped that these tweaks with clarify the requirements so this can be added to the code.

To address the committee's concerns:

The new text in Section 1029.16 and 1029.16.1 will allow for the mid aisle handrail to be the same as for stepped aisles. The term tiered floors will be understood because it is already used in Section 1029.5. The 74 was chosen as the point where a 2nd handrail in the width of the stepped aisle would still allow for movement up and down on each side of the handrail.

The end of the aisle accessways was chosen because the tiered platforms do not always contain seats to measure from. Since the seating areas at stepped aisles are tiered platforms (with or without seats), this may be clearer.

Handrails are permitted on the wall or as the top rail of a guard in Section 1029.16. Since the discontinuous handrail could be either at the edge of the seating platforms or in the stepped aisle, mid-aisle handrail is current language that is easier to understand.

Stepped aisles is not defined for assembly seating, but is clearly understood in the context of Section 1029. Aisle is a defined term.

The grammatical error mentioned by the committee of exceeding to exceed in Section 1029.16.1 was addressed as an editorial correction to the original proposal by ICC staff.

What we want to see:



This is why we do not want continuous handrails where you want someone to access seating. This is a safety issue for when someone tries to climb up or down the tiers or goes over or under the handrail to access the seating areas. Discontinuous handrails already have requirements for maximum number of rows and maximum breaks that have worked with typical assembly seating for many decades.

This is what we do not want to see when you want access to seating.



Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. In some situations, this could require a 2nd handrail for occupant safe egress on the stairways.

E106-18

E107-18

IBC: SECTION 1030.1, (IFC[BE] 1030.1)

Proposed Change as Submitted

Proponent: Ed Kulik, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Building Code

SECTION 1030 EMERGENCY ESCAPE AND RESCUE

Revise as follows

1030.1 General. ~~Where required.~~ In addition to the *means of egress* required by this chapter, *emergency escape and rescue openings* shall be provided in the following occupancies:

1. Group R-2 occupancies located in stories with only one *exit* or *access* to only one *exit* as permitted by Tables 1006.3.3(1) and 1006.3.3(2).
2. Group R-3 and R-4 occupancies.

Basements and sleeping rooms below the fourth story above *grade plane* shall have not fewer than one ~~exterior~~ *emergency escape and rescue opening* in accordance with this section. Where *basements* contain one or more sleeping rooms, ~~an emergency escape and rescue opening~~ *opening* shall be required in each sleeping room, but shall not be required in adjoining areas of the *basement*. Such openings shall open directly into a *public way* or to a *yard* or *court* that opens to a *public way*.

Exceptions:

1. *Basements* with a ceiling height of less than 80 inches (2032 mm) shall not be required to have *emergency escape and rescue openings*.
2. *Emergency escape and rescue openings* are not required from *basements* or sleeping rooms that have an exit door or *exit access* door that opens directly into a *public way* or to a *yard*, *court* or exterior ~~exit~~ *egress balcony* that opens to a *public way*.
3. ~~Basements without habitable spaces used only to house mechanical equipment~~ and having not more than 200 square feet (18.6 m²) in floor area shall not be required to have *emergency escape and rescue openings*.
4. Storm shelters are not required to comply with this section where the shelter is constructed in accordance with ICC 500.
- 4-5. Within individual *dwelling* and *sleeping units* in Groups R-2 and R-3, where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1, 903.3.1.2 or 903.3.1.3, *sleeping rooms* in *basements* shall not be required to have *emergency escape and rescue openings* provided that the *basement* has one of the following:
 - 4-15.1. One *means of egress* and one *emergency escape and rescue opening*.
 - 4-25.2. Two *means of egress*.

Reason: This is one of a series of 11 proposals to coordinate the Emergency Escape and Rescue Openings (EERO) technical criteria in the IBC and IRC. Please see the proposal for the definition of Emergency Escape and Rescue Openings for additional information. Due to the code development schedule the proposals for IBC will be proposed in Group A and the proposals for IRC will be proposed in Group B.

IBC

- The definition includes 'exterior', so it does not need to be repeated in the text.
- It was decided not to add the IRC defined 'habitable attic'. If added to the IBC, would the IBC also have to pick up the definition and the number of stories below the habitable attic space? (the IRC definition says this is not a story).
- IBC Exception 2 – change to correct term for 'exterior egress balcony'
- IBC Exception 3 – coordination with IRC, limit is just size without additional criteria for habitable.
- Add storm shelter exception to IBC. Reference ICC 500 so that the escape openings provided are what is specified for storm shelters.

There will be a similar proposal for the IRC in Group B.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of

Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This is a coordination item for exceptions for EEROs already permitted between the codes.

E107-18

Public Hearing Results

Errata: The errata was the addition of Section 1030.1 Exception 4.

Committee Action:

As Modified

Committee Modification: 1030.1 Where required. In addition to the means of egress required by this chapter, emergency escape and rescue openings shall be provided in the following occupancies:

1. Group R-2 occupancies located in stories with only one exit or access to only one exit as permitted by Tables 1006.3.3(1) and 1006.3.3(2).
2. Group R-3 and R-4 occupancies.

Basements and sleeping rooms below the fourth story above grade plane shall have not fewer than one emergency escape and rescue opening in accordance with this section. Where basements contain one or more sleeping rooms, an emergency escape and rescue opening shall be required in each sleeping room, but shall not be required in adjoining areas of the basement. Such openings shall open directly into a public way or to a yard or court that opens to a public way.

Exceptions:

1. Basements with a ceiling height of less than 80 inches (2032 mm) shall not be required to have emergency escape and rescue openings.
2. Emergency escape and rescue openings are not required from basements or sleeping rooms that have an exit door or exit access door that opens directly into a public way or to a yard, court or exterior egress balcony that opens to a public way.
3. Basements ~~without habitable space used only to house mechanical equipment~~ and having not more than 200 square feet (18.6 m²) in floor area shall not be required to have emergency escape and rescue openings.
4. Storm shelters are not required to comply with this section where the shelter is constructed in accordance with ICC 500.
5. Within individual dwelling and sleeping units in Groups R-2 and R-3, where the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, 903.3.1.2 or 903.3.1.3, sleeping rooms in basements shall not be required to have emergency escape and rescue openings provided that the basement has one of the following:
 - 5.1. One means of egress and one emergency escape and rescue opening.
 - 5.2. Two means of egress.

Committee Reason: The modification restores Exception 3 to its original language. The revised language would require a EERO in a non-habitable basement that had other than mechanical equipment. This proposed exception works for single family homes, not is not great for Group R-2 occupancies. This is a good coordination between the IBC and IRC requirements for emergency escape and rescue openings and also cleans up some of the language. The addition for coordination with storm shelters (see published errata) is needed. (Vote 14-0)

Assembly Action:

None

E107-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Gregory Keith, representing The Boeing Company (grkeith@mac.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1030.1 General. Emergency escape and rescue openings shall comply with the requirements of this section.

~~1030.1~~ **1030.2 Where required.** In addition to the *means of egress* required by this chapter, *emergency escape and*

rescue openings shall be provided in the following occupancies:

1. Group R-2 occupancies located in stories with only one *exit* or *access* to only one *exit* as permitted by Tables 1006.3.3(1) and 1006.3.3(2).
2. Group R-3 and R-4 occupancies.

Basements and sleeping rooms below the fourth story above *grade plane* shall have not fewer than one *emergency escape and rescue opening* in accordance with this section. Where *basements* contain one or more sleeping rooms, an *emergency escape and rescue opening* shall be required in each sleeping room, but shall not be required in adjoining areas of the *basement*. Such openings shall open directly into a *public way* or to a *yard* or *court* that opens to a *public way*.

Exceptions:

1. *Basements* with a ceiling height of less than 80 inches (2032 mm) shall not be required to have *emergency escape and rescue openings*.
2. *Emergency escape and rescue openings* are not required from *basements* or sleeping rooms that have an exit door or *exit access* door that opens directly into a *public way* or to a yard, court or exterior egress balcony that opens to a *public way*.
3. *Basements* without habitable space and having not more than 200 square feet (18.6 m²) in floor area shall not be required to have *emergency escape and rescue openings*.
4. Storm shelters are not required to comply with this section where the shelter is constructed in accordance with ICC 500.
5. Within individual *dwelling* and *sleeping units* in Groups R-2 and R-3, where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1, 903.3.1.2 or 903.3.1.3, *sleeping rooms* in *basements* shall not be required to have *emergency escape and rescue openings* provided that the basement has one of the following:
 - 5.1. One *means of egress* and one *emergency escape and rescue opening*.
 - 5.2. Two *means of egress*.

Commenter's Reason: The ICC Building Code Action Committee submitted a series of proposals intended to clarify and coordinate Chapter 10 emergency escape and rescue opening provisions. The first in the series (E107-18) inadvertently removed necessary charging language from Section 1030. This public comment corrects that oversight. No technical changes are proposed. Inclusion of appropriate charging language is consistent with Item E38-18 which editorially corrected other Chapter 10 charging language provisions. Having proper enabling or charging provisions for various technical requirements is legally necessary for a model code adopted by a given political subdivision.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This public comment is editorial in nature.

E107-18

E108-18

IBC: 1030.1.1, (IFC[BE] 1030.1.1)

Proposed Change as Submitted

Proponent: Ed Kulik, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Building Code

Revise as follows

1030.1.1 Operational constraints and opening control devices. *Emergency escape and rescue openings* shall be operational from inside the room without the use of keys or tools. Window-opening control devices ~~complying with ASTM F2090 shall be permitted for use on windows serving as a required~~ *emergency escape and rescue opening shall comply with ASTM F2090.*

Reason: This is one of a series of 11 proposals to coordinate the Emergency Escape and Rescue Openings (EERO) technical criteria in the IBC and IRC. Please see the proposal for the definition of Emergency Escape and Rescue Openings for additional information. Due to the code development schedule the proposals for IBC will be proposed in Group A and the proposals for IRC will be proposed in Group B.

IBC - Last sentence reworded as a requirement to be consistent with IRC

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This is a coordination item for requirements for EEROs already permitted between the codes.

E108-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: There is an errata to the IRC to Section R310.1.1. This will make the current language in the IRC and IBC match, so this revision is not necessary. (Vote 14-0)

Assembly Action:

None

Staff Analysis: The code language in IRC 2018 is as follows:

R310.1.1 Operational constraints and opening control devices. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge. Window opening control devices on windows serving as a required emergency escape and rescue opening shall comply with ASTM F2090.

E108-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ed Kulik, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1030.1.1 Operational constraints and opening control devices. *Emergency escape and rescue openings* shall be operational from inside the room without the use of keys or tools. Window-opening control devices on windows serving as a required *emergency escape and rescue opening* shall comply with ~~ASTM F2090~~ Section 1015.8.

Commenter's Reason: The BCAC requested that this proposal be disapproved because there was a possibility that there was errata to the IRC that would make these sections the same. That was not the case. However, not all emergency escape and rescue openings (EEROs) are required to have a window opening control device that complies with ASTM F2090. The proposed revision will coordinate with Sections 1015.8. Section 1015.8 contains requirements other than compliance with the ASTM standard. The BCAC will provide coordinating proposals for EEROs for IRC in Group B.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The standards are already included in Section 1015.8, so there is no change to requirements that would increase costs.

E108-18

E109-18

IBC: 1030.2, 1030.2.1, 1030.3, (IFC[BE] 1030.2, 1030.2.1, 1030.3)

Proposed Change as Submitted

Proponent: Ed Kulik, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Building Code

Add new text as follows

1030.2 Emergency escape and rescue openings. Emergency escape and rescue openings shall have minimum dimensions in accordance with Section 1030.2.1 through 1030.2.3.

Revise as follows

~~1030.2.1~~**1030.2.1 Minimum size.** *Emergency escape and rescue openings shall have a minimum net clear opening of 5.7 square feet (0.53 m²).*

Exception: The minimum net clear opening for *grade-floor emergency escape and rescue openings* shall be 5 square feet (0.46 m²).

~~1030.2.1~~**1030.2.2 Minimum dimensions.** The minimum net clear opening height dimension shall be 24 inches (610 mm). The minimum net clear opening width dimension shall be 20 inches (508 mm). The net clear opening dimensions shall be the result of normal operation of the opening.

~~1030.3~~**1030.2.3 Maximum height from floor.** ~~Emergency~~ Where a window is provided as the emergency escape and rescue openings, such window shall have the bottom of the clear opening not greater than 44 inches (1118 mm) measured from the floor.

Reason: This is one of a series of 11 proposals to coordinate the Emergency Escape and Rescue Openings (EERO) technical criteria in the IBC and IRC. Please see the proposal for the definition of Emergency Escape and Rescue Openings for additional information. Due to the code development schedule the proposals for IBC will be proposed in Group A and the proposals for IRC will be proposed in Group B. This proposal deals with Minimum size, dimensions and height.

IBC 310.3 - revise to coordinate language and organization with the IRC.

There will be a similar proposal to Group B for IRC:

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac>.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This is a coordination item for requirements for EEROs already permitted between the codes.

E109-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The change in the text to Section 1030.2.3 appears to be mandating a window. There is no sill height given for other openings. Emergency escape and rescue openings can be doors or other acceptable openings. (Vote 13-1)

Assembly Action:

None

E109-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ed Kulik, representing ICC Building Code Action Committee (bcac@iccsafe.org) requests As Submitted.

Commenter's Reason: One of the points of the 11 changes proposed for emergency escape and rescue opening (EERO) is that they can be doors or windows. The committee approved 9 of those changes during the code change hearings in April. This proposal is an important piece for coordination of the IRC and IBC requirements for EEROs. To address the committee's concerns - The threshold on doors is addressed in Section 1010. Section 1030.2.3 does not mandate windows, but says if window option is chosen, then there is maximum height of the bottom edge so that people can crawl out.

A complete version on what this section would look like if all 11 proposals passed was in the reason statement of G5-18. The following is the section related to door and window sizes. Section 1030.3 was approved in code change E110-18.

1030.2 Emergency escape and rescue openings. Emergency escape and rescue opening shall have minimum dimensions in accordance with Section 1030.2.1 through 1030.2.3.

1030.2.1 Minimum size. *Emergency escape and rescue openings* shall have a minimum net clear opening of 5.7 square feet (0.53 m²).

Exception: The minimum net clear opening for *grade-floor emergency escape and rescue openings* shall be 5 square feet (0.46 m²).

1030.2.2 Minimum dimensions. The minimum net clear opening height dimension shall be 24 inches (610 mm). The minimum net clear opening width dimension shall be 20 inches (508 mm). The net clear opening dimensions shall be the result of normal operation of the opening.

1030.2.3 Maximum height from floor. Where a window is provided as the *Emergency escape and rescue openings*, such window shall have the bottom of the clear opening not greater than 44 inches (1118 mm) measured from the floor.

1030.3 Emergency escape and rescue doors. Where a door is provided as the required emergency escape and rescue opening, it shall be a swinging door or a sliding door.

The BCAC will provide coordinating proposals for EEROs for IRC in Group B.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This is a coordination item for requirements for EEROs already permitted between the codes.

E109-18

E115-18

IBC: 1105.1, 1105.1.1, Table TABLE 1105.1.1

Proposed Change as Submitted

Proponent: Joseph Hetzel, Thomas Associates, Inc., representing American Association of Automatic Door Manufacturers (jhetzel@thomasamc.com)

2018 International Building Code

Revise as follows

1105.1 Public entrances. In addition to *accessible* entrances required by Sections ~~1105.1.1~~1105.1.2 through ~~1105.1.7~~1105.1.8, at least 60 percent of all *public entrances* shall be *accessible*.

Exceptions:

1. An *accessible* entrance is not required to areas not required to be *accessible*.
2. Loading and *service entrances* that are not the only entrance to a tenant space.

Add new text as follows

1105.1.1 Automatic doors. In facilities with the occupancies and building occupant loads indicated in Table 1105.1.1, at least one accessible exterior public entrance shall be either a full power-operated door or a low-energy power-operated door.

**TABLE 1105.1.1
PUBLIC ENTRANCE WITH POWER-OPERATED DOOR**

<u>OCCUPANCY</u>	<u>BUILDING OCCUPANT LOAD GREATER THAN</u>
<u>A-1, A-2, A-3, A-4</u>	<u>300</u>
<u>B, M, R-1</u>	<u>500</u>

- Reason:**
1. Enhances accessibility. It is widely accepted that automatic doors in general enhance overall accessibility, by accommodating a wide array of conditions people have that qualify them to need accessibility at facility entrances. This accommodates a wide variety of accessibility needs that manual doors being installed today cannot encompass.
 2. Considers "transient" use. The Table directly addresses people who infrequently use public entrances so that they would need no special knowledge, skill or tool to enter a facility. All occupancies included in the Table experience such "transient" use.
 3. Addresses a public need. The occupancies cited are associated with a serious existing need for automatic doors. The safety of both use and moving people in and out of buildings in those occupancies by using only manually operated doors is a major concern particularly in emergency situations.
 4. Focuses on public entrances. The Table applies where the public is most likely to access facilities. Regarding which public entrance to choose for an automatic door if multiple entrances are accessible, this is left to the building designer on which would be best but the requirement of "at least one" door allows the designer to consider all entrances if feasible.
 5. Occupancies involved are those most applicable to the public. The population requiring accessibility commonly needs accommodations to enter assembly, business, mercantile, and hotel/motel facilities as part of their everyday life. No code requirement for automatic doors means an increased safety risk and a decreased accessibility convenience.
 6. Brings completion to accessible entrance provisions. The Table is needed in Section 1105, where accessible entrances are governed.
 7. No disproportional economic burden. The thresholds have been chosen so as not to be a requirement for smaller occupancies such as small assembly facilities or strip mall businesses.

8. Addresses statistical need for accessibility. The thresholds also assume that a minimum of 2% of the population will be in need of accessibility at any given time for the specified occupancies. For an occupant load of 300, this means that at least six people will have the need that an automatic door will provide. The anticipated accessibility need should exceed this estimate a large enough percentage of time to constitute a critical mass of facilities needing power-operated doors when meeting the established thresholds.

9. Enhances public safety. Automatic doors are regulated by ANSI/BHMA safety standards intended to prevent people from coming in contact with moving doors. Facilities employing automatic doors are required to abide by these requirements, which affords protection to anyone - including children, the elderly, and/or those with accessibility needs - in the vicinity of moving doors while minimizing or preventing operational problems. Automatic doors are thus far safer in the marketplace than manually operated doors.

10. Favorably increases facility usage. Those with accessibility needs are less likely to choose to use a facility without an automatic door, therefore resulting in reduced institutional, social, and economic benefits to entities operating within a facility.

11. Occupant load thresholds have related code precedence. The justification of minimum occupant load uses Risk Category and minimum number of exits as starting points, since these are the only locations in the Code with occupancy thresholds to consider. Risk Category and minimum number of exits share a common concern with automatic doors because the threshold numbers represent a critical mass of people above which a unique set of code requirements need to apply. Following is an explanation of how the threshold numbers have been arrived at for each occupancy in the Table.

o Group A: Also from Table 1604.5, Risk Category III. The scope of public assemblies is an occupant load greater than 300.

o Groups B, M and R-1: From Table 1006.3.1, minimum number of exits or access to exits per story. Table 1006.3.1 states that three exits or exit access doorways shall be provided from any space with an occupant load of 501 to 1000, and four shall be provided with an occupant load greater than 1000. The proposed Table would set a threshold of three exits or exit access doorways, in a given story with a public entrance, to require an automatic door at that public entrance. R-1 is the applicable Group R occupancy because hotels and motels should be encompassed by the Table where the threshold occupant load would be appropriate for those structures.

12. Alleviates concerns about maximum manual force required to operate an entrance door. Although the IBC regulates this maximum force, any type of force needed to operate a manual door is a concern for the accessibility community. Automatic doors would require no force to operate.

13. Alleviates concerns about manual force variations. Wind pressures, internal building stack pressures, and/or increasing hardware friction are common concerns and affect manual operation of entrance doors all throughout the country. This concern is removed since automatic doors require no force to operate.

14. More than a "best practice" requirement. The requirement is a need, as opposed to a "best practice", because automatic doors encourage people to use facilities, are safer, and more efficiently move people in and out of buildings. It is widely known that people - particularly children, the elderly, and/or those with accessibility needs - have great difficulty, or find it impossible, to open entrance doors because of stack pressures, door configurations, door friction, wind, or door weight.

Cost Impact: The code change proposal will increase the cost of construction. The increased construction cost will be outweighed by the benefits provided to the public as outlined in our reasoning statement.

E115-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Having one automatic door on these types of facilities would address the needs of person with mobility impairments or persons with not enough strength to open exterior doors. The use group and occupant loads are appropriate levels for application. (Vote 13-0)

Assembly Action:

None

E115-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Micah Chappell, Seattle Department of Construction and Inspections, representing Seattle Department of Construction and Inspection (micah.chappell@seattle.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1105.1.1 Automatic doors. In facilities with the occupancies and building occupant loads indicated in Table 1105.1.1, ~~at least one accessible exterior public entrance shall~~ public entrances that are required to be accessible shall have one door be either a full power-operated door or a low-energy power-operated door. Where the public entrance includes a vestibule, at least one door into and one door out of the vestibule shall meet the requirements of this section.

Commenter's Reason: The original proposal provides additional easy if ingress and egress and was a good start in getting automatic doors installed at one required accessible entrance, but seemed to indicate that if you had a bank of doors at the required public entrance, that all of those doors needed to be automatic. We also added to the proposal that all public entrances that are required to be accessible provide one automatic door, considering if you had a large facility, the accessible public entrances could be a significant distance apart making access to an automatic door more difficult. Additionally the proposal did not address what needed to be installed when the accessible public entrance has a vestibule with doors arranged in series.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. This proposal will cause a minor increase in construction cost for the occupancy classifications that are required to meet this standard.

Public Comment 2:

Proponent: Micah Chappell, representing Seattle Department of Construction and Inspection (micah.chappell@seattle.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

TABLE 1105.1.1^a
PUBLIC ENTRANCE WITH POWER-OPERATED DOOR

OCCUPANCY	BUILDING OCCUPANT LOAD GREATER THAN
A-1, A-2, A-3, A-4	300
B, M, R-1	500

a. In mixed-use facilities, when the total sum of the building occupant load is greater than those listed, the most restrictive building occupant load shall apply.

Commenter's Reason: The table did not address mixed-use facilities when applying this section and the proposed footnote provides a definitive path for the Code Official. An example of why this footnote for mixed-use facilities is needed would be if you had both a M occupancy and an A-3 occupancy. The M occupancy has an occupant load of 350 and the A-2 occupancy has an occupant load of 250, individually they do not exceed the requirements of the table so the

requirements would not apply, but the total sum of the building occupant load would exceed the limits of the table. So as this example shows the original proposal did not provide guidance on how to apply the section to mixed-use facilities. We believe the footnote addresses this issue.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. This proposal will cause a minor increase the cost of construction.

Public Comment 3:

Proponent: Lee Kranz, representing Washington Association of Building Officials Technical Code Development Committee (lkranz@bellevuewa.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1105.1.1 Automatic doors. In facilities with the occupancies and building occupant loads indicated in Table 1105.1.1, at least one accessible exterior public entrance shall have at least one door be either a full power-operated door or a low-energy power-operated door. Where the public entrance includes a vestibule, at least one door into and one door out of the vestibule shall meet the requirements of this section.

Commenter's Reason: This public comment is intended to address a potentially confusing aspect of the original proposal related to the number of door requiring the automatic opening device. This change will make it clear that only one of the doors into the building requires automatic opening when a bank of doors are provided.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The cost will be higher because more doors will be required to have automatic opening devices.

Staff Analysis: The 2017 ICC A117.1 includes the following language for automatic door openers on vestibules.

404.3.2 Vestibules. Where an entrance includes a vestibule, at least one exterior door or gate and one interior door or gate in the vestibule shall have the same type of automatic door or gate opener.

E115-18

E117-18

IBC: 1106.2

Proposed Change as Submitted

Proponent: Jim Safranek, representing Safranek Group LLC

2018 International Building Code

Revise as follows

1106.2 Groups I-1, R-1, R-2, R-3 and R-4. Accessible parking spaces shall be provided in Group I-1, R-1, R-2, R-3 and R-4 occupancies in accordance with Items 1 through 4 as applicable.

1. In Group R-2, R-3 and R-4 occupancies that are required to have *Accessible, Type A or Type B dwelling units or sleeping units*, at least 2 percent, but not less than one, of each type of parking space provided shall be *accessible*.
2. In Group I-1 and R-1 occupancies, *accessible* parking shall be provided in accordance with Table 1106.1.
3. Where at least one parking space is provided for each *dwelling unit or sleeping unit*, in addition to the accessible parking in Items 1 and 2, and at least one *accessible* parking space shall be provided for each *Accessible and Type A unit*.
4. Where parking is provided within or beneath a building, *accessible* parking spaces shall be provided within or beneath the building.

Reason: Purpose: To clarify whether the number of parking space required by item 3 of section 1106.2 are in addition to the minimum required number of accessible parking spaces or are included as part of the minimum required number of accessible parking spaces.

Reason and Substantiation: For groups I-1, R-1, R-2, R-3 and R-4 the required minimum number of accessible parking spaces is either 2% (Group R-2, R-3 and R-4) or per Table 1106.1 (Group I-1 and R-1). Additionally, item 3 in section 1106.2 states, "Where a parking space is provided for each dwelling unit or sleeping unit, at least one accessible parking space shall be provided for each Accessible and Type 'A' unit.". Item 3 does not appear to clarify whether the required parking spaces for Accessible and Type 'A' units are included among the required minimum number of accessible spaces (either 2% of provided parking spaces or per Table 1106.1), or, are in addition to the required minimum number of accessible spaces.

For example, given a Group R-2 apartment project with 250 parking stalls for 250 units (1 parking stall per unit), where 5 of the units are Type 'A' units and the remaining units are Type 'B' units and there are 5 accessible parking spaces provided. Do the requirements of Section 1106.2, item 3 mean the following:

1. that a minimum of 5 accessible parking spaces will be required ($250 \times 2\% = 5$, per section 1106.2, item 1) and this also corresponds to the minimum number of required and provided Type 'A' units (1106.2, item 3)?
2. or, that in addition to the minimum required accessible parking spaces (5) (section 1106.2, item 1), 5 additional parking spaces will be required for each of the provided Type 'A' units (per section 1106.2, item 3), resulting in a total of 10 accessible parking spaces?

The proposed additional language to item 3 of section 1106.2 seeks to clarify its intent.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Whether or not the code change proposal will increase or decrease the cost of construction depends upon how jurisdictions have been interpreting item 3 of section 1106.2.

If jurisdictions have been interpreting that accessible parking spaces required by item 1 of section 1106.2 do not include the accessible parking spaces required by item 3 of section 1106.2 (which must be also be additionally provided), this will not increase construction costs. The reason for this is that the jurisdiction's interpretation of items 1 and 3 of section 1106.2 is consistent with the code change proposal, that reflects the intent of the code.

If jurisdictions have been interpreting that accessible parking spaces required by item 1 of section 1106.2 include the accessible parking spaces required by item 3 of section 1106.2, this will increase construction costs. The reason for this is that the jurisdiction's interpretation of items 1 and 3 of section 1106.2 is not consistent with the code change proposal and additional accessible parking spaces and their accompanying accessible access aisles and accessible routes will be required.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: While this item does need to be clarified, this is not the right direction to go for this calculation. The proposed language for Item 3 is effectively doubling up requirements for parking for Groups I-1 and R. The intent is to comply with the most restrictive of the 2010 ADA and the Fair Housing requirements, so this calculation should be the opposite of what is indicated. (Vote 14-0)

Assembly Action:

None

E117-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Dominic Marinelli, representing United Spinal Association (DMarinelli@accessibility-services.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

1106.2 Groups I-1, R-1, R-2, R-3 and R-4. *Accessible* parking spaces shall be provided in Group I-1, R-1, R-2, R-3 and R-4 occupancies in accordance with Items 1 through 4 as applicable.

1. In Group R-2, R-3 and R-4 occupancies that are required to have *Accessible, Type A or Type B dwelling units or sleeping units*, at least 2 percent, but not less than one, of each type of parking space provided shall be *accessible*.
2. In Group I-1 and R-1 occupancies, *accessible* parking shall be provided in accordance with Table 1106.1.
3. Where at least one parking space is provided for each *dwelling unit or sleeping unit*, ~~in addition to the accessible parking in Items 1 and 2, and~~ at least one *accessible* parking space shall be provided for each *Accessible* and Type A unit or the number of accessible parking spaces indicated in Items 1 and 2, whichever is greater.
4. Where parking is provided within or beneath a building, *accessible* parking spaces shall be provided within or beneath the building.

Commenter's Reason: The language is not clear as to if Item 3 is in addition to Item 1 and 2 or considered separately as a worst case. The committee voted to disapprove that this was additive. This should be cleared up.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. If this is cleared up, this could possibly reduce the total number of accessible parking spaces required.

E117-18

E126-18

IBC: 1107.7.2

Proposed Change as Submitted

Proponent: Jim Safranek, representing Safranek Group LLC

2018 International Building Code

Revise as follows

1107.7.2 Multistory units. *A multistory dwelling unit or sleeping unit that is not provided with elevator service is not required to be a Type A unit or a Type B unit. Where a multistory unit is provided with external elevator service to only one floor, the floor provided with elevator service shall be the primary entry to the unit, shall comply with the requirements for a Type A units or Type B unit, where applicable and, where provided within the unit, a living area, a kitchen and a toilet facility shall be provided on that floor.*

Reason: Purpose: One type of Group R-2 multi-family residential project seen in several areas of the United States are apartment buildings consisting solely of multiple, stacked, two-level multistory dwelling units (upper units placed above lower units) using a common-use building stair to access the upper units, instead of using a common-use elevator. For this type of building, per section 1107.7.2 of the 2018 IBC, the individual multistory dwelling units are not required to be Type 'B' units. Therefore, an apartment project consisting solely of a building (or buildings) containing these type of units would not have any Type 'B' units and initially would appear to be exempt from any accessibility requirements. However, section 1107.6.2.2.1 of the 2018 IBC would require that a Type 'A' unit be provided, regardless of the fact that the project did not contain any Type 'B' units. The result of this is a project that did not contain any Type 'B' units and initially appeared to be exempt from any accessibility requirements would be required to provide Type 'A' units and all common-use areas that were initially exempt from accessibility requirements would now be required to comply with applicable accessibility requirements. The purpose of this proposal is to clarify the requirements for Type 'A' units for Group R-2 projects consisting solely of multistory dwelling units without elevator service.

Reason and Substantiation: Where Exception 1 of section 1107.6.2.2.1 permits the number of Type 'A' units to be reduced per section 1107.7, subsection 1107.7.1 (Structures without elevator service), does not address the possibility of multi-level dwelling units in a structure without elevator service. The result of this is that the requirements found in section 1107.7.1 and its subsections, 1107.7.1.1 and 1107.7.1.2 yield units that are classified as Type 'B' units. Additionally, section 1107.7.2 (Multistory units) does identify that a multistory dwelling or sleeping unit not provided with elevator service is not required to be a Type 'B' unit, which mirrors the requirements found in the Fair Housing Act. Section 1107.7.2 also states that a multistory unit with an external elevator service to one floor is required to have the floor of that unit meet Type 'B' requirements. Unfortunately, section 1107.7.2 does not have language such as that found in section 1107.7.1 ("The number of Type 'A' units shall be determined in accordance with Section 1107.6.2.2.1.") stating how the number of Type 'A' units are determined where multi-level dwelling units occur. Given the lack of any specific requirement clarifying how Type 'A' units are determined for multistory units, the general requirement found in section 1107.6.2.2.1 is then applicable and all multistory units, regardless of whether they have a floor required to comply with Type 'B' requirements, or not (in the case of multistory units without elevator service) are utilized when determining the number of Type 'A' units for a project. This will result in all projects with multistory units being required to have Type 'A' units.

For any Group R-2 project (except those with certain grade conditions and those with nonelevator buildings where certain design flood elevation conditions exist) Type 'B' units will always occur and Type 'A' units will always be required. Given this, it appears overly restrictive that the International Building Code (IBC) require that Type 'A' units and their corresponding accessible common-use areas be provided where Type 'B' units and accessible common-use areas are not required, as is the case for R-2 projects that consist solely of stacked multistory dwelling units without any type of elevator service. Additionally, this requirement for Type 'A' units where Type 'B' units are not provided, greatly exceeds the accessibility requirements found in the Fair Housing Act (FHA). For a project consisting solely of multistory dwelling units without elevator service, the multistory dwelling units as well as their accompanying common-use areas would not be required to comply with the accessibility requirements found in the FHA. While some accessibility requirements found in the IBC and its accompanying accessibility standard ICC A117.1 exceed the requirements found in the FHA, in this circumstance, the IBC would greatly exceed the FHA requirements.

The proposed addition to section 1107.7.2 attempts to address this issue by eliminating the requirement for Type 'A' units at Group R-2 projects where only multistory dwelling units without any type of elevator service are provided.

Cost Impact: The code change proposal will decrease the cost of construction for multi-family residential projects that consist solely of multistory dwelling units, there will be a reduction in costs where Type 'A' units and accessible common-use areas are not required.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This code change would be a reduction in the number of Type A units required. This allowance would conflict with what is required in Section 1107.7.1.1. (Vote 14-0)

Assembly Action:

None

E126-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Dominic Marinelli, representing United Spinal Association (DMarinelli@accessibility-services.com) requests As Submitted.

Commenter's Reason: The committee reason for disapproval had two points.

1) This code change would be a reduction in the number of Type A units required.

True, but in minimal situations - This allowance would only be applicable in multi-story townhouses. Type B units are not required in townhouses without elevators because it was considered cost prohibitive to ask for elevators or platform lifts in individual townhouses. It seem appropriate to make this same allowance for Type A units. The definition for multi-story dwelling unit would not let this exception be applies to single story units over a garage - there has to be living space on two or more floors - so for a townhouse with a garage underneath, this would apply for a 3 story unit. Type A units would still be required in apartment building with 20 or more units. With the new sizes in 2017 ICC A117.1 for Accessible and Type A units, there may also be additional costs due to increase in size of turning spaces in each room.

2) This allowance would conflict with what is required in Section 1107.7.1.1.

False - Section 1107.7.1.1 is applicable to single story units in a multi-story building. This allowance would not be a conflict.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. If these units are exempted in townhouses, this would be a cost savings by not requiring private elevators or platform lifts for access.

E126-18

WUIC3-18

IWUIC: 503.2

Proposed Change as Submitted

Proponent: Marcelo Hirschler, GBH International, representing GBH International (gbhint@aol.com)

2018 International Wildland-Urban Interface Code

Revise as follows

503.2 Ignition-resistant building material. Ignition-resistant building materials shall comply with any one of the following:

1. Material shall be tested on ~~all sides~~ the front and back faces either with the ~~extended~~ ASTM E84 (UL 723) test or ASTM E 2768, ~~except panel products shall be permitted to test only the front and back faces. Panel products shall be tested with a ripped or cut longitudinal gap of $\frac{3}{8}$ inch (3.2 mm). Materials that, when tested in accordance with the test procedures set forth in ASTM E84 or UL 723, extended for a test period of 30 minutes, or with ASTM E 2768~~E2768, and shall comply with the following:
 - 1.1. Flame spread. Material shall exhibit a flame spread index not exceeding ~~25~~ and shall not show evidence of progressive combustion following the extended 30-minute test.25.
 - 1.2. Flame front. Material shall exhibit a flame front that does not progress more than 10¹/₂ feet (3200 mm) beyond the centerline of the burner at any time during the extended 30-minute test. This shall be considered evidence of no significant progressive combustion.
 - 1.3. Weathering. Ignition-resistant building materials shall maintain their performance in accordance with this section under conditions of use. Materials shall meet the performance requirements for weathering (including exposure to temperature, moisture and ultraviolet radiation) contained in the following standards, as applicable to the materials and the conditions of use:
 - 1.3.1. Method A "Test Method for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing" in ASTM D 2898, for fire-retardant-treated wood, wood-plastic composite and plastic lumber materials.
 - 1.3.2. ASTM D 7032 for wood-plastic composite materials.
 - 1.3.3. ASTM D 6662 for plastic lumber materials.
 - 1.4. Identification. Materials shall bear identification showing the fire test results.

Exception: ~~Materials composed of a combustible core and a noncombustible exterior covering made from either aluminum at a minimum 0.019 inch (0.48 mm) thickness or corrosion-resistant steel at a minimum 0.0149 inch (0.38 mm) thickness shall not be required to be tested with a ripped or cut longitudinal gap.~~
2. Noncombustible material. Material that complies with the requirements for *noncombustible* materials in Section 202.
3. Fire-retardant-treated wood. Fire-retardant-treated wood identified for exterior use and meeting the requirements of Section 2303.2 of the International Building Code.
4. Fire-retardant-treated wood roof coverings. Roof assemblies containing fire-retardant-treated wood shingles and shakes that comply with the requirements of Section 1505.6 of the International Building Code and classified as Class A roof assemblies as required in Section 1505.2 of the International Building Code.

Reason: This proposal makes 4 changes, discussed below:
First:

It makes no sense to test "all sides" of a product when it becomes physically impossible to distinguish between the ends and no ASTM E84 specimen (which is 24 feet long by 2 feet wide) can be obtained from the ends. When a specimen is presented for testing, if all sides look the same, a lab can't tell which is a second side. Testing front and back is feasible but other sides are not (because the maximum ASTM E84 thickness is 4 inches). In order to test a "2 by 4" specimen a simple calculation is that you would have to cut it into 864 pieces that are 2 x 4, and 4 inches thick, and somehow fasten them together: that is obviously ridiculous. It makes perfect sense to test the front and the back sides to ensure that the same fire performance is present on each side and that requirement is proposed to be retained.

Second:

The requirement to test with a rip or gap is not contained in either ASTM E84 or ASTM E2768 and is simply supposed to differentiate between fire retardant treated wood materials and coated materials. However, there is evidence that impregnation with fire retardant (as for fire retardant treated wood or FRTW) is not a guarantee that the additive penetrates uniformly throughout the wood and yet FRTW is not required to be tested on more than one side or with a gap or rip. That makes no sense. In fact, also, some coated products will be able to meet the requirements with the gap or rip so nothing is gained by adding that requirement. If there is concern about the implications of using coated wood products exceptions can (and should) be placed where the use of coated products is inappropriate, especially as decking materials.

Third:

ASTM E2768 was developed by ASTM E05 (committee on fire standards) specifically for the purpose of giving instructions on how to conduct ASTM E84 when extended to 30 minutes. In fact ASTM E84 states that materials required to be tested to meet the extended ASTM E84 to a 30-minute duration are covered by ASTM E2768. No other standard or code requirement explains how to test for "significant progressive combustion".

ASTM E2768 contains a section that explains how to assess the pass/fail criteria and it states as follows under "conditions of classification":

13.1 The test method has the following conditions of classification for a material or product to be classified as meeting the requirements of this standard:

13.1.1 The flame spread index shall be 25 or less as determined for the initial 10 min test period,

13.1.2 The flame front shall not progress more than 10.5 ft (3.2 m) beyond the centerline of the burners at any time during the 30 min test period. This is considered evidence of no significant progressive combustion in this test method.

13.2 For materials or products that are not homogeneous or symmetrical about their longitudinal axis, only surfaces that have been individually tested shall be eligible to be classified and reported as meeting the conditions of classification of this standard.

Consequently, the changes proposed to items 1.1 and 1.2 are consistent with the statements in ASTM E84 and ASTM E2768.

Fourth:

The exception is proposed to be eliminated because it is unnecessary if the requirement to test with a rip or gap is deleted.

A report on ASTM E2768 tests conducted by a fire test lab (QAI) is attached and it shows that when the flame front does not progress more than 10.5 ft beyond the centerline of the burners this is considered evidence of no significant progressive combustion. Also, no rip or gap used, because that is not what is required by ASTM E2768. Two pages of a similar report (title page and page 7) from another fire test lab (Intertek) also shows that the same criterion is used for both issues.

Cost Impact: The code change proposal will decrease the cost of construction This will eliminate unnecessary testing that represents a barrier without adding fire safety.

WUIC3-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that the proposed revisions to the testing requirements do not match the original intent of the section. The change from testing on all sides to just the front and back faces is an unacceptable reduction in requirements and does not represent actual use and exposure of different types of materials and the cutting of these products during installation. (Vote: 12-2)

Assembly Action:

None

WUIC3-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Tim Earl, representing GBH International (tearl@gbhinternational.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Wildland-Urban Interface Code

503.2 Ignition-resistant building material. Ignition-resistant building materials shall comply with any one of the following:

1. Material shall be tested on all sides with the extended ASTM E84 (UL 723) test or ASTM E 2768, except panel products shall be permitted to test only the front and back faces. Panel products shall be tested with a ripped or cut longitudinal gap of $\frac{1}{8}$ inch (3.2 mm). Materials that, when tested in accordance with the test procedures set forth in ASTM E84 or UL 723 for a test period of 30 minutes, or with ASTM E 2768, comply with the following:
 - 1.1. Flame spread. Material shall exhibit a flame spread index not exceeding 25 and shall not show evidence of progressive combustion following the extended 30-minute test.
 - 1.2. Flame front. Material shall exhibit a flame front that does not progress more than $10\frac{1}{2}$ feet (3200 mm) beyond the centerline of the burner at any time during the extended 30-minute ~~test~~ test. This shall be considered evidence of no significant progressive combustion.
 - 1.3. Weathering. Ignition-resistant building materials shall maintain their performance in accordance with this section under conditions of use. Materials shall meet the performance requirements for weathering (including exposure to temperature, moisture and ultraviolet radiation) contained in the following standards, as applicable to the materials and the conditions of use:
 - 1.3.1. Method A "Test Method for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing" in ASTM D 2898, for fire-retardant-treated wood, wood-plastic composite and plastic lumber materials.
 - 1.3.2. ASTM D 7032 for wood-plastic composite materials.
 - 1.3.3. ASTM D 6662 for plastic lumber materials.
 - 1.4. Identification. Materials shall bear identification showing the fire test results.

Exception: Materials composed of a combustible core and a noncombustible exterior covering made from either aluminum at a minimum 0.019 inch (0.48 mm) thickness or corrosion-resistant steel at a minimum 0.0149 inch (0.38 mm) thickness shall not be required to be tested with a ripped or cut longitudinal gap.
2. Noncombustible material. Material that complies with the requirements for *noncombustible* materials in Section 202.
3. Fire-retardant-treated wood. Fire-retardant-treated wood identified for exterior use and meeting the requirements of Section 2303.2 of the International Building Code.
4. Fire-retardant-treated wood roof coverings. Roof assemblies containing fire-retardant-treated wood shingles and shakes that comply with the requirements of Section 1505.6 of the International Building Code and classified as Class A roof assemblies as required in Section 1505.2 of the International Building Code.

Commenter's Reason: There is disagreement over whether all sides of these products need to be tested, and the committee disapproved the original code change for that reason.

However, during ASTM E84 task group meetings, all commercial test labs present agreed that their interpretation of "significant progressive combustion" is the flame front progressing more than 10 1/2 feet beyond the centerline of the burner at any time during the extended 30-minute test.

Because the assessment of "significant progressive combustion" is an important point that needs clarification, this Public Comment retains only that portion of the original code proposal.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal simply adds language to explicitly state how labs are currently assessing the absence of "significant progressive combustion." It has no cost impact.

Public Comment 2:

Proponent: Marcelo Hirschler, representing GBH International (mmh@gbhint.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Wildland-Urban Interface Code

503.2 Ignition-resistant building material. Ignition-resistant building materials shall comply with any one of the following:

1. Material shall be tested on all sides with the extended ASTM E84 (UL 723) test or ASTM E 2768, except panel products shall be permitted to test only the front and back faces. Panel products shall be tested with a ripped or cut longitudinal gap of 1/8 inch (3.2 mm). Materials that, when tested in accordance with the test procedures set forth in ASTM E84 or UL 723 for a test period of 30 minutes, or with ASTM E 2768, comply with the following:
 - 1.1. Flame spread. Material shall exhibit a flame spread index not exceeding 25 and shall not show evidence of progressive combustion following the extended 30-minute test.
 - 1.2. Flame front. Material shall exhibit a flame front that does not progress more than 10¹/₂ feet (3200 mm) beyond the centerline of the burner at any time during the extended 30-minute test. This shall constitute evidence of no progressive combustion following the extended 30-minute test, as required in Item 1.1.
 - 1.3. Weathering. Ignition-resistant building materials shall maintain their performance in accordance with this section under conditions of use. Materials shall meet the performance requirements for weathering (including exposure to temperature, moisture and ultraviolet radiation) contained in the following standards, as applicable to the materials and the conditions of use:
 - 1.3.1. Method A " Test Method for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing" in ASTM D 2898, for fire-retardant-treated wood, wood-plastic composite and plastic lumber materials.
 - 1.3.2. ASTM D 7032 for wood-plastic composite materials.
 - 1.3.3. ASTM D 6662 for plastic lumber materials.
 - 1.4. Identification. Materials shall bear identification showing the fire test results.

Exception: Materials composed of a combustible core and a noncombustible exterior covering made from either aluminum at a minimum 0.019 inch (0.48 mm) thickness or corrosion-resistant steel at a minimum 0.0149 inch (0.38 mm) thickness shall not be required to be tested with a ripped or cut longitudinal gap.

2. Noncombustible material. Material that complies with the requirements for *noncombustible* materials in Section 202.
3. Fire-retardant-treated wood. Fire-retardant-treated wood identified for exterior use and meeting the requirements of Section 2303.2 of the International Building Code.
4. Fire-retardant-treated wood roof coverings. Roof assemblies containing fire-retardant-treated wood shingles and shakes that comply with the requirements of Section 1505.6 of the International Building Code and classified as Class A roof assemblies as required in Section 1505.2 of the International Building Code.

Commenter's Reason: This public comment simply changes nothing more in the existing code than adding the clarification that, if the flame front does not progress beyond 10.5 feet that is evidence of no progressive combustion as required by 1.1. The logic goes as follows:

1. ASTM E84 is a 10-minute test and not a 30-minute test.

2. ASTM E84 states that, when the test is conducted for 30 minutes (meaning the extended ASTM E84 test , for an additional 20 minutes), it is conducted in accordance with ASTM E2768.

3. ASTM E2768 is the 30-minute test method, and it states, as shown below, that when the flame front does not progress more than 10.5 feet beyond the centerline of the burners that is considered evidence of no significant progressive combustion.

4. All fire testing labs have used this concept for many years and they present the results of the extended ASTM E84 test with two results: flame spread index (after 10 minutes) and maximum flame front (after 30 minutes).

This public comment makes no changes to the required rip or gap or to the requirement for testing all sides as shown in the code at present.

ASTM E84 explicitly states that the extended test to 30 minutes is to be conducted in accordance with ASTM E2768. ASTM E2768 was developed by ASTM E05 (committee on fire standards) specifically for the purpose of giving instructions on how to conduct ASTM E84 when extended to 30 minutes. In fact ASTM E84 states that materials required to be tested to meet the extended ASTM E84 to a 30-minute duration are covered by ASTM E2768. No other standard or code requirement explains how to test for significant progressive combustion .

ASTM E2768 contains a section that explains how to assess the pass/fail criteria and it states as follows under conditions of classification :

13.1 The test method has the following conditions of classification for a material or product to be classified as meeting the requirements of this standard:

13.1.1 The flame spread index shall be 25 or less as determined for the initial 10 min test period,

13.1.2 The flame front shall not progress more than 10.5 ft (3.2 m) beyond the centerline of the burners at any time during the 30 min test period. This is considered evidence of no significant progressive combustion in this test method.

13.2 For materials or products that are not homogeneous or symmetrical about their longitudinal axis, only surfaces that have been individually tested shall be eligible to be classified and reported as meeting the conditions of classification of this standard.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction This will result in a recognition of the unnecessary additional requirement, which is not used by any fire testing lab.

WUIC3-18

WUIC4-18

IWUIC: 503.2

Proposed Change as Submitted

Proponent: Thomas Meyers, Building Intuition, LLC, representing Self (codeconsultant@gmail.com)

2018 International Wildland-Urban Interface Code

Revise as follows

503.2 Ignition-resistant building material. Ignition-resistant building materials shall comply with any one of the following:

1. Material shall be tested on all sides with the extended ASTM E84 (UL 723) test or ASTM E 2768, except panel products shall be permitted to test only the front and back faces. Panel products shall be tested with a ripped or cut longitudinal gap of $\frac{1}{8}$ inch (3.2 mm). Materials that, when tested in accordance with the test procedures set forth in ASTM E84 or UL 723 for a test period of 30 minutes, or with ASTM E 2768, comply with the following:
 - 1.1. Flame spread. Material shall exhibit a flame spread index not exceeding 25 and shall not show evidence of progressive combustion following the extended 30-minute test.
 - 1.2. Flame front. Material shall exhibit a flame front that does not progress more than $10\frac{1}{2}$ feet (3200 mm) beyond the centerline of the burner at any time during the extended 30-minute test.
 - 1.3. Weathering. Ignition-resistant building materials shall maintain their performance in accordance with this section under conditions of use. Materials shall meet the performance requirements for weathering (including exposure to temperature, moisture and ultraviolet radiation) contained in the following standards, as applicable to the materials and the conditions of use:
 - 1.3.1. Method A "~~Test~~"Test Method for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire ~~Testing~~"Testing" in ASTM D 2898, for fire-retardant-treated wood, wood-plastic composite and plastic lumber materials.
 - 1.3.2. ASTM D 7032 for wood-plastic composite materials.
 - 1.3.3. ASTM D 6662 for plastic lumber materials.
 - 1.4. Identification. Materials shall bear identification showing the fire test results.

~~**Exception:** Materials composed of a combustible core and a noncombustible exterior covering made from either aluminum at a minimum 0.019 inch (0.48 mm) thickness or corrosion-resistant steel at a minimum 0.0149 inch (0.38 mm) thickness shall not be required to be tested with a ripped or cut longitudinal gap.~~

2. Noncombustible material. Material that complies with the requirements for *noncombustible* materials in Section 202.
3. Fire-retardant-treated wood. Fire-retardant-treated wood identified for exterior use and meeting the requirements of Section 2303.2 of the International Building Code.
4. Fire-retardant-treated wood roof coverings. Roof assemblies containing fire-retardant-treated wood shingles and shakes that comply with the requirements of Section 1505.6 of the International Building Code and classified as Class A roof assemblies as required in Section 1505.2 of the International Building Code.

Reason: Recent cladding fires involving metal composite materials (MCM's), such as the Grenfell Tower in London, raises questions about the validity of allowing materials to be evaluated contrary to actual end use conditions. MCM's are frequently installed with exposed cores at joints, intersections, and corners. The effect of the exposed core on potential ignition and fire spread should be part of the testing evaluation as it realistically represents actual construction practices.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. No cost change anticipated for existing, compliant products. Additional costs applied to certain products requiring retesting may occur at manufacturer discretion.

WUIC4-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that the deletion of the exception did not address the difference between materials and an assembly and did not agree with the resulting requirement that all products have to be tested ripped or gaped. (Vote: 12-2)

Assembly Action:

None

WUIC4-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Thomas Meyers, Building Intuition, LLC, representing Self (codeconsultant@gmail.com) requests As Submitted.

Commenter's Reason: The original change is intended to address metal composite materials (MCM s), particularly those that use thin metal covering over combustible core materials. Installation of these materials frequently results in exposed core materials at corners, fenestration openings, panel seams, and architectural reveals. Exposed cores at electrical outlet boxes were believed to be the origin of large scale cladding fires in the Middle East. It seems intuitive that one would want to ensure the performance of the plastic core materials when MCM's are installed in areas with wildland-urban interface. Elimination of this exception would force testing of the panel material with some of the combustible core exposed.

During testimony, the committee seemed confused by testimony implying that elimination of this section would affect other materials. The exception is clearly for metal clad materials with combustible cores, most commonly known as MCM s. Regardless, the fire performance of any exterior cladding material using a combustible core should be properly verified and tested as-installed to ensure the performance needed to protect the community and its building infrastructure.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction. Materials that have already been appropriately and successfully tested will remain available for installation. The effect of this code change will only be on materials that previously took advantage of the exception.

WUIC4-18

WUIC5-18

IWUIC: 503.2

Proposed Change as Submitted

Proponent: Tim Earl, GBH International, representing self (tearl@gbhinternational.com)

2018 International Wildland-Urban Interface Code

Revise as follows

503.2 Ignition-resistant building material. Ignition-resistant building materials shall comply with any one of the following:

1. Material shall be tested on ~~all sides~~ the front and back faces either with the extended ASTM E84 (UL 723) test, extended for a test period of 30 minutes, or ASTM E 2768, except panel products shall be permitted to test only the front and back faces, with ASTM E2768. Panel products shall be tested with a ripped or cut longitudinal gap of $\frac{1}{8}$ inch (3.2 mm). Materials ~~that, when tested in accordance with the test procedures set forth in ASTM E84 or UL 723 for a test period of 30 minutes, or with ASTM E 2768, shall~~ comply with the following:
 - 1.1. Flame spread. Material shall exhibit a flame spread index not exceeding ~~25 and shall not show evidence of progressive combustion following the extended 30-minute test.~~25.
 - 1.2. Flame front. Material shall exhibit a flame front that does not progress more than $10\frac{1}{2}$ feet (3200 mm) beyond the centerline of the burner at any time during the extended 30-minute test. This shall be considered evidence of no significant progressive combustion.
 - 1.3. Weathering. Ignition-resistant building materials shall maintain their performance in accordance with this section under conditions of use. Materials shall meet the performance requirements for weathering (including exposure to temperature, moisture and ultraviolet radiation) contained in the following standards, as applicable to the materials and the conditions of use:
 - 1.3.1. Method A "Test Method for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing" in ASTM D 2898, for fire-retardant-treated wood, wood-plastic composite and plastic lumber materials.
 - 1.3.2. ASTM D 7032 for wood-plastic composite materials.
 - 1.3.3. ASTM D 6662 for plastic lumber materials.
 - 1.4. Identification. Materials shall bear identification showing the fire test results.

Exception: Materials composed of a combustible core and a noncombustible exterior covering made from either aluminum at a minimum 0.019 inch (0.48 mm) thickness or corrosion-resistant steel at a minimum 0.0149 inch (0.38 mm) thickness shall not be required to be tested with a ripped or cut longitudinal gap.

2. Noncombustible material. Material that complies with the requirements for *noncombustible* materials in Section 202.
3. Fire-retardant-treated wood. Fire-retardant-treated wood identified for exterior use and meeting the requirements of Section 2303.2 of the International Building Code.
4. Fire-retardant-treated wood roof coverings. Roof assemblies containing fire-retardant-treated wood shingles and shakes that comply with the requirements of Section 1505.6 of the International Building Code and classified as Class A roof assemblies as required in Section 1505.2 of the International Building Code.

Reason: It makes no sense to test "all sides" of a product when it becomes physically impossible to distinguish between the ends and no ASTM E84 specimen (which is 24 feet long by 2 feet wide) can be obtained from the ends. When a specimen is presented for testing, if all sides look the same, a lab can't tell which is a second side. Testing front and back is feasible but other sides are not (because the maximum ASTM E84 thickness is 4 inches). In order to test a "2 by 4" specimen a simple calculation is that you would have to cut it into 864 pieces that are 2 x 4, and 4 inches thick, and somehow fasten them together: that is obviously ridiculous. It makes perfect sense to test the front and the back sides to ensure that the same fire performance is present on each side and that requirement is proposed to be retained. ASTM E2768 was developed by ASTM E05 (committee on fire standards) specifically for the purpose of giving instructions on how to conduct ASTM E84 when extended to 30 minutes. In fact ASTM E84 states that materials required to be tested to meet the extended ASTM E84 to a 30-minute duration are covered by ASTM E2768. ASTM E2768 contains a section that explains how to assess the pass/fail criteria and it states as follows under "conditions of classification":

13.1 The test method has the following conditions of classification for a material or product to be classified as meeting the requirements of this standard:

13.1.1 The flame spread index shall be 25 or less as determined for the initial 10 min test period,

13.1.2 The flame front shall not progress more than 10.5 ft (3.2 m) beyond the centerline of the burners at any time during the 30 min test period. This is considered evidence of no significant progressive combustion in this test method.

13.2 For materials or products that are not homogeneous or symmetrical about their longitudinal axis, only surfaces that have been individually tested shall be eligible to be classified and reported as meeting the conditions of classification of this standard.

Consequently, the changes proposed to items 1.1 and 1.2 are consistent with the statements in ASTM E84 and ASTM E2768.

No other standard contains information on how to assess "no significant progressive combustion".

Cost Impact: The code change proposal will decrease the cost of construction. This will reduce the amount of testing required by eliminating unnecessary tests on all sides of homogeneous wood specimens.

WUIC5-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee did not agree with the change from testing on all sides to just the front and back faces. It was stated that the section description needs to address the requirements for the material ends and sides. (Vote: 13-1)

Assembly Action:

None

WUIC5-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Marcelo Hirschler, representing GBH International (mmh@gbhint.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Wildland-Urban Interface Code

503.2 Ignition-resistant building material. Ignition-resistant building materials shall comply with any one of the following:

1. Material shall be tested on all sides with the extended ASTM E84 (UL 723) test or ASTM E 2768, except panel products shall be permitted to test only the front and back faces. ~~Panel products shall be tested with a ripped or cut longitudinal gap of $\frac{3}{8}$ inch (3.2 mm).~~ Materials that, when tested in accordance with the test procedures set forth in ASTM E84 or UL 723 for a test period of 30 minutes, or with ASTM E 2768, comply with the following:
 - 1.1. Flame spread. Material shall exhibit a flame spread index not exceeding 25 and shall not show evidence of progressive combustion following the extended 30-minute test.
 - 1.2. Flame front. Material shall exhibit a flame front that does not progress more than 10 $\frac{1}{2}$ feet (3200 mm) beyond the centerline of the burner at any time during the extended 30-minute test.
 - 1.3. Weathering. Ignition-resistant building materials shall maintain their performance in accordance with this section under conditions of use. Materials shall meet the performance requirements for weathering (including exposure to temperature, moisture and ultraviolet radiation) contained in the following standards, as applicable to the materials and the conditions of use:
 - 1.3.1. Method A " Test Method for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing "in ASTM D 2898, for fire-retardant-treated wood, wood-plastic composite and plastic lumber materials.
 - 1.3.2. ASTM D 7032 for wood-plastic composite materials.
 - 1.3.3. ASTM D 6662 for plastic lumber materials.
 - 1.4. Identification. Materials shall bear identification showing the fire test results-

Exception: ~~Materials composed of a combustible core and a noncombustible exterior covering made from either aluminum at a minimum 0.019 inch (0.48 mm) thickness or corrosion resistant steel at a minimum 0.0149 inch (0.38 mm) thickness shall not be required to be tested with a ripped or cut longitudinal gap~~
2. Noncombustible material. Material that complies with the requirements for *noncombustible* materials in Section 202.
3. Fire-retardant-treated wood. Fire-retardant-treated wood identified for exterior use and meeting the requirements of Section 2303.2 of the International Building Code.
4. Fire-retardant-treated wood roof coverings. Roof assemblies containing fire-retardant-treated wood shingles and shakes that comply with the requirements of Section 1505.6 of the International Building Code and classified as Class A roof assemblies as required in Section 1505.2 of the International Building Code.

Commenter's Reason: This public comment makes two (associated) changes to existing code language:

1. It eliminates the requirement for the "rip or gap" because the product should be tested as it will be used and not altered.

2. It eliminates the exception, which is unnecessary since it simply exempts some products from having to be tested with a "rip or gap" and become meaningless if that requirement disappears.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This will prevent unnecessary testing of products in a manner different from the way they are being used.

WUIC5-18

F4-18 Part I

IFC: 202 (New)

Proposed Change as Submitted

Proponent: Dave Frable, U.S. General Services Administration, representing U.S. General Services Administration

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD THE IFC COMMITTEE, PART II WILL BE HEARD BY THE IBC-FS COMMITTEE. PLEASE SEE THE TENTATIVE HEARING ORDERS FOR THE RESPECTIVE COMMITTEES.

2018 International Fire Code

Add new definition as follows

LIFE SAFETY SYSTEMS. Systems, devices, and equipment that enhance or facilitates evacuation, smoke control, compartmentation, and/or isolation.

Reason: The intent of this code change proposal is to define the term “life safety system”. The subject term is used in the title of IFC Chapter 9, Fire Protection and Life Safety Systems and throughout Chapter 9 but is not defined. In addition, the term “fire protection system” is defined; however, “life safety system is not.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This is a definition and will not affect the cost of construction.

F4-18 Part I

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval is based upon the proponent's published reason. This is also consistent with the action taken on Part II by the IBC Fire Safety Committee. (Vote: 14-0)

Assembly Action:

None

F4-18 Part I

Individual Consideration Agenda

Public Comment 1:

Proponent: Jeffrey Hugo, representing National Fire Sprinkler Association (hugo@nfsa.org) requests Disapprove.

Commenter's Reason: A definition is needed for life safety systems, but this definition uses terms that do not correlate well within the IBC and IFC. One example is how "compartmentation" is used in the definition. Compartmentation is used in the IBC and IFC, but in different chapters. Where Ch. 9 has life safety systems in the title, the only reference for compartments, more specifically smoke compartments comes from Ch 4 (422.3) of the IBC and the construction requirements are in Ch. 7. A user of the code will see that Ch. 9 is the chapter for life safety systems and not find all of the requirements correlated.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. While there is value in this definition, it will blur passive, active and life safety system requirements and the application of the code.

F4-18 Part I

F4-18 Part II

IBC: 202 (New)

Proposed Change as Submitted

Proponent: Dave Frable, U.S. General Services Administration, representing U.S. General Services Administration

2018 International Building Code

Add new definition as follows

LIFE SAFETY SYSTEMS. Systems, devices, and equipment that enhance or facilitates evacuation, smoke control, compartmentation, and/or isolation.

Reason: The intent of this code change proposal is to define the term “life safety system”. The subject term is used in the title of IFC Chapter 9, Fire Protection and Life Safety Systems and throughout Chapter 9 but is not defined. In addition, the term “fire protection system” is defined; however, “life safety system is not.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is a definition and will not affect the cost of construction.

F4-18 Part II

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The term is used throughout the code. The definition is needed. (Vote 11-3)

Assembly Action:

None

F4-18 Part II

Individual Consideration Agenda

Public Comment 1:

Proponent: Jeffrey Hugo, representing National Fire Sprinkler Association (hugo@nfsa.org) requests Disapprove.

Commenter's Reason: A definition is needed for life safety systems, but this definition uses terms that do not correlate well within the IBC and IFC. One example is how "compartmentation" is used in the definition. Compartmentation is used in the IBC and IFC, but in different chapters. Where Ch. 9 has life safety systems in the title, the only reference for compartments, more specifically smoke compartments comes from Ch 4 (422.3) of the IBC and the construction requirements are in Ch. 7. A user of the code will see that Ch. 9 is the chapter for life safety systems and not find all of the requirements correlated.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. While there is value in this definition, it will blur passive, active and life safety system requirements and the application of the code.

F4-18 Part II

F8-18

IFC: 304, 304.4

Proposed Change as Submitted

Proponent: Matthew Dobson, Vinyl Siding Institute, representing Suburban Exterior Fire Work Group (mdobson@vinylsiding.org); Richard Swan, International Association of Fire Fighters, representing International Association of Fire Fighters (rswan@iaff.org)

2018 International Fire Code

Revise as follows

SECTION 304 COMBUSTIBLE WASTE AND LANDSCAPING MATERIAL

Add new text as follows

304.4 Mulch. Combustible landscaping mulch shall not be placed within 3 feet of combustible walls, roofs, or other combustible components of Group R buildings of Type V construction.

Reason: Over the past code cycles there has been concern over smoker habits, combustible mulch, and the potential hazard they pose with combustion of exterior walls. The Suburban Exterior Fire Work Group, a group of fire service members, UL fire fighter safety institute, and other material stakeholders has been focused on this issue over the past 18 months.

The problem identified is the spread of fire from the exterior into to the unprotected attic space and then spreading quickly to other parts of the building.

The group has taken a 3 prong approach to address the issue:

1. Regulate the human risk by prohibiting smoking near exterior doors.
2. Remove combustible material/mulch from near the outside of combustible wall assemblies.
3. Create a block to slow down any fires that occur in the above described setting.

Over the decade, fire departments in the Washington, DC region have been confronted with structure fires which have demonstrated a consistent pattern of starting on the outside. These fires have the potential for rapid loss of structural integrity and catastrophic collapse before occupants are alerted. As attention has grown locally, it is apparent that this type of fire is becoming common on a national basis.

These fires tend to follow a distinct pattern. These fires start at a low point on the exterior and spread vertically along the exterior wall producing flammable gases, which are readily admitted into the attic area through ventilation soffits. If not cooled, these heated gases accumulate and combust, creating rapidly spreading fire conditions in the attic area, often without occupant awareness. The unchecked fire often results in full roof involvement, creating a dangerous and difficult situation for occupants and fire fighters.

The group examined a number of structure fires which have exhibited the pattern described above. There is agreement over 3 common aspects. First, these fires often result from careless smoking habits. Second, when the smoking materials are not properly disposed of, they often come into contact with combustible materials adjacent to a building and, very commonly, this is mulch. And, last, the combustible exterior wall is a factor in the the growth of these fires into the attic space.

The careless smoker is an impediment to effective fire prevention efforts. The fire service has consistently provided data that shows smoking is the leading cause of fatal fires in the United States. Public fire and life safety efforts have been reasonably effective at communicating the message to not smoke in bed, and various medical organizations have demonstrated the health risk associated with "second hand" smoke. We now see that people are routinely smoking outside, at or near the entrance to a building, which increases the possibility of an accidental ignition of outside combustibles. If one were to chronicle the actions of today's smoker, it would likely show the last action they take when exiting a building is to "light up." When returning inside, they often drop the cigarette near the entrance. Many smokers seem to believe that dropping a match or cigarette onto the ground or into a flower pot is an effective method of extinguishment, however, this behavior often places the smoking material directly into the mulch, initiating the low fire described earlier.

Mulch has become a common exterior decorative material which aids in suppressing weed growth while enhancing a building's curb appeal. However, most mulch is a dead organic material, comprised of chipped wood, tree bark or pine needles. Mulch is most effective when it is maintained in a moist state, however it can dry out very quickly and become a readily ignitable fuel source. Because of its relatively small mass in comparison to its surface area, when ignited, it will progress and sustain open flame.

The group discussed a method in which to proceed, the interest being to address, in the quickest manner, industrial and social changes which could reduce the possibility of a fire on the outside of a building. Each aspect presents unique challenges for fire prevention efforts:

1. Changing the behavior of the smoker is an ongoing and difficult challenge, especially as social pressures have resulted in regulatory changes to require people to smoke outside of a building. Further development of the "fire safe" cigarette, by way of testing using mulch, could be deemed too costly for the industry, and would have no effect on improper disposal of matches. Thus, the quickest and most practical strategy for this aspect of the problem is to expand public fire and life safety education to focus on the hazards of improper disposal of smoking materials, coupled with enforcement of applicable requirements for regulation of smoking and disposal of products. However, in this age of "information overflow" it is questionable if this would result in widespread behavioral changes for smokers.
2. Regulating the use and placement of mulch, that the study group believes could have the quickest and most significant impact toward reducing the exterior fire problem, while additional strategies to address the other problems noted are pursued.

The use of wood and wood related mulch for building decoration is purely optional. It is not a required construction component under current building codes. Therefore, regulations to curtail its use or require that it be separated from a building's combustible exterior are reasonable and could be codified on a national basis. On a large scale, the mere action of creating separation of combustible materials has been a wildland fire tactic for years. Several states and local jurisdictions have already employed this theory by either recommending or requiring that wood-based mulch be separated from exterior combustible walls:

1. The Virginia Department of Forestry recommends to "provide a minimum of an 18 inch clearance between landscaping mulch beds and combustible building materials" and to "ensure proper clearance to electric devices, such as decorative lights, by following the manufacturer's instructions;"
2. In Raleigh, NC, following a disastrous fire in a multi-family building, the city passed a pine straw mulch ordinance that bans the use of pine straw as ground cover within 10 feet of multi-family dwellings. The ordinance exempts 1 and 2-family dwellings, however, the city strongly encourages these homeowners to comply with the pine straw restrictions;
3. The Commonwealth of Massachusetts prohibits the new application of mulch within 18 inches around combustible exteriors of buildings, such as wood or vinyl but not brick or concrete. Residential buildings with six units or less are exempted from this regulation, but it is recommended that all homeowners adopt these safety practices. The regulation applies to all other buildings including commercial properties.
4. Ventura County, CA prohibits mulch and wood chips within the required "defensible space" zone (which ranges from 0' to 30' from the exterior of a building).

This small sampling of jurisdictions has produced enough evidence to lead the study group to suggest the possible introduction of a code proposal to require separation, or non-application, of wood-based mulch in proximity to combustible exterior walls.

The proposed protected soffit approach will require a form of blocking outside of exterior doorways and garage doors. These proposed material have been required in North Carolina for over 5 years and are accepted to provide some form of blocking that will slow down the movement of fire from the outside to the attic space, effectively helping to address the issue and allow fire service more time put out the fire.

We think this approach is effective, efficient, and cost effective.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This change should not impact the cost of construction.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that the definition of mulch varies by location. They also had concerns with the distance requirement, occupancy group and the difficulty with enforcement. (Vote: 13-1)

Assembly Action:

None

F8-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Matthew Dobson, representing Suburban Exterior Fire Work Group (mdobson@vinylsiding.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

Add new definition as follows:

COMBUSTIBLE LANDSCAPING MULCH. A layer of combustible material applied to the exterior ground surface for the conservation of soil moisture, improving fertility and health of the soil, reducing weed growth and enhancing the visual appeal of the area.

304 COMBUSTIBLE WASTE AND LANDSCAPING MATERIAL

304.4 Combustible Landscaping Mulch. Combustible landscaping mulch adjacent to buildings of Type V construction shall not be placed within 3 feet of combustible ~~walls~~ exterior wall coverings, decks, roofs, or other combustible components of Group R buildings of Type V construction.

Commenter's Reason: The committee seemed interested in this change but was concerned because there was no definition for mulch, needed a better justification for 3-foot distance, wanted to include all occupants groups, and questioned how enforcement would occur.

This comment has addressed the concerns of the fire code committee.

The issue of concern is mulch fires, generally started by discarded cigarettes, starting on the outside of buildings and growing and moving up into the attic space causing major fires.

In a recent report from NFPA on Virginia, the leading cause of fire fatalities in 2018 so far is improperly discarded cigarettes. This change will help address parts of this problem. Also, a recent report out of Alberta, indicates similarly that poor disposal of smoking materials caused a majority of serious fires in 2018.

In a review of current mulch regulations in place from Massachusetts to North Carolina, the average distance to keep mulch away from buildings is three feet. The proposal would require mulch be at least three feet from exterior combustible components of Type V construction.

Enforcement can easily become a part of the inspections now conducted on exterior fire safety features and Chapter 1 provides adequate information on how to regulate and enforce this requirement.

These requirements can be easily incorporated in the initial development plans and building plans which in many cases include landscaping plans.

Here are some additional examples of why this requirement is necessary.

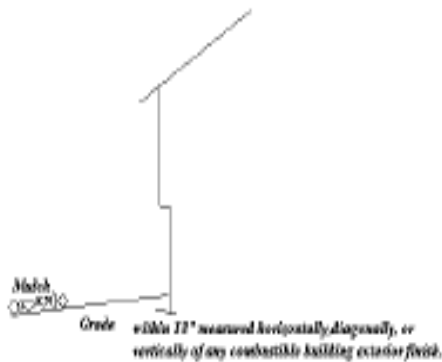
- A mulch fire in Massachusetts occurred in May 2015 in a large Arlington apartment complex. One man died in the fire started by smoking materials discarded in a mulch bed, which spread to a car, then to the building. Thirty-six apartments and six cars were destroyed. The building had no sprinklers, and the estimated dollar loss was \$6.7 million.
- In April 2012, improperly discarded smoking materials ignited mulch outside an assisted living center in Braintree. The fire forced many older adults to evacuate in the early morning hours. Several suffered smoke inhalation injuries.
- In May 2008, a cigarette ignited a mulch fire at a Peabody apartment complex. It caused \$6.7 million in damage to the building, displaced 750 people temporarily and 36 permanently.

Here are some examples of currently in place ordinance and information:

10.14.10.4.1 Mulch shall not be newly applied within 18 inches of any combustible portion of any building [See Figure 10.14.10.4.1(a)]. Exception: Any building, regardless of the existence of fire separations, containing six dwelling units or less.

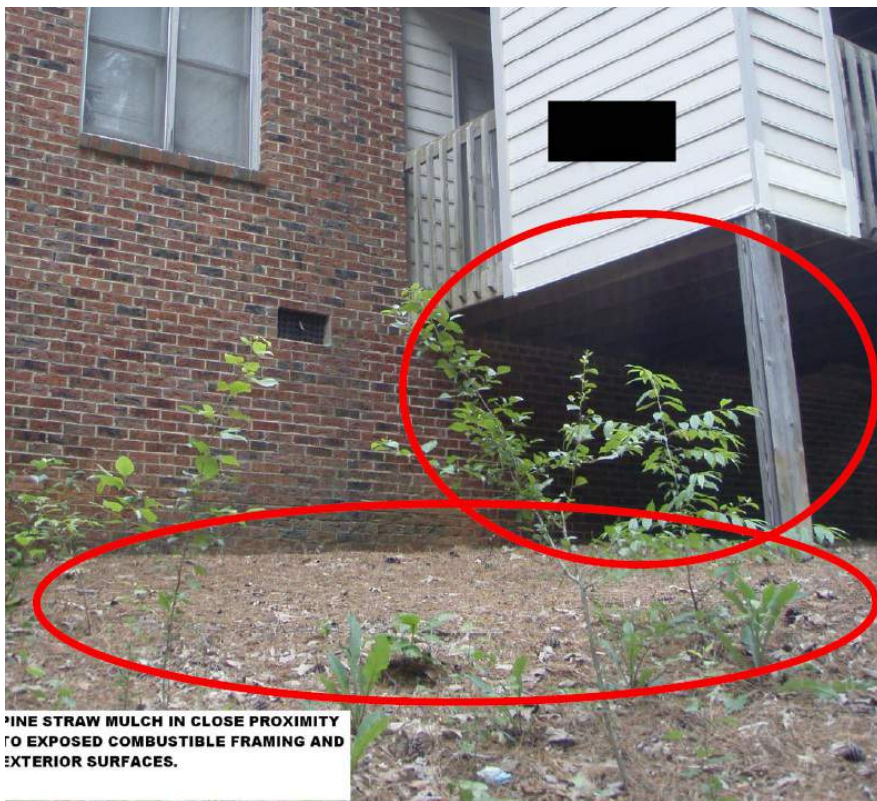
10.14.10.4.2 Mulch as used here shall mean any type of forest material that is produced for the purpose spreading or application over the surface of the soil as a protective cover, to retain moisture, reduce erosion, provide nutrients, suppress weed growth, seed germination and for general landscaping purposes.

Figure 10.14.10.4.1(a)



The state of Massachusetts does not allow mulch within 18 of combustible portion of buildings.

Raleigh, NC/Durham here is a photo of what would not be allowed according to an ordinance in North Carolina.



Carrboro, NC - here is excerpted text from Carrboro, NC.

Section 12-17 Mulch Piles and Pine Straw (Amend. 11/18/08)

(a) No person may cause, suffer, or permit any mulch pile to be created or maintained on any premises if such mulch pile (i) is larger than eight feet in height, or (ii) covers more than 400 square feet of ground area.

(b) Any mulch pile for which a permit is required under Section 105.6.47 (i.e. one comprising 200 cubic feet or more) shall be separated from any other mulch pile for which such a permit is required by a distance of at least fifty feet. In addition, each such pile must be accessible by an approved fire apparatus access road capable of withstanding the imposed loads of a fire truck (60,000 lbs.) and have an all-weather driving surface.

(c) No pine straw or any other decorative ground cover or material with a fire rate of spread more than 12 inches per minute shall be placed, kept, or stored within ten feet of any building with combustible exterior construction and/or combustible doors, windows or other openings. This subsection shall apply to all buildings with combustible exterior construction in existence upon the effective date hereof, upon thirty (30) days notice hereof, and to all new construction with combustible exteriors.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

It is hard to estimate the increase or decrease in cost. In the short term there may be some increase depending on what the building owner decides to use instead of combustible mulch. Longer term the maintenance costs may go down as less mulch may be used.

F13-18

IFC: 310.9

Proposed Change as Submitted

Proponent: Matthew Dobson, Vinyl Siding Institute, representing Suburban Exterior Fire Work Group (mdobson@vinylsiding.org); Richard Swan, representing International Association of Fire Fighters (rswan@iaff.org)

2018 International Fire Code

Add new text as follows

310.9 Group R. Smoking shall be prohibited within 25 feet of any exterior door of Group R buildings of Type V construction.

Reason: Over the past code cycles there has been concern over smoker habits, combustible mulch, and the potential hazard they pose with combustion of exterior walls. The Suburban Exterior Fire Work Group, a group of fire service members, UL fire fighter safety institute, and other material stakeholders has been focused on this issue over the past 18 months.

The problem identified is the spread of fire from the exterior into to the unprotected attic space and then spreading quickly to other parts of the building.

The group has taken a 3 prong approach to address the issue:

1. Regulate the human risk by prohibiting smoking near exterior doors.
2. Remove combustible material/mulch from near the outside of combustible wall assemblies.
3. Create a block to slow down any fires that occur in the above described setting.

The proposed protected soffit approach, contained in a proposal for the IBC, will require a form of blocking outside of exterior doorways and garage doors in the soffit area. These proposed material have been required in North Carolina for over 5 years and are accepted to provide some form of blocking that will slow down the movement of fire from the outside to the attic space, effectively helping to address the issue and allow fire service more time put out the fire. Testing on these protected soffits are currently underway to show the effectiveness of these assemblies both vented and unvented.

Over the decade, fire departments in the Washington, DC region have been confronted with structure fires which have demonstrated a consistent pattern of starting on the outside. These fires have the potential for rapid loss of structural integrity and catastrophic collapse before occupants are alerted. As attention has grown locally, it is apparent that this type of fire is becoming common on a national basis.

These fires tend to follow a distinct pattern. These fires start at a low point on the exterior and spread vertically along the exterior wall producing flammable gases, which are readily admitted into the attic area through ventilation soffits. If not cooled, these heated gases accumulate and combust, creating rapidly spreading fire conditions in the attic area, often without occupant awareness. The unchecked fire often results in full roof involvement, creating a dangerous and difficult situation for occupants and fire fighters.

The group examined a number of structure fires which have exhibited the pattern described above. There is agreement over 3 common aspects. First, these fires often result from careless smoking habits. Second, when the smoking materials are not properly disposed of, they often come into contact with combustible materials adjacent to a building and, very commonly, this is mulch. And, last, the combustible exterior wall is a factor in the the growth of these fires into the attic space.

The careless smoker is an impediment to effective fire prevention efforts. The fire service has consistently provided data that shows smoking is the leading cause of fatal fires in the United States. Public fire and life safety efforts have been reasonably effective at communicating the message to not smoke in bed, and various medical organizations have demonstrated the health risk associated with "second hand" smoke. We now see that people are routinely smoking outside, at or near the entrance to a building, which increases the possibility of an accidental ignition of outside combustibles. If one were to chronicle the actions of today's smoker, it would likely show the last action they take when exiting a building is to "light up." When returning inside, they often drop the cigarette near the entrance. Many smokers seem to believe that dropping a match or cigarette onto the ground or into a flower pot is an effective method of extinguishment, however, this behavior often places the smoking material directly into the mulch, initiating the low fire described earlier.

Mulch has become a common exterior decorative material which aids in suppressing weed growth while enhancing a building's curb appeal. However, most mulch is a dead organic material, comprised of chipped wood, tree bark or pine needles. Mulch is most effective when it is maintained in a moist state, however it can dry out very quickly and become a readily ignitable fuel source. Because of its relatively small mass in comparison to its surface area, when ignited, it will progress and sustain open flame.

The group discussed a method in which to proceed, the interest being to address, in the quickest manner, industrial and social changes which could reduce the possibility of a fire on the outside of a building. Each aspect presents unique challenges for fire prevention efforts:

1. Changing the behavior of the smoker is an ongoing and difficult challenge, especially as social pressures have resulted in regulatory changes to require people to smoke outside of a building. Further development of the "fire safe" cigarette, by way of testing using mulch, could be deemed too costly for the industry, and would have no effect on improper disposal of matches. Thus, the quickest and most practical strategy for this aspect of the problem is to expand public fire and life safety education to focus on the hazards of improper disposal of smoking materials, coupled with enforcement of applicable requirements for regulation of smoking and disposal of products. However, in this age of "information overflow" it is questionable if this would result in widespread behavioral changes for smokers;
2. Regulating the use and placement of mulch, that the study group believes could have the quickest and most significant impact toward reducing the exterior fire problem, while additional strategies to address the other problems noted are pursued.

The use of wood and wood related mulch for building decoration is purely optional. It is not a required construction component under current building codes. Therefore, regulations to curtail its use or require that it be separated from a building's combustible exterior are reasonable and could be codified on a national basis. On a large scale, the mere action of creating separation of combustible materials has been a wildland fire tactic for years. Several states and local jurisdictions have already employed this theory by either recommending or requiring that wood-based mulch be separated from exterior combustible walls:

1. The Virginia Department of Forestry recommends to "provide a minimum of an 18 inch clearance between landscaping mulch beds and combustible building materials" and to "ensure proper clearance to electric devices, such as decorative lights, by following the manufacturer's instructions;"
2. In Raleigh, NC, following a disastrous fire in a multi-family building, the city passed a pine straw mulch ordinance that bans the use of pine straw as ground cover within 10 feet of multi-family dwellings. The ordinance exempts 1 and 2-family dwellings, however, the city strongly encourages these homeowners to comply with the pine straw restrictions;
3. The Commonwealth of Massachusetts prohibits the new application of mulch within 18 inches around combustible exteriors of buildings, such as wood or vinyl but not brick or concrete. Residential buildings with six units or less are exempted from this regulation, but it is recommended that all homeowners adopt these safety practices. The regulation applies to all other buildings including commercial properties.
4. Ventura County, CA prohibits mulch and wood chips within the required "defensible space" zone (which ranges from 0' to 30' from the exterior of a building).

This small sampling of jurisdictions has produced enough evidence for a code proposal to require separation, or non-application, of wood-based mulch in proximity to combustible exterior walls.

We think this approach is effective, efficient, and cost effective.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This change is intended to modify human behavior and will not impact the cost of construction.

F13-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that, similar to F8-18, they had concerns with the distance requirement, occupancy group and the difficulty with enforcement. (Vote: 14-0)

Assembly Action:

None

F13-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Matthew Dobson, representing Suburban Exterior Fire Work Group (mdobson@vinylsiding.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

310.9 ~~Group R~~ Type V construction. Smoking shall be prohibited within 25 feet of any exterior door of ~~Group R~~ buildings of Type V construction.

Commenter's Reason: The fire code committee noted their reason for disapproval was that it needed more reason for the 25 foot, it wanted the occupancy provision removed as it should apply to all occupancies, and it was concerned about enforcement of the rule.

This substantiation and modification to language have addressed the committee concerns.

This change would apply to all types of occupancies of Type V construction.

It s worth also noting that In a recent report from NFPA on Virginia, the leading cause of fire fatalities in 2018 so far is improperly discarded cigarettes. This change will help address parts of this problem. Also, a recent report out of Alberta, indicates similarly that poor disposal of smoking materials caused a majority of serious fires in 2018.

In a review of the fire code, the 25-foot distance has precedence and is appropriate. In the International Fire Code a 25-foot distance for smoking distance and recreational fires are specifically regulated in the following sections:

- 307.4.2 Location of recreational fires to buildings and combustible material
- 3703 smoking near combustible fibers section
- 5003.7.1 smoking near hazardous materials
- 5706.2.8 Smoking near flammable and combustible liquids
- 6107.2 Smoking LP filling operations

These current similar rules are in place.

Current enforcement of this new regulation would be handled similarly to how the above existing regulations are enforced. Also, building owners could create enforcement tools through signage, lease agreements, and other forms of occupant education.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This regulation will impact human behavior and will not have an impact on the cost of construction.

F13-18

F17-18

IFC: 315.3.2, 1031.2, 3311.3

Proposed Change as Submitted

Proponent: Robert Davidson, Davidson Code Concepts, LLC, representing Self (rjd@davidsoncodeconcepts.com)

2018 International Fire Code

Revise as follows

315.3.2 Means of egress. Combustible materials shall not be stored in *exits, fire-resistance-rated corridors or enclosures for stairways and ramps*. Combustible materials in the means of egress during construction, demolition, remodeling or alterations shall comply with Section 3311.3.

1031.2 Reliability. Required *exit accesses, exits and exit discharges* shall be continuously maintained free from obstructions or impediments to full instant use in the case of fire or other emergency where the building area served by the *means of egress* is occupied. An *exit, fire-resistance-rated corridor or exit passageway* shall not be used for any purpose that interferes with a *means of egress*.

3311.3 Storage. Combustible materials associated with construction, demolition, remodeling or alterations to an occupied structure shall not be stored in *exits, fire-resistance-rated corridors, enclosures for stairways and ramps, or exit access corridors serving an occupant load of 30 or more*.

Exceptions:

1. Where the only occupants are construction workers.
2. Combustible materials that are temporarily accumulated to support work being performed when workers are present.

Reason: This proposal is intended to correct an anomaly that occurred when two unrelated proposals by different submitters collided in impact when the 2012 codes were printed and causes some to believe fire-resistance-rated corridors are not "exits".

I had submitted a proposal that included modifying then Section 1030.2, (now 1031.2), by taking language that existed in other portions of Chapter 10 and adding them to 1030.2 since the requirements were ones that not only applied at the time of construction, but must be maintained for the life of the building or structure. (Proposal F172-09/10 attached).

The International Fire Code Development Committee approved the proposal.

The main premise was protecting "exits" and including existing language that stated "An exit or exit passageway shall not be used for any purpose other than as a means of egress."

At the time my proposal was submitted and approved the definition of exit in the code was:

"EXIT. *That portion of a means of egress system which is separated from other interior spaces of a building or structure by fire-resistance-rated construction and opening protectives as required to provide a protected path of egress travel between the exit access and the exit discharge . Exits include exterior exit doors at the level of exit discharge , vertical exit enclosures , exit passageways , exterior exit stairways , exterior exit ramps and horizontal exits.*

That definition included fire-resistance-rated corridors by virtue of the first sentence and represented what historically was considered an exit.

Unfortunately during that cycle a separate proposal in front of another committee included a proposal that changed the definition of an exit to:

"EXIT. *That portion of a means of egress system between the exit access and the exit discharge or public way. Exit components include exterior exit doors at the level of exit discharge, interior exit stairways, interior exit ramps, exit passageways, exterior exit stairways and exterior exit ramps and horizontal exits."*

The definition currently reads:

"[BE] EXIT. *That portion of a means of egress system between the exit access and the exit discharge or public way. Exit components include exterior exit doors at the level of exit discharge, interior exit stairways and ramps, exit passageways, exterior exit stairways and ramps and horizontal exits.*

[BE] EXIT ACCESS. That portion of a means of egress system that leads from any occupied portion of a building or structure to an exit."

Because of the new definition and some language in the commentary generically referring to corridors as exit access, it is no longer clear if a fire-resistance-rated corridor is included in the two fire code sections addressing exits as intended by the proposal approved by the committee. The need to protect a fire-resistant-rated corridor is as important as protecting an exit passageway and other types of exits as documented by the following section:

"[BE] 1020.6 Corridor continuity. *Fire-resistance-rated corridors shall be continuous from the point of entry to an exit, and shall not be interrupted by intervening rooms. Where the path of egress travel within a fire-resistance-rated corridor to the exit includes travel along unenclosed exit access stairways or ramps, the fire-resistance-rating shall be continuous for the length of the stairway or ramp and for the length of the connecting corridor on the adjacent floor leading to the exit.*

Exceptions:

1. *Foyers, lobbies or reception rooms constructed as required for corridors shall not be construed as intervening rooms.*
2. *Enclosed elevator lobbies as permitted by Item 1 of Section 1016.2 shall not be construed as intervening rooms."*

By adding the wording "fire-resistance-rated corridor" to the two sections in this proposal the intent of the committee approval of F172-09/10 will be met.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Since this proposal addresses a topic that deals with maintenance of a exit path during day to day activities, it does not impact the cost of construction.

Analysis: Note that this proposal includes sections that are part of an errata to the 2018 IFC. Section 315.3.2 the second sentence is new and Section 3311.3 is a new section to the 2018 that was inadvertently missed during publication.

F17-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that there are issues regarding the definition and interpretation of combustible storage, temporary vs. permanent, and rooms that are open to the corridor. (Vote: 9-5)

Assembly Action:

None

F17-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Robert Davidson, Davidson Code Concepts, LLC, representing Self (rjd@davidsoncodeconcepts.com)requests As Submitted.

Commenter's Reason: The reason for disapproval was as follows:

"The committee stated that there are issues regarding the definition and interpretation of combustible storage, temporary vs. permanent, and rooms that are open to the corridor. (Vote: 9-5)"

The issues are perplexing because this concepts was already approved via F151-09/10 and did not occur because of a unrelated proposal in front of another committee changing the definition of exit.

Combustible Storage is currently part of the code and currently applied to other fire-resistance rated egress components without difficulties.

Similarly there are no problems being raised about temporary versus permanent with those means of egress components.

And rooms permitted to be open to corridors are specific activities that do not include storage. Specifically Section 1020.6 Corridor Continuity, Exception 1. Foyers, lobbies or reception rooms constructed as required for corridors shall not be construed as intervening rooms.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This proposal does not involve construction activities. It regulates use of spaces already constructed.

F17-18

F18-18

IFC: 315.8 (New); IBC: [F] 307.1, [F]307.4

Proposed Change as Submitted

Proponent: Robert Davidson, Davidson Code Concepts, LLC, representing Tesla, USA (rjd@davidsoncodeconcepts.com)

2018 International Fire Code

Add new text as follows

315.8 Used or Off Specification Lithium-Ion Batteries. The storage of used or off specification lithium-ion batteries shall comply with the following as appropriate:

1. Gathering locations in occupancies other than those involving Mercantile occupancy battery recycling activities shall comply with Section 315.8.1.
2. Mercantile occupancy battery sale recycling activities shall comply with Section 315.8.2.
3. Indoor collection and storage activities exceeding the limitations of Sections 315.8.1 or Section 315.8.2 occurring in mixed occupancy buildings shall comply with Section 315.8.3.
4. Indoor storage and recycling activities in detached buildings shall comply with Section 315.8.4.
5. Outdoor storage shall comply with Section 315.8.5.

315.8.1 Gathering locations. Indoor storage of used and off specification lithium-ion batteries being gathered for shipment to recycling facilities shall be in rooms or spaces protected by an automatic sprinkler system complying with Section 903.3.1.1. Batteries quantities shall not exceed one cubic ft. (0.03 m³) per fire area, and the batteries shall be stored in open top noncombustible containers spaced a minimum 3 ft. (914 mm) from combustible materials and a minimum 10 feet (3048 mm) from exits from the room, space or building.

315.8.2 Mercantile battery sale recycling locations. Rooms or spaces associated with mercantile battery sale recycling activities shall not exceed 100 sq. ft. in size. The rooms or spaces shall be separated from the remainder of the building areas by two-hour fire barriers constructed in accordance with Section 707 of the International Building Code and two-hour horizontal assemblies constructed in accordance with Section 711 of the International Building Code, as appropriate. The room or space shall be protected by a radiant-energy detection system installed in accordance with NFPA 72 and shall be protected by an automatic sprinkler system designed and installed in accordance with Section 903.3.1.1.

315.8.3 Indoor storage in mixed occupancies. Mixed occupancy indoor storage and recycling activities not meeting the limitations of Section 315.8.1 or Section 315.8.2 shall be classified as a Group H-2 occupancy and shall be in rooms or spaces not exceeding 5000 sq. ft. (464 m²) in area separated from the remainder of the building areas by three-hour fire barriers constructed in accordance with Section 707 of the International Building Code and three-hour horizontal assemblies constructed in accordance with Section 711 of the International Building Code, as appropriate.

Individual pile sizes shall be limited to sixty-four cubic ft. (1.81 m³) with a 5 foot separation to the next pile. Piles shall not be located within 10 feet of exits from the room, space or building.

315.8.3.1 Prevention and Mitigation. Occupancies storing used or off specification lithium-ion batteries shall have a plan approved by the fire code official that provides for the prevention of fire incidents and includes early detection mitigation measures.

315.8.3.2 Fire detection. The room or space shall be protected by a radiant-energy detection system installed in accordance with Section 907.

315.8.3.3 Fire suppression. The building the battery storage is located in shall be provided with an automatic fire suppression system installed in accordance with Section 903.1.1. The Group H-2 battery storage room or space shall be protected by a NFPA 15 water spray automatic suppression system installed in accordance with Section 904.12 with a density based on large scale fire testing complying with Section 1206.2.11.

315.8.3.4 Explosion protection. Explosion protection shall be installed in accordance with Section 911.

315.8.4 Detached buildings. Indoor storage and recycling activities shall be permitted in Group H-2 detached buildings located more than 100 feet (30.5 M) from buildings, lot lines, public ways, stored combustible materials, hazardous materials, high piled stock and other exposure hazards. The storage shall comply with the following:

1. Individual rooms or areas inside the building shall not exceed 7,000 sq ft (650 m²) and shall be are separated from other areas by three hour fire barriers constructed in accordance with Section 707 of the International Building Code and three-hour horizontal assemblies constructed in accordance with Section 711 of the International Building Code, as appropriate.
2. The building shall be protected by a radiant-energy detection system installed in accordance with Section 907.
3. Any area containing lithium-ion batteries shall be protected by a NFPA 15 water spray automatic suppression system installed in accordance with Section 904.12 with a density based on large scale fire testing complying with Section 1206.2.11.
4. Explosion protection shall be installed in accordance with Section 911.
5. Individual pile sizes shall be limited to sixty-four cubic ft. (1.81 m³) with a 5 foot separation to other piles, walls, appliances and equipment. Piles shall not be located within 10 feet of exits from the room, space or building. There shall be no more than 64 piles per room or space.
6. A plan approved by the fire code official that provides for the prevention of fire incidents and includes early detection mitigation measures.

315.8.5 Outdoor storage. Outdoor storage shall comply with the following:

1. Individual pile sizes shall be limited to sixty-four cubic ft. (1.81 m³).
2. Piles located outdoors shall be separated by a minimum 100 feet (30.5 M) from the following exposures:
 - 2.1 Lot lines
 - 2.2 Public ways
 - 2.3 Buildings
 - 2.4 Stored combustible materials
 - 2.5 Hazardous materials
 - 2.6 High-piled stock
 - 2.7 Other exposure hazards

Exception: Clearances are permitted to be reduced to 3 ft. (914 mm) when a 3-hour free standing fire barrier, suitable for exterior use, and extending 15 ft. (1.5 m) above and extending 15 ft (1.5 m) beyond the physical boundary of the pile is provided to protect the exposure.

2018 International Building Code

[F] 307.1 High-hazard Group H. High-hazard Group H occupancy includes, among others, the use of a building or structure, or a portion thereof, that involves the manufacturing, processing, generation or storage of materials that constitute a physical or health hazard in quantities in excess of those allowed in *control areas* complying with Section 414, based on the maximum allowable quantity limits for *control areas* set forth in Tables 307.1(1) and 307.1(2). Hazardous occupancies are classified in Groups H-1, H-2, H-3, H-4 and H-5 and shall be in accordance with this section, the requirements of Section 415 and the International Fire Code. Hazardous materials stored, or used on top of roofs or canopies, shall be classified as outdoor storage or use and shall comply with the International Fire Code.

Revise as follows

{F} 307.4 High-hazard Group H-2. Buildings and structures containing materials that pose a deflagration hazard or a hazard from accelerated burning shall be classified as Group H-2. Such materials shall include, but not be limited to, the following:

Class I, II or IIIA flammable or combustible liquids that are used or stored in normally open containers or systems, or in closed containers or systems pressurized at more than 15 pounds per square inch gauge (103.4 kPa).

Combustible dusts where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 414.1.3.

Cryogenic fluids, flammable.

Flammable gases.

Organic peroxides, Class I.

Oxidizers, Class 3, that are used or stored in normally open containers or systems, or in closed containers or systems pressurized at more than 15 pounds per square inch gauge (103 kPa).

Pyrophoric liquids, solids and gases, nondetonable.

Storage of used or off specification lithium-ion batteries in mixed use or detached buildings shall be in accordance with Section 315.8 of the International Fire Code.

Unstable (reactive) materials, Class 3, nondetonable.

Water-reactive materials, Class 3.

Reason: Lithium-ion batteries have significant fire and explosion hazards and there have been some serious fires and explosions associated with storage of used batteries in recycling and disposal facilities, including a serious event in Hilden Germany that seriously injured three fire fighters.

This proposal adds requirements for protecting storage of lithium-ion batteries being stored on premise prior to sending to recycling or disposal facilities, and for storage at recycling or disposal facilities. The requirements are broken down to address those with a small collection area, mercantile occupancies that have collection areas for returned batteries, storage at recycling or disposal facilities in mixed use buildings and storage at recycling or disposal facilities in detached buildings. The hazard is addressed by adding requirements for fire protection features, amounts that can be present, and fire-resistant construction separation. The larger areas permitted for storage at recycling or disposal facilities in mixed use and detached buildings will be classified as an H-2 Group. The outdoor storage setback requirements are consistent with setback requirements for outdoor electrochemical energy storage system installations.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will not increase or decrease the cost of construction. However this will limit the facilities where used or off specification lithium-ion batteries can be stored.

F18-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that there are issues with the package and container types, thermal runaway, ignition potential, unlimited area buildings, the relation to IBC incidental use and gathering areas to occupancy group. (Vote: 13-1)

Assembly Action:

None

F18-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O Brian, FCAC, representing FCAC (fcac@iccsafe.org) ; Robert Davidson, Davidson Code Concepts, LLC, representing Tesla USA/PRBA (rjd@davidsoncodeconcepts.com) requests As Modified by This Public Comment requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

OFF SPECIFICATION BATTERY OR CELL .

A cell or battery that has been tested during the manufacturing quality control process and found not to be within the manufacturer's designed set of criteria for its intended use.

315.8 Used or Off Specification ~~Lithium-Ion Batteries or cells.~~ ~~The Areas associated with the collection or storage of used or off specification lithium-ion batteries or cells shall comply with the following as appropriate provisions of this section and Chapter 32 as applicable.~~

Exceptions:

- ~~1. Gathering locations in occupancies other than those involving Mercantile occupancy battery recycling activities shall comply with Section 315.8.1.~~
- ~~2. Mercantile occupancy battery sale recycling activities shall comply with Section 315.8.2.~~
- ~~3. Indoor collection and storage activities exceeding the limitations of Sections 315.8.1 or Section 315.8.2 occurring in mixed occupancy buildings shall comply with Section 315.8.3.~~
- ~~4. Indoor storage and recycling activities in detached buildings shall comply with Section 315.8.4.~~
- ~~5. Outdoor storage shall comply with Section 315.8.5.~~
1. Areas within a facility that are operated in accordance with procedures that provide for the state of charge of the lithium-ion batteries and cells to be thirty percent or less. The procedures shall be approved by the fire code official.
2. When fire and fault condition testing conducted or witnessed and reported by an approved testing laboratory is provided showing that a fire involving the batteries in storage will be limited to the design area of an automatic sprinkler system installed in accordance with Section 903.3.1.1 and will not adversely impact occupant egress from the building or adversely impact adjacent stored materials or the building structure. The test report shall be provided to the fire code official for review and approval in accordance with Section 104.7.2

**Table 315.8
Collection and Storage Requirements**

Occupancy Type/Location of the Area	Requirements
<u>Collection locations; any occupancy</u>	<u>Section 315.8.1</u>
<u>Mercantile, vehicle repair, aircraft repair and laboratory battery collection and storage locations</u>	<u>Sections 315.8.1 and 315.8.2</u>
<u>Any storage area exceeding the limitations of Section 315.8.1 or 315.8.2 that is located inside a building</u>	<u>Section 315.8.3</u>
<u>Any storage area outside a building</u>	<u>Section 315.8.4</u>

315.8.1 Gathering Collection locations; any occupancy. ~~Indoor storage of used and off-specification lithium-ion batteries being gathered for shipment to recycling facilities shall be in rooms or spaces protected by an automatic sprinkler system complying with Section 903.3.1.1. Batteries quantities~~ All areas located indoors in any occupancy where used batteries are collected from employees or the public shall be provided with open top noncombustible containers or containers approved for battery collection activities. Containers shall not exceed one cubic ft. (0.03 m³) per fire area, and the batteries shall be stored in open top noncombustible containers spaced in size. Containers shall have a minimum 3 ft. (914 mm) of open space from other battery collection containers and combustible materials and shall be located a minimum 10-5 feet (3,048-1,524 mm) from exits from the room, space or building. Where combustible materials are located within the space between collection containers, the containers shall be spaced a minimum 10 feet (3,048 mm) apart.

315.8.2 Mercantile battery sale recycling, vehicle repair, aircraft repair and laboratory occupancy battery collection and storage locations. Batteries collected and stored at mercantile, vehicle repair, aircraft repair or laboratory occupancies other than those in collection containers complying with Section 315.8.1 shall be stored in accordance with one or more of the following methods. Battery terminals shall be protected either through battery design methods or a protective packaging method to prevent short circuit of the battery.

1. In rooms or spaces not exceeding 200 sq. ft. (18.58 m²) in gross floor area ~~Rooms or spaces associated with mercantile battery sale recycling activities shall not exceed 100 sq. ft. in size.~~ The rooms or spaces shall be separated from the remainder of the building areas by ~~two-hour~~ fire barriers with a fire resistance rating of two hours constructed in accordance with Section 707 of the International Building Code and ~~two-hour~~ horizontal assemblies with a fire resistance rating of two hours constructed in accordance with Section 711 of the International Building Code, as appropriate. The room or space shall be protected by a radiant-energy detection system installed in accordance with NFPA 72 and ~~shall be protected by an automatic sprinkler system designed and installed in accordance with Section 903.3.1.1.~~
2. In approved prefabricated portable buildings or containers not exceeding 200 sq. ft. (18.58 m²) in gross floor area that are constructed with two-hour fire-resistance ratings and provided with radiant-energy detection system installed in accordance with NFPA 72 and an approved automatic fire suppression system.
3. In metal drums with batteries separated from each other by vermiculite or other approved material, or in containers approved for battery collection and storage activities. Each area containing such metal drums or approved containers shall not exceed 200 sq. ft. (18.58 m²) in area and shall be separated from other battery storage areas by a minimum of 10 feet (3,048 mm). The collection and storage area shall be protected by a radiant-energy detection system installed in accordance with NFPA 72.
4. In containers approved for use in transportation that will prevent an event from propagating beyond the container. Each area containing the approved transportation containers shall not exceed 200 sq. ft. (18.58 m²) in area and shall be separated from other battery storage areas by a minimum of 10 feet (3,048 mm). The storage area shall be protected by a radiant-energy detection system installed in accordance with NFPA 72.
5. Indoor storage areas meeting the provisions of Section 315.8.3.

315.8.3 Indoor storage in mixed occupancies. ~~Mixed-occupancy indoor storage and recycling activities~~ Indoor storage involving used or off-specification lithium-ion or lithium metal batteries or cells not meeting the limitations of Section 315.8.1 or Section 315.8.2 shall comply with Sections 315.8.3.1 through 315.8.3.4 and shall be classified as a Group H-2 occupancy and 3 occupancy. The battery storage shall be in rooms or spaces not exceeding 5000 sq. ft. (464 m²) in area separated from the remainder other areas of the building areas by three-hour fire barriers constructed with a fire resistance rating of three-hours in accordance with Section 707 of the International Building Code and three-hour horizontal assemblies constructed with a fire resistance rating of three-hours in accordance with Section 711 of the International Building Code, as appropriate. Individual pile sizes shall be limited to sixty-four cubic ft. (1.81 m³) with a 5-foot separation to the next pile. Piles ~~Batteries and cells shall not be located within 10 feet (3,048 mm) of exits from the room, space or building or space in which they are stored.~~

315.8.3.1 Prevention and Mitigation. ~~Occupancies storing used or off-specification lithium-ion batteries shall have a plan approved by the fire code official. A plan that provides for the prevention of fire incidents and includes early detection mitigation measures shall be provided to the fire code official for approval.~~

315.8.3.2 Fire detection. The room or space shall be protected by a radiant-energy detection system installed in accordance with Section 907.

315.8.3.3 Fire suppression. The building the battery storage is located in shall be provided with an automatic fire suppression system installed in accordance with Section 903.1.1. The Group H-2-3 battery or cell storage room or space shall be protected by a NFPA 15 water spray automatic suppression system installed in accordance with Section 904.12 with a density based on large scale fire testing complying with Section 1206.2.11.

315.8.3.4 Explosion protection. ~~Explosion protection.~~ The rooms and spaces occupied for the battery or cell storage shall be provided with explosion protection installed in accordance with Section 911.

315.8.4 Detached buildings. ~~Indoor storage and recycling activities shall be permitted in Group H-2 detached buildings located more than 100 feet (30.5 M) from buildings, lot lines, public ways, stored combustible materials, hazardous materials, high piled stock and other exposure hazards. The storage shall comply with the following:~~

- ~~1. Individual rooms or areas inside the building shall not exceed 7,000 sq ft (650 m²) and shall be separated from other areas by three-hour fire barriers constructed in accordance with Section 707 of the International Building Code and three-hour horizontal assemblies constructed in accordance with Section 711 of the International Building Code, as appropriate.~~
- ~~2. The building shall be protected by a radiant-energy detection system installed in accordance with Section 907.~~
- ~~3. Any area containing lithium-ion batteries shall be protected by a NFPA 15 water spray automatic suppression system installed in accordance with Section 904.12 with a density based on large-scale fire testing complying with Section 1206.2.11.~~
- ~~4. Explosion protection shall be installed in accordance with Section 911.~~
- ~~5. Individual pile sizes shall be limited to sixty-four cubic ft. (1.81 m³) with a 5-foot separation to other piles, walls, appliances and equipment. Piles shall not be located within 10 feet of exits from the room, space or building. There shall be no more than 64 piles per room or space.~~
- ~~6. A plan approved by the fire code official that provides for the prevention of fire incidents and includes early detection mitigation measures.~~

315.8.54 Outdoor storage location. Outdoor storage shall comply with the following:

1. Individual pile sizes shall be limited to sixty-four cubic ft. (1.81 m³) 200 square feet (18.58 m²) in area separated from other piles by 10 feet (3,048 mm).
2. Piles located outdoors shall be separated by a minimum 100-20 feet (30.5 M-914 mm) from the following exposures:
 - 2.1. Lot lines
 - 2.2. Public ways
 - 2.3. Buildings
 - 2.4. ~~Stored combustible materials~~ Other storage
 - 2.5. Hazardous materials
 - 2.6. ~~High-piled stock~~
 - 2.7-2.6 Other exposure hazards

Exception: Clearances are permitted to be reduced to not less than 3 ft. (914 mm) when a 3-hour free standing fire barrier, suitable for exterior use, and extending 15 ft. (1.5 m) above and extending 15 ft. (1.5 m) beyond the physical boundary of the pile is provided to protect the exposure.

2018 International Building Code

[F] 307.1 High-hazard Group H. High-hazard Group H occupancy includes, among others, the use of a building or structure, or a portion thereof, that involves the manufacturing, processing, generation or storage of materials that constitute a physical or health hazard in quantities in excess of those allowed in *control areas* complying with Section 414, based on the maximum allowable quantity limits for *control areas* set forth in Tables 307.1(1) and 307.1(2). Hazardous occupancies are classified in Groups H-1, H-2, H-3, H-4 and H-5 and shall be in accordance with this section, the requirements of Section 415 and the International Fire Code. Hazardous materials stored, or used on top of roofs or canopies, shall be classified as outdoor storage or use and shall comply with the International Fire Code.

307.4 High-hazard Group H-2. Buildings and structures containing materials that pose a deflagration hazard or a hazard from accelerated burning shall be classified as Group H-2. Such materials shall include, but not be limited to, the following:

Class I, II or IIIA flammable or combustible liquids that are used or stored in normally open containers or systems, or in closed containers or systems pressurized at more than 15 pounds per square inch gauge (103.4 kPa).

Combustible dusts where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 414.1.3.

Cryogenic fluids, flammable.

Flammable gases.

Organic peroxides, Class I.

Oxidizers, Class 3, that are used or stored in normally open containers or systems, or in closed containers or systems pressurized at more than 15 pounds per square inch gauge (103 kPa).

Pyrophoric liquids, solids and gases, nondetonable.

~~Storage of used or off specification lithium ion batteries in mixed use or detached buildings shall be in accordance with Section 315.8 of the International Fire Code.~~

Unstable (reactive) materials, Class 3, nondetonable.

Water-reactive materials, Class 3.

[F] 307.5 High-hazard Group H-3. Buildings and structures containing materials that readily support combustion or that pose a physical hazard shall be classified as Group H-3. Such materials shall include, but not be limited to, the following:

Class I, II or IIIA flammable or combustible liquids that are used or stored in normally closed containers or systems pressurized at 15 pounds per square inch gauge (103.4 kPa) or less.

Combustible fibers, other than densely packed baled cotton, where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 414.1.3.

Consumer fireworks, 1.4G (Class C, Common)

Cryogenic fluids, oxidizing

Flammable solids

Organic peroxides, Class II and III

Oxidizers, Class 2

Oxidizers, Class 3, that are used or stored in normally closed containers or systems pressurized at 15 pounds per square inch gauge (103 kPa) or less

Oxidizing gases

Storage or recycling of used or off specification lithium batteries or cells in buildings as required by Section 315.8 of the International Fire Code.

Unstable (reactive) materials, Class 2

Water-reactive materials, Class 2

Commenter's Reason: The fire code committee disapproved F18-18 upon the submitters request.

The original proposal was submitted based upon language submitted during the NFPA 855 Energy Storage Systems standard draft work. Subsequent to submittal and posting, industry members were reached out to for review and comment. The industry identified that as proposed the language would prohibit, (shut down), many battery collection and recycling efforts currently in place including those required by law.

The battery industry formed their own code committee to work with the FCAC work group to come up with language that would provide the necessary level of protection that recognized existing industry initiatives. As result a number of floor modifications were developed, reviewed and supported by FCAC and requested to be considered by the IFC code hearing committee. Unfortunately the chair did not accept the floor modifications and as a result the proponent asked for disapproval to provide for a comprehensive public comment to be brought forth.

The first suggested modification is to add a definition for off specification batteries and cells to clarify that the intent is to apply the requirements to those batteries or cells that do not pass quality control testing during the manufacturing process and are stored for recycling or destruction.

Section 318.8 has been modified to clarify application of the requirements; include all types of batteries; use an easier to apply table format for application of the following sections; and to add two exceptions to application of the new requirements. The first exception recognizes a state of charge of 30% or less as an acceptable safety level. This level of

energy is recognized by the FAA for shipping of batteries and there is extensive data and testing information available. The second exception recognizes the use of laboratory testing to determine appropriate sprinkler density levels confirming fire event confinement, a concept already embraced for the installation of energy storage systems.

Section 318.1 has been modified to clarify that it applies to gathering activities. This is typically a box located in any occupancy where the public and/or employees deposit used batteries, including from home. They batteries are of mixed chemistry and typically in the smaller formats such as used for cameras, wireless phones, remotes, etc. The distance between collection containers has been modified to recognize that in some cases a clear space can be maintained, but that in others the space may have other combustible commodities located there such as in a retail establishment and in those cases the distance has been doubled since the intent is eliminate propagation from collection box to collection box.

Section 318.8.2 has been modified to recognize that there are a number of occupancies wherein larger format used batteries may be stored. The square footage limitation of 100 square feet has been enlarged to 200 square feet to recognize added space is necessary for storing large format batteries such as those for EVs. Three additional recognized methods of protected storage have been added with the same 200 square foot limitation to add options for facilities to apply. And a fifth option was added to simply go to the higher level protection found in Section 318.8.3 for H-3 indoor storage.

Section 318.8.3 has been modified to simply apply to indoor storage of amounts greater than that permitted by Sections 318.8.1 or 318.8.2. Whether or not it is a mixed use is covered by the IBC. The section was clarified to apply only to lithium batteries or cells and the group designation was changed to H-3 instead of H-2. (see later explanation below). The square foot limitation was eliminated based upon the high hazard group designation and the following protection levels that are required to be provided for. The remaining changes were format/editorial in nature.

Section 318.8.4 was deleted as no longer necessary due to the reformatting of Section 318.8.3. Those requirements now apply whether the indoor storage is in a dedicated building or a mixed use building.

Section 315.8.5 (now Section 318.8.4) was modified to only apply to lithium batteries and cells; eliminate the cubic foot limitation, simplify the exposure hazard listing and to modify the distance between piles to match distances already embraced by the IFC for hazardous materials.

The occupancy group designation proposal of H-2 in the IBC was changed to a H-3. The reason is twofold, first, H-2 is for materials that present a deflagration hazard in their natural state, not those that may produce combustible gases or vapors when burning. Something many products do. Secondly, many existing buildings and storage activities already exceed the H-2 area limitations, by applying H-3 instead there is still a high level of fire protection required with limitations in size by all but the Type 1A construction types. A facility can use Type 1A to obtain an unlimited area which is reasonable based upon the other protection features these new provisions will require.

This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

However, this will limit the facilities where used or off specification lithium-ion batteries can be stored.

Public Comment 2:

Proponent: Lynne M. Kilpatrick, Sunnyvale Department of Public Safety, representing California Fire Chiefs Association requests As Modified by This Public Comment.

Replace as follows:

2018 International Fire Code

105.6.27 Lithium batteries, used. An operational permit is required to collect or store more than 1,000 pounds (454 kg) of used lithium batteries.

315.8 Used lithium battery storage and handling. The storage and handling of used lithium ion and lithium metal

batteries or cells in quantities exceeding 1,000 pounds (454 kg) shall comply with Sections 315.8.1 through 315.8.10, and Chapter 32 where applicable.

315.8.1 Permits. Permits shall be required as set forth in Section 105.6.

315.8.2 Maximum quantity in a fire area. The aggregate quantity of used lithium batteries stored and handled in a single fire area shall not exceed 9,000 pounds (4086 kg).

315.8.3 Construction requirements. *Fire areas* shall be separated by *fire barriers* having a fire-resistance rating of not less than 2-hours constructed in accordance with Section 707 of the *International Building Code* and *horizontal assemblies* constructed in accordance with Section 711 of the *International Building Code*.

315.8.4 Number of fire areas. The maximum number of fire areas within a building shall be four.

315.8.5 Group H, Division 2 occupancy. Storage and handling of more than 9,000 pounds (4086 kg) of lithium batteries within a single fire area shall be within an approved Group H, Division 2 occupancy constructed in accordance with the *International Building Code* and protected throughout with approved automatic smoke detection and radiant-energy detection systems.

315.8.6 Automatic sprinkler system. Buildings containing *fire areas* used for lithium battery storage or handling shall be equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1. The design of the sprinkler system within each fire area shall not be less than Ordinary Hazard Group 2 with a design area of 3,000 square feet (278.7 m²). Where the storage arrangement is required by other provisions of this code to be provided with a higher level of sprinkler system protection, the higher level of sprinkler system protection shall be provided.

315.8.7 Automatic smoke detection. An approved automatic smoke detection system that activates an approved occupant notification system shall be provided throughout each *fire area* in accordance with Section 907.

315.8.8 Radiant energy detection. An approved radiant-energy detection system that activates an approved occupant notification system shall be installed throughout each *fire area* in accordance with Section 907.

315.8.9 Collection containers. Containers used to collect or store lithium batteries shall be noncombustible and have an individual capacity not exceeding 30 gallons (113.6 L), or be approved for transportation in accordance with the Department of Transportation (DOTn) regulations.

315.8.10 Storage configuration. Lithium batteries shall be considered a high-hazard commodity in accordance with Chapter 32 and where applicable, lithium battery storage shall comply with Chapter 32 in addition to Section 315.8.

2018 International Building Code

[F] 307.4 High-hazard Group H-2. Buildings and structures containing materials that pose a deflagration hazard or a hazard from accelerated burning shall be classified as Group H-2. Such materials shall include, but not be limited to, the following:

Class I, II or IIIA flammable or combustible liquids that are used or stored in normally open containers or systems, or in closed containers or systems pressurized at more than 15 pounds per square inch gauge (103.4 kPa).

Combustible dusts where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 414.1.3.

Cryogenic fluids, flammable.

Flammable gases.

Organic peroxides, Class I.

Oxidizers, Class 3, that are used or stored in normally open containers or systems, or in closed containers or systems pressurized at more than 15 pounds per square inch gauge (103 kPa).

Pyrophoric liquids, solids and gases, nondetonable.

Storage of used of lithium ion and lithium metal batteries or cells in accordance with Section 315.8 of the International Fire Code.

Unstable (reactive) materials, Class 3, nondetonable.

Water-reactive materials, Class 3.

Commenter's Reason: This proposal is a complete replacement of code proposal F18-18 as it is our position that the

original proposal's broad scope and intent to regulate every lithium ion and lithium metal battery collection location is unnecessary and not supported by fire loss data.

The technical provisions presented here are based on controls currently implemented at a major US company's lithium battery collection and recycling site. These controls, along with operational changes, were established after several fires at the site and have served to provide early warning and reasonable and adequate control of battery fires since their implementation.

A concept similar to the storage of hazardous materials within control areas is being introduced here by requiring used lithium battery storage and handling within designated fire areas protected by smoke detection, radiant-energy detection (e.g. UV/IR) and an Ordinary Hazard Group 2 automatic sprinkler system. In our opinion, the Ordinary Hazard Group 2 sprinkler design is justified until such time that additional large-scale testing takes place or data supporting a more rigorous means of fire protection is justified and accepted by the membership.

Section 315.8 allows up to 1,000 pounds (approximately 1/2 pallet) of lithium batteries before requiring additional controls. By setting the threshold quantity at 1,000 pounds, this section is intended to apply to locations where battery collection is a primary activity which is where additional fire and life safety controls are warranted. The 1,000-pound threshold is based on pre-2018 IFC regulations of energized lithium battery systems. Although that threshold was revised to 20 kWh in the 2018 IFC, the 1,000 pound-threshold, which is approximately equivalent to 20 kWh, is utilized for ease of enforcement.

Section 315.8.1 requires compliance with operational permits in accordance with Section 105.6 permit and a new permit (Section 105.6.27) is proposed to be added as a part of this public comment where used lithium battery storage or handling exceeds 1,000 pounds.

Section 315.8.2 establishes a maximum quantity of lithium batteries allowed within each designated fire area in the building. The maximum quantity proposed is 9,000 pounds, which is approximately 4 pallets. This 9,000-pound limit roughly correlates to the 600-kWh quantity that is currently allowed in Section 1206.2.9 for energized lithium battery systems before a Group H occupancy is required.

Section 315.8.3 requires that fire areas be separated from additional fire areas by fire barriers having not less than 2-hour fire resistance rating. The 2-hour fire resistance rating is proposed since it is the current protection required to separate a Group H2 occupancy from a B occupancy.

Section 315.8.4 limits the number of fire areas allowed in a building to four and is based on the control area approach to compartmentalizing hazardous materials in Chapter 50.

Section 315.8.5 mandates that where more than 9,000 pounds per fire area, or more than four fire areas are needed indoors, a Group H, Division 2 occupancy is required.

Sections 315.8.6-315.8.8 require that each fire area be protected by an approved smoke detection system, an approved radiant energy (e.g. UV/IR) detection system and an approved automatic sprinkler system having a minimum design standard of that required in Group H occupancies. The lithium battery fires we have experienced to date have tended to be very smoky fires and the smoke detection system coupled with the UV/IR flame detection system both serve as early warning systems to initiate the earliest possible response.

Section 315.8.9 requires containers to be either DOT approved for transportation of batteries or noncombustible with an individual capacity limited to 30 gallons.

Section 315.8.10 mandates that lithium batteries be treated as a high hazard commodity and where such storage is over 6 feet on racks must also comply with Chapter 32 provisions for high-piled combustible storage.

IBC Section 307.4 simply provides the appropriate link to the IFC and acknowledges that the IBC is where occupancy classifications are established.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. This proposal will increase the cost of construction only where lithium battery quantities exceed 1,000 pounds.

Public Comment 3:

Proponent: Kevin Callahan, CompTIA, representing Director, Computing Technology Industry Association requests Disapprove.

Commenter's Reason: On behalf of the Computing Technology Industry Association (CompTIA), we respectfully submit these comments in opposition to Code Proposal F18-18. CompTIA is a non-profit trade association serving as the voice of the information technology industry. With approximately 2,000 member companies, 3,000 academic and training partners

and nearly 2 million IT certifications issued, CompTIA is dedicated to advancing industry growth through educational programs, market research, networking events, professional certifications and public policy advocacy.

Last month, CompTIA submitted a letter to the Fire Code Action Committee (FCAC) with our initial comments on the proposed code amendments. The letter, which is attached for your reference, highlights our concerns regarding the overly restrictive regulations that are neither practical nor substantiated by data. Equally troubling is the lack of meaningful dialogue with relevant stakeholders that has taken place during the course of the preparation and review of this proposal. For these reasons and others cited in the letter, CompTIA requested the FCAC to deny or postpone action on the code amendments.

In June, the FCAC approved F18-18 without addressing the concerns raised in our earlier letter. As such, we continue to have the same misgivings regarding the proposed code amendments. We ask the ICC to deny or postpone Code Proposal F18-18, and instead allow for a more open and transparent process to create practical, meaningful regulations for the safe storage of used batteries.

Thank you for your consideration of our comments.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction. However, this will limit the facilities where used or off-specification lithium-ion batteries can be stored, increasing costs to businesses of all sizes.

F18-18

F21-18

IFC: SECTION 320, 320.1

Proposed Change as Submitted

Proponent: Marcelo Hirschler, representing GBH International (gbhint@aol.com)

2018 International Fire Code

Add new text as follows

SECTION 320 ARTIFICIAL DECORATIVE VEGETATION

320.1 General. Artificial decorative vegetation placed outdoors, either within 30 feet (9140 mm) of a building, or on an occupied roof of a building, shall comply with Sections 807.4.1 and 807.4.2

Reason: There is abundant evidence that combustible materials outdoors can cause severe fires that can spread to a nearby building. One example is artificial decorative vegetation. The recent fire at the Cosmopolitan Hotel in Las Vegas (which involved unregulated decorative vegetation) has demonstrated that combustible materials in occupiable roofs can also cause significant fire damage. The distance of 30 feet was chosen because it is considered the distance beyond which accessory structures in wildland areas cease being a serious fire safety concern. The fire testing recommended (807.4.1) is the same as for indoor artificial vegetation, namely either NFPA 701 (test methods 1 or 2, as appropriate, based on the type of material) or NFPA 289, with a 20 kW ignition source. The additional requirement (807.4.2) is that no unlisted electrical wiring or lighting is permitted on the decorative vegetation item.

Cost Impact: The code change proposal will increase the cost of construction. Artificial decorative vegetation used outdoors near a building or on a roof will have to be fire tested.

F21-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that the requirement would be difficult to enforce and does not include other elements. (Vote: 13-1)

Assembly Action:

None

F21-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Marcelo Hirschler, representing GBH International (mmh@gbhint.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

SECTION 320 ARTIFICIAL ~~DECORATIVE-COMBUSTIBLE~~ VEGETATION ON ROOFS AND NEAR BUILDINGS

320.1 General. Artificial ~~decorative vegetation placed~~ combustible vegetation exceeding 6 feet (1830 mm) in height installed outdoors, either within 30-3 feet (9140-914 mm) of a building, or on an occupied the roof of a building, shall comply with Sections ~~be labeled as having complied with Section 807.4.1. The placement of the vegetation shall also comply with Sections 806.3 and 807.4.2.~~

Exception: Where there is no opening within 5 feet (1524 mm) of the combustible vegetation.

Commenter's Reason: This public comment addresses several issues raised during the committee action hearing, as follows.

1. A much lower distance is used (3 feet), which ensures that this will not apply to distant vegetation.
2. A size limitation has been placed on the vegetation (more than 6 feet), which ensures that it will not apply to small items.
3. It is made clear that this applies to installations, and not to items on castors or items brought to the site for a specific event. Note that installations of over 6 feet in height will be something that has a considerable source of fire.
4. The concept of occupied roof has been deleted, so it applies to all roofs because the potential for damage is the same whether or not people are present.
5. A requirement for placing a label on the vegetation will make it easier to enforce. The label refers only to the fire test contained in chapter 8 and the requirement for the label will make it easier for enforcers.
6. Requirements to meet the same other issues as vegetation placed indoors has been added as a separate sentence, without information being required on the label.
7. An exception has been added to ensure that it does not apply if there are no nearby openings.

The type of construction is not being proposed as an exception because the danger is associated with the penetration via openings (which can exist for all types of construction) or with fire exposure by people and other combustibles in the proximity of the vegetation.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction Very large combustible artificial vegetation will have to be fire tested when placed close to a building.

F21-18

F22-18

IFC: 105.6.1 (New), 202(New), 301.2, 302.1, 320 (New), Chapter 80

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Fire Code

Add new text as follows

105.6.1 Additive Manufacturing. An operational permit is required to conduct additive manufacturing operations as covered in Section 320.3.

3D PRINTER. A machine used in the additive manufacturing process for fabricating objects through the deposition of a material using a print head, nozzle, or another printer technology.

ADDITIVE MANUFACTURING. A process of joining materials to make objects from 3D model data, usually layer upon layer, sometimes referred to as 3D printing. The Code recognizes two types of additive manufacturing:

Revise as follows

301.2 Permits. Permits shall be required as set forth in Section 105.6 for the activities or uses regulated by Sections 306, 307, 308, ~~315~~ and ~~315~~320.

302.1 Definitions. The following terms are defined in Chapter 2:

3D PRINTER.

ADDITIVE MANUFACTURING.

BONFIRE.

HI-BOY.

HIGH-VOLTAGE TRANSMISSION LINE.

OPEN BURNING.

PORTABLE OUTDOOR FIREPLACE.

POWERED INDUSTRIAL TRUCK.

RECREATIONAL FIRE.

SKY LANTERN.

Add new text as follows

SECTION 320 ADDITIVE MANUFACTURING (3D PRINTING)

320.1 General. Additive manufacturing equipment and operations shall comply with Section 320.

320.1.1 Scope. Additive manufacturing shall comply with one of the following:

1. Non-industrial additive manufacturing shall comply with Section 320.2.
2. Industrial additive manufacturing shall comply with Section 320.3.

320.2 Non-industrial additive manufacturing. Non-industrial additive manufacturing equipment and operations shall

comply with Section 320.2.1 through 320.2.5.

320.2.1 Industrial manufacturing. Non-industrial additive manufacturing equipment and operations shall comply with Section 320.2. Additive manufacturing equipment and operations that do not comply with 320.2.1 through 320.2.5 shall comply with Section 320.3.

320.2.2 Listing. 3D printers used in non-industrial additive manufacturing shall be listed and labeled in accordance with UL 60950-1 or UL 62368-1. The listing shall also verify:

1. The 3D printers are self-contained and do not utilize ancillary equipment, other than pre-packaged production materials.
2. The operation of the 3D printers will not create a hazardous (classified) environment outside of the unit's outer enclosure as defined in NFPA 70, Article 500.
3. The 3D printers are only intended for use with maximum 30 liter prepackaged production materials, which are investigated with the 3D printer and identified in the manufacturer's instruction.

320.2.3 Installation, operation and maintenance. 3D printers shall be installed, operated and maintained in accordance with this Code, the listing and the manufacturer's instructions.

320.2.4 Installation limitations. Non-industrial additive manufacturing shall be limited to installations and operations that comply with all of the following:

1. Do not utilize external dust collection systems.
2. Do not utilize external inert gas supplies for creating an inert environment.
3. Do not utilize automated external powder feed or sieve features.
4. Do not utilize hazardous materials in excess of the maximum allowable quantities regulated by Chapter 50.

320.2.5 Occupancies. Non-industrial additive manufacturing shall be permitted in all occupancy groups.

320.3 Industrial additive manufacturing. Industrial additive manufacturing equipment and operations shall comply with Section 320.3.1 through 320.3.9.

320.3.1 Additive manufacturing operations and equipment. Additive manufacturing operations and equipment that do not comply with Section 320.2 shall comply with Section 320.3.

320.3.2 Permits required. Permits shall be obtained from the fire code official in accordance with Section 105.6 prior to engaging in industrial additive manufacturing operations.

320.3.3 Listing. 3D printers used in industrial additive manufacturing shall be listed and labeled in accordance with UL 2011 or approved for the application based on a field evaluation conducted by an approved agency.

320.3.4 Installation, operation and maintenance. Industrial additive manufacturing equipment shall be installed, operated and maintained in accordance with this code, the manufacturer's instructions and where applicable the listing.

320.3.5 Combustible dusts and metals. Industrial additive manufacturing operations that use or generate combustible dust or combustible metals shall comply with Chapter 22, Chapter 50 and this section.

320.3.5.1 Powder evaluation. Printing powders used in industrial additive manufacturing operations shall be tested for combustibility in accordance with NFPA 484 or 654 as applicable. A copy of test reports shall be provided to the fire code official upon request.

320.3.5.2 Combustible (non-metallic) dusts. Industrial additive manufacturing that uses combustible (non-metallic) dusts shall comply with NFPA 654.

320.3.5.3 Combustible metals. Industrial additive manufacturing operations that use combustible metals shall also comply with NFPA 484.

320.3.5.4 Ancillary equipment. Ancillary equipment provided for recycling, sieving, vacuuming or handling combustible powders shall be designed and approved for such use.

320.3.6 Hazardous materials. Industrial additive manufacturing operations that use hazardous materials exceeding the maximum allowable quantities shall comply with Chapter 50.

320.3.7 Technical assistance. Where required by the fire code official, a report evaluating the acceptability of technologies, processes, products, facilities, materials and uses associated with the operation shall be provided in accordance with 104.7.2 and approved.

320.3.8 Performance based design alternative. Where approved by the fire code official, buildings and facilities where industrial additive manufacturing is performed shall be permitted to comply with the performance based design options in Section 5001.3 as an alternative to compliance with the other requirements set forth in this Section.

320.2.9 Occupancies. Industrial additive manufacturing shall only be conducted in the occupancy groups associated with manufacturing operation, and permitted by the Chapter 50 maximum allowable quantity tables. Where approved, the requirements in Section 320.3.6 shall be permitted to provide the technical basis for determining compliance with Table 5003.1.1(1), footnote q.

Add new standard(s) follows

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook IL 60062

2011-06:

Factory Automation Equipment
60950-1—14:

Information Technology Equipment - Safety Requirements
62368-1—14:

Audio/video, Information and Communication Technology Equipment - Safety Requirements

Reason: The use of additive manufacturing, often referred to as 3D printing, is becoming more prevalent in industrial and non-industrial applications. This proposal introduces basic safety requirements for these operations.

Non-industrial additive manufacturing - 3D printers are available for less than \$500

and are being used in classrooms, offices and businesses for producing customized

products and prototypes. Section 320.2 establishes basic safety requirements for

this self-contained equipment, which includes pre-packaged production materials. The product listing is being relied upon to verify that the equipment operates safely and does not create a hazardous (classified) area outside of the unit.

Industrial use additive manufacturing - Section 320.3 covers 3D additive manufacturing operations, which includes all operations that aren't covered by Section 320.2. These are typically industrial operations using external powder feed supplies, dust collection systems and/or inert gas supplies. Some of the requirements for industrial operations are as follows:

320.3.3 requires the industrial 3D printer to be listed to UL 2011, but includes an option for non-listed equipment to be approved based on a field evaluation.

320.3.6 was added due to the new unique challenges some jurisdictions may face in approving industrial additive manufacturing operations. Among other resources they can use is a risk assessment conducted in accordance with the UL 3400 Outline of Investigation for Additive Manufacturing Facility Safety Management, which is applicable where parts are manufactured using powder-based additive manufacturing techniques.

This section also includes a pointer to the Section 5001.3 performance based design option, which has been used in some industrial additive manufacturing operations.

An operational permit is required for industrial additive operations.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will increase the cost of construction

There is no significant cost increase for non-industrial additive manufacturing covered by Section 320.2, unless the price of listed equipment is higher than non-listed equipment. There are increased costs for industrial additive manufacturing operations that might be related to obtaining listed equipment, and the operational permit fees.

Analysis: A review of the standard proposed for inclusion in the code, UL 2011-06, UL 60950-1-14, and UL 62368-1—14, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

F22-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval is based upon the proponent's published reason. (Vote: 8-5)

Assembly Action:

None

F22-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

ADDITIVE MANUFACTURING. A process of joining materials to make objects from 3D model data, usually layer upon layer, sometimes referred to as 3D printing. The Code recognizes two types of additive manufacturing:

Industrial additive manufacturing. 3D printing that uses equipment external to the 3D printer for feed of powders or dust collection operations that typically utilize combustible powders or metals, an inert gas supply, a combustible dust collection system, or that create a hazardous (classified) location area or zone outside of the equipment.

Non-industrial additive manufacturing. 3D printing which exclusively uses self-contained 3D printing equipment without external powder supply, dust collection system, or inert gas supply operations that do create a hazardous (classified) location area outside of the equipment, and do not utilize an inert gas supply or a combustible dust collection system.

320.1.2-3 Installation, operation and maintenance. 3D printers and associated additive manufacturing equipment shall be installed, operated and maintained in accordance with this Code, the listing and the manufacturer's instructions.

320.1.3 Production materials. Only the production materials listed for use with the equipment and included in the manufacturer's instructions shall be used.

320.2 Non-industrial additive manufacturing. Non-industrial additive manufacturing equipment and operations shall comply with Section 320.2.1 through 320.2.5. Additive manufacturing equipment and operations that do not comply with Section 320.2 shall comply with Section 320.3.

320.2.1 Industrial manufacturing. ~~Non-industrial additive manufacturing equipment and operations shall comply with Section 320.2. Additive manufacturing equipment and operations that do not comply with 320.2.1 through 320.2.5 shall comply with Section 320.3.~~

320.2.21 Listing. 3D printers used in non-industrial additive manufacturing shall be listed and labeled in accordance with UL 60950-1 ~~or~~ UL 62368-1 or UL 2011. The listing shall also verify:

1. The 3D printers are self-contained and ~~do not utilize ancillary equipment, other than~~ utilize maximum 30 liter pre-packaged production materials.
2. The operation of the 3D printers ~~will~~ shall not create a hazardous (classified) ~~environment electrical area or zone~~ outside of the unit's.
3. If any hazardous (classified) electrical area or zone exists inside of the unit's outer enclosure as defined in NFPA 70, Article 500.3, the area shall be protected by intrinsically safe electrical construction or other acceptable protection methods.
4. The 3D printers shall not utilize inert gas or an external combustible dust collection system. ~~The 3D printers are only intended for use with maximum 30 liter prepackaged production materials, which are investigated with the 3D printer and identified in the manufacturer's instruction.~~

320.2.4 Installation limitations. ~~Non-industrial additive manufacturing shall be limited to installations and operations that comply with all of the following:~~

1. ~~Do not utilize external dust collection systems.~~

2. Do not utilize external inert gas supplies for creating an inert environment.
3. Do not utilize automated external powder feed or sieve features.
4. Do not utilize hazardous materials in excess of the maximum allowable quantities regulated by Chapter 50.

320.2.52 Occupancies. Non-industrial additive manufacturing shall be permitted in all occupancy groups.

320.3 Industrial additive manufacturing. Industrial additive manufacturing equipment and operations shall comply with Section 320.3.1 through 320.3.912.

~~**320.3.1 Additive manufacturing operations and equipment.** Additive manufacturing operations and equipment that do not comply with Section 320.2 shall comply with Section 320.3.~~

320.3.21 Permits required. Permits shall be obtained from the fire code official in accordance with Section 105.6 prior to engaging in industrial additive manufacturing operations.

320.3.32 Listing. 3D printers used in industrial additive manufacturing shall be listed and labeled in accordance with UL 2011 or approved for the application based on a field evaluation conducted by an approved agency.

~~**320.3.4 Installation, operation and maintenance.** Industrial additive manufacturing equipment shall be installed, operated and maintained in accordance with this code, the manufacturer's instructions and where applicable the listing.~~

320.3.53 Combustible dusts and metals. Industrial additive manufacturing operations that use or generate store, use or produce combustible dust or combustible metals shall, combustible particulate solids or combustible metals shall comply with Chapter 22, ~~Chapter 50~~ and this section.

~~**320.3.5.14 Powder evaluation.** Printing powders used in industrial additive manufacturing operations shall be tested for combustibility in accordance with NFPA 484 or ~~654~~ NFPA 652 as applicable. A copy of test reports shall be provided to the fire code official upon request.~~

320.3.5.2 Combustible (non-metallic) dusts. Industrial additive manufacturing ~~that uses~~ operations that store, use or produce combustible (non-metallic) dusts shall comply with NFPA 654.

320.3.5.36 Combustible metals. Industrial additive manufacturing operations that store or use combustible metals shall ~~also~~ comply with NFPA 484.

320.3.5.47 Ancillary equipment. Ancillary equipment provided for recycling, sieving, vacuuming or handling combustible powders shall be designed and approved for such use.

320.3.68 Hazardous materials. Industrial additive manufacturing operations that store or use hazardous materials exceeding the maximum allowable ~~quantities~~ quantity limits shall comply with Chapter 50.

320.3.9 Inert Gas. Additive manufacturing processes that utilize inert gases shall comply with Chapter 53. Ventilation or gas detection shall be provided in accordance with Section 5307.

320.3.710 Technical assistance. Where required by the fire code official, a report evaluating the acceptability of technologies, processes, products, facilities, materials and uses associated with the operation shall be provided in accordance with 104.7.2 and approved.

~~**320.3.811 Performance based design alternative.** Where approved by the fire code official, buildings and facilities where industrial additive manufacturing is performed shall be permitted to comply with the performance based design options in Section 5001.3 as an alternative to compliance with the other requirements set forth in this Section.~~

~~**320.23.912 Occupancies.** Industrial additive manufacturing shall only be conducted in the occupancy groups associated with manufacturing operation, and permitted by the Chapter 50 maximum allowable quantity tables. Where approved, the requirements in Section 320.3.6 shall be permitted to provide the technical basis for determining compliance with Table 5003.1.1(1), footnote q.~~

Commenter's Reason: This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the

current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at:

<https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

The IFC committee supported the inclusion of additive manufacturing (AM) requirements in the code, but had concerns with some of the proposed language, which has been addressed with this public comment. Highlights of the changes include:

The definitions of non-industrial and industrial additive manufacturing were revised to clarify the type of operations covered by each of them.

Common requirements for "Installation, operation and maintenance" and "Production materials" were move to Section 320.1 from Sections 320.2 and 320.3.

Non-industrial additive manufacturing requirements were revised to clarify they do not include equipment that has the potential to produce a hazardous (classified) location electrical area or zone outside the 3D printer enclosure, which could lead to a potential combustible dust or vapor explosion. The typical cord connected desktop 3D printers used in personal and professional (non-industrial) applications today are not covered by operational permits and are intended for use in ordinary electrical locations.

Industrial additive manufacturing requirements were revised to improve readability, correct references, and address the safety of inert gas used in the production process.

Unnecessary cross references and duplicative requirements were removed.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. Potential cost increases since these operations were previously not regulated in the IFC.

F22-18

F23-18

IFC: SECTION 320, 320.1, 320.2, 320.3, 320.4, 320.5, 320.6

Proposed Change as Submitted

Proponent: Marcelo Hirschler, GBH International, representing GBH International (gbhint@aol.com)

2018 International Fire Code

Add new text as follows

SECTION 320 OUTDOOR FURNITURE AFFIXED OUTSIDE BUILDINGS

320.1 General. Outdoor furniture, such as benches, that are affixed outside buildings, shall be considered storage and shall comply with section 315 and this section.

Exception: Outdoor furniture placed beneath overhead projections from buildings where automatic sprinklers are installed under such projections in accordance with Section 315.4.1.

320.2 Distance from buildings. Furniture placed outdoors shall not be affixed within 5 feet (1524 mm) of any building, except if it is labeled as having complied with any one of Sections 320.3 through 320.6.

320.3 Traditional materials. The furniture shall be constructed entirely of wood, identified for outdoor use, and non-combustible materials, complying with Section 703.5.1 of the International Building Code.

320.4 Plastic composites. The furniture shall be constructed entirely of materials that meet all the requirements for plastic composite deck boards, in accordance with section 2612 of the International Building Code.

320.5 Heat release. The furniture shall be constructed entirely of materials intended for outdoor use that exhibit a peak rate of heat release not exceeding 300 kW/m² when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m² in the horizontal orientation.

320.6 Full scale testing. The furniture shall be constructed entirely of materials intended for outdoor use and the entire item of furniture shall exhibit a maximum rate of heat release not exceeding 100 kW when tested in accordance with NFPA 289, using the 20 kW ignition source.

Reason: Section 315 of the IFC addresses storage, including, particularly, storage beneath overhead projections from buildings (Section 315.4.1). However, storage is defined as something intended for future use. The IFC code does not make it clear whether items placed permanently (for example by being secured or screwed in place) near a building (or against a building) for their immediate use are necessarily considered to be “stored” and whether the storage section applies.

It has been found that when plastic benches are attached to buildings and placed underneath overhead projections, they can result in severe fires that can destroy the overhang and then continue to destroy the building itself. ATF conducted tests on several plastic lumber benches simulating an actual incident. In the incident, a plastic lumber bench attached to a brick wall, from the outside, at a school and under an overhang, was ignited with a small ignition source (child's coat) and the entire school was destroyed soon after ignition. Tests conducted by GBH International showed that a Southern Yellow Pine (standard park bench lumber) would have performed much better and that even some plastic lumber materials could have done much better. The maximum heat release rate of plastic lumber bench ignited in this type of scenario is very high and can be above 4 MW, while the wood bench did not ignite the overhang. An attached set of pictures and information shows key results.

It is interesting that the IFC does an excellent job in regulating garbage cans and laundry carts placed near buildings (even if they are not secured in place) but it does not regulate park benches, or other park furniture.

It has been explained that the practice of placing park benches under an overhang is a common feature in areas where rain is frequent, for protection.

The code proposal would allow benches, or other outdoor furniture, constructed of wood or of non-combustible materials without further requirements (traditional materials).

If plastic benches (or plastic composite benches) are proposed to be placed near buildings, the proposal states that they need to comply with one of the following: (a) the same requirements as plastic composites used for deck boards (i.e. section 2612 of the IBC), (b) the same heat release results from ASTM E1354 that materials used for garbage cans or

laundry carts are required to meet (i.e. section 304.3 or 318.1) or the same heat release results as decorative materials (i.e. section 807.3) or foam plastic exhibit booths (i.e. section 807.5.1) are required to meet.

At the same time the code proposal clarifies that combustible products placed for immediate use outside buildings must comply with the same storage requirements as those stored for future use, in section 315. This means that if the furniture is placed beneath overhead projections, automatic sprinklers must be installed under such projections, per 315.4.1, as shown below.

315.4.1 Storage beneath overhead projections from buildings. Where buildings are protected by an automatic sprinkler system, the outdoor storage, display and handling of combustible materials under eaves, canopies or other projections or overhangs are prohibited except where automatic sprinklers are installed under such eaves, canopies or other projections or overhangs.

Cost Impact: The code change proposal will increase the cost of construction. This code proposal will require that outdoor furniture affixed near a building must have improved fire performance, which will improve fire safety.

F23-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that the requirements should not be conditional on if the furniture is affixed due to inconsistency. In addition there is no criteria provided for the distance of 5 feet, the type of exterior wall is not addressed and the heat release requirement does not take into account the type of furniture material. (Vote: 14-0)

Assembly Action:

None

F23-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Marcelo Hirschler, representing GBH International (mmh@gbhint.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

SECTION 320 ~~OUTDOOR FURNITURE AFFIXED OUTSIDE BUILDINGS~~

320.1 General. ~~Outdoor furniture, such as benches, that are affixed outside buildings, shall be considered storage and shall comply with section 315 and this section.~~

Exception: ~~Outdoor furniture placed beneath overhead projections from buildings where automatic sprinklers are installed under such projections in accordance with Section 315.4.1.~~

320.1 General Furniture, such as benches, placed outside buildings under a combustible exterior projection shall comply with Section 320.2 and any one of Sections 320.3, 320.4, 320.5 or 320.6.

Exception: Where automatic sprinklers in accordance with Section 315.4.1 are installed under the exterior projection.

320.2 Distance from buildings. ~~Furniture placed outdoors shall not be affixed placed outdoors within 5-2 feet (1524 mm610 mm) of any building, except if unless it is labeled as having complied with any one of Sections 320.3 through 320.6.~~

320.3 Traditional materials. ~~The furniture shall be constructed entirely of wood, identified for outdoor use, and non-combustible noncombustible materials, complying with Section with Section 703.5.1 of the International Building Code, or of wood.~~

320.4 Plastic ~~composites~~ composite materials. The furniture shall be constructed entirely of plastic composite materials that meet all the requirements for plastic composite deck boards, in accordance with section 2612 of the International Building Code.

320.5 Heat release. ~~The As an alternate to the requirements in Sections 320.3, 320.4 and 320.6, the furniture shall be permitted to be constructed entirely of materials intended for outdoor use that exhibit a peak rate of heat release not exceeding 300 kW/m² when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m² in the horizontal orientation.~~

320.6 Full scale testing. ~~The furniture shall As an alternate to the requirements in Sections 320.3, 320.4 and 320.5, the furniture shall be permitted to be constructed entirely of materials intended for outdoor use and such that the entire item of furniture shall exhibit exhibits a maximum rate of heat release not exceeding 100 kW when tested in accordance with NFPA 289, using the 20 kW ignition source.~~

Commenter's Reason: The public comment addresses all comments received during the hearings and the committee concerns, as follows.

1. The requirement that the furniture be affixed was eliminated.

2. The requirement is restricted to furniture within 2 feet of a building and under a combustible exterior projection.
3. The type of construction has not been amended because the incident inspiring this code proposal occurred with benches placed against a brick wall and yet the entire building was destroyed, starting with burning the combustible exterior projection. (see attached image)
4. All references to storage have been eliminated.
5. The section on traditional materials was revised to clarify that only noncombustible materials need to comply with the noncombustibility test in 703.5.1.
6. The section on plastic composite materials was revised to clarify that it applies only to plastic composite materials.
7. The sections on heat release testing (320.5 and 320.6) were revised to clarify that they alternate options to the requirements in sections 320.3 and 320.4, which apply, respectively, to wood (and noncombustible materials) and to plastic composite materials.
8. The exception for areas protected by sprinklers is retained.
9. The requirement that the materials be intended for outdoor use is being deleted because it would be difficult to enforce and it is not a safety issue.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. This code proposal will require that outdoor furniture placed near a building must have improved fire performance, which will improve fire safety.

F23-18

F26-18

IFC: 403.3.2, 403.8.1.1.2, 403.8.2.2, 403.8.3.1, 403.10.3.1.1

Proposed Change as Submitted

Proponent: John Williams, Chair, representing Healthcare Committee (AHC@iccsafe.org); Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Fire Code

Revise as follows

403.3.2 Fire safety plan. A copy of the fire safety plan shall be maintained at the facility at all times. The plan shall include all of the following in addition to the requirements of Section 404:

1. Locations of ~~patients-care recipients~~ who are rendered incapable of self-preservation.
2. Maximum number of ~~patients-care recipients~~ rendered incapable of self-preservation.
3. Area and extent of each ambulatory care facility.
4. ~~Location of adjacent smoke compartments or refuge areas, where required.~~
5. ~~Path of travel to adjacent smoke compartments.~~
6. Location of any special locking, ~~delayed egress or access control~~ arrangements.

403.8.1.1.2 Fire safety plans-plan. A copy of the fire safety plan shall be maintained at the facility at all times. ~~Plans~~ The plan shall include the following in addition to the requirements of Section 404.2.2:

1. Location and number of ~~resident-care recipient~~ sleeping rooms.
2. Location of special locking or egress control arrangements.

403.8.2.2 Fire safety plans-plan. A copy of the plan shall be maintained at the facility at all times. ~~Plans~~ The plan shall include all of the following in addition to the requirements of Section 404.2.2:

1. Location and number of ~~patient-care recipients~~ sleeping rooms and operating rooms.
2. ~~Location of adjacent smoke compartments or refuge areas.~~
3. ~~Path of travel to adjacent smoke compartments.~~
4. Location of special locking, ~~delayed egress or access control~~ arrangements.
5. ~~Location of elevators utilized for patient movement in accordance with the fire safety plan, where provided.~~

Add new text as follows

403.8.3.1 Fire safety plan. A copy of the fire safety plan shall be maintained at the facility at all times. The plan shall include the following in addition to the requirements of Section 404.2.2:

1. Location and number of cells.
2. Location of special locking arrangements.

Revise as follows

403.10.3.1.1 Fire safety plans. A copy of the fire safety plan shall be maintained at the facility at all times. ~~Plans~~ The plan shall include the following in addition to the requirements of Section 404.2.2:

1. Location and number of ~~resident-care recipient~~ sleeping rooms.
2. Location of special locking ~~or egress control~~ arrangements.

Reason: This is a series of proposal to coordinate the fire safety, evacuation and lock down plans between Groups I-1, I-2, I-3, R-4 and ambulatory care facilities. The FCAC and Healthcare committees worked together to address all situations where a staged evacuation or defend-in-place is utilized. See the proposal to IFC Section 403.3 for information on what these changes will look like if all pass.

Group I-1, Condition 2 includes smoke compartments. When looking at adding smoke compartments, refuge area and path of travel, it was noted that this is already stated in 404.2.1 Item 1 and 404.2.2 Items 2.2 and 4.5. Therefore it is proposed to remove from Ambulatory care and Group I-2. Assisted evacuation is addressed in 404.2.1 Item 4 and 404.2.2 Item 2.3.

All patients and residents have been changed to care recipients to be consistent with the definitions for these types of facilities.

Last cycle there was a lot of work on the different locking systems. There should be a consistent and generic reference for these locking systems – “location of special locking arrangements”. This will eliminate a laundry list and improve coordination over time as locking arrangements for ingress and egress are added.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC) and the ICC Committee on Healthcare (CHC).

The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at:

<https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

The CHC was established by the ICC Board to evaluate and assess contemporary code issues relating to healthcare facilities. This is a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. In 2017 the CHC held 2 open meetings and numerous conference calls, *which included members of the committees as well as any interested parties, to discuss and debate the proposed changes.* Information on the CHC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CHC effort can be downloaded from the CHC website at: <https://www.iccsafe.org/codes-tech-support/cs/icc-committee-on-healthcare/>.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. These are operational requirements for emergency responders, resident and staff safety and therefore will not affect the cost of construction.

F26-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 403.8.2.2 Fire safety plan. A copy of the plan shall be maintained at the facility at all times. The plan shall include all of the following in addition to the requirements of Section 404.2.2:

1. Location and number of care recipients sleeping rooms and operating rooms.
2. Location of special locking ~~control~~ arrangements.

Committee Reason: This proposal addresses the correct terminology "care recipient" versus "patient." In addition this proposal removes duplicative language that is already provided in Section 404 for smoke compartments. Section 403.8.2.2 was modified to remove "control" from item 4 to be consistent with the revisions in sections 403.3.2 and 403.10.3.1.1. (Vote: 14-0)

Assembly Action:

None

F26-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Williams, representing Healthcare Committee (ahc@iccsafe.org) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Fire Code

403.8.1.1.2 Fire safety plan. A copy of the fire safety plan shall be maintained at the facility at all times. The plan shall include the following in addition to the requirements of Section 404.2.2:

1. Location and number of care recipient sleeping rooms.
2. Location of special locking ~~or egress control~~ arrangements.

Commenter's Reason: This additional modification is for consistency with the modification to the proposal and the original proposal.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The modification is for terminology and will not change any building construction requirements.

F26-18

F28-18

IFC: 403.3.4, 403.8.1.6, 403.8.2.3, 403.10.3.6, 405.1, 405.2

Proposed Change as Submitted

Proponent: John Williams, Chair, representing Healthcare Committee (AHC@iccsafe.org); Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Fire Code

Delete without substitution

~~**403.3.4 Emergency evacuation drills.** Emergency evacuation drills shall comply with Section 405.~~

~~**Exception:** The movement of patients to safe areas or to the exterior of the building is not required.~~

~~**403.8.1.6 Resident participation in drills.** Emergency evacuation drills shall involve the actual evacuation of residents to a selected assembly point and shall provide residents with experience in exiting through all required exits. All required exits shall be used during emergency evacuation drills.~~

Revise as follows

403.8.2.3 Emergency evacuation drills. Emergency evacuation drills shall comply with Section 405.

~~**Exceptions**~~ **Exception:**

- ~~1. The movement of patients to safe areas or to the exterior of the building is not required.~~
- ~~2. Where emergency evacuation drills are conducted after visiting hours or where patients or residents are expected to be asleep, a coded announcement shall be an acceptable alternative to audible alarms.~~

Delete without substitution

~~**403.10.3.6 Resident participation in drills.** Emergency evacuation drills shall involve the actual evacuation of residents to a selected assembly point and shall provide residents with experience in exiting through all required exits. All required exits shall be used during emergency evacuation drills.~~

~~**Exception:** Actual exiting from emergency escape and rescue windows shall not be required. Opening the emergency escape and rescue window and signaling for help shall be an acceptable alternative.~~

Revise as follows

405.1 General. Emergency fire and evacuation drills complying with Sections 405.2 through 405.9 shall be conducted not less than annually where fire safety and evacuation plans are required by Section 403 or where required by the *fire code official*. Drills shall be designed in cooperation with the local authorities.

Add new text as follows

405.2 Occupant participation. Emergency fire and evacuation drills shall involve the actual evacuation of occupants to a selected assembly point and shall provide occupants with experience in exiting through all required exits. All required exits shall be used during emergency evacuation drills.

Exceptions:

1. In Ambulatory Care Facilities and Group I-2 the movement of care recipients to a safe area or to the exterior of the building is not required.
2. In Group I-1, Condition 2 the assembly point for residents is permitted to be within an adjacent smoke compartment.
3. In Group R-4, actual exiting from emergency escape and rescue openings shall not be required. Opening the emergency escape and rescue opening and signaling for help shall be an acceptable alternative.
4. In Group I-3, Conditions 2 through 5 where a defend-in-place response is permitted, the assembly point for detainees is permitted to be within an adjacent smoke compartment.
5. In Group I-3, Conditions 2 through 5, movement of detainees is not required to an assembly point is not required where there are security concerns.

Reason: This is a series of proposal to coordinate the fire safety, evacuation and lock down plans between Groups I-1, I-2, I-3, R-4 and ambulatory care facilities. The FCAC and Healthcare committees worked together to address all situations where a staged evacuation or defend-in-place is utilized. See the proposal to IFC Section 403.3 for information on what these changes will look like if all pass.

The requirements for drills in Section 405 never really say where you move to during a drill. It is only implied in IFC 405.8 when it mentions accountability at assembly points.

How to leave and get to an assembly point is stated for Group I-1 and R-4, but does not recognize the new requirements for smoke compartments in Group I-1, Condition 2. It is implied by the exceptions in ambulatory care and Group I-2 that drills are for moving to smoke compartments by having exception for movement of patients in beds. This should be stated at the beginning of the drill requirements for all facilities.

The exceptions for drills should be in the drill section specifically. The exceptions could stay in the specific requirements, but only if Section 405 included a description of what was supposed to happen for drills, otherwise the reference to Section 405 does not make sense.

Exception 4 and 5 are in recognition of detainee participation in drills for jails.

Note: If both exceptions to 403.8.2.3 are removed (exception 1 is addressed under a different proposal), the whole section is redundant text and should be removed.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC) and the ICC Committee on Healthcare (CHC).

The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at:

<https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

The CHC was established by the ICC Board to evaluate and assess contemporary code issues relating to healthcare facilities. This is a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. In 2017 the CHC held 2 open meetings and numerous conference calls, *which included members of the committees as well as any interested parties, to discuss and debate the proposed changes.* Information on the CHC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CHC effort can be downloaded from the CHC website at: <https://www.iccsafe.org/codes-tech-support/cs/icc-committee-on-healthcare/>.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. These are operational requirements for emergency responders, resident and staff safety and will not affect the cost of construction.

F28-18

Public Hearing Results

Errata:

405.2 Occupant participation. Emergency fire and evacuation drills shall involve the actual evacuation of occupants to a selected assembly point and shall provide occupants with experience in exiting through all required exits. All required exits shall be used during emergency evacuation drills.

Exceptions:

1. In Ambulatory Care Facilities and Group I-2 the movement of care recipients to a safe area or to the exterior of the building is not required.
2. In Group I-1, Condition 2 the assembly point for residents is permitted to be within an adjacent smoke compartment.
3. In Group R-4, actual exiting from emergency escape and rescue openings shall not be required. Opening the emergency escape and rescue opening and signaling for help shall be an acceptable alternative.
4. In Group I-3, Conditions 2 through 5 where a defend-in-place response is permitted, the assembly point for detainees is permitted to be within an adjacent smoke compartment.
5. In Group I-3, Conditions 2 through 5, movement of detainees is not required to an assembly point ~~is not required~~ where there are security concerns.

Committee Action:

Disapproved

Committee Reason: This was disapproved as it was felt that Section 405.2 as proposed would apply too broadly to all occupancies and requires all available exits to be used during drills which is seen as excessive. In addition, the term "patient" needs to be revised to "care recipients." (Vote: 14-0)

Assembly Action:

None

F28-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Williams, representing Healthcare Committee (ahc@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

403.8.2.3 Emergency evacuation drills. Emergency evacuation drills shall comply with Section 405.

Exception: Where emergency evacuation drills are conducted after visiting hours or where ~~patients or residents~~ care recipients are expected to be asleep, a coded announcement shall be an acceptable alternative to audible alarms.

405.2 Occupant participation. Emergency fire and evacuation drills shall involve the actual evacuation of occupants to a selected assembly point and shall provide occupants with experience in exiting through ~~all~~ required exits. ~~All required exits shall be used during emergency evacuation drills.~~

Exceptions:

1. In Ambulatory Care Facilities and Group I-2 the movement of care recipients to a safe area or to the exterior of the building is not required.
2. In Group I-1, Condition 2 the assembly point for residents is permitted to be within an adjacent smoke compartment.
3. In Group R-4, actual exiting from emergency escape and rescue openings shall not be required. Opening the emergency escape and rescue opening and signaling for help shall be an acceptable alternative.
4. In Group I-3, Conditions 2 through 5 where a defend-in-place response is permitted, the assembly point for detainees is permitted to be within an adjacent smoke compartment.
5. In Group I-3, Conditions 2 through 5, movement of detainees is not required to an assembly point is not required where there are security concerns.

Commenter's Reason: The proposed deletion to Section 405.2 was a recommendation by the Fire Code Development Committee. This was originally copied from 2018 IFC Section 403.8.1.6 and 403.10.3.6. However, which exits are used should be decided on a case by case basis depending on the drill and the facility.

The modification to Section 403.8.2.3 is for consistency in terminology in the provisions

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

These are operational requirements for emergency responders, resident and staff safety and will not affect construction costs. The modification to 403.8.2.3 is terminology only. The modification to 405.2 is operational. Neither modification will change any building construction requirements.

F28-18

F37-18

IFC: 404.1

Proposed Change as Submitted

Proponent: Joe McElvaney, self, representing Self (joemcelvaney@gmail.com)

2018 International Fire Code

Revise as follows

404.1 General. ~~Where required by Section 403, fire~~ Fire safety, evacuation and lockdown plans shall comply with Sections 404.2 through 404.4.1.

Reason: As currently written section 404 would only apply to those occupancies in section 403 to have fire safety, evacuation and/or lockdown plans.

However section 403 does not required any occupancies to have a lockdown plan.

Plus if an owner wishes to have a fire safety, evacuation plan and/or lockdownplan, it would make sense to use the same requirement/format for those occupancies as outline in section 404

Cost Impact: The code change proposal will increase the cost of construction

This code change will increase the cost of construction, by requiring all occupancies that are required or not required to have a fire safety, evacuation and/or lockdown plan to use the same outline/format as called out in IFC section 404.

F37-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This was disapproved with concern that it will apply the lockdown provisions where they were not intended. Currently the lockdown section applies where lockdown plans are formed but are not required. (Vote: 12-2)

Assembly Action:

None

F37-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Marc Sampson, representing selfrequests As Submitted.

Commenter's Reason: As currently written in the 2018 IFC, section 404.1 points back to section 403 for when to use section 404 for fire safety, evacuation and/or lock-down plans, however there are no requirements for lock-downs in section 403. Thus the code user can never get back to contents of section 404 for a lock down plan.

This code change removes the reference to Section 403 and allows lock-down plans to be developed per section 404.

To address the committee's concern that lock-down provisions would be applied where not intended, as previously stated there are no requirements for lock-downs in section 403.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction Based on proponent original code change content

F37-18

F38-18

IFC: 404.2.2

Proposed Change as Submitted

Proponent: Robert Davidson, Davidson Code Concepts, LLC, representing Self (rjd@davidsoncodeconcepts.com); William Kramer, School District of Philadelphia, representing School District of Philadelphia (wkramer@philasd.org)

2018 International Fire Code

Revise as follows

404.2.2 Fire safety plans. Fire safety plans shall include the following:

1. The procedure for reporting a fire or other emergency.
2. The life safety strategy including the following:
 - 2.1. Procedures for notifying occupants, including areas with a private mode alarm system.
 - 2.2. Procedures for occupants under a defend-in-place response.
 - 2.3. Procedures for evacuating occupants, including those who need evacuation assistance.
3. Site plans indicating the following:
 - 3.1. The occupancy assembly point.
 - 3.2. The locations of fire hydrants.
 - 3.3. The normal routes of fire department vehicle access.
4. Floor plans identifying the locations of the following:
 - 4.1. Exits.
 - 4.2. Primary evacuation routes.
 - 4.3. Secondary evacuation routes.
 - 4.4. Accessible egress routes.
 - 4.4.1. Areas of refuge.
 - 4.4.2. Exterior areas for assisted rescue.
 - 4.5. Refuge areas associated with *smoke barriers* and *horizontal exits*.
 - 4.6. Manual fire alarm boxes.
 - 4.7. Portable fire extinguishers.
 - 4.8. Occupant-use hose stations.
 - 4.9. Fire alarm annunciators and controls.
5. A list of major fire hazards associated with the normal use and occupancy of the premises, including maintenance and housekeeping procedures.
6. Identification and assignment of personnel responsible for maintenance of systems and equipment installed to prevent or control fires.
7. Identification and assignment of personnel responsible for maintenance, housekeeping and controlling fuel hazard sources.
8. Exterior doors shall be identified on plans with the exposure side alphabetical prefix that coincides with the National Incident Management System exterior Incident command system (ICS) division designation coupled with sequential numeric door number assignments.

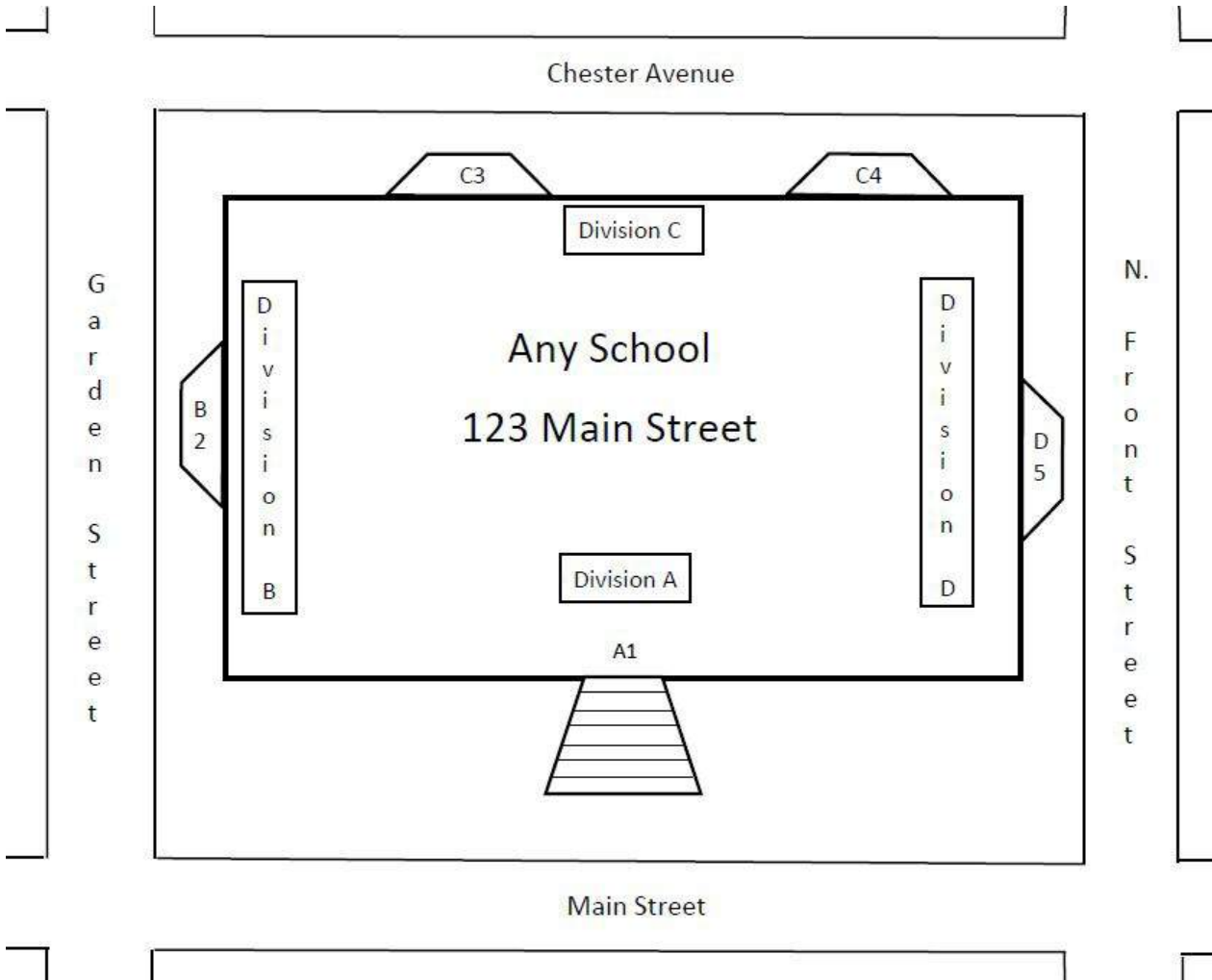
Reason: The IFC does not include recommendations for exterior door numbering that is in compliance with incident management procedures. Due to the lack this being addressed in the IFC for emergency planning purposes a number of agencies have developed recommendations that are not in compliance with NIMS. The most common recommendation starts with the main entrance door being labeled as 1, and then sequentially clockwise around the building. In an emergency situation, especially one that requires mutual aid, it is imperative that we know where our assignments are. In addition, should we run into an emergency inside a building we need to be able to quickly identify where the person in need is located. By failing to utilize the geographic locations of ICS we have failed to ensure a quick, effective and safe response.

A simple fix is to require that a prefix be utilized that coincides with the exterior ICS division designations. Therefore, the main entrance would be Door A1. From a response perspective if I am responding to an active shooter situation, or other emergency, in a school and I am ordered to report to Door 4, I have no idea where that is. However, if I am ordered to report to Door C4 I know it is in the rear of the building. Likewise, if I am an officer in need of assistance from inside a

building and can see an exit door that is labeled from the inside, if it is Door 5, no one except those familiar with the building will know where that is. If however, that same door is labeled D5, everyone knows it is on the right side of the building.

The adoption of a nationwide system of managing incidents and events starts with the basic knowledge that everyone is speaking the same language. That starts with the geographic divisions of an incident. Therefore, the simple addition of adding a prefix and number for exterior doors of a building and requiring them to be labeled inside and outside, is paramount for officer and occupant safety. I am requesting that the ICC consider adding these requirements to the IFC.

This proposal adds a requirement that in preparing fire safety plans the exterior doors be designated and indicated utilizing alphanumeric designations coinciding with the ICS division side and the sequential door number.



Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal has no impact on the cost of construction. It has a minimal cost impact on the preparation of fire safety plans.

F38-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposal was disapproved based on the need for more specific information such as stroke size for the identification. Also, there was concern that, as written, this proposal only addresses the plans and not the building itself. (Vote: 10-4)

Assembly Action:

None

F38-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Robert Davidson, Davidson Code Concepts, LLC, representing Self (rjd@davidsoncodeconcepts.com)requests As Submitted.

Commenter's Reason: The committees disapproval was as follows:
The proposal was disapproved based on the need for more specific information such as stroke size for the identification. Also, there was concern that, as written, this proposal only addresses the plans and not the building itself. (Vote: 10-4)

The reasons centered around the fact that the proposal does not call for marking of doors to correspond to the NIMS division designations.

That omission was intentional because requiring address posting or door numbering has always been controversial and because in this case it is unnecessary. The marking would be optional, but if marking occurs it should meet the needs of emergency responders. Currently with no guidance marking occurs with no relation to the NIMS training utilized by emergency responders.

The proposal is that the emergency plans utilize this numbering scheme for recognition by emergency responders. NIMS ICS training is mandatory for all active emergency service personnel which includes recognition of alphabetical division designations. This occurs at emergency scenes whether or not a building even has an emergency action plan. When you couple a door number with a division designation the emergency responder simply counts doors from one edge of the division side to the other.

The other benefit of not requiring the doors to be marked, the renumbering designation occurs on paper. Not replacing existing markings other than those cases where confusing designations and marking have already occurred and those locations should make the minimal expenditure to renumber their doors.

Facility staff involved in emergency response should also be receiving NIMS training which means they should have no difficulty understanding and applying this requirement.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal has no impact on the cost of construction. It has a minimal cost impact on the preparation of fire safety plans.

F38-18

F43-18

IFC: 508.1.6; IBC: 911.1.6

Proposed Change as Submitted

Proponent: Kevin Brinkman, representing National Elevator Industry, Inc. (klbrinkman@neii.org)

2018 International Fire Code

Revise as follows

508.1.6 Required features. The *fire command center* shall comply with NFPA 72 and shall contain the following features:

1. The emergency voice/alarm communication system control unit.
2. The fire department communications system.
3. Fire detection and alarm system annunciator.
4. Annunciator unit visually indicating the location of the elevators and whether they are operational.
5. Status indicators and controls for air distribution systems.
6. The fire fighter's control panel required by Section 909.16 for smoke control systems installed in the building.
7. Controls for unlocking *interior exit stairway* doors simultaneously.
8. Sprinkler valve and water-flow detector display panels.
9. Emergency and standby power status indicators.
10. A telephone for fire department use with controlled access to the public telephone system.
11. Fire pump status indicators.
12. Schematic building plans indicating the typical floor plan and detailing the building core, *means of egress, fire protection systems, fire-fighter air-replenishment systems, fire-fighting equipment and fire department access, and the location of fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions.*
13. An *approved* Building Information Card that includes, but is not limited to, all of the following information:
 - 13.1. General building information that includes: property name, address, the number of floors in the building above and below grade, use and occupancy classification (for mixed uses, identify the different types of occupancies on each floor) and the estimated building population during the day, night and weekend;
 - 13.2. Building emergency contact information that includes: a list of the building's emergency contacts including but not limited to building manager, building engineer and their respective work phone number, cell phone number and e-mail address;
 - 13.3. Building construction information that includes: the type of building construction including but not limited to floors, walls, columns and roof assembly;
 - 13.4. *Exit access stairway* and *exit stairway* information that includes: number of *exit access stairways* and *exit stairways* in building; each *exit access stairway* and *exit stairway* designation and floors served; location where each *exit access stairway* and *exit stairway* discharges, *interior exit stairways* that are pressurized; *exit stairways* provided with emergency lighting; each *exit stairway* that allows reentry; *exit stairways* providing roof access; elevator information that includes: number of elevator banks, elevator bank designation, elevator car numbers and respective floors that they serve; location of elevator machine rooms, control rooms and control spaces; location of sky lobby; and location of freight elevator banks;
 - 13.5. Building services and system information that includes: location of mechanical rooms, location of building management system, location and capacity of all fuel oil tanks, location of emergency generator and location of natural gas service;
 - 13.6. *Fire protection system* information that includes: location of standpipes, location of fire pump room, location of fire department connections, floors protected by automatic sprinklers and location of different types of *automatic sprinkler systems* installed including but not limited to dry, wet and pre-action;
 - 13.7. Hazardous material information that includes: location and quantity of hazardous material.
14. Work table.
15. Generator supervision devices, manual start and transfer features.
16. Public address system, where specifically required by other sections of this code.
17. Elevator fire recall switch in accordance with ASME A17.1/CSA B44.
18. Elevator emergency or standby power selector switch(es) (labelled "elevator emergency power"), where emergency or standby building power is provided and the emergency or standby building power is provided not sufficient to operate all elevators and associated equipment simultaneously.

2018 International Building Code

[F] 911.1.6 Required features. The fire command center shall comply with NFPA 72 and shall contain all of the following features:

1. The emergency voice/alarm communication system control unit.
2. The fire department communications system.
3. Fire detection and alarm system annunciator.
4. Annunciator unit visually indicating the location of the elevators and whether they are operational.
5. Status indicators and controls for air distribution systems.
6. The fire fighter's control panel required by Section 909.16 for smoke control systems installed in the building.
7. Controls for unlocking *interior exit stairway* doors simultaneously.
8. Sprinkler valve and waterflow detector display panels.
9. Emergency and standby power status indicators.
10. A telephone for fire department use with controlled access to the public telephone system.
11. Fire pump status indicators.
12. Schematic building plans indicating the typical floor plan and detailing the building core, *means of egress*, fire protection systems, fire fighter air replenishment system, fire-fighting equipment and fire department access and the location of *fire walls, fire barriers, fire partitions, smoke barriers* and smoke partitions.
13. An *approved* Building Information Card that contains, but is not limited to, the following information:
 - 13.1. General building information that includes: property name, address, the number of floors in the building above and below grade, use and occupancy classification (for mixed uses, identify the different types of occupancies on each floor), and the estimated building population during the day, night and weekend.
 - 13.2. Building emergency contact information that includes: a list of the building's emergency contacts including but not limited to building manager and building engineer and their respective work phone number, cell phone number, e-mail address.
 - 13.3. Building construction information that includes: the type of building construction including but not limited to floors, walls, columns, and roof assembly.
 - 13.4. *Exit access* and *exit stairway* information that includes: number of *exit access* and *exit stairways* in the building, each *exit access* and *exit stairway* designation and floors served, location where each *exit access* and *exit stairway* discharges, *interior exit stairways* that are pressurized, *exit stairways* provided with emergency lighting, each *exit stairway* that allows reentry, *exit stairways* providing roof access; elevator information that includes: number of elevator banks, elevator bank designation, elevator car numbers and respective floors that they serve; location of elevator machine rooms, control rooms and control spaces; location of sky lobby, location of freight elevator banks.
 - 13.5. Building services and system information that includes: location of mechanical rooms, location of building management system, location and capacity of all fuel oil tanks, location of emergency generator, location of natural gas service.
 - 13.6. Fire protection system information that includes: location of standpipes, location of fire pump room, location of fire department connections, floors protected by automatic sprinklers, location of different types of *automatic sprinkler systems* installed including, but not limited to, dry, wet and pre-action.
 - 13.7 Hazardous material information that includes: location of hazardous material, quantity of hazardous material.
14. Work table.
15. Generator supervision devices, manual start and transfer features.
16. Public address system, where specifically required by other sections of this code.
17. Elevator fire recall switch in accordance with ASME A17.1/BSA 44.
18. Elevator emergency or standby power selector switch(es) (labelled "elevator emergency power"), where emergency or standby building power is provided and the emergency or standby building power is provided not sufficient to operate all elevators and associated equipment simultaneously.

Reason: To clarify that no switch is needed if the emergency or standby power is sufficient to operate all elevators and associated equipment simultaneously.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
To change to cost since it is a clarification

Public Hearing Results

Errata: [F] 911.1.6 Required features. The fire command center shall comply with NFPA 72 and shall contain all of the following features:
(Items 1-17 unchanged)

18. Elevator emergency or standby power selector switch(es) (labelled "elevator emergency power"), where emergency or standby building power is ~~provided,~~ provided and the emergency or standby building power is not sufficient to operate all elevators and associated equipment simultaneously.

Committee Action:

Disapproved

Committee Reason: The proposal was disapproved as more justification was needed from the proponent and specifically there was concern with how this would work with Occupant evacuation elevators (OEE) since those elevators would need to be available during an entire event. (Vote: 13-1)

Assembly Action:

None

F43-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Kevin Brinkman, representing National Elevator Industry, Inc. (klbrinkman@neii.org) requests As Submitted.

Commenter's Reason: Request approval as submitted. This change was submitted by NEII but was also reviewed by the ASME Code Coordination committee which includes members from ICC and NFPA. This proposal will clarify when a switch is required for emergency or standby power and its operation.

The current language requires a selector switch anytime emergency or standby power is provided. The purpose of the switch is to allow the firefighter to select which elevator or elevators receive the emergency or standby power. In some cases, the emergency or standby power is sufficient to power all of the elevators at once; therefore, there is no need for a selector switch. In fact, requiring the switch when none is needed may create confusion in an emergency. The proposed language would clarify that the switch is only required when the emergency or standby power is insufficient to power all elevators at one time.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This change would reduce the cost of construction because the selector switch would not be required when emergency or standby power is sufficient to power all elevators at once.

F43-18

F47-18

IFC: 510.1.1, 510.1.1.1

Proposed Change as Submitted

Proponent: Adria Reinertson, Riverside County Fire Department, representing Riverside County Fire Department, California Fire Chiefs Association (adriar@moval.org)

2018 International Fire Code

Add new text as follows

510.1.1 Building conduit and pathway survivability. All new buildings shall be constructed with not less than a two-inch (2") dedicated conduit raceway or other method approved by the fire code official for future expandability, or the installation of an Emergency Responder Radio Coverage System. The raceway shall meet pathway survivability requirements in NFPA 1221 and shall be installed from the lowest floor level to the roof.

510.1.1.1 Identification. The raceway and junction boxes shall be labeled "Emergency Responder Radio Coverage System use only".

Reason: Communications are key to a successful response to an emergency incident. When emergency responder radio coverage systems are installed in a new building they are tested and approved for the conditions present at the time. Often times, as additional buildings and infrastructure are built in the immediate and adjacent vicinity, the original radio coverage system will no longer function as approved due to interference, etc. This proposal requires a dedicated raceway to be installed at time of construction to allow for future expandability and/ or the installation of a radio coverage system. This proposal would allow for easy expansion and/or installations without the additional cost of invasive retrofits to the original system.

Cost Impact: The code change proposal will increase the cost of construction. This code change will increase the cost of construction, however, it will greatly reduce the cost of future installations and/or retrofits for expandability.

F47-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved as this requirement seemed excessive and would apply to all buildings regardless of size or features. In addition, it was noted that perhaps Section 510.5.1.1 dealing with installation may be a better location for such a requirements. Also, NFPA 1221 does not establish when pathway survivability is required and a sprinklered building is already considered to have level 1 pathway survivability. Therefore a level of protection is already provided in many buildings without conduit. (Vote 13-1)

Assembly Action:

None

F47-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Adria Reinertson, representing Riverside County Fire Department, California Fire Chiefs Association (adriar@moval.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

510.1.1 510.5.3 Building conduit and pathway survivability. All new buildings shall be constructed with not less than a two-inch (2") dedicated conduit raceway or other method approved by the fire code official for future expandability, or the installation of an Emergency Responder Radio Coverage System. The raceway shall meet pathway survivability requirements in NFPA 1221 and shall be installed from the lowest floor level to the roof.

510.1.1.1 510.5.3.1 Identification. The raceway and junction boxes shall be labeled "Emergency Responder Radio Coverage System use only".

Commenter's Reason: The installation requirements for an Emergency Responder Radio Coverage System can be expensive and obtrusive, if installed after the building construction has been completed. This proposal provides for the basic pathway to be pre-installed, to reduce time and cost of installing an Emergency Responder Radio Coverage System by installing the initial pathway in the building.

The installation requirements are found in Section 510 and related requirement are in NFPA 1221. NFPA 1221 requires communications and signal circuits to be identified. NFPA 1221 has the following requirements:

5.5.5.3 Communications and signal circuits shall be identified by the use of a distinctive color on covers or doors.

5.5.5.4 The words "emergency communication-signal circuit" shall be clearly marked on all terminal and junction locations to prevent unintentional interference.

This Public Comment moves the proposed sections into the installation requirements section as recommended comments from the Code Development Committee. This proposal brings the communication and signaling circuit identification requirement into the International Fire Code.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. This code change will increase the cost of construction due to the requirement to install conduit for future use, however, it will greatly reduce the cost of future installations and/or retrofits for expandability.

F47-18

F49-18

IFC: 202 (New), 510.4.1

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (FCAC@iccsafe.org)

2018 International Fire Code

Add new definition as follows

CRITICAL AREAS. Areas that are designated for emergency responder radio coverage including exit stairs, exit passageways, elevator lobbies, fire protection equipment room and control valve locations, fire command centers and other areas identified by the fire code official.

Revise as follows

510.4.1 Emergency responder communication enhancement system signal strength. The building shall be considered to have acceptable emergency responder communications enhancement system coverage when signal strength measurements in 95 percent of all areas and 99 percent in critical areas on each floor of the building meet the signal strength requirements in Sections 510.4.1.1 through 510.4.1.3.

Reason: This is one of 10 proposals being submitted as a package relating to technical changes proposed for Section 510. While the Fire Code Committee will consider each proposal independently, the intent is for approval of all proposals in this package which have been submitted as a correlated set of companion code change proposals. This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

This proposal clarifies existing requirements within the 2018 edition of Section 510 through a reference to NFPA 1221 by placing the language related to 99% in critical areas within the technical provisions of 510.4.1. Covering critical areas of a building is vital to the operations of public safety responders. A definition for "critical areas" has been included under a separate proposal and includes such areas as exit stairways, elevator lobbies, fire pump rooms, etc.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This is already required in NFPA 1221 already requires this. Section 510.4.2 requires compliance with NFPA 1221.

F49-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved based upon concern that requiring 99 percent will do little to improve the performance from the current criteria of 95%. In addition the definition uses the term "other areas" and it is unclear as to how those areas will be determined. (Vote 11-3)

Assembly Action:

None

F49-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

510.4.1 Emergency responder communication enhancement system signal strength. The building shall be considered to have acceptable emergency responder communications enhancement system coverage when signal strength measurements in 95 percent of all areas and 99 percent in ~~critical areas~~ areas designated as critical areas by the fire code official on each floor of the building meet the signal strength requirements in Sections 510.4.1.1 through 510.4.1.3.

CRITICAL AREAS. Areas that are designated for the highest level of emergency responder radio coverage including but not limited to areas such as exit stairs, exit passageways, elevator lobbies, fire protection equipment room and control valve locations, fire command centers ~~and other areas identified by the fire code official.~~

Commenter's Reason: This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at:

<https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

This proposal clarifies existing requirements within the 2018 edition of Section 510 through a reference to NFPA 1221 by placing the language related to 99% in critical areas within the technical provisions of 510.4.1. Covering critical areas of a building is vital to the operations of public safety responders. A definition for "critical areas" has been included to clarify what is intended by that term. As the definition notes critical areas include such areas as exit stairways, elevator lobbies, fire pump rooms and fire command centers.

New information: The committee stated that this change proposal would impose new/higher requirements of 99% coverage for critical areas. This public comment is not adding new or higher requirements. Rather it is simply eliminating a technical difference with current requirements in the 2016 and soon to be published 2019 edition of NFPA 1221 for critical areas. NFPA 1221 is referenced standard in the IFC and the intent is to harmonize the technical requirements between the IFC and NFPA 1221

This public comment retains the definition for critical areas. The definition provides a simple explanation for areas that are typically designated as "critical" for firefighter emergency communication to both transmit and receive emergency messages on their portable radios.

Critical areas are absolutely necessary to have 99% RF coverage for firefighter/emergency responder safety in these very specific areas within the building. These are areas where firefighters typically: manage operations (fire command centers), use to reach fire locations, stage for suppression operations, use to access and rescue trapped occupants or monitor/control critical fire protection systems.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of

construction

This is already required in NFPA 1221. Section 510.4.2 requires compliance with NFPA 1221.

F49-18

F63-18

IFC: 603.3, 603.3.1, 603.3.1.1 (New), 603.3.2, 603.3.2.1, 603.3.2.2, 603.3.2.3, 603.3.2.4, 603.3.2.5, 603.3.2.6, 603.3.2.7, 603.3.3, Chapter 80

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Fire Code

Revise as follows

603.3 Fuel oil storage systems. Fuel oil storage systems for building heating systems shall be installed and maintained in accordance with this code. ~~Fuel-oil Tanks and fuel-oil~~ piping systems shall be installed in accordance with Chapter 13 of the International Mechanical Code.

603.3.1 Fuel oil storage in outside, above-ground tanks. Where connected to a fuel-oil piping system, the maximum amount of fuel oil storage allowed outside above ground without additional protection shall be 660 gallons (2498 L). The storage of fuel oil above ground in quantities exceeding 660 gallons (2498 L) shall comply with NFPA 31.

Add new text as follows

603.3.1.1 Approval. Outside Fuel oil storage tanks shall be in accordance with UL142 or UL 2085.

Revise as follows

603.3.2 Fuel oil storage inside buildings. Fuel oil storage inside buildings shall comply with Sections 603.3.2.1 through 603.3.2.5 or Chapter 57: of this code.

Add new text as follows

603.3.2.1 Approval. Inside Fuel oil storage tanks shall be in accordance with UL 80, UL 142, UL 443, or UL 2085.

Revise as follows

~~603.3.2~~**603.3.2.2 Quantity limits.** One or more fuel oil storage tanks containing Class II or III *combustible liquid* shall be permitted in a building. The aggregate capacity of all tanks shall not exceed the following:

1. 660 gallons (2498 L) in unsprinklered buildings, where stored in a tank complying with UL 80, UL 142, UL 443, or UL 2085.
2. 1,320 gallons (4996 L) in buildings equipped with an *automatic sprinkler* system in accordance with Section 903.3.1.1, where stored in a tank complying with UL 142.
3. 3,000 gallons (11 356 L) in buildings equipped with an automatic sprinkler system in accordance with Section 903.3.1.1, where stored in protected above-ground tanks complying with UL 2085 and Section 5704.2.9.7 ~~and the room is protected by an automatic sprinkler system in accordance with Section 903.3.1.1 of this code.~~

603.3.2.2 Restricted use and connection. Tanks installed in accordance with Section 603.3.2 shall be used only to supply fuel oil to fuel-burning equipment, generators or fire pumps installed in accordance with Section 603.3.2.4. Connections between tanks and equipment supplied by such tanks shall be made using closed piping ~~systems~~systems in accordance with the International Mechanical Code.

603.3.2.3 Applicability of maximum allowable quantity and control area requirements. The quantity of *combustible liquid* stored in tanks complying with Section 603.3.2 shall not be counted towards the maximum allowable quantity set forth in Table 5003.1.1(1), and such tanks shall not be required to be located in a *control area*.

603.3.2.4 Installation. Tanks and piping systems shall be installed in accordance with Section 915 and Chapter 13, both of the International Mechanical Code, as applicable.

603.3.2.5 Separation. Rooms containing fuel oil tanks for internal combustion engines shall be separated from the remainder of the building by *fire barriers, horizontal assemblies,* or both, with a minimum 1-hour fire-resistance rating with 1-hour fire-protection-rated *opening protectives* constructed in accordance with the International Building Code.

Exception: Rooms containing protected above-ground tanks complying with Section 5704.2.9.7 of this code shall not be required to be separated from surrounding areas.

603.3.2.6 Spill containment. Tanks exceeding ~~55-60~~ gallon (~~208-227~~ L) capacity or an aggregate capacity of 1,000 gallons (3785 L) that are not provided with integral secondary containment shall be provided with spill containment sized to contain a release from the largest tank.

603.3.2.7 Tanks in basements. Tanks in *basements* shall be in accordance with UL 80 and shall be located not more than two stories below grade plane.

603.3.3 ~~Underground storage of fuel oil.~~Fuel oil storage in underground tanks. The storage of fuel oil in underground storage tanks shall comply with UL 58 or UL 1316 and installed in accordance with NFPA 31.

Add new standard(s) follows

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook IL 60062

443-06:

Steel Auxiliary Tanks for Oil-Burner Fuel (with revisions through March 8, 2013)

Reason: This is one of 17 proposals being submitted as a package relating to technical and organizational changes proposed for Chapter 6. While the Fire Code Committee will consider each proposal independently, the intent is for approval of all proposals in this package which have been submitted as a correlated set of companion code change proposals.

This proposal provides the following clarity:

1. The scope of these sections is for fuel oil storage systems for building heating systems, not for generators or fire pumps.
2. These sections cover both installation and maintenance.
3. Both tanks and fuel oil piping systems are covered in Chapter 13 of the IMC.
4. Identifies what standards that the fuel oil storage tanks located outside, inside, and underground are required to comply.
5. Adds UL 443, UL 58, and UL 1316 as additional alternative standards for tanks to comply.
6. Correlates in Section 603.3.2.6 the technical requirements with the definitions of containers (a vessel of 60 gallons or less) and tanks (a vessel more than 60 gallons).

CONTAINER. A vessel of 60 gallons (227 L) or less in capacity used for transporting or storing hazardous materials. Pipes, piping systems, engines and engine fuel tanks are not considered to be containers.

TANK. A vessel containing more than 60 gallons (227 L).

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Clarifies existing requirements, and provides additional alternative compliance paths for the tanks.

Analysis: A review of the standard proposed for inclusion in the code, UL 443-06 with revisions through March 8, 2013, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 603.3 Fuel oil storage systems. Fuel oil storage systems ~~for building heating systems~~ shall be installed and maintained in accordance with this code. Tanks and fuel-oil piping systems shall be installed in accordance with Chapter 13 of the International Mechanical Code.

603.3.1.1 Approval. Outside Fuel oil storage tanks shall be in accordance with UL142, ~~or~~ UL 2085., or UL 80.

603.3.2.7 Tanks in basements. Tanks in basements shall be ~~in accordance with UL 80~~ and shall be located not more than two stories below grade plane.

Committee Reason: This proposal was approved for a couple reasons. First it provides a more specific reference to Chapter 13 of the IMC for fuel oil piping. Next it references the appropriate referenced standards with regard to underground tanks. The modifications address several issues. The first is the removal of "building heating systems" as this section is intended to be more broadly scoped to other fuel oil applications. The second addressed a standard that was overlooked when assembling the proposal that is appropriate for outside storage tanks UL 80. (Vote: 14-0)

Assembly Action:

None

F63-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jeffrey Shapiro, representing STI/SPFA (jeff.shapiro@intlcodeconsultants.com) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Fire Code

603.3.2.1 Approval. Inside Fuel oil storage tanks shall be in accordance with UL 80, UL 142, ~~UL 443,~~ or UL 2085.

603.3.2.2 Quantity limits. One or more fuel oil storage tanks containing Class II or III *combustible liquid* shall be permitted in a building. The aggregate capacity of all tanks shall not exceed the following:

1. 660 gallons (2498 L) in unsprinklered buildings, where stored in a tank complying with UL 80, UL 142, ~~UL 443,~~ or UL 2085.
2. 1,320 gallons (4996 L) in buildings equipped with an *automatic sprinkler* system in accordance with Section 903.3.1.1, where stored in a tank complying with UL 142.
3. 3,000 gallons (11 356 L) in buildings equipped with an automatic sprinkler system in accordance with Section 903.3.1.1, where stored in protected above-ground tanks complying with UL 2085 and Section 5704.2.9.7 of this code.

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook IL 60062

~~443-06:~~

Steel Auxiliary Tanks for Oil Burner Fuel (with revisions through March 8, 2013)

Commenter's Reason: To my knowledge, there are no active listings for UL 443, and because I understand that the standard does not include requirements related to tank supports, it does not appear suitable for equivalent recognition to UL 80 or other code-recognized tank construction standards.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Since there are no active product listings for this standard, deleting the reference should have no impact on cost.

F63-18

F64-18

IFC: 603.3.2.1

Proposed Change as Submitted

Proponent: Bob Morgan, Fort Worth Fire Department, representing Fort Worth Fire Department

2018 International Fire Code

Revise as follows

603.3.2.1 Quantity limits. One or more fuel oil storage tanks containing Class II or III *combustible liquid* shall be permitted in a building. The aggregate capacity of all tanks shall not exceed the following:

1. 660 gallons (2498 L) in unsprinklered buildings, where stored in a tank complying with UL 80, UL 142 or UL 2085.
2. 1,320 gallons (4996 L) in buildings equipped with an *automatic sprinkler* system in accordance with Section 903.3.1.1, where stored in a tank complying with UL 142- as a listed secondary containment tank. Secondary containment shall be monitored visually or automatically.
3. 3,000 gallons (11 356 L) where stored in protected above-ground tanks complying with UL 2085 and Section 5704.2.9.7 and the room is protected by an *automatic sprinkler system* in accordance with Section 903.3.1.1. Secondary containment shall be monitored visually or automatically.

Reason: The current allowance of 1,320 gallons in a single wall tank in a non-Group H occupancy area is simply not consistent with historical practice for such installations and is not equivalent to what is required in Chapter 50 relative to maximum allowable quantities, which would normally only allow up to 240 gallons in a fully sprinklered non-Group H occupancy in a use-closed system.

Additionally, the vast majority of these tanks presently installed inside and outside buildings are of the double-wall type for permanent installations.

Primary concern is the exposure of 1,320 gallons of spilled diesel (fuel oil - Class II combustible liquid) inside a building, resulting in much greater involvement in a fire condition than in the vented interstitial space of a double-wall tank.

The double-wall tank provides an added layer of protection at a reasonable cost and is common industry practice currently, especially when located inside a building.

Cost Impact: The code change proposal will increase the cost of construction

The vast majority of fuel tanks associated with generators and fire pumps are of the double-wall type presently; however, being that the code currently allows these to be of the single wall type for the maximum 1,320 gallon designated quantity, the requirement of double-wall would be an increase in the cost of construction as a result.

F64-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This proposal was approved as it was felt necessary that if secondary containment is provided that it needs to be monitored. (Vote: 11-2)

Assembly Action:

None

F64-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jeffrey Shapiro, representing STI/SPFA (jeff.shapiro@intlcodeconsultants.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

603.3.2.1 Quantity limits. One or more fuel oil storage tanks containing Class II or III *combustible liquid* shall be permitted in a building. The aggregate capacity of all tanks shall not exceed the following:

1. 660 gallons (2498 L) in unsprinklered buildings, where stored in a tank complying with UL 80, UL 142 or UL 2085.
2. 1,320 gallons (4996 L) in buildings equipped with an *automatic sprinkler* system in accordance with Section 903.3.1.1, where stored in a tank complying with UL 142. The tank shall be listed as a listed secondary containment tank, ~~Secondary, and the secondary~~ and the secondary containment shall be monitored visually or automatically.
3. 3,000 gallons (11 356 L) where stored in protected above-ground tanks complying with UL 2085 and Section 5704.2.9.7 and the room is protected by an *automatic sprinkler system* in accordance with Section 903.3.1.1. ~~Secondary~~The tank shall be listed as a secondary containment tank, as required by UL 2085, and the secondary containment shall be monitored visually or automatically.

Commenter's Reason: The recommended change correlates the sentence structures in Items 2 and 3 for consistency. UL 2085 tanks require secondary containment, but the text in Item 3, as initially approved, could lead to questions since Item 2 clearly requires secondary containment vs. Item 3, which silently relies on someone knowing that UL 2085 requires secondary containment as part of the listing.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The expected cost increase was documented in the original proposal. The public comment is consistent with the original cost statement.

F64-18

F65-18

IFC: 603.4, 603.4.2.1, 603.4.2.1.1, 603.4.2.2, 603.4.2.2.1, 603.4.2.2.2, 603.4.2.2.3, 603.4.2.2.4, Chapter 80

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Fire Code

603.4 Portable unvented heaters. Portable unvented fuel-fired heating equipment shall be prohibited in occupancies in Groups A, E, I, R-1, R-2, R-3 and R-4 and ambulatory care facilities.

Exceptions:

1. ~~In one- and two-family dwellings portable~~ Portable unvented fuel-fired heaters ~~, where approved and listed in accordance with UL 647 are permitted to be used in one- and two-family dwellings, where operated and maintained in accordance with the manufacturer's instructions.~~
2. Portable outdoor gas-fired heating appliances in accordance with Section 603.4.2.

Revise as follows

603.4.2.1 Location. Portable outdoor gas-fired heating appliances shall be used and located in accordance with Sections 603.4.2.1.1 through 603.4.2.1.4.

603.4.2.1.1 Prohibited locations. The storage or use of portable outdoor gas-fired heating appliances is prohibited in any of the following locations:

1. Inside of any occupancy where connected to the fuel gas container.
2. Inside of tents, canopies and membrane structures.
3. On exterior balconies.

Exception: As allowed permitted in Section 6.22 of NFPA 58 Chapter 61 of this code.

603.4.2.2 Installation-Use and operation. Portable outdoor gas-fired heating appliances shall be ~~installed~~ used and operated in accordance with Sections 603.4.2.2.1 through 603.4.2.2.4.

603.4.2.2.1 Listing and approval. Only *listed and approved* portable outdoor gas-fired heating appliances utilizing a fuel gas container that is integral to the appliance shall be used. Portable outdoor gas-fired heating appliances shall be listed and labeled in accordance with ANSI Z83.26/CSA 2.37 or ANSI Z21.58/CSA 1.6.

603.4.2.2.2 Installation-Use and maintenance. Portable outdoor gas-fired heating appliances shall be ~~installed~~ used and maintained in accordance with the manufacturer's instructions.

Delete without substitution

603.4.2.2.3 Tip-over switch. ~~Portable outdoor gas-fired heating appliances shall be equipped with a tilt or tip-over switch that automatically shuts off the flow of gas if the appliance is tilted more than 15 degrees (0.26 rad) from the vertical.~~

603.4.2.2.4 Guard against contact. ~~The heating element or combustion chamber of portable outdoor gas-fired heating appliances shall be permanently guarded so as to prevent accidental contact by persons or material.~~

Add new standard(s) follows

ANSI

American National Standards
Institute
25 West 43rd Street, 4th Floor
New York NY 10036

ANSI Z83.26/CSA 2.37-2014:

Gas-Fired Outdoor Infrared Patio Heaters

Outdoor Cooking Gas Appliances

Reason: This is one of 17 proposals being submitted as a package relating to technical and organizational changes proposed for Chapter 6. While the Fire Code Committee will consider each proposal independently, the intent is for approval of all proposals in this package which have been submitted as a correlated set of companion code change proposals.

This proposal addresses the following for portable unvented heaters and outdoor gas-fired heating appliances:

1. Replaces "installed" with "used", because these are portable products.
2. For listed portable unvented heaters in one- and two-family dwellings, the fire code official will not be present to approve the use. The requirements have been expanded to also require these heaters to be operated and maintained in accordance with the manufacturer's instructions, which are part of the listing of the heater.
3. Adds specific standards for the portable outdoor gas-fired heating appliances.
4. Removes the tip-over switch requirement (Section 603.4.2.2.3) because this is already a requirement in ANSI Z83.26/CSA 2.37 (Section 5.19). The listing standard includes a performance test to determine.
5. Removes the guard requirement (Section 603.4.2.2.4) because this is already a requirement in ANSI Z83.26/CSA 2.37 (Section 5.14). The listing standard includes requirements addressing accessibility to any heated surface (Section 5.14).

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Clarifies already existing requirements.

Analysis: A review of the standards proposed for inclusion in the code, ANSI Z83.26/CSA 2.37-2014 and ANSI Z21.58/CSA 1.6-2015, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 603.4.2.2.3 Tip-over switch. Portable outdoor gas-fired heating appliances shall be equipped with a tilt or tip-over switch that automatically shuts off the flow of gas if the appliance is tilted more than 15 degrees (0.26 rad) from the vertical.

603.4.2.2.4 Guard against contact. The heating element or combustion chamber of portable outdoor gas-fired heating appliances shall be permanently guarded so as to prevent accidental contact by persons or material.

Committee Reason: This proposal was approved based upon proponents reason. There was some concern that the reference to the standard may lose the provisions related to tip over and therefore the proposal was modified to retain Section 603.4.2.2.3 and 603.4.2.2.4 which are existing IFC sections. Note there was some concern with the reference to a cooking standard (ANSI Z21.58/CSA 1.6-2015: Outdoor Cooking Gas Appliances) within a section focused upon heating requirements. (Vote: 10-3)

Assembly Action:

None

F65-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Bruce Swiecicki, representing National Propane Gas Association (bswiecicki@npga.org) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Fire Code

603.4.2.2.1 Listing and approval. Only *listed* and *approved* portable outdoor gas-fired heating appliances utilizing a fuel gas container that is integral to the appliance shall be used. Portable outdoor gas-fired heating appliances shall be listed and labeled in accordance with ANSI Z83.26/CSA 2.37. ~~or Z21.58/CSA 1.6.~~

Commenter's Reason: The modification that was made to F65-18 at the code hearings, which brings back the requirement for a tip-over switch in 603.4.2.2.3, now renders all grills listed and labeled to Z21.58 to be in violation of that section. Grills constructed to ANSI Z21.58 Outdoor Cooking Gas Appliances are required to undergo a tipping test to make sure they don't tip over when the angle of tip is 15 degrees from the vertical. However, grills listed to Z21.58 are not required to have a tip-over switch installed in them. Therefore, this change is needed in order for listed gas-fired grills to continue to be used.

In addition, there are other possibilities for gas-fired heating appliances to be used outdoors. Two additional standards that can be referenced are ANSI Z21.63 Portable Type Gas Camp Heaters and ANSI Z21.103 Unvented Portable Type Gas Camp Heaters for Indoor and Outdoor Use. Both of these standards have tip-over provisions that would allow compliance with 603.4.2.2.3 in the form that it is proposed for modification. However, due to ICC regulations, those standards may not be proposed until the next cycle.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal will not increase or decrease the cost of construction. It is simply not relevant as it is only focused on portable heaters.

Public Comment 2:

Proponent: Bruce Swiecicki, representing National Propane Gas Association (bswiecicki@npga.org) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Fire Code

603.4.2.2.3 Tip-over switch. Portable outdoor gas-fired heating appliances shall be equipped with a tilt or tip-over switch that automatically shuts off the flow of gas if before the appliance is tilted more than 15 degrees (0.26 rad) to the

minimum angle of critical balance from the vertical which would result in the appliance tipping over.

Commenter's Reason: The standard that is referenced in 603.4.2.2.1, ANSI Z83.26, as well as ANSI Z21.63 and ANSI Z21.103, have provisions to address tip-over. The provisions in Z83.26 and Z21.103 establish the angle of critical balance, which is defined in those standards as the minimum angle through which a heater must be tipped to cause it to tip over due solely to the force of gravity.

This angle will often exceed 15 degrees from the vertical but even if it is less than that, the important thing is that the tip-over switch will activate before the appliance is tipped to the angle of critical balance. The significance of this proposal is that 15 degrees from the vertical is an arbitrary number and it is more relevant to link tip-over activation to the angle of critical balance.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal will not impact the cost of construction.

F65-18

F67-18

IFC: 603.10, 603.10.1, 603.10.2

Proposed Change as Submitted

Proponent: Richard Boisvert, Brighton Area Fire Authority, representing Michigan Fire Inspector's Society (rboisvert@brightonareafire.com)

2018 International Fire Code

Add new text as follows

603.10 Clothes dryer exhaust ducts. Clothes dryer exhaust ducts shall be in accordance with Sections 603.10.1 and 603.10.2.

603.10.1 Installation. Clothes dryer vent ducts shall be installed and maintained in accordance with the International Mechanical Code and the manufacturer's installation instructions.

603.10.2 Maintenance. The lint trap, mechanical and heating components, and the exhaust duct system of a clothes dryer shall be maintained to prevent the accumulation of lint or debris that prevents the exhaust of air, products of combustion or that creates a fire hazard.

Reason: Th IFC does not specifically address clothes dryer exhaust duct system installation and maintenance. The addition of this section creates a clear code path to ensure these duct systems are maintained to prevent fires.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This change will not affect the cost of construction, however, it will require additional maintenance costs to maintain them following installation.

F67-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved based upon concerns that the enforcement will be problematic. In addition, there was concern as to determining how often it would need to be inspected. The reference to the manufacturers instructions may be subjective. It was also pointed out that this is not specific to any occupancy and should be narrowed down. There was some support by the committee with some modification to reflect exhaust systems. It was also felt that potentially this could be a necessary tool for enforcement as this is a fire hazard. (Vote: 7-6)

Assembly Action:

None

F67-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

610 CLOTHES DRYER EXHAUST SYSTEMS

~~603.10~~ **610.1 Clothes dryer exhaust duct systems.** Clothes dryer exhaust ducts shall duct systems shall be in accordance with Sections 603.10.1 and 603.10.2.

~~603.10.1~~ **610.1.1 Installation.** Clothes dryer vent ducts shall be installed and maintained in exhaust duct systems shall be installed in accordance with the International Mechanical Code, or the International Fuel Gas Code, and the manufacturer's installation instructions.

~~603.10.2~~ **610.1.2 Maintenance.** The lint trap, mechanical and heating components, and the exhaust duct system of a clothes dryer shall be ~~maintained~~ maintained in accordance with the manufacturer's operating instructions to prevent the accumulation of lint or debris that prevents the exhaust of air, ~~products and products~~ of combustion ~~or that creates a fire hazard.~~

Commenter's Reason: This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

This modification addresses the concern raised by the Technical Committee. There are many statistics published each year regarding clothes dryer fires, such as NFPA, CPSC, and USFA. There are approximately 15,600 structure fires, 400 injuries, and 15 deaths reported annually as a result of dryer fires. According to the United States Fire Administration, every year clothes dryer fires account for over \$100 million in losses. Also, dryer fires involving commercial dryers have a 78% higher injury rate than residential dryer fire. A majority of dryer fires occur as a result of highly flammable lint getting caught in the dryer's vent and becoming heated to the point of ignition. While many of the statistics address residential applications, there are also some statistics that identify issues in commercial applications, too.

Thus, maintaining of clothes dryers and the clothes dryer exhaust duct systems in any occupancy using clothes dryers is critical to reducing the fire hazard. The Mechanical, Fuel Gas, and Residential Codes require commercial and residential clothes dryers to be listed and labeled, and to be installed in accordance with the manufacturer's installation instructions. The required product testing standards include requirements for specific cleaning and maintenance directions to be part of the manufacturer's installation and use instructions.

The frequency for inspections depends on various factors, such as how often the dryer is used, the geometry of the exhaust duct system, and the age and type of dryer.

The proposal is modified as follows:

1. Establish a new stand-alone section in Chapter 6 for clothes dryer exhaust duct systems, because these potential hazards are present regardless of what the source of power or fuel for drying the clothes.
2. Use the term “exhaust duct system”, which is consistent with the terms used in the Mechanical, Fuel Gas, and Residential codes. These systems include the termination outlet and may include dryer exhaust duct power ventilators, which are also known as booster fans.
3. Expand the installation codes to also include the Fuel Gas Code for the gas-fired clothes dryers.
4. The Mechanical Code does not include maintenance requirements.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This change will not affect the cost of construction, however, it will require additional maintenance costs to maintain them following installation.

F67-18

F69-18

IFC: 604.1.1

Proposed Change as Submitted

Proponent: John Williams, Chair, representing Healthcare Committee (AHC@iccsafe.org)

2018 International Fire Code

Add new text as follows

604.1.1 Healthcare facilities. In Group I-2 facilities, ambulatory care facilities and outpatient clinics, the electrical systems and equipment shall be maintained and tested in accordance with NFPA 99.

Reason: In order to meet federal conditions of participation health care facilities must comply with the electrical systems and equipment must be maintenance and testing requirements listed in NFPA 99, Health Care Facilities Code (K913). This change will align the electrical systems maintenance and testing requirements for Outpatient Clinics, Group B Ambulatory Care and Group I-2 facilities.

This proposal is submitted by the ICC Committee on Healthcare (CHC). The CHC was established by the ICC Board to evaluate and assess contemporary code issues relating to healthcare facilities. This is a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. In 2017 the CHC held 2 open meetings and numerous conference calls, *which included members of the committees as well as any interested parties, to discuss and debate the proposed changes.* Information on the CHC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CHC effort can be downloaded from the CHC website at: <https://www.iccsafe.org/codes-tech-support/cs/icc-committee-on-healthcare/>.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This change is an operational change regarding maintenance and testing. This will not increase the cost of construction on the healthcare industry.

F69-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This was disapproved as it does not correlate with the essential electrical requirements in chapter 4 of the of the IBC. This reference to NFPA 99 in this proposal has broader application in the IFC which seems beyond the scope of application of this code.. (Vote: 12-2)

Assembly Action:

None

F69-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Williams, representing Healthcare Committee (ahc@iccsafe.org)requests As Submitted.

Commenter's Reason: This proposal is intended to reference the maintenance and testing requirements of NFPA 99 and not the new construction requirements. IBC Section 422.6 covers installation according to NFPA 99 for ambulatory care and IBC Section 407.11 covers Group I-2. We want to make systems that are installed according NFPA per IBC are properly maintained. We need this for alignment with CMS conditions of participation in the IFC.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This change is an operational change regarding maintenance and testing. This will not increase the cost of construction on the healthcare industry.

F69-18

F76-18

IFC: 605.1.2, Chapter 80

Proposed Change as Submitted

Proponent: Jeffrey Shapiro, representing International Institute of Ammonia Refrigeration (jeff.shapiro@intlcodeconsultants.com)

2018 International Fire Code

Revise as follows

605.1.2 Ammonia refrigeration. Refrigeration systems using ammonia refrigerant and the buildings in which such systems are installed shall comply with IIAR-2 for system design and installation, IIAR 6 for maintenance and inspection, and IIAR-7 for operating procedures. Decommissioning of ammonia refrigeration systems shall comply with IIAR-8.

Update standard(s) as follows

IIAR

International Institute of Ammonia
Refrigeration
1001 N. Fairfax Street, Suite 503
Alexandria VA 22314
US

IIAR – 2-2014:

Safe Design of Closed-circuit Ammonia ~~Refrigerating~~ Refrigeration Systems

IIAR – 8-2015:

Decommissioning of Closed-circuit Ammonia ~~Refrigerating~~ Refrigeration Systems

IIAR 6-2018:

Standard for Inspection, Testing, and Maintenance of Closed-Circuit Ammonia Refrigeration Systems

Reason: IIAR 6 is a newly developed standard, being produced in accordance with ANSI requirements. It will provide comprehensive model regulations for maintenance and inspection of ammonia refrigeration systems and is part of a comprehensive set of IIAR standards for such systems that have been adopted by the IFC, IMC and other model codes. The first public comment period for this document has been completed, and it is anticipated that the document will be finished in time for adoption by the ICC membership in 2018.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. IIAR 6 is a maintenance and inspection standard for existing ammonia refrigeration systems.

Analysis: A review of the standard proposed for inclusion in the code, IIAR 6—2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

F76-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The committee approved the proposal based upon the need for the maintenance and inspection standard. The proposal also corrects the title to existing standard IAR 2 which is necessary. (Vote: 14-0)

Assembly Action:

None

F76-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jeffrey Shapiro, representing International Institute of Ammonia Refrigeration (jeff.shapiro@intlcodeconsultants.com) requests Disapprove.

Commenter's Reason: This public comment is submitted as a contingency in case IAR 6 is not done before the final action hearing, in which case it must be disapproved.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Not adopting the standard will not impact construction costs.

Public Comment 2:

Proponent: CP28 Administration.

Commenter's Reason: The administration of ICC Council Policy 28 (CP28) is not taking a position on this code change. This public comment is being submitted to bring a procedural requirement to the attention of the ICC voting membership. In accordance with Section 3.6.3.1.1 of ICC Council Policy 28 (partially reproduced below), the new referenced standard(s) IAR 6-2018:Standard for Inspection, Testing, and Maintenance of Closed-Circuit Ammonia Refrigeration Systems, must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered. **(CP28) 3.6.3.1.1 Proposed New Standards.** In order for a new standard to be considered for reference by the Code, such standard shall be submitted in at least a consensus draft form in accordance with Section 3.4. If the proposed new standard is not submitted in at least consensus draft form, the code change proposal shall be considered incomplete and shall not be processed. The code change proposal shall be considered at the Committee Action Hearing by the applicable code development committee responsible for the corresponding proposed changes to the code text. If the committee action at the Committee Action Hearing is either As Submitted or As Modified and the standard is not completed, the code change proposal shall automatically be placed on the Public Comment Agenda with the recommendation stating that in order for the public comment to be considered, the new standard shall be completed and readily available prior to the Public Comment Hearing

F76-18

F78-18

IFC: 605.1.2, Chapter 80

Proposed Change as Submitted

Proponent: Jeffrey Shapiro, representing International Institute of Ammonia Refrigeration (jeff.shapiro@intlcodeconsultants.com)

2018 International Fire Code

Revise as follows

605.1.2 Ammonia refrigeration. Refrigeration systems using ammonia refrigerant and the buildings in which such systems are installed shall comply with IIAR-2 for system design and installation and IIAR-7 for operating procedures. Decommissioning of ammonia refrigeration systems shall comply with IIAR 8, and engineering practices for existing ammonia refrigeration systems shall be in accordance with IIAR 9.

Add new standard(s) follows

IIAR

International Institute of Ammonia
Refrigeration
1001 N. Fairfax Street, Suite 503
Alexandria VA 22314

IIAR 9-2018:

Standard for Recognized and Generally Accepted Good Engineering Practices (RAGAGEP) for Existing Closed-circuit Ammonia Refrigeration Systems

Reason: IIAR 9 is a newly developed standard, being produced in accordance with ANSI requirements. It will provide comprehensive model regulations for minimum retroactive safety requirements applicable to ammonia refrigeration systems. It is part of a comprehensive set of IIAR standards for such systems that have been adopted by the IFC, IMC and other model codes. It is anticipated that the document will be finished in time for adoption by the ICC membership in 2018.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The proposed standard does not affect construction. It applies to existing ammonia refrigeration systems.

Analysis: A review of the standard proposed for inclusion in the code, IIAR 9-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

F78-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This proposal was approved as it adds necessary requirements for existing ammonia refrigeration systems through the reference to the new standard IAR9. (Vote: 14-0)

Assembly Action:

None

F78-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jeffrey Shapiro, representing International Institute of Ammonia Refrigeration (jeff.shapiro@intlcodeconsultants.com) requests Disapprove.

Commenter's Reason: This public comment is submitted as a contingency in case IAR 9 is not done before the final action hearing, in which case it must be disapproved.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Not adopting the standard will not impact construction costs.

Public Comment 2:

Proponent: CP28 Administration.

Commenter's Reason: The administration of ICC Council Policy 28 (CP28) is not taking a position on this code change. This public comment is being submitted to bring a procedural requirement to the attention of the ICC voting membership. In accordance with Section 3.6.3.1.1 of ICC Council Policy 28 (partially reproduced below), the new referenced standard IAR 9-2018:Standard for Recognized and Generally Accepted Good Engineering Practices (RAGAGEP) for Existing Closed-circuit Ammonia Refrigeration Systems must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

(CP28) 3.6.3.1.1 Proposed New Standards. In order for a new standard to be considered for reference by the Code, such standard shall be submitted in at least a consensus draft form in accordance with Section 3.4. If the proposed new standard is not submitted in at least consensus draft form, the code change proposal shall be considered incomplete and shall not be processed. The code change proposal shall be considered at the Committee Action Hearing by the applicable code development committee responsible for the corresponding proposed changes to the code text. If the committee action at the Committee Action Hearing is either As Submitted or As Modified and the standard is not completed, the code change proposal shall automatically be placed on the Public Comment Agenda with the recommendation stating that in order for the public comment to be considered, the new standard shall be completed and readily available prior to the Public Comment Hearing

F78-18

F79-18 Part I

IFC: 202, (New), 605.8, 605.8.1, 605.8.1.1 (New), 605.8.1.2 (New), 605.17.1; IMC: [F]1106.5.1

Proposed Change as Submitted

Proponent: Connor Barbaree, ASHRAE, representing ASHRAE (cbarbaree@ashrae.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD THE IFC COMMITTEE, PART II WILL BE HEARD BY THE IMC COMMITTEE. PLEASE SEE THE TENTATIVE HEARING ORDERS FOR THE RESPECTIVE COMMITTEES.

2018 International Fire Code

CHAPTER 2 DEFINITIONS

SECTION 202 GENERAL DEFINITIONS

Add new definition as follows

REFRIGERANT DETECTOR. A device that is capable of sensing the presence of refrigerant vapor.

CHAPTER 6 BUILDING SERVICES AND SYSTEMS

SECTION 605 MECHANICAL REFRIGERATION

[M] 605.1 Scope. Refrigeration systems shall be installed in accordance with the International Mechanical Code.

605.5 Access. Access to refrigeration systems having a refrigerant circuit containing more than 220 pounds (100 kg) of Group A1 or 30 pounds (14 kg) of any other group refrigerant shall be provided for the fire department at all times as required by the *fire code official*.

605.6 Testing of equipment. Refrigeration equipment and systems having a refrigerant circuit containing more than 220 pounds (100 kg) of Group A1 or 30 pounds (14 kg) of any other group refrigerant shall be subject to periodic testing in accordance with Section 605.6.1. Records of tests shall be maintained. Tests of emergency devices or systems required by this chapter shall be conducted by persons trained and qualified in refrigeration systems.

605.6.1 Periodic testing. The following emergency devices or systems shall be periodically tested in accordance with the manufacturer's instructions and as required by the *fire code official*.

1. Treatment and flaring systems.
2. Valves and appurtenances necessary to the operation of emergency refrigeration control boxes.
3. Fans and associated equipment intended to operate emergency ventilation systems.
4. Detection and alarm systems.

Revise as follows

605.8 Refrigerant detection. Machinery rooms shall be provided with ~~a refrigerant detector~~ one or more refrigerant detectors capable of detecting the specific refrigerant(s) utilized in the machinery room, with an audible and visible alarm. Where ammonia is used as the refrigerant, detection shall comply with IIAR 2. For refrigerants other than ammonia, refrigerant detection shall comply with Section 605.8.1.

605.8.1 Refrigerants other than ammonia.

A detector, or a sampling tube that draws air to a detector, shall be provided at ~~an one or more approved location~~ locations where refrigerant from a leak is expected to accumulate. ~~The system shall be designed to initiate audible and visible alarms inside of and outside each entrance to the refrigerating machinery room and transmit a signal to an approved location where the concentration of refrigerant detected exceeds the lesser of the following:~~

1. ~~The corresponding TLV-TWA values shown in the International Mechanical Code for the refrigerant classification.~~
2. ~~Twenty-five percent of the lower flammable limit (LFL).~~

Detection of a refrigerant concentration exceeding the upper detection limit or 25 percent of the lower flammable limit (LFL), whichever is lower, shall stop refrigerant equipment in the machinery room in accordance with Section 605.9.1. detection, signaling and control circuits shall be supervised. The detection system shall be designed in accordance with Sections 605.8.1.1 and 605.8.1.2.

Add new text as follows

605.8.1.1 Low level response. The system shall be designed to perform the following actions when the concentration of refrigerant detected exceeds the smallest value of Occupational Exposure Limit (OEL) and does not exceed the smallest value of Refrigerant Concentration Level (RCL), as listed in the International Mechanical Code for any refrigerant utilized in the machinery room:

1. Initiate audible and visible alarms inside of and outside each entrance to the refrigerating machinery room and transmit a signal to an approved location.
2. The ventilation system shall provide a flow rate not less than the highest of the following values for any refrigerant utilized in the machinery room: for Group A1 and B1 refrigerants 100% of the normal ventilation quantity, and for Group A2L, A2, A3, B2L, B2, and B3 refrigerants, 50% of the emergency conditions quantity, as required by the International Mechanical Code.
3. After initiation of alarms and ventilation system, it is permissible to utilize automatic reset of alarms and ventilation system after the refrigerant concentration has reduced below the OEL and maintained below the OEL for a minimum of 15 minutes.

605.8.1.2 High level response. The system shall be designed to perform the following actions when the concentration of refrigerant detected exceeds the refrigerant concentration limit (RCL), or 25 percent of the lower flammable limit (LFL), or upper detection limit of the detector, whichever is lower, for any refrigerant utilized in the machinery room:

1. Initiate audible and visible alarms inside of and outside each entrance to the refrigerating machinery room and transmit a signal to an approved location.
2. The ventilation system shall provide a flow rate not less than 100% of the emergency conditions quantity required by the International Mechanical Code.
3. For Group A2L, A2, A3, B2L, B2, and B3 refrigerants, stop refrigerant equipment in the machinery room in accordance with Section 605.9.1.
4. After initiation, alarms and ventilation system shall continue until manually reset at a location within the machinery room.

Delete without substitution

~~**605.17.1 Refrigerant detection system.** The machinery room shall be provided with a refrigerant detection system. The refrigerant detection system shall be in accordance with Section 605.8 and all of the following:~~

- ~~1. The detectors shall activate at or below a refrigerant concentration of 25 percent of the LFL.~~
- ~~2. Upon activation, the detection system shall activate the emergency ventilation system in Section 605.17.3.~~
- ~~3. The detection, signaling and control circuits shall be supervised.~~

2018 International Mechanical Code

Delete and substitute as follows

~~**[F] 1106.5.1 Refrigerant detection system.** The *machinery room* shall be provided with a refrigerant detection system. The *refrigerant* detection system shall be in accordance with Section 605.8 of the International Fire Code and all of the following:~~

- ~~1. The detectors shall activate at or below a refrigerant concentration of 25% of the LFL.~~
- ~~2. Upon activation, the detection system shall activate the emergency ventilation system required by Section 1106.5.2.~~
- ~~3. The detection, signaling and control circuits shall be supervised.~~

~~**1106.5.1 Refrigerant detection system.** The *machinery room* shall be provided with a refrigerant detection system. The *refrigerant* detection system shall be in accordance with Section 605.8 of the International Fire Code.~~

Reason: The proposed code changes include technical content based on ASHRAE Standard 34-2016 with Addendum G and ASHRAE Standard 15-2016 with Addendum H. The revisions in these two ASHRAE addenda are dependent and must be correlated as shown in this code change proposal. Upon publication, these addenda will be incorporated into the 2019

editions of ASHRAE 34 and ASHRAE 15.

There was a considerable amount of industry research into the use of flammable refrigerants that occurred in 2016 and 2017, following the announcement in June 2016 of a collaborative research effort between ASHRAE, AHRI, and US DOE. ASHRAE SSSPC15 relied upon this body of knowledge, extended upon prior ASHRAE research from 2012, in drafting the addenda to the 2016 edition of Standard 15.

The refrigerant safety group classification is an alphabetical/numerical designation that is used to identify both the toxicity and flammability classifications of a given refrigerant. There are two new safety group classifications added to ASHRAE 34: A2L and B2L. Previously 2L was a sub-class of class 2 as an interim measure to implement changes to refrigerant flammability classification into ASHRAE 34 prior to making associated changes to a future edition of ASHRAE 15; but now 2L is a separate class and safety requirements must be revised to distinguish between class 2 and class 2L.

The current definitions of "flammability classification" and "toxicity classification" are improper since both contain mandatory code requirements. The definitions should only define the term, not contain code requirements with the use of the word "shall." The current definition of refrigerant safety classifications is incorrect due to revisions to ASHRAE 34. The attempt to define the technical requirements of flammability are not correct. ASHRAE 34 goes into extensive requirements as to how to test and classify a refrigerant regarding flammability. The code should leave the technical requirements to ASHRAE 34 which is accomplished in Section 1103.1. The definition only has to identify the meanings of the classification categories. These terms used are found in the body of ASHRAE 34. The addition of "refrigerant" to the term "flammability classification" and "toxicity classification" clarify that the definitions only apply to refrigerants. Flammability and toxicity are terms also used in the ventilation sections of the code. These definitions do not apply to the use of those terms in Chapter 5.

Bibliography: (AHRI) Final Report - AHRI 8005 "Risk Assessment of Class 2L Refrigerants in Chiller Systems", prepared by Bill Goetzler, Matt Guernsey, & Collin Weber (July 2013).

<http://www.ahrinet.org/Resources/Research.aspx>

(ASHRAE 2012) ASHRAE Research Project TRP-1448, "Final Report: Ventilation Requirements for Refrigerating Machinery Rooms", July 2012.

(ASHRAE 2016a) ASHRAE Standard 15-2016 "Safety Standard for Refrigeration Systems" (2016).

(ASHRAE 2016b) ASHRAE Standard 34-2016 "Designation and Safety Classification of Refrigerants" (2016).

(Papas et. al. 2016) Paul Papas, Shiling Zhang, Hai Jiang, Parmesh Verma, Ivan Rydkin, Richard Lord & Larry Burns (2016) Computational fluid dynamics modeling of flammable refrigerant leaks inside machine rooms: Evaluation of ventilation mitigation requirements, Science and Technology for the Built Environment, 22:4, 463-471, DOI:10.1080/23744731.2016.1163240

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This code change proposal addresses a new safety group of refrigerants, with no precedent on the construction costs.

F79-18 Part I

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved based upon a request from the proponent that the standard is not yet complete to address this issue. (Vote: 14-0)

Assembly Action:

None

F79-18 Part I

Individual Consideration Agenda

Public Comment 1:

Proponent: Connor Barbaree, representing ASHRAE (cbarbaree@ashrae.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

CHAPTER 2 DEFINITIONS

SECTION 202 GENERAL DEFINITIONS

REFRIGERANT DETECTOR. A device that is capable of sensing the presence of refrigerant vapor.

CHAPTER 6 BUILDING SERVICES AND SYSTEMS

SECTION 605 MECHANICAL REFRIGERATION

[M] 605.1 Scope. Refrigeration systems shall be installed in accordance with the International Mechanical Code.

605.5 Access. Access to refrigeration systems having a refrigerant circuit containing more than 220 pounds (100 kg) of Group A1 or 30 pounds (14 kg) of any other group refrigerant shall be provided for the fire department at all times as required by the *fire code official*.

605.6 Testing of equipment. Refrigeration equipment and systems having a refrigerant circuit containing more than 220 pounds (100 kg) of Group A1 or 30 pounds (14 kg) of any other group refrigerant shall be subject to periodic testing in accordance with Section 605.6.1. Records of tests shall be maintained. Tests of emergency devices or systems required by this chapter shall be conducted by persons trained and qualified in refrigeration systems.

605.6.1 Periodic testing. The following emergency devices or systems shall be periodically tested in accordance with the manufacturer's instructions and as required by the *fire code official*.

1. Treatment and flaring systems.
2. Valves and appurtenances necessary to the operation of emergency refrigeration control boxes.
3. Fans and associated equipment intended to operate emergency ventilation systems.
4. Detection and alarm systems.

605.8 Refrigerant detection. Machinery rooms shall be provided with one or more refrigerant detectors capable of detecting the specific refrigerant(s) utilized in the machinery room, with one or more set points that activate responses, with an audible and visible alarm. Where ammonia is used as the refrigerant, detection shall comply with IAR 2. For refrigerants other than ammonia, refrigerant detection shall comply with Section 605.8.1.

605.8.1 Refrigerants other than ammonia. A detector, or a sampling tube that draws air to a detector, shall be provided at one or more approved locations where refrigerant from a leak is expected to accumulate. ~~The detection, signaling and control circuits shall be supervised. The detection system shall be designed in accordance with Sections 605.8.1.1 and 605.8.1 to initiate audible and visible alarms inside and outside of each entrance to the refrigerating~~

machinery room, and transmit a signal to an approved location, where the concentration of refrigerant detected exceeds the lowest value of the occupational exposure limit (OEL) as shown in Table 1103.1 of the International Mechanical Code, corresponding to any refrigerant in the machinery room. For any flammable refrigerants in the machinery room, refrigerant detection shall comply with Section 605.8.2.

~~**605.8.1.1 Low level response.** The system shall be designed to perform the following actions when the concentration of refrigerant detected exceeds the smallest value of Occupational Exposure Limit (OEL) and does not exceed the smallest value of Refrigerant Concentration Level (RCL), as listed in the International Mechanical Code for any refrigerant utilized in the machinery room:~~

- ~~1. Initiate audible and visible alarms inside of and outside each entrance to the refrigerating machinery room and transmit a signal to an approved location.~~
- ~~2. The ventilation system shall provide a flow rate not less than the highest of the following values for any refrigerant utilized in the machinery room: for Group A1 and B1 refrigerants 100% of the normal ventilation quantity, and for Group A2L, A2, A3, B2L, B2, and B3 refrigerants, 50% of the emergency conditions quantity, as required by the International Mechanical Code.~~
- ~~3. After initiation of alarms and ventilation system, it is permissible to utilize automatic reset of alarms and ventilation system after the refrigerant concentration has reduced below the OEL and maintained below the OEL for a minimum of 15 minutes.~~

~~**605.8.1.2 High level response.** The system shall be designed to perform the following actions when the concentration of refrigerant detected exceeds the refrigerant concentration limit (RCL), or 25 percent of the lower flammable limit (LFL), or upper detection limit of the detector, whichever is lower, for any refrigerant utilized in the machinery room:~~

- ~~1. Initiate audible and visible alarms inside of and outside each entrance to the refrigerating machinery room and transmit a signal to an approved location.~~
- ~~2. The ventilation system shall provide a flow rate not less than 100% of the emergency conditions quantity required by the International Mechanical Code.~~
- ~~3. For Group A2L, A2, A3, B2L, B2, and B3 refrigerants, stop refrigerant equipment in the machinery room in accordance with Section 605.9.1.~~
- ~~4. After initiation, alarms and ventilation system shall continue until manually reset at a location within the machinery room.~~

605.8.2 Flammable refrigerants other than ammonia. Detection of a refrigerant concentration exceeding the refrigerant concentration limit (RCL) value as shown in Table 1103.1 of the International Mechanical Code, or twenty-five percent of the lower flammable limit (LFL), or the upper detection limit, whichever is lower, shall stop refrigerant equipment in the machinery room in accordance with Section 605.9.1. The detection, signaling and control circuits shall be supervised. Multi-port type refrigerant detectors shall be prohibited where using any flammable refrigerant. Group A2L and Group B2L refrigerants, other than ammonia, shall comply with Section 605.8.3.

605.8.3 A2L and B2L refrigerants other than ammonia. Refrigerant detectors for Group A2L and Group B2L refrigerants, other than ammonia, shall meet all of the following conditions:

1. A refrigerant detector shall be capable of detecting each of the specific refrigerant designations in the machinery room.

2. The refrigerant detector shall activate responses within a time not to exceed a limit specified in Table 605.8.3, after exposure to a refrigerant concentration exceeding a limit value specified in Table 605.8.3.

3. The refrigerant detector shall have a set point not greater than the applicable occupational exposure limit (OEL) value as specified in Table 1103.1 of the International Mechanical Code. The applicable OEL value shall be the lowest OEL value for any refrigerant designation in the machinery room. Refrigerants that do not have a published OEL value in the International Mechanical Code shall use the values published in ASHRAE 34, or a value determined in accordance with ASHRAE 34 where approved by the fire code official.

4. The refrigerant detector shall have a set point not greater than the applicable refrigerant concentration limit (RCL) value as specified in Table 1103.1 of the International Mechanical Code. The applicable RCL value shall be the lowest RCL value for any refrigerant designation in the machinery room. Refrigerants that do not have a published RCL value in the International Mechanical Code shall use the values published in ASHRAE 34, or a value determined in accordance with ASHRAE 34 where approved by the fire code official.

5. The refrigerant detector shall provide a means for automatic self-testing. In the event of a failure during a refrigerant detector self-test, a trouble alarm signal shall be transmitted to an approved monitored location. The refrigerant detector shall be tested during installation and annually thereafter, or at an interval not exceeding the manufacturer's installation instructions, whichever is more often. Testing shall verify compliance with the alarm set point(s) and response time(s) in accordance with Table 605.8.3.

6. The type of alarm reset for the refrigerant detector shall be in accordance with Table 605.8.3. Manual reset type

alarms shall have the reset located inside the machinery room. Automatic reset type alarms shall not deactivate until after the refrigerant concentration has been reduced below the OEL and maintained below the OEL for not less than 5 minutes.

**Table 605.8.3
ALARMS FOR GROUP A2L AND B2L REFRIGERANTS OTHER THAN AMMONIA**

<u>Limit Value</u>	<u>Response Time</u>	<u>Alarm Type</u>	<u>Alarm Reset Type</u>
<u>Set Point = OEL or less</u>	<u>300 seconds or less</u>	<u>Trouble Alarm</u>	<u>Automatic</u>
<u>Set Point = RCL or less</u>	<u>15 seconds or less</u>	<u>Emergency Alarm</u>	<u>Manual</u>

605.13 Mechanical ventilation exhaust. Exhaust from mechanical ventilation systems serving refrigeration machinery rooms containing flammable, toxic or highly toxic refrigerants, other than ammonia, capable of exceeding 25 percent of the LFL or 50 percent of the IDLH shall be equipped with *approved* treatment systems to reduce the discharge concentrations to those values or lower.

Exception: Refrigeration—Refrigerating systems containing a Group A2L refrigerant and complying with Section ~~605.17~~ 1105.6 of the International Mechanical Code.

2018 International Mechanical Code

~~**1106.5.1 Refrigerant detection system.** The machinery room shall be provided with a refrigerant detection system. The refrigerant detection system shall be in accordance with Section 605.8 of the International Fire Code.~~

Commenter's Reason: ASHRAE SSPC 15 is publishing a modification to ASHRAE Standard 15 that includes new requirements for refrigerant detection for Group A2L refrigerants. The original text of IFC 2018 regarding detectors for Group A2L refrigerants was based on an initial Advisory Public Review (APR) published by ASHRAE in December 2015.

When the ASHRAE SSPC 15 Committee had reviewed all of the comments, they later issued a Publication Public Review (PPR). Through multiple PPRs the detection requirements significantly changed. These proposed modifications are based on the results of input from public comments.

The change will also be consistent with the Public Comment to F79-18, Part II and M88-18. All three of these Public Comments work together in addressing the safety issues when using Group A2L refrigerants.

It is important for the Fire Code to be up-to-date on the use of A2L refrigerants since these refrigerants fall into the category of low global warming potential refrigerants. There will be an increased use of low global warming refrigerants to protect the environment.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The change clarifies the detector requirements when using A2L refrigerant in a machinery room. The use of A2L refrigerant remains an option.

F79-18 Part I

F79-18 Part II

IFC: [M]605.16, [M]605.17, [M]605.17.2, TABLE [M] 605.17.2, [M]605.17.3; IMC: 202(New), 1103.1, TABLE 1103.1, 1106.4, 1106.5.2, TABLE 1106.5.2

Proponent: Connor Barbaree, ASHRAE, representing ASHRAE (cbarbaree@ashrae.org)

2018 International Fire Code

Revise as follows:

[M] 605.16 Electrical equipment. Where *refrigerant* of Groups A2L, A2, A3, B2L, B2 and B3, as defined in the International Mechanical Code, are used, refrigeration machinery rooms shall conform to the Class I, Division 2 hazardous location classification requirements of NFPA 70.

Exceptions:

1. Ammonia machinery rooms that are provided with ventilation in accordance with Section 1106.3 of the International Mechanical Code.
2. Machinery rooms for systems containing Group A2L *refrigerants* that are provided with ventilation in accordance with Section 605.17, or Group B2L refrigerants that are provided with ventilation in accordance with Section 605.17. Sections 605.12.3 and Section 1106.3 of the International Mechanical Code.

[M] 605.17 Special requirements for Group A2L refrigerant machinery rooms. Machinery rooms with systems containing Group A2L refrigerants shall comply with Sections 605.17.1 through 605.17.3. Section 1106.4 of the International Mechanical Code.

Exception: Machinery rooms conforming to the Class 1, Division 2 hazardous location classification requirements of NFPA 70.

Delete without substitution:

~~**[M] 605.17.2 Emergency ventilation system.** An emergency ventilation system shall be provided at the minimum exhaust rate specified in ASHRAE 15 or Table 605.17.2. Shut down of the emergency ventilation system shall be by manual means.~~

**TABLE [M] 605.17.2
MINIMUM EXHAUST RATE**

REFRIGERANT	Q (m ³ /sec)	Q (cfm)
R32	15.4	32,600
R143a	13.6	28,700
R444A	6.46	13,700
R444B	10.6	22,400
R445A	7.83	16,600
R446A	23.9	50,700
R447A	23.8	50,400
R451A	7.04	15,000
R451B	7.05	15,000
R1234yf	7.80	16,600
R1234ze(E)	5.92	12,600

~~**[M] 605.17.3 Emergency ventilation system discharge.** The point of discharge to the atmosphere shall be located outside of the structure at not less than 15 feet (4572 mm) above the adjoining grade level and not less than 20 feet (6096 mm) from any window, ventilation opening or exit.~~

2018 International Mechanical Code

CHAPTER 2 DEFINITIONS

SECTION 202 GENERAL DEFINITIONS

Delete and substitute as follows:

~~**FLAMMABILITY CLASSIFICATION.** Refrigerants shall be assigned to one of the three classes—1, 2 or 3—in accordance with ASHRAE 34. For Classes 2 and 3, the heat of *combustion* shall be calculated assuming that *combustion* products are in the gas phase and in their most stable state.~~

~~**Class 1.** Refrigerants that do not show flame propagation when tested in air at 14.7 psia (101 kPa) and 140°F (60°C).~~

~~**Class 2.** Refrigerants having a lower flammability limit (LFL) of more than 0.00625 pound per cubic foot (0.10 kg/m³) at 140°F (60°C) and 14.7 psia (101 kPa) and a heat of combustion of less than 8169 Btu/lb (19 000 kJ/kg).~~

~~**Class 3.** Refrigerants that are highly flammable, having a LFL of less than or equal to 0.00625 pound per cubic foot (0.10 kg/m³) at 140°F (60°C) and 14.7 psia (101 kPa) or a heat of combustion greater than or equal to 8169 Btu/lb (19 000 kJ/kg).~~

~~**FLAMMABILITY CLASSIFICATION (REFRIGERANT).** The alphabetical/numerical designation used to identify the flammability of refrigerants. Class 1 indicates a refrigerant with no flame propagation. Class 2L indicates a refrigerant with lower flammability and lower burning velocity. Class 2 indicates a refrigerant with lower flammability. Class 3 indicates a refrigerant with higher flammability.~~

Add new definition as follows:

~~**REFRIGERANT CONCENTRATION LIMIT (REFRIGERANT) (RCL)** The refrigerant concentration limit, in air, intended to reduce the risks of acute toxicity, asphyxiation, and flammability hazards in normally occupied, enclosed spaces.~~

Delete and substitute as follows:

~~**REFRIGERANT SAFETY CLASSIFICATIONS.** Groupings that indicate the toxicity and flammability classes in accordance with Section 1103.1. The classification group is made up of a letter (A or B) that indicates the toxicity class, followed by a number (1, 2 or 3) that indicates the flammability class. Refrigerant blends are similarly classified, based on the compositions at their worst cases of fractionation, as separately determined for toxicity and flammability. In some cases, the worst case of fractionation is the original formulation.~~

~~**Flammability.** See “Flammability classification.”~~

~~**Toxicity.** See “Toxicity classification.”~~

REFRIGERANT SAFETY GROUP CLASSIFICATION. The alphabetical/numerical designation that indicates both toxicity and flammability classifications of refrigerants.

Toxicity. See "Toxicity classification (Refrigerant)."

Flammability. See "Flammability classification (Refrigerant)."

~~**TOXICITY CLASSIFICATION.** Refrigerants shall be classified for toxicity in one of two classes in accordance with ASHRAE 34:~~

~~**Class A.** Refrigerants that have an occupational exposure limit (OEL) of 400 parts per million (ppm) or greater.~~

~~**Class B.** Refrigerants that have an OEL of less than 400 ppm.~~

TOXICITY CLASSIFICATION (REFRIGERANT). An alphabetical designation used to identify the toxicity of refrigerants. Class A indicates a refrigerant with lower toxicity. Class B indicates a refrigerant with higher toxicity.

CHAPTER 11 REFRIGERATION

SECTION 1103 REFRIGERATION SYSTEM CLASSIFICATION

Revise as follows:

1103.1 Refrigerant classification. Refrigerants shall be classified in accordance with ASHRAE 34 as listed in Table 1103.1. Each refrigerant shall be assigned to one of the following refrigerant safety group classifications: A1, A2L, A2, A3, B1, B2L, B2, or B3. For refrigerants that do not have values in Table 1103.1, the safety group, RCL value, and OEL value shall be determined in accordance with ASHRAE 34 and approved by the code official.

TABLE 1103.1

REFRIGERANT CLASSIFICATION, AMOUNT AND OEL

CHEMICAL REFRIGERANT	FORMULA	CHEMICAL NAME OF BLEND	REFRIGERANT SAFETY GROUP CLASSIFICATION	AMOUNT OF REFRIGERANT PER OCCUPIED SPACE				[F] DEGREES OF HAZARD ^a
				RCL			OEL ^e	
				lb per 1000 ft ³ pounds per 1,000 cubic feet	ppm	g/m ³	ppm	
R-11 ^d	CCl ₃ F	trichlorofluoromethane	A1	0.39	1,100	6.2	C1,000	2-0-0 ^b
R-12 ^d	CCl ₂ F ₂	dichlorodifluoromethane	A1	5.6	18,000	90	1,000	2-0-0 ^b
R-13 ^d	CClF ₃	chlorotrifluoromethane	A1	—	—	—	1,000	2-0-0 ^b
R-13B1 ^d	CBrF ₃	bromotrifluoromethane	A1	—	—	—	1,000	2-0-0 ^b
R-14	CF ₄	tetrafluoromethane (carbon tetrafluoride)	A1	25	110,000	400	1,000	2-0-0 ^b
R-22	CHClF ₂	chlorodifluoromethane	A1	13	59,000	210	1,000	2-0-0 ^b
R-23	CHF ₃	trifluoromethane (fluoroform)	A1	7.3	41,000	120	1,000	2-0-0 ^b
R-30	CH ₂ Cl ₂	dichloromethane (methylene chloride)	B1	—	—	—	—	—
R-32	CH ₂ F ₂	difluoromethane (methylene fluoride)	A2L A2 ^f	4.8	36,000	77	1,000	1-4-0
R-40	CH ₃ Cl	chloromethane (methyl chloride)	B2	—	—	—	—	—
R-50	CH ₄	methane	A3	—	—	—	1,000	—
R-113 ^d	CCl ₂ FCClF ₂	1,1,2-trichloro-1,2,2-trifluoroethane	A1	1.2	2,600	20	1,000	2-0-0 ^b
R-114 ^d	CClF ₂ CClF ₂	1,2-dichloro-1,1,2,2-tetrafluoroethane	A1	8.7	20,000	140	1,000	2-0-0 ^b
R-115	CClF ₂ CF ₃	chloropentafluoroethane	A1	47	120,000	760	1,000	—
R-116	CF ₃ CF ₃	hexafluoroethane	A1	34	97,000	550	1,000	1-0-0
R-123	CHCl ₂ CF ₃	2,2-dichloro-1,1,1-trifluoroethane	B1	3.5	9,100	57	50	2-0-0 ^b
R-124	CHClFCF ₃	2-chloro-1,1,1,2-tetrafluoroethane	A1	3.5	10,000	56	1,000	2-0-0 ^b
R-125	CHF ₂ CF ₃	pentafluoroethane	A1	23	75,000	370	1,000	2-0-0 ^b
R-134a	CH ₂ FCF ₃	1,1,1,2-tetrafluoroethane	A1	13	50,000	210	1,000	2-0-0 ^b
R-141b	CH ₃ CCl ₂ F	1,1-dichloro-1-fluoroethane	—	0.78	2,600	12	500	2-1-0
R-142b	CH ₃ CClF ₂	1-chloro-1, 1-difluoroethane	A2	5.1	20,000	83	1,000	2-4-0
R-143a	CH ₃ CF ₃	1,1,1-trifluoroethane	A2L A2 ^f	4.5	21,000	70	1,000	2-0-0 ^b
R-152a	CH ₃ CHF ₂	1,1-difluoroethane	A2	2.0	12,000	32	1,000	1-4-0
R-170	CH ₃ CH ₃	ethane	A3	0.54	7,000	8.7	1,000	2-4-0
R-E170	CH ₃ OCH ₃	Methoxymethane (dimethyl ether)	A3	1.0	8,500	16	1,000	—
R-218	CF ₃ CF ₂ CF ₃	octafluoropropane	A1	43	90,000	690	1,000	2-0-0 ^b
R-227ea	CF ₃ CHFCF ₃	1,1,1,2,3,3,3-heptafluoropropane	A1	36	84,000	580	1,000	—
R-236fa	CF ₃ CH ₂ CF ₃	1,1,1,3,3,3-hexafluoropropane	A1	21	55,000	340	1,000	2-0-0 ^b
R-245fa	CHF ₂ CH ₂ CF ₃	1,1,1,3,3-pentafluoropropane	B1	12	34,000	190	300	2-0-0 ^b
R-290	CH ₃ CH ₂ CH ₃	propane	A3	0.56	5,300	9.5	1,000	2-4-0
R-C318	-(CF ₂) ₄ -	octafluorocyclobutane	A1	41	80,000	660	1,000	—
R-400 ^d	zeotrope	R-12/114 (50.0/50.0)	A1	10	28,000	160	1,000	2-0-0 ^b
R-400 ^d	zeotrope	R-12/114 (60.0/40.0)	A1	11	30,000	170	1,000	—
R-401A	zeotrope	R-22/152a/124 (53.0/13.0/34.0)	A1	6.6	27,000	110	1,000	2-0-0 ^b
R-401B	zeotrope	R-22/152a/124 (61.0/11.0/28.0)	A1	7.2	30,000	120	1,000	2-0-0 ^b
R-401C	zeotrope	R-22/152a/124 (33.0/15.0/52.0)	A1	5.2	20,000	84	1,000	2-0-0 ^b
R-402A	zeotrope	R-125/290/22 (60.0/2.0/38.0)	A1	17	66,000	270	1,000	2-0-0 ^b
R-402B	zeotrope	R-125/290/22 (38.0/2.0/60.0)	A1	15	63,000	240	1,000	2-0-0 ^b
R-403A	zeotrope	R-290/22/218 (5.0/75.0/20.0)	A2	7.6	33,000	120	1,000	2-0-0 ^b
R-403B	zeotrope	R-290/22/218 (5.0/56.0/39.0)	A1	18	70,000	290	1,000	2-0-0 ^b

R-404A	zeotrope	R-125/143a/134a (44.0/52.0/4.0)	A1	31	130,000	500	1,000	2-0-0 ^b
R-405A	zeotrope	R-22/152a/142b/C318 (45.0/7.0/5.5/2.5)	—	16	57,000	260	1,000	—
R-406A	zeotrope	R-22/600a/142b (55.0/4.0/41.0)	A2	4.7	21,000	25	1,000	—
R-407A	zeotrope	R-32/125/134a (20.0/40.0/40.0)	A1	19	83,000	300	1,000	2-0-0 ^b
R-407B	zeotrope	R-32/125/134a (10.0/70.0/20.0)	A1	21	79,000	330	1,000	2-0-0 ^b
R-407C	zeotrope	R-32/125/134a (23.0/25.0/52.0)	A1	18	81,000	290	1,000	2-0-0 ^b
R-407D	zeotrope	R-32/125/134a (15.0/15.0/70.0)	A1	16	68,000	250	1,000	2-0-0 ^b
R-407E	zeotrope	R-32/125/134a (25.0/15.0/60.0)	A1	17	80,000	280	1,000	2-0-0 ^b
R-407F	zeotrope	R-32/125/134a (30.0/30.0/40.0)	A1	20	95,000	320	1,000	—
R-408A	zeotrope	R-125/143a/22 (7.0/46.0/47.0)	A1	21	95,000	340	1,000	2-0-0 ^b
R-409A	zeotrope	R-22/124/142b (60.0/25.0/15.0)	A1	7.1	29,000	110	1,000	2-0-0 ^b
R-409B	zeotrope	R-22/124/142b (65.0/25.0/10.0)	A1	7.3	30,000	120	1,000	2-0-0 ^b
R-410A	zeotrope	R-32/125 (50.0/50.0)	A1	26	140,000	420	1,000	2-0-0 ^b
R-410B	zeotrope	R-32/125 (45.0/55.0)	A1	27	140,000	430	1,000	2-0-0 ^b
R-411A	zeotrope	R-127/22/152a (1.5/87.5/11.0)	A2	2.9	14,000	46	990	—
R-411B	zeotrope	R-1270/22/152a (3.0/94.0/3.0)	A2	2.8	13,000	45	980	—
R-412A	zeotrope	R-22/218/142b (70.0/5.0/25.0)	A2	5.1	22,000	82	1,000	—
R-413A	zeotrope	R-218/134a/600a (9.0/88.0/3.0)	A2	5.8	22,000	94	1,000	—
R-414A	zeotrope	R-22/124/600a/142b (51.0/28.5/4.0/16.5)	A1	6.4	26,000	100	1,000	—
R-414B	zeotrope	R-22/124/600a/142b (50.0/39.0/1.5/9.5)	A1	6.0	23,000	95	1,000	—
R-415A	zeotrope	R-22/152a (82.0/18.0)	A2	2.9	14,000	47	1,000	—
R-415B	zeotrope	R-22/152a (25.0/75.0)	A2	2.1	12,000	34	1,000	—
R-416A	zeotrope	R-134a/124/600 (59.0/39.5/1.5)	A1	3.9	14,000	62	1,000	2-0-0 ^b
R-417A	zeotrope	R-125/134a/600 (46.6/50.0/3.4)	A1	3.5	13,000	56	1,000	2-0-0 ^b
R-417B	zeotrope	R-125/134a/600 (79.0/18.3/2.7)	A1	4.3	15,000	70	1,000	—
R-417C	zeotrope	R-125/134a/600 (19.5/78.8/1.7)	A1	5.4	21,000	87	1,000	—
R-418A	zeotrope	R-290/22/152a (1.5/96.0/2.5)	A2	4.8	22,000	77	1,000	—
R-419A	zeotrope	R-125/134a/E170 (77.0/19.0/4.0)	A2	4.2	15,000	67	1,000	—
R-419B	zeotrope	R-125/134a/E170 (48.5/48.0/3.5)	A2	4.6	17,000	74	1,000	—
R-420A	zeotrope	R-134a/142b (88.0/12.0)	A1	12	45,000	190	1,000	2-0-0 ^b
R-421A	zeotrope	R-125/134a (58.0/42.0)	A1	17	61,000	280	1,000	2-0-0 ^b
R-421B	zeotrope	R-125/134a (85.0/15.0)	A1	21	69,000	330	1,000	2-0-0 ^b
R-422A	zeotrope	R-125/134a/600a (85.1/11.5/3.4)	A1	18	63,000	290	1,000	2-0-0 ^b
R-422B	zeotrope	R-125/134a/600a (55.0/42.0/3.0)	A1	16	56,000	250	1,000	2-0-0 ^b
R-422C	zeotrope	R-125/134a/600a (82.0/15.0/3.0)	A1	18	62,000	290	1,000	2-0-0 ^b
R-422D	zeotrope	R-125/134a/600a (65.1/31.5/3.4)	A1	16	58,000	260	1,000	2-0-0 ^b
R-422E	zeotrope	R-125/134a/600a (58.0/39.3/2.7)	A1	16	57,000	260	1,000	—
R-423A	zeotrope	R-134a/227ea (52.5/47.5)	A1	19	59,000	310	1,000	2-0-0 ^c
R-424A	zeotrope	R-125/134a/600a/600/601a (50.5/47.0/0.9/1.0/0.6)	A1	6.2	23,000	100	970	2-0-0 ^b
R-425A	zoetrope	R-32/134a/227ea (18.5/69.5/12.0)	A1	16	72,000	260	1,000	2-0-0 ^b
R-426A	zeotrope	R-125/134a/600a/601a (5.1/93.0/1.3/0.6)	A1	5.2	20,000	83	990	—

R-427A	zeotrope	R-32/125/143a/134a (15.0/25.0/10.0/50.0)	A1	18	79,000	290	1,000	2-1-0
R-428A	zeotrope	R-125/143a/290/600a (77.5/20.0/0.6/1.9)	A1	23	83,000	370	1,000	—
R-429A	zeotrope	R-E170/152a/600a (60.0/10.0/30.0)	A3	0.81	6,300	13	1,000	—
R-430A	zeotrope	R-152a/600a (76.0/24.0)	A3	1.3	8,000	21	1,000	—
R-431A	zeotrope	R-290/152a (71.0/29.0)	A3	0.69	5,500	11	1,000	—
R-432A	zeotrope	R-1270/E170 (80.0/20.0)	A3	0.13	1,200	2.1	700	—
R-433A	zeotrope	R-1270/290 (30.0/70.0)	A3	0.34	3,100	5.5	880	—
R-433B	zeotrope	R-1270/290 (5.0-95.0)	A3	0.51	4,500	8.1	950	—
R-433C	zeotrope	R-1270/290 (25.0-75.0)	A3	0.41	3,600	6.6	790	—
R-434A	zeotrope	R-125/143a/600a (63.2/18.0/16.0/2.8)	A1	20	73,000	320	1,000	—
R-435A	zeotrope	R-E170/152a (80.0/20.0)	A3	1.1	8,500	17	1,000	—
R-436A	zeotrope	R-290/600a (56.0/44.0)	A3	0.50	4,000	8.1	1,000	—
R-436B	zeotrope	R-290/600a (52.0/48.0)	A3	0.51	4,000	8.1	1,000	—
R-437A	zeotrope	R-125/134a/600/601 (19.5/78.5/1.4/0.6)	A1	5.0	19,000	82	990	—
R-438A	zeotrope	R-32/125/134a/600/601a (8.5/45.0/44.2/1.7/0.6)	A1	4.9	20,000	79	990	—
R-439A	zeotrope	R-32/125/600a (50.0/47.0/3.0)	A2	4.7	26,000	76	990	—
R-440A	zeotrope	R-290/134a/152a (0.6/1.6/97.8)	A2	1.9	12,000	31	1,000	—
R-441A	zeotrope	R-170/290/600a/600 (3.1/54.8/6.0/36.1)	A3	0.39	3,200	6.3	1,000	—
R-442A	zeotrope	R-32/125/134a/152a/227ea (31.0/31.0/30.0/3.0/5.0)	A1	21	100,000	330	1,000	—
R-443A	zeotrope	R-1270/290/600a (55.0/40.0/5.0)	A3	0.19	1,700	3.1	580	—
R-444A	zeotrope	R-32/152a/1234ze(E) (12.0/5.0/83.0)	A2L A2 ^f	5.1	21,000	81	850	—
R-444B	zeotrope	R-32/152a/1234ze(E) (41.5/10.0/48.5)	A2L A2 ^f	4.3	23,000	69	890	—
R-445A	zeotrope	R-744/134a/1234ze(E) (6.0/9.0/85.0)	A2L A2 ^f	4.2	16,000	67	930	—
R-446A	zeotrope	R-32/1234ze(E)/600 (68.0/29.0/3.0)	A2L A2 ^f	2.5	16,000	39	960	—
R-447A	zeotrope	R-32/125/1234ze(E) (68.0/3.5/28.5)	A2L A2 ^f	2.6	16,000	42	900	—
R-448A	zeotrope	R-32/125/1234yf/134a/1234ze(E) (26.0/26.0/20.0/21.0/7.0)	A1	24	110,000	390	890	—
R-449A	zeotrope	R-32/125/1234yf/134a (24.3/24.7/25.3/25.7)	A1	23	100,000	370	830	—
R-450A	zeotrope	R-134a/1234ze(E) (42.0/58.0)	A1	20	72,000	320	880	—
R-451A	zeotrope	R-1234yf/134a (89.8/10.2)	A2L A2 ^f	5.3	18,000	81	520	—
R-451B	zeotrope	R-1234yf/134a (88.8/11.2)	A2L A2 ^f	5.3	18,000	81	530	—
R-452A	zeotrope	R-32/125/1234yf (11.0/59.0/30.0)	A1	27	100,000	440	780	—
R-500 ^e	azeotrope	R-12/152a (73.8/26.2)	A1	7.6	30,000	120	1,000	2-0-0 ^b
R-501 ^d	azeotrope	R-22/12 (75.0/25.0)	A1	13	54,000	210	1,000	—
R-502 ^c	azeotrope	R-22/115 (48.8/51.2)	A1	21	73,000	330	1,000	2-0-0 ^b
R-503 ^c	azeotrope	R-23/13 (40.1/59.9)	—	—	—	—	1,000	2-0-0 ^b
R-504 ^d	azeotrope	R-32/115 (48.2/51.8)	—	28	140,000	450	1,000	—
R-507A	azeotrope	R-125/143a (50.0/50.0)	A1	32	130,000	520	1,000	2-0-0 ^b
R-508A	azeotrope	R-23/116 (39.0/61.0)	A1	14	55,000	220	1,000	2-0-0 ^b
R-508B	azeotrope	R-23/116 (46.0/54.0)	A1	13	52,000	200	1,000	2-0-0 ^b
R-509A	azeotrope	R-22/218 (44.0/56.0)	A1	24	75,000	390	1,000	2-0-0 ^b
R-510A	azeotrope	R-E170/600a (88.0/12.0)	A3	0.87	7,300	14	1,000	—
R-511A	azeotrope	R-290/E170 (95.0/5.0)	A3	0.59	5,300	9.5	1,000	—
R-512A	azeotrope	R-134a/152a (5.0/95.0)	A2	1.9	11,000	31	1,000	—
R-513A	azeotrope	R-1234yf/134a (56.0/44.0)	A1	20	72,000	320	650	—
R-600	CH ₃ CH ₂ CH ₂ CH ₃	butane	A3	0.15	1,000	2.4	1,000	1-4-0
R-600a	CH(CH ₃) ₂ CH ₃	2-methylpropane (isobutane)	A3	0.59	4,000	9.6	1,000	2-4-0

R-601	CH ₃ CH ₂ CH ₂ CH ₂ CH ₃	pentane	A3	0.18	1,000	2.9	600	—
R-601a	(CH ₃) ₂ CHCH ₂ CH ₃	2-methylbutane (isopentane)	A3	0.18	1,000	2.9	600	—
R-610	ethoxyethane (ethyl ether)	CH ₃ CH ₂ OCH ₂ CH ₃	—	—	—	—	400	—
R-611	methyl formate	HCOOCH ₃	B2	—	—	—	100	—
R-717	NH ₃	ammonia	B2L B2 ^f	0.014	320	0.22	25	3-3-0 ^c
R-718	H ₂ O	water	A1	—	—	—	—	0-0-0
R-744	CO ₂	carbon dioxide	A1	4.5	40,000	72	5,000	2-0-0 ^b
R-1150	CH ₂ =CH ₂	ethene (ethylene)	A3	—	—	—	200	1-4-2
R-1233zd(E)	CF ₃ CH=CHCl	trans-1-chloro-3,3,3-trifluoro-1-propene	A1	5.3	16,000	85	800	—
R-1234yf	CF ₃ CF=CH ₂	2,3,3,3-tetrafluoro-1 propene	A2L A2 ^f	4.7	16,000	75	500	—
R-1234ze(E)	CF ₃ CH=CHF	trans-1,3,3,3-tetrafluoro-1 -propene	A2L A2 ^f	4.7	16,000	75	800	—
R-1270	CH ₃ CH=CH ₂	Propene (propylene)	A3	0.1	1,000	1.7	500	1-4-1

For SI: 1 pound = 0.454 kg, 1 cubic foot = 0.0283m³

- a. Degrees of hazard are for health, fire, and reactivity, respectively, in accordance with NFPA 704.
- b. Reduction to 1-0-0 is allowed if analysis satisfactory to the code official shows that the maximum concentration for a rupture or full loss of refrigerant charge would not exceed the IDLH, considering both the refrigerant quantity and room volume.
- c. For installations that are entirely outdoors, use 3-1-0.
- d. Class I ozone depleting substance; prohibited for new installations.
- e. Occupational Exposure Limit based on the OSHA PEL, ACGIH TLV-TWA, the TERA WEEL or consistent value on a time-weighted average (TWA) basis (unless noted C for ceiling) for an 8 hr/d and 40 hr/wk.
- f. ~~The ASHRAE Standard 34 flammability classification for this refrigerant is 2L, which is a subclass of Class 2.~~

1106.4 Flammable refrigerants. Where refrigerants of Groups A2L, A2, A3, B2L, B2 and B3 are used in one or more refrigerating systems, the *machinery room* shall conform to the Class 1, Division 2, *hazardous location* classification requirements of NFPA 70.

Exceptions:

1. Ammonia *machinery rooms* that are provided with *ventilation* in accordance with Section 1106.3.
2. ~~*Machinery rooms for systems containing in which the refrigerating system(s) that contain(s) flammable refrigerants utilize only Group A2L refrigerants that refrigerant(s), and are in accordance with Section 1106.5.*~~

1106.5.2 Emergency ventilation system. An emergency ventilation system shall be provided at the minimum exhaust rate specified in ASHRAE ~~15 or Table 1106.5.2-15~~. Shutdown of the emergency ventilation system shall be by manual means.

Delete without substitution:

**TABLE 1106.5.2
MINIMUM EXHAUST RATES**

REFRIGERANT	Q(m/sec)	Q(cfm)
R32	15.4	32,600
R143	13.6	28,700
R444A	6.46	13,700
R444B	10.6	22,400
R445A	7.83	16,600
R446A	23.9	50,700
R447A	23.8	50,400
R451A	7.04	15,000
R451B	7.05	15,000
R1234yf	7.80	16,600
R1234ze(E)	5.92	12,600

Reason:

The proposed code changes include technical content based on ASHRAE Standard 34-2016 with Addendum G and ASHRAE Standard 15-2016 with Addendum H. The revisions in these two ASHRAE addenda are dependent and must be correlated as shown in this code change proposal. Upon publication, these addenda will be incorporated into the 2019 editions of ASHRAE 34 and ASHRAE 15.

There was a considerable amount of industry research into the use of flammable refrigerants that occurred in 2016 and 2017, following the announcement in June 2016 of a collaborative research effort between ASHRAE, AHRI, and US DOE. ASHRAE SSPC15 relied upon this body of knowledge, extended upon prior ASHRAE research from 2012, in drafting the addenda to the 2016 edition of Standard 15.

The refrigerant safety group classification is an alphabetical/numerical designation that is used to identify both the toxicity and flammability classifications of a given refrigerant. There are two new safety group classifications added to ASHRAE 34: A2L and B2L. Previously 2L was a sub-class of class 2 as an interim measure to implement changes to refrigerant flammability classification into ASHRAE 34 prior to making associated changes to a future edition of ASHRAE 15; but now 2L is a separate class and safety requirements must be revised to distinguish between class 2 and class 2L.

The current definitions of “flammability classification” and “toxicity classification” are improper since both contain mandatory code requirements. The definitions should only define the term, not contain code requirements with the use of the word “shall.” The current definition of refrigerant safety classifications is incorrect due to revisions to ASHRAE 34. The attempt to define the technical requirements of flammability are not correct. ASHRAE 34 goes into extensive requirements as to how to test and classify a refrigerant regarding flammability. The code should leave the technical requirements to ASHRAE 34 which is accomplished in Section 1103.1. The definition only has to identify the meanings of the classification categories. These terms used are found in the body of ASHRAE 34. The addition of “refrigerant” to the term “flammability classification” and “toxicity classification” clarify that the definitions only apply to refrigerants. Flammability and toxicity are terms also used in the ventilation sections of the code. These definitions do not apply to the use of those terms in Chapter 5.

Bibliography:

(AHRI) Final Report - AHRI 8005 "Risk Assessment of Class 2L Refrigerants in Chiller Systems", prepared by Bill Goetzler, Matt Guernsey, & Collin Weber (July 2013).

<http://www.ahrinet.org/Resources/Research.aspx>

(ASHRAE 2012) ASHRAE Research Project TRP-1448, "Final Report: Ventilation Requirements for Refrigerating Machinery Rooms", July 2012.

(ASHRAE 2016a) ASHRAE Standard 15-2016 "Safety Standard for Refrigeration Systems" (2016).

(ASHRAE 2016b) ASHRAE Standard 34-2016 "Designation and Safety Classification of Refrigerants" (2016).

(Papas et. al. 2016) Paul Papas, Shiling Zhang, Hai Jiang, Parmesh Verma, Ivan Rydkin, Richard Lord & Larry Burns (2016) Computational fluid dynamics modeling of flammable refrigerant leaks inside machine rooms: Evaluation of ventilation mitigation requirements, Science and Technology for the Built Environment, 22:4, 463-471, DOI:10.1080/23744731.2016.1163240

Cost Impact

The code change proposal will not increase or decrease the cost of construction .

This code change proposal addresses a new safety group of refrigerants, with no precedent on the construction costs.

Internal ID: 3460

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Should not remove the exhaust rate table and rely solely on the standards. (Vote 11-0)

Assembly Action:

None

F79-18 Part II

Individual Consideration Agenda

Public Comment 1:

Proponent: Connor Barbaree, representing ASHRAE (cbarbaree@ashrae.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

605.16 Electrical equipment. Where *refrigerant* of Groups A2L, A2, A3, B2L other than ammonia, B2 and B3, as defined in the International Mechanical Code, are used, refrigeration machinery rooms shall conform to the Class I, Division 2 hazardous location classification requirements of NFPA 70.

Exceptions:

1. Ammonia machinery rooms that are provided with ventilation in accordance with Section 1106.3 of the International Mechanical Code.
2. Machinery rooms for systems containing Group A2L or B2L refrigerants that are provided with ~~ventilation~~ refrigerant detection in accordance with Section 605.17, ~~or Group B2L refrigerants that are provided with 8~~ and ventilation in accordance with ~~Sections~~ Section 605.12.3-13 and Section 1106.3-5 of the International Mechanical Code.

~~**605.17 Special requirements for Group A2L refrigerant machinery rooms.** Machinery rooms with systems containing Group A2L refrigerants shall comply with Section 1106.4 of the International Mechanical Code.~~

~~**Exception:** Machinery rooms conforming to the Class 1, Division 2 hazardous location classification requirements of NFPA 70.~~

2018 International Mechanical Code

SECTION 1106 MACHINERY ROOM, SPECIAL REQUIREMENTS

1106.4 Flammable refrigerants. Where refrigerants of Groups A2L, A2, A3, B2L other than ammonia, B2 and B3 are used in one or more refrigerating systems, the *machinery room* shall conform to the Class 1, Division 2, *hazardous location* classification requirements of NFPA 70.

~~Exceptions~~ **Exception:** ~~1. Ammonia machinery rooms that are provided with ventilation in accordance with Section 1106.3. 2. Machinery rooms in which the refrigerating system(s) that contain(s) flammable refrigerants utilize only Group A2L refrigerant(s) or Group B2L refrigerant(s) other than ammonia, and are in accordance with comply with the ventilation requirements of Section 1106.5.2.~~

1106.5 Special requirements for Group A2L and B2L refrigerant machinery rooms. *Machinery rooms* for systems containing Group A2L or Group B2L refrigerants other than ammonia shall comply with Sections 1106.5.1 through 1106.5.3.

Exception: *Machinery rooms* conforming to the Class I, Division 2, hazardous location classification requirements of NFPA 70 are not required to comply with Sections 1106.5.1 and 1106.5.2.

~~**1106.5.2 Emergency ventilation system.** An emergency ventilation system shall be provided at the minimum exhaust rate specified in ASHRAE 15. Shutdown of the emergency ventilation system shall be by manual means.~~

1106.5.2 Ventilation required. Machinery rooms shall be vented to the outdoors, utilizing ventilation in accordance with Sections 1106.5.3 through 1106.5.8 or ASHRAE 15.

1106.5.3 Alarms. Alarms shall comply with Sections 1106.5.3.1 through 1106.5.3.4.

1106.5.3.1 Annunciation. The alarm shall have visual and audible annunciation inside the machinery room and outside each entrance to the machinery room.

1106.5.3.2 Set point. The refrigerant detector set points shall activate an alarm in accordance with the type of reset in Table 1106.5.3.2. Manual reset type alarms shall have the reset mechanism located inside the machinery room.

**TABLE 1106.5.3.2
VENTILATION FOR GROUP A2L AND B2L REFRIGERANTS OTHER THAN AMMONIA**

Limit Value	Response Time (seconds)	Alarm Type	Alarm Reset Type	Ventilation Rate	Ventilation Reset Type
Set Point ≤ OEL	≤ 300	Trouble Alarm	Automatic	Level 1	Automatic
Set Point ≤ RCL	≤ 15	Emergency Alarm	Manual	Level 2	Manual

1106.5.3.3 Optional setting. Alarms set at levels other than indicated in Table 1106.5.3.2, such as IDLH, and automatic reset alarms are permitted in addition to those required by Section 1106.5.3. The meaning of each alarm shall be clearly marked by signage near the annunciators.

1106.5.3.4 Trouble alarm. In the event of a failure during a refrigerant detector self-test, a trouble alarm signal shall be transmitted to an approved monitored location.

1106.5.4 Mechanical ventilation. Mechanical ventilation shall be in accordance with all of the following:

1. One or more power-driven fans capable of exhausting air from the machinery room shall be provided. Multispeed fans shall be permitted.
2. Electric motors driving fans shall not be placed inside ducts. Fan rotating elements shall be nonferrous or nonsparking, or the casing shall consist of or be lined with such material.
3. Supply make-up air to replace that being exhausted shall be provided. Ducts for supply to and exhaust from the machinery room shall serve no other area. Makeup air supply outlet locations shall be positioned relative to the exhaust air inlet location(s) to prevent short-circuiting.
4. Inlets to the exhaust ducts shall be located in an area where refrigerant from a leak will concentrate, with consideration given to the location of the makeup air supply paths and refrigerating machines, and the density of the refrigerant relative to air.
5. Inlets to exhaust ducts shall be within 1 ft (0.3 m) of the lowest point of the machinery room for refrigerants that are heavier than air, and shall be within 1 ft (0.3 m) of the highest point for refrigerants that are lighter than air.
6. The discharge of the exhaust air shall be to the outdoors in such a manner as not to cause a nuisance or danger.

1106.5.5 Level 1 Ventilation. The refrigerating machinery room mechanical ventilation required by Section 1106.5.4 shall exhaust at an airflow rate not less than shown in Table 1106.5.5. Ventilation reset shall be in accordance with the type of reset in Table 1106.5.3.2. Automatic reset shall not deactivate the ventilation system until after the refrigerant concentration has been reduced below the OEL and maintained below the OEL for not less than 5 minutes.

**TABLE 1106.5.5
Level 1 Ventilation Rate for Class A2L Refrigerants**

Status	Airflow
<u>Operated when occupied, and</u> <u>Operated when activated in accordance with Section 1106.5.2 and Table 1106.5.3.2</u>	The greater of: (a) 0.5 ft ³ /min per ft ² (2.54 L/s per m ²) of <i>machinery room</i> area, or (b) 20 ft ³ /min (9.44 L/s) per person
<u>Operable when occupied</u>	With or without mechanical cooling of the <i>machinery room</i> , the greater of: (a) the airflow rate required to not exceed a temperature rise of 18°F (10°C) above inlet air temperature, or (b) the airflow rate required to not exceed a maximum air temperature of 122°F (50°C) in the <i>machinery room</i>

1106.5.6 Level 2 Ventilation. A part of the *machinery room* mechanical ventilation referred to in Section 1106.5.4 shall exhaust an accumulation of refrigerant resulting from leaks or a rupture of a refrigerating system or portion thereof in the *machinery room*. The refrigerant detector(s) shall activate ventilation at a set point and response time in accordance with Table 1106.5.3.2, and at an airflow rate not less than the value determined in accordance with Section 1106.5.7. Where multiple refrigerant designations are in the *machinery room*, the required airflow shall be evaluated according to each refrigerating system and the highest airflow rate shall apply.

Ventilation reset shall be in accordance with the type of reset in Table 1106.5.3.2. Manual type ventilation reset shall have the reset mechanism located inside the *machinery room*.

1106.5.7 Group A2L ventilation rate. Where required by Section 1106.5.6, the total airflow for Level 2 Ventilation shall be not less than the airflow rate determined by Figure 1106.5.7.

~~1106.5.3~~**1106.5.8 Emergency ventilation system discharge.** The emergency ventilation system point of discharge to the atmosphere shall be located outside of the structure at not less than 15 feet (4572 mm) above the adjoining grade level and not less than 20 feet (6096 mm) from any window, *ventilation* opening or *exit*.

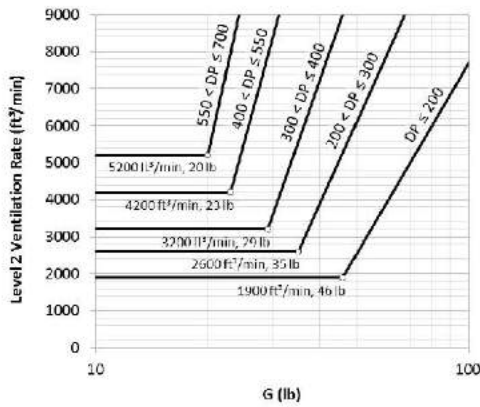
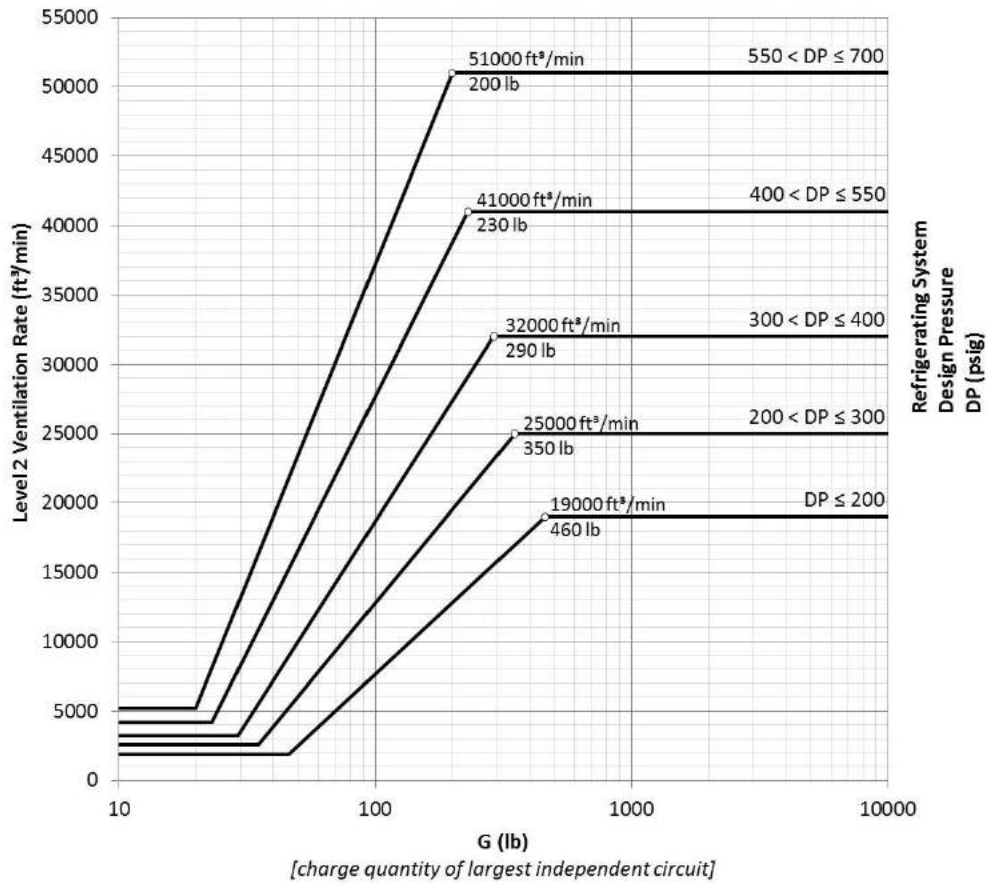


FIGURE 1106.5.7 (I-P)
Level 2 Ventilation Rate for Group A2L Refrigerants

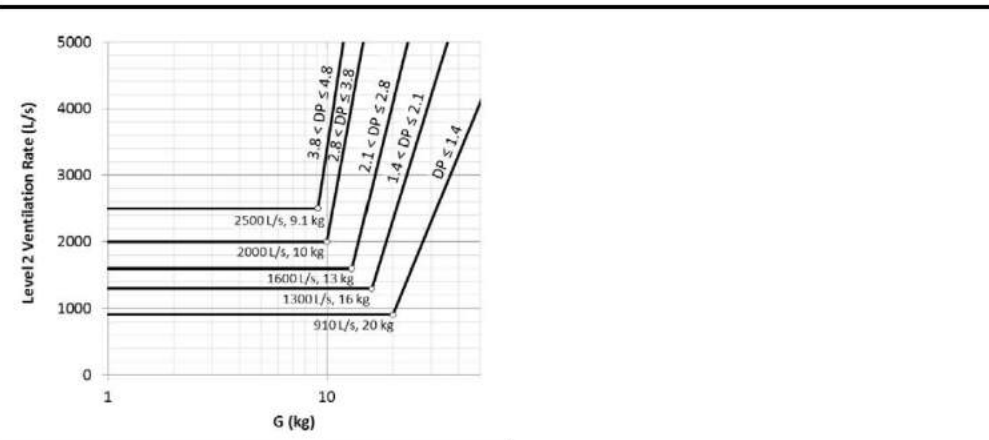
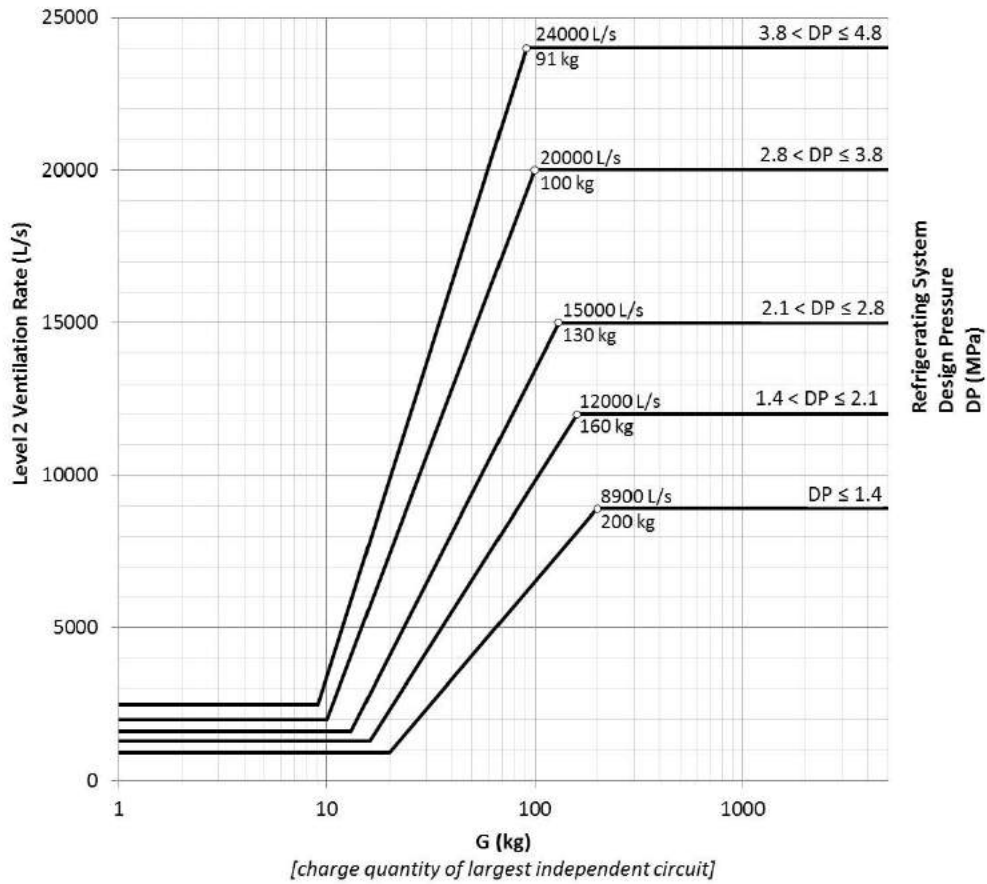


FIGURE 1106.5.7 (SI)
Level 2 Ventilation Rate for Group A2L Refrigerants

Commenter's Reason: When the ventilation table was added to the 2018 Code, it was based on an initial Advisory Public Review (APR) published by ASHRAE. When the SSPC 15 (ASHRAE 15 Committee) had reviewed all of the comments, they issue a Publication Public Review (PPR). Through multiple PPRs, the ventilation requirements significantly changed. These modifications are based on the results of input from public comments.

The proposed modification will add new ventilation requirements to the code consistent with what will appear in ASHRAE 15. The ventilation requirements are based on the size of the refrigerant charge and the pressure of the refrigerant system. There are two levels of ventilation required. The first level, identified as Level 1, is based on a minor leak in the refrigerant system. Level 1 ventilation also requires the signaling of a trouble alarm.

Since Level 1 Ventilation is based on a minor leak, the alarm is permitted to automatically reset. This allows normal operation in the event of a nuisance alarm.

When there is a significant leak of the refrigerant, Level 2 ventilation is automatically activated. Level 2 ventilation is required when the refrigerant detector reaches a concentration of refrigerant that is at or above the RCL which is 25 percent of the lower flammable limit for A2L refrigerants. The ventilation rate is determined by the value shown on the charts, based on charge size and system pressure. Once Level 2 ventilation is activated, an emergency signal is activated and the alarms (detector) must be manually reset.

The two levels of ventilation are a better method of providing the necessary safety in a machinery room. This prevents a dangerous level of refrigerant from accumulating in the event of a leak.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This change clarifies the requirements for ventilation of a machinery room. The use of A2L refrigerant is optional.

F79-18 Part II

F81-18

IFC: 605.12.2, 605.12.2.1, 605.12.4

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Daikin US (JBEngineer@aol.com)

2018 International Fire Code

Revise as follows

605.12.2 Flammable refrigerants. Systems containing more than 6.6 pounds (3 kg) of ~~flammable Group A2, A3, B2, or B3~~ refrigerants having a density equal to or greater than the density of air shall discharge vapor to the atmosphere only through an *approved* treatment system in accordance with Section 605.12.5 or a flaring system in accordance with Section 605.12.6. Systems containing more than 6.6 pounds (3 kg) of ~~flammable Group A2, A3, B2, or B3~~ refrigerants having a density less than the density of air shall be permitted to discharge vapor to the atmosphere provided that the point of discharge is located outside of the structure at not less than 15 feet (4572 mm) above the adjoining grade level and not less than 20 feet (6096 mm) from any window, ventilation opening or *exit*.

Add new text as follows

605.12.2.1 Group A2L refrigerant. Systems containing more than 6.6 pounds (3 kg) of Group A2L refrigerant shall discharge vapor directly to atmosphere where the fire code official determines, on review of an engineering analysis prepared in accordance with Section 104.7.2, that a fire hazard would not result from atmospheric discharge of Group A2L refrigerant.

Revise as follows

605.12.4 Ammonia and Group B2L refrigerant. Systems containing more than 6.6 pounds (3 kg) of ammonia or Group B2L refrigerant shall discharge vapor to the atmosphere in accordance with one of the following methods:

1. Directly to atmosphere where the *fire code official* determines, on review of an engineering analysis prepared in accordance with Section 104.7.2, that a fire, health or environmental hazard would not result from atmospheric discharge of ammonia or B2L refrigerant.
2. Through an *approved* treatment system in accordance with Section 605.12.5.
3. Through a flaring system in accordance with Section 605.12.6.
4. ~~Through~~ For ammonia, through an *approved* ammonia diffusion system in accordance with Section 605.12.7.
5. By other *approved* means.

Exception: Ammonia/water absorption systems containing less than 22 pounds (10 kg) of ammonia and for which the ammonia circuit is located entirely outdoors.

Reason: ASHRAE 34 changed the grouping of refrigerants adding two new categories, A2L and B2L. These refrigerants are lower flammable refrigerants. The refrigerants do not readily ignite and do not pose the same hazard as A2, A3, B2, and B3 refrigerants. With the addition of these new refrigerants, revisions are necessary to these section. Ammonia is a Group B2L refrigerant, hence, there are already special requirements. The modification will allow other B2L refrigerants to meet the same requirements.

A2L refrigerants have similar flammability characteristics to ammonia. Hence, allowance for the evaluation of ignition should apply similar to ammonia. The text in Section 606.12.3.1 is similar to item 1 in Section 606.12.5. Item 1 of Section 606.12.5 also includes an evaluation of the health or environmental hazard which would not apply to A2L refrigerants.

Cost Impact: The code change proposal will decrease the cost of construction Group A2L refrigerants will be treated similar to ammonia regarding the flammability.

F81-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved based upon the action taken on F79-18 Part I which also deals with A2L refrigerants. This may be a viable option but more information is needed. (Vote: 14-0)

Assembly Action:

None

F81-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Daikin US (JBEngineer@aol.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

605.12.2 Flammable refrigerants. Systems containing more than 6.6 pounds (3 kg) of Group A2, A3, B2, or B3 refrigerants having a density equal to or greater than the density of air shall discharge vapor to the atmosphere only through an *approved* treatment system in accordance with Section 605.12.5 or a flaring system in accordance with Section 605.12.6. Systems containing more than 6.6 pounds (3 kg) of Group A2, A3, B2, or B3 refrigerants having a density less than the density of air shall be permitted to discharge vapor to the atmosphere provided that the point of discharge is located outside of the structure at not less than 15 feet (4572 mm) above the adjoining grade level and not less than 20 feet (6096 mm) from any window, ventilation opening or *exit*.

605.12.2.1 Group A2L refrigerant. Systems containing more than 6.6 pounds (3 kg) of Group A2L refrigerant shall discharge vapor directly to atmosphere where the fire code official determines, on review of an ~~engineering~~ analysis prepared in accordance with Section 104.7.2, that a fire hazard would not result from atmospheric discharge of Group A2L refrigerant.

605.12.4 Ammonia and Group B2L refrigerant. Systems containing more than 6.6 pounds (3 kg) of ammonia or Group B2L refrigerant shall discharge vapor to the atmosphere in accordance with one of the following methods:

1. Directly to atmosphere where the *fire code official* determines, on review of an engineering analysis prepared in accordance with Section 104.7.2, that a fire, health or environmental hazard would not result from atmospheric discharge of ammonia or B2L refrigerant.
2. Through an *approved* treatment system in accordance with Section 605.12.5.
3. Through a flaring system in accordance with Section 605.12.6.
4. For ammonia, through an *approved* ammonia diffusion system in accordance with Section 605.12.7.
5. By other *approved* means.

Exception: Ammonia/water absorption systems containing less than 22 pounds (10 kg) of ammonia and for which the ammonia circuit is located entirely outdoors.

Commenter's Reason: This is a companion change to F79-18. The Committee response is not accurate in that F79-18 does not address the discharge of Group A2L or B2L refrigerants. These two class of refrigerants have the flammability properties similar to ammonia, which is a B2L refrigerant. Hence, a separate section is needed to regulate the refrigerants. The requirements for the remaining flammable refrigerants that fall into Group A2, A3, B2, and B3 do not change. The only new requirements are for A2L refrigerants. Engineering was removed as a prefix to analysis since the term is unnecessary with a reference to Section 104.7.2. This will avoid possible confusion.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. The discharge of A2L and B2L refrigerants will be properly addressed. The newer discharge requirements are less expensive to install.

F81-18

F84-18

IFC: 606.1, 606.2, 606.3, 606.3.1, 606.3.2, 606.3.3, 606.3.4, 606.4, 606.5, 606.5.1, 606.5.2, 606.5.3, 606.6, 606.6.1, 606.6.2, 606.6.2.1, 606.6.2.2, 606.6.2.3, 606.6.2.4

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Fire Code

Add new text as follows

606.1 General. Elevators and conveying systems required by this code or the International Building Code shall comply with Chapter 30 of the International Building Code and Sections 606.2 through 606.6

Revise as follows

~~606.1~~**606.2 Emergency operation.** Existing elevators with a travel distance of 25 feet (7620 mm) or more shall comply with the requirements in Chapter 11-of this code. New elevators shall be provided with Phase I emergency recall operation and Phase II emergency in-car operation in accordance with ASME A17.1/CSA B44.

~~606.2~~**606.3 Standby power.** In buildings and structures where standby power is required or furnished to operate an elevator, standby power shall be provided in accordance with Section 1203-of this code. Operation of the system shall be in accordance with Sections ~~606.2.1~~606.3.1 through ~~606.2.4~~ 606.3.4.

~~606.2.1~~**606.3.1 Manual transfer.** Standby power shall be manually transferable to all elevators in each bank.

~~606.2.2~~**606.3.2 One elevator.** Where only one elevator is installed, the elevator shall automatically transfer to standby power within 60 seconds after failure of normal power.

~~606.2.3~~**606.3.3 Two or more elevators.** Where two or more elevators are controlled by a common operating system, all elevators shall automatically transfer to standby power within 60 seconds after failure of normal power where the standby power source is of sufficient capacity to operate all elevators at the same time. Where the standby power source is not of sufficient capacity to operate all elevators at the same time, all elevators shall transfer to standby power in sequence, return to the designated landing and disconnect from the standby power source. After all elevators have been returned to the designated level, not less than one elevator shall remain operable from the standby power source.

~~606.2.4~~**606.3.4 Machine room ventilation.** Where standby power is connected to elevators, the machine room ventilation or air conditioning shall be connected to the standby power source.

~~[BE] 606.3~~**606.4 Emergency signs.** An *approved* pictorial sign of a standardized design shall be posted adjacent to each elevator call station on all floors instructing occupants to use the exit stairways and not to use the elevators in case of fire. The sign shall read: IN FIRE EMERGENCY, DO NOT USE ELEVATOR. USE EXIT STAIRS.

Exceptions:

1. The emergency sign shall not be required for elevators that are part of an accessible *means of egress* complying with Section 1009.4.
2. The emergency sign shall not be required for elevators that are used for occupant self-evacuation in accordance with Section 3008 of the International Building Code.

Add new text as follows

606.5 Maintenance of elevators. Elevator features and lobbies required by Section 3006 of the International Building Code shall be maintained and in accordance with Sections 606.5.1 thru 606.5.3

Revise as follows

~~606.4~~**606.5.1 Fire service access elevator-elevators and lobbies.** Where fire service access elevators are required by Section 3007 of the International Building Code, the fire service access elevator fire protection and safety features required by Section 3007 of the International Building Code shall be maintained and lobbies shall be maintained free of storage and furniture.

~~606.5~~**606.5.2 Occupant evacuation elevator elevators and lobbies.** Where occupant evacuation elevators are provided in accordance with Section 3008 of the International Building Code, the occupant evacuation elevator fire protection and safety features and lobbies required by Section 3008 of the International Building Code shall be maintained free of storage and furniture.

~~606.6~~**606.5.3 Water protection of hoistway enclosures.** Methods to prevent water from infiltrating into a hoistway enclosure required by Section 3007.3 and Section 3008.3 of the International Building Code shall be maintained.

Add new text as follows

606.6 Elevator keys. All elevators shall be provided with elevator car door and fire-fighter service keys in accordance with Sections 606.6.1 thru 606.6.2.4

Revise as follows

~~606.7~~**606.6.1 Elevator key location.** Keys for the elevator car doors and fire-fighter service keys shall be kept in an *approved* location for immediate use by the fire department.

~~606.8~~**606.6.2 Standardized fire service elevator keys.** Buildings with elevators equipped with Phase I emergency recall, Phase II emergency in-car operation, or a fire service access elevator shall be equipped to operate with a standardized fire service elevator key approved by the *fire code official*.

Exception: The owner shall be permitted to place the building's nonstandardized fire service elevator keys in a key box installed in accordance with Section 506.1.2.

~~606.8.1~~**606.6.2.1 Requirements for standardized fire service elevator keys.** Standardized fire service elevator keys shall comply with all of the following:

1. All fire service elevator keys within the jurisdiction shall be uniform and specific for the jurisdiction. Keys shall be cut to a uniform key code.
2. Fire service elevator keys shall be of a patent-protected design to prevent unauthorized duplication.
3. Fire service elevator keys shall be factory restricted by the manufacturer to prevent the unauthorized distribution of key blanks. Uncut key blanks shall not be permitted to leave the factory.
4. Fire service elevator keys subject to these rules shall be engraved with the words "~~DO~~ DO NOT DUPLICATE."

~~606.8.2~~**606.6.2.2 Access to standardized fire service keys.** Access to standardized fire service elevator keys shall be restricted to the following:

1. Elevator owners or their authorized agents.
2. Elevator contractors.
3. Elevator inspectors of the jurisdiction.
4. *Fire code officials* of the jurisdiction.
5. The fire department and other emergency response agencies designated by the *fire code official*.

~~606.8.3~~**606.6.2.3 Duplication or distribution of keys.** A person shall not duplicate a standardized fire service elevator key or issue, give, or sell a duplicated key unless in accordance with this code.

~~606.8.4~~**606.6.2.4 Responsibility to provide keys.** The building owner shall provide up to three standardized fire service elevator keys where required by the *fire code official*, upon installation of a standardized fire service key switch or switches in the building.

Reason: This is one of 17 proposals being submitted as a package relating to technical and organizational changes proposed for Chapter 6. While the Fire Code Committee will consider each proposal independently, the intent is for approval of all proposals in this package which have been submitted as a correlated set of companion code change proposals.

The new scoping section for elevators correlates Section 606 with Chapter 30 of the International Building Code. Clarity is provided regarding the maintenance of not only the elevator lobbies, but also the fire protection and safety features of the elevator. Clarity is also provided in grouping together the sections for maintenance of elevators and lobbies (the new Section 606.5) and the sections for elevator keys (the new Section 606.6)

It is the intention of F-CAC that this proposal correlate with the B-CAC Proposal being heard by the IBC-E Technical Committee to match the elevator signage requirements for standard and occupant evacuation elevators in both IBC

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal clarifies already existing requirements.

Public Hearing Results

Errata: 606.5.2 Occupant evacuation elevators and lobbies. Where occupant evacuation elevators are provided in accordance with Section 3008 of the International Building Code, the occupant evacuation elevator fire protection and safety features and lobbies required by Section 3008 of the International Building Code shall be maintained ~~and maintained~~ free of storage and furniture.

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved as the IFC does not require elevators and does not address conveying systems. It was also suggested that Section 606.1 be clarified that Sections 606.2 through 606.6 are sections within the IFC not IBC. (Vote: 14-0)

Assembly Action:

None

F84-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

606.1 General. ~~Elevators~~ Where elevators and conveying systems ~~required by this code or the International Building Code are installed, they shall comply with Chapter 30 of the International Building Code and Sections 606.2 through 606.6 of this code.~~

Commenter's Reason: This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

The modification by this Public Comment addresses the Technical Committee reason for Disapproval. The original proposal is part of a package of Chapter 6 reorganization proposals; this proposal is necessary to coordinate the new section numbers with the other Chapter 6 proposal that were AS or AM by the Technical Committee,

Although the Fire Code requires elevators for accessibility in Section 1009.2.1, the requirements in Chapter 30 of the Building Code and Section 606 of the Fire Code should be enforced, whether elevators are required to be installed or not.

Clarification is proposed to the scoping section of Section 606 to clarify the application of the requirements of Section 606 of the Fire Code and Chapter 30 of the Building Code.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal clarifies already existing requirements.

F84-18

F85-18

IFC: 606.6

Proposed Change as Submitted

Proponent: Adria Reinertson, Riverside County Fire Department, representing Riverside County Fire Department, California Fire Chiefs Association (adriar@moval.org)

2018 International Fire Code

Add new text as follows

606.6 Storage within elevator lobbies. Where hoistway opening protection is required by Section 3006.2 of the International Building code, elevator lobbies shall be maintained free of storage.

Reason: There are existing provisions to prohibit storage of furniture and combustibles in fire service and occupant evacuation elevators. This proposal addresses combustible storage in other elevator lobbies requiring hoistway protection.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal clarifies that storage is not permitted in any protected hoistway and does not have an impact on construction costs.

F85-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved as determining what is considered storage as often these spaces will contain furniture. (Vote: 13-1)

Assembly Action:

None

F85-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Adria Reinertson, representing Riverside County Fire Department, California Fire Chiefs Association (adriar@moval.org)requests As Submitted.

Commenter's Reason:

Section 3006.2 of the International Building Code requires hoistway protection in accordance with IBC Section 3006.3 if a building meets certain criteria, i.e. height, occupancy or lack of fire protection. Two of the methods to protect the hoistway is by use of enclosed elevator lobbies. As mentioned in the original proposal reason statement, there are already provisions in the IFC to eliminate storage and furniture within occupant evacuation elevator and firefighter access elevator lobbies. As there are other required elevator lobbies to protect hoistways, this proposal is attempting to ensure that these elevator lobbies will not be used as overflow storage or staging areas.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal clarifies that storage is not permitted within any protected hoistway and does not have an impact on cost of construction.

F85-18

F86-18

IFC: 606.8, 606.8.1

Proposed Change as Submitted

Proponent: Kevin Brinkman, representing National Elevator Industry, Inc. (klbrinkman@neii.org)

2018 International Fire Code

Revise as follows

606.8 Standardized fire service elevator keys. Buildings with elevators equipped with Phase I emergency recall, Phase II emergency in-car operation, or a fire service access elevator shall be equipped to operate with a standardized fire service elevator key approved by the *fire code official* or a standardized key in accordance with ASME A17.1/CSA B44.

Exception: The owner shall be permitted to place the building's nonstandardized fire service elevator keys in a key box installed in accordance with Section 506.1.2.

606.8.1 Requirements for standardized fire service elevator keys. Standardized fire service elevator keys shall comply with all of the following:

1. All fire service elevator keys within the jurisdiction shall be uniform and ~~specific for the jurisdiction.~~ approved in accordance with Section 606.8. Keys shall be cut to a uniform key code.
2. Fire service elevator keys shall be of a patent-protected design to prevent unauthorized duplication.
3. Fire service elevator keys shall be factory restricted by the manufacturer to prevent the unauthorized distribution of key blanks. Uncut key blanks shall not be permitted to leave the factory.
4. Fire service elevator keys subject to these rules shall be engraved with the words "DO NOT DUPLICATE."

Reason: To eliminate a potential conflict with ASME A17.1/CSA B44 and all jurisdictions more flexibility in selection of a standardized keys.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This change will not impact cost since it allows more options and eliminates a potential conflict.

F86-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved based upon concern that the fire code official could already allow such keys therefore the reference is unnecessary. (Vote: 14-0)

Assembly Action:

None

F86-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Kevin Brinkman, representing National Elevator Industry, Inc. (klbrinkman@neii.org) requests As Submitted.

Commenter's Reason: Request approval as submitted. This proposal was submitted by NEII but is was also reviewed with the ASME Code Coordination committee which includes members from ICC and NFPA. ASME A17.1/CSA B44 requires the use of an FEO-K1 key for operation of all switches for Firefighters Emergency Operation (FEO) on elevators. This requirement to A17.1/B44 was added based on meetings with firefighters and their request to have one unique key. The current language in 606.8.1 requires keys that are "... uniform and specific to a jurisdiction.". The phrase "... specific to a jurisdiction" could be misinterpreted to mean that each jurisdiction must have its own unique key that is different than all other jurisdictions. This interpretation creates a conflict with ASME A17.1/CSA B44. The proposed change would still require the same key to be used throughout the jurisdiction, but would allow that key to be used by other jurisdictions as well, and eliminate the conflict with A17.1/B44. This would increase safety by allowing firefighters called to assist in a neighboring jurisdiction to have the key necessary for operation of the FEO system.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Since this change is to clarify the language and eliminate a potential conflict there is no change in the cost of construction.

F86-18

F87-18

IFC: 606.8.5, 315.3.3

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Fire Code

Add new text as follows

606.8.5 Storage. Furniture, materials or combustible waste shall not be stored in elevator cars or elevator machine rooms.

Exception: Blankets used for protection of elevator cab walls during construction or renovation.

Revise as follows

315.3.3 Equipment rooms. Combustible material shall not be stored in boiler rooms, mechanical rooms, elevator machine rooms, electrical equipment rooms or in *fire command centers* as specified in Section 508.1.5.

Reason: This is one of 17 proposals being submitted as a package relating to technical and organizational changes proposed for Chapter 6. While the Fire Code Committee will consider each proposal independently, the intent is for approval of all proposals in this package which have been submitted as a correlated set of companion code change proposals.

These changes will clarify that elevator cars and machine rooms are not to be used for storage. An exception is provided for blankets that are used for protecting the elevator cab walls.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will not increase or decrease the cost of construction. These areas are currently not permitted to be used for storage purposes.

F87-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved but was felt to have merit. More language regarding combustibility of furniture needs to be worked into the proposal to make it viable. (Vote: 13-1)

Assembly Action:

None

F87-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

606.8.5 Storage. ~~Furniture, materials or combustible waste shall not be stored~~ Storage is prohibited in elevator cars or elevator machine rooms.

Exception: Exceptions:

1. Blankets used for protection of elevator cab walls during construction or renovation.
2. Materials necessary for the operation and maintenance of the elevator equipment

Commenter's Reason: This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at:

<https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

This modification addresses the concern raised by the Technical Committee. The new language in 606.8.5 is consistent with requirements for general storage restrictions in Section 315.

Fundamentally, any material should not be stored in either elevator cars or elevator machine rooms, other than (1) the blankets used to protect elevator cab walls during construction or renovation, and (2) materials in the elevator machine room that are necessary for the maintenance and operation of elevator equipment.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

These areas are currently not permitted to be used for storage purposes.

F87-18

F91-18

IFC: SECTION 708, 708.1

Proposed Change as Submitted

Proponent: Bill McHugh, The McHugh Company, representing National Fireproofing Contractors Association (billmchugh-jr@att.net)

2018 International Fire Code

Add new text as follows

SECTION 708 SPRAY FIRE-RESISTIVE MATERIALS AND INTUMESCENT FIRE-RESISTIVE COATINGS

708.1 Maintaining Protection. The fire-resistance ratings of building elements, components or assemblies shall be maintained. The materials shall be securely bonded, not exhibit cracks, voids, spalls, delamination or any exposure to the substrate and be in accordance with the permitted fireproofing thicknesses. The materials shall be maintained in accordance with the listing and manufacturers instructions, where known.

Reason: We compliment the work of the Fire Code Action Committee and its successful F-113 proposal that resulted in new sections for maintaining assemblies in the IFC Chapter 7, Fire and Smoke Protection Features. There were several needed sections added to the International Fire Code through the F-113 Proposal. However, there was no section submitted at the time by the industry for sprayed fire-resistive materials (SFRM) or intumescent fire-resistive materials (IFRM) Fireproofing. This proposal adds the section to add a section on maintaining protection of building elements, structural members or assemblies receiving SFRM and IFRM Fireproofing.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This code proposal does not increase the cost of construction because all Fire and Smoke Protection Features are supposed to be maintained currently.

F91-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that the new proposed section goes beyond what is expected for an inspection and they had issues with the language, specifically regarding what test method is required, "fireproofing thicknesses" and "where known." (Vote: 12-2)

Assembly Action:

None

F91-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Bill McHugh, representing National Fireproofing Contractors Association (billmchugh-jr@att.net) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

SECTION 708 SPRAY FIRE-RESISTIVE-RESISTANT MATERIALS AND INTUMESCENT FIRE-RESISTIVE COATINGS-RESISTANT MATERIALS

708.1 Maintaining Protection. ~~The fire resistance ratings of building elements, components or assemblies shall be maintained. The materials shall be securely bonded, not exhibit cracks, voids, spalls, delamination or any exposure to the substrate and be in accordance with the permitted fireproofing thicknesses. The materials shall be maintained in accordance with the listing and manufacturers instructions, where known~~Where required when the building was originally permitted and constructed, spray fire-resistant materials and intumescent fire-resistant materials shall be visually inspected to verify that the materials do not exhibit exposure to the substrate.

Commenter's Reason: The purpose of this public comment is to address the Fire-Safety Committee and Opponent comments during the Committee Action Hearings in Columbus, OH. The proposal complimented the work of the Fire Code Action Committee on Chapter 7 creating separate sections for each type of fire-resistance. The committee felt the proposal was valuable and needed in the International Fire Code as it adds maintenance of spray fire-resistant materials and intumescent fire-resistant materials to the code. However, they thought the language was not concise, clear and might be confusing to those inspecting the materials.

To address the committee concerns, the proposal has been modified to be very specific to the type of materials to be visually inspected and maintained. This public comment brings needed attention to spray fire-resistant and intumescent fire-resistant materials that protect the first item mentioned in 701.2, Structural members.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal only clarifies that spray fire-resistant materials and intumescent fire-resistant materials are to be maintained through mentioning specific materials that protect structural elements listed in 701.2.

F91-18

F92-18 Part I

IFC: Chapter 8, 801, 801.1, 808, 808.1, 808.2, 808.3, 808.4, 808.5

Proposed Change as Submitted

Proponent: Ali Fattah, City of San Diego, representing Self

2018 International Fire Code

CHAPTER 8 INTERIOR FINISH, DECORATIVE MATERIALS AND FURNISHINGS

SECTION 801 GENERAL

801.1 Scope. The provisions of this chapter shall govern interior finish, interior trim, furniture, furnishings, decorative materials and decorative vegetation ~~in on the interior and exterior of buildings~~. Existing buildings shall comply with Sections 803 through 808. New buildings shall comply with Sections 804 through ~~808~~809, and Section 803 of the International Building Code.

808 OUTDOOR ARTIFICIAL DECORATIVE VEGETATION

808.1 General. Artificial decorative vegetation placed outdoors, within 30 feet (9140 mm) of a building, or on an occupied roof of a building shall comply with this section.

808.2 Testing. Artificial decorative vegetation shall meet the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701. Meeting such criteria shall be documented and certified by the manufacturer in an approved manner. Alternatively, the artificial decorative vegetation shall be tested in accordance with NFPA 289, using the 20 kW ignition source, and shall have a maximum heat release rate of 100 kW.

808.3 Electrical fixtures and wiring. The use of unlisted electrical wiring and lighting on artificial decorative vegetation shall be prohibited. The use of electrical wiring and lighting on artificial trees constructed entirely of metal shall be prohibited.

808.4 Candles and open flames. Candles and open flames shall not be used on or within 5 feet of artificial decorative vegetation.

808.5 Maintenance. Artificial decorative vegetation shall be tested to demonstrate that the flame propagation performance criterion or the heat release criterion from Section 808.2, as appropriate, remains effective for the period for which the artificial decorative vegetation remains in service, as approved by the fire code official. Materials tested to Chapter 16 of NFPA 701 that retain the flame propagation performance shall be deemed acceptable.

Reason: The proposed code change is in response to the increased use of decorative artificial vegetation on occupied roofs, within interior courts in buildings and outdoor occupancies such as Group A-5 stadiums. In the event that plastics in the decorative combustible vegetation ignites it can spread fire to surrounding buildings and this potential was very visible when artificial palm trees on the pool deck at the Las Vegas Cosmopolitan Hotel ignited in July of 2015. The IBC and IFC presently only specifically regulate decorative artificial vegetation in buildings through the requirements in Section 807.4 that was added in the last code cycle. The hazards are just as important in outdoor occupancies as they are in indoor occupancies.

Occupied roofs typically are classified as Group A-2 or A-3 occupancies and outdoor stadiums are classified as Group A-5 both of which accommodate large numbers of people. Additionally, when placed in close proximity to a building they can spread fire to a building if ignited.

Outdoor use poses weathering problems due to moisture, UV exposure or cleaning chemicals necessary to freshen up the vegetation. As a result, testing is required after weathering conditioning per the requirements of Chapter 16 in NFPA 701. Since there are no specific standards and tests done for this specific type of outdoor plastic compliance with the weathering accelerated weathering testing per ASTM D4329 and ASTM D4587 where fire retardant coating is used is not being required to allow the fire code official flexibility.

Cost Impact: The code change proposal will increase the cost of construction

Artificial decorative vegetation protected with fire retardants need to be tested for outdoor weathering.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that they had multiple issues with the proposal including: concern with the maintenance and enforcement, some of the requirements are electrical in scope, the term "permanent" is not specified, there is no size limit, the distance requirement is too high and no justification was provided, construction types are not included and there is no account for weather conditions. (Vote: 14-0)

Assembly Action:

None

F92-18 Part I

Individual Consideration Agenda

Public Comment 1:

Proponent: Ali Fattah, City of San Diego, representing City of San Diego (afattah@sandiego.gov) requests As Modified by This Public Comment.

Replace as follows:

2018 International Fire Code

SECTION 320 ARTIFICIAL COMBUSTIBLE VEGETATION

320.1 Artificial Combustible Vegetation on Roofs and Near Buildings. Artificial combustible vegetation exceeding 6 feet (1828.8 mm) in height and permanently installed outdoors, within 5 feet (1524 mm) of a building or on the roof of a building, shall comply with Section 807.4.1. The placement of artificial combustible vegetation shall also comply with Sections 806.3 and 807.4.2.

Exception: Artificial decorative vegetation located more than 30 feet (9144 mm) from the exterior wall of a building.

Commenter's Reason: This public comment has been submitted to address the constructive feedback offered during the committee Action Hearing. While the Fire Code Committee did not approve the original change several members of the committee and speakers in opposition encouraged submitting a public comment because they found that the hazards of artificial vegetation to be valid.

The proposal has been simplified and references applicable provisions in Section 806 and 807. The original proposal had not intended to change those sections but merely copied their requirements into the proposed new Sections. Several speakers and committee members raised issues with the electrical requirements in Section 807.4.2.

The proposal as revised in this public comment mainly focuses on regulating installations in close proximity to buildings or on the roofs of buildings regardless of whether occupied or not since the intent is structure protection and not occupant protection. This addresses some issues raise by the committee regarding applicability.

A height limit of 6 ft was added below which the proposed regulations will not apply. It seems to be a reasonable height and is representative of most common interior applications. An area limit could not be included since fire testing will be necessary to do so. A request was made to the NFPA Foundation for funding and was not approved so resources do not exist now to address this question.

Terms such as permanent and installed are intended to lead the code user to understand that transient items are not being regulated by the proposed section rather it is large Artificial Combustible Vegetation. This should also address a committee members objection that the original proposal would have regulated table top ornaments.

We reduced the fire separation distance originally included in the proposal to 3 ft for two reasons. The first reason is that the IFC does not restrict the location of such materials wen placed on the interior of a building. Secondly, since exterior applications do not have the benefit of fire sprinkler protection it seems prudent to include some distance. Additionally, the proposal does not differentiate between types of construction or exterior finishes however the 5 ft distance has a rational based on the distance in IBC Table 705.8 when exterior wall openings are first permitted in exterior walls that have unprotected openings in non-sprinklered buildings. We should keep in mind that the materials will be labeled to comply with the requirements for interior installations.

Proponent sympathizes with a comment made by a speaker that spoke to the limited resources Fire Code Officials must enforce the fire code and that the additional regulations proposed will add an additional burden. The regulations are necessary to provide a code section to reference when a violation is found of the section in conjunction with other violations. This is like traffic citations given for mobile phone use while driving where it is less likely for law enforcement to make a traffic stop only for that violation. However, if the violation also includes speeding or other moving violations it can be added to the traffic citation.

Finally, the regulations addressing exterior weathering were removed from the proposal since the NFPA 701 edition that will be adopted by the 2021 IBC will require compliance for outdoor installations. It is expected that the protection will remain for the service life of the material.

Bibliography: Two interesting articles might be useful as references were used in developing the code change. <https://www.nfpa.org/News-and-Research/Publications/NFPA-Journal/2016/May-June-2016/Features/Combustible> and <https://library.ul.com/wp-content/uploads/sites/40/2016/09/10266-Artificial-Trees-White-Paper-FinalR1.pdf>

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. This code change will minimally increase the cost of construction by extending the regulation to the exterior of the building. However, materials compliance for interior use may require some modification to address exterior weathering. At present the materials address in this code change are regulated by code officials intermittently and inconsistently and the code change will improve uniformity and consistency of enforcement which will reduce the cost of construction due to increase volume of fabrication. .

F92-18 Part I

F92-18 Part II

IBC: Chapter 8, 801, 801.1, 802.3, 807, 807.1, 807.2, 807.3, 807.4

Proposed Change as Submitted

Proponent: Ali Fattah, City of San Diego, representing Self

2018 International Building Code

CHAPTER 8 INTERIOR FINISHES AND DECORATIVE MATERIALS

SECTION 801 SCOPE

801.1 Scope. The provisions of this chapter shall govern the use of materials used as *interior finishes, trim* and *decorative materials*.

~~FF~~ **802.3 Decorative materials and trim.** *Decorative materials* and *trim* shall be restricted by combustibility, fire performance or flame propagation performance criteria in accordance with Section 806 for the interior of the building and Section 807 for the exterior of the building.

807 ARTIFICIAL DECORATIVE VEGETATION ON BUILDINGS AND IN OUTDOOR OCCUPANCIES

807.1 General. Fixed artificial decorative vegetation placed in outdoor occupancies or on an occupied roof of a building shall comply with this section.

807.2 Testing. Artificial decorative vegetation shall meet the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701. Meeting such criteria shall be documented and certified by the manufacturer in an approved manner. Alternatively, the artificial decorative vegetation shall be tested in accordance with NFPA 289, using the 20 kW ignition source, and shall have a maximum heat release rate of 100 kW.

807.3 Electrical fixtures and wiring. The use of unlisted electrical wiring and lighting on artificial decorative vegetation shall be prohibited. The use of electrical wiring and lighting on artificial trees constructed entirely of metal shall be prohibited.

807.4 Ignition sources and maintenance. Ignition sources and maintenance of outdoor artificial vegetation shall be in accordance with Section 808.4 and 808.5 of the IFC.

Reason: The proposed code change is in response to the increased use of decorative artificial vegetation on occupied roofs, within interior courts in buildings and outdoor occupancies such as Group A-5 stadiums. In the event that plastics in the decorative combustible vegetation ignites it can spread fire to surrounding buildings and this potential was very visible when artificial palm trees on the pool deck at the Las Vegas Cosmopolitan Hotel ignited in July of 2015. The IBC and IFC presently only specifically regulate decorative artificial vegetation in buildings through the requirements in IFC Section 807.4 that was added in the last code cycle. The hazards are just as important in outdoor occupancies as they are in indoor occupancies.

Occupied roofs typically are classified as Group A-2 or A-3 occupancies and outdoor stadiums are classified as Group A-5 both of which accommodate large numbers of people. Additionally, when placed in close proximity to a building they can spread fire to a building if ignited.

Outdoor use poses weathering problems due to moisture, UV exposure or cleaning chemicals necessary to freshen up the vegetation. As a result, testing is required after weathering conditioning per the requirements of Chapter 16 in NFPA 701. Since there are no specific standards and tests done for this specific type of outdoor plastic compliance with the weathering accelerated weathering testing per ASTM D4329 and ASTM D4587 where fire retardant coating is used is not being required to allow the fire code official flexibility.

Cost Impact: The code change proposal will increase the cost of construction. The proposed code change will require that products utilizing fire retardants to demonstrate the ability to weather in outdoor environments.

Public Hearing Results

Committee Action:

Disapproved

Assembly Action:

None

F92-18 Part II

Individual Consideration Agenda

Public Comment 1:

Proponent: Ali Fattah, City of San Diego, representing City of San Diego requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

SECTION 429 ARTIFICIAL DECORATIVE VEGETATION

429.1 Artificial decorative vegetation. Artificial decorative vegetation exceeding 6 feet (1830 mm) in height and permanently installed outdoors within 5 feet (1524 mm) of a building, or on the roof of a building, shall comply with Section 320.1 of the *International Fire Code*.

Exception: Artificial decorative vegetation located more than 30 feet (9144 mm) from the exterior wall of a building.

Commenter's Reason: This public comment has been submitted to address the constructive feedback offered during the lengthy debate in both the Fire Safety Committee and the Fire Code Committee during the Committee Action Hearing. While the Fire Safety Committee did not approve the original change several members of the committee and speakers in opposition encouraged submitting a public comment because they found that the hazards of artificial vegetation to be valid.

The proposal has been simplified and is proposed to be moved to a new Section in IBC Chapter 4 where we had initially proposed the proposed regulations. ICC staff suggested that the proposal be added to Chapter 8 of the IBC by modifying the scope of the chapter. We repeatedly received comments that code users will not think to go to Chapter 8 that addresses materials within buildings when the proposed regulations are applicable to installations on the exterior of a building. Furthermore, we added further simplification by referencing a proposed Section 320.1 proposed for the the International Fire Code. This will address the majority of the comments we heard.

Additionally, we have limited the scope of the requirement to apply to artificial trees that have a height exceeding 6 ft and when located within 3 feet of a building. This addresses concerns raised by both committees regarding the broadness of the scope and applicability of the regulation.

Using the term permanent addresses cases where the structure used to frame the artificial vegetation is permanently bolted to the building or where it is installed in a large heavy planter that can not be readily moved. We hope that this addresses issues raised regarding architects placing the artificial decorative vegetation on support systems that can be readily moved with casters. Additionally the height limit and using the term permanent should also exclude table ornaments as was raised by a member of the Fire Code Committee.

A height limit of 6 ft was added below which the proposed regulations will not apply. It seems to be a reasonable height and is representative of most common interior applications. Additionally fences having a 6 ft high are exempted from a building permit so this was also used in determining the height limit. An area limit could not be included since fire testing will be necessary to do so. A request was made to the NFPA Foundation for funding and was not approved so resources do not exist now to address this question.

Terms such as permanent and installed are intended to lead the code user to understand that transient items are not being regulated by the proposed section rather it is large Artificial Combustible Vegetation. This should also address a committee members objection that the original proposal would have regulated table top ornaments.

We reduced the fire separation distance originally included in the proposal to 5 ft for two reasons. The first reason is that the IFC does not restrict the location of such materials when placed on the interior of a building. Secondly, since exterior applications do not have the benefit of fire sprinkler protection it seems prudent to include some distance. Additionally, the proposal does not differentiate between types of construction or exterior finishes however the 5 ft distance has a

rational based on the distance in IBC Table 705.8 when exterior wall openings are first permitted in exterior walls on non-sprinkler protected buildings. We should keep in mind that when the proposed section is implemented that the combustible materials will be labeled to comply with the requirements for interior installations.

Finally, the regulations addressing exterior weathering were removed from the proposal since the NFPA 701 edition that will be adopted by the 2021 IBC will require compliance for outdoor installations. It is expected that the protection will remain for the service life of the material.

The proposal references a Section in the IFC and if Part I of this code change or if the public comment to code Change F21-18 are not approved by this membership the correlating committee should not adopt Part II of this code change. We believe that this pointer to the IFC is necessary since our experience has been that these elements may come in during initial construction or as alterations to existing buildings.

While the IBC does not regulate the proximity of live irrigated vegetation to buildings, the proposed code change is necessary due to the demonstrated hazards of fire as we show in the original proposal. A building permit is not required for live vegetation but is required for structures that resist wind and seismic loads and their self weight and to address loads imposed on the supporting structure or foundation.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. We believe that there will be an increase in the cost of construction however since many of the artificial trees have been installed in the interior of a building the same complaint materials are expected to be installed on the exterior. Additionally since these items have not been regulated by the IBC and IFC we have no baseline to compare to since their use has been relatively recent in the past 5 to 10 years. The fire incident we referenced included elements that were constructed under the 2012 IBC/IFC or the prior editions which were developed almost 10 years ago.

F92-18 Part II

F93-18

IFC: 806.1.4 (New), Chapter 80

Proposed Change as Submitted

Proponent: Marcelo Hirschler, GBH International, representing GBH International (gbhint@aol.com)

2018 International Fire Code

Add new text as follows

806.1.4 Fire retardant treatments for natural cut trees. Fire retardant treatments applied to natural cut trees shall be tested by an approved agency and shall comply with one of the following:

1. Both Test Method 1 and Test Method 2 of ASTM E3082.
2. Exhibit a maximum rate of heat release not exceeding 100 kW when applied in accordance with the manufacturer's recommendations and tested in accordance with section 5.5 of NFPA 289.

Add new standard(s) follows

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box
C700
West Conshohocken PA 19428-2959
US

E3082-17:

Standard Test Methods for Determining the Effectiveness of Fire Retardant Treatments for Natural Christmas Trees

Reason: It has been found that many treatments are offered for sale that are said to improve the fire performance of natural Christmas trees. The Natural Christmas Tree Association has been very worried for some time about the efficacy of some of these products. It has been found that the use of poorly formulated and untested fire retardant treatments can accelerate the drying out of the Christmas tree and actually worsen the fire danger. The Natural Christmas Tree Association approached both ASTM (committee E05 on fire standards) and individual members off the NFPA Fire Tests committee to develop a test method for assessing whether the treatments offered for sale are actually doing as claimed by manufacturers. The state of California has a fire test that it uses to approve such treatments, based on a small scale fire test, but other states do not.

As a result of these concerns, ASTM has now developed and published ASTM E3082 for that purpose. It contains both a small scale test (Test Method 1) and a full scale test (Test Method 2). In order to comply with the requirements of ASTM E3082 a treatment must comply with both tests, and then it will be said to have "passed" the test. Test Method 1 is similar to the test used by the state of California for its requirements. Test Method 2 is a full scale heat release test largely based on UL Outline of Investigation 2358, "Fire Tests of Pre-Lit Artificial Seasonal Use Trees and Other Seasonal Decorative Items".

NFPA has developed a procedure within NFPA 289 (a heat release test for full scale individual fuel items) to also test Christmas tree treatments. The test in NFPA 289 (section 5.5) is similar (but not identical) to the full scale test in ASTM E3082 (Test Method 2) and does not have pass fail criteria. Therefore the pass fail criteria recommended are those used when testing to NFPA 289 in more than one section of the IFC (807.3, 807.4.1, 807.5.1.1, etc.), which are a heat release rate not exceeding 100 kW.

NFPA statistics show that, between 2011 and 2015, U.S. fire departments responded to an estimated 200 structure fires, per year, caused by Christmas trees resulting in an annual average of 6 deaths, 16 injuries and \$14.8 million in property damage. When comparing Christmas tree fires to other reported home fires, 1 out of every 32 home fires that began with a Christmas tree resulted in a death compared to 1 death out of every 143 reported home fires.

The use of an appropriate fire retardant treatment is a passive means or protection, which adds fire safety to the active means in 806.1.1 and 806.1.3.

Cost Impact: The code change proposal will increase the cost of construction

This will provide added fire safety but it will require manufacturers of fire retardant treatments to conduct some fire testing to demonstrate the effectiveness of their products.

Analysis: A review of the standard proposed for inclusion in the code, ASTM E3082-17 Standard Test Methods for Determining the Effectiveness of Fire Retardant Treatments for Natural Christmas Trees, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

F93-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that the proposal has enforcement and misinterpretation issues and there is currently no requirement to have the treatment. It was suggested to add the language of "where applied" to improve the clarity of the requirement. (Vote: 11-3)

Assembly Action:

None

F93-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Tim Earl, representing GBH International (tearl@gbhinternational.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

806.1.4 Fire retardant treatments for natural cut trees. ~~Fire~~ Where fire retardant treatments are applied to natural cut trees shall, the fire retardant treatment shall be tested by an approved agency and shall comply with one of the following:

- ~~1. Both both Test Method 1 and Test Method 2 of ASTM E3082.~~
- ~~2. Exhibit a maximum rate of heat release not exceeding 100 kW when applied in accordance with the manufacturer's recommendations and tested in accordance with section 5.5 of NFPA 289.~~

Commenter's Reason: Both testimony and the committee highlighted that it is important to clarify that this code section only becomes a requirement "where fire retardant treatments are applied" meaning that this does not introduce a requirement that any treatment be applied to natural cut trees. It was also noted that it must be clarified that the requirement applies to the treatment and does not apply to the tree. Therefore, it is the commercial treatment that needs to be tested and not the individual trees.

Also, it was pointed out enforcement would be easier if the packaging for the fire retardant treatment was labeled simply to comply with the ASTM test, which has its own pass-fail criteria.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. Manufacturers of fire retardant treatments will need to perform fire tests to prove that their treatments actually increase the fire performance of the trees upon which they are applied.

F93-18

F95-18

IFC: 808.4

Proposed Change as Submitted

Proponent: Misty Guard, representing Bradley Corporation (Misty.Guard@bradleycorp.com)

2018 International Fire Code

Revise as follows

808.4 Combustible lockers. Where lockers constructed of combustible materials are used, the lockers shall be considered to be interior finish and shall comply with ~~Section 803~~Table 803.3.

Exception: Lockers constructed entirely of wood and noncombustible materials shall be permitted to be used wherever interior finish materials are required to meet a Class C classification in accordance with Section 803.1.2.

Reason: The current requirement references all of Section 803, whereas the intent is to apply Table 803.3 for interior finish. Combustible lockers are made of different materials, including wood, ABS, and HDPE. If the material meets the interior finish requirements of Table 803.3 then they should be permitted.

The current Section 803 would appear to apply different requirements for wood, ABS, and HDPE lockers. The exception to allow any wood to be classified as Class C is acceptable. There is an implication that HDPE would be regulated differently than ABS. Section 803.9 could be incorrectly interpreted as applying to HDPE lockers. However, this section was never intended to apply to lockers. The original change adding this section addressed large areas of HDPE panels as an interior finish. No mention was made in the code change of lockers.

HDPE lockers have been installed for the last 25 years, as have ABS lockers. Many fire stations, schools, and health club like the added benefits of HDPE and ABS lockers. From a cleanliness and sanitation standpoints, HDPE and ABS lockers are superior to many metal lockers.

A study was completed by NFPA Research entitled, "Non-Residential Structure Fires That Originated in Lavatories, Locker Rooms or Coat Check Rooms," dated November 2017, authored by Marty Ahrens. The report shows no fire issue with HDPE or ABS lockers. There are no fire deaths reported from fires originating in a locker room. Hence, the perceived fire hazard does not exist with lockers in commercial building that meet the interior finish requirements of Table 803.3. This change is needed for clarification.

Bibliography: Ahrens, M. (2017). Non-Residential Structure Fires that Originated in Lavatories, Locker Rooms or Coat Check Rooms. Quincy, MA: NFPA Research.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The code change proposal will not increase or decrease the cost of construction.

F95-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that they did not agree with the proposed revised reference to the table and that it was incorrect. (Vote: 14-0)

Assembly Action:

None

F95-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Building Owners and Managers Association International (jbenigneer@aol.com); Andrew Klein, representing Building Owners and Managers Association International (andrew@asklein.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

808.4 Combustible lockers. Where lockers constructed of combustible materials are used, the lockers shall be considered to be interior finish and shall comply with ~~Table 803.3~~ Section 803.

Exception:Exceptions:

1. Lockers constructed entirely of wood and noncombustible materials shall be permitted to be used wherever interior finish materials are required to meet a Class C classification in accordance with Section 803.1.2..
2. Plastic lockers located in locker rooms shall meet a Class B or C classification in accordance with Section 803.1.2 based on the requirements of Table 803.3.

Commenter's Reason: Locker rooms are a unique location and also where lockers are located. Quite often plastic lockers are installed because of they are a high quality to resist mold growth, corrosion resistance, readily cleanable, and quiet. Locker rooms are often subjected to continuous high humidity, hence, the benefits of plastic lockers. The plastic lockers typically meet the Class C requirements.

When a change was made to regulate lockers in the 2012 edition of the Fire Code, the result was that plastic HDPE lockers were required to meet Class A requirements and be tested to NFPA 286. The same requirements do not apply to ABS or PVC lockers. Plastic lockers are made from all these materials. This results in a prejudicial requirement against HDPE lockers without technical justification. The initial code change on lockers only stated that the can be a significant fire load with plastic lockers. However, no fire load was given, no fire statistics were given, nor were any fire death related to locker fires presented.

Prior to the code change to the Fire Code, lockers in locker rooms were considered the equivalent to furniture. Plastic lockers, including HDPE lockers, have been used and installed for more than 25 years. Interestingly, many HDPE plastic lockers are installed in firehouses and fire stations. Fire statistics from NFPA indicate that plastic lockers have NOT been a fire concern. A copy of the NFPA report is available upon request from JBEngineer@aol.com.

Plastic lockers are often located near plastic shower modules. These plastic shower modules do not have to meet the requirements of NFPA 286. Only one product line in a locker room has been singled out, HDPE plastic lockers. This modification corrects the requirements and treats all plastic locker equally.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction This will revert the requirements for lockers to the 2009 and earlier edition whereby all plastic lockers can be evaluated based on their flame spread and smoke developed rating. A change to the 2012 edition added special requirements for one type of locker which eliminates the lockers from use without any technical justification.

F95-18

F100-18

IFC: 901.4.4, 901.5, 901.5.1, 901.6, 901.8

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Fire Code

Revise as follows

901.4.4 Additional fire protection systems. In occupancies of a hazardous nature, where special hazards exist in addition to the normal hazards of the occupancy, or where the *fire code official* determines that access for fire apparatus is unduly difficult, the *fire code official* shall have the authority to require additional ~~safeguards. Such safeguards include, but shall not be limited to, the following: automatic fire detection systems, fire alarm systems, automatic fire extinguishing systems, standpipe systems, or portable or fixed extinguishers.~~ Fire protection equipment safeguards and fire protection systems. Fire protection systems required under this section shall be installed in accordance with this code and the applicable referenced standards.

901.5 Installation acceptance testing. ~~Fire detection and alarm systems, emergency alarm systems, gas detection systems, fire extinguishing systems, fire hydrant systems, fire standpipe systems, fire pump systems, private fire service mains and all other fire~~ Fire protection systems and appurtenances thereto shall be subject to acceptance tests as contained in the installation standards and as *approved* by the *fire code official*. The *fire code official* shall be notified before any required acceptance testing.

901.5.1 Occupancy. It shall be unlawful to occupy any portion of a building or structure until the required fire ~~detection, alarm and suppression~~ protection systems have been tested and *approved*.

901.6 Inspection, testing and maintenance. ~~Fire detection and alarm systems, emergency alarm systems, gas detection systems, fire extinguishing systems, mechanical smoke exhaust systems and smoke and heat vents protection systems~~ shall be maintained in an operative condition at all times, and shall be replaced or repaired where defective. Nonrequired *fire protection systems* and equipment shall be inspected, tested and maintained or removed in accordance with Section 901.8.

901.8 Removal of or tampering with equipment. It shall be unlawful for any person to remove, tamper with or otherwise disturb any fire ~~hydrant, fire detection and alarm system, fire suppression system or other fire appliance~~ protection system required by this code except for the purposes of extinguishing fire, training, recharging or making necessary repairs or where *approved* by the *fire code official*.

Reason: Section 901.1 through 901.4.3 uses "Fire Protection System" and the remainder of 901 uses a list of multiple systems, many times leaving out sprinkler systems and other types of systems. This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will not increase or decrease the cost of construction Language clarifies and encompasses all systems that meet the definition. No cost involved.

F100-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval is based upon the proponent's published reason regarding the clarification of the language in the sections. (Vote: 14-0)

Assembly Action:

None

F100-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jeffrey Hugo, representing National Fire Sprinkler Association (hugo@nfsa.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

901.4.4 Additional fire protection systems. In occupancies of a hazardous nature, where special hazards exist in addition to the normal hazards of the occupancy, or where the *fire code official* determines that access for fire apparatus is unduly difficult, the *fire code official* shall have the authority to require additional safeguards and fire protection systems. Fire protection and life safety systems required under this section shall be installed in accordance with this code and the applicable referenced standards.

901.5 Installation acceptance testing. Fire protection and life safety systems and appurtenances thereto shall be subject to acceptance tests as contained in the installation standards and as *approved* by the *fire code official*. The *fire code official* shall be notified before any required acceptance testing.

901.5.1 Occupancy. It shall be unlawful to occupy any portion of a building or structure until the required fire protection and life safety systems have been tested and *approved*.

901.6 Inspection, testing and maintenance. Fire protection and life safety systems shall be maintained in an operative condition at all times, and shall be replaced or repaired where defective. Nonrequired *fire protection and life safety* systems and equipment shall be inspected, tested and maintained or removed in accordance with Section 901.8.

901.8 Removal of or tampering with equipment. It shall be unlawful for any person to remove, tamper with or otherwise disturb any fire protection and life safety system required by this code except for the purposes of extinguishing fire, training, recharging or making necessary repairs or where *approved* by the *fire code official*.

Commenter's Reason: This correlates the beginning of Ch. 9 to the action on F97-18 by adding in "...and life safety..."

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Correlation.

F100-18

F106-18

IFC: 903.2.7, 903.2.9 (IBC: [F] 903.2.7, [F] 903.2.9)

Proposed Change as Submitted

Proponent: Ellie Klausbruckner, Klausbruckner & Associates Inc., representing Klausbruckner & Associates, Inc. (ek@klausbruckner.com)

2018 International Fire Code

Revise as follows

903.2.7 Group M. An *automatic sprinkler system* shall be provided throughout buildings containing a Group M occupancy where one of the following conditions exists:

1. A Group M *fire area* exceeds 12,000 square feet (1115 m²).
2. A Group M *fire area* is located more than three stories above grade plane.
3. The combined area of all Group M *fire areas* on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m²).
4. A Group M occupancy where the area used for the display and sale of upholstered furniture or mattresses exceeds 5,000 square feet (464 m²).

903.2.9 Group S-1. An *automatic sprinkler system* shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

1. A Group S-1 *fire area* exceeds 12,000 square feet (1115 m²).
2. A Group S-1 *fire area* is located more than three stories above grade plane.
3. The combined area of all Group S-1 *fire areas* on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m²).
4. A Group S-1 *fire area* used for the storage of commercial motor vehicles where the *fire area* exceeds 5,000 square feet (464 m²).
5. A Group S-1 occupancy where the area used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m²).

Reason: In a lot of retail or storage areas there may be as little as a few upholstered furniture for display or storage. These sections imply if the area of the display or storage of upholstered furniture is even 10 sq ft and this display is located in a very large room/building, that the entire room/building needs to be sprinklered. We do not believe this was the intent of this section.

Cost Impact: The code change proposal will decrease the cost of construction. This is intended to clarify that the area of the upholstered display or storage and not the entire room needs to be considered. A lot of businesses having small number of upholstered furniture will no longer be "lumped" together with facilities that are of actual concern.

F106-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval is based upon the proponent's published reason and that the current language is overly restrictive as written. The addition of "where the area" provides clarification that it is the area used that determines the condition. (Vote: 8-6)

Assembly Action:

None

F106-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Fire Code

903.2.7 Group M. An *automatic sprinkler system* shall be provided throughout buildings containing a Group M occupancy where one of the following conditions exists:

1. A Group M *fire area* exceeds 12,000 square feet (1115 m²).
2. A Group M *fire area* is located more than three stories above grade plane.
3. The combined area of all Group M *fire areas* on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m²).
4. ~~A Group M occupancy where the area used for the display and sale of upholstered furniture or mattresses exceeds 5,000 square feet (464 m²).~~

903.2.7.2 Group M upholstered furniture or mattresses. An *automatic sprinkler system* shall be provided throughout a Group M fire area where the area used for the display and sale of upholstered furniture or mattresses exceeds 5,000 square feet (464 m²).

903.2.9 Group S-1. An *automatic sprinkler system* shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

1. A Group S-1 *fire area* exceeds 12,000 square feet (1115 m²).
2. A Group S-1 *fire area* is located more than three stories above grade plane.
3. The combined area of all Group S-1 *fire areas* on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m²).
4. A Group S-1 *fire area* used for the storage of commercial motor vehicles where the *fire area* exceeds 5,000 square feet (464 m²).
5. ~~A Group S-1 occupancy where the area used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m²).~~

903.2.9.3 Group S-1 upholstered furniture and mattresses. An *automatic sprinkler system* shall be provided throughout a Group S-1 fire area where the area used for the storage of upholstered furniture exceeds 2,500 square feet (232 m²).

Exception: Self-service storage facilities no greater than one story above grade plane where all storage spaces can be accessed directly from the exterior.

Commenter's Reason: This public comment is intended to correlate the language of F102-18 which was approved by the committee as modified and F106-18 which was approved as submitted by the committee. In a lot of retail or storage areas there may be as little as a few upholstered furniture for display or storage. These sections imply if the area of the display or storage of upholstered furniture is even 10 sq ft and this display is located in a very large room/building, that the entire room/building needs to be sprinklered. We do not believe this was the intent of this section.

This public comment addresses a number of issues dealing with the suppression requirements for spaces containing upholstered furniture or mattresses.

The term Occupancy is replaced with fire area to clarify that the target hazard is the space containing the hazard.

The threshold language has been dropped down to its own subsection to provide for suppression being installed only within the target hazard fire area, not the entire building the fire area may be located within. An exception has been added to the S-1 trigger for one story self-service storage facilities where all storage spaces can be accessed from the exterior.

This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

By limiting the fire suppression requirement to the targeted hazard fire area instead of suppressing the whole building, the cost of construction could be reduced in certain situations.

This is intended to clarify that the area of the upholstered display or storage and not the entire room needs to be considered. A lot of businesses having small number of upholstered furniture will no longer be "lumped" together with facilities that are of actual concern.

Public Comment 2:

Proponent: Marcelo Hirschler, GBH International, representing GBH International (mmh@gbhint.com) requests Disapprove.

Commenter's Reason: This proposal is unenforceable since "the area used for the display and sale of upholstered furniture or mattresses" or "the area used for the storage of upholstered furniture or mattresses" can be changed continuously as a function of the number of items available for storage, display or sale. Proposal F102, also accepted by the committee (with modifications) is clear, in that it addresses the "fire area" which is a function of the design of the building and will not depend on the number of items present.

Note that there was significant amount of opposition from the committee (8-6).

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposal F102 is the one that decreases the cost impact. Disapproving this proposal has no effect.

F106-18

F110-18

IFC: 903.2.10, 903.2.11.3 (IBC: [F]903.2.10, [F]903.2.11.3)

Proposed Change as Submitted

Proponent: Jeffrey Shapiro, representing National Fire Sprinkler Association (jeff.shapiro@intlcodeconsultants.com)

2018 International Fire Code

903.2.10 Group S-2 enclosed parking garages. An automatic sprinkler system shall be provided throughout buildings classified as enclosed parking garages in accordance with Section 406.6 of the International Building Code where either where any of the following conditions exists:

1. Where the fire area of the enclosed parking garage in accordance with Section 406.6 of the International Building Code exceeds 12,000 square feet (1115 m²).
2. Where the enclosed parking garage in accordance with Section 406.6 of the International Building Code is located beneath other groups.

Exception: Enclosed parking garages located beneath Group R-3 occupancies.

3. Where the fire area of the open parking garage in accordance with Section 406.5 of the International Building Code exceeds 48,000 square feet (4460 m²).

903.2.11.3 Buildings 55 feet or more in height. An automatic sprinkler system shall be installed throughout buildings that have one or more stories with an occupant load of 30 or more located 55 feet (16 764 mm) or more above the lowest level of fire department vehicle access, measured to the finished floor.

Exception:Exceptions:

~~1.Open parking structures.~~

~~2.Occupancies in Group F-2.~~

Reason: Historically, open parking garages have been considered to have a very low fire risk, which has led to dozens of special allowances for reduced code requirements in these occupancies. Fire tests run decades ago offered some support for this perspective. However, it is common knowledge that much of what makes up a vehicle today is combustible, and bodies and interior components that may previously have been of steel are now primarily plastic, rubber, fiberglass and lightweight metals, facilitating vehicle-to-vehicle fire spread and production of dense combustible smoke layers. Stored energy systems in electric vehicles also increase the fuel load. Nevertheless, the wisdom of exempting open parking garages from many code requirements that would otherwise apply has tended to go unchallenged, lacking sufficient evidence to demonstrate the existence of a problem. That has now changed. An open parking garage fire in Liverpool UK on January 1, 2018 demonstrated the fire risk associated with the new world order of vehicle construction. The concrete building and 1,400 cars were destroyed by a fire that reportedly started in a single vehicle's engine compartment.

The thought that allowing smoke to escape from an open parking garage perimeter will entirely mitigate fire risk is certainly debunked by this incident, and this proposal seeks to recognize that these structures and their contents can present significant challenges to the fire service and result in catastrophic fire losses. The recommended sprinkler threshold based on building height is consistent with the threshold that was established years ago for most occupancies, and the reason for exempting open parking garages is no longer evident. The proposal also provides for an area based threshold, which is very generous compared to other occupancies that might be argued as having similar, or even lesser, fire loads. The recommended value is four times larger than what is applicable to enclosed garages, recognizing that, while there may be some benefit to perimeter openings, the fire service will ultimately be relied on to control these fires if sprinklers are not provided. Therefore, it is appropriate to limit the size of a fire area in these building so that there is a reasonable ability of the fire service to access and extinguish a fire before it becomes uncontrollable.

Cost Impact: The code change proposal will increase the cost of construction
Yes, there is a cost increase.

F110-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 2018 International Building Code

[F] 403.3 Automatic sprinkler system. Buildings and structures shall be equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 and a secondary water supply where required by Section 403.3.3.

Exception: An automatic sprinkler system shall not be required in spaces or areas of:

- ~~1. Open parking garages in accordance with Section 406.5.~~
2. Telecommunications equipment buildings used exclusively for telecommunications equipment, associated electrical power distribution equipment, batteries and standby engines, provided that those spaces or areas are equipped throughout with an automatic fire detection system in accordance with Section 907.2 and are separated from the remainder of the building by not less than 1-hour fire barriers constructed in accordance with Section 707 or not less than 2-hour horizontal assemblies constructed in accordance with Section 711, or both.

2018 International Fire Code

914.3.1 Automatic sprinkler system. Buildings and structures shall be equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 and a secondary water supply where required by Section 914.3.2.

Exception: An automatic sprinkler system shall not be required in spaces or areas of:

- ~~1. Open parking garages in accordance with Section 406.5 of the International Building Code.~~
2. Telecommunications equipment buildings used exclusively for telecommunications equipment, associated electrical power distribution equipment, batteries and standby engines, provided that those spaces or areas are equipped throughout with an automatic fire detection system in accordance with Section 907.2 and are separated from the remainder of the building by not less than 1-hour fire barriers constructed in accordance with Section 707 of the International Building Code or not less than 2-hour horizontal assemblies constructed in accordance with Section 711 of the International Building Code, or both.

Committee Reason: Approval of the modification is based on the need to revise the high-rise sections in order to be consistent with the revision to Section 903.2.11.3. Approval of the proposal is based upon the proponent's published reason. (Vote: 10-4)

Assembly Action:

None

F110-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jonathan Humble, American Iron and Steel Institute, representing American Iron and Steel Institute (jhumble@steel.org)requests Disapprove.

Commenter's Reason: We recommend that this proposal be disapproved because the proposal:

- Lacks technical substantiation to warrant this change, and
- Raises more questions about vehicle fires.

The substantiation of the code change proposals relies heavily on the incident in Merseyside, U.K. Using that information, in conjunction with other information provided to us, we find:

The report [1] by Merseyside Fire & Rescue Service recommends automatic fire sprinklers in combination with adequate floor (parking level tier) drains, but does not address quantity and location of drains necessary to assist in mitigating fires as a result of the spillage and ignition of fuel combined with the water from the automatic fire sprinklers. The code change proposal also recommends sprinkler protection however it does not address the coordination or relationship with drainage.

The report [1] discussed the use of joints for drainage with PVC type pipes as a contributing factor in the spread of fire below the incident floor. In the US such a system is not common in the construction of open parking structures as joints in floors are normally sealed.

Both the report [1] and testimony at the spring code hearing discussed the construction of vehicles in today's market as containing more plastic components which could have contributed to the fire spreading. However, this is merely a general claim. We do not know how many of the plastic parts actually contributed since there are also plastic parts attached to the engine block of vehicles which do not readily combust. Therefore, it is clear that this subject requires further study as to what did or did not contribute to the spread of the fire.

Parking structures in North America continue to have a very low rate of incident as borne out through testimony by the proponent and the many studies conducted from 1972 through 2011 [2,3,4,5].

The proposal's substantiation raises more questions about other circumstances which involve vehicles, such as: surface parking lots, automobile retail establishments, etc. which had not been addressed by this code change submission or any other code change proposals.

All of the above suggest we should not just accept this proposal, but rather consider evaluating this subject further.

Bibliography: [1] MF&RS, "Kings Dock Car Park Fire Protection Report April 2018", Merseyside Fire & Rescue Service, Service Headquarters, , Bridle Road, Bootle, Merseyside, United Kingdom, L30 4YD, April, 2018.

[2] MRA, "Survey of Fire Experience in Automobile Parking Structures in the United States and Canada", Market Research Associates, New Jersey, 1972.

[3] MRA, "1979 Update of the Survey of Fire Experience in Automobile Parking in the United States and Canada", Market Research Associates, New Jersey, 1979.

[4] PMR, "Parking Garage Fires - A Statistical Analysis of Parking Garage Fires in the United States: 1986-1988", Parking Market Research Company, McLean, VA, 1992.

[5] NPA, "Parking Structure Fire Facts - A Summary of Current Research", National Parking Association Consultants Council, 2011.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This public comment to disapprove will decrease the cost of construction as it will remove the proposed requirement for an automatic fire suppression system for open parking structures.

Public Comment 2:

Proponent: Stephen Skalko, Stephen V. Skalko, P.E. & Associates, LLC, representing Stephen V. Skalko, P.E. & Associates, LLC (svskalko@svskalko-pe.com); Jason Krohn, Precast/Prestressed Concrete Institute, representing Precast/Prestressed Concrete Institute (jkrohn@pci.org); William Hall, Portland Cement Association, representing Alliance for Concrete Codes and Standards (jhall@cement.org) requests Disapprove.

Commenter's Reason: The proponent of F110-18 did not provide any technical documentation with the expected robustness needed to make such a drastic change to the building code by requiring open parking garages to be fully sprinklered and therefore should be disapproved. The following points are offered to support this position of Disapproval.

The recent fire loss in an open parking garage, that the Fire Committee found compelling in the Reason Statement of the proponent of F110-18, involves a fire incident that occurred in the UK at the first of 2018. All the details of this incident were not known at the time of the Code Action Hearing (CAH). However, upon review of the final report by the Merseyside Fire and Rescue Service (MFRS), the parking garage in question, referred to as a car park in the UK, had design features that likely contributed to fire spread between floors resulting in a far larger number of vehicles becoming involved than normal for vehicle fire incidences [Merseyside Fire Rescue Service, *Kings Dock Car Park Fire Protection Report*, April 2018, Merseyside, UK].

The following are two of the most notable differences of these design features contributing to the spread of fire in the UK car park incident:

- ○ The car park had a light gauge aluminum drainage tray attached to the underside of each precast floor panel and in line with the joint of the precast floor system. The trays lead to plastic vertical piping to transfer liquids to the building storm water drainage system. The design called for a 1/2-inch gap between floor panels to allow drainage into the aluminum tray below. This gap in the floor joints allowed burning fuel spills from vehicle gas tanks to flow directly to floors below which spread fire to vehicles on other floors.

In the United States the floor joints are not left open. They are typically sealed by a combination backer rod and sealant or covered by the placement of a concrete topping with tooled and sealed joints. This not only minimizes spread of fire to floors below by leaking fuels, but also inhibits the spread of flames from the incident floor to vehicles on floors above.

- ○ The building code requirements in the UK permitted only a 15-minutes structural fire resistance of the precast concrete floors for the Kings Dock car park. The fire exposure from the initial vehicle (and subsequent vehicles) damaged the underside of the floor panels above sufficient enough to permit the fire to extend upward to vehicles on the next parking level.

In the US the typical precast floor systems in open parking garages meets at least a minimum of a 1-hour fire resistance, which increases significantly the ability to prevent fire spread between floors.

A study of car park fires in the UK showed a total 3,096 fire incidences over a twelve-year period [BD2552 *Fire Spread in Car Parks*, Building Research Establishment for Department for Communities and Local Government, December 2010]. The average number of car park fires per year for that period was 258/year. This represents a very low number of incidences per year and thus low risk for fires in car parks. The experience with fire incidences in the US is also very low risk for this building occupancy type.

- ○ The US Fire Administration statistics show an average of over 1.7 million fires [FA-311, *Fire in the United States 1994-2004*, 14th edition, August 2007] for the period from 1999 to 2002. When compared to the average total parking garage fires (1760 incidents) described in an NFPA study of parking garage fires [M. Ahrens, *Structure and Vehicle Fires in General Vehicle Parking Garages*, NFPA, January 2006] represent less than 0.1% of the fire incidences.
- ○ A Parking Market Research Company (PMRC) study [D.F. Denda, *Parking Garage Fires (A Statistical Analysis of Parking Garage Fires in the United States: 1986-1988)*, Parking Market Research Company, April 1992] reached a similar conclusion on such low risk. That study looked at over 4,400 fire incidences for general vehicle parking including garages and surface lots with only 25% of these incidences in parking garages. During that same 3-year period approximately 7 million total fire incidences were reported. The parking garage fires for that 3-year period represent about 0.016% of the total fires.

The car park fire incident in the UK, with the significantly large number of vehicles becoming involved due to mitigating circumstances and design features contributing to fire spread, was an unusual event and is not a sufficient basis to support F110-18. The design practices and features of open parking structures in the US, which minimize fire spread between floors and reasonably withstand the structural impact from fire effects, have been shown to have an excellent record when it comes to fire incidences. Based on open parking garages having a very low risk from vehicle fires in the US, the mandate for sprinkler protection in the IFC is unwarranted.

Recommend DISAPPOVAL of F110-18

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction if F110-18 is approved it will increase the cost of construction of open parking garages. Disapproval will result in no increase in costs.

F110-18

F117-18

IFC: 903.3.1.2 (IBC[F] 903.3.1.2)

Proposed Change as Submitted

Proponent: Stephen DiGiovanni, representing self (sdigiovanni@clarkcountynv.gov)

2018 International Fire Code

Revise as follows

903.3.1.2 NFPA 13R sprinkler systems. ~~Automatic sprinkler systems in Group R occupancies up to and including four stories in height in buildings not exceeding 60 feet (18 288 mm) in height above grade plane shall be permitted to be installed throughout in accordance with NFPA 13R.~~ The 13R where the Group R occupancy meets all of the following conditions:

1. Four stories or less above grade plane.
2. The floor level of the highest story is 30 feet (9114 mm) or less above the lowest level of fire department vehicle access.
3. The floor level of the lowest story is 30 feet (9114 mm) or less below the lowest level of fire department vehicle access.

~~The number of stories of Group R occupancies constructed in accordance with Sections 510.2 and 510.4 of the International Building Code shall be measured from the horizontal assembly creating separate buildings grade plane.~~

Reason: The recent fires in Group R occupancies, both occupied and under construction, requires revisiting the applicable code requirements.

One major concern is the affect of the recent advent of podium-style buildings, and how the code has changed to allow NFPA 13R sprinkler systems to heights that exceed the original scope of NFPA 13R. The scope of NFPA 13R, 2007 edition, reads "This standard shall cover the design and installation of automatic sprinkler systems for protection against fire hazards in residential occupancies up to and including 4 stories in height". In 2013, the scope of NFPA 13R was changed to read "This standard shall cover the design and installation of automatic sprinkler systems for protection against fire in residential occupancies up to and including four stories in height in buildings not exceeding 60 feet (18 m) in height above grade plane."

This followed a change in the 2009 IBC that greatly expanded the use of the podium concept. After the expansion of the podium concept, the increase in height for NFPA 13R systems was permitted, leading us to where we are today. Today, 5 and 6 story height buildings can be created, where the separate podium building is one or two stories (measured from grade plane) and the other separate building, atop the podium building, is 4 stories as measured from the podium, all protected with NFPA 13R fire sprinklers.

There is a big difference in the protection provided between NFPA 13R and NFPA 13 systems, in the required design density and areas covered by fire sprinklers. Allowing the NFPA 13R sprinkler system for these taller podium style buildings leads to a significant decrease in the protection being provided by automatic fire sprinklers, versus what was required prior to the code changes referenced above.

When determining a suitable trigger for height to propose for this code section, a review of other parts of the code led to the requirements for when standpipe systems are required per Section 905.3.1. Philosophically, standpipe systems would be required where travel distance by responding fire fighters is long enough that hose lines fed directly from fire engines may not reach the fire, so that fire hose would need to be carried into the building, for connection to an outlet that is closer to the fire. The decision to trigger the requirement for a standpipe would represent a recognition of an increased building hazard, which in this can be adapted as a means to determine the break point between allowing a NFPA 13R sprinkler system, and requiring a NFPA 13 sprinkler system.

Cost-wise, the infrastructure, such as main pipe sizes, required to install a standpipe system, would ease the impact of requiring the sprinkler system to be NFPA 13, rather than NFPA 13R. While there would be significant argument that the pipe sizes would all have to be increased in order to change from NFPA 13R to NFPA 13, which would clearly increase costs, this increase is tempered by the fact that the pipe sizes required to comply with the standpipe system are so large that the NFPA 13 sprinkler design can very easily be accommodated with little to no increase in pipe sizing. In other words, by using the same requirement for when a standpipe system is required, the impact of requiring a NFPA 13 system, versus 13R, is substantially reduced.

For this reason, the proposal is to use the trigger for installation of a standpipe system, per existing Section 905.3.1, as the upper limit for permitting the installation of NFPA 13R systems, and by default creating the trigger for switching the sprinkler system to a NFPA 13 sprinkler system in Group R occupancies.

In summary, this proposal intends to address the recent fire history in Group R occupancies, especially those built with the podium concept, and seeks to increase the protection required in these buildings. The proposal utilizes the same trigger for requiring a standpipe system, for the point where the sprinkler system would have to change from NFPA 13R design, to NFPA 13 design. While there is still an increase in cost, this increase is greatly minimized due to the already existing requirement for standpipe systems.

Cost Impact: The code change proposal will increase the cost of construction

This proposal will increase construction costs by requiring NFPA 13 sprinkler systems in some situations where NFPA 13R sprinkler systems are currently permitted. There is no doubt that, due to the difference in water flow required, additional sprinkler requirements, and other requirements in the NFPA standards, that the cost of NFPA 13 sprinkler systems is higher than the cost of NFPA 13R sprinkler systems. Some of this cost is mitigated by aligning the new requirement to the requirement for installing a standpipe system, which already would represent greater flow capacity for the building, ostensibly requiring larger diameter mains already; however, even with this mitigating factor, there is little doubt that this code change would represent an increase in overall construction costs.

F117-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval is based upon the proponent's published reason. (Vote: 11-3)

Assembly Action:

None

F117-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Dan Buuck, representing National Association of Home Builders (dbuuck@nahb.org); Margo Thompson (mthompson@newportventures.net); John Catlett (jcatlett@boma.org); Jeffrey Hugo, National Fire Sprinkler Association (hugo@nfsa.org); Paula Cino (pcino@nmhc.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

903.3.1.2 NFPA 13R sprinkler systems. *Automatic sprinkler systems* in Group R occupancies up to and including four stories in height above grade plane shall be permitted to be installed throughout in accordance with NFPA 13R ~~where the Group R occupancy meets all of the following conditions:~~

- ~~1. Four stories or less above grade plane.~~
- ~~2. The floor level of the highest story is 30 feet (9114 mm) or less above the lowest level of fire department vehicle access.~~
- ~~3. The floor level of the lowest story is 30 feet (9114 mm) or less below the lowest level of fire department vehicle access.~~

The number of stories of Group R occupancies constructed in accordance with Sections 510.2 and 510.4 of the International Building Code shall be measured from grade plane.

Commenter's Reason: Similar to the original proposal, this public comment limits the overall height of Group R occupancies to four stories above the grade plane, where current code allows up to four stories above the pedestal. This public comment differs from the proposal by removing the 30-foot maximum height allowance for NFPA 13R systems. As stated in the summary of the NFPA Life Safety Sprinkler System Workshop (<https://tinyurl.com/ybysd3wr>), there is no question that NFPA 13R systems have been effective. For that reason, it is unnecessary to lower the threshold for their use to 30 feet, which limits multifamily buildings to 3 stories above grade once the foundation is accounted for. With 66% of the multistory buildings constructed in 2017 being 3 stories or more (https://www.census.gov/construction/chars/pdf/mfb_floors.pdf), the proposal as originally written substantially increases cost for the multifamily building industry.

The 30-foot height limit for requiring a NFPA 13R fire sprinkler system in the original proposal was chosen to correlate with the requirement for standpipes in Section 905.3.1. However, correlating the threshold of 30 feet to the topmost floor starts the requirement for standpipes but it stops the application of NFPA 13R. This means a four-story building over 30 feet would have a standpipe and a NFPA 13 system. While there are potentially increased pipe sizes for the combined standpipe and the NFPA 13 sprinkler system, as explained below *, a manual wet standpipe is permitted for four story buildings. Adding a NFPA 13 system with the standpipe at the fourth floor requires more flow and pressure to the sprinkler system, meaning, in most cases, it adds a standalone fire pump to supply the sprinkler system demand, negating the benefit of having the manual wet standpipe option.

National Multifamily Housing Members estimate that moving from 13R to 13 sprinkler systems would carry an incremental installed cost increase of approximately \$1.00/sq. ft. \$2.00/sq. ft. of overall building area on average across the US. This does not include final cost with markup to the building owner or adding a fire pump to the NFPA 13 system. Greater density and spacing of sprinklers, larger pipe diameter, sprinklers in concealed spaces, and especially, requirements for attic protection (with some exceptions) all contribute to the added cost. Costs associated with requirements for attic protection in 13 systems not only includes the additional sprinklers and piping but also costs associated with increased

hydraulic demand and water supply as well as necessary freeze protection in cold and even moderate climates. Price quotes and completed projects have shown that installing a NFPA 13 system can add approximately 50% to the cost compared to a NFPA 13R system. The extent of these costs are dependent upon regulatory costs, size of the system, available water supply, whether a fire pump is required, etc.

* A four-story residential occupancy protected by a NFPA 13R system also is required to have a Class I standpipe system (IFC 905.3.1). A Class I standpipe can be of several types, such as automatic dry or wet and manual dry or wet (NFPA 14: 5.4.1.1). Typically in a sprinklered building with a standpipe, the systems are combined (NFPA 14: 3.3.15.3 and 7.10.1.3), this means the above ground pipe is used for both purposes: to serve as a single pipe system in stairways to serve standpipe hose connections and to serve the floor fire sprinkler system. A combined sprinkler/standpipe system contains water at all times, but when the manual wet standpipe (NFPA 14: 3.3.15.5) is combined with the sprinkler system, it only has the system demand (flow and pressure) to serve the sprinkler system. The standpipe system demand (flow and pressure) is supplied by the fire department through the fire department connection to serve the standpipe hose outlets. In other words, there is enough flow and pressure from the municipal water supply to provide the sprinkler system demand (NFPA 14: 3.3.18), but not the standpipe system. The standpipe pressure is provided by the fire department during a fire. What is the purpose for using a wet manual systems? It eliminates the need for a fire pump to serve the standpipe only, since the fire department only uses the Class I hose connections, the fire department is allowed per NFPA 14 to provide the pressure. NFPA 14 allows manual wet systems to serve low-and mid-rise buildings but not high-rises. Since this proposal only allows four-stories from grade plane and Chapter 5 doesn't allow any building using NFPA 13R to be over 60 feet in height, there is no potential for misapplication. In fact, the manual wet standpipe combined with the sprinkler system has been allowed by the codes for many years and is typical for most new four-story residential construction.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. This public comment will increase construction costs compared to current code by requiring NFPA 13 sprinkler systems in pedestal buildings where NFPA 13R sprinkler systems are currently permitted. However, it will lessen the cost impact to overall construction, including four-story residential buildings, compared to the original proposal. It is estimated that moving from a NFPA 13R to a NFPA 13 sprinkler system would carry an incremental installed cost increase of approximately \$1.00/sq. ft. - \$2.00/sq. ft. of overall building area on average across the US.

Public Comment 2:

Proponent: Tien Peng, representing National Ready Mixed Concrete Association (tpeng@nrmca.org) requests As Submitted.

Commenter's Reason: Under **903.3.1.2 NFPA 13R sprinkler systems**. *Automatic sprinkler systems* in Group R occupancies up to and including **four stories** in height shall be permitted to be installed throughout in accordance with NFPA 13R.

The number of stories used in determining the minimum type of construction for buildings, including pedestal or podium construction should be measured from **the grade plane or lowest level of fire department access** per this proposal to meet the intent of the NFPA sprinkler system designed per 903.3.1.2 for R Occupancies. The trade-off allowing for the number of stories to be counted from the podium continues the increased fire risks and community costs. Examples such as Edgewater, NJ, DaVinci, Los Angeles, College Park, MD, Montrose Fire, Houston, TX all point to the increase risks.

Bibliography: N/A

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. Code should be revised in favor of occupant safety even if there is a slight increase in construction costs.

Public Comment 3:

Proponent: Ken Brouillette, City of Seattle Fire Department, representing Seattle Fire Department (ken.brouillette@seattle.gov); Jonathan Siu, City of Seattle Department of Construction and Inspections (jon.siu@seattle.gov) requests Disapprove.

Commenter's Reason:

Brouillette: The appropriate use of NFPA 13R should continue to be developed through the NFPA process and not by ICC. NFPA 13R states, NFPA 13R is appropriate for use as an alternative to NFPA 13 only in those residential occupancies, as defined in this standard, up to and including four aboveground stories in height. It should be noted that model building codes contain special allowances for pedestal or podium-style buildings, which permit the story height for structures above the pedestal to be measured from the top surface of the pedestal, rather than from grade plane, and it is the intent of NFPA 13R to follow this model building code method for determining the number of stories. Accordingly, it is possible for a four-story residential structure to be within the scope of NFPA 13R even when that structure is constructed

on top of a one-story pedestal. However, where this is allowed, model building codes will require the pedestal portion to be constructed using Type I construction, and the pedestal portion will be required to be protected by an NFPA 13 compliant sprinkler system.

NFPA 13R also indicates that the standard is limited to buildings that are 60 ft (18 m) or less in height above grade plane.

The current code language in the 2018 IFC is consistent with the scope of NFPA 13R and should not be changed unless the standard itself has been changed through NFPA .

This code change requirement would be too restrictive as it removes the current allowance for buildings up to 60 feet in height measured from grade plane.

Siu: Our objection to this proposal is that by measuring to lowest fire department vehicle access, it penalizes buildings built on downsloping corner lots. Figure 1 below depicts two identical buildings built side-by-side, fronting on a level street (site plan). Both lots have identical slopes downward from the street (west elevation). Building 2 is built mid-block; Building 1 is built on a street corner. Because lowest fire department vehicle access for the Building 1 is measured from the sloping side street, its measurement datum is lower than the mid-block building, which is measured from the fronting street. Based on the measurements shown in the figure, this proposal would trigger a full NFPA 13 system for the Building 1 whereas the Building 2 could use an NFPA 13-R system, yet in all ways except location, the buildings are identical. Note that it can be argued that Building 1 has better fire department access (two sides) than Building 2. It seems that if Building 2 is considered to be safe, the Building 1 should not be penalized for its corner location.

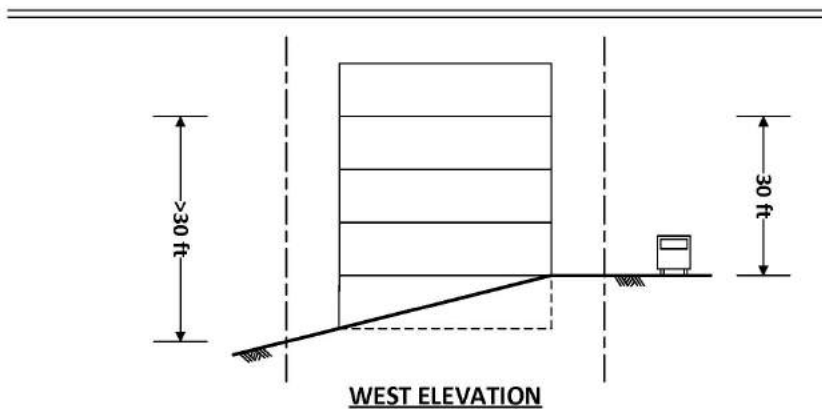
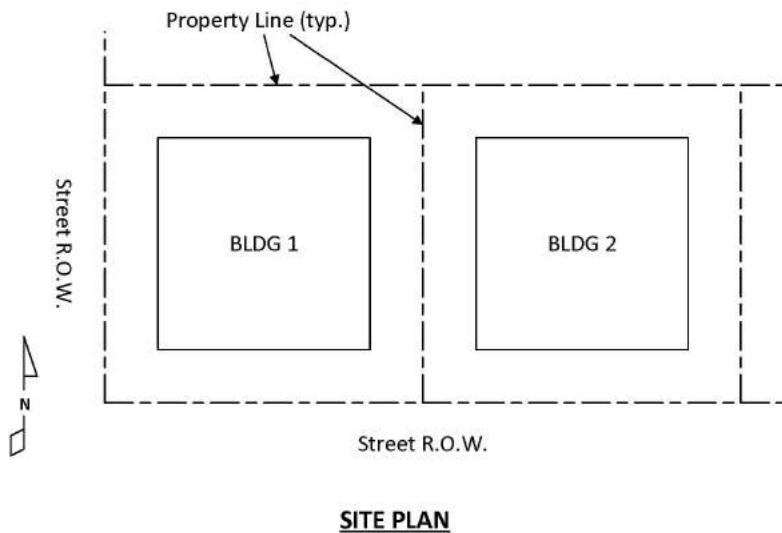


FIG. 1 – F117-18 – CORNER VS MID-BLOCK LOT

Bibliography:

NFPA 13R 2019 Edition (Appendix) (Section A1.1)

A.1.1 NFPA 13R is appropriate for use as an alternative to NFPA 13 only in those residential occupancies, as defined in this standard, up to and including four aboveground stories in height. It should be noted that model building codes contain special allowances for pedestal or podium-style buildings, which permit the story height for structures above the pedestal to be measured from the top surface of the pedestal, rather than from grade plane, and it is the intent of NFPA 13R to follow this model building code method for determining the number of stories. Accordingly, it is possible for a four-story residential structure to be within the scope of NFPA 13R even when that structure is constructed on top of a one-story pedestal.

However, where this is allowed, model building codes will require the pedestal portion to be constructed using Type I construction, and the pedestal portion will be required to be protected by an NFPA 13 compliant sprinkler system.

Regardless of whether a building does or does not involve a pedestal, NFPA 13R systems are always limited to structures that

do not exceed 60 ft (18 m) in height above grade plane. Note that model building codes do not allow building height to be measured from the top of a pedestal. That allowance only applies to determining the number of stories. The 60 ft (18 m) overall height limit is consistent with limits established by model building codes for buildings of Type V construction.

The height of a structure above grade plane is determined by model building codes, which base the height on the average

height of the highest roof surface above grade plane. For further information on the building height story limits, see model building codes.

NFPA 13R 2019 Edition Section 1.1 Scope

1.1* Scope. This standard shall cover the design and installation of automatic sprinkler systems for protection against fire hazards in residential occupancies up to and including four stories in height that are located in buildings not exceeding 60 ft (18 m) in height above grade plane.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. Based on the original proponents cost impact statement and if F117-18 is disapproved, then a cost savings would occur by not having to install a NFPA 13 automatic fire sprinkler system and maintaining code compliance with a NFPA 13R system.

F117-18

F126-18

IFC: 905.3.1 (IBC: [F] 905.3.1)

Proposed Change as Submitted

Proponent: Robert Davidson, Davidson Code Concepts, LLC, representing Self (rjd@davidsoncodeconcepts.com)

2018 International Fire Code

Revise as follows

905.3.1 Height. Class III standpipe systems shall be installed throughout buildings where any of the following conditions exist:

1. Four or more stories are above or below grade plane.
2. The floor level of the highest story is located more than 30 feet (9144 mm) above the lowest level of the fire department vehicle access.
3. The floor level of the lowest story is located more than 30 feet (9144 mm) below the highest level of fire department vehicle access.

Exceptions:

1. Class I standpipes are allowed in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.
2. Class I standpipes are allowed in Group B and E occupancies.
3. Class I ~~manual~~ standpipes are allowed in ~~open parking garages where the highest floor is located not more than 150 feet (45 720 mm) above the lowest level of fire department vehicle access.~~ parking garages.
4. ~~Class I manual~~ Semi-automatic dry standpipes are allowed in open parking garages that are subject to freezing temperatures, ~~provided that the hose connections are located as required for Class II standpipes in accordance with Section 905.5.~~ temperatures.

Reason: The purpose of this change is to modify the two exceptions addressing standpipe system installed in open parking garages. The exceptions have been in the IFC/IBC unchanged since the 2000 editions of the codes while the materials in vehicles has changed to add more combustible synthetic material, thinner/lighter metals and a growing increase of alternative fueled vehicles, GH2, CNG, LPG and Lithium-Ion batteries. Electric Vehicle charging stations have been installed within parking garages to encourage their use. Basically, the current requirements for parking garages, open or closed, in the codes are based on old vehicle concepts and studies.

Multi-vehicle large fires can occur and have occurred. As in any multi-story building, effective firefighting actions to protect life and property involved being able to quickly apply water to the fire. The type of fire and danger presented by that fire has increased as the use of alternative fueled vehicles has increased.`

This proposal deletes the options for manual standpipes which as a rule require extra effort on the part of the fire service to get water to upper stories and attempt extinguishment of the fire. In place is allowance for Class I standpipes to be installed an any parking garage. The standpipes are there for firefighter use, in the rare occurrence a parking garage opts to have trained personnel they can add the necessary outlet reducer and hose line.

The proposal also calls for semi-automatic dry systems where subject to freezing temperatures. As part of that change the Class II location requirement was eliminated.

NFPA 14 2016 edition

3.3.17.6 Semiautomatic Dry Standpipe System. *A standpipe system permanently attached to a water supply that is capable of supplying the system demand at all times arranged through the use of a device such as a deluge valve and that requires activation of a remote control device to provide water at hose connections.*

Neither the height of the story the fire is located on or the temperature of the atmosphere impacts the size of the fire and amount of water needed to be rapidly applied. The standpipe systems should meet all the requirements for a semi-automatic dry system which will provide for a more rapid water supply availability.

The fuel loads have changed significantly in parking garages due to modern manufacturing methods and the increased use of alternative fuels. Improvement in the requirements of the codes is necessary to address those changes.

Background material.

<http://www.urbanfiretraining.com/parking-garages.html>

<http://www.firerescuemagazine.com/articles/print/volume-7/issue-2/strategy-and-tactics/fighting-vehicle-fires-in-parking-garages.html>

<http://www.fireengineering.com/ap-news/2018/01/01/parking-garage-fire-destroys-hundreds-of-cars-in-uk.html>

<https://www.youtube.com/watch?v=KVx6avRTNCA>

<https://www.youtube.com/watch?v=HK0U-PKJ1NE>

Cost Impact: The code change proposal will increase the cost of construction. This proposal will increase costs but is balanced with allowance for Class I standpipes in all parking garages and by eliminating the Class II outlet location requirements. The nature of the fuel load has changed within parking structures and fire protection systems need to be improved to deal with the potential fires.

F126-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval is based upon the proponent's published reason. (Vote: 14-0)

Assembly Action:

None

F126-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Daniel E Nichols, representing MTA Metro-North Railroad (rotoray@optonline.net) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Fire Code

905.3.1 Height. Class III standpipe systems shall be installed throughout buildings where any of the following conditions exist:

1. Four or more stories are above or below grade plane.
2. The floor level of the highest story is located more than 30 feet (9144 mm) above the lowest level of the fire department vehicle access.
3. The floor level of the lowest story is located more than 30 feet (9144 mm) below the highest level of fire department vehicle access.

Exceptions:

1. Class I standpipes are allowed in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.
2. Class I standpipes are allowed in Group B and E occupancies.
3. Class I standpipes are allowed in parking garages.
4. ~~Semi-automatic dry standpipes are allowed in open parking garages that are subject to freezing temperatures.~~

Commenter's Reason: IFC 905.3.1 exceptions deal with the Class of standpipes. The original proposal removes the Class I exception for open parking structures when it added in semiautomatic dry, requiring a Class III standpipe in open parking structures. There is no substantiation of why occupant hose stations need to be placed in open parking structures. NFPA 14-2016 does not exempt Class II occupant use hose when a system is semiautomatic dry; Section 5.4.2 states that a semiautomatic dry can be used with a Class II or Class III system.

Besides the reasons for the removal of all occupant use hose in all Group B and E occupancies in the last cycle, the placement of occupant use hose in open parking garages would be an attraction to vandals in an area known for tampering (see reasons for standpipe cap protections) and would be outside the intent of incipient fire control (see reason statement and support for F110-18).

IFC 905.8 already discusses when dry standpipes can and cannot be used; as well as directing the code user to NFPA 14 to select appropriate types of standpipe systems to address the issues. There is no substantiation of why semiautomatic-dry systems need to be added to only open parking structures. The addition of semiautomatic dry will require a suitable water supply, backflow prevention, electronic monitoring, and provisions for heat (in colder climates). The 2018 IFC would allow for manual standpipes, which can be supplied from a fire department pumper attached to a hydrant within 100 feet of the fire department connection.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction This removes the semiautomatic dry requirement and returns to permitted language used in 905.3.1 and 905.8.

F126-18

F128-18

IFC: 905.9 (IBC: [F] 905.9)

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Fire Code

Revise as follows

905.9 Valve supervision. Valves controlling water supplies shall be supervised in the open position so that a change in the normal position of the valve will generate a supervisory signal at the supervising station required by Section 903.4. Where a fire alarm system is provided, a signal shall be transmitted to the control unit.

Exceptions:

1. Valves to underground key or hub valves in roadway boxes ~~provided by the municipality or public utility~~ do not require supervision.
2. Valves locked in the normal position and inspected as provided in this code in buildings not equipped with a fire alarm system.
3. Control valves and isolation valves for dry manual standpipes are permitted to be locked in the open position.

Reason: In Exception 1, the removal of the supervision requirement for municipal or public utility roadboxes correlates to a similar proposal made to IFC/IBC 903.4. NFPA 24, referenced by the IFC does not require supervision of private main roadboxes. By removing this text, it would apply to be public and private mains.

In Exception 3, the fire department is the water supply for dry manual standpipe systems. Section 5.6.1 of NFPA 14 specifically states electrical supervision for the control valve in a dry manual standpipe system is not required. This may seem to contradict Section 6.3.7.1 of NFPA 14, but a dry manual standpipe system is not connected to an automatic system water supply. Dry manual standpipes are supplied by the fire department and the valve position is controlled by the fire department. Locking the control valve (if provided) for the dry manual system in the open position insures uninterrupted operation when the system is pressurized.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will decrease the cost of construction

This proposal clarifies which valves are required to be electrically supervised and which valves are permitted to be locked. This will provide consistency in the market and eliminate alternate interpretations of the code.

F128-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that there are situations where the proposed exception would not be acceptable. The specific example given was a large building under construction that has commingled parts of the building that have dry or wet standpipes that are used as manual means for fire fighting that would need to be electrically supervised. (Vote: 8-7)

Assembly Action:

None

F128-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org); Stephen DiGiovanni, representing FCAC (sdigiovanni@clarkcountynv.gov); Jeffrey Hugo (hugo@nfsa.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

905.9 Valve supervision. Valves controlling water supplies shall be supervised in the open position so that a change in the normal position of the valve will generate a supervisory signal at the supervising station required by Section 903.4. Where a fire alarm system is provided, a signal shall be transmitted to the control unit.

Exceptions:

1. Valves to underground key or hub valves in roadway boxes do not require supervision.
2. Valves locked in the normal position and inspected as provided in this code in buildings not equipped with a fire alarm system.
3. ~~Control valves and isolation valves for dry manual standpipes are permitted to be locked in the open position.~~

Commenter's Reason: This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at:

<https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

This proposal originally contained two changes. One change is to revise Exception 1 to no longer qualify the exception only for underground valves that are provided by the public entity This change correlates to another FCAC proposal, F123-18, which was approved by the Fire Code Committee. F123-18 was developed to address the challenges with enforcing the requirement for valve supervision for underground valves on private property. This change to address underground valve supervision is being retained in this public comment.

The second change in the original proposal was to add a third exception to allow valves for dry manual standpipe to be locked, instead of supervised. This part of the proposal received considerable feedback from the Fire Code Committee, and ultimately the original proposal was denied. Please note that this public comment no longer proposes this new exception 3.

As such, this public comment is provided to continue the part of the original proposal that correlates to F123-18, which was approved by the committee, while dropping the third exception proposal, which clearly was not supported by the Fire Code Committee.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The code section is not enforceable, so it is assumed that few if any are actually installing the monitoring on underground valves. For those that currently do install the monitoring, this change will decrease the cost of construction.

F128-18

F132-18

IFC: 906.1 (IBC: [F] 906.1)

Proposed Change as Submitted

Proponent: Richard Kluge, Ericsson Inc., representing Alliance for Telecommunications Industry Solutions (richard.kluge@ericsson.com)

2018 International Fire Code

Revise as follows

906.1 Where required. Portable fire extinguishers shall be installed in all of the following locations:

1. In new and existing Group A, B, E, F, H, I, M, R-1, R-2, R-4 and S occupancies.

Exceptions:

1. In Group R-2 occupancies, portable fire extinguishers shall be required only in locations specified in Items 2 through 6 where each dwelling unit is provided with a portable fire extinguisher having a minimum rating of 1-A:10-B:C.
2. In Group E occupancies, portable fire extinguishers shall be required only in locations specified in Items 2 through 6 where each classroom is provided with a portable fire extinguisher having a minimum rating of 2-A:20-B:C.
2. Within 30 feet (9144 mm) distance of travel from commercial cooking equipment and from domestic cooking equipment in Group I-1; I-2, Condition 1; and R-2 college dormitory occupancies.
3. In areas where flammable or combustible liquids are stored, used or dispensed.
4. On each floor of structures under construction, except Group R-3 occupancies, in accordance with Section 3315.1.
5. Where required by the sections indicated in Table 906.1.
6. Special-hazard areas, including but not limited to laboratories, computer rooms and generator rooms, where required by the *fire code official*.

Exception: Portable fire extinguishers are not required at normally unmanned buildings or structures where a portable fire extinguisher suitable to the hazard of the location is provided on the vehicle of visiting personnel.

Reason: The IFC section 906 Commentary repeatedly discusses the use of Portable Fire Extinguishers for incipient fire control to allow for increased time for evacuation, but these benefits are not applicable to unmanned locations. US telecommunication carriers operate a large number of small unmanned equipment facilities. It is not practical to install and maintain Portable Fire Extinguishers in accordance with NFPA 10 at normally unmanned locations as explained below.

Backup generators at remote telecommunications locations provide telecommunications services when commercial ac power fails. These sites may have diesel fuel or liquified propane gas (LPG) stored either indoors or outdoors. Fuel oil, when used, is typically less than 660 gallons in capacity. The sites are normally unmanned. Technicians will travel to the sites only when needed for repairs or maintenance activities. These sites are considered Utility and Miscellaneous Group U occupancies under the IBC. Adherence to the current Section 906 of the IFC requires keeping an extinguisher at the site in compliance with NFPA 10. This requires monthly inspections. For rarely visited remote locations, compliance to NFPA 10 entails a monthly visit for the sole purpose of inspecting the extinguisher, which while possible, is not reasonable. Certain remote and isolated locations are not accessible or impractical to visit during winter months as access is blocked by snow. Furthermore, if there were a fire, the vast majority of the time, there is no one on site to use the extinguisher as the site is not manned. Having a Portable Fire Extinguisher on the technician's vehicle when servicing the site is a more effective alternative to a fixed site-mounted extinguisher. The Portable Fire Extinguisher carried on the vehicle can be inspected and maintained per NFPA 10 and ready for use if necessary.

From the International Building Code Commentary

Per IBC Section 312, Utility and Miscellaneous Group U Commentary: "Structures housing accessory equipment that is part of a utility or communications system are often classified as Group U occupancies when there is no intent that these structures be occupied except for serving and maintaining the equipment within the structure." This language supports an exemption to clearly state the Portable Fire Extinguishers are not required in unmanned or unoccupied Group U structures when visiting personnel have extinguishers available.

Related content from NFPA 76, Standard for Fire Protection of Telecommunications Facilities

NFPA 76, Chapter 11, "Small Unoccupied Structures" applies to small normally unoccupied telecommunications sites including on-grade walk-in cabinets, on-grade huts, cell huts, and controlled environmental vaults. Section 11.2.3 clearly states that portable fire extinguishers shall not be required in these facilities.

Related content from CFR, Subchapter N, Artificial Islands and Fixed Structures on the Outer Continental Shelf

Code of Federal Regulations of the United States of America, Subchapter N, Artificial Islands and Fixed Structures on the Outer Continental Shelf, Part 145 Fire-Fighting Equipment also supports the position that fire extinguishers in unmanned locations are not required. Per the CFR, Subchapter N, Artificial Islands and Fixed Structures on the Outer Continental Shelf, Part 14, fire extinguishers are only required when crews will be working at the site on a 24-hour basis. Continual deployment of Portable Fire Extinguishers at unmanned locations provides no value and is not practical.

Cost Impact: The code change proposal will decrease the cost of construction. The cost of code compliance will decrease if portable fire extinguishers will not be required to be installed and maintained at unmanned locations.

F132-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that: the language needed improvement to be clear, it is in the wrong location, it should focus on Group U telecommunication facilities, needs "where approved" added and it should address other Group U occupancies. (Vote: 14-0)

Assembly Action:

None

F132-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Richard Kluge, Ericsson Inc., representing Alliance for Telecommunications Industry Solutions (richard.kluge@ericsson.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

906.1 Where required. Portable fire extinguishers shall be installed in all of the following locations:

Exception: Portable fire extinguishers are not required in unoccupied Group U communication equipment structures.

1. In new and existing Group A, B, E, F, H, I, M, R-1, R-2, R-4 and S occupancies.

Exceptions:

1. In Group R-2 occupancies, portable fire extinguishers shall be required only in locations specified in Items 2 through 6 where each dwelling unit is provided with a portable fire extinguisher having a minimum rating of 1-A:10-B:C.
2. In Group E occupancies, portable fire extinguishers shall be required only in locations specified in Items 2 through 6 where each classroom is provided with a portable fire extinguisher having a minimum rating of 2-A:20-B:C.
2. Within 30 feet (9144 mm) distance of travel from commercial cooking equipment and from domestic cooking equipment in Group I-1; I-2, Condition 1; and R-2 college dormitory occupancies.
3. In areas where flammable or combustible liquids are stored, used or dispensed.
4. On each floor of structures under construction, except Group R-3 occupancies, in accordance with Section 3315.1.
5. Where required by the sections indicated in Table 906.1.
6. Special-hazard areas, including but not limited to laboratories, computer rooms and generator rooms, where required by the *fire code official*.

~~**Exception:** Portable fire extinguishers are not required at normally unmanned buildings or structures where a portable fire extinguisher suitable to the hazard of the location is provided on the vehicle of visiting personnel.~~

Commenter's Reason: As drafted, the original proposal was not approved by the committee, which questioned its inclusion in the charging statement. After considering several alternative locations for the exception language, such as placing it after item 3 alone, and in two locations after items 3 and 6, it was determined that before item 1 is the logical location for the exception.

There was a suggestion by one committee member to include "where approved" but this text does not seem warranted when the code is the minimum set of requirements for unoccupied facilities. The AHJ can always request a PFE at a group U communications facility if it is deemed necessary, but this would never be the norm.

The committee feedback was divided on whether the exception should be applicable to other utilities. The text proposed focuses on Group U communication facilities and aligns with the IBC wording for such structures.

Bibliography:

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. The cost of code compliance will decrease if portable fire extinguishers will not be required to be installed and maintained at unoccupied locations.

Public Comment 2:

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

906.1 Where required. Portable fire extinguishers shall be installed in all of the following locations:

1. In new and existing Group A, B, E, F, H, I, M, R-1, R-2, R-4 and S occupancies.

Exceptions:

1. In Group R-2 occupancies, portable fire extinguishers shall be required only in locations specified in Items 2 through 6 where each dwelling unit is provided with a portable fire extinguisher having a minimum rating of 1-A:10-B:C.
2. In Group E occupancies, portable fire extinguishers shall be required only in locations specified in Items 2 through 6 where each classroom is provided with a portable fire extinguisher having a minimum rating of 2-A:20-B:C.
2. Within 30 feet (9144 mm) distance of travel from commercial cooking equipment and from domestic cooking equipment in Group I-1; I-2, Condition 1; and R-2 college dormitory occupancies.
3. In areas where flammable or combustible liquids are stored, used or dispensed.
4. On each floor of structures under construction, except Group R-3 occupancies, in accordance with Section 3315.1.
5. Where required by the sections indicated in Table 906.1.
6. Special-hazard areas, including but not limited to laboratories, computer rooms and generator rooms, where required by the *fire code official*.

Exception: Portable fire extinguishers are not required at normally unmanned Group U occupancy buildings or structures where a portable fire extinguisher suitable to the hazard of the location is provided on the vehicle of visiting personnel.

Commenter's Reason: The revised language clearly identifies that this exception is for Group U facilities only.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction.

This public comment provides a clarification on an exception and will not have any impact on the cost of construction.

Public Comment 3:

Proponent: randy schubert, Ericsson, representing ATIS (randy.schubert@ericsson.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

906.1 Where required. Portable fire extinguishers shall be installed in all of the following locations:

1. In new and existing Group A, B, E, F, H, I, M, R-1, R-2, R-4 and S occupancies.

Exceptions:

1. In Group R-2 occupancies, portable fire extinguishers shall be required only in locations specified in Items 2 through 6 where each dwelling unit is provided with a portable fire extinguisher having a minimum rating of 1-A:10-B:C.
 2. In Group E occupancies, portable fire extinguishers shall be required only in locations specified in Items 2 through 6 where each classroom is provided with a portable fire extinguisher having a minimum rating of 2-A:20-B:C.
2. Within 30 feet (9144 mm) distance of travel from commercial cooking equipment and from domestic cooking equipment in Group I-1; I-2, Condition 1; and R-2 college dormitory occupancies.
 3. In areas where flammable or combustible liquids are stored, used or dispensed.

Exception: Portable fire extinguishers are not required in unoccupied Group U communication equipment structures.

4. On each floor of structures under construction, except Group R-3 occupancies, in accordance with Section 3315.1.
5. Where required by the sections indicated in Table 906.1.

Exception: Portable fire extinguishers are not required in unoccupied Group U communication equipment structures.

6. Special-hazard areas, including but not limited to laboratories, computer rooms and generator rooms, where required by the *fire code official*.

~~**Exception:** Portable fire extinguishers are not required at normally unmanned buildings or structures where a portable fire extinguisher suitable to the hazard of the location is provided on the vehicle of visiting personnel.~~

Commenter's Reason: As drafted, the original proposal was not approved by the committee, which questioned its inclusion in the charging statement. After considering several alternative locations for the exception language, the most applicable locations are placing the statement after items 3 and 5. There was a suggestion by one committee member to include "where approved" but this text does not seem warranted when the code is the minimum set of requirements for unoccupied facilities. The AHJ can always request a PFE at a group U communications facility if it is deemed necessary, but this would never be the norm.

The committee feedback was divided on whether the exception should be applicable to other utilities. The text proposed focuses on Group U communication facilities and aligns with the IBC wording for such structures.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposed exception does not impact construction cost.

F132-18

F138-18

IFC: 907.2.3, 907.2.3.1 (New), 907.2.3.2 (New) (IBC: [F] 907.2.3, [F]907.2.3.1 (New), [F]907.2.3.2 (New))

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org); Michael Pallett, Telecor Inc., representing Telecor Incorporated (mpallett@telecor.com)

2018 International Fire Code

Delete and substitute as follows

~~**907.2.3 Group E.** A manual fire alarm system that initiates the occupant notification signal utilizing an emergency voice/alarm communication system meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall be installed in Group E occupancies. Where *automatic sprinkler systems* or smoke detectors are installed, such systems or detectors shall be connected to the building fire alarm system.~~

Exceptions:

- ~~1. A manual fire alarm system is not required in Group E occupancies with an *occupant load* of 50 or less.~~
- ~~2. Emergency voice/alarm communication systems meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall not be required in Group E occupancies with occupant loads of 100 or less, provided that activation of the manual fire alarm system initiates an *approved* occupant notification signal in accordance with Section 907.5.~~
- ~~3. Manual fire alarm boxes are not required in Group E occupancies where all of the following apply:
 - ~~3.1. Interior corridors are protected by smoke detectors.~~
 - ~~3.2. Auditoriums, cafeterias, gymnasiums and similar areas are protected by *heat detectors* or other *approved* detection devices.~~
 - ~~3.3. Shops and laboratories involving dusts or vapors are protected by *heat detectors* or other *approved* detection devices.~~~~
- ~~4. Manual fire alarm boxes shall not be required in Group E occupancies where all of the following apply:
 - ~~4.1. The building is equipped throughout with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1.~~
 - ~~4.2. The emergency voice/alarm communication system will activate on sprinkler water flow.~~
 - ~~4.3. Manual activation is provided from a normally occupied location.~~~~

~~**907.2.3 Group E.** A manual fire alarm system shall be installed in Group E occupancies with an occupant load greater than 50. Where an automatic sprinkler system or a smoke detector system is installed, such systems shall be connected to the building fire alarm system.~~

Add new text as follows

907.2.3.1 Manual fire alarm boxes. Manual fire alarm boxes shall be provided unless either of the following applies:

1. Interior corridors are protected by smoke detectors; auditoriums, cafeterias, gymnasiums and similar areas are protected by heat detectors or other approved detection devices; and shops and laboratories involving dusts or vapors are protected by heat detectors or other approved detection devices.
2. The building is equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1, and occupant notification will activate upon sprinkler waterflow, with manual activation provided at a normally occupied location.

907.2.3.2 Occupant notification. Where the occupant load of the Group E occupancy is greater than 100, the fire alarm system shall initiate one of the following:

1. An occupant notification signal utilizing an emergency voice/alarm communications system complying with Sections 907.5.2.2 and 907.6.
2. An occupant notification signal complying with Section 907.5 and an interconnected in-building mass notification system complying with Sections 907.5.2.2 and installed in accordance with Section 907.6, and NFPA 72.

Reason: Changes proposed for 907.2.3 are intended to:

- a) improve code language clarity by eliminating complex lists of exceptions;

b) permit listed mass notification systems in conjunction with fire alarm systems as an alternative to EVAC for occupant notification.

In North America, the risk of death and serious injury in schools has shifted from fire incidences towards incidences of violence through a combination of reduction of fire deaths and an increase of violence. NFPA 72 2010 formally introduced listed (UL 2572) mass notification systems as an enforceable class of emergency communication system (ECS). Mass notification often utilizes both voice and textual notification and is intended to communicate information about emergencies including but not limited to: fire, human caused events (accidental and intentional), other dangerous situations, accidents, and natural disasters.

As threats to children in schools evolve, in-building mass notification systems (MNS) have and are being professionally developed specifically for educational occupancies. MNS are designed to support multiple situations including: environmental, active shooter, hostage, and weather. MNS may include automatic responses such as: lockdown, partial lockdown with partial evacuation, lockdown acknowledgment and tracking, lockout, reverse evacuation, covert monitoring, and others. EVAC systems do not require a risk analysis because the risk of fire in schools is generally well understood. But MNS (as per NFPA 72) does require formal consideration of the risks above by requiring a specific risk analysis be developed for each school.

This proposal provides an option for listed mass notification systems in combination with fire alarm systems as an alternative to EVAC systems in schools. The relationship between fire alarm and in-building mass notification is well-developed in NFPA 72. Some schools are budget limited and cannot support the purchase of both EVAC and MNS. This proposal is intended to provide choice for jurisdictions considering MNS as an option.

The proposed code includes safeguards to ensure the level of protection of the school is not reduced as compared with EVAC. References to NFPA 72 ensure that MNS systems are listed to UL 2572 or UL 864. Both NFPA 72 and UL 2572 require that listed MNS systems are manufactured to common core F.A. standards including: secondary power, monitoring for integrity, supervisory, trouble, emergency control functions, notification and control circuits, annunciation and zoning, pathway class designation, monitoring for integrity and circuit performance, audible characteristics, system performance and integrity, performance of initiating device circuits (IDCs), notification appliance circuits (NACs), and signaling line circuits (SLCs).

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will not increase or decrease the cost of construction. There is no cost impact, because the proposal presents MNS/fire alarm as an option, not a requirement. The restructuring of the paragraph maintains the current requirements so there is no additional cost associated with these changes.

When MNS/fire alarm is chosen, there is the additional cost of the MNS system, but also cost reductions from changing EVAC to manual fire alarm and the elimination of P.A. systems that are normally installed in schools.

F138-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that they had concern with the proposed new Section 907.2.3.1 not having a reference to the existing Section 907.2 regarding the requirement to provide not fewer than one manual fire alarm box. Additionally it was noted that the format is cumbersome, hard to read and needs more refinement. (Vote: 14-0)

Assembly Action:

None

F138-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael Pallett, representing Telecor Incorporated (mpallett@telecor.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Fire Code

907.2.3 Group E. A manual fire alarm system that initiates the occupant notification signal utilizing an emergency voice/alarm communication system meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall be installed in Group E occupancies. Where *automatic sprinkler systems* or smoke detectors are installed, such systems or detectors shall be connected to the building fire alarm system.

Exceptions:

1. A manual fire alarm system is not required in Group E occupancies with an *occupant load* of 50 or less.
2. Emergency voice/alarm communication systems meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall not be required in Group E occupancies with occupant loads of 100 or less, provided that activation of the manual fire alarm system initiates an *approved* occupant notification signal in accordance with Section 907.5.
3. Manual fire alarm boxes ~~are~~ shall not be required in Group E occupancies where all of the following apply:
 - 3.1. Interior *corridors* are protected by smoke detectors.
 - 3.2. Auditoriums, cafeterias, gymnasiums and similar areas are protected by *heat detectors* or other *approved* detection devices.
 - 3.3. Shops and laboratories involving dusts or vapors are protected by *heat detectors* or other *approved* detection devices.
 - 3.4. Manual activation is provided from a normally occupied location.
4. Manual fire alarm boxes shall not be required in Group E occupancies where all of the following apply:
 - 4.1. The building is equipped throughout with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1.
 - 4.2. The emergency voice/alarm communication system will activate on sprinkler water flow.
 - 4.3. Manual activation is provided from a normally occupied location.
5. In lieu of utilizing an emergency voice/alarm communications system, a listed in-building mass notification system, interconnected in conjunction with a fire alarm system is permitted where all the following apply:
 - 5.1 The fire alarm system and in-building mass notification system are integrated such that their joint operations and capabilities also comply with the emergency voice/alarm communications system requirements of Section 907.5.2.2.
 - 5.2 The in-building mass notification system is installed to the same standards as the fire alarm system in accordance with Section 907.6, and NFPA 72.
 - 5.3 The in-building mass notification system equipment and components are listed to UL 2572 or UL 864.

Commenter's Reason: This public comment is to revise F138-18 according to ICC Committee Action Hearing (CAH), Fire Code Action Committee (FCAC), and AFAA feedback.

F138-18 is important in the recognition of the unified effort it takes to respond to an Active Shooter Event in our K-12 schools. The response goes beyond the Fire Service, involving Police, EMS, local security (often former police), and importantly - school staff.

According to The Police Response to Active Shooter Incidents Published March 2014 by the Police Executive Research Forum:

Remember that on average, it takes police three minutes to arrive on the scene, and another few minutes to locate and stop the shooters. So for at least the first few minutes of an attack, the potential victims are on their own. The major message that we have for civilians is, You are not helpless. What you do matters. And what you do can save your own life and the lives of others. Our research found that many times, active-shooter attacks stopped because potential victims took action to stop the shooter directly, or they made it more difficult for the shooter to find targets.

The IFC 2018 added section 917 Mass Notification Systems, but only for Colleges and Universities. This is as big an issue for K-12 schools as it is for Colleges and Universities. Not only is the population of K-12 more vulnerable, but of the top 8 worst school/collage/university shootings with 10 deaths or more as of June 2018: 5 of 8 were K-12 schools accounting for 77 deaths; Colleges and Universities accounted for 60 deaths. Out of the 24 worst, 13 are K-12 schools.

Fire Emergency Voice Alarm Communication Systems (EVAC) provides only so much support for the first responders, and relatively little support for school administrative staff. Whenever one of these tragedies occurs, a common denominator is that the school staff is always present, and always respond first. Technology is already being deployed to provide functionality such as real time lockdown reporting, emergency covert listening and two-way individual room communications, emergency call buttons, panic buttons, geofenced wireless alerting, and comprehensive remote access. School districts and states are already working with police services to incorporate new emerging technologies into their response plans. Some of these technologies are already required by IFC 2018 in section 404.2.3 Lockdown Plans.

Emerging technologies are being used in response to emergency situations. By specifically requiring a UL 2572/864 listing and NFPA 72 compliance for all emergency communications used in our K-12 schools, F138 will require at a minimum, in-building mass notification technologies used in our schools to be designed, deployed, and maintained to the same level of reliability as other emergency communication equipment such as EVAC.

Bibliography: CRITICAL ISSUES IN POLICING SERIES

The Police Response to Active Shooter Incidents

March 2014

POLICE EXECUTIVE RESEARCH FORUM

http://www.policeforum.org/assets/docs/Critical_Issues_Series/the%20police%20response%20to%20active%20shooter%20

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There was no change to the cost associated with F138-18 due to this public comment. F138-18 does not represent a cost increase because the changes are presented as an option for building officials, rather than a new requirement.

F138-18

F144-18

IFC: 907.4, 907.5, 907.5.1 (New), 907.5.1.1, 907.5.2.1.3 (New), 907.5.2.1.3.1 (New), 907.5.2.1.3.2 (New) (IBC: [F] 907.4, [F]907.5, [F]907.5.1 (New), [F]907.5.1.1, [F]907.5.2.1.3 (New), [F]907.5.2.1.3.1 (New), [F]907.5.2.1.3.2 (New))

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Fire Code

Revise as follows

907.4 Initiating devices. ~~Where manual or automatic alarm initiation is required as part of a fire alarm system, the initiating a fire alarm system is required by another section of this code, occupant notification in accordance with Section 907.5 shall be initiated by one or more of the following. Initiating devices shall be installed in accordance with Sections 907.4.1 through 907.4.3.1.~~

1. Manual fire alarm boxes.
2. Automatic fire detectors.
3. Automatic sprinkler system waterflow devices.
4. Automatic fire-extinguishing systems.

907.5 Occupant notification systems, notification. ~~A fire alarm system shall annunciate at the fire alarm control unit and shall initiate occupant notification upon activation. Occupant notification by fire alarms shall be in accordance with Sections 907.5.1 through 907.5.2.3.3. Where a fire alarm system is required by another section of this code, it shall be activated by:~~

1. ~~Automatic fire detectors.~~
2. ~~Automatic sprinkler system waterflow devices.~~
3. ~~Manual fire alarm boxes.~~
4. ~~Automatic fire-extinguishing systems.~~

Exception: ~~Where notification systems are allowed elsewhere in Section 907 to annunciate at a constantly attended location:~~

~~907.5.2.3.3. Occupant notification by smoke alarms in Groups R-1 and R-2 Occupancies shall comply with Section 907.5.2.1.3.2.~~

Add new text as follows

907.5.1 Alarm activation and annunciation. Upon activation, fire alarm systems shall initiate occupant notification and shall annunciate at the fire alarm control unit, or where allowed elsewhere in Section 907, at a constantly attended location.

907.5.1.1 Presignal feature. ~~A presignal feature shall not only be installed unless provided where approved by the fire code official. Where a presignal feature is provided, a signal approved. The presignal shall be annunciated at an approved at a constantly attended location approved by the fire code official, so that occupant notification can be activated in~~ having the capability to activate the occupant notification system in the event of fire or other emergency.

907.5.2.1.3 Audible signal frequency in Groups R-1 and R-2 sleeping rooms. Audible signal frequency in Groups R-1 and R-2 occupancies shall be in accordance with Sections 907.5.2.1.3.1 and 907.2.1.3.2.

907.5.2.1.3.1 Fire alarm system signal. In sleeping rooms of Groups R-1 and R-2 Occupancies, the audible alarm activated by a fire alarm system shall be a 520 Hz low-frequency signal complying NFPA 72.

907.5.2.1.3.2 Smoke alarm signal in sleeping rooms. In sleeping rooms of Groups R-1 and R-2 Occupancies that are required by Sections 907.2.8 or 907.2.9 to have a fire alarm system, the audible alarm signal activated by single- or multiple-station smoke alarms in the dwelling unit or sleeping unit shall be a 520 Hz signal complying NFPA 72.

Where a sleeping room smoke alarm is unable to produce a 520 Hz signal, the 520 Hz alarm signal shall be provided by a listed notification appliance or a smoke detector with an integral 520 Hz sounder.

Reason: This Proposal seeks to enhance the waking effectiveness of high risk segments of the population in the

International Fire Code (IFC) by requiring a consistent use of the 520 Hz low frequency audible fire alarm signal in new Group R-1 and R-2 occupancies that are required to have a fire alarm system.

This approach is an interim option to get the low frequency signal in buildings where the technology is commercially available and avoids requiring the low frequency signal in buildings where the technology is not currently available in the stream of commerce. The proposal has taken careful consideration to not require the low frequency technology in buildings without a fire alarm system because there are no smoke alarms currently available with an integral sounder capable of producing the low frequency signal. However, it does not prohibit their installation if the product becomes available in the future. The reason the proposal does require the low frequency signal in sleeping areas of buildings with a fire alarm system because there are numerous manufacturers of system connected smoke detectors with an integral sounder that produces the 520 Hz low frequency signal.

Peer-reviewed research has concluded the 520 Hz low frequency is six times more effective than the standard 3 KHz signal at waking high risk segments of the population (people over 65, people who are hard of hearing, school age children and people who are alcohol impaired). The standard 3 KHz audible alarm signal has been used in the majority of fire alarm horns and smoke alarms for the past 30 years.

The reason this Proposal is necessary is because NFPA 72 stipulates both the 520 Hz and 3 KHz signal in the sleeping rooms of hotels, dormitories and apartment building bedrooms when smoke alarms are installed in the sleeping room. Specifically, Chapter 18 of NFPA 72 requires audible notification appliances (horns, speakers or smoke detectors with an integral sounder bases) to produce the 520 HZ low frequency signal in all sleeping rooms of buildings with a protected premises fire alarm system. Whereas Chapter 29 of NFPA 72 only requires smoke alarms to produce the 520 Hz low frequency signal for people with hearing loss or provided voluntarily for those with hearing loss.

The different requirements within NFPA 72 present a life safety issue because the wakening effectiveness of the 520 Hz low frequency is superior to 3 KHz audible alarm signal awakening high risk segments of the population. The low frequency signal needs to be provided in areas intended for sleeping for people over 65, people who are hard of hearing, school age children and people who are alcohol impaired.

There are several product solutions currently available in the market capable of providing the 520 Hz low frequency signal.

1. Fire alarm system horns and horn/strobes
2. Smoke detectors with integral sounder bases
3. Speakers connected to an Emergency Voice Alarm Communication (EVAC) system

Peer-Reviewed Research:

Ian R. Thomas and Dorothy Bruck, *Waking Effectiveness of Alarms for Adults Who Are Hard of Hearing* (Melbourne, Australia: Victoria University), National Fire Protection Association, 2007

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will increase the cost of construction

The code change proposal will increase the cost of construction. The total installation cost will only increase in new R-1 and R-2 occupancies where a fire alarm system is required by Section 907 by requiring the use of the 520 Hz low frequency audible fire alarm signal.

In accordance with the included cost analysis the estimated price increase is \$57 per sleeping room for occupancies that are not required to utilize an emergency voice alarm communication (EVAC) system for occupant notification and approximately \$107 per sleeping room for occupancies that are required to utilize an (EVAC) system for occupant notification.

For non-EVAC systems, the solution utilizes a currently available smoke detector with an integral low frequency sounder base instead of installing a smoke alarm and low frequency horn. For EVAC systems, the solution utilizes a currently available fire alarm system speaker and a smoke detector with an integral low frequency sounder base.

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The committee stated that although there are technical issues this is needed due to an aging population and the research shows that low frequency devices are more effective. In addition it was noted that there are devices that are currently available that can meet the requirement. (Vote: 9-5)

Assembly Action:

None

F144-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Thomas Daly, representing The Hospitality Security Consulting Group, LLC (thomas.daly@myhscg.com) requests Disapprove.

Commenter's Reason: This proposal would impose a mandate for buildings for a technology that does not exist. There are no listed and approved smoke alarms available that can produce a 520hz signal when operating on backup power pursuant to Sec. 907.2.10.6.

Until such time as potential devices are designed, tested, listed and approved, this mandate is premature.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

No cost impact to delay this proposed code change.

F144-18

F149-18

IFC: 907.5.2.2.5 (IBC: [F] 907.5.2.2.5), 1203.2.4; IBC: 2702.2.4

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org); Jason Webb, representing Automatic Fire Alarm Association Codes & Standards Committee (jwebb608@gmail.com)

2018 International Fire Code

Revise as follows

907.5.2.2.5 Emergency power. Emergency voice/ alarm communications systems shall be provided with emergency power in accordance with Section 1203. ~~The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in NFPA 72.~~

1203.2.4 Emergency voice/alarm communication systems. Emergency power shall be provided for emergency voice/alarm communication systems as required in Section 907.5.2.2.5. ~~The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in NFPA 72.~~

2018 International Building Code

~~[F] 2702.2.4 Emergency voice/alarm communication systems.~~ **Voice Alarm Communication Systems.**

Emergency power shall be provided for emergency voice/alarm communication systems as required in Section 907.5.2.2.5. ~~The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in NFPA 72.~~

Reason: This code change is to provide clarification that the standby power for the EVACs system is to be designed to comply with NFPA 72.

We are deleting the reference and code section 1203.2.4. This is causing confusion and the standby power requirements for Fire Alarm systems is clearly outlined in NFPA 72.

This section contradicts itself. NFPA 72 10.6.7.2.1.2 requires secondary power for 24 hours under quiescent load but *also* requires the secondary power to be capable of operating the system for 15 minutes at maximum load after the 24 hours. Deleting the time and simply referencing the standard insures consistency.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will decrease the cost of construction. Depending on interpretation this could reduce the cost of construction. Overall this will provide code clarity and alignment with NFPA 72 and within the IBC-IFC

F149-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 2018 International Fire Code

~~907.5.2.2.5 Standby Emergency power.~~ Emergency voice/ alarm communications systems shall be provided with ~~emergency standby~~ power in accordance with ~~section 1203 NFPA 72.~~

1203.2.4 Emergency voice/alarm communication systems. ~~Emergency Standby~~ power shall be provided for emergency voice/alarm communication systems ~~as required~~ in accordance with NFPA 72.

2018 International Building Code

2702.2.4 Emergency Voice Alarm Communication Systems. ~~Standby Emergency~~ power shall be provided for emergency voice/alarm communication systems ~~as required~~ in accordance with NFPA 72 907.5.2.2.5.

Committee Reason: Approval of the modification is based on the improvement of the language to clarify that the requirements are for standby power. Approval of the proposal is based upon the proponent's published reason that it is appropriate to the leave the requirements in the NFPA 72 referenced standard. (Vote: 14-0)

Assembly Action:

None

F149-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Dustin J. Wakefield, PE, LEED AP, Virginia Department of General Services, representing Bureau of Capital Outlay Management requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

907.5.2.2.5 ~~Standby Emergency~~ power. Emergency voice/ alarm communications systems shall be provided with ~~standby power emergency power~~ in accordance with Section ~~1203-2702.2~~ of the International Building Code and NFPA 72.

1203.2.4 Emergency voice/alarm communication systems. ~~Standby power Emergency power~~ shall be provided for emergency voice/alarm communication systems ~~in accordance with~~ in accordance with Section 2702.2 of the International Building Code and NFPA 72.

2018 International Building Code

2702.2.4 Emergency Voice Alarm Communication Systems. ~~Standby Emergency~~ power shall be provided for emergency voice/alarm communication systems ~~in accordance with Section 907.5.2.2.5~~ as required in Section 907.5.2.2.5 and NFPA 72.

Commenter's Reason: An emergency voice/alarm communication system (EVACS) is a critical life safety system that must remain operational during the initial phases of a fire incident. As such, EVACS are considered emergency power loads, which are governed under Article 700 - Emergency Systems - in the NEC. Furthermore, NFPA 72 explicitly states that generators used to provide secondary power for EVACS shall meet the requirements for a Type 10, Class 24, Level 1 system and be installed in accordance with NEC Article 700.

The initial proposed modification to change the language in the code to Standby power is contrary to the referenced standards governing the design and installation of the secondary power supply. It introduces confusion over the type of power system required and may, at times, result in the incorrect classification of a Legally Required or Option Standby Power System per NEC Articles 701 or 702.

It is recommended that the code language be modified as contained herein, and that the term "emergency power" be retained for this critical emergency system in order to avoid confusion and to be consistent with the referenced standards.

Bibliography: There are no applicable external references for this proposed modification.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Since this is solely a terminology issue, there is no anticipated cost impact on the design or construction process.

F149-18

F152-18

IFC: 907.5.2.3.3 (IBC: [F]907.5.2.3.3)

Proposed Change as Submitted

Proponent: Jeffrey Shapiro, representing Self (jeff.shapiro@intlcodeconsultants.com)

2018 International Fire Code

Revise as follows

907.5.2.3.3 Group R-2. In Group R-2 occupancies required by Section 907 to have a fire alarm system, each *story* that contains *dwelling units* and *sleeping units* shall be provided with the future capability to support visible alarm notification appliances in accordance with Chapter 11 of ICC A117.1. Such capability shall accommodate wired or wireless equipment. The future capability shall include one of the following:

1. The interconnection of the building fire alarm system with the unit smoke alarms.
2. The replacement of audible appliances with combination audible/visible appliances.
3. The future extension of the existing wiring from the unit smoke alarm locations to required locations for visible appliances.

For wired equipment, the fire alarm power supply and circuits shall have not less than 5% excess capacity to accommodate future addition of visible alarm notification appliances, and access to such circuits shall be available on every story. Such circuits shall not be required to be extended beyond a single access point on a story.

Reason: Last cycle, F213-16 was approved with the intent of clarifying and standardizing the capability for future additions of alarm equipment to accommodate changes for units that may need to be converted to accommodate hearing impaired occupants. The question of a reasonable percentage for excess capacity of wired equipment was left unresolved, and I committed to bringing something back to address this so that the fire alarm industry would have a standardized basis for designing excess capacity into systems. The proposed text has been prepared based on what I learned in a discussion with an individual who has been instrumental in the development of ANSI A117.1 regarding the intent of the standard and his experience as an accessibility expert with respect to the relatively low frequency of units being retrofitted for hearing impaired occupants.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The requirement for future expansion capability already exists in this section. I am just trying to quantify the provision, so the cost consequence cannot be accurately assessed, since some installations my previously have provided more expansion capability and others less.

F152-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that they liked the concept of requiring future design capability but the proposed language does not provide the necessary level of information and the wording is incomplete. (Vote: 14-0)

Assembly Action:

None

F152-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

907.5.2.3.3 Group R-2. In Group R-2 occupancies required by Section 907 to have a fire alarm system, each story that contains *dwelling units* and *sleeping units* shall be provided with ~~the future~~ the capability to support future visible alarm notification appliances in accordance with Chapter 11 of ICC A117.1. Such capability shall accommodate wired or wireless equipment. ~~The future capability shall include one of the following:~~

- ~~1. The interconnection of the building fire alarm system with the unit smoke alarms.~~
- ~~2. The replacement of audible appliances with combination audible/visible appliances.~~
- ~~3. The future extension of the existing wiring from the unit smoke alarm locations to required locations for visible appliances.~~

~~For wired equipment, the fire alarm power supply and circuits shall have not less than 5% excess capacity to accommodate future addition of visible alarm notification appliances, and access to such circuits shall be available on every story. Such circuits shall not be required to be extended beyond a single access point on a story.~~

907.5.2.3.3.1 Wired equipment. Where wired equipment is used to comply with the future capability required by Section 907.5.2.3.3, the system shall include one of the following capabilities:

1. The replacement of audible appliances with combination audible/visible appliances or additional visible notification appliances. 2. The future extension of the existing wiring from the unit smoke alarm locations to required locations for visible appliances.
2. For wired equipment, the fire alarm power supply and circuits shall have not less than 5% excess capacity to accommodate future addition of visible alarm notification appliances, and a single access point to such circuits shall be available on every story. Such circuits shall not be required to be extended beyond a single access point on a story. The fire alarm system shop drawings required by Section 907.1.2 of the Code shall include the power supply and circuit documentation to accommodate future addition of visible notification appliances

Commenter's Reason:

This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at:

<https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

The PC is an agreed to compromise by the proponents of F150, F151 and F152. The reason for the PC and all three proposals is they seek to clarify that all dwelling units within apartment buildings are not required to be pre-wired for visible notification appliances. This change is necessary because many designers and code authorities think the word "capability" means that conduit and wiring needed to be installed into each dwelling unit for possible future use.

Note that the way the cdpACCESS displays it appears to be all new text in Section 907.5.2.3.3.1 however much of the text is simply moved from Section 907.5.2.3.3 to new Section 907.5.2.3.3.1 as shown below.

907.5.2.3.3 Group R-2. In Group R-2 occupancies required by Section 907 to have a fire alarm system, each *story* that contains *dwelling units* and *sleeping units* shall be provided with the ~~future~~ capability to support future visible alarm notification appliances in accordance with Chapter 11 of ICC A117.1. Such capability shall accommodate wired or wireless equipment.

907.5.2.3.3.1 Wired equipment. Where wired equipment is used to comply with ~~the~~ future capability required by Section 907.5.2.3.3, the system shall include one of the following capabilities:

~~1. The interconnection of the building fire alarm system with the unit smoke alarms.~~

The replacement of audible appliances with combination audible/visible appliances or additional visible notification appliances.

The future extension of the existing wiring from the unit smoke alarm locations to required locations for visible appliances.

For wired equipment, the fire alarm power supply and circuits shall have not less than 5% excess capacity to

accommodate future addition of visible alarm notification appliances, and a single access point to such circuits shall be available on every story. Such circuits shall not be required to be extended beyond a single access point on a story. The fire alarm system shop drawings required by Section 907.1.2 of the Code shall include the power supply and circuit documentation to accommodate future addition of visible notification appliances.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The requirement for future expansion capability already exists in this section. This proposal and PC quantify the provision, so the cost consequence can be accurately assessed, since some installations previously provided more expansion capability and others less.

F152-18

F153-18

IFC: 907.6.5 (IBC: [F] 907.6.5)

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org); Richard Roberts, representing Honeywell (richard.roberts@systemsensor.com); Jason Webb, representing Automatic Fire Alarm Association Codes & Standards Committee (jwebb608@gmail.com)

2018 International Fire Code

Revise as follows

907.6.5 ~~Access~~ **Access and visibility.** Access shall be provided to ~~each fire alarm device and notification appliance for devices, notification appliances, and equipment requiring~~ periodic inspection, maintenance and testing. Where devices, notification appliances and equipment are concealed from view, an approved sign or other means to identify their location shall be provided.

Reason: One of the causes of "unwanted alarms" is identified as fire alarm devices that get installed but are not accessible to perform routine inspection, testing and maintenance. Duct mounted smoke detectors; detection in elevator shafts and atrium detection are some of the key areas of concern. During construction and initial testing special equipment is provided to reach these spaces, but when the building is in normal operation these special lifts and appliances are not available. Leaving smoke devices not tested or maintained.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will not increase or decrease the cost of construction. In 95% of all cases there will be no additional cost to install the fire alarm system and devices when properly designed. In some specific cases it may be more expensive to install the device "correctly" but that is the right way to do it.

F153-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that they had issues with the sign requirements and that it should say "other approved means." Additionally there was confusion about the link between the access and visibility requirements and noted that they are stated as separate requirements. (Vote: 14-0)

Assembly Action:

None

F153-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

907.6.5 Access and visibility. Access shall be provided to fire alarm devices, notification appliances, and equipment requiring periodic inspection, maintenance and testing. ~~Where devices, notification appliances and equipment are concealed from view, an approved sign or other means to identify their location shall be provided.~~

907.6.5.1 Concealed equipment. Fire alarm devices, notification appliances, and equipment shall not be concealed from view unless they are provided with an approved sign indicating their presence and location. The sign shall be in letters 1 inch (25mm) high on a contrasting background and be located in the immediate vicinity of the device, appliance or equipment.

Exception: Where approved signs are not required when the location is indicated on a chart, diagram, plan, or similar document maintained on the premises.

Commenter's Reason: This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

The access section isn't new; this language simply adds equipment to the list. Often, one of the most commonly missed items during inspection and testing is power supplies which are commonly placed above drop ceilings, out of view.

The concealed equipment section is new to the code but is necessary to provide the code official with a tool to require the equipment that currently is concealed or is added in concealed locations to be identified. As the use of wireless devices and equipment grows, so will the use of repeaters and similar components which will routinely be mounted in concealed spaces such as above ceilings. This requirement calls for the use of a sign to identify these units, but allows for a plan or diagram in lieu of signs if approved by the fire code official.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

In 95% of all cases there will be no additional cost to install the fire alarm system and devices when properly designed. In some specific cases it may be more expensive to install the device correctly but that is the right way to do it.

F153-18

F158-18

IFC: 907.10, 907.10.1

Proposed Change as Submitted

Proponent: Thomas Daly, representing The Hospitality Security Consulting Group, LLC (Thomas.Daly@myhscg.com)

2018 International Fire Code

Revise as follows

907.10 Smoke alarm maintenance. Smoke alarms shall be tested and maintained in accordance with the manufacturer's instructions. ~~Smoke alarms shall be replaced when they fail to respond to operability tests, or when they exceed 10 years from the date of manufacture, unless an earlier replacement is specified in the manufacturer's published instructions.~~

Add new text as follows

907.10.1 Replacement. Newly installed smoke alarms shall be replaced, deemed construction, when they fail to respond to operability tests, or when they exceed 10 years from the date of manufacture, unless an earlier replacement is specified in the manufacturer's published instructions.

Reason: The proposed changes will clarify the intent of the language by differentiating between maintenance (testing, cleaning, etc) and replacement (construction) and apply the replacement obligation to newly installed smoke alarms, as there is no corresponding language in Chapter 11 making this replacement obligation applicable to existing installations.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The proposal will likely decrease the cost of operations.

F158-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that the new proposed language of "deemed" and "newly installed" makes the new section more confusing and does not add clarity to the existing section requirements. (Vote: 14-0)

Assembly Action:

None

F158-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Thomas Daly, representing The Hospitality Security Consulting Group, LLC (thomas.daly@myhscg.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

907.10 Smoke alarm maintenance. Smoke alarms shall be tested and maintained in accordance with the manufacturer's instructions.

907.10.1 Replacement. Newly installed smoke alarms shall be replaced ~~, deemed construction,~~ when they fail to respond to operability tests, or when they exceed 10 years from the date of manufacture, unless an earlier replacement is specified in ~~the~~ manufacturers published instructions. Replacement is construction.

Commenter's Reason: As this provision in the 2018 IFC was not in Chapter 11, this proposed change clarifies the applicability and indicates the replacement activity is construction, not maintenance.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. Given the impact on affected occupancies, including but not limited to, apartments, condominiums, hotels, dormitories, board and care and assisted living the clarification as to intent will dramatically reduce the cost of compliance.

F158-18

F169-18

IFC: TABLE 911.1 (IBC: [F] TABLE 414.5.1)

Proposed Change as Submitted

Proponent: Geoffrey Raifsnider, Global Finishing Solutions, representing Self

2018 International Fire Code

**TABLE 911.1
EXPLOSION CONTROL REQUIREMENTS^f**

MATERIAL	CLASS	EXPLOSION CONTROL METHODS	
		Barricade construction	Explosion (deflagration) venting or explosion (deflagration) prevention systems
Hazard Category			
Combustible dusts ^a	—	Not required	Required
Cryogenic fluids	Flammable	Not required	Required
Explosives	Division 1.1	Required	Not required
	Division 1.2	Required	Not required
	Division 1.3	Not required	Required
	Division 1.4	Not required	Required
	Division 1.5	Required	Not required
	Division 1.6	Required	Not required
Flammable gas	Gaseous	Not required	Required
	Liquefied	Not required	Required
Flammable liquids	IA ^b	Not required	Required
	IB ^c	Not Required	Required
Organic peroxides	Unclassified detonable	Required	Not permitted
	I	Required	Not permitted
Oxidizer liquids and solids	4	Required	Not permitted
Pyrophoric	Gases	Not required	Required
Unstable (reactive)	4	Required	Not permitted
	3 detonable	Required	Not permitted
	3 nondetonable	Not required	Required
Water-reactive liquids and solids	3	Not required	Required
	2 ^e	Not required	Required
Special Uses			
Acetylene generator rooms	—	Not required	Required
Grain processing	—	Not required	Required
Liquefied petroleum gas distribution facilities	—	Not required	Required
Where explosion hazards exist ^d	Detonation	Required	Not permitted
	Deflagration	Not required	Required

2018 International Building Code

**{F} TABLE 414.5.1
EXPLOSION CONTROL REQUIREMENTS^{a, h}**

MATERIAL	CLASS	EXPLOSION CONTROL METHODS	
		Barricade construction	Explosion (deflagration) venting or explosion (deflagration) prevention systems ^b
HAZARD CATEGORY			
Combustible dusts ^c	—	Not Required	Required
Cryogenic flammables	—	Not Required	Required
Explosives	Division 1.1	Required	Not Required
	Division 1.2	Required	Not Required
	Division 1.3	Not Required	Required
	Division 1.4	Not Required	Required
	Division 1.5	Required	Not Required
	Division 1.6	Required	Not Required
Flammable gas	Gaseous	Not Required	Required
	Liquefied	Not Required	Required
Flammable liquid	IA ^d	Not Required	Required
	IB ^e	Not Required	Required
Organic peroxides	U	Required	Not Permitted
	I	Required	Not Permitted
Oxidizer liquids and solids	4	Required	Not Permitted
Pyrophoric gas	—	Not Required	Required
Unstable (reactive)	4	Required	Not Permitted
	3 Detonable	Required	Not Permitted
	3 Nondetonable	Not Required	Required
Water-reactive liquids and solids	3	Not Required	Required
	2 ^g	Not Required	Required
SPECIAL USES			
Acetylene generator rooms	—	Not Required	Required
Grain processing	—	Not Required	Required
Liquefied petroleum gas-distribution facilities	—	Not Required	Required
Where explosion hazards exist ^f	Detonation	Required	Not Permitted
	Deflagration	Not Required	Required

- a. See Section 414.1.3.
- b. See the International Fire Code.
- c. As generated during manufacturing or processing.
- d. Storage or use.
- e. In open use or dispensing.
- f. Rooms containing dispensing and use of hazardous materials where an explosive environment can occur because of the characteristics or nature of the hazardous materials or as a result of the dispensing or use process.
- g. A method of explosion control shall be provided where Class 2 water-reactive materials can form potentially explosive mixtures.
- h. Explosion venting is not required for Group H-5 fabrication areas complying with Section 415.11.1 and the International Fire Code.

Reason: This proposed change brings this table in alignment with the current edition of NFPA 30

Cost Impact: The code change proposal will decrease the cost of construction
Elimination of deflagration venting or deflagration prevention system for enclosures used for open use or dispensing will reduce the cost of construction.

F169-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that they had concerns about the proposed deletion of all Class 1B flammable liquids from the table in relation to NFPA 30. It was noted that in there are class 1B liquids that can also be classified as an unstable reactive. It was suggested that a closer look at NFPA 30 is needed to make sure they are in alignment. (Vote: 13-0)

Assembly Action:

None

F169-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Geoffrey Raifsnider, representing Selfrequests As Modified by This Public Comment.

Replace as follows:

2018 International Fire Code

**TABLE 911.1
EXPLOSION CONTROL REQUIREMENTS^f**

MATERIAL	CLASS	EXPLOSION CONTROL METHODS	
		Barricade construction	Explosion (deflagration) venting or explosion (deflagration) prevention systems
Hazard Category			
Combustible dusts ^a	-	Not required	Required
Cryogenic fluids	Flammable	Not required	Required
Explosives	Division 1.1	Required	Not required
	Division 1.2	Required	Not required
	Division 1.3	Not required	Required
	Division 1.4	Not required	Required
	Division 1.5	Required	Not required
	Division 1.6	Required	Not required
Flammable gas	Gaseous	Not required	Required
	Liquefied	Not required	Required
Flammable liquids	IA ^b	Not required	Required
	IB ^c	Not required	Required
Organic peroxides	Unclassified detonable	Required	Not permitted
	I	Required	Not permitted
Oxidizer liquids and solids	4	Required	Not permitted
Pyrophoric	Gases	Not required	Required
Unstable (reactive)	4	Required	Not permitted
	3 detonable	Required	Not permitted
	3 nondetonable	Not required	Required
Water-reactive liquids and solids	3	Not required	Required
	2 ^e	Not required	Required
Special Uses			
Acetylene generator rooms	-	Not required	Required
Grain processing	-	Not required	Required
Liquefied petroleum gas distribution facilities	-	Not required	Required
Where explosion hazards exist ^d	Detonation	Required	Not permitted
	Deflagration	Not required	Required

- a. Combustible dusts that are generated during manufacturing or processing. See definition of “Combustible dust” in Chapter 2.
- b. Storage or use.
- c. ~~In open use or dispensing.~~ Where heated above its boiling point.
- d. Rooms containing dispensing and use of hazardous materials where an explosive environment can occur because of the characteristics or nature of the hazardous materials or as a result of the dispensing or use process.
- e. A method of explosion control shall be provided where Class 2 water-reactive materials can form potentially explosive mixtures.
- f. Explosion venting is not required for Group H-5 Fabrication Areas complying with Chapter 27 and the International Building Code.

2018 International Building Code

**[F] TABLE 414.5.1
EXPLOSION CONTROL REQUIREMENTS^{a, h}**

MATERIAL	CLASS	EXPLOSION CONTROL METHODS	
		Barricade construction	Explosion (deflagration) venting or explosion (deflagration) prevention systems ^b
HAZARD CATEGORY			
Combustible dusts ^c	-	Not Required	Required
Cryogenic flammables	-	Not Required	Required
Explosives	Division 1.1	Required	Not Required
	Division 1.2	Required	Not Required
	Division 1.3	Not Required	Required
	Division 1.4	Not Required	Required
	Division 1.5	Required	Not Required
	Division 1.6	Required	Not Required
Flammable gas	Gaseous	Not Required	Required
	Liquefied	Not Required	Required
Flammable liquid	IA ^d	Not Required	Required
	IB ^e	Not Required	Required
Organic peroxides	U	Required	Not Permitted
	I	Required	Not Permitted
Oxidizer liquids and solids	4	Required	Not Permitted
Pyrophoric gas	-	Not Required	Required
Unstable (reactive)	4	Required	Not Permitted
	3 Detonable	Required	Not Permitted
	3 Nondetonable	Not Required	Required
Water-reactive liquids and solids	3	Not Required	Required
	2 ^g	Not Required	Required
SPECIAL USES			
Acetylene generator rooms	-	Not Required	Required
Grain processing	-	Not Required	Required
Liquefied petroleum gas-distribution facilities	-	Not Required	Required
Where explosion hazards exist ^f	Detonation	Required	Not Permitted
	Deflagration	Not Required	Required

- a. See Section 414.1.3.
- b. See the International Fire Code.
- c. As generated during manufacturing or processing.
- d. Storage or use.
- e. ~~In open use or dispensing.~~
- e. Where heated above its boiling point.
- f. Rooms containing dispensing and use of hazardous materials where an explosive environment can occur because of the characteristics or nature of the hazardous materials or as a result of the dispensing or use process.
- g. A method of explosion control shall be provided where Class 2 water-reactive materials can form potentially explosive mixtures.
- h. Explosion venting is not required for Group H-5 fabrication areas complying with Section 415.11.1 and the International Fire Code .

Commenter's Reason: The committee stated their concern was that the original proposal to remove Class IB from the row for Flammable Liquids from Table 911.1 Explosion Control Requirements would also imply that other Class IB liquids that can be classified as an unstable (reactive) material would not need explosion control.

Table 911.1 currently includes a row for all Unstable (reactive) materials. The original proposal did not make any changes

to this row. The definition of Unstable (reactive) material and the various Classifications are currently in the code and no changes are being proposed to those sections.

If there is a 1B flammable liquid that is also an Unstable (reactive) material, then Table 911.1 would still address where explosion control is required.

This modification would address the concerns raised by the committee and the opponents to the original proposal by only requiring explosion control for 1B Flammable Liquids heated above its boiling point. These concerns were based upon the direction that NFPA 30 will be taking with regards to explosion control requirements for flammable and combustible liquids, not the current edition of NFPA 30.

Requirements for Unstable (reactive) materials would remain unchanged.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. Elimination of deflagration venting or deflagration prevention systems for enclosures used for open use or dispensing of Class 1B flammable liquids not heated above their boiling point will reduce the cost of construction.

F169-18

F173-18

IFC: 913.2.2 (IBC: [F] 913.2.2)

Proposed Change as Submitted

Proponent: Kevin Scott, representing KH Scott & Associates LLC (khscottassoc@gmail.com)

2018 International Fire Code

Revise as follows

913.2.2 Circuits supplying fire pumps. Cables used for survivability of circuits supplying fire pumps shall be protected using one of the following methods:

Exception: Cables, or portions of cables, located within a fire pump room or generator room which is separated from the remainder of the occupancy with fire-resistance-rated construction.

1. Cables used for survivability of required critical circuits shall be *listed* in accordance with UL 2196 and shall have a *fire-resistance rating* of not less than ~~1-hour~~ 2 hours.
2. Electrical circuit protective systems shall have a fire-resistance rating of not less than ~~1-hour~~ 2 hours. Electrical circuit protective systems shall be installed in accordance with their listing requirements.
3. Construction having a *fire-resistance rating* of not less than ~~1-hour~~ 2 hours.
4. The cable or raceway is encased in a minimum of 2 inches (50 mm) of concrete.

Reason: Protecting the fire pump power supply is essential, but more critical when the pump is located within the building.

Section 695.6(A)(2)(d) of NFPA 70 requires that the power supply for fire pumps be protected for a minimum of 2 hours when it is routed through the building. The revisions to Items 1, 2 and 3 will correlate this requirement with the National Electrical Code.

The exception is added to clarify that cables located within the fire pump room are not required to be protected, and cables located with the generator room are not required to be protected. The fire-resistance rating is not specified since it could be either 1-hour or 2-hour based on other code sections.

- IBC Section 901.8 requires that the fire pump room be separated by either 1-hour or 2-hour construction depending on whether the building is high-rise or not.
- IFC/IBC Section 903.3.1.1 allows the elimination of sprinklers in the generator room if the generator room is of 2-hour construction and provided with a fire detection system.

Based on the above sections the separation could be 1-hour or 2-hour. It should also be noted that the 2-hour separation for the generator is not required, but rather an option. If the 2-hour separation and detection is not provided, then the room is provided with sprinklers. Additionally, the proposed exception in 913.2.2 would not apply since there is no fire-resistance-rated separation.

Cost Impact: The code change proposal will increase the cost of construction

This may increase the cost of construction if listed cables are used and now must be 2-hour rated. However, Item 4 allows embedding the cables in concrete which would not require 2-hour listed cables.

F173-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that they had issues with the language regarding the inclusion of the generator room into the fire pump room and the 1 hour vs. 2 hour rating requirement. The preference was for proposal F174-18. (Vote: 14-0)

Assembly Action:

None

F173-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Robert Solomon, National Fire Protection Association, representing National Fire Protection Association requests As Submitted.

Commenter's Reason: The original F173-18 proposal does indeed provide correlation with Article 695 of the *National Electrical Code*, and NFPA 20, *Standard for the Installation of Stationary Fire Pumps for Fire Protection*. Specifically, the conductors leading up to the fire pump room per the NEC, have to be rated for 2 hours. The equivalent protection method of burying the conductors under two inches of concrete is also acceptable. In a separate comment we will recommend disapproving companion proposal F174-18, as this proposal does not provide correlation with the NEC as indicated in the reason statement.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. This may increase the cost of construction if listed cables are used and now must be 2-hour rated. However, Item 4 allows embedding the cables in concrete which would not require 2-hour listed cables.

F173-18

F174-18

IFC: 913.2.2 (IBC: [F] 913.2.2)

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Fire Code

Revise as follows

913.2.2 Circuits supplying fire pumps. Cables used for survivability of circuits supplying fire pumps shall be protected using one of the following methods:

1. Cables used for survivability of required critical circuits shall be *listed* in accordance with UL 2196 and shall have a *fire-resistance rating* of not less than 1 hour.
2. Electrical circuit protective systems shall have a fire-resistance rating of not less than 1 hour. Electrical circuit protective systems shall be installed in accordance with their listing requirements.
3. Construction having a *fire-resistance rating* of not less than 1 hour.
4. The cable or raceway is encased in a minimum of 2 inches (50 mm) of concrete.

Exception: This section shall not apply to cables, or portions of cables, located within a fire pump room or generator room which is separated from the remainder of the occupancy with fire-resistance-rated construction.

Reason: Protecting the fire pump power supply is essential, but more critical when the pump is located within the building.

Section 695.6(A)(2)(d) of NFPA 70, the National Electrical Code, requires that the power supply for fire pumps be protected for a minimum of 2 hours when it is routed through the building. These revisions will correlate this requirement with the National Electrical Code.

The exception is added to clarify that where the cables are located within the fire pump room are not required to be protected, and cables located with the generator room are not required to be protected. The fire-resistance rating is not specified since it could be either 1-hour or 2-hour based on other code sections.

- IBC Section 901.8 requires that the fire pump room be separated by either 1-hour or 2-hour construction depending on whether the building is high-rise or not.
- IFC/IBC Section 903.3.1.1 allows the elimination of sprinklers in the generator room if the generator room is of 2-hour construction and provided with a fire detection system.

Based on the above sections the separation could be 1-hour or 2-hour. It should also be noted that the 2-hour separation for the generator is not required, but rather an option. If the 2-hour separation and detection is not provided, then the room is provided with sprinklers. Additionally, the proposed exception in 913.2.2 would not apply since there is no fire-resistance-rated separation.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Correlates with the NEC so is simply a clarification.

F174-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval is based upon the proponent's published reason. (Vote: 14-0)

Assembly Action:

None

F174-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Robert Solomon, National Fire Protection Association, representing National Fire Protection Association requests Disapprove.

Commenter's Reason: The reason statement provided for proposal F174-18 indicates the proposal is intended to provide correlation with requirements of the National Electrical Code (NEC). The current language in the proposal conflicts with the requirements of the NEC which requires 2-hour rated conductors outside of the fire pump room. In a separate comment we have recommended approving proposal F173-18 in lieu of F174-18.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
There will be no cost impact since as proposed would have been less restrictive than NFPA 70 would require.

F174-18

F180-18

IFC: 1031.3.1

Proposed Change as Submitted

Proponent: John Williams, Chair, representing Healthcare Committee (AHC@iccsafe.org)

2018 International Fire Code

Revise as follows

1031.3.1 Group I-2. In Group I-2, the required clear width for *aisles, corridors and ramps* that are part of the required *means of egress* shall comply with Section 407.4.3 of the International Building Code and Section 1020.2. ~~The facility shall have a plan to maintain the required clear width during emergency situations.~~

Exception: In areas required for bed movement, equipment shall be permitted in the required width where all of the following provisions are met:

1. The equipment is low hazard and wheeled.
2. The facility shall have a plan to remove wheeled equipment in order to maintain the required clear width during emergency situations.
3. The equipment does not reduce the effective clear width for the *means of egress* to less than 5 feet (1525 mm).
4. The equipment is limited to:
 - 4.1. Equipment and carts in use.
 - 4.2. Medical emergency equipment.
 - 4.3. Infection control carts.
 - 4.4. Patient lift and transportation equipment.
5. Medical emergency equipment and patient lift and transportation equipment, when not in use, are required to be located on one side of the corridor.
6. The equipment is limited in number to not more than one per patient sleeping room or patient care room within each smoke compartment.

Reason: This clarification of language is required in order to conform with Federal Standards and CMS enforcement rules (K211). The reference to Section 407.4.3 is to point to the fixed furniture requirements for hospitals and nursing homes. This relocated language gives the AHJ enforcement language to ensure that all wheeled equipment that may be occasionally found in hallways, must be included in the facility's emergency plan and must be moved out of the required egress width in the event of an emergency situation. Items that are often found in corridors include crash carts and infection control carts, which are needed to be near the point of use and readily available in typical circumstances, but must be moved out of the corridor during emergencies.

This proposal is submitted by the ICC Committee on Healthcare (CHC). The CHC was established by the ICC Board to evaluate and assess contemporary code issues relating to healthcare facilities. This is a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. In 2017 the CHC held 2 open meetings and numerous conference calls, *which included members of the committees as well as any interested parties, to discuss and debate the proposed changes*. Information on the CHC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CHC effort can be downloaded from the CHC website at: <https://www.iccsafe.org/codes-tech-support/cs/icc-committee-on-healthcare/>.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposed language is operational clarification.

F180-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that they had concerns with the new exception provision for a facility to have a plan to remove wheeled equipment in that it could require going into a more hazardous area to remove it and it could be impractical. Additionally a conflict was noted between the new exception and the existing one that would follow it in the list. (Vote: 12-2)

Assembly Action:

None

F180-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Williams, representing Healthcare Committee (ahc@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

1031.3.1 Group I-2. In Group I-2, the required clear width for *aisles, corridors* and *ramps* that are part of the required *means of egress* shall comply with Section 407.4.3 of the International Building Code and Section 1020.2. The facility shall have a plan to maintain the required clear width during emergency situations.

Exception: In areas required for bed movement, equipment shall be permitted in the required width where all of the following provisions are met:

1. The equipment is low hazard and wheeled.
2. ~~The facility shall have a plan to remove wheeled equipment in order to maintain the required clear width during emergency situations.~~
3. The equipment does not reduce the effective clear width for the *means of egress* to less than 5 feet (1525 mm).
4. The equipment is limited to:
 - 4.1. Equipment and carts in use.
 - 4.2. Medical emergency equipment.
 - 4.3. Infection control carts.
 - 4.4. Patient lift and transportation equipment.
5. Medical emergency equipment and patient lift and transportation equipment, when not in use, are required to be located on one side of the corridor.
6. The equipment is limited in number to not more than one per patient sleeping room or patient care room within each smoke compartment.

Commenter's Reason: The committee did not like the wheeled equipment moved to the list in the exception. We have left the language where it currently is. The addition of the reference to Section 407.4.3 in IBC is needed as a pointer to the allowance for fixed furniture.

Also not letting me submit proposal.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal is a pointer with no changes to current requirements.

F180-18

F182-18

IFC: 105.6.47 , 202, 1001.3, 1031.11, 1031.11.1, 1031.11.2

Proposed Change as Submitted

Proponent: Michael O'Brian, representing FCAC (fcac@iccsafe.org)

2018 International Fire Code

Add new text as follows

105.6.47 Valet trash collection. An operational permit is required to use a valet trash collection service in a Group R-2 Occupancy.

Add new definition as follows

VALET TRASH COLLECTION A service that collects occupant-generated combustible trash or recyclable materials from dwelling units, where the trash is left outside of dwelling units for scheduled pickup.

Add new text as follows

1001.3 Permits. Permits shall be required as forth in Section 105.6 for the activities regulated in 1031.11.

1031.11 Combustible trash in means of egress. Combustible trash or recyclable materials shall not be placed in exits, in enclosures for stairways or ramps, in corridors, in elevator lobbies or on egress balconies except as permitted by one of the following:

1. Combustible trash or recyclable materials associated with construction, demolition, remodeling, or alterations in accordance with Section 3311.3.
2. Combustible trash or recyclable materials in corridors or on egress balconies of Group R-2 Occupancies that is awaiting scheduled valet trash collection in accordance with Sections 1031.11.1 and 1031.11.2.

1031.11.1 Valet Trash collection. Trash or recyclable materials awaiting valet trash collection shall only be placed in a corridor or on an egress balcony within 18 hours of scheduled pickup and shall not obstruct the minimum egress width required by Section 1020.2.

Trash or recyclable materials awaiting valet trash collection shall be placed completely inside of one or more containers with a closed lid that complies with Section 1031.11.2. Additional trash or recyclable material placed outside of compliant containers are prohibited in a corridor or egress balcony.

1031.11.2 Valet trash collection containers. Containers used for valet trash collection shall not exceed a capacity of 2.0 cubic feet (15 gallons, 0.06 cubic meters) and shall be provided with tight-fitting or self-closing lids. Containers and lids shall comply with one of the following:

1. Containers and lids located in an area protected by fire sprinklers shall be constructed entirely of noncombustible materials or materials that meet a peak rate of heat release not exceeding 300 kW/m² when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m² in the horizontal orientation. Containers and lids shall be listed or bear the label of an approved agency that validates compliance with this requirement. The automatic sprinkler system supplying the sprinklers shall be permitted to comply with Section 903.3.1.1 or 903.3.1.2.
2. Containers and lids located in an area that is not protected by fire sprinklers in accordance with Item 1 shall be constructed entirely of noncombustible materials or materials that meet a peak rate of heat release not exceeding 150 kW/m² when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m² in the horizontal orientation. Containers and lids shall be listed or bear the label of an approved agency that validates compliance with this requirement. Wall and ceiling finishes in the area where valet trash collection containers are placed for pickup shall be noncombustible or shall comply with the requirements of Section 803 for Class B interior finish materials.

Reason: Valet trash collection services have become common in many R-2 occupancies. Occupants receiving this service place trash and recyclables in the corridors outside of their apartments to be picked up by a collection service, which typically comes by on a regular scheduled basis.

Currently, there are no provisions in the IFC that specifically prohibit or regulate the placement of combustible trash or recyclables in common egress areas for pickup by others. Without regulation, the hazard of excessive fire loading or exit obstruction is significant. This proposal seeks to establish reasonable safety precautions to allow this process to be offered, based on:1. An operational permit is required, ensuring that the Fire Code Official is aware that the service is being provided and encouraging code compliance.2. Requires that trash containers not obstruct the minimum required clear width of the means of egress.3. Clarifies that, in general, trash is not allowed to be accumulated in exits, corridors or egress balconies.4. Regulates trash containers and interior finish of the container placement area based on whether fire sprinklers are provided.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: FCAC

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal does not affect construction costs but may increase cost of compliance with the fire code depending upon how the provisions are enforced. However enforcement of these provisions will reduce the risk of fires.

F182-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval is based upon the proponent's published reason. (Vote: 9-5)

Assembly Action:

None

F182-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Robert Davidson, Davidson Code Concepts, LLC, representing Self (rjd@davidsoncodeconcepts.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

1031.11 Combustible trash in means of egress. Combustible trash or recyclable materials shall not be placed in exits, in enclosures for stairways or ramps, in corridors, in elevator lobbies or on egress balconies except as permitted by one of the following:

1. Combustible trash or recyclable materials associated with construction, demolition, remodeling, or alterations in accordance with Section 3311.3.
2. Combustible trash or recyclable materials in corridors or on egress balconies of Group R-2 Occupancies that is awaiting scheduled valet trash collection in accordance with Sections 1031.11.1 ~~and through 1031.11.23.~~

1031.11.3 Automatic Sprinkler Protection Valet trash collection shall only be permitted in Group R-2 occupancies protected by an automatic sprinkler system installed throughout the building in accordance with Section 903.3.1.1 or 903.3.1.2.

Commenter's Reason: Valet trash collection being permitted in R-2 corridors is a subject of disagreement among those in fire suppression, fire protection and fire prevention arenas. Corridors historically have been required to be free of obstructions for the use of occupants evacuating the building as well as by firefighters accessing the building and individual units for rescue and firefighting activities. The valet trash proposal introduces a hazard to those critical paths that will provide a fire hazard fuel load, within the path.

This is acknowledged by the criteria within the proposal itself.

Unfortunately, much of the criteria is going to rely on voluntary compliance. Even if a local enforcing agency inspects R-2 occupancies on a cyclical basis, problems presenting fire hazards from non-compliance with the limitations within this proposal can occur weekly. There will be bad actors in the business as well as the good actors.

For that reason this activity should only be permitted in R-2 occupancies where the building is protected by an automatic sprinkler system to provide a level of safety should a fire occur involving the trash located in the critical corridor egress and firefighter access paths.

Note that there is no height limitation for the provision of this service. As written it can occur in a high-rise building and it is well known there are 1000s of residential high-rise buildings that do not have automatic fire suppression systems installed throughout the building. The impact of fire in a high-rise building is well documented as well as the impact of fire within a required means of egress path.

I'll only refer to one such fire that occurred in an unsuppressed residential occupancy on January 9, 2012 in Chicago when a dwelling unit door to a 9th floor corridor was left open as occupants escaped the fire in the dwelling unit, (reportedly intentionally to let a pet escape), resulting in the products of combustion filling the corridor and resulting in the death of a woman who had unknowingly ridden an elevator to the fire floor. Now the code will allow the actual fuel load for a fire to be located in a similar corridor. Possibly subject to a wind driven fire, an event that has turned out deadly for the fire service.

If this proposal is to end up being part of the fire code it must be predicated on the existence of automatic fire suppression throughout the building.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This does not impact the construction cost of buildings. It impacts where a hazardous activity may occur.

Public Comment 2:

Proponent: Kara Gerczynski, Elizabeth Fire Protection District, representing Elizabeth Fire Protection District (kara@elizabethfire.com) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Fire Code

1031.11.1 Valet Trash collection. Trash or recyclable materials awaiting valet trash collection shall only be placed in a corridor or on an egress balcony within 18 hours of scheduled pickup and shall not obstruct the minimum egress width required by Section 1020.2.

Trash or recyclable materials awaiting valet trash collection shall be placed completely inside of one or more containers with a ~~closed~~ latching lid that complies with Section 1031.11.2. Additional trash or recyclable material placed outside of compliant containers are prohibited in a corridor or egress balcony.

1031.11.2 Valet trash collection containers. Containers used for valet trash collection shall not exceed a capacity of 2.0 cubic feet (15 gallons, 0.06 cubic meters) and shall be provided with tight-fitting or self-closing latching lids. Containers and lids shall comply with one of the following:

1. Containers and lids located in an area protected by fire sprinklers shall be constructed entirely of noncombustible materials or materials that meet a peak rate of heat release not exceeding 300 kW/m² when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m² in the horizontal orientation. Containers and lids shall be listed or bear the label of an approved agency that validates compliance with this requirement. The lid shall be equipped with a latching device that engages to secure the lid to the container and that can only be released manually. The automatic sprinkler system supplying the sprinklers shall be permitted to comply with Section 903.3.1.1 or 903.3.1.2.
2. Containers and lids located in an area that is not protected by fire sprinklers in accordance with Item 1 shall be constructed entirely of noncombustible materials or materials that meet a peak rate of heat release not exceeding 150 kW/m² when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m² in the horizontal orientation. Containers and lids shall be listed or bear the label of an approved agency that validates compliance with this requirement. The lid shall be equipped with a latching device that engages to secure the lid to the container and that can only be released manually. Wall and ceiling finishes in the area where valet trash collection containers are placed for pickup shall be noncombustible or shall comply with the requirements of Section 803 for Class B interior finish materials.

Commenter's Reason: The proponent is basing their code change on a container and lid that is entirely of noncombustible materials but has no way to ensure that the lid will remain closed to provide for that noncombustible rating. Providing a latching lid will ensure the following: 1. Trash is limited to what fits inside the container. Limiting the amount of fire load in the corridors. 2. The sprinkler system designed for the corridor will meet the requirements if the trash is secured in the container. If the lid was not secured or partially open, the sprinkler system may not meet the design requirements for light hazard of a corridor. 3. Having a latching lid will help heat sources from entering the container. 4. In the event of a fire, if the containers fall over, trash would not be scattered throughout the corridor. It would also help firefighter safety while they are providing suppression operations in the corridor.

Having a latching lid is the only way to secured combustibles in the container as the proponents of the proposal expect the use of valet trash.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There are no construction costs with the proposed modification to the code proposal.

Public Comment 3:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org); Andrew Klein (andrew@asklein.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

105.6.47 Valet trash collection. An operational permit is required to use a for providers of valet trash collection service in a Group R-2 Occupancy Occupancies.

Commenter's Reason: This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

This Public Comment addresses an issue that was raised during the Committee Action Hearing to make the valet trash collection permitting requirements more streamlined for jurisdictions who choose to require permits. Many apartments who offer such services contract with a service provider. The revised language makes it clear that operational permits are required for the service provider and not for each individual site serviced within a jurisdiction.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. By clarifying that permits are required of the service provider, this Public Comment lessens the burden on jurisdictions. The decrease in the cost of permitting is transferred as savings to operators of apartment complexes.

Public Comment 4:

Proponent: Andrew Klein, representing Valet Living (andrew@asklein.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

1031.11.2 Valet trash collection containers. Containers used for valet trash collection shall not exceed a capacity of 2.0 cubic feet (15 gallons, 0.06 cubic meters) and shall be provided with tight-fitting or self-closing lids. Containers and lids shall comply with one of the following:

1. Containers and lids located on an exterior egress balcony of a building not exceeding three stories above grade plane shall be constructed entirely of noncombustible materials or materials that meet a peak rate of heat release not exceeding 300 kW/m² when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m² in the horizontal orientation. Containers and lids shall be listed or bear the label of an approved agency that validates compliance with this requirement. The egress balcony shall be constructed in accordance with Section 1021.
2. Containers and lids located in an area protected by fire sprinklers shall be constructed entirely of noncombustible materials or materials that meet a peak rate of heat release not exceeding 300 kW/m² when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m² in the horizontal orientation. Containers and lids shall be listed or bear the label of an approved agency that validates compliance with this requirement. The automatic sprinkler system supplying the sprinklers shall be permitted to comply with Section 903.3.1.1 or 903.3.1.2.
23. Containers and lids not located on an exterior egress balcony in accordance with Item 1 or located in an area that is not protected by fire sprinklers in accordance with Item 1-2 shall be constructed entirely of noncombustible materials or materials that meet a peak rate of heat release not exceeding 150 kW/m² when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m² in the horizontal orientation. Containers and lids shall be listed or bear the label of an approved agency that validates compliance with this requirement. Wall and ceiling finishes in the area where valet trash collection containers are placed for pickup shall be noncombustible or shall comply with the requirements of Section 803 for Class B interior finish materials.

Commenter's Reason: The practice of door-side trash collection in apartment communities, commonly referred to as valet trash, began with a single apartment unit in Tampa in 1995 and now extends to 1.5 million residences among more than 5,000 apartment communities in 40 states. The industry has a perfect safety record since inception - no history of life loss or impediment to life safety, resident evacuation building safety, or first responder safety. Fire officials in certain local jurisdictions have questioned whether the service meets the fire code in terms of the combustibility features of Chapter 3 and the egress provisions of Chapter 10, but everyone agrees that the code has only pointers - no definitive answer on the practice or regulation of it. To settle the uneven interpretations and enforcements, the industry joined the FCAC proponent in Columbus in April in support of the F-182-18, which was approved as submitted.

We offer a tweak to what the language that was approved. The requirement that collection containers in non-sprinkled open-air corridors and breezeways be constructed of non-combustible materials or materials that meet an ASTM 1354 peak heat release of 150 kW/m² is excessive in proportionality of risk when applied to certain unsprinkled construction – which was unsprinkled because the life safety risk of the unsprinkled areas was not sufficient to require sprinklers in the building code.

Members of the FCAC offered a compromise of allowing containers meeting an ASTM 1354 peak heat release of 300 kW/m² to be used in unsprinkled open-air corridors and breezeways in buildings of up to three stories in construction. The industry supports this compromise as offered in this public comment.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. The net effect of the public comment and overall code change proposal will significantly decrease the cost of construction to the degree that developers can forego the expense and space of trash rooms, chutes and dumpster systems. The cost of non-combustible containers or ones that meet the ASTM 1354 standard at 150 kW/m² are 4.5 times that of those which meet the 300 kW/m² peak heat release rate with no data or testing on whether the more stringent standard, which carries a deleterious fiscal impact on the industry, is proportional to the risk.

Public Comment 5:

Proponent: Brian M. McGraw, P.E., Virginia Department of Fire Programs, State Fire Marshal's Office, representing Virginia State Fire Marshal's Office, Virginia Fire Services Board (brian.mcgraw@vdfp.virginia.gov) requests Disapprove.

Commenter's Reason: The Virginia Fire Services Board opposes Proposal F182-18. This proposal will result in unsafe conditions for building occupants and firefighters. The premise of “valet trash” violates several sections of the current Fire Code, including:

- 304.1: Combustible waste material creating a fire hazard shall not be allowed to accumulate in buildings or structures or upon premises.
- 304.2: Storage of combustible rubbish shall not produce conditions that will create a nuisance or a hazard to the public health, safety or welfare.
- 1031.2: Required exit accesses, exits and exit discharges shall be continuously maintained free from obstructions or impediments to full instant use in the case of fire or other emergency where the building area served by the means of egress is occupied.
- 1031.1: A means of egress shall be free from obstructions that would prevent its use, including the accumulation of snow and ice.
- 1031.6: ... Furnishings, decorations or other objects shall not be placed so as to obstruct exits, access thereto, egress therefrom, or visibility thereof...

The above requirements are longstanding fundamentals of protecting the means of egress and providing for fire safety in buildings. However, because one or more businesses have undertaken business practices that violate current code requirements, the answer is to weaken the requirements, potentially putting occupants and firefighters at risk.

The proposal states that “trash or recyclable materials awaiting valet trash collection shall only be placed in a corridor or on an egress balcony within 18 hours of scheduled pickup and shall not obstruct the minimum egress width required by Section 1020.2”. What happens if the scheduled pickup does not occur? Is the trash or recyclable material allowed to remain in the corridor until the next scheduled pickup? How does the tenant placing their trash or recyclable material in the corridor know what the minimum egress width is? How do you enforce this? Who is responsible for compliance? The valet trash service provider? The building owner? The building manager? The tenant?

The proposal specifies the size and type of container that must be used and that they must be provided with tight-fitting or self-closing lids. However, the proposal does not require the lid to be used. What if the occupant has more trash than will fit in the container? Leave the lid off? Put it next to the container?

There are no restrictions on the type of materials that can be put out. During the Committee Action Hearings, the one service provider that was represented stated that their policies prohibited hazardous materials, flammable liquids, etc. What about the other service providers?

In limited visibility, firefighters follow the wall to find their way. We teach the general public to follow the wall to find their way out in smoke. This proposal allows the introduction of obstructions that will require firefighters and occupant that are attempting to follow the wall to lose contact with the wall.

This proposal fails to address a number of important factors and presents a multitude of enforcement issues and should be disapproved.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction.

This proposal affects the operation of a building after occupancy and, therefore, has no impact on cost of construction.

F185-18

IFC: 1103.7.5.1

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org); Jason Webb, Automatic Fire Alarm Association Codes & Standards Committee, representing Automatic Fire Alarm Association Codes & Standards Committee; Richard Roberts, representing Honeywell (richard.roberts@systemsensor.com)

2018 International Fire Code

Revise as follows

1103.7.5.1 Group R-1 hotel and motel manual fire alarm system. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in ~~existing~~ the following:

1. Existing Group R-1 hotels and motels more than three stories ~~or in height~~.
2. Existing Group R-1 hotels and motels with more than 20 sleeping units.
3. Existing unsprinklered Group R-1 hotels and motels more than one story in height.

Exceptions:

1. Buildings less than two stories in height where all *sleeping units*, attics and crawl spaces are separated by 1-hour fire-resistance-rated construction and each *sleeping unit* has direct access to a *public way, egress court* or yard.
2. Manual fire alarm boxes are not required throughout the building where the following conditions are met:
 - 2.1. The building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2.
 - 2.2. The notification appliances will activate upon sprinkler water flow.
 - 2.3. Not less than one manual fire alarm box is installed at an *approved* location.

Reason: For existing unsprinklered Group R-1 occupancies a fire alarm system would be required if the building is more than one story or has more than 20 sleeping units.

Fires in some older multiple story unsprinklered hotels without fire alarm systems, as was allowed in the IBC/IFC up to 2003, have resulted in multiple fire fatalities and fire injuries, where a fire in on the first-floor envelopes the second story means of egress.

Such fires in two-story motels without automatic sprinkler systems occurred on January 4, 2010 in South Birmingham, AL (4 fatalities on the second floor), on December 14, 2013 in Wausau, WI (20 injuries) and in Point Pleasant Beach, NJ on March 21, 2014 (four fatalities on the second floor).

One additional example of a multiple life-loss fire was the Newport, OR City Center Motel on August 5, 2016, 4 civilian fire deaths and 3 civilian fire injuries. Fire deaths occurred on both the ground floor and the 2nd floor. The fire started on the ground floor. No sprinklers and no reports of a fire alarm system sounding.

These fires resulted in fatalities, as second floor occupants could not escape due to the means of egress being blocked by smoke and flames. In these fires resulting in fatalities, no fire alarm system was in place to provide early warning to occupants.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will increase the cost of construction

This change will impact the cost of construction or operation of a smaller number existing hotels. When you need to add notification (horns and strobes) to these buildings, the cost would be about 350.00 a device installed.

F185-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that the proposed requirements are more restrictive than those for new construction and could result in newly occupied buildings having to add a system after the certificate of occupancy is issued. (Vote: 9-5)

Assembly Action:

None

F185-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org); Kevin Scott, representing FCAC (khscothassoc@gmail.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Fire Code

1103.7.5.1 Group R-1 hotel and motel manual fire alarm system. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in existing Group R-1 hotels and motels more than ~~three stories~~ one story in height or with more than 20 *sleeping units*.

Exceptions:

1. ~~Buildings~~ A manual fire alarm system is not required in buildings less than two stories in height where all sleeping units, attics and crawl spaces are separated by 1-hour fire-resistance-rated construction and each sleeping unit has direct access to a public way, egress court or yard.
2. A manual fire alarm system is not required in buildings not more than three stories in height and not more than 20 sleeping units equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.
- ~~2-3.~~ Manual fire alarm boxes are not required throughout the building where the following conditions are met:
 - ~~2-1-3.1.~~ The building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.
 - ~~2-2-3.2.~~ The notification appliances will activate upon sprinkler water flow.
 - ~~2-3-3.3.~~ Not less than one manual fire alarm box is installed at an approved location.

Commenter's Reason: This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to firesafety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

This public comment continues with the original concept of addressing multi-story, unsprinklered hotels and motels.

The charging statement requires a fire alarm system for existing facilities greater than 1 story. Exception 1 is revised to clarify that it eliminates the entire fire alarm system where each unit has direct egress and 1-hour separation in a 1-story building.

The new Exception 2 eliminates the requirement for a fire alarm system in sprinklered buildings up to 3 stories provided the building contains no more than 20 sleeping units.

Application to existing buildings would be as follows:

Fire Alarm System Required in Existing *SPRINKLERED* Group R-1

Number of Units	1 Story	2 or 3 Stories	3 stories
20 or less	Not required	Not Required	Required ^b
more than 20	Required ^{a,b}	Required ^b	Required ^b

a. Exception 1 could eliminate the fire alarm system for 1-story buildings.

b. Exception 3 would eliminate all but one manual fire alarm box.

Fire Alarm System Required in Existing *NONSPRINKLERED* Group R-1

Number of Units	1 Story	2 or 3 Stories	3 stories
20 or less	Not required	Required	Required
more than 20	Required ^a	Required	Required

a. Exception 1 could eliminate the fire alarm system for 1-story buildings.

Fires in two-story motels without automatic sprinkler systems occurred on January 4, 2010 in South Birmingham, AL (4 fatalities on the second floor), on December 14, 2013 in Wausau, WI (20 injuries) and in Point Pleasant Beach, NJ on March 21, 2014 (four fatalities on the second floor).

One additional example of a multiple life-loss fire was the Newport, OR City Center Motel on August 5, 2016, 4 civilian fire deaths and 3 civilian fire injuries. Fire deaths occurred on both the ground floor and the 2nd floor. The fire started on the ground floor. No sprinklers and no reports of a fire alarm system sounding.

These fires resulted in fatalities, as second floor occupants could not escape due to the means of egress being blocked by smoke and flames. In fires resulting in fatalities, no fire alarm system was in place to provide early warning to occupants.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The code change proposal will increase the onetime cost of ownership. When you need to add notification (horns and strobes) to these buildings, the cost would be about \$350.00 a device installed.

Some hotel chains are already adding fire alarm systems on their own.

F193-18

IFC: 202 (New), TABLE 906.1 (IBC: [F] TABLE 906.1), 1202.1, SECTION 1204 (New), 3106.6.2, 3107.16, SECTION 3307 (New), UL (New), Chapter 80

Proposed Change as Submitted

Proponent: Andrew King, International Association of Fire Chiefs, Fire & Life Safety Section, representing International Association of Fire Chiefs, Fire & Life Safety Section (andyk@franklintrn.gov)

2018 International Fire Code

Add new definition as follows

PORTABLE GENERATOR. A mobile internal combustion engine-driven device that provides electrical power.

Revise as follows

**TABLE 906.1
ADDITIONAL REQUIRED PORTABLE FIRE EXTINGUISHERS**

SECTION	SUBJECT
303.5	Asphalt kettles
307.5	Open burning
308.1.3	Open flames—torches
309.4	Powered industrial trucks
<u>1204.10</u>	<u>Portable generators</u>
2005.2	Aircraft towing vehicles
2005.3	Aircraft welding apparatus
2005.4	Aircraft fuel-servicing tank vehicles
2005.5	Aircraft hydrant fuel-servicing vehicles
2005.6	Aircraft fuel-dispensing stations
2007.7	Heliports and helistops
2108.4	Dry cleaning plants
2305.5	Motor fuel-dispensing facilities
2310.6.4	Marine motor fuel-dispensing facilities
2311.6	Repair garages
2404.4.1	Spray-finishing operations
2405.4.2	Dip-tank operations
2406.4.2	Powder-coating areas
2804.3	Lumberyards/woodworking facilities
2808.8	Recycling facilities
2809.5	Exterior lumber storage
2903.5	Organic-coating areas
3006.3	Industrial ovens
3104.12	Tents and membrane structures
3206.10	High-piled storage
3315.1	Buildings under construction or demolition
3317.3	Roofing operations
3408.2	Tire rebuilding/storage
3504.2.6	Welding and other hot work
3604.4	Marinas
3703.6	Combustible fibers
5703.2.1	Flammable and combustible liquids, general
5704.3.3.1	Indoor storage of flammable and combustible liquids
5704.3.7.5.2	Liquid storage rooms for flammable and combustible liquids
5705.4.9	Solvent distillation units
5706.2.7	Farms and construction sites—flammable and combustible liquids storage
5706.4.10.1	Bulk plants and terminals for flammable and combustible liquids
5706.5.4.5	Commercial, industrial, governmental or manufacturing establishments—fuel dispensing
5706.6.4	Tank vehicles for flammable and combustible liquids
5906.5.7	Flammable solids
6108.2	LP-gas

1202.1 Definitions. The following terms are defined in Chapter 2:
BATTERY SYSTEM, STATIONARY STORAGE.

BATTERY TYPES.

1. **Lead-acid battery.**

CAPACITOR ARRAY.

CAPACITOR ENERGY STORAGE SYSTEM.

CRITICAL CIRCUIT.

EMERGENCY POWER SYSTEM.

ENERGY MANAGEMENT SYSTEMS.

FUEL CELL POWER SYSTEM, STATIONARY.

PORTABLE GENERATOR.

STANDBY POWER SYSTEM.

STATIONARY BATTERY ARRAY.

Add new text as follows

SECTION 1204 PORTABLE GENERATORS

1204.1 Portable generators. The use, operation, and maintenance of portable generators shall comply with this section.

1204.2 Carbon monoxide mitigation. Portable generators shall be listed and labeled in accordance with the UL 2201 carbon monoxide mitigation requirements.

1204.3 Operation and maintenance. Portable generators shall be operated and maintained in accordance with the manufacturer's instructions.

1204.4 Grounding. Portable generators shall be grounded in accordance with NFPA 70.

1204.5 Operating locations. Portable generators shall be only operated outdoors a minimum of 10 ft. (1524 m) from any building openings such as windows and doors or air intakes. Portable generators shall not be operated within buildings or enclosed areas. Additional separation shall be provided for tents, membrane structures and outdoor assembly events as specified in Chapter 31 of this Code.

1204.6 Cords and wiring. Extension cords and temporary wiring used to connect portable generators shall be in accordance with Section 604 of this code and shall be provided with GFCI protection.

1204.7 Connections to premise wiring. Connections to a premise wiring system shall comply with all of the following:

1. Power shall not be provided in a manner that "back feeds" receptacles or the premise wiring system.
2. Connection to a premise served by commercial power shall be made through a listed transfer switch installed, used and maintained in accordance with NFPA 70.
3. Connections to buildings not served by commercial power shall comply with NFPA 70.

1204.8 Refueling. Portable generators shall not be refueled while operating.

1204.9 Storage and repair. Storage and repair of fuel fired portable generators shall comply with Section 313.

1204.10 Fire extinguisher. One portable fire extinguisher shall be provided in accordance with Section 906 for an Ordinary (Moderate) hazard Class B and Class C fire hazard, and placed in an approved location.

Revise as follows

3106.6.2 Generators-Portable generators. Generators-Portable generators shall comply with Section 1204. Portable generators shall be installed not less than 10 feet (3048 mm) from combustible materials, and shall be isolated from the public by physical guard, fence or enclosure installed not less than 3 feet (914 mm) away from the internal combustion power source.

3107.16 Separation of generators—Portable generator separation. ~~Generators—Portable generators~~ and other internal combustion power sources shall be separated from tents or membrane structures by not less than 20 feet (6096 mm) and shall be isolated from contact with the public by fencing, enclosure or other *approved* means.

Add new text as follows

SECTION 3307 PORTABLE GENERATORS

3307.1 General. Portable generators used at construction and demolition sites shall comply with Section 1204.

Add new standard(s) follows

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook IL 60062

UL 2201-18:

Standard for Tests for Determining Carbon Monoxide (CO) Emission Rate of Portable Generators

Reason: The use of portable generators is unregulated in the IFC, except for Section 313 storage, use and repair requirements and some Chapter 31 setback requirements. These products are frequently used to provide power at special outdoor events, construction sites, and during power outages, which often occur during and following natural disasters. A 2016 Consumer Product Safety Commission (CPSC) staff report https://www.cpsc.gov/s3fs-public/PGMAsummitCPSCstaffpresentation_2.pdf?utm_source=rss&utm_medium=rss&utm_campaign=Portable%20Generator%20Technical%20Reports indicated that in the

9 year period of 2004 through 2012, there were 8,703 CO injuries and 666 fatalities associated with the use of portable generators. The report also indicated that a typical engine powering a 5 kW portable generator emits a weighted average CO rate of nominally 1500 g/hr, compared to an idling mid-size late 1990's vintage cars that emit 2.4 - 5.4 g/hr of CO. This proposal provides basic safety requirements for the use of portable generators, including the following:

1. 1204.2 requires portable generators to be listed and labeled in accordance with UL 2201 carbon monoxide mitigation requirements, which (1) limit the amount of CO produced by a portable generator, and (2) require the portable generator to shutoff in elevated CO environments. These requirements were developed based on an analysis of the CPSC CO incident data, and are complementary, addressing both indoor misuse and outdoor use incidents. In accordance with UL 2201, the CO emission rate shall not exceed 150 g/h, and the generator shall shutoff at any time when there is a peak 400 ppm CO concentration, or the average CO concentration is greater than 150 ppm during a rolling 600 seconds during the test.
2. 1204.5 includes restrictions on locations where portable generators can be operated to minimize the chance of carbon monoxide poisoning and fires.
3. 1204.7 provides guidance on how power from portable generators can be provided to premise wiring systems. Back feeding receptacles is an unsafe practice which can bypass premise overcurrent protection and create a dangerous situation when local commercial power comes back online. It can also endanger utility workers while they repairing power lines, when they are not expecting any power.
4. 1204.10 requires a portable fire extinguisher be provided where portable generators are used. The sizing and rating complies with NFPA 10 for the hazard classification associated with portable generators fueled with a flammable liquid (gasoline). This is consistent with current portable fire extinguisher requirements for mitigation of potential fire hazards.

Cost Impact: The code change proposal will increase the cost of construction. There could be additional expense for providing portable extinguishers, providing grounding per NFPA 70, providing NFPA 70 compliant connections, and UL 2201 compliant portable generators.

Analysis: A review of the standard proposed for inclusion in the code, UL 2201-18, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

F193-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved as there were concerns with what separations are appropriate. Discussions surrounded 5 and 10 feet but also concern those may not be correct as well. Also there was concern that the fire extinguisher was not required to have a Class A rating. A reference to NFPA 37 was suggested. (Vote: 9-4)

Assembly Action:

None

F193-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Andrew King, International Association of Fire Chiefs, representing UL LLC (andyk@franklintn.gov); Howard Hopper, representing UL LLC (howard.d.hopper@ul.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

PORTABLE GENERATOR. A mobile internal combustion engine-driven device that provides temporary electrical power. This includes hand portable, wheeled, trailer mounted, and motor vehicle mounted generator sets. It does not include generators in permanent, fixed installations.

1204.1 Portable generators. The use, operation, and maintenance of portable generators shall comply with this section.

1204.2 ~~Carbon monoxide mitigation~~Listing. Portable generators manufactured after January 1, 2021 shall be listed and labeled in accordance with the UL 2201-carbon monoxide mitigation requirements.

1204.5 Operating locations. Portable generators shall be only operated outdoors a minimum of ~~10~~ 5 ft. (1524 ~~mm~~) from any building openings such as windows and doors or air intakes Portable generators shall not be operated within buildings or enclosed areas. Additional separation shall be provided for tents, membrane structures and outdoor assembly events as specified in Chapter 31 of this Code.

1204.10 Fire extinguisher. ~~One A listed~~ portable fire extinguisher complying with Section 906 with a minimum rating of 2-A:20-B:C shall be provided in accordance with Section 906 for an Ordinary (Moderate) hazard Class B and Class C fire hazard, and placed in an approved location not more than 50 feet (15240 mm) from the portable generator.

3106.6.2 ~~Portable generators~~Generators.. ~~Portable generators shall comply with Section 1204. Portable generators shall~~ Generators shall be installed not less than 10 feet (3048 mm) from combustible materials, and shall be isolated from the public by physical guard, fence or enclosure installed not less than 3 feet (914 mm) away from the internal combustion power source. __

3107.16 ~~Portable generator separation~~Separation of generators. ~~Portable generators-Generators~~ and other internal combustion power sources shall be separated from tents or membrane structures by not less than 20 feet (6096 mm) and shall be isolated from contact with the public by fencing, enclosure or other *approved* means.

Commenter's Reason: A few concerns were raised with the original proposal which have been addressed as follows:

There was concern that the definition of portable generator may not adequately identify the type of generators being covered, and to differentiate them from permanently installed fixed generators regulated by NFPA 37. The Portable Generator definition was revised to address these concerns.

The original proposal did not allow existing portable generators not listed to UL 2201 from being used, which was not the intent of the proposal. This was addressed by only requiring UL 2201 listing for portable generators manufactured after January 1, 2021, which will not impact portable generators currently in use or on the market.

There was no disagreement with prohibiting portable generators from being used within buildings or in enclosed spaces, but requiring them to be spaced a minimum 10 ft from windows, doors and air intakes might be problematic based on a buildings location. It was felt that a minimum 5 ft. spacing to windows, doors and air intake openings, combined with UL 2201 listings that significantly limit levels of carbon monoxide in the exhaust provides an acceptable level of safety.

The concern with the portable fire extinguisher not including a Class A rating was addressed with a revision to Section 1204.10. A 50 foot travel distance was also introduced which is consistent with NFPA 10. Specifying that portable extinguishers be provided in an "approved location" was removed since fire code officials are typically not on the job site to approve the portable extinguisher location.

Section 3106.6.2 and 3107.16 reverted to existing language which covered all generators, not just portable generators.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. There could be an additional expense for providing portable extinguishers, providing grounding per NFPA 70, providing NFPA 70 compliant connections, and UL 2201 compliant portable generators.

F193-18

F199-18

IFC: 1204.2.2

Proposed Change as Submitted

Proponent: Joseph Cain, Solar Energy Industries Association (SEIA), representing Solar Energy Industries Association (JoeCainPE@gmail.com)

2018 International Fire Code

Revise as follows

1204.2.2 Emergency escape and rescue openings. ~~Panels and modules installed on Group R-3 buildings~~ Photovoltaic (PV) panel systems shall not be placed on the portion of a roof that is below an emergency escape and rescue opening. A pathway of not less than 36 inches (914 mm) wide shall be provided to ~~the~~ not fewer than one emergency escape and rescue ~~opening.~~ opening for each sleeping room.

Reason: Section 1204.2.2 was new in the 2018 IFC, as a result of Proposal F-87 Part 1.

"Panels and modules" is a non-specific reference to solar photovoltaic (PV) systems. This incomplete language does not correlate to terms defined in the IBC. "*Photovoltaic panel system*" is a term defined in the IBC and IRC.

As written in the 2018 IFC, this provision applies only to Group R-3 occupancies. However, IBC and IFC Section 1030.1 also require emergency escape and rescue openings for Group R-2 and Group R-4 occupancies, in certain cases. By removing the R-3 buildings, the access pathway requirement is expanding to any occupancy where emergency escape and rescue openings are required. In those cases where a sleeping room has more than one opening that meets the dimensional criteria for an emergency escape and rescue opening, an access pathway is required to not fewer than one emergency escape and rescue opening for each sleeping room. The language "not fewer than one" is consistent with language found in IBC/IFC Section 1030.1.

Cost Impact: The code change proposal will not increase or decrease the cost of construction

This proposal clarifies that access pathways are required to emergency escape and rescue openings in any residential occupancy where they are required by IFC Section 1030 and IBC Section 1030. This will neither increase nor decrease the cost of construction.

F199-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved with concern that is difficult to know which emergency escape rescue opening would be needed in a fire and would reduce safety. The removal of Group R-3 was seen as beneficial to apply the provisions more generally. (Vote: 8-5)

Assembly Action:

None

F199-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Joseph H. Cain, Solar Energy Industries Association (SEIA), representing Solar Energy Industries Association (joecainpe@gmail.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

1204.2.2 Emergency escape and rescue openings. Photovoltaic (PV) ~~panel systems~~ panels and BIPV modules shall not be placed on the portion of a roof that is below an emergency escape and rescue opening. A pathway of not less than 36 inches (914 mm) wide shall be provided to not fewer than one emergency escape and rescue opening for each sleeping room.

Exception: BIPV systems listed in accordance with Section 690.12(B)(2) of NFPA 70, where the removal or cutting away of portions of the BIPV system during firefighting operations have been determined to not expose a firefighter to electrical shock hazards.

Commenter's Reason: The edit to Photovoltaic (PV) panels and BIPV modules is in response to public testimony during the Committee Action Hearings. These edits are intended to clarify that both roof-mounted PV panel systems and BIPV modules are within the scope of the requirement.

The exception added to this proposal uses language identical to the exception language added in the floor modification to F200-18, which was unanimously Approved as Modified by the IFC Committee.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The public comment and the code change proposal impact only layout of PV system components.

F199-18

F203-18

IFC: 202, 105.6.14 (New), 105.7.2, 105.7.3, 105.7.7 (New), TABLE 903.2.11.6 (IBC: [F] TABLE 903.2.11.6), 907.2.22 (IBC [F] 907.2.22), 907.2.23 (IBC [F] , TABLE 911.1, 1201.1, 1202.1, 1203.2.5 (New), 1203.2.6, 1206, Chapter 80; IBC: [F] TABLE 414.5.1

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Fire Code

BATTERY TYPES.

Delete without substitution

CAPACITOR ARRAY. An arrangement of individual capacitor modules in close proximity to each other, mounted on storage racks or in cabinets or other enclosures.

CAPACITOR ENERGY STORAGE SYSTEM. A stationary, rechargeable energy storage system consisting of capacitors, chargers, controls and associated electrical equipment designed to provide electrical power to a building or facility. The system is typically used to provide standby or emergency power, an uninterruptable power supply, load shedding, load sharing or similar capabilities.

ENERGY STORAGE MANAGEMENT SYSTEMS. An electronic system that protects ~~stationary energy storage batteries systems~~ from operating outside their safe operating parameters, and ~~generates an alarm and trouble signal for off normal conditions~~; ~~disconnects electrical power to the ESS or places it in a safe condition if potentially hazardous temperatures or other conditions are detected.~~

ENERGY STORAGE SYSTEM (ESS).

One or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time.

Add new text as follows

ENERGY STORAGE SYSTEM CABINET. A cabinet containing components of the energy storage system that is included in the UL 9540 listing for the system. Personnel are not able to enter the enclosure, other than reaching in to access components for maintenance purposes.

ENERGY STORAGE SYSTEM COMMISSIONING.

A systematic process that provides documented confirmation that an energy storage system functions according to the intended design criteria and complies with applicable code requirements.

ENERGY STORAGE SYSTEM DECOMMISSIONING.

A systematic process that provides documentation and procedures that allow an energy storage system to be safely de-energized, disassembled, readied for shipment or storage, and removed from the premise in accordance with applicable code requirements.

ENERGY STORAGE SYSTEM, ELECTROCHEMICAL.

An energy storage system that stores energy and produces electricity using chemical reactions. It includes, among others, battery ESS and capacitor ESS.

ENERGY STORAGE SYSTEM, MOBILE.

An energy storage system capable of being moved and utilized for temporary energy storage applications, and not installed as fixed or stationary electrical equipment. The system can include integral wheels for transportation, or be loaded on a trailer and unloaded for charging, storage and deployment.

ENERGY STORAGE SYSTEM, STATIONARY.

An energy storage system installed as fixed or stationary electrical equipment in a permanent location.

ENERGY STORAGE SYSTEM, WALK-IN UNIT.

A pre-fabricated building that contains energy storage systems. It includes doors that provide walk-in access for personnel to maintain, test and service the equipment, and is typically used in outdoor and mobile ESS applications.

Delete without substitution

STATIONARY BATTERY ARRAY. An arrangement of individual stationary storage batteries in close proximity to each other, mounted on storage racks or in modules, battery cabinets or other enclosures.

Add new text as follows

105.6.14 Energy storage systems, mobile. An operational permit is required for mobile energy storage systems regulated by Section 1206.

Delete without substitution

~~**[A] 105.7.2 Battery systems.** A construction permit is required to install stationary storage battery systems regulated by Section 1206.2.~~

~~**[A] 105.7.3 Capacitor energy storage systems.** A construction permit is required to install capacitor energy storage systems regulated by Section 1206.3.~~

Add new text as follows

105.7.7 Energy storage systems. A construction permit is required to install energy storage systems regulated by Section 1206.

**TABLE 903.2.11.6
ADDITIONAL REQUIRED FIRE SUPPRESSION SYSTEMS**

SECTION	SUBJECT
914.2.1	Covered and open mall buildings
914.3.1	High-rise buildings
914.4.1	Atriums
914.5.1	Underground structures
914.6.1	Stages
914.7.1	Special amusement buildings
914.8.2	Airport traffic control towers
914.8.3, 914.8.6	Aircraft hangars
914.9	Flammable finishes
914.10	Drying rooms
914.11.1	Ambulatory care facilities
1029.6.2.3	Smoke-protected assembly seating
1103.5.1	Existing Group A occupancies
1103.5.2	Pyroxylin plastic storage in existing buildings
1103.5.3	Existing Group I-2 occupancies
1103.5.4	Existing Group I-2, Condition 2 occupancies
1103.5.4	Pyroxylin plastics
<u>Table 1206.7, Table 1206.8, Table 1206.9, Table 1206.10.</u>	<u>Stationary and mobile energy storage systems</u>
2108.2	Dry cleaning plants
2108.3	Dry cleaning machines
2309.3.2.6.2	Hydrogen motor fuel-dispensing area canopies

2404.2	Spray finishing in Group A, E, I or R
2404.4	Spray booths and spray rooms
2405.2	Dip-tank rooms in Group A, I or R
2405.4.1	Dip tanks
2405.9.4	Hardening and tempering tanks
2703.10	HPM facilities
2703.10.1.1	HPM work station exhaust
2703.10.2	HPM gas cabinets and exhausted enclosures
2703.10.3	HPM exit access corridor
2703.10.4	HPM exhaust ducts
2703.10.4.1	HPM noncombustible ducts
2703.10.4.2	HPM combustible ducts
2807.3	Lumber production conveyor enclosures
2808.7	Recycling facility conveyor enclosures
3006.1	Class A and B ovens
3006.2	Class C and D ovens
Table 3206.2	Storage fire protection
3206.4	Storage
3704.5	Storage of more than 1,000 cubic feet of loose combustible fibers
5003.8.4.1	Gas rooms
5003.8.5.3	Exhausted enclosures
5004.5	Indoor storage of hazardous materials
5005.1.8	Indoor dispensing of hazardous materials
5104.4.1	Aerosol product warehouses
5106.3.2	Aerosol display and merchandising areas
5306.2.1	Exterior medical gas storage room
5306.2.2	Interior medical gas storage room
5306.2.3	Medical gas storage cabinet
5606.5.2.1	Storage of smokeless propellant
5606.5.2.3	Storage of small arms primers
5704.3.7.5.1	Flammable and combustible liquid storage rooms
5704.3.8.4	Flammable and combustible liquid storage warehouses
5705.3.7.3	Flammable and combustible liquid Group H-2 or H-3 areas
6004.1.2	Gas cabinets for highly toxic and toxic gas
6004.1.3	Exhausted enclosures for highly toxic and toxic gas
6004.2.2.6	Gas rooms for highly toxic and toxic gas
6004.3.3	Outdoor storage for highly toxic and toxic gas
6504.1.1	Pyroxylin plastic storage cabinets
6504.1.3	Pyroxylin plastic storage vaults
6504.2	Pyroxylin plastic storage and manufacturing

For SI: 1 cubic foot = 0.023 m³.

Revise as follows

907.2.22 ~~Battery rooms~~ Energy storage systems. An automatic smoke detection system ~~or radiant energy detection system~~ shall be installed in ~~rooms, areas and walk-in units~~ containing ~~stationary energy storage battery~~ systems as required in Section ~~1206.2-1206.~~

Delete without substitution

~~907.2.23 Capacitor energy storage systems.~~ An automatic smoke detection system shall be installed in areas containing capacitor energy storage systems as required by Section 1206.3.

**TABLE 911.1
EXPLOSION CONTROL REQUIREMENTS^f**

MATERIAL	CLASS	EXPLOSION CONTROL METHODS	
		Barricade construction	Explosion (deflagration) venting or explosion (deflagration) prevention systems
Hazard Category			
Combustible dusts ^a	—	Not required	Required
Cryogenic fluids	Flammable	Not required	Required
Explosives	Division 1.1	Required	Not required
	Division 1.2	Required	Not required
	Division 1.3	Not required	Required
	Division 1.4	Not required	Required
	Division 1.5	Required	Not required
	Division 1.6	Required	Not required
Flammable gas	Gaseous	Not required	Required
	Liquefied	Not required	Required
Flammable liquids	IA ^b	Not required	Required
	IB ^c	Not required	Required
Organic peroxides	Unclassified detonable	Required	Not permitted
	I	Required	Not permitted
Oxidizer liquids and solids	4	Required	Not permitted
Pyrophoric	Gases	Not required	Required
Unstable (reactive)	4	Required	Not permitted
	3 detonable	Required	Not permitted
	3 nondetonable	Not required	Required
Water-reactive liquids and solids	3	Not required	Required
	2 ^e	Not required	Required
Special Uses			
Acetylene generator rooms	—	Not required	Required
<u>Electrochemical energy storage systems^g</u>		<u>Not Required</u>	<u>Required</u>
Grain processing	—	Not required	Required
Liquefied petroleum gas distribution facilities	—	Not required	Required
Where explosion hazards exist ^d	Detonation	Required	Not permitted
	Deflagration	Not required	Required

- a. Combustible dusts that are generated during manufacturing or processing. See definition of "Combustible dust" in Chapter 2.
- b. Storage or use.
- c. In open use or dispensing.
- d. Rooms containing dispensing and use of hazardous materials where an explosive environment can occur because of the characteristics or nature of the hazardous materials or as a result of the dispensing or use process.
- e. A method of explosion control shall be provided where Class 2 water-reactive materials can form potentially explosive mixtures.
- f. Explosion venting is not required for Group H-5 Fabrication Areas complying with Chapter 27 and the International Building Code.
- g. Where explosion control is required in Section 1206.6.

Revise as follows

1201.1 Scope. The provisions of this chapter shall apply to the installation, operation ~~and maintenance, maintenance,~~ repair, retrofitting, testing, commissioning and decommissioning of energy systems used for generating or storing energy. It shall not apply to equipment associated with the generation, control, transformation, transmission, or distribution of energy installations that is under the exclusive control of an electric utility or lawfully designated agency.

1202.1 Definitions. The following terms are defined in Chapter 2:
BATTERY SYSTEM, STATIONARY STORAGE.

BATTERY TYPES.

1. ~~Lead-acid battery.~~

1. CAPACITOR

~~ARRAY.CAPACITOR~~

1. ENERGY STORAGE SYSTEM.

CRITICAL CIRCUIT.

EMERGENCY POWER SYSTEM.

ENERGY STORAGE MANAGEMENT SYSTEMS.

ENERGY STORAGE SYSTEM.

ENERGY STORAGE SYSTEM CABINET.

ENERGY STORAGE SYSTEM COMMISSIONING.

ENERGY STORAGE SYSTEM DECOMMISSIONING.

ENERGY STORAGE SYSTEM, ELECTROCHEMICAL.

ENERGY STORAGE SYSTEM, MOBILE.

ENERGY STORAGE SYSTEM, WALK-IN UNIT.

FUEL CELL POWER SYSTEM, STATIONARY.

STANDBY POWER SYSTEM.~~STATIONARY BATTERY ARRAY.~~

Add new text as follows

1203.2.5 Exhaust ventilation. Standby power shall be provided for mechanical exhaust ventilation systems as required in Section 1206.6.1.2.1. The system shall be capable of powering the required load for a duration of not less than two hours.

1203.2.6 Gas detection systems. Emergency power shall be provided for gas detection systems where required by Sections 1203.2.9 and ~~1203.2.16~~ 1203.2.16. Standby power shall be provided for gas detection systems where required by ~~Section~~ Sections 916.5 and 1206.6.2.2.4.

SECTION 1206 ELECTRICAL ENERGY STORAGE SYSTEMS (ESS)

1206.1 General. The provisions in this section are applicable to stationary and mobile electrical energy storage systems (ESS).

1206.1.1 Scope. ESS having capacities exceeding the values shown in Table 1206.1 shall comply with this section.

1206.1.2 Permits. Permits shall be obtained for ESS as follows:

1. Construction permits shall be obtained for stationary ESS installations and for mobile ESS charging and storage installations covered by 1206.10.1. Permits shall be obtained in accordance with Sections 105.7.7.
2. Operational permits shall be obtained for mobile ESS deployment operations covered by Section 1206.10.3. Permits shall be obtained in accordance with Sections 105.6.14.

**TABLE 1206.1
ENERGY STORAGE SYSTEM (ESS) THRESHOLD QUANTITIES**

TECHNOLOGY	ENERGY CAPACITY ^a
<u>Lead acid batteries, all types</u>	<u>70 KWh (252 Megajoules) ^c</u>
<u>Nickel cadmium batteries (Ni-Cd)</u>	<u>70 KWh (252 Megajoules)</u>
<u>Nickel metal hydride (Ni-MH)</u>	<u>70 KWh (252 Megajoules)</u>
<u>Lithium-ion batteries</u>	<u>20 KWh (72 Megajoules)</u>
<u>Flow batteries ^b</u>	<u>20 KWh (72 Megajoules)</u>
<u>Other battery technologies</u>	<u>10 KWh (36 Megajoules)</u>
<u>Capacitor ESS</u>	<u>3 KWh (10.8 Mega joules)</u>
<u>Other electrochemical ESS technologies</u>	<u>3 KWh (10.8 Mega joules)</u>

a. Energy capacity is the total energy capable of being stored (nameplate rating), not the usable energy rating. For units rated in Amp-Hours, KWh shall equal rated voltage times amp-hour rating divided by 1000.

b. Shall include vanadium, zinc-bromine, polysulfide-bromide, and other flowing electrolyte type technologies.

c. 50 gallons of lead acid battery electrolyte shall be considered equivalent to 70 KWh.

1206.1.3 Construction documents. The following information shall be provided with the permit application:

1. Location and layout diagram of the room or area in which the ESS is to be installed.
2. Details on the hourly fire-resistance ratings of assemblies enclosing the ESS.
3. The quantities and types of ESS to be installed.
4. Manufacturer's specifications, ratings and listings of each ESS.
5. Description of energy (battery) management systems and their operation.
6. Location and content of required signage.
7. Details on fire suppression, smoke or fire detection, thermal management, ventilation, exhaust and deflagration venting systems, if provided.
8. Support arrangement associated with the installation, including any required seismic restraint.
9. A commissioning plan complying with 1206.2.1.
10. A decommissioning plan complying with 1206.2.3.

1206.1.4 Hazard mitigation analysis. A failure modes and effects analysis (FMEA) or other approved hazard mitigation analysis shall be provided in accordance with Section 104.7.2 under any of the following conditions:

1. Where ESS technologies not specifically identified in Table 1206.1 are provided.
2. More than one ESS technology is provided in a room or enclosed area where there is a potential for adverse interaction between technologies.
3. Where allowed as a basis for increasing maximum allowable quantities. See Section 1206.5.2.

1206.1.4.1 Fault condition. The hazard mitigation analysis shall evaluate the consequences of the following failure modes. Only single failure modes shall be considered.

1. A thermal runaway condition in a single ESS rack, module or unit.
2. Failure of any battery (energy) management system.
3. Failure of any required ventilation or exhaust system.
4. Voltage surges on the primary electric supply.
5. Short circuits on the load side of the ESS.
6. Failure of the smoke detection, fire detection, fire suppression, or gas detection system.
7. Required spill neutralization not being provided or failure of a required secondary containment system.

1206.1.4.2 Analysis approval. The fire code official is authorized to approve the hazardous mitigation analysis

provided the consequences of the hazard mitigation analysis demonstrate:

1. Fires will be contained within unoccupied ESS rooms or areas for the minimum duration of the fire-resistance rated separations identified in Section 1206.7.4.
2. Fires in occupied work centers will be detected in time to allow occupants within the room or area to safely evacuate.
3. Toxic and highly toxic gases released during fires will not reach concentrations in excess of IDLH level in the building or adjacent means of egress routes during the time deemed necessary to evacuate occupants from any affected area.
4. Flammable gases released from ESS during charging, discharging and normal operation will not exceed 25 percent of their lower flammability limit (LFL).
5. Flammable gases released from ESS during fire, overcharging and other abnormal conditions will be controlled through the use of ventilation of the gases preventing accumulation or by deflagration venting.

1206.1.4.3 Additional protection measures. Construction, equipment and systems that are required for the ESS to comply with the hazardous mitigation analysis, including but not limited to those specifically described in Section 1206 shall be installed, maintained and tested in accordance with nationally recognized standards and specified design parameters.

1206.1.5 Large scale fire test. Where required elsewhere in Section 1206, large scale fire testing shall be conducted on a representative ESS in accordance with UL 9540A. The testing shall be conducted or witnessed and reported by an approved testing laboratory and show that a fire involving one ESS will not propagate to an adjacent ESS, and where installed within buildings, enclosed areas and walk-in units will be contained within the room, enclosed area or walk-in unit for a duration equal to the fire resistance rating of the room separation specified in Section 1206.7.4. The test report shall be provided to the fire code official for review and approval in accordance with Section 104.7.2.

1206.1.6 Fire remediation. Where a fire or other event has damaged the ESS and ignition or re-ignition of the ESS is possible, the system owner, agent, or lessee shall take the following actions, at their expense, to mitigate the hazard or remove damaged equipment from the premises to a safe location.

1206.1.6.1 Fire mitigation personnel. Where, in the opinion of the fire code official, it is essential for public safety that trained personnel be on site to respond to possible ignition or re-ignition of a damaged ESS, the system owner, agent or lessee shall immediately dispatch one or more fire mitigation personnel to the premise, as required and approved, at their expense. These personnel shall remain on duty continuously after the fire department leaves the premise until the damaged energy storage equipment is removed from the premises, or earlier if the fire code official indicates the public safety hazard has been abated.

1206.1.6.2 Duties. On-duty fire mitigation personnel shall have the following responsibilities:

1. Keep diligent watch for fires, obstructions to means of egress and other hazards.
2. Immediately contact the fire department if their assistance is needed to mitigate any hazards or extinguish fires.
3. Take prompt measures for remediation of hazards in accordance with the decommissioning plan in Section 1206.2.3.
4. Take prompt measures to assist in the evacuation of the public from the structures.

1206.2 Commissioning, decommissioning, operation and maintenance. Commissioning, decommissioning, operation and maintenance shall be conducted in accordance with this section.

1206.2.1 Commissioning. Commissioning of newly installed ESS, and existing ESS that have been retrofitted, replaced or previously decommissioned and are returning to service shall be conducted prior to the ESS being placed in service in accordance with a commissioning plan that has been approved prior to initiating commissioning. The commissioning plan shall include the following:

1. A narrative description of the activities that will be accomplished during each phase of commissioning including the personnel intended to accomplish each of the activities.
2. A listing of the specific ESS and associated components, controls and safety related devices to be tested, a description of the tests to be performed and the functions to be tested.
3. Conditions under which all testing will be performed, which are representative of the conditions during normal operation of the system.
4. Documentation of the owner's project requirements and the basis of design necessary to understand the installation and operation of the ESS.
5. Verification that required equipment and systems are installed in accordance with the approved plans and specifications.
6. Integrated testing for all fire and safety systems.
7. Testing for any required thermal management, ventilation or exhaust systems associated with the ESS installation.
8. Preparation and delivery of operation and maintenance documentation.
9. Training of facility operating and maintenance staff.
10. Identification and documentation of the requirements for maintaining system performance to meet the original design intent during the operation phase.
11. Identification and documentation of personnel who are qualified to service, maintain and decommission the ESS, and respond to incidents involving the ESS, including documentation that such service has been contracted for.
12. A decommissioning plan for removing the ESS from service, and from the facility in which it is located. The plan shall include details on providing a safe, orderly shutdown of energy storage and safety systems with notification to the code officials prior to the actual decommissioning of the system. The decommissioning plan shall include contingencies for removing an intact operational ESS from service, and for removing an ESS from service that has been damaged by a fire or other event.

Exception: Commissioning shall not be required for lead acid and nickel cadmium battery systems at facilities under the exclusive control of communications utilities that comply with NFPA 76 and operate at less than 50 VAC and 60 VDC. However a decommissioning plan shall be provided and maintained whenever required by the fire code official.

1206.2.1.1 Initial acceptance testing. During the commissioning process an ESS shall be evaluated for proper operation in accordance with the manufacturer's instructions and the commissioning plan prior to final approval.

1206.2.1.2 Commissioning report. A report describing the results of the system commissioning and including the results of the initial acceptance testing required in Section 1206.2.1.1 shall be provided to code official prior to final inspection and approval and maintained at an approved on-site location.

1206.2.2 Operation and maintenance. An operating and maintenance manual shall be provided to both the ESS owner or their authorized agent and the ESS operator before the ESS is put into operation and shall include the following:

1. Manufacturer's operation manuals and maintenance manuals for the entire ESS or for each component of the system requiring maintenance, that clearly identify the required routine maintenance actions.
2. Name, address and phone number of a service agency that has been contracted to service the ESS and its associated safety systems.
3. Maintenance and calibration information, including wiring diagrams, control drawings, schematics, system programming instructions and control sequence descriptions, for all energy storage control systems.
4. Desired or field-determined control set points that are permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.
5. A schedule for inspecting and recalibrating all ESS controls.
6. A service record log form that lists the schedule for all required servicing and maintenance actions and space for logging such actions that are completed over time and retained on site.

The ESS shall be operated and maintained in accordance with the manual and a copy of the manual shall be retained at an approved onsite location.

1206.2.2.1 Ongoing inspection and testing. Systems that monitor and protect the ESS installation shall be inspected and tested in accordance with the manufacturer's instructions and the operating and maintenance manual. Inspection and testing records shall be maintained in the operation and maintenance manual.

1206.2.3 Decommissioning. The code official shall be notified prior to decommissioning of an ESS. Decommissioning shall be performed in accordance with the decommissioning plan that includes the following:

1. A narrative description of the activities to be accomplished for removing the ESS from service, and from the facility in which it is located.
2. A listing of any contingencies for removing an intact operational ESS from service, and for removing an ESS from service that has been damaged by a fire or other event.

1206.3 Equipment. ESS equipment shall be in accordance with Sections 1206.3.1 through 1206.3.9

1206.3.1 Energy storage system listings. ESS shall be listed in accordance with UL 9540.

Exception: Lead-acid and nickel cadmium battery systems installed in facilities under the exclusive control of communications utilities, and operating at less than 50 VAC and 60 VDC in accordance with NFPA 76 are not required to be listed.

1206.3.2 Equipment listing. Chargers, inverters, energy storage management systems shall be covered as part of the UL 9540 listing or shall be listed separately.

1206.3.3 Utility interactive systems. Inverters shall be listed and labeled in accordance with UL 1741. Only inverters listed and labeled for utility interactive system use and identified as interactive shall be allowed to operate in parallel with the electric utility power system to supply power to common loads.

1206.3.4 Energy storage management system. Where required by the ESS listing an approved energy storage management system shall be provided that monitors and balances cell voltages, currents and temperatures within the manufacturer's specifications. The system shall disconnect electrical connections to the ESS or otherwise place it in a safe condition if potentially hazardous temperatures or other conditions such as short circuits, over voltage or under voltage are detected.

1206.3.5 Enclosures. Enclosures of ESS shall be of noncombustible construction.

1206.3.6 Repairs. Repairs of ESS shall only be done by qualified personnel. Repairs with other than identical parts shall be considered retrofitting and comply with Section 1206.3.7. Repairs shall be documented in the service records log.

1206.3.7 Retrofits. Retrofitting of an existing ESS shall comply with the following:

1. A construction permit shall be obtained in accordance with Section 105.7.7.
2. New batteries, battery modules, capacitors and similar ESS components shall be listed in accordance with UL 1973.
3. Battery management and other monitoring systems shall be connected and installed in accordance with the manufacturer's instructions.
4. The overall installation shall continue to comply with UL 9540 listing requirements, where applicable.
5. Systems that have been retrofitted shall be commissioned in accordance with Section 1206.2.1.
6. Retrofits shall be documented in the service records log.

1206.3.7.1 Retrofitting Lead Acid and Nickel Cadmium. Section 1206.3.7 shall not apply to retrofitting of lead acid and nickel cadmium batteries with other lead acid and nickel cadmium batteries at facilities under the exclusive control of communications utilities that comply with NFPA 76 and operate at less than 50 VAC and 60 VDC.

1206.3.8 Replacements. Replacements of ESS shall be considered new ESS installations and shall comply with the provisions of Section 1206 as applicable to new ESS. The ESS being replaced shall be decommissioned in accordance with Section 1206.2.3.

1206.3.9 Reused and repurposed equipment. Equipment and materials shall only be reused or reinstalled as permitted in Section 104.7.1. Storage batteries previously used in other applications, such as electric vehicle propulsion, shall not be reused in applications regulated by Chapter 12, unless (1) approved by the fire code official and (2) the equipment is refurbished by a battery refurbishing company approved in accordance with UL 1974.

1206.4 General installations requirements. Stationary and mobile ESS shall comply with the requirements of section 1206.4.1 through 1206.4.12.

1206.4.1 Electrical disconnects. Where the ESS disconnecting means is not within sight of the main electrical service disconnecting means, placards or directories shall be installed at the location of the main electrical service disconnecting means indicating the location of stationary storage battery system disconnecting means in accordance with NFPA 70.

Exception: Electrical disconnects for lead acid and nickel cadmium battery systems at facilities under the exclusive control of communications utilities and operating at less than 50 VAC and 60 VDC shall be permitted to have electrical disconnects signage in accordance with NFPA 76.

1206.4.2 Working clearances. Access and working space shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment in accordance with NFPA 70 and the manufacturer's instructions.

1206.4.3 Fire-resistance rated separations. Rooms and other indoor areas containing ESS shall be separated from other areas of the building in accordance with Section 1206.7.4. ESS shall be permitted to be in the same room with the equipment they support.

1206.4.4 Seismic and structural design. Stationary ESS shall comply with the seismic design requirements in Chapter 16 of the International Building Code, and shall not exceed the floor loading limitation of the building.

1206.4.5 Vehicle impact protection. Where ESS are subject to impact by a motor vehicle, including fork lifts, vehicle impact protection shall be provided in accordance with Section 312.

1206.4.6 Combustible storage. Combustible materials shall not be stored in ESS rooms, areas, or walk-in units. Combustible materials in occupied work centers covered by Section 1206.4.10 shall be stored at least 3 feet (914 mm) from ESS cabinets.

1206.4.7 Toxic and highly toxic gases. ESS that have the potential to release toxic and highly toxic gas during charging, discharging and normal use conditions shall be provided with a hazardous exhaust system in accordance with Section 502.8 of the International Mechanical Code.

1206.4.8 Signage. Approved signs shall be provided on or adjacent to all entry doors for ESS rooms or areas and on enclosures of ESS cabinets and walk-in units located outdoors, on rooftops or in open parking garages. Signs designed to meet both the requirements of this section and NFPA 70 shall be permitted. The signage shall include the following or equivalent.

1. "Energy Storage System", "Battery Storage System", "Capacitor Energy Storage System", or the equivalent.
2. The identification of the electrochemical ESS technology present.
3. "Energized electrical circuits"
4. If water reactive electrochemical ESS are present the signage shall include "APPLY NO WATER"
5. Current contact information, including phone number, for personnel authorized to service the equipment and for fire mitigation personnel required by Section 1206.1.6.1.

Exception: Existing electrochemical ESS shall be permitted to include the signage required at the time they were installed.

1206.4.9 Security of installations. Rooms, areas and walk-in units in which electrochemical ESS are located shall be secured against unauthorized entry and safeguarded in an approved manner. Security barriers, fences, landscaping, and other enclosures shall not inhibit the required air flow to or exhaust from the electrochemical ESS and its components.

1206.4.10 Occupied work centers. Electrochemical ESS located in rooms or areas occupied by personnel not directly involved with maintenance, service and testing of the systems shall comply with the following.

1. Electrochemical ESS located in occupied work centers shall be housed in locked noncombustible cabinets or other enclosures to prevent access by unauthorized personnel.
2. Where electrochemical ESS are contained in cabinets in occupied work centers, the cabinets shall be located within 10 feet (3048 mm) of the equipment that they support.
3. Cabinets shall include signage complying with Section 1206.4.8.

1206.4.11 Open rack installations. Where electrochemical ESS are installed in a separate equipment room and only authorized personnel have access to the room, they shall be permitted to be installed on an open rack for ease of maintenance.

1206.4.12 Walk-in units. Walk-in units shall only be entered for inspection, maintenance and repair of ESS units and ancillary equipment, and shall not be occupied for other purposes.

1206.5 Electrochemical ESS Protection. The protection of electrochemical ESS shall be in accordance with Sections

1206.5.1 through 1206.5.8 where required by Section 1206.7 through 1206.10.

1206.5.1 Size and separation. Electrochemical ESS shall be segregated into groups not exceeding 50 KWh (180 Mega joules). Each group shall be separated a minimum three feet (914 mm) from other groups and from walls in the storage room or area. The storage arrangements shall comply with Chapter 10.

Exceptions:

1. Lead acid and nickel cadmium battery systems in facilities under the exclusive control of communications utilities and operating at less than 50 VAC and 60 VDC in accordance with NFPA 76.
2. The fire code official is authorized to approve larger capacities or smaller separation distances based on large scale fire testing complying with Section 1206.1.5.

1206.5.2 Maximum allowable quantities. Fire areas within rooms, areas and walk-in units containing electrochemical ESS shall not exceed the maximum allowable quantities in Table 1206.5.

Exceptions:

1. Where approved by the fire code official, rooms, areas and walk-in units containing electrochemical ESS that exceed the amounts in Table 1206.5 shall be permitted based on a hazardous mitigation analysis in accordance with Section 1206.1.4 and large scale fire testing complying with Section 1206.1.5.
2. Lead-acid and nickel cadmium battery systems installed in facilities under the exclusive control of communications utilities, and operating at less than 50 VAC and 60 VDC in accordance with NFPA 76.
3. Dedicated use buildings in compliance with Section 1206.7.1.

1206.5.2.1 Mixed electrochemical energy systems. Where rooms, areas and walk-in units contain different types of electrochemical energy technologies, the total aggregate quantities of the systems shall be determined based on the sum of percentages of each technology type quantity divided by the maximum allowable quantity of each technology type. The sum of the percentages shall not exceed 100 percent of the maximum allowable quantity.

**TABLE 1206.5
MAXIMUM ALLOWABLE QUANTITIES OF ELECTROCHEMICAL ESS**

TECHNOLOGY	MAXIMUM ALLOWABLE QUANTITIES ^a
STORAGE BATTERIES	
Lead acid, all types	Unlimited
Nickel cadmium (Ni-Cd)	Unlimited
Nickel metal hydride (Ni-MH)	Unlimited
Lithium-ion	600 KWh
Flow batteries ^b	600 KWh
Other battery technologies	200 KWh
CAPACITORS	
All types	20 KWh
OTHER ELECTROCHEMICAL ESS	
All types	20 KWh

a. For electrochemical ESS units rated in Amp-Hours, KWh shall equal rated voltage times the Amp-hour rating divided by 1000.

b. Shall include vanadium, zinc-bromine, polysulfide-bromide, and other flowing electrolyte type technologies.

1206.5.3 Elevation. Electrochemical ESS shall not be located in the following areas:

1. Where the floor is located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access, or
2. Where the floor is located below the lowest level of exit discharge.

Exceptions:

1. Lead acid and Nickel cadmium battery systems less than 50 VAC and 60 VDC installed in facilities under the exclusive control of communications utilities in accordance with NFPA 76.
2. Where approved, installations shall be permitted in underground vaults complying with NFPA 70, Article 450, Part III.
3. Where approved by the fire code official, installations shall be permitted on higher and lower floors.

1206.5.4 Fire detection. An approved automatic smoke detection system or radiant energy-sensing fire detection system complying with Section 907.2 shall be installed in rooms, indoor areas, and walk-in units containing electrochemical ESS. An approved radiant energy-sensing fire detection system shall be installed to protect open parking garage and rooftop installations. Alarm signals from detection systems shall be transmitted to a central station, proprietary or remote station service in accordance with NFPA 72, or where approved to a constantly attended location.

1206.5.4.1 System status. Where required by the fire code official, visible annunciation shall be provided on cabinet exteriors or in other approved locations to indicate that potentially hazardous conditions associated with the ESS exist.

1206.5.5 Fire suppression systems. Rooms and areas within buildings and walk-in units containing electrochemical ESS shall be protected by an automatic fire suppression system designed and installed in accordance with one of the following:

1. An automatic sprinkler systems designed and installed in accordance with Section 903.3.1.1 with a minimum density of 0.3 gpm/ft.² based on the fire area or 2,500 ft.² design area, whichever is smaller.
2. Where approved, an automatic sprinkler system designed and installed in accordance with Section 903.3.1.1 with a sprinkler hazard classification based on large scale fire testing complying with Section 1206.1.5.
3. The following alternate automatic fire extinguishing systems designed and installed in accordance with Section 904, provided the installation is approved by the fire code official based on large scale fire testing complying with Section 1206.1.5

NFPA 12, Standard on Carbon Dioxide Extinguishing Systems
NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection
NFPA 750, Standard on Water Mist Fire Protection Systems
NFPA 2001, Standard on Clean Agent Fire Extinguishing Systems
NFPA 2010, Standard for Fixed Aerosol Fire-Extinguishing Systems

Exception: Fire suppression systems for lead acid and nickel cadmium battery systems at facilities under the exclusive control of communications utilities that operate at less than 50 VAC and 60 VDC shall be provided where required by NFPA 76.

1206.5.5.1 Water reactive systems. Electrochemical ESS that utilize water reactive materials shall be protected by an approved alternative automatic fire-extinguishing system in accordance with Section 904, where the installation is approved by the fire code official based on large scale fire testing complying with Section 1206.1.5.

1206.5.6 Maximum enclosure size. Outdoor walk-in units housing ESS shall not exceed 53 feet by 8 feet by 9.5 feet high. Walk-in units that exceed these dimensions shall be considered indoor installations and comply with the requirements in Section 1206.7.

1206.5.7 Vegetation control. Areas within 10 feet (3 m) on each side of outdoor ESS shall be cleared of combustible vegetation and other combustible growth. Single specimens of trees, shrubbery, or cultivated ground cover such as green grass, ivy, succulents, or similar plants used as ground covers shall be permitted to be exempt provided that they do not form a means of readily transmitting fire.

1206.5.8 Means of egress separation. ESS located outdoors and in open parking garages shall be separated from any means of egress as required by the fire code official to ensure safe egress under fire conditions, but in no case less than 10 feet (3048 mm).

Exception: The fire code official is authorized to approve a reduced separation distance if large scale fire testing complying with Section 1206.1.5 is provided that shows that a fire involving the ESS will not adversely impact occupant egress.

1206.6 Electrochemical ESS technology specific protection. Electrochemical ESS installations shall comply with the requirements of this section in accordance with the applicable requirements of Table 1206.6.

**TABLE 1206.6
ELECTROCHEMICAL ESS TECHNOLOGY SPECIFIC REQUIREMENTS**

COMPLIANCE REQUIRED ^b	BATTERY TECHNOLOGY				OTHER ESS AND BATTERY TECHNOLOGIES ^b	CAPACITOR ESS ^b
	Lead-acid	Ni-Cad and Ni-MH	Lithium-ion	Flow		
1206.6.1 Exhaust ventilation	Yes	Yes	No	Yes	Yes	Yes
1206.6.2 Spill control and neutralization	Yes ^c	Yes ^c	No	Yes	Yes	Yes
1206.6.3 Explosion control	Yes ^a	Yes ^a	Yes	No	Yes	Yes
1206.6.4 Safety caps	Yes	Yes	No	No	Yes	Yes
1206.6.5 Thermal runaway	Yes	Yes	Yes ^d	No	Yes ^d	Yes

a. Not required for lead-acid and nickel cadmium batteries at facilities under the exclusive control of communications utilities that comply with NFPA 76 and operate at less than 50 VAC and 60 VDC.

b. Protection shall be provided unless documentation acceptable to the fire code official is provided in accordance with Section 104.7.2 that provides justification why the protection is not necessary based on the technology used.

c. Applicable to vented (i.e. flooded) type nickel cadmium and lead acid batteries.

d. The thermal runaway protection is permitted to be part of a battery management system that has been evaluated with the battery as part of the evaluation to UL 1973.

1206.6.1 Exhaust ventilation. Where required by Table 1206.6 or elsewhere in this code, exhaust ventilation of rooms, areas, and walk-in units containing electrochemical ESS shall be provided in accordance with the International Mechanical Code and Section 1206.6.1.1 or 1206.6.1.2.

1206.6.1.1 Ventilation based upon LFL. The exhaust ventilation system shall be designed to limit the maximum concentration of flammable gas to 25 percent of the lower flammable limit (LFL) of the total volume of the room, area, or walk-in unit during the worst-case event of simultaneous charging of batteries at the maximum charge rate, in accordance with nationally recognized standards.

1206.6.1.2 Ventilation based upon exhaust rate. Mechanical exhaust ventilation shall be provided at a rate of not less than 1 ft³/min/ft² (5.1 L/sec/m²) of floor area of the room, area, or walk-in unit. The ventilation shall be either continuous or shall be activated by a gas detection system in accordance with Section 1206.6.1.2.4.

1206.6.1.2.1 Standby power. Mechanical exhaust ventilation shall be provided with a minimum of two hours of standby power in accordance with Section 1203.2.5.

1206.6.1.2.2 Installation instructions. Required mechanical exhaust ventilation systems shall be installed in accordance with the manufacturer's installation instructions and the International Mechanical Code.

1206.6.1.2.3 Supervision. Required mechanical exhaust ventilation systems shall be supervised by an approved central station, proprietary or remote station service in accordance with NFPA 72, or shall initiate an audible and visible signal at an approved constantly attended on-site location.

1206.6.1.2.4 Gas detection system. Where required by Section 1206.6.1.2, rooms, areas, and walk-in units containing ESS shall be protected by an approved continuous gas detection system that complies with Section 916 and with the following:

1. The gas detection system shall be designed to activate the mechanical ventilation system when the level of flammable gas in the room, area, or walk-in unit exceeds 25 percent of the LFL.
2. The mechanical ventilation system shall remain on until the flammable gas detected is less than 25 percent of the LFL.
3. The gas detection system shall be provided with a minimum of 2 hours of standby power in accordance with Section 1203.2.6.
4. Failure of the gas detection system shall annunciate a trouble signal at an approved central station, proprietary or remote station service in accordance with NFPA 72, or shall initiate an audible and visible trouble signal at an approved constantly attended on-site location.

1206.6.2 Spill control and neutralization. Where required by Table 1206.6 or elsewhere in this code, areas containing free-flowing liquid electrolyte or hazardous materials shall be provided with spill control and neutralization in accordance with this section.

1206.6.2.1 Spill control. Spill control shall be provided to prevent the flow of liquid electrolyte or hazardous materials to adjoining rooms or areas. The method shall be capable of containing a spill from the single largest battery or vessel.

1206.6.2.2 Neutralization. An approved method to neutralize spilled liquid electrolyte shall be provided that is capable of neutralizing a spill from the largest battery or vessel to a pH between 5.0 and 9.0.

1206.6.3 Explosion control. Where required by Table 1206.6 or elsewhere in this code, explosion control complying with Section 911 shall be provided for rooms, areas or walk-in units containing electrochemical ESS technologies.

Exceptions:

1. Where approved, explosion control is permitted to be waived by the fire code official based on large scale fire testing complying with Section 1206.1.5 which demonstrates that flammable gases are not liberated from electrochemical ESS cells or modules where tested in accordance with UL 9540A.
2. Where approved, explosion control is permitted to be waived by the fire code official based on documentation provided in accordance with Section 104.7 that demonstrates that the electrochemical ESS technology to be used does not have the potential to release flammable gas concentrations in excess of 25 percent of the LFL anywhere in the room, area, walk-in unit or structure under thermal runaway or other fault conditions.

1206.6.4 Safety caps. Where required by Table 1206.6 or elsewhere in this code, vented batteries and other ESS shall be provided with flame-arresting safety caps.

1206.6.5 Thermal runaway. Where required by Table 1206.6 or elsewhere in this code, batteries and other ESS shall be provided with a listed device or other approved method to prevent, detect and minimize the impact of thermal runaway.

1206.7 Indoor installations. Indoor ESS installations shall be in accordance with Sections 1206.7.1 through 1206.7.4.

1206.7.1 Dedicated use buildings. For the purpose of Table 1206.7 dedicated use ESS buildings shall be classified as Group F-1 occupancies and comply with all the following:

1. The building shall only be used for ESS, electrical energy generation, and other electrical grid related operations.
2. Occupants in the rooms and areas containing ESS are limited to personnel that operate, maintain, service, test and repair the ESS and other energy systems.
3. No other occupancy types shall be permitted in the building.
4. Administrative and support personnel shall be permitted in areas within the buildings that do not contain ESS, provided:

4.1 The areas do not occupy more than 10 percent of the building area of the story in which they are located.

4.2 A means of egress is provided from the incidental use areas to the public way that does not require occupants to traverse through areas containing ESS or other energy system equipment.

1206.7.2 Non-dedicated use buildings. For the purpose of Table 1206.7 non-dedicated use buildings include all buildings that contain ESS and do not comply with Section 1206.7.2 dedicated use building requirements.

**TABLE 1206.7
INDOOR ESS INSTALLATIONS**

COMPLIANCE REQUIRED	DEDICATED USE BUILDINGS ^a	NON-DEDICATED USE BUILDINGS ^b
1206.4 General installation requirements	Yes	Yes
1206.5.1 Size and separation	Yes	Yes
1206.5.2 Maximum allowable quantities	No	Yes
1206.5.3 Elevation	Yes	Yes
1206.5.4 Smoke and automatic fire detection	Yes ^c	Yes
1206.5.5 Fire suppression systems	Yes ^d	Yes
1206.7.3 Dwelling units and sleeping units	NA	Yes
1206.7.4 Fire-resistance rated separations	Yes	Yes
1206.6 Technology specific protection	Yes	Yes

NA = Not allowed.

a. See Section 1206.7.1.

b. See Section 1206.7.2.

c. Where approved by the fire code official, alarm signals are not required to be transmitted to a central station, proprietary or remote station service in accordance with NFPA 72, or a constantly attended location where local fire alarm annunciation is provided and trained personnel are always present.

d. Where approved by the fire code official, fire suppression systems are permitted to be omitted in dedicated use buildings located more than 100 feet (30.5 M) from buildings, lot lines, public ways, stored combustible materials, hazardous materials, high piled stock and other exposure hazards.

1206.7.3 Dwelling units and sleeping units. ESS shall not be installed in sleeping units or in habitable spaces of dwelling units.

1206.7.4 Fire-resistance rated separations. Rooms and areas containing ESS shall include fire-resistance rated separations as follows:

1. In dedicated use buildings, rooms and areas containing ESS shall be separated from areas in which administrative and support personnel are located.
2. In non-dedicated use buildings, rooms and areas containing ESS shall be separated from other areas in the building.

Separation shall be provided by 2 hour rated fire barriers constructed in accordance with Section 707 of the International Building Code and 2 hour rated horizontal assemblies constructed in accordance with Section 711 of the International Building Code, as appropriate.

1206.8 Outdoor installations. Outdoor installations shall be in accordance with Sections 1206.8.1 through 1206.8.3.

1206.8.1 Remote outdoor installations. For the purpose of Table 1206.8, remote outdoor installations include ESS located more than 100 feet (30.5 M) from buildings, lot lines, public ways, stored combustible materials, hazardous materials, high piled stock and other exposure hazards.

1206.8.2 Installations near exposures. For the purpose of Table 1206.8, installations near exposures include all outdoor ESS installations that do not comply with Section 1206.8.1 remote outdoor location requirements.

**TABLE 1206.8
OUTDOOR ESS INSTALLATIONS ^a**

COMPLIANCE REQUIRED	REMOTE INSTALLATIONS ^a	INSTALLATIONS NEAR EXPOSURES ^b
<u>1206.4 All ESS installations</u>	<u>Yes</u>	<u>Yes</u>
<u>1206.5.1 Size and separation</u>	<u>No</u>	<u>Yes ^c</u>
<u>1206.5.2 Maximum allowable quantities</u>	<u>No</u>	<u>Yes</u>
<u>1206.5.4 Smoke and automatic fire detection</u>	<u>Yes</u>	<u>Yes</u>
<u>1206.5.5 Fire suppression systems</u>	<u>Yes ^d</u>	<u>Yes</u>
<u>1206.5.6 Maximum enclosure size</u>	<u>Yes</u>	<u>Yes</u>
<u>1206.5.7 Vegetation control</u>	<u>Yes</u>	<u>Yes</u>
<u>1206.5.8 Means of egress separation</u>	<u>Yes</u>	<u>Yes</u>
<u>1206.8.3 Clearance to exposures</u>	<u>Yes</u>	<u>Yes</u>
<u>1206.6 Technology specific protection</u>	<u>Yes</u>	<u>Yes</u>

a. See Section 1206.8.1.

b. See Section 1206.8.2.

c. In outdoor walk-in units, spacing is not required between ESS units and the walls of the enclosure.

d. Where approved by the fire code official, fire suppression systems are permitted to be omitted.

1206.8.3 Clearance to exposures. ESS located outdoors shall be separated by a minimum ten feet (3048 mm) from the following exposures:

1. Lot lines
2. Public ways
3. Buildings
4. Stored combustible materials
5. Hazardous materials
6. High-piled stock
7. Other exposure hazards

Exceptions:

1. Clearances are permitted to be reduced to 3 feet (914 mm) where a 1-hour free standing fire barrier, suitable for exterior use, and extending 5 feet (1.5 m) above and extending 5 feet (1.5 m) beyond the physical boundary of the ESS installation is provided to protect the exposure.
2. Clearances to buildings are permitted to be reduced to 3 feet (914 mm) where noncombustible exterior walls with no openings or combustible overhangs are provided on the wall adjacent to the ESS and the fire-resistance rating of the exterior wall is a minimum 2 hours.
3. Clearances to buildings are permitted to be reduced to 3 feet (914.4 mm) where a weatherproof enclosure constructed of noncombustible materials is provided over the ESS, and it has been demonstrated that a fire within the enclosure will not ignite combustible materials outside the enclosure based on large scale fire testing complying with Section 1206.1.5.

1206.9 Special installations. Rooftop and open parking garage ESS installations shall comply with Sections 1206.9.1 through 1206.9.6.

1206.9.1 Rooftop installations. For the purpose of Table 1206.9, rooftop ESS installations are those located on the roofs of buildings.

1206.9.2 Open parking garage installations. For the purpose of Table 1206.9, open parking garage ESS installations are those located in a structure or portion of a structure that complies with Section 406.5 of the International Building Code.

**TABLE 1206.9
SPECIAL ESS INSTALLATIONS**

COMPLIANCE REQUIRED	ROOFTOPS ^a	OPEN PARKING GARAGES ^b
1206.4 All ESS installations	Yes	Yes
1206.5.1 Size and separation	Yes	Yes
1206.5.2 Maximum allowable quantities	Yes	Yes
1206.5.4 Smoke and automatic fire detection	Yes	Yes
1206.5.6 Maximum enclosure size	Yes	Yes
1206.5.8 Means of egress separation	Yes	Yes
1206.9.3 Clearance to exposures	Yes	Yes
1206.9.4 Fire suppression systems	Yes	Yes
1206.9.5 Rooftop installations	Yes	No
1206.9.6 Open parking garage installations	No	Yes
1206.6 Technology specific protection	Yes	Yes

a. See Section 1206.9.1.

b. See Section 1206.9.2.

1206.9.3 Clearance to exposures. ESS located on rooftops and in open parking garages shall be separated by a minimum ten feet (3048 mm) from the following exposures:

1. Buildings, except the building on which rooftop ESS is mounted
2. Any portion of the building on which a rooftop system is mounted that is elevated above the rooftop on which the system is installed
3. Lot lines
4. Public ways
5. Stored combustible materials
6. Locations where motor vehicles can be parked
7. Hazardous materials
8. Other exposure hazards

Exceptions:

1. Clearances are permitted to be reduced to 3 feet (914 mm) where a 1-hour free standing fire barrier, suitable for exterior use, and extending 5 feet (1.5 m) above and extending 5 feet (1.5 m) beyond the physical boundary of the ESS installation is provided to protect the exposure.
2. Clearances are permitted to be reduced to 3 feet (914.4 mm) where a weatherproof enclosure constructed of noncombustible materials is provided over the ESS and it has been demonstrated that a fire within the enclosure will not ignite combustible materials outside the enclosure based on large scale fire testing complying with Section 1206.1.5.

1206.9.4 Fire suppression systems. ESS located in walk-in units on rooftops or in walk-in units in open parking garages shall be provided with automatic fire suppression systems within the ESS enclosure in accordance with Section 1206.5.5. Areas containing ESS other than walk-in units in open parking structures on levels not open above to the sky shall be provided with an automatic fire suppression system complying with Section 1206.5.5. Exception: A fire suppression system is not required in open parking garages if large scale fire testing complying with Section 1206.1.5 is provided that shows that a fire will not impact the exposures in Section 1206.9.3.

1206.9.5 Rooftop installations. ESS and associated equipment that are located on rooftops and not enclosed by building construction shall comply with the following:

1. Stairway access to the roof for emergency response and fire department personnel shall be provided either through a bulkhead from the interior of the building or a stairway on the exterior of the building.
2. Service walkways at least 5 feet (1524 mm) in width shall be provided for service and emergency personnel from the point of access to the roof to the system.
3. ESS and associated equipment shall be located from the edge of the roof a distance equal to at least the height of the system, equipment, or component but not less than 5 feet (1.5 m).
4. The roofing materials under and within 5 feet (1524 mm) horizontally from an ESS or associated equipment shall be noncombustible or shall have a Class A rating when tested in accordance with ASTM E108 or UL 790.
5. A Class I standpipe outlet shall be installed at an approved location on the roof level of the building or in the stairway bulkhead at the top level.
6. The ESS shall be the minimum of 10 feet from the fire service access point on the roof top.

1206.9.6 Open parking garages. ESS and associated equipment that are located in open parking garages shall comply with all of the following:

1. ESS shall not be located within 50 feet (15,240 mm) of air inlets for building HVAC systems.

Exception: This distance shall be permitted to be reduced to 25 feet (7.620 mm) if the automatic fire alarm system monitoring the radiant-energy sensing detectors de-energizes the ventilation system connected to the air intakes upon detection of fire.

2. ESS shall not be located within 25 feet (7620 mm) of exits leading from the attached building where located on a covered level of the parking structure not directly open to the sky above.
3. An approved fence with a locked gate or other approved barrier shall be provided to keep the general public at least five feet (1024 mm) from the outer enclosure of the ESS.

1206.10 Mobile ESS equipment and operations. Mobile ESS equipment and operations shall comply with Sections 1206.10.1 through 1206.10.7.7

1206.10.1 Charging and storage. For the purpose of Section 1206.10, charging and storage covers the operation where mobile ESS are charged and stored so they are ready for deployment to another site, and where they are charged and stored after a deployment.

1206.10.2 Deployment. For the purpose of Section 1206.10, deployment covers operations where mobile ESS are located at a site other than the charging and storage site and are being used to provide power.

1206.10.3 Permits. Construction and operational permits shall be provided for charging and storage of mobile ESS and operational permits shall be provided for deployment of mobile ESS as required by Section 1206.1.2.

1206.10.4 Construction documents. Construction documents complying with Section 1206.3 shall be provided with the construction permit application for mobile ESS charging and storage locations.

1206.10.4.1 Deployment documents. The following information shall be provided with the operation permit applications for mobile ESS deployments:

1. Relevant information for the mobile ESS equipment and protection measures in the construction documents required by Section 1206.1.3.
2. Location and layout diagram of the area in which the mobile ESS is to be deployed, including a scale diagram of all nearby exposures.
3. Location and content of signage, including no smoking signs.
4. Description of fencing to be provided around the ESS, including locking methods.
5. Details on fire suppression, smoke and automatic fire detection, system monitoring, thermal management, exhaust ventilation, and explosion control, if provided.
6. For deployment, the intended duration of operation, including anticipated connection and disconnection times and dates.
7. Location and description of local staging stops during transit to the deployment site. See Section 1206.10.8.5.
8. Description of the temporary wiring, including connection methods, conductor type and size, and circuit overcurrent protection to be provided.
9. Description of how fire suppression system connections to water supplies or extinguishing agents are to be provided.
10. Contact information for personnel who are responsible for maintaining and servicing the equipment, and responding to emergencies as required by Section 1206.1.6.1.

1206.10.5 Approved locations. Locations where mobile ESS are charged, stored and deployed shall be restricted to the locations established on the construction and operational permits.

1206.10.6 Charging and storage. Installations where mobile ESS are charged and stored shall be treated as permanent ESS indoor or outdoor installations, and shall comply with the following sections, as applicable:

1. Indoor charging and storage shall comply with Section 1206.7.
2. Outdoor charging and storage shall comply with Section 1206.8.
3. Charging and storage on rooftops and in open parking garages shall comply with Section 1206.9.

Exceptions:

1. Electrical connections shall be permitted to be made using temporary wiring complying with the manufacturer's instructions, the UL 9540 listing, and NFPA 70.
2. Fire suppression system connections to the water supply shall be permitted to use approved temporary connections.

1206.10.7 Deployed mobile ESS requirements. Deployed mobile ESS equipment and operations shall comply with this section and Table 1206.10.

1206.10.7.1 Duration. The duration of mobile ESS deployment shall not exceed 30 days.

Exceptions:

1. Mobile ESS deployments that provide power for durations longer than 30 days shall comply with Section 1206.10.7.
2. Mobile ESS deployments shall not exceed 180 days unless additional operational permits are obtained.

1206.10.7.2 Restricted locations. Deployed mobile ESS operations shall not be located indoors, in covered parking garages, on rooftops, below grade, or under building overhangs.

1206.10.7.3 Clearance to exposures. Deployed mobile ESS shall be separated by a minimum 10 feet (3048 mm) from the following exposures:

1. Public ways
2. Buildings
3. Stored combustible materials
4. Hazardous materials
5. High-piled stock
6. Other exposure hazards

Deployed mobile ESS shall be separated by a minimum 50 feet (15.3 M) from public seating areas and from tents, canopies and membrane structures with an occupant load of 30 or more.

1206.10.7.4 Electrical connections. Electrical connections shall be made in accordance with the manufacturer's instructions and the UL 9540 listing. Temporary wiring for electrical power connections shall comply with NFPA 70. Fixed electrical wiring shall not be provided.

1206.10.7.5 Local staging. Mobile ESS in transit from the charging and storage location to the deployment location and back shall not be parked within 100 feet (30,480 mm) of an occupied building for more than one hour during transit, unless specifically approved by the fire code official when the permit is issued.

1206.10.7.6 Fencing. An approved fence with a locked gate or other approved barrier shall be provided to keep the general public at least five feet (1024 mm) from the outer enclosure of a deployed mobile ESS.

**TABLE 1206.10
MOBILE ENERGY STORAGE SYSTEMS (ESS)**

COMPLIANCE REQUIRED	DEPLOYMENT ^a
<u>1206.4 All ESS installations</u>	Yes ^b
<u>1206.5.1 Size and separation</u>	Yes ^c
<u>1206.5.2 Maximum allowable quantities</u>	Yes
<u>1206.5.4 Smoke and automatic fire detection</u>	Yes ^e
<u>1206.5.5 Fire suppression systems</u>	Yes ^d
<u>1206.5.6 Maximum enclosure size</u>	Yes
<u>1206.5.7 Vegetation control</u>	Yes
<u>1206.5.8 Means of egress separation</u>	Yes
<u>1206.6 Technology specific protection</u>	Yes

a. See Section 1206.10.2.

b. Mobile operations on wheeled vehicle or trailers shall not be required to comply with Section 1206.4.4 seismic and structural load requirements.

c. In walk-in units, spacing is not required between ESS units and the walls of the enclosure.

d. Fire suppression system connections to the water supply shall be permitted to use approved temporary connections.

e. Alarm signals are not required to be transmitted to an approved location for mobile ESS deployed 30 days or less.

1206.10.7.7 Smoking. Smoking shall be prohibited within 10 feet (3048 mm) of mobile ESS. Signs shall be posted in accordance with Section 310.

Delete without substitution

~~**1206.1 Scope.** The provisions in this section are applicable to energy storage systems designed to provide electrical power to a building or facility. These systems are used to provide standby or emergency power, an uninterruptable power supply, load shedding, load sharing or similar capabilities.~~

~~**1206.2 Stationary storage battery systems.** Stationary storage battery systems having capacities exceeding the values shown in Table 1206.2 shall comply with Section 1206.2.1 through 1206.2.12.6, as applicable.~~

**TABLE 1206.2
BATTERY STORAGE SYSTEM THRESHOLD QUANTITIES.**

BATTERY TECHNOLOGY	CAPACITY^a
Flow batteries ^b	20 kWh
Lead acid, all types	70 kWh
Lithium, all types	20 kWh
Nickel cadmium (Ni-Cd)	70 kWh
Sodium, all types	20 kWh ^c
Other battery technologies	10 kWh

For SI: 1 kilowatt-hour = 3.6 megajoules.

- a. ~~For batteries rated in amp-hours, kWh shall equal rated voltage times amp-hour rating divided by 1000.~~
- b. ~~Shall include vanadium, zinc-bromine, polysulfide-bromide, and other flowing electrolyte type technologies.~~
- c. ~~70 kWh for sodium-ion technologies.~~

1206.2.1 Permits. Permits shall be obtained for the installation and operation of stationary storage battery systems in accordance with Section 105.7.2.

1206.2.2 Construction documents. The following information shall be provided with the permit application:

1. Location and layout diagram of the room in which the stationary storage battery system is to be installed;
2. Details on hourly fire-resistance-rated assemblies provided;
3. Quantities and types of storage batteries and battery systems;
4. Manufacturer's specifications, ratings and listings of storage batteries and battery systems;
5. Details on energy management systems;
6. Location and content of signage;
7. Details on fire-extinguishing, smoke detection and ventilation systems;
8. Rack storage arrangement, including seismic support criteria.

1206.2.3 Hazard mitigation analysis. A failure modes and effects analysis (FMEA) or other approved hazard mitigation analysis shall be provided in accordance with Section 104.7.2 under any of the following conditions:

1. Battery technologies not specifically identified in Table 1206.2 are provided;
2. More than one stationary storage battery technology is provided in a room or indoor area where there is a potential for adverse interaction between technologies;
3. Where allowed as a basis for increasing maximum allowable quantities in accordance with Section 1206.2.9.

1206.2.3.1 Fault condition. The hazard mitigation analysis shall evaluate the consequences of the following failure modes, and others deemed necessary by the *fire code official*. Only single failure modes shall be considered:

1. Thermal runaway condition in a single-battery storage rack, module or array;
2. Failure of any energy management system;
3. Failure of any required ventilation system;
4. Voltage surges on the primary electric supply;
5. Short circuits on the load side of the stationary battery storage system;
6. Failure of the smoke detection, fire-extinguishing or gas detection system;
7. Spill neutralization not being provided or failure of the secondary containment system;

1206.2.3.2 Analysis approval. The *fire code official* is authorized to approve the hazardous mitigation analysis provided that the hazard mitigation analysis demonstrates all of the following:

1. Fires or explosions will be contained within unoccupied battery storage rooms for the minimum duration of the fire-resistance-rated walls identified in Table 509.1 of the International Building Code;
2. Fires and explosions in battery cabinets in occupied work centers will be detected in time to allow occupants within the room to evacuate safely;
3. Toxic and highly toxic gases released during fires and other fault conditions shall not reach concentrations in excess of Immediately Dangerous to Life or Health (IDLH) levels in the building or adjacent means of egress routes during the time deemed necessary to evacuate from that area;
4. Flammable gases released from batteries during charging, discharging and normal operation shall not exceed 25 percent of their lower flammability limit (LFL);
5. Flammable gases released from batteries during fire, overcharging and other abnormal conditions shall not create an explosion hazard that will injure occupants or emergency responders;

1206.2.3.3 Additional protection measures. Construction, equipment and systems that are required for the stationary storage battery system to comply with the hazardous mitigation analysis, including but not limited to those specifically described in Section 1206.2, shall be installed, maintained and tested in accordance with nationally recognized standards and specified design parameters:

1206.2.4 Seismic and structural design. Stationary storage battery systems shall comply with the seismic design requirements in Chapter 16 of the International Building Code, and shall not exceed the floor-loading limitation of the building:

1206.2.5 Vehicle impact protection. Where stationary storage battery systems are subject to impact by a motor vehicle, including fork lifts, vehicle impact protection shall be provided in accordance with Section 312.

~~**1206.2.6 Combustible storage.** Combustible materials not related to the stationary storage battery system shall not be stored in battery rooms, cabinets or enclosures. Combustible materials in occupied work centers covered by Section 1206.2.8.5 shall not be stored less than 3 feet (915 mm) from battery cabinets.~~

~~**1206.2.7 Testing, maintenance and repair.** Storage batteries and associated equipment and systems shall be tested and maintained in accordance with the manufacturer's instructions. Any storage batteries or system components used to replace existing units shall be compatible with the battery charger, energy management systems, other storage batteries and other safety systems. Introducing other types of storage batteries into the stationary storage battery system or other types of electrolytes into flow battery systems shall be treated as a new installation and require approval by the *fire code official* before the replacements are introduced into service.~~

~~**1206.2.8 Location and construction.** Rooms and areas containing stationary storage battery systems shall be designed, located and constructed in accordance with Sections 1206.2.8.1 through 1206.2.8.7.4.~~

~~**1206.2.8.1 Location.** Stationary storage battery systems shall not be located in areas where the floor is located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access, or where the floor level is more than 30 feet (9144 mm) below the finished floor of the lowest level of exit discharge.~~

Exceptions:

- ~~1. Lead acid and nickel cadmium stationary storage battery systems.~~
- ~~2. Installations on noncombustible rooftops of buildings exceeding 75 feet (22 860 mm) in height that do not obstruct fire department rooftop operations, where *approved by the fire code official*.~~

~~**1206.2.8.2 Separation.** Rooms containing stationary storage battery systems shall be separated from other areas of the building in accordance with Section 509.1 of the International Building Code. Battery systems shall be allowed to be in the same room with the equipment they support.~~

~~**1206.2.8.3 Stationary battery arrays.** Storage batteries, prepackaged stationary storage battery systems and preengineered stationary storage battery systems shall be segregated into stationary battery arrays not exceeding 50 kWh (180 megajoules) each. Each stationary battery array shall be spaced not less than 3 feet (914 mm) from other stationary battery arrays and from walls in the storage room or area. The storage arrangements shall comply with Chapter 10.~~

Exceptions:

- ~~1. Lead acid and nickel cadmium storage battery arrays.~~
- ~~2. Listed preengineered stationary storage battery systems and prepackaged stationary storage battery systems shall not exceed 250 kWh (900 megajoules) each.~~
- ~~3. The fire code official is authorized to approve listed, preengineered and prepackaged battery arrays with larger capacities or smaller battery array spacing if large-scale fire and fault condition testing conducted or witnessed and reported by an approved testing laboratory is provided showing that a fire involving one array will not propagate to an adjacent array, and be contained within the room for a duration equal to the fire-resistance rating of the room separation specified in Table 509 of the International Building Code.~~

~~**1206.2.8.4 Separate rooms.** Where stationary batteries are installed in a separate equipment room that can be accessed only by authorized personnel, they shall be permitted to be installed on an open rack for ease of maintenance.~~

~~**1206.2.8.5 Occupied work centers.** Where stationary storage batteries are located in an occupied work center, they shall be housed in a noncombustible cabinet or other enclosure to prevent access by unauthorized personnel.~~

~~**1206.2.8.5.1 Cabinets.** Where stationary batteries are contained in cabinets in occupied work centers, the cabinet enclosures shall be located within 10 feet (3048 mm) of the equipment that they support.~~

~~**1206.2.8.6 Signage.** Approved signs shall be provided on doors or in locations near entrances to stationary storage battery system rooms and shall include the following or equivalent:~~

- ~~1. The room contains energized battery systems.~~
- ~~2. The room contains energized electrical circuits.~~
- ~~3. The additional markings required in Section 1206.2.12 for the types of storage batteries contained within the room.~~

Exception: Existing stationary storage battery systems shall be permitted to include the signage required at the time it was installed.

1206.2.8.6.1 Electrical disconnects. Where the stationary storage battery system disconnecting means is not within sight of the main service disconnecting means, placards or directories shall be installed at the location of the main service disconnecting means indicating the location of stationary storage battery system disconnecting means in accordance with NFPA 70.

1206.2.8.6.2 Cabinet signage. Battery storage cabinets provided in occupied work centers in accordance with Section 1206.2.8.5 shall have exterior labels that identify the manufacturer and model number of the system and electrical rating (voltage and current) of the contained battery system. There shall be signs within the cabinet that indicate the relevant electrical and chemical hazards, as required by Section 1206.2.12.

1206.2.8.7 Outdoor installations. Stationary storage battery systems located outdoors shall comply with Sections 1206.2.8.7 through 1206.2.8.7.4, in addition to all applicable requirements of Section 1206.2. Installations in outdoor enclosures or containers that can be occupied for servicing, testing, maintenance and other functions shall be treated as battery storage rooms.

Exception: Stationary battery arrays in noncombustible containers shall not be required to be spaced 3 feet (914 mm) from the container walls.

1206.2.8.7.1 Separation. Stationary storage battery systems located outdoors shall be separated by a minimum 5 feet (1524 mm) from the following:

1. Lot lines.
2. Public ways.
3. Buildings.
4. Stored combustible materials.
5. Hazardous materials.
6. High-piled stock.
7. Other exposure hazards.

Exception: The fire code official is authorized to approve smaller separation distances if large-scale fire and fault condition testing conducted or witnessed and reported by an approved testing laboratory is provided showing that a fire involving the system will not adversely impact occupant egress from adjacent buildings, or adversely impact adjacent stored materials or structures.

1206.2.8.7.2 Means of egress. Stationary storage battery systems located outdoors shall be separated from any means of egress as required by the fire code official to ensure safe egress under fire conditions, but not less than 10 feet (3048 mm).

Exception: The fire code official is authorized to approve lesser separation distances if large-scale fire and fault condition testing conducted or witnessed and reported by an approved testing laboratory is provided showing that a fire involving the system will not adversely impact occupant egress.

1206.2.8.7.3 Security of outdoor areas. Outdoor areas in which stationary storage battery systems are located shall be secured against unauthorized entry and safeguarded in an approved manner.

1206.2.8.7.4 Walk-in units. Where a stationary storage battery system includes an outer enclosure, the unit shall only be entered for inspection, maintenance and repair of batteries and electronics, and shall not be occupied for other purposes.

1206.2.9 Maximum allowable quantities. Fire areas within buildings containing stationary storage battery systems exceeding the maximum allowable quantities in Table 1206.2.9 shall comply with all applicable Group II occupancy requirements in this code and the International Building Code.

Exception: Where approved by the fire code official, areas containing stationary storage batteries that exceed the amounts in Table 1206.2.9 shall be treated as incidental use areas and not Group II occupancies based on a hazardous mitigation analysis in accordance with Section 1206.2.3 and large-scale fire and fault condition testing conducted or witnessed and reported by an approved testing laboratory.

**TABLE 1206.2.9
MAXIMUM ALLOWABLE BATTERY QUANTITIES**

BATTERY TECHNOLOGY	MAXIMUM ALLOWABLE QUANTITIES^a	GROUP H OCCUPANCY
Flow batteries ^b	600 kWh	Group H-2
Lead acid, all types	Unlimited	Not Applicable
Lithium, all types	600 kWh	Group H-2
Nickel cadmium (Ni-Cd)	Unlimited	Not Applicable
Sodium, all types	600 kWh	Group H-2
Other battery technologies	200 kWh	Group H-2 ^c

For SI: 1 kilowatt-hour = 3.6 megajoules.

- a. ~~For batteries rated in amp-hours, Kilowatt-hours (kWh) shall equal rated battery voltage times the amp-hour rating divided by 1,000.~~
- b. ~~Shall include vanadium, zinc-bromine, polysulfide-bromide, and other flowing electrolyte-type technologies.~~
- c. ~~Shall be a Group H-4 occupancy if the fire code official determines that a fire or thermal runaway involving the battery technology does not represent a significant fire hazard.~~

1206.2.9.1 Mixed battery systems. ~~Where areas within buildings contain different types of storage battery technologies, the total aggregate quantities of batteries shall be determined based on the sum of percentages of each battery type quantity divided by the maximum allowable quantity of each battery type. If the sum of the percentages exceeds 100 percent, the area shall be treated as a Group H occupancy in accordance with Table 1206.2.9.~~

1206.2.10 Storage batteries and equipment. ~~The design and installation of storage batteries and related equipment shall comply with Sections 1206.2.10.1 through 1206.2.10.8.~~

1206.2.10.1 Listings. ~~Storage batteries and battery storage systems shall comply with the following:~~

1. ~~Storage batteries shall be listed in accordance with UL 1973.~~
2. ~~Prepackaged and preengineered stationary storage battery systems shall be listed in accordance with UL 9540.~~

Exception: ~~Lead-acid batteries are not required to be listed.~~

1206.2.10.2 Prepackaged and preengineered systems. ~~Prepackaged and preengineered stationary storage battery systems shall be installed in accordance with their listing and the manufacturer's instructions.~~

1206.2.10.3 Energy management system. ~~An approved energy management system shall be provided for battery technologies other than lead-acid and nickel cadmium for monitoring and balancing cell voltages, currents and temperatures within the manufacturer's specifications. The system shall transmit an alarm signal to an approved location if potentially hazardous temperatures or other conditions such as short circuits, over voltage or under voltage are detected.~~

1206.2.10.4 Battery chargers. ~~Battery chargers shall be compatible with the battery chemistry and the manufacturer's electrical ratings and charging specifications. Battery chargers shall be listed and labeled in accordance with UL 1564 or provided as part of a listed preengineered or prepackaged stationary storage battery system.~~

1206.2.10.5 Inverters. ~~Inverters shall be listed and labeled in accordance with UL 1741. Only inverters listed and labeled for utility interactive system use and identified as interactive shall be allowed to operate in parallel with the electric utility power system to supply power to common loads.~~

1206.2.10.6 Safety caps. ~~Vented batteries shall be provided with flame-arresting safety caps.~~

1206.2.10.7 Thermal runaway. ~~Where required by Section 1206.2.12, storage batteries shall be provided with a listed device or other approved method to prevent, detect and control thermal runaway.~~

1206.2.10.8 Toxic and highly toxic gas. ~~Stationary storage battery systems that have the potential to release toxic and highly toxic gas during charging, discharging and normal use conditions shall comply with Chapter 60.~~

1206.2.11 Fire-extinguishing and detection systems. Fire-extinguishing and detection systems shall be provided in accordance with Sections 1206.2.11.1 through 1206.2.11.5.

1206.2.11.1 Fire-extinguishing systems. Rooms containing stationary storage battery systems shall be equipped with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1. Commodity classifications for specific technologies of storage batteries shall be in accordance with Chapter 5 of NFPA 13. If the storage battery types are not addressed in Chapter 5 of NFPA 13, the *fire code official* is authorized to approve the fire-extinguishing system based on full-scale fire and fault condition testing conducted or witnessed and reported by an *approved laboratory*.

Exception: Spaces or areas containing stationary storage battery systems used exclusively for telecommunications equipment in accordance with Section 903.2.

1206.2.11.1.1 Alternative fire-extinguishing systems. Battery systems that utilize water-reactive materials shall be protected by an approved alternative automatic fire-extinguishing system in accordance with Section 904. The system shall be listed for protecting the type, arrangement and quantities of storage batteries in the room. The *fire code official* shall be permitted to approve the alternative fire-extinguishing system based on full-scale fire and fault condition testing conducted or witnessed and reported by an *approved laboratory*.

1206.2.11.2 Smoke detection system. An *approved automatic smoke detection system* shall be installed in rooms containing *stationary storage battery systems* in accordance with Section 907.2.

1206.2.11.3 Ventilation. Where required by Section 1206.2.3 or 1206.2.12, ventilation of rooms containing stationary storage battery systems shall be provided in accordance with the International Mechanical Code and one of the following:

1. The ventilation system shall be designed to limit the maximum concentration of flammable gas to 25 percent of the lower flammability limit, or for hydrogen, 1.0 percent of the total volume of the room.
2. Continuous ventilation shall be provided at a rate of not less than 1 cubic foot per minute (cfm) per square foot $[0.00508 \text{ m}^3/(\text{s} \cdot \text{m}^2)]$ of floor area, but not less than 150 cfm (4 m^3/min).

The exhaust system shall be designed to provide air movement across all parts of the floor for gases having a vapor density greater than air and across all parts of the vault ceiling for gases having a vapor density less than air.

1206.2.11.3.1 Cabinet ventilation. Where cabinets located in occupied spaces contain storage batteries that are required by Section 1206.2.3 or 1206.2.12 to be provided with ventilation, the cabinet shall be provided with ventilation in accordance with Section 1206.2.11.3.

1206.2.11.3.2 Supervision. Required mechanical ventilation systems for rooms and cabinets containing storage batteries shall be supervised by an *approved* central station, proprietary or remote station service or shall initiate an audible and visual signal at an *approved* constantly attended on-site location.

1206.2.11.4 Gas detection system. Where required by Section 1206.2.3 or 1206.2.12, rooms containing stationary storage battery systems shall be protected by a gas detection system complying with Section 916. The gas detection system shall be designed to activate where the level of flammable gas exceeds 25 percent of the lower flammable limit (LFL), or where the level of toxic or highly toxic gas exceeds one-half of the IDLH.

1206.2.11.4.1 System activation. Activation of the gas detection system shall result in all the following:

1. Initiation of distinct audible and visible alarms in the battery storage room.
2. Transmission of an alarm to an approved location.
3. De-energizing of the battery charger.
4. Activation of the mechanical ventilation system, where the system is interlocked with the gas detection system.

Exception: Lead-acid and nickel-cadmium stationary storage battery systems shall not be required to comply with items 1, 2 and 3.

1206.2.11.5 Spill control and neutralization. Where required by Section 1206.2.12, approved methods and materials shall be provided for the control and neutralization of spills of electrolyte or other hazardous materials in areas containing stationary storage batteries as follows:

1. For batteries with free-flowing electrolyte, the method and materials shall be capable of neutralizing a spill of the total capacity from the largest cell or block to a pH between 5.0 and 9.0.
2. For batteries with immobilized electrolyte, the method and material shall be capable of neutralizing a spill of 3.0 percent of the capacity of the largest cell or block in the room to a pH between 5.0 and 9.0.

1206.2.12 Specific battery type requirements. This section includes requirements applicable to specific types of storage batteries. Stationary storage battery systems with more than one type of storage battery shall comply with requirements applicable to each battery type.

1206.2.12.1 Lead-acid storage batteries. Stationary storage battery systems utilizing lead-acid storage batteries shall comply with the following:

1. Ventilation shall be provided in accordance with Section 1206.2.11.3.
2. Spill control and neutralization shall be in accordance with Section 1206.2.11.5.
3. Thermal runaway protection shall be provided for valve-regulated lead-acid (VRLA) storage batteries in accordance with Section 1206.2.10.7.
4. The signage in Section 1206.2.8.6 shall indicate the room contains lead-acid batteries.

1206.3.5.1 Fire-extinguishing systems. Rooms containing capacitor energy storage systems shall be equipped with an automatic sprinkler system installed in accordance with Section 903.3.1.1. Commodity classifications for specific capacitor technologies shall be in accordance with Chapter 5 of NFPA 13. If the capacitor types are not addressed in Chapter 5 of NFPA 13, the fire code official is authorized to approve the automatic sprinkler system based on full-scale fire and fault condition testing conducted by an approved laboratory.

1206.2.12.2 Nickel-cadmium (Ni-Cd) storage batteries. Stationary storage battery systems utilizing nickel-cadmium (Ni-Cd) storage batteries shall comply with the following:

1. Ventilation shall be provided in accordance with Section 1206.2.11.3.
2. Spill control and neutralization shall be in accordance with Section 1206.2.11.5.
3. Thermal runaway protection shall be provided for valve-regulated sealed nickel-cadmium storage batteries in accordance with Section 1206.2.10.7.
4. The signage in Section 1206.2.8.6 shall indicate the room contains nickel-cadmium batteries.

1206.2.12.3 Lithium-ion storage batteries. The signage in Section 1206.2.8.6 shall indicate the type of lithium batteries contained in the room.

1206.3.2.5 Electrical disconnects. Where the capacitor energy storage system disconnecting means is not within sight of the main service disconnecting means, placards or directories shall be installed at the location of the main service disconnecting means identifying the location of the capacitor energy storage system disconnecting means in accordance with NFPA 70.

1206.2.12.4 Sodium-beta storage batteries. Stationary storage battery systems utilizing sodium-beta storage batteries shall comply with the following:

1. Ventilation shall be provided in accordance with Section 1206.2.11.3.
2. The signage in Section 1206.2.8.6 shall indicate the type of sodium batteries in the room and include the instructions, "APPLY NO WATER."

1206.3.2.6 Outdoor installation. Capacitor energy systems located outdoors shall comply with Sections 1206.3.2.6 through 1206.3.2.6.4 in addition to all applicable requirements of Section 1206.3. Installations in outdoor enclosures or containers that can be occupied for servicing, testing, maintenance and other functions shall be treated as capacitor storage rooms.

Exception: Capacitor arrays in noncombustible containers shall not be required to be spaced 3 feet (914 mm) from the container walls.

1206.3.2.6.1 Separation. Capacitor energy systems located outdoors shall be not less than 5 feet (1524 mm) from the following:

1. Lot lines.
2. Public ways.
3. Buildings.
4. Stored combustible materials.
5. Hazardous materials.
6. High-piled stock.
7. Other exposure hazards.

Exception: The fire code official is authorized to approve lesser separation distances if large-scale fire and fault condition testing conducted or witnessed and reported by an approved testing laboratory is provided showing that a fire involving the system will not adversely impact occupant egress from adjacent buildings, or adversely impact adjacent stored materials or structures.

1206.2.12.5 Flow storage batteries. Stationary storage battery systems utilizing flow storage batteries shall comply with the following:

1. Ventilation shall be provided in accordance with Section 1206.2.11.3.
2. Spill control and neutralization shall be in accordance with Section 1206.2.11.5.
3. The signage required in Section 1206.2.8.6 shall indicate the type of flow batteries in the room.

1206.3.2.6.3 Security of outdoor areas. Outdoor areas in which capacitor energy storage systems are located shall be secured against unauthorized entry and safeguarded in an approved manner.

1206.3.2.1 Location. Capacitor energy storage systems shall not be located in areas where the floor is located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access, or where the floor level is more than 30 feet (9144 mm) below the finished floor of the lowest level of exit discharge.

1206.3.4.4 Capacitor chargers. Capacitor chargers shall be compatible with the capacitor manufacturer's electrical ratings and charging specifications. Capacitor chargers shall be listed and labeled in accordance with UL 1564 or provided as part of a listed preengineered or prepackaged capacitor energy storage system.

1206.2.12.6 Other battery technologies. Stationary storage battery systems utilizing battery technologies other than those described in Sections 1206.2.12.1 through 1206.2.12.5 shall comply with the following:

1. Gas detection systems complying with Section 916 shall be provided in accordance with Section 1206.2.11.4 where the batteries have the potential to produce toxic or highly toxic gas in the storage room or cabinet in excess of the permissible exposure limits (PEL) during charging, discharging and normal system operation.
2. Mechanical ventilation shall be provided in accordance with Section 1206.2.11.3.
3. Spill control and neutralization shall be in accordance with Section 1206.2.11.5.
4. In addition to the signage required in Section 1206.2.8.6, the marking shall identify the type of batteries present, describe the potential hazards associated with the battery type, and indicate that the room contains energized electrical circuits.

1206.3.2.2 Separation. Rooms containing capacitor energy storage systems shall be separated from the following occupancies by fire barriers or horizontal assemblies, or both, constructed in accordance with the International Building Code:

1. Group B, F, M, S and U occupancies by 1-hour fire-resistance-rated construction.
2. Group A, E, I and R occupancies by 2-hour fire-resistance-rated construction.

1206.3.2.6.4 Walk-in units. Where a capacitor energy storage system includes an outer enclosure, the unit shall only be entered for inspection, maintenance and repair of batteries and electronics, and shall not be occupied for other purposes.

1206.3.4.1 Listing. Capacitors and capacitor energy storage systems shall comply with the following:

1. Capacitors shall be listed in accordance with UL 1973.
2. Prepackaged and preengineered stationary capacitor energy storage systems shall be listed in accordance with UL 9540.

1206.3.4.5 Toxic and highly toxic gas. ~~Capacitor energy storage systems that have the potential to release toxic and highly toxic materials during charging, discharging and normal use conditions shall comply with Chapter 60.~~

1206.3.5.1.1 Alternative fire extinguishing systems. ~~Capacitor energy storage systems that utilize water-reactive materials shall be protected by an approved alternative automatic fire-extinguishing system in accordance with Section 904. The system shall be listed for protecting the type, arrangement and quantities of capacitors in the room. The fire code official shall be permitted to approve the system based on full-scale fire and fault condition testing conducted by an approved laboratory.~~

1206.3 Capacitor energy storage systems. ~~Capacitor energy storage systems having capacities exceeding 3 kWh (10.8 megajoules) shall comply with Sections 1206.3 through 1206.3.2.6.1.~~

Exception: ~~Capacitors regulated by NFPA 70, Chapter 460, and capacitors included as a component part of other listed electrical equipment are not required to comply with this section.~~

1206.3.2.3 Capacitor arrays. ~~Capacitor energy storage systems shall be segregated into capacitor arrays not exceeding 50 kWh (180 megajoules) each. Each array shall be spaced not less than 3 feet (914 mm) from other arrays and from walls in the storage room or area. The storage arrangements shall comply with Chapter 10.~~

Exception: ~~Capacitor energy storage systems in noncombustible containers located outdoors shall not be required to be spaced 3 feet (914 mm) from the container walls.~~

1206.3.3 Maximum allowable quantities. ~~Fire areas within buildings containing capacitor energy storage systems that exceed 600 kWh of energy capacity shall comply with all applicable Group H occupancy requirements in this code and the International Building Code.~~

1206.3.4.2 Prepackaged and preengineered systems. ~~In addition to other applicable requirements of this code, prepackaged and preengineered capacitor energy storage systems shall be installed in accordance with their listing and the manufacturer's instructions.~~

1206.3.5.3 Ventilation. ~~Where capacitors release flammable gases during normal operating conditions, ventilation of rooms containing capacitor energy storage systems shall be provided in accordance with the International Mechanical Code and one of the following:~~

- ~~1. The ventilation system shall be designed to limit the maximum concentration of flammable gas to 25 percent of the lower flammability limit.~~
- ~~2. Continuous ventilation shall be provided at a rate of not less than 1 cubic foot per minute (cfm) per square foot [$0.00508 \text{ m}^3/(\text{s} \cdot \text{m}^2)$] of floor area, but not less than 150 cfm ($4 \text{ m}^3/\text{min}$).~~

~~The exhaust system shall be designed to provide air movement across all parts of the floor for gases having a vapor density greater than air and across all parts of the ceiling for gases having a vapor density less than air.~~

1206.3.5.3.1 Supervision. ~~Required mechanical ventilation systems for rooms containing capacitor energy storage systems shall be supervised by an approved central station, proprietary or remote station service, or shall initiate an audible and visible signal at an approved, constantly attended on-site location.~~

1206.3.1 Permits. ~~Permits shall be obtained for the installation of capacitor energy storage systems in accordance with Section 105.7.3.~~

1206.3.2.4 Signage. ~~Approved signs shall be provided on doors or in locations adjacent to the entrances to capacitor energy storage system rooms and shall include the following or equivalent verbiage and information:~~

- ~~1. "CAPACITOR ENERGY STORAGE ROOM."~~
- ~~2. "THIS ROOM CONTAINS ENERGIZED ELECTRICAL CIRCUITS."~~
- ~~3. An identification of the type of capacitors present and the potential hazards associated with the capacitor type.~~

1206.3.4.3 Energy management system. ~~An approved energy management system shall be provided for monitoring and balancing capacitor voltages, currents and temperatures within the manufacturer's specifications. The system shall transmit an alarm signal to an approved location if potentially hazardous temperatures or other conditions such as short circuits, over voltage or under voltage are detected.~~

~~**1206.3.5.2 Smoke detection system.** An approved *automatic smoke detection system* shall be installed in rooms containing *capacitor energy storage systems* in accordance with Section 907.2.~~

~~**1206.3.5.4 Spill control and neutralization.** Where capacitors contain liquid electrolyte, *approved methods and materials* shall be provided for the control and neutralization of spills of electrolyte or other hazardous materials in areas containing capacitors as follows:~~

- ~~1. For capacitors with free-flowing electrolyte, the method and materials shall be capable of neutralizing a spill of the total capacity from the largest cell or block to a pH between 5.0 and 9.0.~~
- ~~2. For capacitors with immobilized electrolyte, the method and material shall be capable of neutralizing a spill of 3.0 percent of the capacity of the largest cell or block in the room to a pH between 5.0 and 9.0.~~

~~**1206.3.2.6.2 Means of egress.** *Capacitor energy storage systems* located outdoors shall be separated from any means of egress as required by the fire code official to ensure safe egress under fire conditions, but not less than 10 feet (3048 mm):~~

~~**Exception:** The *fire code official* is authorized to approve lesser separation distances if large-scale fire and fault condition testing conducted or witnessed and reported by an approved testing laboratory is provided showing that a fire involving the system will not adversely impact occupant egress.~~

~~**1206.3.6 Testing, maintenance and repair.** Capacitors and associated equipment and systems shall be tested and maintained in accordance with the manufacturer's instructions. Any capacitors or system components used to replace existing units shall be compatible with the capacitor charger, energy management systems, other capacitors, and other safety systems. Introducing different capacitor technologies into the capacitor energy storage system shall be treated as a new installation and require approval by the *fire code official* before the replacements are introduced into service.~~

~~**1206.3.2 Location and construction.** Rooms and areas containing capacitor energy storage systems shall be designed, located and constructed in accordance with Sections 1206.3.2 through 1206.3.2.5.~~

~~**1206.3.4 Capacitors and equipment.** The design and installation of *capacitor energy storage systems* and related equipment shall comply with Sections 1206.3.4.1 through 1206.3.4.5.~~

~~**1206.3.5 Fire-extinguishing and detection systems.** Fire-extinguishing and smoke detection systems shall be provided in *capacitor energy storage system* rooms in accordance with Sections 1206.3.5.1 through 1206.3.5.2.~~

Add new standard(s) follows

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy MA 02169-7471

76 - 16.:

Standard for the Fire Protection of Telecommunications Facilities

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook IL 60062

1974 -17:

Evaluation for Re-purposing Batteries

9540A-17:

Standard for Safety Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems

2018 International Building Code

**[F] TABLE 414.5.1
EXPLOSION CONTROL REQUIREMENTS^{a, h}**

MATERIAL	CLASS	EXPLOSION CONTROL METHODS	
		Barricade construction	Explosion (deflagration) venting or explosion (deflagration) prevention systems ^b
HAZARD CATEGORY			
Combustible dusts ^c	—	Not Required	Required
Cryogenic flammables	—	Not Required	Required
Explosives	Division 1.1	Required	Not Required
	Division 1.2	Required	Not Required
	Division 1.3	Not Required	Required
	Division 1.4	Not Required	Required
	Division 1.5	Required	Not Required
	Division 1.6	Required	Not Required
Flammable gas	Gaseous	Not Required	Required
	Liquefied	Not Required	Required
Flammable liquid	IA ^d	Not Required	Required
	IB ^e	Not Required	Required
Organic peroxides	U	Required	Not Permitted
	I	Required	Not Permitted
Oxidizer liquids and solids	4	Required	Not Permitted
Pyrophoric gas	—	Not Required	Required
Unstable (reactive)	4	Required	Not Permitted
	3 Detonable	Required	Not Permitted
	3 Nondetonable	Not Required	Required
Water-reactive liquids and solids	3	Not Required	Required
	2 ^g	Not Required	Required
SPECIAL USES			
Acetylene generator rooms	—	Not Required	Required
<u>Electrochemical energy storage systemsⁱ</u>	---	<u>Not Required</u>	<u>Required</u>
Grain processing	—	Not Required	Required
Liquefied petroleum gas-distribution facilities	—	Not Required	Required
Where explosion hazards exist ^f	Detonation	Required	Not Permitted
	Deflagration	Not Required	Required

- a. See Section 414.1.3.
- b. See the International Fire Code .
- c. As generated during manufacturing or processing.
- d. Storage or use.
- e. In open use or dispensing.
- f. Rooms containing dispensing and use of hazardous materials where an explosive environment can occur because of the characteristics or nature of the hazardous materials or as a result of the dispensing or use process.
- g. A method of explosion control shall be provided where Class 2 water-reactive materials can form potentially explosive mixtures.
- h. Explosion venting is not required for Group H-5 fabrication areas complying with Section 415.11.1 and the International Fire Code .
- i. Where explosion control is required in Section 1206.6 of the International Fire Code.

Reason: The addition of energy storage system (ESS) requirements into the 2018 code was an initial effort to address

safety hazards associated with the increased use of lithium-ion batteries, capacitors and other modern energy storage system (ESS) technologies for an expanded number of grid related energy storage applications. The new requirements were a huge step toward addressing modern ESS technologies and grid based applications. However as written the requirements made it difficult to apply appropriate safety requirements for different installations, each with their own risks and exposures. Case in point, a lead acid battery ESS installation in an unmanned rural telecommunications repeater doesn't present the same risks and exposures as a lithium-ion battery ESS installation in a mixed occupancy high rise in an urban area.

Since the 2018 ESS requirements were developed there has been a lot of work done by private and government stakeholders to enhance ESS installation requirements, including the initial drafting of the NFPA 855 Energy Storage System standard. The Fire Code Action Committee's ESS work group, which includes 45+ code officials, manufacturers, users and industry experts identified several areas in the 2018 code that needed to be addressed to provide requirements that better address the hazards and exposures associated with various types of ESS installations, technologies and operations.

This section rewrite retains many of the basic protection concepts in the 2018 code, but also provide customized requirements for different types of installations and different types of ESS technologies in use today. We chose to replace the section in its entirety, rather than trying to edit existing text. Explanations of some of the more significant changes are included below.

Mobile ESS operations, consisting of lithium-ion batteries on trailers or skids are being deployed to locations to provide a temporary source of power. An operational permit is required for the mobile operations.

Section 1206.1 includes general requirements for all ESS. No significant changes were made to the Construction Document and Hazard Mitigation Analysis requirements.

Section 1206.1.5 - The 2018 code allowed certain variances be allowed based on large scale fire and fault condition testing, but the criteria for conducting such testing was undefined. The UL 9540A Test Method was specifically developed to cover this testing.

Section 1206.1.6 - This section was developed to address fire events involving lithium-ion battery systems, since lithium-ion battery fires have the potential to re-ignite hours or even days after initial extinguishment by the fire department, who cannot remain on scene indefinitely until the fire damaged ESS is safely removed from the premises. The fire remediation requirements, similar to fire watch requirements, make the owner responsible for sending mitigation personnel to the scene take over the remediation process.

Section 1206.2 covers commissioning, decommissioning, maintenance and testing requirements, which are important considerations for providing a safe, code compliant installation.

Section 1206.3 covers the ESS equipment itself, and much of these requirements are unchanged from the 2018 code. New section on repairs, retrofits and replacements were added to address practices to be followed when systems need to be upgraded or serviced.

Section 1206.3.8 allows code officials to regulate installations of repurposed electric vehicle batteries that are converted for ESS use in buildings.

Section 1206.4 includes requirements that need to be met by all ESS installations, and much of these are unchanged from the 2018 requirements. The Walk-in units section, with associated definition, is new and recognizes that ISO type shipping containers are being used to house ESS in various outdoor and mobile applications.

Section 1206.5 describes ESS protection requirements that are only applicable for certain type of installations, such as indoor dedicated use ESS installations, outdoor ESS installations in remote locations, and rooftop installations. Section 1206.5 tells you how to provide a particular type of protection, and tables in Sections 1206.7 through 1206.10 tell you when this protection is required.

1206.5.2 The size and separation protection concept (formerly "arrays") was introduced in the 2018 code. The term array was confusing and has been replaced. A maximum ESS unit size of 50 KWh previously only applied to unlisted ESS, but now all ESS are required to be listed due to the significant fire event that can be produced by 50 KWh of some ESS technologies.

1206.5.3 MAQs amounts are essentially the same as 2018 values. Due to introductions of facilities such as dedicated use ESS (utility size) requirements, and exemptions for increases based on large scale fire testing, it is no longer necessary to reference Group H-2 occupancies.

1206.5.4 Elevation requirements are similar to those in the 2018 IFC, but now restrict below grade installations except in underground vaults or when specifically approved by the code official. This is due to concerns raised by the fire service about responding to ESS fires in below grade locations.

1206.5.5 The previous smoke detection requirements have been modified to allow radiant energy-sensing fire detection as an option.

1206.5.6 The fire suppression requirements in the 2018 code only allowed NFPA 13 systems to be provided to protect ESS, but it was difficult or impossible to determine required design density. These requirements have been updated to specify a minimum 0.3 gpm/ft.² design density, with options for lower densities based on large scale fire testing per UL 9540A. Also an option for providing alternate fire suppression systems has been added, provided they have successfully passed UL 9540A fire testing.

1206.5.7 A maximum enclosure size for walk-in units, corresponding to the largest ISO type containers used for these installations, was established to provide differentiation between a walk-in unit and an inside installation.

1206.5.9 Separation from outdoor means of egress pathways leading to a public way were in the 2018 code.

Section 1206.6 includes electrochemical ESS technology specific protection, in a new table format. Table 1206.6 identifies which technologies need technology specific protection, which may include exhaust ventilation, spill control and neutralization, explosion control, safety caps and thermal runaway.

Section 1206.6.4 (explosion control) addresses a potentially significant hazard. Lithium-ion battery systems and other electrochemical ESS technologies have the potential to rapidly build up potentially explosive atmospheres in the battery or electrochemical ESS room or enclosure under thermal runaway and other conditions which could result in a catastrophic fire and or explosion. To protect against these hazards explosion control in accordance with IFC Section 911 is required for certain battery technologies.

Section 1206.7 covers indoor locations, and identifies two types of indoor installations, dedicated use installations (typical of utility grid related facilities) and non-dedicated use installations (typical of ESS in mixed use buildings or incidental use areas of occupancies). Protection for each installation is commensurate with the related risk and exposures.

Similarly Section 1206.8 covers two types of outdoor installations, remote outdoor installations (more than 100 feet from exposures, and installations near exposures (<100 ft.) more typical of an urban environment.

Section 1206.9 covers two special installations, rooftop ESS and open parking garage ESS.

Section 1206.10 covers two types of mobile ESS installations/operations, charging and storage of the mobile ESS at its home facility when it is not deployed to an event or facility, and deployment of the mobile ESS for temporary energy storage applications, such as providing power at an electric vehicle event. Mobile ESS charging and storage locations are treated the same as a stationary indoor or outdoor installation in accordance with Section 1206.7 or 1206.8, but can include temporary electrical and fire suppression system connections. This provides an acceptable level of protection based on the exposures at the facility, and prevents parties from using an ESS on wheels as a permanent ESS with less than effective protection.

Section 1206.10 also includes requirements for deploying mobile ESS to a facility or event for providing up to 30 days of temporary power (with some exceptions). An operational permit is required for each mobile ESS deployment.

The proposal also eliminated references to providing ESS in incidental use areas. Modern load leveling and peak shaving ESS applications make the 10% floor area limitations of incidental use areas impractical for anticipated installations. However the additional protection in this section, including equivalent Section 1206.7.5 fire-resistance rated separations, should effectively mitigate hazards with providing ESS on floor areas greater than 10% of the total floor area.

To summarize this proposal, developed by a large industry and code official work group, more effectively protects ESS installations based on knowledge gained since last code cycle. It provides protection customized for the types of installations that are being deployed today, instead of using the "one size fits all" type of protection in the 2018 code.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Some of the requirements in this proposal have the potential to increase the cost of providing ESS installations. However some of the provisions in this proposal better address risks and owner/user needs in dedicated use (utility) buildings and outdoor remote installations, and will probably decrease the cost of those installations as compared to installations installed using the 2018 IFC requirements.

Analysis: A review of the standards proposed for inclusion in the code, UL 1974 -17, UL 9540A-17 and NFPA 76-16, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 105.6.14 Energy storage systems, mobile. An operational permit is required for stationary and mobile energy storage systems regulated by Section 1206.

1201.3 Mixed system installation. Where approved, the aggregate nameplate kWh energy of all energy storage systems in a fire area shall not exceed the maximum quantity specified for any of the energy systems in this chapter. Where required by the fire code official, a hazard mitigation analysis shall be provided and approved in accordance with Section 104.7.2 to evaluate any potential adverse interaction between the various energy systems and technologies.

1206.1 General. The provisions in this section are applicable to stationary and mobile electrical energy storage systems (ESS).

Exception: ESS in Group R-3 and R-4 occupancies shall comply with Section 1206.11.

1206.1.2 Permits. Permits shall be obtained for ESS as follows:

1. Construction permits shall be obtained for stationary ESS installations and for mobile ESS charging and storage installations covered by 1206.10.1. Permits shall be obtained in accordance with Sections 105.7.7.

2. Operational permits shall be obtained for stationary ESS installations and for mobile ESS deployment operations covered by Section 1206.10.3. Permits shall be obtained in accordance with Sections 105.6.14.

1206.1.2.1 Communication utilities. Operational permits shall not be required for lead acid and nickel cadmium battery systems at facilities under the exclusive control of communications utilities that comply with NFPA 76 and operate at less than 50 VAC and 60 VDC.

TABLE 1206.7

INDOOR ESS INSTALLATIONS

1206.5.4 Smoke and automatic fire detection ^{c, f}

NA = Not allowed.

a. See Section 1206.7.1.

b. See Section 1206.7.2.

c. Where approved by the fire code official, alarm signals are not required to be transmitted to a central station, proprietary or remote station service in accordance with NFPA 72, or a constantly attended location where local fire alarm annunciation is provided and trained personnel are always present.

d. Where approved by the fire code official, fire suppression systems are permitted to be omitted in dedicated use buildings located more than 100 feet (30.5 M) from buildings, lot lines, public ways, stored combustible materials, hazardous materials, high piled stock and other exposure hazards.

f. Lead-acid and nickel cadmium battery systems installed in Group U buildings and structures less than 1500 ft² (140 m²) under the exclusive control of communications utilities, and operating at less than 50 VAC and 60 VDC in accordance with NFPA 76 are not required to have an approved automatic smoke or fire detection system.

1206.8 Outdoor installations. Outdoor installations shall be in accordance with Sections 1206.8.1 through 1206.8.3. Exterior wall installations for individual ESS units not exceeding 20 kWh shall be in accordance with Section 1206.8.4.

1206.8.4 Exterior wall installations. ESS shall be permitted to be installed outdoors on exterior walls of buildings when all of the following conditions are met:

1. The maximum energy capacity of individual ESS units shall not exceed 20 kWh.

2. The ESS shall comply with applicable requirements in Section 1206.

3. The ESS shall be installed in accordance with the manufacturer's instructions and their listing.

4. Individual ESS units shall be separated from each other by at least three feet (914 mm).

5. The ESS shall be separated from doors, windows, operable openings into buildings, or HVAC inlets by at least five feet (1524 mm).

Exception: Where approved smaller separation distances in items 4 and 5 shall be permitted based on large scale fire testing complying with Section 1206.1.5.

1206.11 ESS in Group R-3 and R-4 Occupancies. ESS in Group R-3 and R-4 occupancies shall be installed and maintained in accordance with Sections 1206.11.1 through 1206.11.9. The temporary use of an owner or occupant's electric powered vehicle as an ESS shall be in accordance with Section 1206.4.10.

1206.11.1 Equipment listings. ESS shall be listed and labeled for residential use in accordance with UL 9540.

Exceptions:

1. Where approved, repurposed unlisted battery systems from electric vehicles are allowed to be installed outdoors or in detached dedicated cabinets located not less than 5 feet (1524 mm) from exterior walls, property lines and public ways.

2. ESS less than 1 kWh (3.6 megajoules).

1206.11.2 Installation. ESS shall be installed in accordance with the manufacturer's instructions and their listing.

1206.11.2.1 Spacing. Individual units shall be separated from each other by at least three feet of spacing unless smaller separation distances are documented to be adequate based on large scale fire testing complying with Section 1206.1.5.

1206.11.3 Location. ESS shall only be installed in the following locations:

1. Detached garages and detached accessory structures.

2. Attached garages separated from the dwelling unit living space and sleeping units in accordance with Section 406.3.2 of the International Building Code.

3. Outdoors on exterior walls located a minimum 3 ft. from doors and windows.

4. Utility closets and storage or utility spaces within dwelling units and sleeping units.

1206.11.4 Energy ratings. Individual ESS units shall have a maximum rating of 20 kWh. The aggregate rating structure shall not exceed:

1. 40 kWh within utility closets and storage or utility spaces.

2. 80 kWh in attached or detached garages and detached accessory structures.

3. 80 kWh on exterior walls.

4. 80 kWh outdoors on the ground.

1206.11.5 Electrical installation. ESS shall be installed in accordance with NFPA 70. Inverters shall be listed and labeled in accordance with UL 1741 or provided as part of the UL 9540 listing. Systems connected to the utility grid shall use inverters listed for utility interaction.

1206.11.6 Fire detection. Rooms and areas within dwellings units, sleeping units and attached garages in which ESS are installed shall be protected by smoke alarms in accordance with Section 907.2.10. A heat detector listed and interconnected to the smoke alarms shall be installed in locations within dwelling units, sleeping units and attached garages where smoke alarms cannot be installed based on their listing.

1206.11.7 Protection from impact. Stationary storage battery systems installed in a location subject to vehicle damage shall be protected by approved barriers. Appliances in garages shall also be installed in accordance with Section 304.3 of the International Mechanical Code.

1206.11.8 Ventilation. Indoor installations of ESS that include batteries that produce hydrogen or other flammable gases during charging shall be provided with ventilation in accordance with Section 1206.6.1.

1206.11.9 Toxic and highly toxic gas. ESS that have the potential to release toxic or highly toxic gas during charging, discharging and normal use conditions shall not be installed within Group R-3 or R-4 occupancies.

1206.11.10 Electric vehicle use. The temporary use of an owner or occupant's electric powered vehicle to power a dwelling unit or sleeping unit while parked in an attached or detached garage or outside shall comply with the vehicle manufacturer's instructions and NFPA 70.

Committee Reason: The proposal was approved as the provisions of the 2018 Section 1206 need refinement and does not offer the flexibility and understanding of the different types of installations in use such as standalone systems or systems within a high rise building. There are a series of modification that work to integrate concepts from other proposals within code change proposal F203-18.

- **Section 1201.3.** - The modification to Section 1201.3 of the 2018 IFC pulls all energy systems together to better determine what can be included in a fire area and appropriately requires the nameplate kWh to determine the size of the systems. This concept is found in code change proposal F190-18.
- **Sections 1206.1.2, 1206.1.2.1.** Section 1206.1.2 of the proposal was revised along with the addition of a new section 1206.1.2.1 allowing the exception from operational permits for the telecommunications utilities. As part of this revision the permit requirements proposed in 105.6.14 were broadened to both mobile and stationary ESS. This is consistent with F204-18 which was written with the intent to be integrated with the revised provisions in Section 1206. This is also appropriate since the telecommunication industry must comply with NFPA 76.
- **Table 1206.7.** This table was modified to include a footnote providing an exception for lead acid and nickel cadmium installations for the communication utilities from smoke and automatic fire detection due to the good safety history and nature of the installations. This modification originates in F208-18 and due to the nature of the revisions to Section 1206 was better addressed in the new format of F203-18.
- **Section 1206.8.4.** The addition of Section 1206.8.4 and associated revisions to proposed Section 1206.8 recognize wall mounted ESS. These provisions were originally proposed in F210-18 and were intended to be integrated into the rewrite of Section 1206.
- **Section 1206.11.** The addition of Section 1206.11 recognizes the use of ESS in a residential setting and provides appropriate requirements for the fire code official. These provisions were originally proposed in code change proposal F211-18 and were intended to be integrated into the rewrite of Section 1206. Note that as part of this modification Section 1206.1 was revised to add a new exception for Group R-3 and R-4 occupancies that comply with new section 1206.11. (Vote: 12-1)

Assembly Action:

None

F203-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Charles Foster, representing Energy Storage Association (cfoster20187@yahoo.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

1201.1 Scope. The provisions of this chapter shall apply to the installation, operation, maintenance, repair, retrofitting, testing, commissioning and decommissioning of energy systems used for generating or storing energy. It shall not apply to equipment associated with the generation, control, transformation, transmission, or distribution of energy installations that is under the exclusive control of an electric utility or lawfully designated agency, provided that the ESS under the exclusive control of such electric utility or lawfully designated agent provides an equivalent level of safety as required by Section 1206.

Commenter's Reason: The intent of the proposed change is to ensure that all ESS systems enjoy the same level of safety, irrespective of the base code governing its installation.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
No cost impact as the proposal simply clarifies the existing scope without adding or subtracting from it.

Public Comment 2:

Proponent: Charles Foster, representing Energy Storage Association (cfoster20187@yahoo.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

1206.5.1 Size and separation. Electrochemical ESS shall be segregated into groups not exceeding ~~50-250~~ 100-900 KWh (~~180-900~~ Mega joules). Each group shall be separated a minimum three feet (914 mm) from other groups and from walls in the storage room or area. The storage arrangements shall comply with Chapter 10.

Exceptions:

1. Lead acid and nickel cadmium battery systems in facilities under the exclusive control of communications utilities and operating at less than 50 VAC and 60 VDC in accordance with NFPA 76.
2. The fire code official is authorized to approve larger capacities or smaller separation distances based on large scale fire testing complying with Section 1206.1.5.

Commenter's Reason: The reduction from 250 to 50 kWh is burdensome to the industry. ESA appreciates the concern for safety but it is unaware of any actual fire that was either initiated or made worse by virtue of the fact that a 250 kWh group was installed vs a 50 kWh group.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. A limitation of 50 kWhs will increase the cost of construction by reducing the amount of ESS that can be installed per sq ft.

Public Comment 3:

Proponent: Charles Foster, representing Energy Storage Association (cfoster20187@yahoo.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

**TABLE 1206.5
MAXIMUM ALLOWABLE QUANTITIES OF ELECTROCHEMICAL ESS**

TECHNOLOGY	MAXIMUM ALLOWABLE QUANTITIES ^a
STORAGE BATTERIES	
Lead acid, all types	Unlimited
Nickel cadmium (Ni-Cd)	Unlimited
Nickel metal hydride (Ni-MH)	Unlimited
Lithium-ion	600 KWh <u>1,000 kWh</u>
Flow batteries ^b	600 KWh
Other battery technologies	200 KWh
CAPACITORS	
All types	20 KWh
OTHER ELECTROCHEMICAL ESS	
All types	20 KWh

a. For electrochemical ESS units rated in Amp-Hours, KWh shall equal rated voltage times the Amp-hour rating divided by 1000

b. Shall include vanadium, zinc-bromine, polysulfide-bromide, and other flowing electrolyte type technologies

Commenter's Reason: Based on industry experience, ESA does not believe the risk of fire increases significantly by allowing the aggregation of 1,000 kWh groups of batteries vis-à-vis 600 kWh groups.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. Allowing the aggregation of 1,000 kWh groupings would make the cost of ESS more economical.

Public Comment 4:

Proponent: Charles Foster, representing Energy Storage Association (cfoster20187@yahoo.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

1206.8.1 Remote outdoor installations. For the purpose of Table 1206.8, remote outdoor installations include ESS located more than ~~100-50~~ feet (~~30-15.5-25~~ M) from buildings, lot lines, public ways, stored combustible materials, hazardous materials, high piled stock and other exposure hazards.

Commenter's Reason: ESA members have growing experience with ESS systems and they are unconvinced of any additional safety benefit that would accrue by locating an ESS container 100 ft from exposures rather than 50 ft although the additional expense is significant.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction Doubling the distance from 50 to 100 ft erodes the cost effectiveness of ESS.

Public Comment 5:

Proponent: Charles Foster, representing Energy Storage Association (cfoster20187@yahoo.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

ENERGY STORAGE SYSTEM, MOBILE.

~~An energy storage system capable of being moved and utilized for temporary energy storage applications, and not installed as fixed or stationary electrical equipment. The system can include integral wheels for transportation, or be loaded on a trailer and unloaded for charging, storage and deployment.~~deployed in a deployable enclosure or mounted on a rail car, wheeled trailer, semi-trailer, vehicle or hand-cart, used for microgrid, grid-interactive usage, or other uses such as portable telecommunication facilities. Deployments are considered temporary where used for durations of less than 30 days.

Commenter's Reason: adds clarity for mobile ESS

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
No cost impact as it adds no new requirements and is simply a clarification of intent.

Public Comment 6:

Proponent: Charles Foster, representing Energy Storage Association (cfoster20187@yahoo.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

1206.6.1 Exhaust-ventilationVentilation. Where required by Table 1206.6 or elsewhere in this code, ~~exhaust~~ ventilation of rooms, areas, and walk-in units containing electrochemical ESS shall be provided in accordance with the International Mechanical Code and Section 1206.6.1.1 or 1206.6.1.2.

Commenter's Reason: An HVAC unit on a container acts as both a ventilation system, as well as an exhaust system. Separating the functions of ventilation needed during normal use, and exhaust needed during emergency events is not practical in such cases - it's one and the same system.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Editorial only - adds no new requirements

Public Comment 7:

Proponent: Charles Foster, representing Energy Storage Association (cfoster20187@yahoo.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

~~**1206.5.7 Vegetation control.** Areas within 10 feet (3 m) on each side of outdoor ESS shall be cleared of combustible vegetation and other combustible growth. Single specimens of trees, shrubbery, or cultivated ground cover such as green grass, ivy, succulents, or similar plants used as ground covers shall be permitted to be exempt provided that they do not form a means of readily transmitting fire.~~

Commenter's Reason: Walk-in units are constructed of non-combustible materials. This provision seems to be a reach - is it directing the operator to cut the grass around the walk-in unit? as it is currently worded with the allowance of single species trees, etc., it is not clear what is being required.

This provision seems like good practice but would be difficult to enforce.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There is no impact - grass should be cut anyway -

Public Comment 8:

Proponent: Charles Foster, representing Energy Storage Association (cfoster20187@yahoo.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

ENERGY STORAGE SYSTEM (ESS). One or more devices, assembled together, not used to propel rail or wheeled vehicles, capable of storing energy in order to supply electrical energy at a future time.

Commenter's Reason: This proposal clarifies that the standard is not intended to apply to ESS used for transportation.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal only clarifies the intent. It adds no new requirements and thus does not affect cost.

Public Comment 9:

Proponent: Charles Foster, representing Energy Storage Association (cfoster20187@yahoo.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

1206.5.6 Maximum enclosure size. Outdoor walk-in units housing ESS shall not exceed 53 feet by 8 feet by 9.5 feet high. ~~Walk-in units that exceed these dimensions, not including bolt-on HVAC and related equipment, as approved.~~ Outdoor walk-in units exceeding these limitations shall be considered indoor installations and comply with the requirements in Section 1206.7.

Commenter's Reason: The walk-in enclosure size requirement in this provision was a good faith effort to bound the maximum size but was not based on specific fire safety concerns. Some ESA containers currently in production slightly exceed the maximum size allowed. This proposal would provide flexibility.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. Increased flexibility will make ESS installations more economic.

Public Comment 10:

Proponent: Charles Foster, representing Energy Storage Association (cfoster20187@yahoo.com) requests As Modified

by This Public Comment.

Modify as follows:

2018 International Fire Code

1206.9.3 Clearance to exposures. ESS located on rooftops and in open parking garages shall be separated by a minimum ten feet (3048 mm) from the following exposures:

1. Buildings, except the building on which rooftop ESS is mounted
2. Any portion of the building on which a rooftop system is mounted that is elevated above the rooftop on which the system is installed
3. Lot lines
4. Public ways
5. Stored combustible materials
- ~~6. Locations where motor vehicles can be parked~~
7. Hazardous materials
8. Other exposure hazards

Exceptions:

1. Clearances are permitted to be reduced to 3 feet (914 mm) where a 1-hour free standing fire barrier, suitable for exterior use, and extending 5 feet (1.5 m) above and extending 5 feet (1.5 m) beyond the physical boundary of the ESS installation is provided to protect the exposure.
2. Clearances are permitted to be reduced to 3 feet (914.4 mm) where a weatherproof enclosure constructed of noncombustible materials is provided over the ESS and it has been demonstrated that a fire within the enclosure will not ignite combustible materials outside the enclosure based on large scale fire testing complying with Section 1206.1.5.

Commenter's Reason: 10 ft is unwarranted. NFPA 13 Handbook states: Even though there is gasoline in the automobiles, the loss history for these occupancies demonstrates that the fires in standard-type garages are typically limited to one car and do not pose an excessive challenge for the sprinkler system to control. Section 4.4.4.5 of NFPA 13 only requires 5 ft separation (through means of a fence) from parked vehicles).

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This proposal would facilitate ESS installations, driving down cost without increasing risks,

Public Comment 11:

Proponent: Richard Kluge, representing Alliance for Telecommunications Industry Solutions (richard.kluge@ericsson.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

**TABLE 1206.6
ELECTROCHEMICAL ESS TECHNOLOGY SPECIFIC REQUIREMENTS**

COMPLIANCE REQUIRED ^b	BATTERY TECHNOLOGY				OTHER ESS AND BATTERY TECHNOLOGIES ^b	CAPACITOR ESS ^b
	Lead-acid	Ni-Cad and Ni-MH	Lithium-ion	Flow		
1206.6.1 Exhaust ventilation	Yes	Yes	No	Yes	Yes	Yes
1206.6.2 Spill control and neutralization	Yes ^c	Yes ^c	No	Yes	Yes	Yes
1206.6.3Explosion control	Yes ^a	Yes ^a	Yes	No	Yes	Yes
1206.6.4 Safety caps	Yes	Yes	No	No	Yes	Yes
1206.6.5 Thermal runaway	Yes ^d	Yes	Yes ^e	No	Yes ^e	Yes

a. Not required for lead-acid and nickel cadmium batteries at facilities under the exclusive control of communications utilities that comply with NFPA 76 and operate at less than 50 VAC and 60 VDC.

b. Protection shall be provided unless documentation acceptable to the fire code official is provided in accordance with Section 104.7.2 that provides justification why the protection is not necessary based on the technology used.

c. Applicable to vented (i.e. flooded) type nickel cadmium and lead acid batteries.

d. Not required for vented (i.e. flooded) type lead acid batteries.

e. The thermal runaway protection is permitted to be part of a battery management system that has been evaluated with the battery as part of the evaluation to UL 1973.

Commenter's Reason: Thermal runaway protection is not necessary for flooded lead-acid batteries. This has been consistent in the codes for many cycles, both in the IFC and NFPA 1. The public input to section 1206 made considerable changes and lost this important distinction when developing the table. Adding the footnote will make the table technically correct and reflective of the true risks of each battery chemistry.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The change will clarify that certain battery constructions are not prone to thermal runaway and do not need external thermal runaway controls.

Public Comment 12:

Proponent: Richard Kluge, representing Alliance for Telecommunications Industry Solutions (richard.kluge@ericsson.com)requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

1206.2 Commissioning, decommissioning, operation and maintenance. Commissioning, decommissioning, operation and maintenance shall be conducted in accordance with this section.

Exception: This section shall not apply to lead acid and nickel cadmium battery systems at facilities under the exclusive control of communications utilities that comply with NFPA 76 and operate at less than 50 VAC and 60 VDC. However a decommissioning plan shall be provided and maintained where required by the fire code official.

1206.2.1 Commissioning. Commissioning of newly installed ESS, and existing ESS that have been retrofitted, replaced or previously decommissioned and are returning to service shall be conducted prior to the ESS being placed in service in accordance with a commissioning plan that has been approved prior to initiating commissioning. The commissioning plan shall include the following:

1. A narrative description of the activities that will be accomplished during each phase of commissioning including the personnel intended to accomplish each of the activities.
2. A listing of the specific ESS and associated components, controls and safety related devices to be tested, a description of the tests to be performed and the functions to be tested.
3. Conditions under which all testing will be performed, which are representative of the conditions during normal operation of the system.
4. Documentation of the owner's project requirements and the basis of design necessary to understand the installation and operation of the ESS.
5. Verification that required equipment and systems are installed in accordance with the approved plans and specifications.
6. Integrated testing for all fire and safety systems.
7. Testing for any required thermal management, ventilation or exhaust systems associated with the ESS installation.
8. Preparation and delivery of operation and maintenance documentation.
9. Training of facility operating and maintenance staff.
10. Identification and documentation of the requirements for maintaining system performance to meet the original design intent during the operation phase.
11. Identification and documentation of personnel who are qualified to service, maintain and decommission the ESS, and respond to incidents involving the ESS, including documentation that such service has been contracted for.
12. A decommissioning plan for removing the ESS from service, and from the facility in which it is located. The plan shall include details on providing a safe, orderly shutdown of energy storage and safety systems with notification to the code officials prior to the actual decommissioning of the system. The decommissioning plan shall include contingencies for removing an intact operational ESS from service, and for removing an ESS from service that has been damaged by a fire or other event.

~~**Exception:** Commissioning shall not be required for lead acid and nickel cadmium battery systems at facilities under the exclusive control of communications utilities that comply with NFPA 76 and operate at less than 50 VAC and 60 VDC. However a decommissioning plan shall be provided and maintained where when required by the fire code official.~~

Commenter's Reason: The exception language for telecommunications installations of lead-acid or nickel-cadmium batteries complying with NFPA 76 is relocated from Section 1206.2 to 1206.2.1 Since the exception addresses both commissioning and decommissioning, this is a better location. Since telecommunications installations with lead-acid or nickel-cadmium batteries complying with NFPA 76 are exempt from commissioning process and most decommissioning processes via the code, there is no reason to require compliance to the operation and maintenance aspects. These installations have been in wide use for many decades and have had an exceptional safety record without the additional code governance.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Relocated text will not affect cost of construction.

Public Comment 13:

Proponent: Richard Kluge, representing Alliance for Telecommunications Industry Solutions (richard.kluge@ericsson.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

**TABLE 1206.6
ELECTROCHEMICAL ESS TECHNOLOGY SPECIFIC REQUIREMENTS**

COMPLIANCE REQUIRED ^b	BATTERY TECHNOLOGY				OTHER ESS AND BATTERY TECHNOLOGIES ^b	CAPACITOR ESS ^b
	Lead-acid	Ni-Cad and Ni-MH	Lithium-ion	Flow		
1206.6.1 Exhaust ventilation	Yes	Yes	No	Yes	Yes	Yes
1206.6.2 Spill control and neutralization	Yes ^c	Yes ^c	No	Yes	Yes	Yes
1206.6.3Explosion control	Yes ^a	Yes ^a	Yes	No	Yes	Yes
1206.6.4 Safety caps	Yes	Yes	No	No	Yes	Yes
1206.6.5 Thermal runaway	Yes	Yes ^d	Yes de	No	Yes de	Yes

a. Not required for lead-acid and nickel cadmium batteries at facilities under the exclusive control of communications utilities that comply with NFPA 76 and operate at less than 50 VAC and 60 VDC.

b. Protection shall be provided unless documentation acceptable to the fire code official is provided in accordance with Section 104.7.2 that provides justification why the protection is not necessary based on the technology used.

c. Applicable to vented (i.e. flooded) type nickel cadmium and lead acid batteries.

d. Not required for vented (i.e. flooded) type nickel cadmium batteries.

e. The thermal runaway protection is permitted to be part of a battery management system that has been evaluated with the battery as part of the evaluation to UL 1973.

Commenter's Reason: Thermal runaway protection is not necessary for flooded nickel-cadmium batteries. This has been consistent in the codes for many cycles, both in the IFC and NFPA 1. The public input to section 1206 made considerable changes and lost this important distinction when developing the table. Adding the footnote will make the table technically correct and reflective of the true risks of each battery chemistry.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The change will not impact the cost of construction.

Public Comment 14:

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org)requests As Modified by This Public Comment.

Further modify as follows:

2018 International Fire Code

1206.11.10 Electric vehicle use. The temporary use of an owner or occupant's electric ~~powered vehicle to vehicle to~~ power a dwelling unit or sleeping unit while parked in an attached or detached garage or outside shall comply with ~~the vehicle manufacturer's instructions and~~ NFPA 70.

Commenter's Reason: This proposal makes editorial changes to Section 1206.11.10 regarding electric vehicle use. It will not be possible for a code official to know which electric vehicle will be parked at the building, so it will be impossible to enforce language on complying with vehicle manufacturer instructions (there are over 50 models of EVs available on the market today).

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
As a proposal for a table and a section that is editorial in nature, this will have no impact on construction costs.

Public Comment 15:

Proponent: Philip Undercuffler, representing OutBack Power Technologies (pundercuffler@outbackpower.com)requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

1206.3.7 Retrofits. Retrofitting of an existing ESS shall comply with the following:

1. A construction permit shall be obtained in accordance with Section 105.7.7.
2. New batteries, battery modules, capacitors and similar ESS components shall be listed ~~in accordance with UL 1973.~~
3. Battery management and other monitoring systems shall be connected and installed in accordance with the manufacturer s instructions.
4. The overall installation shall continue to comply with UL 9540 listing requirements, where applicable.
5. Systems that have been retrofitted shall be commissioned in accordance with Section 1206.2.1.
6. Retrofits shall be documented in the service records log.

Commenter's Reason: UL 1973 does not cover all ESS components, nor are all batteries listed to UL 1973; UL 1989 is the relevant standard for VRLA batteries, while flow batteries and other ESS technologies are evaluated to other standards. Any language that would allow only UL 1973 as the only option for retrofit would be too restrictive and eliminate any lead acid battery retrofit, without technical justification or benefit. The key requirement should be that any retrofit of an ESS unit must be with listed product.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposed revision would clarify that any retrofit must use listed equipment, but allows the NRTLs and the evaluation process to determine the appropriate standard for each specific piece of equipment. Not all ESS components are within the scope of UL 1973 (although without this modification, forcing equipment to be listed to inappropriate standards would increase the cost)

Public Comment 16:

Proponent: Philip Undercuffler, representing OutBack Power Technologies (pundercuffler@outbackpower.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

1206.5.1 Size and separation. Electrochemical ESS shall be segregated into groups not exceeding 50 KWh (180 Mega joules). Each group shall be separated a minimum three feet (914 mm) from other groups and from walls in the storage room or area. The storage arrangements shall comply with Chapter 10.

Exceptions:

1. Lead acid and nickel cadmium battery systems in facilities under the exclusive control of communications utilities and operating at less than 50 VAC and 60 VDC in accordance with NFPA 76.
2. The fire code official is authorized to approve larger capacities or smaller separation distances based on large scale fire testing complying with Section 1206.1.5.
3. Separation for lead acid battery systems shall not be required where the battery cells have flame retardant casings.

Commenter's Reason: There is no special hazard or risk requiring three foot minimum separation between groups or to walls with lead acid batteries, as was recognized both in Table 1206.5 and with the 2018 and prior versions of the IFC. Table 1206.5 allows an unlimited maximum allowable quantity for lead acid batteries regardless of voltage or application, as the table correctly recognizes that this technology does not present a special fire risk or hazard that has not already been addressed. This recognition is based on a long successful history of safe and reliable operation of hundreds of thousands of systems in a wide range of applications across the US and the world. Lead acid batteries may have their issues, which have been addressed elsewhere within this Code, but they do not have a history of propagating flame from cell to cell or otherwise presenting any hazard that needs mitigation through maintaining special clearances. The proposed requirement for flame retardant casings as a qualification for this exception provides additional assurance to address any unforeseen concerns.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposed revision would maintain similar spacing and separation requirements for lead acid batteries as exists in the 2018 IFC. Without this proposed change, construction costs for lead acid battery systems would increase substantially.

Public Comment 17:

Proponent: Philip Undercuffler, representing OutBack Power Technologies (pundercuffler@outbackpower.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

1206.11.1 Equipment listings. ESS shall be listed and labeled ~~for residential use~~ in accordance with UL 9540. ESS listed and labeled solely for utility or commercial use shall not be used for residential applications.

Exceptions:

1. Where approved, repurposed unlisted battery systems from electric vehicles are allowed to be installed outdoors or in detached dedicated cabinets located not less than 5 feet (1524 mm) from exterior walls, property lines and public ways.
2. ESS less than 1 kWh (3.6 megajoules).

Commenter's Reason: Per UL 9540 40.4, energy storage systems are only marked "for residential use" when they are limited to installations only in those locations, in other words it is a restrictive marking. Some UL 9540 listed energy storage systems may have no such restrictions, and can safely be used in any application – residential, commercial, or other. Their use within the capabilities of their certification should not be artificially limited. The proposed modification would achieve the intended result, which is that products whose listing evaluation has determined that they are restricted to specific applications which are not residential may not be used in residential applications.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposed revision will not change the listing requirements for ESS -- all ESS must be listed to UL9540. It simply addresses a misunderstanding in the use of the listing mark as applies to products listed for limited applications, if a product is not marked with qualifiers it can be used in the broadest range of applications.

Public Comment 18:

Proponent: Nicholas Frank, Nexceris, representing Nexceris (n.frank@nexceris.com) requests As Submitted.

Commenter's Reason: Within IFC 1206 in section 1206.2.10.1 there is a requirement that a battery system is UL 9540 listed. However, there is no mention of UL 9540A which is a test method that provides valuable test data on the failure mechanisms of a given lithium-ion energy storage system (ESS). This is key information for authorities having jurisdiction (AHJ) when permitting lithium-ion systems. It helps them understand the associated hazards of the systems and the magnitude of failure. This is especially important given the current state of the industry where there is a large range in quality of lithium-ion cells and systems. Some systems are great at dealing with failures and others not designed to deal with failures at all. This information should be readily available during permitting.

It should be mentioned that NFPA 855 requires the UL 9540A test method and incorporating this into IFC 1206 would increase the harmonization of the energy storage system installation standards used in industry.

UL 9540A requires that a battery is overheated until failure at 5°C/minute. During heating, two distinct points of measurement are required at the off-gas event (cell venting) and thermal runaway in Section 6.2.5 and Section 6.2.6, respectively. When the UL 9540A report shows that the off-gas event occurs before thermal runaway, IFC 1206 should require off-gas monitoring. This increases the safety of the lithium-ion battery system by providing a redundant perspective on battery health, an early warning of failure, and the option to provide preventative action of thermal runaway. World class standards organizations have validated these concepts. For the IFC to miss this opportunity would be a disservice to first responders.

To summarize the intent of this public comment, it is to recognize UL 9540A in IFC 1206 as a test method for evaluating the failure mechanisms of lithium-ion battery systems. In addition to recognizing UL 9540A, the IFC to should require off-gas monitoring if the UL 9540A test report states that off-gas events occur prior to thermal runaway.

Bibliography: UL 9540A Test Method: <https://industries.ul.com/energy/battery-and-energy-storage-technology/ul-9540a-test-method>

Published paper on Off-gas Monitoring: Hill, Davion; Gully, Benjamin; Agarwal, Arun; Nourai, Ali; Thrun, Lora; Swartz, Scott; Koslowski, Mark; Cummings, Steve; Butkowski, John; Moore, Brad. (2013). Detection of off gassing from Li-ion batteries. 1-7. 10.1109/EnergyTech.2013.6645307.

Stages of a battery failure explanation: <https://liiontamer.com/lithium-ion-battery-failure-stages/>

Prevention of thermal runaway: <https://www.youtube.com/watch?v=Cx03a8GvrXA>

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction UL 9540A is a test method which will need to be performed by an external laboratory.

Off-gas monitoring adds less than 1% of the total system cost.

Public Comment 19:

Proponent: CP28 Administration.

Commenter's Reason: The administration of ICC Council Policy 28 (CP28) is not taking a position on this code change. This public comment is being submitted to bring a procedural requirement to the attention of the ICC voting membership. In accordance with Section 3.6.3.1.1 of ICC Council Policy 28 (partially reproduced below), the new referenced standard UL 1974 -17:Evaluation for Re-purposing Batteries, must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

(CP28) 3.6.3.1.1 Proposed New Standards. In order for a new standard to be considered for reference by the Code, such standard shall be submitted in at least a consensus draft form in accordance with Section 3.4. If the proposed new standard is not submitted in at least consensus draft form, the code change proposal shall be considered incomplete and shall not be processed. The code change proposal shall be considered at the Committee Action Hearing by the applicable code development committee responsible for the corresponding proposed changes to the code text. If the committee action at the Committee Action Hearing is either As Submitted or As Modified and the standard is not completed, the code change proposal shall automatically be placed on the Public Comment Agenda with the recommendation stating that in order for the public comment to be considered, the new standard shall be completed and readily available prior to the Public Comment Hearing

F203-18

F209-18

IFC: 1206.2.11.5

Proposed Change as Submitted

Proponent: Jeffrey Betz, AT&T Corporation, representing AT&T Corporation (jbetz@att.com)

2018 International Fire Code

Revise as follows

1206.2.11.5 Spill control and neutralization. Where required by Section 1206.2.12, approved methods and materials shall be provided for the control and neutralization of spills of electrolyte or other hazardous materials in areas containing stationary storage batteries as follows:

1. For batteries with free-flowing electrolyte, ~~the a method and materials shall be capable of neutralizing of:~~
 - 1.1. Providing spill control to prevent the flow of electrolyte to adjoining areas when rooms or areas are used for the storage of free-flowing electrolyte in individual vessels having a capacity of more than 55 gallons (208 L), or in which the aggregate capacity of multiple vessels exceeds 1,000 gallons (3785 L)
 - 1.2. Neutralizing a spill of the total capacity from the largest individual cell or block to a pH between 5.0 and 9.0.
2. For batteries with immobilized electrolyte, the method and material shall be capable of neutralizing a spill of 3.0 percent of the capacity of the largest cell or block in the room to a pH between 5.0 and 9.0.

Reason: This proposal incorporates and clarifies the code industry's basic quantity requirements for spill control. It further provides the specific requirements of this chapter (12 formerly Section 608) related to vessel and aggregate thresholds currently addressed in the 2015 IFC Section 608 Commentary (2018 IFC 1206.2.11.5 Spill containment and neutralization) and 2015 IFC Code and Commentary Chapter 50 Hazardous Materials Section 5004.2.1 Spill control for hazardous materials liquids.

2015 IFC Commentary - Section 608.5

Batteries that contain a free-flowing liquid electrolyte pose the same containment problems as any other corrosive liquid hazardous material, but the containment and neutralization provisions in this section are performance based and neither specifically require spill control in the form of containment nor a specific method of neutralization. The quantity of neutralization material required to be available would be greater for these less-viscous electrolytes, however, because of their mobility and the rapidity with which they can spread and the potential scope of the spread. See the commentary to Section 5004.2.1 for further discussion of spill control strategies. The exception recognizes the reduced spill control hazard of sealed batteries that contain a higher-viscosity electrolyte.

2015 IFC Commentary - Chapter 50 Hazardous Materials 5004.2.1 Spill control for hazardous material liquids

The requirement for spill control in a room or area is based on two items. The first is that the storage container(s) have a capacity of more than 55 gallons (208 L). The second is that the aggregate capacity of multiple vessels be more than 1,000 gallons (3785 L). The area, once determined to require spill control, must be protected so that the containment area will handle the release from the largest container in the area.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. No additional cost impact, as this clarifies intent of current code.

F209-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved because the volume allowed by this proposal without spill control and secondary containment is excessive. This would change the number from 50 gallons to 1000 gallons. (Vote: 14-0)

Assembly Action:

None

F209-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org); Robert Davidson, Davidson Code Concepts, LLC, representing FCAC (rjd@davidsoncodeconcepts.com); Richard Kluge (richard.kluge@ericsson.com); Jeffrey Betz (jbetz@att.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Fire Code

1206.2.11.5 Spill control and neutralization. Where required by Section 1206.2.12, approved methods and materials shall be provided for the control and neutralization of spills of electrolyte or other hazardous materials in areas containing stationary storage batteries as follows:

1. For batteries with free-flowing electrolyte, the method and materials shall be capable of neutralizing a spill of the total capacity from the largest cell or block to a pH between 5.0 and 9.0.
2. For batteries with immobilized electrolyte, the method and material shall be capable of neutralizing a spill of 3.0 percent of the capacity of the largest cell or block in the room to a pH between 5.0 and 9.0.

1206.2.11.5.1 Communication Utilities. The requirements of Section 1206.2.11.5 shall only apply when the aggregate capacity of multiple vessels exceeds 1,000 gallons (3785 L) for lead acid and nickel cadmium battery systems operating at less than 50 VAC and 60 VDC that are located at facilities under the exclusive control of communications utilities and those facilities comply with NFPA 76 in addition to applicable requirements of this code.

Commenter's Reason: This public comment incorporates and clarifies the code industry's basic quantity requirements for spill control as it applies to telecommunication utility facilities utilizing lead acid or nickel cadmium batteries. It provides a trigger for when to require spill control measures that corresponds to what is required for high hazard occupancies. In the IFC, you typically must be a high hazard occupancy before there is a requirement for spill control, then you must have individual containers exceeding 55 gallons in capacity or an aggregate amount exceeding 1,000 gallons.

5004.2.2 Secondary containment for hazardous material liquids and solids. *Where required by Table 5004.2.2 buildings, rooms or areas used for the storage of hazardous materials liquids or solids shall be provided with secondary containment in accordance with this section where the capacity of an individual vessel or the aggregate capacity of multiple vessels exceeds both of the following:*

1. *Liquids: Capacity of an individual vessel exceeds 55 gallons (208 L) or the aggregate capacity of multiple vessels exceeds 1,000 gallons (3785 L).*

Since the lead-acid or nickel cadmium batteries regulated by this portion of the code do not exceed 50 gallons of electrolytes individually the 'exceeding 55 gallons' trigger would not come in to play, so only the '1,000-gallon aggregate' threshold is being brought over.

The committee's reason for denial was:

"This proposal was disapproved because the volume allowed by this proposal without spill control and secondary containment is excessive. This would change the number from 50 gallons to 1000 gallons."

This would not be accurate, though the trigger would now be a 1000 gallon aggregate, the change is targeted only to telecommunication utility facilities wherein individual batteries do not exceed 50 gallons. So if a spill was to occur due to the failure of a battery casing the amount would be 50 gallons. You would need the simultaneous failure of 20 batteries to

reach 1000 gallons, an unlikely event. It's important to acknowledge that even if this was a high hazard occupancy, 50 gallon containers would not trigger spill containment until an aggregate of 1000 gallons was reached. In essence, the IFC already has determined the amounts as acceptable.

The suggested language has been restructured to leave the existing language as is and to instead add a section advising when to apply the spill control requirements to a telecommunications utility facility. This would apply only to spaces dedicated to the telecommunications activities, it would not apply in a mixed use occupancy.

This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
No additional cost impact, as this clarifies intent of current code.

F209-18

F212-18

IFC: Chapter 22, 202 (New)

Proposed Change as Submitted

Proponent: Ellie Klausbruckner, representing Klausbruckner & Associates, Inc. (ek@klausbruckner.com); Kevin Scott, representing KH Scott & Associates LLC (khscottassoc@gmail.com)

2018 International Fire Code

Revise as follows

CHAPTER ~~22~~ COMBUSTIBLE DUST-PRODUCING OPERATIONS

~~SECTION 2201 GENERAL~~

Delete without substitution

~~**2201.1 Scope.** The equipment, processes and operations involving dust explosion hazards shall comply with the provisions of this code and NFPA 652.~~

~~**2201.2 Permits.** Permits shall be required for *combustible dust* producing operations as set forth in Section 105.6.~~

~~SECTION 2202 DEFINITION~~

~~**2202.1 Definition.** The following term is defined in Chapter 2:
COMBUSTIBLE DUST.~~

~~SECTION 2203 PRECAUTIONS~~

~~**2203.1 Owner responsibility.** The owner or operator of a facility with operations that manufacture, process, blend, convey, repackage, generate or handle potentially combustible dust or combustible particulate solids shall be responsible for compliance with the provisions of this code and NFPA 652.652.~~

~~**2203.2 Dust hazard analysis (DHA).** The requirements of NFPA 652 apply to all new and existing facilities and operations with combustible dust hazard. Existing facilities shall have a dust hazard analysis (DHA) completed in accordance with Section 7.1.2 of NFPA 652.652.
The fire code official shall be authorized to order a dust hazard analysis to occur sooner if a combustible dust hazard has been identified in a facility that has not previously performed an analysis.~~

~~**2203.3 Sources of ignition.** Smoking, the use of heating or other devices employing an open flame, or the use of spark-producing equipment is prohibited in areas where *combustible dust* is generated, stored, manufactured, processed or handled.~~

~~**2203.4 Housekeeping.** Accumulation of *combustible dust* shall be kept to a minimum in the interior of buildings. Accumulated *combustible dust* shall be collected by vacuum cleaning or other means that will not place *combustible dust* into suspension in air. Forced air or similar methods shall not be used to remove dust from surfaces.~~

~~SECTION 2204 ADDITIONAL REQUIREMENTS~~

~~**2204.1 Specific hazards standards.** The industry or commodity specific codes and standards listed in Table 2204.1 shall be complied with based on the identification and evaluation of the specific fire and deflagration hazards that exist at a facility.~~

**TABLE 2204.1
SPECIFIC HAZARDS STANDARDS**

STANDARD	SUBJECT
NFPA 61	Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities
NFPA 69	Standard on Explosion Prevention Systems
NFPA 70	National Electrical Code
NFPA 85	Boiler and Combustion System Hazards Code
NFPA 120	Standard for Fire Prevention and Control in Coal Mines
NFPA 484	Standard for Combustible Metals
NFPA 654	Standard for Prevention of Fire and Dust Explosions from the Manufacturing, Processing and Handling of Combustible Particulate Solids
NFPA 655	Standard for the Prevention of Sulfur Fires and Explosions
NFPA 664	Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities

Add new text as follows

2201.1 Scope. The equipment, processes and operations involving dust explosion hazards and use or handling of combustible dust shall comply with the provisions of this chapter

Exceptions:

1. In an unsprinklered building, dust production or use, including use-open and use-closed systems, where the quantity does not exceed 5 pounds (2.3 kg) or 0.7 cu ft. (0.019822 m³)
2. In a building equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, dust production or use, including use-open and use-closed systems, where the quantity does not exceed 10 pounds (4.5 kg) or 1.4 cu ft. (0.039644 m³)
3. Storage and use of consumer materials in Group B or R occupancies.
4. Storage and use of commercially packaged materials in Group M occupancies.
5. Materials displayed in original packaging in Group M occupancies and intended as building materials or for personal or household use.
6. Storage of sealed containers of combustible dust at facilities not associated with an operation that uses, handles or generates combustible dust.
7. Materials stored or used in farm buildings or similar occupancies intended for on-premises agricultural purposes.

2201.2 Permits. Permits shall be required for combustible dust-producing operations as set forth in Section 105.6.

2202 DEFINITIONS

2202.1 Definitions. The following terms are defined in Chapter 2:

Dust Collection System

Combustible Dust

2203 DUST EXPLOSION PREVENTION

2203.1 Critical Depth Layer.

The maximum dust layer on all surfaces, including but not limited to walls, ceilings, beams, equipment, furniture, pipes and ducts, shall not exceed the Critical Depth Layer specified in Table 2203.1. The critical depth layer depth is permitted to be adjusted for explosion hazard further evaluated in accordance with one of the following:

1. Section 6.1.1.3 of NFPA 654.
2. Section 4.2.2 of NFPA 664 for wood flour.

Accumulated combustible dust shall be collected by one of the methods listed in 2203.5.

**Table 2203.1
Critical Depth Layer**

Type of Dust	Critical Depth Layer (Inches)
Wood Flour	1/8
All Other Dusts	1/32

For SI: 1 inch = 25.4 mm

2203.2 Dust Producing and Dust Handling Equipment. Dust producing equipment and dust handling equipment, including but not limited to vacuums, dust collection systems, dryers, mixers, blenders, separators, conveyors, storage containers, silos or other similar devices shall be listed and shall be maintained in accordance with the manufacturer's recommended standards.

2203.2.1 Signages and Markings. Signages and markings shall be provided in accordance with Section 2203.2.1.1 through 2203.2.1.3.

2203.2.1.1 Deflagration Vent Discharge Area Markings. Where dust collection systems and other equipment, systems, or systems components are provided with deflagration vents, the area within the deflagration vent's discharge area shall be marked in an approved manner.

2203.2.1.2 Caution Signs.

Signs shall be posted near the dust containing equipment with deflagration vents that reads as follows:

CAUTION: THIS EQUIPMENT CAN CONTAIN EXPLOSIVE DUST.

KEEP OUTSIDE THE MARKED AREA WHILE EQUIPMENT IS OPERATING.

2203.2.1.3 Warning Signs. Where dust collection systems and other equipment, systems, or systems components are provided with deflagration vents, vent closures shall be clearly marked as follows:

WARNING: EXPLOSION RELIEF DEVICE. STAY CLEAR.

2203.3 Dust Collection and Conveying Systems. Dust collection and conveying systems shall be in accordance with Sections 2203.3.1 through 2203.3.3.

2203.3.1 Dust Collection Systems. Dust collection systems shall be designed to collect dust emissions from dust producing equipment at the point of generation. Dust collection systems shall be in accordance with Section 511 of the International Mechanical Code.

Exception: Closed systems using listed equipment and designed in accordance with manufacturer's recommendations and specifications, where cleanouts are provided in accordance with Section 2203.3.3.

Heating, ventilation, and air conditioning (HVAC) systems shall not be used as the means to collect dusts from localized sources.

2203.3.1.1 Location. Dust collectors shall be located outside of buildings.

Exceptions:

1. Dust collectors inside of buildings complying with Section 511 of the International Mechanical Code.
2. Wet-type dust collectors when specifically listed for the type of dust conveyed shall be permitted inside of buildings where in accordance with the manufacturer's instructions and specifications.
3. Dust collectors designed to specific NFPA standards listed in Table 2204.1 for the specific type of dust conveyed.

2203.3.1.2 Minimum Conveying Velocities. The minimum velocities within ducts used as part of the dust collection system shall be in accordance with Table 2203.3.1.2.

**Table 2203.3.1.2
Minimum Conveying Velocities**

Type of Product	Feet Per Minute
Fine light dust, such as cotton, lint, and wood flour (100 mesh and under)	2000 (10 m/s)
Dry dust such as fine rubber molding powder	2500 (13 m/s)
Average dust such as sawdust, grinding dust, coal dust	3500 (18 m/s)
Heavy dust such as metal turnings, including aluminum and magnesium powder	4000 (20 m/s)

2203.3.2 Plastic Ducts and Conveying Systems. Plastic, fiberglass, other nonconductive ducts, duct liners or pipes shall not be used as part of ducts and conveying systems. Ductwork utilizing a combustible lining shall be permitted only in high impact areas and where approved. Flexible hose shall be permitted if designed and installed in accordance with the following requirements:

1. Manufactured of static dissipative construction.
2. Used only for connections and isolation purposes.
3. Limited to 18 inches (457 mm) in length.
4. Properly grounded.

2203.3.3 Cleanouts. Openings shall be provided in enclosed equipment and conveyors to allow access to all parts of the equipment and conveyors to permit inspection, cleaning, maintenance, and the effective use of portable extinguishers or hose streams. Cleanouts for ducts used as part of the dust collection system shall be in accordance with the International Mechanical Code.

2203.4 Sources of Ignition. Sources of Ignition shall be controlled in accordance with Sections 2203.4.1 through 2203.4.9.5.

2203.4.1 Classified Electrical. Classified electrical shall be in accordance with NFPA 70. Electrical motors and electrical components of the equipment shall not be installed in the dust laden air stream unless listed for Class II, Division 1 locations.

2203.4.2 Static Electricity. Bonding and grounding is required to minimize accumulation of static electric charge in the following locations:

1. Dust producing equipment
2. Dust collection system.
3. Pneumatic dust conveying systems conveying combustible dust from one location to another, combustible dust conveyors, piping and conductive components. Conveying systems include transport modes such as railcars, hopper cars, boxcars, tank cars and trucks into which or from which commodities or products are pneumatically conveyed.
4. Conveying systems using metallic piping.

2203.4.3 Hot Works. Hot work and similar spark producing operations shall not be conducted in or adjacent to combustible dust producing areas unless precautions have been taken to provide safety. Hot work shall be permitted only in safe, designated areas in accordance with Chapter 35. Hot work is prohibited on equipment that is operating.

2203.4.3.1 Signs. Conspicuous signs with the following warning shall be posted in the vicinity of combustible dust producing areas or in the vicinity of combustible dust use:
NO WELDING. THE USE OF WELDING OR CUTTING EQUIPMENT IN OR NEAR THIS AREA IS DANGEROUS BECAUSE OF FIRE AND EXPLOSION HAZARDS. WELDING AND CUTTING SHALL BE DONE ONLY UNDER THE SUPERVISION OF THE PERSON IN CHARGE.

2203.4.4 Hot Surfaces and Hot Equipment. In areas where a dust explosion hazard or dust flash fire hazard exists, the temperature of external surfaces, shall be maintained below 80 percent (in degrees Celsius) of the lower of the dust surface ignition temperature or the dust-cloud ignition temperature for worst-case dusts. External surfaces shall include

but not limited to:

1. Compressors.
2. Steam, water or process piping.
3. Ducts.
4. Conveyors.
5. Process equipment.

Where steam pipes or hot surfaces occur in dust producing or dust handling areas, accumulation of dust on the surfaces shall be minimized by an approved method.

Exception:Drying apparatus listed for the intended use and installed in accordance with the manufacturer's instructions.

2203.4.5 Powered Industrial Trucks. Powered industrial trucks used in electrically classified areas shall be listed for such use.

2203.4.6 Smoking Prohibited. Smoking shall be prohibited in or adjacent to dust producing or dust handling areas. "No Smoking" signs complying with Section 310 shall be conspicuously posted in such areas. Smoking shall be permitted only in designated areas.

2203.4.7 Spark Producing Devices. Spark-producing devices shall not be located within 20 feet (6096 mm) of areas requiring classified electrical unless separated by a permanent partition.

2203.4.8 Self-heating materials. Materials in silos and other large storage piles of particulates prone to self-heating shall be in accordance with Section 8.5.11 of NFPA 652.

2203.4.9 Open Flames and Fuel Fired Equipment. Open flames and fuel fired equipment shall be in accordance with Section 2203.4.9.1 through 2203.4.9.5.

2203.4.9.1 Release or Airborne Combustible Dust. Production, maintenance or repair activities that have the potential to release or force combustible dust to become airborne shall not be conducted within 35 feet (11 m) of an open flame or pilot flame.

2203.4.9.2 Space Heaters. Fuel-fired space heaters drawing local ambient air shall not be located within electrically classified areas. Space heating appliances in dust producing or dust handling areas shall be located where not subject to accumulation of deposits of combustible dust.

2203.4.9.3 Equipment Listing. Fuel-fired process equipment shall be listed for its intended use and shall be operated and maintained in accordance with the manufacturer's instructions.

2203.4.9.4 Inspection and Preventative Maintenance. Inspection and maintenance of fuel-fired process equipment shall include verification that significant combustible dust accumulations do not exist within or around the equipment.

2203.4.9.5 Sources of Combustion Air. In Class II electrically classified locations, heating units shall be provided with a source of combustion air ducted directly from the building exterior or from an unclassified location.

2203.5 Housekeeping. Accumulation of combustible dust on surfaces inside buildings shall be maintained below the critical depth layer in Section 2203.1. Pressurized air or similar methods shall not be used to remove dust from surfaces. Accumulated combustible dust shall be collected by one of the following methods:

1. Portable vacuum cleaners listed for use in Class II, Group G, Division 1 atmospheres as defined in NFPA 70.
2. Dust collection systems.
3. Other approved means that will not place combustible dust into suspension in air.

2203.6 Standard Operational Procedures. Dust producing equipment and all associated equipment including dust collection equipment shall be maintained in accordance with the manufacturer's instructions and specifications and applicable codes. The inspection, testing and maintenance program shall include the following, as applicable:

1. Fire and explosion protection and prevention equipment, as applicable, in accordance with the applicable NFPA standards.
2. Dust control equipment.
3. Control of potential ignition sources.
4. Electrical, process and mechanical equipment, including applicable process interlocks.
5. Lubrication of bearings for dust collection, dust handling and dust producing equipment.
6. Additional maintenance in accordance with the manufacturer's instructions and specifications for dust collection, dust handling and dust producing equipment.

1. Records shall be kept of maintenance and repairs performed. The standard operating procedures shall be submitted to the fire code official for review and approval. The written standard operating procedures shall be signed by the person responsible for facility operations.

2203.7 Emergency Response Plan. A written emergency response plan shall be developed for preventing, preparing for and responding to work-related emergencies including but not limited to fire and explosion. The following information shall be developed into the plan:

1. Identification of dust hazards.
2. Identification and location of all utilities to affected areas.
3. Site plans or floor plans locating utility shut-off controls including water, gas and power.
4. Identify the potential for explosion.
5. Identify the location of fire extinguishing equipment compatible with the hazards present.
6. Any additional information required by the fire code official.

2203.8 Training. The plans and procedures required in Sections 2203.5, 2203.6 and 2203.7 shall be approved by the fire code official. The plans and procedures shall be reviewed annually and updated as required by process changes. Initial and annual refresher training shall be provided to employees who are involved in operating, maintaining and supervising facilities that handle combustible dust. Initial and annual refresher training shall include:

1. Workplace hazards.
2. General orientation, plant diagrams and plant safety rules.
3. Process description or flowchart.
4. Equipment operation, safe startup and shutdown, and response to hazard conditions or an incident.
5. The location and use of all related fire and explosion protection and prevention systems.
6. Equipment maintenance requirements and practices, including visual inspections of conveyors and ducts.
7. Housekeeping requirements, including the maintenance of the critical depth layer in Section 2203.1.
8. Emergency response plans as required in Section 2203.7.

The employer shall maintain records of initial and annually training and review.

2204 DUST EXPLOSION SCREENING TESTS

2204.1 Combustibility and Explosivity Tests. Where combustibility or explosivity screening tests are required to analyze the combustible dust as part of compliance with Section 414.1.3 of the International Building Code and Section 104.7 of the this code, it shall be in accordance with Section 5.4 of NFPA 652.

2204.2 Samples. Representative samples for the screening test shall be obtained in accordance with Section 5.5 of NFPA 652.

2205 STANDARDS

2205.1 Specific Hazards Standards. The fire code official is authorized to enforce additional industry or material specific provisions of the codes and standards listed in Table 2205.1 as applicable to prevent and control dust explosions.

**Table 2205.1
Explosion Protection Standards**

<u>Standard</u>	<u>Subject</u>
<u>NFPA 61</u>	<u>Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities</u>
<u>NFPA 69</u>	<u>Standard on Explosion Prevention Systems</u>
<u>NFPA 70</u>	<u>National Electrical Code</u>
<u>NFPA 77</u>	<u>Recommended Practice on Static Electricity</u>
<u>NFPA 85</u>	<u>Boiler and Combustion System Hazards Code</u>
<u>NFPA 120</u>	<u>Standard for Fire Prevention and Control in Coal Mines</u>
<u>NFPA 484</u>	<u>Standard for Combustible Metals</u>
<u>NFPA 652</u>	<u>Standard on the Fundamentals of Combustible Dust</u>
<u>NFPA 654</u>	<u>Standard for Prevention of Fire and Dust Explosions from the Manufacturing, Processing and Handling of Combustible Particulate Solids</u>
<u>NFPA 655</u>	<u>Standard for the Prevention of Sulfur Fires and Explosions</u>
<u>NFPA 664</u>	<u>Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities</u>

2205.1.1 Dust Hazard Analysis. If a dust hazard analysis (DHA) is required by the fire code official to new or existing facilities and operations, it shall be in accordance with NFPA 652. The DHA for existing facilities shall be in accordance with Section 7.1.2 of NFPA 652.

DUST COLLECTION SYSTEM. A combination of equipment designed to contain, capture and collect airborne combustible dusts.

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy MA 02169-7471

77-14:

Recommended Practice on Static Electricity

Reason: Combustible dust continues to be an issue of concern with AHJs. While references to NFPA for unique dust hazards can be useful, the entire protection cannot just evolve around ten different NFPA Standards. It is simply impractical to apply standards and only standards without any additional guidance for code users, especially fire inspectors in their daily work. One of the premises in the IFC development has been that the code should contain information for use in the field, while items for plan review can be referenced to other standards since plan review is normally conducted in the office where the information in the standards is accessible. In the field, the inspector needs information to apply to situation in front of him or her.

Similar concerns arise from application of Flammable Finishes that involve spraying and/or dipping operations using flammable liquids. Except for unique applications, it has not been necessary to analyze the size of the flammable liquids droplets/vapors, flammability of materials, etc. Providing appropriate hazard mitigations, including sources of ignition, exhaust, etc. Chapter 24 addresses concerns for a wide range of flammable liquids without the need for inspectors to delve into 10 different standards. This proposed new chapter 22 takes a similar approach. This code change does not deter from the current Chapter, in that those standards are still imbedded in this new proposed chapter, as appropriate. But the code change provides additional guidelines on how to mitigate dust accumulation and sources of ignition. It also provides guidelines on housekeeping, employee training, operational procedures.

If fire plan reviewer or inspector has additional concerns, it still leaves the door open to requiring additional NFPA Standards and Dust Hazard Analysis. That option is still available with this proposed revision under Section 2205.

Section 2201.1: Exception 1 allows 5 lbs. to address small laboratory type use. Additionally combustible dust has a fire hazard rating of 2 and in some rare cases 3. When comparing to MAQs of other materials with fire hazard rating of 2 typical basic MAQs for these materials are 25 lbs and other materials with fire hazard rating of 3 have typical basic MAQs of 10 lbs. Doubling for a sprinklered building, in Exception 2, also puts things in line with other hazardous materials allowances. The remaining exceptions are listed based on similar exceptions in standards due to lack of major incidences in commonly encountered storage and uses.

Section 2203.1: Collection of accumulated dust is the single most critical method of dust explosion prevention. It is one of the simpler methods of evaluating and addressing prevention. The critical depth layer in Table 2203.1 provides a very general approach for fire inspectors, while Section 2203.1 allows for more complicated analysis by adjusting the critical layer depth and/or determining explosion hazard found in NFPA 654 & 664.

Section 2203.2: It is difficult for an inspector to determine if the equipment is inherently safe and/or the associated electrical has been designed properly unless the equipment is listed. This section also requires maintenance in accordance with manufacturer's instructions. Subsections on markings and signs are provided to avoid injury to personnel if vent panels are dislodged or in the event of an incident.

Section 2203.3.1: Dust collection systems need to draw at the point of generation for maximum efficiency. The exception is included since closed system use of combustible dust where dust is not open to the environment of the room does not need a dust collector. References to mechanical code is provided for location of dust collection system.

Section 2203.3.1.1: The general requirement is to locate the dust collector outside of buildings. Exceptions are added to address 1) IMC allowances, 2) wet-type dust collectors which when designed and installed per manufacturer's cut sheets do not pose an explosion hazard since the dust is wetted and therefore is inherently safer inside the building, and 3) references to the different NFPA standards for specific dusts when the dust and the dust collection is detailed and specific to a particular NFPA standard for mitigation of dust explosion.

Section 2203.3.1.2: Source is from California Mechanical Code Table 505.2. These velocities have been used for decades and provide a minimum velocity to move the various particles. Particles of different types and weights require different velocities to properly move the particles.

Section 2203.3.2: Grounding and bonding is required for ducts and conveyors. Added precautions are used for types of ducts and piping that will be difficult to dissipate static electricity.

Section 2203.3.3: In addition to the cleanouts proposed for the dust collection in the International Mechanical Code, a method is needed to access all parts of a conveying system for cleaning and inspection. Lack of cleanouts was one of issues that resulted in the explosion in the Imperial Sugar Company, Port Wentworth GA.

Section 2203.4.1: Although these requirements already apply, sending the code user, who may otherwise be unfamiliar to the National Electric Code is appropriate.

Section 2203.4.2: To avoid sources of ignition from static discharge, grounding and bonding is required for equipment that come in contact with combustible dust.

Section 2203.4.3: Similar language is used in IFC Section 2403.2.7 for Flammable Finishes. Limiting hot works to designated area is critical to avoid additional sources of ignition within areas where combustible dust is used.

Section 2203.4.4: Avoiding heated surfaces in areas subject to explosion hazard is very important aspect of controlling sources of ignition. Some of the language is from IFC Section 2404.6.1.2 for Flammable Finishes and some is from other standards.

Section 2203.4.5: Similar language in IFC 2403.2.8 for Flammable Finishes.

Section 2203.4.6: Similar language in IFC Section 2403.2.6 for Flammable Finishes.

Section 2203.4.7: Similar language in IFC Section 2403.2.2 for Flammable Finishes.

Section 2203.4.8: This section is derived from and references NFPA 652. It addresses unique and very hazardous condition for self-heating materials.

Section 2203.4.9: Basic safety requirements need to be maintained in the event that open flame or fuel fired equipment is needed as part of the processes. These sections provide guidelines on how to safely use these equipment and reduce the probability of an incident.

Section 2203.5: Basic housekeeping is required to limit the accumulation of dust specified in Section 2203.1.

Section 2203.6: Standard Operational Procedures is the business owner's commitment to maintaining the operations safe and equipment in good working condition.

Section 2203.7: Emergency response plan is important for facilities where the a potential dust explosion exists.

Section 2203.8: Training is important for facilities with potential dust explosion hazards to encourage employees into maintaining safe conditions within the facility. Educating employees in understanding that maintenance and housekeeping are key life safety aspects in a facility is important.

Section 2204: Dust explosion screening tests may be necessary for specific types of dust. This section allows the AHJ to require and sends the user to the appropriate NFPA standard and section.

Section 2205: If unique hazards that are not covered by this chapter come up [e.g. design of large dryers in large agricultural and food processing facilities], this section allows fire code official to use these NFPA Standards for specific hazards. Similar language is existing in the current code.

Dust Collection System: New definition is provided in Chapter 2.

Bibliography: International Fire Code, ICC, Chapter 24.

Also the following referenced NFPA Standards:

NFPA 61: Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities

NFPA 69: Standard on Explosion Prevention Systems

NFPA 77: Recommended Practice on Static Electricity

NFPA 85: Boiler and Combustion System Hazards Code

NFPA 120: Standard for Fire Prevention and Control in Coal Mines

NFPA 484: Standard for Combustible Metals

NFPA 652: Standard on the Fundamentals of Combustible Dust

NFPA 654: Standard for Prevention of Fire and Dust Explosions from the Manufacturing, Processing and Handling of Combustible Particulate Solids

NFPA 655: Standard for the Prevention of Sulfur Fires and Explosions

NFPA 664: Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Please note that the proposal may increase or decrease the cost impact to construction. It highly depends on the type and scale of combustible dust use. In most cases, we believe not applying NFPA 652 for all cases will reduce the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, NFPA 77-14 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

F212-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 2201.1 Scope. The equipment, processes and operations involving dust explosion hazards and use or handling of combustible dust shall comply with the provisions of this chapter

Exceptions:

~~1. In an unsprinklered building, dust production or use, including use-open and use-closed systems, where the quantity does not exceed 5 pounds (2.3 kg) or 0.7 cu ft. (0.019822 m³)~~

~~2. In a building equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, dust production or use, including use-open and use-closed systems, where the quantity does not exceed 10 pounds (4.5 kg) or 1.4 cu ft. (0.039644 m³)~~

3. Storage and use of consumer materials in Group B or R occupancies.

4. Storage and use of commercially packaged materials in Group M occupancies.

5. Materials displayed in original packaging in Group M occupancies and intended as building materials or for personal or household use.

6. Storage of sealed containers of combustible dust at facilities not associated with an operation that uses, handles or generates combustible dust.

7. Materials stored or used in farm buildings or similar occupancies intended for on-premises agricultural purposes.

Committee Reason: This proposal was approved as it provides more flexibility as the provisions provide practical tools to assess dust hazards along with exceptions that provide quick guidance on applicability. The modification removes the first two footnotes from proposed section 2201.1 which sets the scope for the chapter. These two footnotes are removed as they do not have a scientific basis to address based simply on weight and whether or not sprinklers are provided. (Vote: 10-3)

Assembly Action:

None

F212-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org); Kevin Scott, representing FCAC (khscottassoc@gmail.com) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Fire Code

2203.1 Critical Depth Layer. _

The maximum dust layer on all surfaces, including but not limited to walls, ceilings, beams, equipment, furniture, pipes and ducts, shall not exceed the Critical Depth Layer specified in Table 2203.1. The critical depth layer ~~depth~~ is permitted to be adjusted for explosion hazard further evaluated in accordance with one of the following:

1. Section 6.1.1.3 of NFPA 654.
2. Section 4.2.2 of NFPA 664 for wood flour.

Accumulated combustible dust shall be collected by one of the methods listed in Section 2203.5.

2203.2 Dust Producing and Dust Handling Equipment. Dust producing equipment and dust handling equipment, including but not limited to vacuums, dust collection systems, dryers, mixers, blenders, separators, conveyors, ~~storage~~

~~containers, silos or other similar devices~~ equipment shall be listed and shall be maintained in accordance with the manufacturer's ~~recommended standards~~ instructions.

2203.2.1 Signages—Signs and Markings. ~~Signages—Signs~~ and markings shall be provided in accordance with Section 2203.2.1.1 through 2203.2.1.3.

2203.2.1.1 Deflagration Vent Discharge Area Markings. Where dust collection systems and other equipment, systems ~~, or systems~~ system components are provided with deflagration vents, the area within the deflagration vent's discharge area shall be marked in an approved manner.

2203.2.1.2 Caution Signs. Signs shall be posted near the dust containing equipment with deflagration vents that reads as follows:
CAUTION—THIS EQUIPMENT CAN CONTAIN EXPLOSIVE DUST.

KEEP OUTSIDE THE MARKED ~~AREA~~ AREAS WHILE EQUIPMENT IS OPERATING.

2203.2.1.3 Warning Signs. Where dust collection systems and other equipment, systems ~~, or systems~~ system components are provided with deflagration vents, vent closures shall be clearly marked as follows:
WARNING

—EXPLOSION RELIEF DEVICE. STAY CLEAR.

2203.3.1 Dust Collection Systems. Dust collection systems shall be designed to collect dust emissions from dust producing equipment at the point of generation. Dust collection systems shall be in accordance with Section 511 of the International Mechanical Code.

Exception:

Closed systems using listed equipment and designed in accordance with manufacturers recommendations and specifications, where cleanouts are provided in accordance with Section 2203.3.3.

Heating, ventilation, and air conditioning (~~HVAC~~) systems shall not be ~~used as the means to collect dusts from localized sources~~ combined or interconnected with dust collection systems.

2203.3.1.1 Location. Dust collectors shall be located outside of buildings.

Exceptions:

1. Dust collectors inside of buildings complying with Section 511 of the International Mechanical Code.
2. Wet-type dust collectors when specifically listed for the type of dust conveyed shall be permitted inside of buildings where in accordance with the manufacturers instructions and specifications.
3. Dust collectors designed to specific NFPA standards listed in Table ~~2204.1~~ 2205.1 for the specific type of dust conveyed.

**Table 2203.3.1.2
Minimum Conveying Velocities**

Type of Product	Feet Per Minute
Fine light dust; such as cotton, lint, and wood flour (100 mesh and under)	2000 (10 m/s)
Dry dust such as fine rubber molding powder	2500 (13 m/s)
Average dust such as sawdust, grinding dust, coal dust	3500 (18 m/s)
Heavy dust such as metal turnings, including aluminum and magnesium powder	4000 (20 m/s)

2203.3.2 Plastic Ducts and Conveying Systems. Plastic, fiberglass, other nonconductive ducts, duct liners or pipes shall not be used as part of ducts and conveying systems. Ductwork utilizing a combustible lining shall be permitted only in high impact areas and where approved. Flexible hose shall be permitted if designed and installed in accordance with the following requirements:

1. Manufactured of static dissipative construction.
2. Used only for ~~connections~~ connection and isolation purposes.

3. Limited to 18 inches (457 mm) in length.
4. Properly grounded.

2203.4.3 Hot Works/Work. Hot work and similar spark producing operations shall not be conducted in or adjacent to combustible dust producing areas unless precautions have been taken to provide safety. Hot work shall be permitted only in safe, designated areas in accordance with Chapter 35. Hot work is prohibited on equipment that is operating.

2203.4.3.1 Signs. Conspicuous signs with the following warning shall be posted in the vicinity of combustible dust producing areas or in the vicinity of combustible dust use:

NO WELDING

~~THE USE OF WELDING OR CUTTING EQUIPMENT IN OR NEAR THIS AREA IS DANGEROUS BECAUSE OF FIRE AND EXPLOSION HAZARDS. WELDING AND CUTTING SHALL BE DONE ONLY UNDER THE SUPERVISION OF THE PERSON IN CHARGE.~~

2203.4.9.1 Release or Airborne Combustible Dust. ~~Production~~ Open flames or pilot flames shall be separated by a minimum of 35 ft (11 m) from production, maintenance or repair activities that ~~have the potential to can~~ release or force cause combustible dust to become airborne ~~shall not be conducted within 35 feet (11 m) of an open flame or pilot flame.~~

2203.4.9.5 Sources of Combustion Air. In Class II electrically classified locations, ~~heating units fuel-fired appliances~~ shall be provided with a source of combustion air ducted directly from the building exterior or from an unclassified location.

2203.6 Standard Operational Procedures. Dust producing equipment and all associated equipment including dust collection equipment shall be maintained in accordance with the manufacturer's instructions and specifications and applicable codes. The inspection, testing and maintenance program shall include the following, as applicable:

1. Fire and explosion protection and prevention equipment, as applicable, in accordance with the applicable NFPA standards.
2. Dust collection and control equipment.
3. Control of potential ignition sources.
4. Electrical, process and mechanical equipment, including applicable process interlocks.
5. Lubrication of bearings for dust collection, dust handling and dust producing equipment.
6. Additional maintenance in accordance with the manufacturers instructions and specifications for dust collection, dust handling and dust producing equipment.

~~Records shall be kept~~ of maintenance and repairs ~~performed~~ shall be maintained. The standard operating procedures shall be submitted to the fire code official for review and approval. The written standard operating procedures shall be signed by the person responsible for facility operations.

2203.7 Safety and Emergency Response Plan. A written safety and emergency response plan shall be developed for preventing, preparing for and responding to work-related emergencies including but not limited to fire and explosion. The following information shall be developed into the plan:

1. Identification of dust hazards.
2. Identification and location of all utilities to affected areas.
3. Site plans or floor plans locating utility shut-off controls including water, gas and power.
4. Identify the potential for explosion.
5. Identify the location of fire extinguishing equipment compatible with the hazards present.
6. Any additional information required by the fire code official.

2203.8 Training. The plans and procedures required in Sections 2203.5, 2203.6 and 2203.7 shall be approved by the fire code official. ~~The plans and procedures shall be reviewed annually and updated as required by process changes.~~ Initial and annual refresher training shall be provided to employees who are involved in operating, maintaining and supervising facilities that handle combustible dust. Initial and annual refresher training shall include:

1. Workplace hazards.
2. General orientation, plant diagrams and plant safety rules.
3. Process description or flowchart.
4. Equipment operation, safe startup and shutdown, and response to hazard conditions or an incident.
5. The location and use of all related fire and explosion protection and prevention systems.
6. Equipment maintenance requirements and practices, including visual inspections of conveyors and ducts.
7. Housekeeping requirements, including the maintenance of the critical depth layer in Section 2203.1.
8. Emergency response plans as required in Section 2203.7.

The employer shall maintain records of initial and annually training and review.

2205.1.1 Dust Hazard Analysis. If a dust hazard analysis (DHA) is required by the fire code official to new or existing facilities and operations, it shall be in accordance with NFPA 652. The ~~DHA for existing dust hazard analysis for existing~~ facilities shall be in accordance with Section 7.1.2 of NFPA 652.

Commenter's Reason: This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to firesafety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>
This proposal was Approved as Modified by the committee. This Public Comment merely provides some editorial revisions and clarifications to the Chapter. The revised sections are listed below:

Section 2202.1: editorial

Section 2203.1: editorial

Section 2203.2: two revisions occur to this section. First, containers and silos are removed because storage containers and vessels are not typically listed. Secondly, the section will refer to the manufacturer's instructions. The instructions need to be followed. If they happen refer to a standard, then that standard is followed. However, if they don't reference a standard, the instructions still need to be followed.

Section 2203.2.1: this term is changed to "signs" to be consistent with Section 2203.4.3.1.

Section 2203.2.1.1: editorial

Section 2203.2.1.2: the language on the sign is editorially revised and formatted to match other sections in the code.

Section 2203.2.1.3: editorial and formatting revisions.

Section 2203.3.1: HVAC is deleted. It is not needed, and this is not typical throughout code. Also, it is revised to clarify that the ventilation system and dust collection system are not to be interconnected.

Section 2203.3.1.1: corrected so it references the appropriate table

Table 2203.3.1.2: editorial to be consistent will other items in the table.

Section 2203.3.2: editorial. Section 2203.4: editorial.

Section 2203.4.3: editorial, correct term is hot work.

Section 2203.4.3.1: editorial and formatting.

Section 2203.4.4: editorial.

Section 2203.4.9.1: Section 2203.4 and its subsections regulate "ignition sources", therefore, this section is rewritten to require that the ignition sources are controlled when within 35 ft of potentially hazardous activities. There is no change in intent or application.

Section 2203.4.9.5: This section is revised to state "fuel-fired appliances" rather than heating units. The change to fuel-fired appliances allows it to apply to all appliances, not just heaters.

Section 2203.6: editorial.

Section 2203.7: This section is revised to change the title of the plan to the "Safety and Emergency Response Plan". When the title is simply "emergency response plan", it can be interpreted as FD response. That is not the intended application. Therefore, the title is revised and consistent with the title of Safety and Emergency Response Plan used in Section 5707.3.

Section 2203.8: editorial.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

These revisions are editorial and for clarification.

Public Comment 2:

Proponent: Kevin Scott, representing KH Scott & Associates LLC (khscoassoc@gmail.com) ; Ellie Klausbruckner representing Klausbruckner and Associates (ek@klausbruckner.com) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Fire Code

2203.3.2 Plastic Ducts and Conveying Systems. Plastic, fiberglass, other nonconductive ducts, duct liners or pipes shall not be used as part of ducts and conveying systems. Ductwork utilizing a combustible lining shall be permitted only in high impact areas and where approved. Flexible hose shall be permitted if designed and installed in accordance with the following requirements:

1. Manufactured of static dissipative construction.
2. Used only for connections to equipment and isolation purposes.
3. ~~Limited to 18 inches (457 mm) in length.~~
4. Properly grounded.

Commenter's Reason: This proposal was Approved as Modified by the committee. This Public Comment removes the limitation of 18" for flexible hoses.

The limitation on length is dependent on the type of equipment and machinery that is used. Flexible connections are necessary for vibration isolation, such as the connection from the ductwork to the machinery, and operation of moving components on equipment, such as overhead saws, routers and flying saws.

Item 2 is revised to state that flexible hoses can be used for connections to equipment. This clarifies this statement and eliminates the use of flexible hoses to simply make connections between two ends of metallic duct.

Item 3 is deleted removing the length limitation of 18 inches.

The proposed modification allows the use of flexible hoses for making connections to equipment, but they must be properly constructed and grounded.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This revision does not mandate a change. It allows the use of flexible connections for ductwork.

Public Comment 3:

Proponent: Kevin Scott, representing KH Scott & Associates LLC, Inc. (khscoassoc@gmail.com) ; Ellie Klausbruckner representing Klausbruckner and Associates (ek@klausbruckner.com) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Fire Code

2203.5 Housekeeping. Accumulation of combustible dust on surfaces inside buildings shall be maintained below the critical depth layer in Section 2203.1. ~~Pressurized air or similar methods shall not be used to remove dust from surfaces.~~ Accumulated combustible dust shall be collected by one of the following methods:

1. Portable vacuum cleaners listed for use in Class II, Group G, Division 1 atmospheres as defined in NFPA 70.
2. ~~Dust collection systems~~ Scoops, brooms, brushes and shovels.
3. Water washdown.
- ~~34.~~ Other approved means that will not place combustible dust into suspension in air.

Use of compressed or pressurized air shall only be permitted where other methods of cleaning have been used and additional cleaning is necessary, or areas to be cleaned cannot be accessed safely. Cleaning with pressurized air must be performed in accordance with NFPA 652, 654 or 664.

Commenter's Reason: This proposal was Approved as Modified by the committee. This Public Comment revises the allowed methods of cleaning dust.

The first modification revises the strict prohibition of compressed air. The sentence prohibiting the use of compressed air is deleted, and the final paragraph is added which provides specific criteria. The NFPA standards allow the use of compressed air, but only after other methods have been used to collect as much dust as possible and failed, or in areas which cannot be safely accessed. Then, air is allowed provided that the dust producing equipment is not operating and ignition sources are controlled or eliminated.

- NFPA 652 Section 8.4.2.6.2 provides specific requirements on the use of compressed air for cleaning.
- NFPA 654 Section 8.2.2.4 provides specific requirements on the use of compressed air for cleaning.
- NFPA 664 Section 11.2.1.1 provides specific requirements on the use of compressed air for cleaning.

This modification will provide consistency with the referenced standards and allows the use of compressed air in a controlled environment. Compressed air will not be the first choice for cleaning, but it can be used as a last resort when it becomes the best choice to clean up the hazard.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction.

This public comment will not affect construction, this is a maintenance issue. This proposal allows the use of compressed air under specific restrictions.

Staff Analysis: Please note that F213-18 was Approved as Submitted and blended with the AM version of F212-18 would appear as shown below. F213-18 does not have any public comments. This particular PC appears to take a different approach but similar in intent.

2203.5 Housekeeping. Accumulation of combustible dust on surfaces inside buildings shall be maintained below the critical depth layer in Section 2203.1. Pressurized air or similar methods shall not be used to remove dust from surfaces. Accumulated combustible dust shall be collected by one of the following methods:

1. Portable vacuum cleaners listed for use in Class II, Group G, Division 1 atmospheres as defined in NFPA 70.
2. Dust collection systems.
3. Other approved means that will not place combustible dust into suspension in air.

Exception: Forced air or similar methods shall be permitted to remove dust in accordance with NFPA 652, NFPA 654, or NFPA 664

Public Comment 4:

Proponent: Robert Davidson, Davidson Code Concepts, LLC, representing American Forest & Paper Association (rjd@davidsoncodeconcepts.com) requests Disapprove.

Commenter's Reason: The American Forest Paper Association (AF PA) has long been involved in the development and implementation of combustible dust standards promulgated by the National Fire Protection Association (NFPA), among other organizations. Relevant NFPA standards have been in existence for years and contain specific, detailed recommendations that are the product of lengthy deliberations by subject matter experts.

The International Fire Code (IFC), in Section 2204, has long recognized the validity of NFPA standards through incorporation by reference. Considering the history of work in this area by NFPA, we are concerned that F212-18 unnecessarily introduces a new set of recommendations into a space that has been fully (and competently) occupied by NFPA for decades and referenced by the IFC.

This creates the risk of inconsistencies between the various standards, leaving fire code officials and affected facilities with less, and not more, clarity regarding the appropriate standard of care that should be exercised when addressing combustible dust hazards. Each NFPA dust related standard has requirements tailored to that industry which on its face precludes a set of generic requirements applicable to all as has been included in F212-18.

In 2018 edition of the IFC, Chapter 22 was updated to bring in the new NFPA 652 standard and correlated the application of NFPA 652 and the various NFPA standards that provide requirements for specific dust producing industries. This work was done in collaboration with the Chemical Safety Board (CSB) which had reached out to the International Code Council to incorporate the new standard and improve the application of the dust hazard requirements.

Based on our review of the proposal, there are numerous instances in which the drafters fail to appreciate and account for pre-existing NFPA requirements as well as the practical implementation of combustible dust controls by fire code officials. For these reasons, we have significant concerns with any proposal to greatly expand the language of IFC Chapter 22 in a manner that does not carefully track NFPA standards and, therefore, urge that F212-18 be disapproved.

Technical issues:

Section 2201.1. Exception

The authors have attempted to carve out exceptions for application of all the chapter s requirements that do not sync with the scoping of the NFPA standards referenced and as written could allow unregulated combustible dust hazards. The relevant NFPA standards have differing scoping requirements and the proposed exemptions were extracted from two of those standards. As written and accepted by the committee the exceptions would have broader application than apparent. Scoping must be all inclusive with each situation analyzed against both NFPA 652 and the relevant material specific standard.

2203 Critical Depth Layer

The language in this section gives the appearance that there are two simple depth layer depths to apply. That would be incorrect, a review of the relevant NFPA standards provide much more information on application and modification of the application of those depths. There are also multiple methods for determining if a hazard exists and there are also criteria that specifically declare a hazard if certain conditions exist. A simple review of NFPA 654 Section 6.1.1.3 along with Section 6.1.3 documents same. The proposal has a reference error for NFPA 664, the reference should be 4.4.2, however the review path starts out at Section 4.4.1 on thru 4.4.2 which will confirm that multiple methods and additional guidance exists for that standard as well. Additionally, the correct term is wood dust, not wood flour. The language states that the sections in NFPA 654 and NFPA 664 "are permitted" to be applied. If the code official decides they are not permitting same, a multitude of options for determining the existence of a dust hazard cannot be applied by the regulated industry. In addition, NFPA 654 and NFPA 664 are not the only dust hazard standards with criteria regarding the critical depth layer. As written, other appropriate standards cannot be applied.

Section 2203.2 Dust Producing and Handling Equipment.

This section states that all listed equipment and similar equipment shall be listed . The term listing in standards and codes parlance implies a 3rd party approval for the specified function. FM or UL does not list approve the majority of the noted equipment and as a result this is a requirement that cannot be complied with, nor is there a need for such listing.

Section 2203.2.1.1 Deflagration Vent Discharge Area Markings.

This section requires that deflagration vent discharge areas be marked approved manner which is not defined nor explained as to what would comply making the requirement subjective. It also misleads the code official into believing that this requirement is all that is necessary when there are detailed provisions contained within dust hazard standards and NFPA 68 requiring analysis of the vent discharge hazards to eliminate hazards to people and/or building exposures.

Section 2303.2.1.2 Caution Signs.

This is an unnecessary and onerous requirement. In Pulp and Paper and Wood Processing facilities and chemical facilities this will require dozens of signs if not up to a hundred signs at some facilities. It is more practical to label each building or enclosure entrance (e.g. wood conveyor tunnel) where combustible dust handling or generating equipment is present with a sign stating for example: Warning: Combustible Dust Hazard Area. Avoid Dispersion of Dust . OR , Warning: Combustible Dust Hazard Area: Follow Safe Work Practices. What defines the marked areas . Is this a hazard zone? There is no defined basis for the delineation of the marked area . NFPA 68 has requirements for establishing a hazard or exclusion zone around vented dust collectors based on the dust Kst and volume of the collector but no other requirements for a marked area exists in NFPA combustible dust documents. Similar to Section 2203.2.1.1 it misleads the code official into believing that this requirement addresses the topic when there is much more detail in the referenced standards.

Section 2203.1.3 Warning Signs.

NFPA 68 Standard on Explosion Protection by Deflagration Venting (2018 Edition) requires a warning sign near vents in paragraph 11.3.4* Vent closures shall be clearly marked as follows: WARNING: Explosion relief device . Stay clear is not a requirement. This is another example of a discrepancy this proposal has with relevant NFPA standards currently

referenced by the IFC and applied against facilities. If a facility currently meets the NFPA 68 warning sign requirement it will be in violation of this proposed language causing unnecessary costs to replace all existing signs.

Section 2201.3.1 Dust Collection Systems.

This section is confusing in that exhaust systems are separate and distinct from heating, ventilation and air conditioning systems. It appears the authors are attempting to draw in a Mechanical Code requirement that is best left to that code since compliance with the IMC is a basic requirement for hazardous exhaust systems. Specifically, both Sections 501.2 and 510.4 of the IMC address the need for an independent exhaust system. This is in Chapter 5 for Exhaust Systems , not Chapter 4 Ventilation systems. This causes unnecessary confusion and again incorporates a topic that is covered in more detail in a related document.

Section 2204.3.1.1 Location.

This section neglects to include any mention of enclosureless dust collectors (EDC). EDC s are allowed per NFPA 654 and 664 if all requirements are met for the installation and should be included in the listing. The pointer to go check the referenced standards for additional permitted systems corroborates the position that the proposed changes to the IFC are inappropriate because the user still must go to the referenced standards to find ALL of the relevant requirements. There are no short cuts to the process and the proposed language is misleading in that manner.

Section 2203.3.1.2 Minimum Conveying Velocities.

The authors state that the velocities utilized come from California s Mechanical Code. That code is based upon the IAPMO Mechanical Code, not the ICC International Mechanical Code. More importantly, the referenced NFPA standards rely upon the American Conference of Governmental Industrial Hygienists Industrial Ventilation Manual for the causing a conflict. For fine Light Dust ACGIH recommends a minimum of 2,500-3,000 fpm, not reduced 2,000 fpm the authors suggest. For Dry Dust, such as fine rubber molding powder ACGIH recommends a minimum of 3,000 fpm, not the reduced number of 2,500 fpm the authors included. So not only does the proposal create conflicts with the referenced NFPA standards on dust hazards, it suggests velocities that are insufficient based upon the ACGIH Industrial Ventilation Manual.

Range of Minimum Duct Design Velocities

Nature of Contaminant	Examples	Design Velocity
Vapors, gases, smoke		Any desired velocity (economic optimum velocity usually 1000–2000 fpm) [5.08–10.16 m/s]
Fumes, metal smokes	Welding	2000–2500 fpm [10.16–12.70 m/s]
Very fine light dust	Cotton lint, wood flour, litho powder	2500–3000 fpm [12.7–15.24 m/s]
Dry dusts and powders	Fine rubber dust, Bakelite molding powder dust, jute lint, cotton dust, shavings (light), soap dust, leather shavings	3000–3500 fpm [15.24–17.78 m/s]
Average industrial dust	Grinding dust, buffing lint (dry), wool jute dust (shaker waste), coffee beans, shoe dust, granite dust, silica flour, general material handling, brick cutting, clay dust, foundry (general), limestone dust, packaging and weighing asbestos dust in textile industries	3500–4000 fpm [17.78–20.32 m/s]
Heavy dusts	Sawdust (heavy and wet), metal turnings, foundry tumbling barrels and shake-out, sand blast dust, wood blocks, hog waste, brass turnings, cast iron boring dust, lead dust	4000–4500 fpm [20.32–22.86 m/s]
Heavy or moist dusts	Lead dusts with small chips, moist cement dust, buffing lint (sticky), quick-lime dust	4500 fpm [22.86 m/s] and up

Table 5-1: From American Conference of Governmental Industrial Hygienists (ACGIH®), Industrial Ventilation: A Manual of Recommended Practice, 29th Edition. Copyright 2016. Reprinted with permission.

Duct Networks 5

Section 2203.3.2 Plastic Ducts and Conveying Systems. Item 1. Manufactured of static dissipative construction.

Static dissipative hoses are required for c dusts with a Minimum Ignition Energy up to 2000 mJ due to the risk of propagating brush discharges. If the c dust MIE is for example 2000 mJ then static dissipative or conductive hose is not required or needed as there is no risk of static ignition. See Britton, Avoiding Static Ignition Hazards in Chemical Operations for additional information. This requirement is overly restrictive as a result.

Section 2303.3.2 Item 3. Limited to 18 inches (457 mm) in length.

There is no requirement in NFPA 77, NFPA 499, NFPA 652, NFPA 654, NFPA 664 that limits the length of flexible conductive hose to 18 inches. It is limited to NFPA 61 for Agricultural and Food Processing Facilities for duct systems. NFPA 61 points to NFPA 654 for pneumatic conveying systems. The authors have combined two distinct systems into one set of requirements inappropriately and in doing so created another conflict in the application of the referenced standards. This is an onerous restriction without a technical basis. The wood products industry use several pieces of equipment that require the use of longer flexible hoses 8-10 feet in length in some cases for flying saws. There is no basis for limiting length if the hose material is conductive with flexible wire inside hose attached to metal on end(s) for bonding and grounding with a resistance of less than 1 million ohms.

Section 2203.3.3 Cleanouts.

This section requires openings in **enclosed equipment and conveyors to allow access to all parts of the equipment and conveyors to permit inspection, cleaning, maintenance, and the effective use of portable extinguishers or hose streams**. Providing access to all enclosed parts of equipment and conveyors is neither practical nor useful. Further, though the authors point to the IMC in the second sentence, they ignore the fact that fire protection for hazardous exhaust systems is covered by the Section 510.8 of the IMC and Duct Cleanouts are covered by Section 510.8.1 of the IMC. Since the proposed language does not match the existing IMC sections, the proposal causes a conflict with the requirements of the IMC.

Section 2203.4.1 Hazardous Area Classification.

This section refers to Classified area classification, the correct terminology from the NEC (NFPA 70) is Hazardous (Classified) Areas. As written the proposed language has a disconnect with the terms of the NEC. The section then goes on to require compliance with Sections 500-506 of NFPA 70. Since this language would apply to combustible dusts, in Chapter 5 of the NEC a combustible dust electrical hazard would be a Class II Location covered by Article 502, Article 504, and Article 506, and Article 506 Zone 20, 21 and 22 Locations for Combustible Dusts or Ignitable Fibers/Flyings. Articles 501, 503 and 506 Zone 0, 1 and 2 Locations would not apply. The NEC reference in the proposed language is incorrect and partially unenforceable. Further, in identifying electrical equipment to listed the language refers to the dust laden air stream. Air stream is not defined, more importantly, that phrase has no relation to the conditions identified in NFPA 70, Article 500, Section (C) Class II Locations, including Subsection (1) Class II, Division 1 and Subsection (2) Class II, Division 2. There is a complete disconnect with the applicable language in the NEC and as written would likely not provide for the appropriate level of protection. This will be misleading to code officials and the regulated facilities.

Section 2203.4.3.1 Signs.

In Pulp and Paper and Wood Processing facilities and chemical facilities this will require dozens of signs, if a hundred or more signs at some facilities. Welding may be needed for repairs anytime where dust handling, generation or storage equipment is present. Safe Work and Hot Work Permits in accordance with Chapter 35 of the IFC addresses the hazards and risks of welding in combustible dust areas. This onerous and costly requirement is not necessary.

Section 2203.4.4 Hot Surfaces and Hot Equipment.

This section has requirements for worst-case dusts. There is no definition of this phrase. As such there is no way for the code official to understand how to apply the phrase and connected requirements and no way for a regulated facility to know what is required for compliance, leaving the language as unenforceable.

Section 2203.4.6 Smoking Prohibited.

Prescribing No Smoking signs in all industrial facilities in or adjacent to dust producing or dust handling areas is overly prescriptive and costly, since many facilities ban smoking completely throughout the facility. This is an onerous requirement. Section 310 would not require all these locations to be posted if the building was posted as No Smoking.

Section 2204.1 Combustibility and Explosivity Tests.

This section refers to when such tests are required by Section 414.1.3 of the IBC and Section 104.7 of the IFC. Neither of those sections requires such tests or provide any guidance on when they should be conducted. Further, Section 414.1.3 of the IBC only applies when a new occupancy is proposed and only to hazardous materials. Combustible dust is not a hazardous material by definition. The language then points directly to Section 5.4 of NFPA 52 which then instructs that the

tests be conducted in accordance with Section 5.5 of that chapter which addresses a sampling plan. (Which means Section 2204.2 simply repeats what Section 5.4 of NFPA 652 tells you to do already.) There is no guidance on when or where such actions are to be taken because the authors have by-passed correct application of NFPA 652. Chapter 5 of NFPA 652 applies Hazard Identification for characterizing properties of combustible dusts as required to support a Dust Hazard Analysis (DHA). Chapter 7 of NFPA 652 addresses Dust Hazard Analysis, but the language does not point the code user to that fact. Based upon Chapter 4 and Chapter 7 of NFPA 652, all new and existing facilities with a potential combustible dust hazard must perform a DHA. The current IFC language provides clear guidance on that topic, this new language does not. As proposed there is no trigger for the information to be submitted in this proposed language.

Section 2205.1 Specific Hazard Standards.

The language in the current code makes it clear that the appropriate referenced standards must be complied with which is the responsibility of the owner or operator. The proposed new language changes that mandate of compliance to The fire code official is authorized. The fire code official is always authorized to apply any part of the fire code, that is covered by Chapter 1. This is a significant change in that now the needed standards will only apply if the fire code official determines they are necessary as compared to the current language that mandates compliance by the facility regardless of action taken by the fire code official. The new language of this entire proposal does not provide enough requirements for a safe facility, the referenced standards must be applied and the language needs to reflect that. This section and Section 2204.1 are fatal flaws for the proposal because they take away the certainty of applying NFPA 652 and the other referenced standards necessary for safe facilities. The Chemical Safety Board expects NFPA 652 and any appropriate standard to be applied in total, as does OSHA and the NFPA 1 Fire Code. The current 2018 edition of the IFC meets those expectations because they are necessary. This proposal returns the IFC to earlier years when thorough compliance was not clearly required.

The relevant NFPA standards properly cover the combustible dust hazard through requirements developed by a broad range of interested parties including enforcers and the regulated industry. The current IFC language correctly ties the fire code to those standards including when and how to apply them. Because of this and the technical problems noted above, the F212-18 proposal should be disapproved.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

As written, the proposal can increase the cost of compliance because of the conflicts with the currently referenced standards and with the International Mechanical Code. Ambiguity with the application of the referenced standards can also cause an increase in compliance. By disapproving the proposal the conflicts and ambiguity will be eliminated.

Public Comment 5:

Proponent: David Tyree, American Wood Council, representing American Wood Council (dtyree@awc.org) requests Disapprove.

Commenter's Reason: The International Fire Code (IFC), in Section 2204, has long recognized the validity of NFPA standards through incorporation by reference. In light of the history of work in this area by NFPA, we are concerned that F212-18 would unnecessarily introduce a new set of recommendations into a space that has been fully occupied by NFPA for decades. This creates the risk of inconsistencies between the various standards, leaving fire code officials and affected facilities with less clarity regarding the appropriate standard of care that should be exercised when addressing combustible dust hazards.

Based on our review of the proposal, there are numerous instances in which the proposal fails to appreciate and account for pre-existing NFPA recommendations as well as the practical implementation of combustible dust controls by fire code officials. For these reasons, we have significant concerns with any proposal to greatly expand the scope of IFC Chapter 22 in a manner that does not carefully track NFPA standards and, therefore, urge that F212-18 be disapproved. The International Fire Code (IFC), in Section 2204, has long recognized the validity of NFPA standards through incorporation by reference. In light of the history of work in this area by NFPA, we are concerned that F212-18 would unnecessarily introduce a new set of recommendations into a space that has been fully (and competently) occupied by NFPA for decades. This creates the risk of inconsistencies between the various standards, leaving fire code officials and affected facilities with less clarity regarding the appropriate standard of care that should be exercised when addressing combustible dust hazards.

Our reasons for disapproval by section are as follows:

Section 2203.1 - *The current edition has not been listed, subsequent NFPA 654 and 664 editions will likely have different paragraph numbers than the current edition due to revisions to the edition.*

Section 2203.2 - *FM or UL does not approve the above-noted equipment. There is no listing agency that approves the equipment. This requirement would therefore not be valid and should be removed from the Section.*

Section 2203.2.1.2 - *This is an onerous requirement. In Pulp and Paper and Wood Processing facilities and chemical*

facilities this will require tens if of signs if not up to a hundred signs at some facilities. It is more practical to label each building or enclosure entrance (e.g. wood conveyor tunnel) where combustible dust handling or generating equipment is present with a sign stating for example: Warning: Combustible Dust Hazard Area. Avoid Dispersion of Dust . OR , Warning: Combustible Dust Hazard Area: Follow Safe Work Practices.

The existing text brings up the question of defines marked areas. Is this a hazard zone? There is no defined basis for the delineation of the marked area . NFPA 68 has requirements for establishing a hazard or exclusion zone around vented dust collectors based on the dust Kst and volume of the collector but no other requirements for a marked area exists in NFPA combustible dust documents.

Section 2203.2.1.3 - NFPA 68 Standard on Explosion Protection by Deflagration Venting (2018 Edition) requires a warning sign near vents in paragraph 11.3.4* Vent closures shall be clearly marked as follows:

WARNING: Explosion relief device

Stay clear is not a requirement. This is another example of a discrepancy in the NFPA and the IFCC recommended requirement. If a facility meets the NFPA 68 warning sign requirement it will not meet the specific IFCC venting signage requirement.

Section 2203.3.1.2 - What is the reference for these conveying velocities. The American Conference of Governmental Hygienists Industrial Ventilation Manual (considered the gold standard for industrial ventilation across the US and globe recommends the table inserted). NFPA combustible dust standards have incorporated by reference the ACGIH duct velocity recommendations.

Section 2203.3.2 - Static dissipative hoses are required for c dusts with a Minimum Ignition Energy up to 2000 mj due to the risk of propagating brush discharges. If the c dust MIE is for example 2000 mj then static dissipative or conductive hose is not required or needed as there is no risk of static ignition. See Britton, Avoiding Static Ignition Hazards in Chemical Operations for additional information. There additionally is no basis provided for the hose length restriction in NFPA 652, 654 or 664 standards.

The wood processing industry uses large saws (e.g. flying saws) that move across long section of OSB and plywood that is equipped with 6-10 feet of flexible hose connected to a dust collection system. This would prohibit or limit the use of this equipment and restrict the use of similar dust collection ductwork required for this type equipment.

Section 2203.4.3.1 - As noted earlier in this reason statement, this is a very onerous signage requirement. In Pulp and Paper and Wood Processing facilities and chemical facilities this will require tens of signs if not up to a hundred signs at some facilities. Welding may be needed for repairs anytime c dust handling, generation or storage equipment is present. Safe Work and Hot Work Permits address the hazards and risks of welding in combustible dust areas.

Section 2303.4.4 - What is the definition of worst-case dusts ? It is inappropriate to have a requirement with a nebulous, undefined term.

Section 2203.4.6 - What is the basis for this requirement? Most saws are spark production devices and are allowed in hazardous classified locations. Also classified electrical is an incomplete phrase and is ambiguous? The correct term is hazardous area classification or hazardous area classified equipment.

Section 2203.5 - Compressed air can be used for housecleaning following NFPA 652, 654 and 664.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There is no increase.

F212-18

F226-18

IFC: 2311.8

Proposed Change as Submitted

Proponent: Spencer Quong, representing Toyota Motor North America (squong@yahoo.com); Robert Davidson, Davidson Code Concepts, LLC, representing Toyota, USA (RJD@davidsoncodeconcepts.com)

2018 International Fire Code

Revise as follows

2311.8 Repair garages for vehicles fueled by lighter-than-air fuels. The room, motor vehicle repair booth or motor vehicle repair space containing repair garage activities for the conversion or repair of vehicles that use CNG, LNG, hydrogen or other lighter-than-air motor fuels shall be in accordance with Sections 2311.8 through 2311.8.11 in addition to the other requirements of Section 2311. Repair garages for the repair of vehicles that use hydrogen fuel shall be in accordance with this code and NFPA 2.

Exceptions:

1. Repair garages where work is conducted only on vehicles that have been defueled and their systems purged with nitrogen gas, and where standard operating procedures to document and maintain the fueling status throughout repair operations are approved.
2. Repair garages where work is not performed on the fuel system and is limited to exchange of parts and maintenance not requiring open flame or welding on the CNG-, LNG-, hydrogen- or other lighter-than-air-fueled motor vehicle.
3. Repair garages for hydrogen-fueled vehicles where work is not performed on the hydrogen storage tank and is limited to the exchange of parts and maintenance not requiring open flame or welding on the hydrogen-fueled vehicle. During the work, the entire hydrogen fuel system shall contain less than 200 cubic feet (5.6 m³) of hydrogen.
4. Repair garages for natural-gas-fueled vehicles where work is not being performed on the fuel storage tank, and is limited to the exchange of parts and maintenance not requiring open flame or welding on the natural-gas-fueled vehicle. During the work, the natural gas, in the vehicle fuel tank shall contain a pressure of not more than 250 psi at 70°F (1724 kPa at 21°C).
5. Where approved by the fire code official, repair garages for hydrogen-fueled vehicles where an analysis has been submitted documenting that a flammable mixture in air will not occur in the room or space if the hydrogen is released from the motor fuel tank.

Reason: The purpose of this proposal is to eliminate the extra protection features for hydrogen motor vehicle repair garages in those cases where an analysis has been performed and submitted documenting that flammable mixture of the hydrogen and air will not occur if the hydrogen is released from its tank.

The application of this exception would be conditioned upon the approval of the fire code official since the necessary analysis, including computer modeling, would be facility specific including the dimensions of the room or space.

Cost Impact: The code change proposal will decrease the cost of construction

This change would decrease the cost of construction in those cases where the application of the analysis exception is approved.

F226-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved with concern that even with analysis the flammable mixture may be to high. The committee would like to see more details on what the analysis includes or possibly a standard that addresses this allowance. (Vote: 13-1)

Assembly Action:

None

F226-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Robert Davidson, Davidson Code Concepts, LLC, representing Toyota, USA (rjd@davidsoncodeconcepts.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

2311.8 Repair garages for vehicles fueled by lighter-than-air fuels. The room, motor vehicle repair booth or motor vehicle repair space containing repair garage activities for the conversion or repair of vehicles that use CNG, LNG, hydrogen or other lighter-than-air motor fuels shall be in accordance with Sections 2311.8 through 2311.8.11 in addition to the other requirements of Section 2311. Repair garages for the repair of vehicles that use hydrogen fuel shall be in accordance with this code and NFPA 2.

Exceptions:

1. Repair garages where work is conducted only on vehicles that have been defueled and their systems purged with nitrogen gas, and where standard operating procedures to document and maintain the fueling status throughout repair operations are approved.
2. Repair garages where work is not performed on the fuel system and is limited to exchange of parts and maintenance not requiring open flame or welding on the CNG-, LNG-, hydrogen- or other lighter-than-air-fueled motor vehicle.
3. Repair garages for hydrogen-fueled vehicles where work is not performed on the hydrogen storage tank and is limited to the exchange of parts and maintenance not requiring open flame or welding on the hydrogen-fueled vehicle. During the work, the entire hydrogen fuel system shall contain less than 200 cubic feet (5.6 m³) of hydrogen.
4. Repair garages for natural-gas-fueled vehicles where work is not being performed on the fuel storage tank, and is limited to the exchange of parts and maintenance not requiring open flame or welding on the natural-gas-fueled vehicle. During the work, the natural gas, in the vehicle fuel tank shall contain a pressure of not more than 250 psi at ~~70°F~~ 70 F (1724 kPa at ~~21°C~~ 21 C).
5. Where approved by the fire code official, repair garages for hydrogen-fueled vehicles where an analysis has been submitted documenting that a flammable mixture in air ignition hazard will not occur in the room or space if the hydrogen is released from the motor fuel tank. The analysis shall be in accordance with Section 104.9 of this code. The analysis shall include the following:
 - 5.1. The location of the hydrogen release within the room or space.
 - 5.2. The modeled plume from the leak source to dissipation or exhaust, and shall include the plume concentrations with a detailed explanation of why an ignition would not occur at any point where the concentration is at or above the lower explosive limit (LEL) for hydrogen.

Commenter's Reason: To address the committee concerns the proposal has been modified to identify that the intent is to document that an ignition hazard will not occur, that the submittal must be in accordance with Section 104.9 "Alternative materials, design and methods of construction and equipment" and identifying core information that must be included in the analysis.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction This change would decrease the cost of construction in those cases where the application of the analysis exception is approved.

F229-18

IFC: 2404.3.4

Proposed Change as Submitted

Proponent: Geoffrey Raifsnider, Global Finishing Solutions, representing Self

2018 International Fire Code

Add new text as follows

2404.3.4 Limited Finishing Workstations. A limited finishing workstation shall comply with the applicable provisions of NFPA 33 and Sections 2404.4 through 2404.8.2.

Reason: This proposed addition addresses a common type of spray application enclosure used in the finishing industry that is not currently addressed by the code. NFPA 33 includes definitions and the minimum safety requirements for this type of equipment.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. There is no cost impact due to this change. Equipment is currently built to meet the requirements of NFPA 33.

F229-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved as it conflicts with limited spray area concept. When limited spray area provisions were reviewed the issue of limited finishing workstations was incorporated into that concept. (Vote: 14-0)

Assembly Action:

None

F229-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Geoffrey Raifsnider, representing Self (graifsnider@globalfinishing.com) requests As Submitted.

Commenter's Reason: The committee indicated that this proposal was disapproved as it conflicts with limited spray area concept. They indicated that when previously reviewed the issue of limited finishing workstations were incorporated. However, the current language addresses limited spraying spaces and not enclosed spray finishing. The language in this section is consistent with open spraying as indicated by the electrical wiring section. It also limits the surface area that can be painted

The proposal as originally submitted addresses an enclosed finishing booth which is common in the industry and is not currently addressed by the code. NFPA 33 includes definitions and the minimum safety requirements for this type of equipment.

This proposal does not change the requirements of open spraying covered by section 2404.9 Limited spraying spaces.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There is no cost impact due to this change. Equipment is currently built to meet the requirements of NFPA 33.

F229-18

F243-18

IFC: 3104.2, 3104.3, 3104.4

Proposed Change as Submitted

Proponent: Thomas Markel, representing Industrial Fabrics Association International - Tent Rental Division; Paul Armstrong, representing IFAI (paul@paulandvauna.com)

2018 International Fire Code

Revise as follows

3104.2 Flame propagation performance treatment. Before a permit is granted, the *owner* or agent shall file with the *fire code official* a certificate ~~executed~~ provided by the product manufacturer certifying the materials have been tested by an approved testing laboratory. The certificate shall indicate that the floor coverings, tents, membrane structures and their appurtenances, which include sidewalls, drops and tarpaulins, are composed of materials meeting the flame propagation performance of Test Method 2 of NFPA 701. Additionally, it shall indicate that the bunting and combustible decorative materials and effects are composed of material meeting the flame propagation performance criteria of Test Method 1 or Test Method 2 of NFPA 701, as applicable. Alternatively, the materials shall be treated with a flame retardant in an *approved* manner and meet the flame propagation performance criteria of the applicable test method of NFPA 701. The flame propagation performance criteria shall be effective for the period specified by the permit.

3104.3 Label. Membrane structures or tents shall have a permanently affixed label bearing the identification of size and fabric or material ~~type in addition to information required in Section 3104.4 of this Chapter.~~

3104.4 Certification. An affidavit or affirmation shall be submitted to the fire code official and either a copy retained on the premises on which the tent or air-supported structure is located or label affixed to the tent or air supported structure. The affidavit shall attest to the names and address of the manufacturers of the tent or air-supported structure and either of the following information relative to the flame propagation performance criteria of the fabric:

- ~~1. Names and address of the manufacturers of the tent or air-supported structure.~~
- ~~2. Either with~~ The date the fabric was last treated with flame-retardant solution, the trade name or kind of chemical used in treatment, name of person or firm treating the material and name of testing agency and test standard by which the fabric was tested, or
- 3: trade ~~Trade~~ name or kind of chemical used in ~~treatment.~~ treatment.
- 4: name ~~Name~~ of person or firm treating the ~~material.~~ material and
- 5: name ~~Name~~ of testing agency and test standard by which the fabric was ~~tested.~~ tested, or
2. The material meets NFPA 701 test Method 1 or 2 without treatment.

Reason: Tents and membrane structures have been labeled and certifications provided for decades since the Hartford circus fire. At the time of the fire tent material was a natural fiber and waterproofing was accomplished with a flammable mixture. After the fire a external flame retardant was required to be applied to retard flame spread. The topical application was subject to weather and cleaning and would degrade over time and exposure. Retreatment and retesting was needed for compliance.

With the availability of polyester or PVC based material, that has flame retardant integrated into the raw material before extrusion, external treatment of material is not required. The flame retardant is capable of performing for the life of the material and cannot be washed or weathered away. Also, "field testing" (NFPA 705) the tent or membrane structure by cutting out sections for testing, damages the membrane and degrades the structural integrity of the material increasing the danger to the public for a structural failure.

This code proposal changes three parts of the flame propagation requirement that are interrelated.

Flame propagation (3104.2): Testing agencies have never issue the label or certification of the assembled product, rather they test and document the materials used in assembly. The affixed label and certification provided for permitting have ***always*** been provided by the manufacturer (see attachments). This change to flame propagation corrects the code to what has been the acceptable practice for generations. Further it would be impossible and impractical to enforce the current code; for testing agencies are not capable of producing the label and certification documentation for every tent and sidewall produced by a manufacturer, nor are they able to trace the chain of custody of the materials as the manufacturer's have been doing as evident in both the certifications and labels (see attachments). Therefore this change only brings the code in line with what has been acceptable practice.

Labeling (3104.3): The code is very general and viewing the attached labels, the information presented varies widely. By tying the information required for the label to "match" the certification documentation aids the fire code official to insure the installation matches the permit documents.



Certification (3104.4): This change brings the code requirements of documentation up-to-date with modern tent and membrane structure manufacturing. Rarely is a natural fiber used in new product manufacturing. However, use of older tents made from natural fibers still occurs. The change in certification reflects the modern use of polyester and PVC material (new #3) whose flame retardant is now integrated in the raw polyester or PVC before extruded into material, and therefore cannot be washed or weathered away as the topical application method used on natural fibers.

IMPORTANT DOCUMENT		
Certificate of Flame Resistance		
REGISTRATION APPLICATION NUMBER	ISSUED BY	Date of Manufacture
F140.1	 ANCHOR INDUSTRIES INC.	03/01
	EVANSVILLE, INDIANA 47725	Order Number
	MANUFACTURERS OF THE FINISHED TENT PRODUCTS DESCRIBED HEREIN	
This is to certify that the materials described have been flame-retardant treated (or are inherently nonflammable) and were supplied to:		
7254 BRAVO EVENTS - THE FLORISTRY 1385 OSLAWARE AVENUE BUFFALO NY 14209		
Certification is hereby made that: The articles described on this Certificate have been treated with a flame-retardant approved chemical and that the application of said chemical was done in conformance with California Fire Marshal Code, equal to exceeds NFPA 701, CPAI 84, ULC 109. The method of the FR chemical application is:		
Serial #		
Description of item certified:		
Flame Retardant Process Used Will Not Be Removed By Washing And Is Effective For The Life Of The Fabric		
ANCHOR INDUSTRIES INC.	Signed:	
Name of Applicant of Flame Retardant Finish		

IMPORTANT DOCUMENT		
Certificate of Flame Resistance		
REGISTRATION APPLICATION NUMBER	ISSUED BY	Date of Shipment
F140.1	 ANCHOR INDUSTRIES INC.	5/5/2006
	EVANSVILLE, INDIANA 47725	Tent Identification
	MANUFACTURERS OF THE FINISHED TENT PRODUCTS DESCRIBED HEREIN	04237496
This is to certify that the materials described have been flame-retardant treated (or are inherently nonflammable) and were supplied to:		
72654 FANTHER CREATIONS LTD DBA BRAVO EVENTS - THE FLORIST 71 PARK ST BUFFALO NY 14201		
Certification is hereby made that: The articles described on this Certificate have been treated with a flame-retardant approved chemical and that the application of said chemical was done in conformance with California Fire Marshal Code. All fabric has been tested and passes NFPA 701-99, CPAI 84, ULC 109.		
Serial #		
8151210 (1)		
Description of item certified:		
CENTURY END 60WX20 HOLE SNYDER WHITE VINYL WITHOUT WEB GUYS		
Flame Retardant Process Used Will Not Be Removed By Washing And Is Effective For The Life Of The Fabric		
SNYDER MFG NEW PHILADELPHIA OH	Signed:	
Name of Applicant of Flame Resistant Finish		ANCHOR INDUSTRIES INC.

IMPORTANT DOCUMENT
Certificate of Flame Resistance

ISSUED BY



Date of Shipment
05/20/11

Registration Number
F140.1

Tent Identification
14950431

EVANSVILLE, INDIANA 47725

MANUFACTURERS OF THE FINISHED TENT PRODUCTS DESCRIBED HEREIN

This is to certify that the materials described have been flame-retardant treated (or are inherently nonflammable) and were supplied to:

BRAVO EVENTS THE FLORISTRY
DBA BRAVO EVENTS - THE FLORISTRY
71 PARK ST
BUFFALO, NY 14201



Certification is hereby made that:

The articles described on this Certificate have been treated with a flame-retardant approved chemical and that the application of said chemical was done in conformance with California Fire Marshall Code. All fabric has been tested and passes NFPA 701-04, ULC 109.

Serial #
8152310 (1)

Description of item certified:
CENTURY END 80WX20 LOOP SNYDER
WHITE VL W/O WEB GUYS 10'SP

**Flame Retardant Process Used Will Not Be Removed By
Washing And Is Effective For The Life Of The Fabric**

SNYDER MFG NEW PHILADELPHIA, OH
Name of Applicator of Flame Resistant Finish

Signed: 
ANCHOR INDUSTRIES INC

Certificate of Flame Resistance

PAGE: 1

Date Manufactured
05/31/2011

AZTEC TENTS
2665 COLUMBIA ST
TORRANCE, CA 90503
(800) 228-3687

INV NUMBER: 0186290
P.O. NUMBER:
CUSTOMER NO: BRAVO14

This is to certify that the materials described below have been flame retardant treated (or are inherently flame retardant).

BRAVO EVENTS
71 PARK STREET
Buffalo, NY 14210

Vendor	Trade Name	UL Code #
Shun	Hardi Gra	F-322.04
Shun	Shun	F-322.04
California Comp.	Lam-Tex 12, 14, 16, 18oz	F-413.01
Colord Fabrics	Clear vinyl 30ga / 30ga	F-510.02
Colr	Clear vinyl 10ga / 30ga	F-510.02
DAF	DAF	F-553.02
Exclusivity Edge	PolySateen Liner	F-434.01
Famen	Emciment 502	F-444.01
Famen	Emciment 702	F-444.02
George Textiles	Geo-Polycor	F-500.01
Pro-Tech	Geo Cloth / Weave	F-504.01
Shyler	Weatherspan	F-140.01
Ti Vantage	Procoat Sunbrella	F-368.05
Ti Vantage	Proco 500	F-121.02
Ti Vantage	Big Top	F-121.10
Ti Vantage	Original Weatspan	F-505.01
Ti Vantage	Avetlon / Coasione	F-065.01
Verselag	Corexam 81673, 81515	F-830.01

Certification is hereby made that the articles described below hereof are made from a flame-retardant fabric or material registered and approved by the California State Fire Marshal for such use. The fabric has been tested and passes NFPA 701 Large Scale. See chart to right for trade name of flame-resistant fabric or material used and additionally referenced on the label of the fabric panel.

THE FLAME RETARDANT PROCESS USED WILL NOT BE REMOVED BY WASHING

David Bradley

General Manager- Manufacturing

Name of Applicator or Production Superintendent

Title of Applicator or Production Superintendent

ITEMS MANUFACTURED	TYPE	PRODUCED
30x30 2pc Jumbotrac Top UW ***Double Valance ***Ratchet Tensioners w/ S-Hook on both Ends	S	1
30x15 Mid Jumbotrac Top UW ***Double Valance ***Ratchet Tensioners w/ S-Hook on Both Ends	S	2
30x10 Mid Jumbotrac Top UW ***Double Valance ***Ratchet Tensioners w/ S-Hook on Both Ends	S	1
40x40 2pc Jumbotrac Top UW ***Double Valance ***Ratchet Tensioners w/ S-Hook on Both Ends	S	1
40x20 Mid Jumbotrac Top UW ***Double Valance ***Ratchet Tensioners w/ S-Hook on Both Ends	S	4
40x10 Mid Jumbotrac Top UW ***Double Valance ***Ratchet Tensioners w/ S-Hook on Both Ends	S	1
Mid-Span Tensioner *** (12) for 30x *** (16) for 40x	S	28

Certificate of Flame Resistance



ISSUED BY
Snyder Manufacturing, Inc.
3001 Progress Street
Dover, OH 44622

Manufactured by
Fred's Tents & Canopies
7 Tent Lane
Stillwater, NY 12170

Date treated or
manufactured

03/07

This is to certify that the materials described below have been flame-retardant treated (or are inherently nonflammable)

FOR

Bravo Events Expos Displays
71 Park Street
Buffalo, NY 14201

Certification is hereby made that: (Check "a" or "b")

a) The articles described below this Certificate have been treated with a flame-retardant chemical approved and registered by the State Fire Marshal and that the application of said chemical was done in conformance with the laws of the State of California and the Rules and Regulations of the State Fire Marshal.

Name of chemical used _____ Chem. Reg. No. _____

Method of application _____

(b) The articles described below are made from a flame-resistant fabric or material registered and approved by the State Fire Marshal for such use.

NFPA-701 (large scale)

Trade name of flame-resistant fabric or material used Blockout White 1610

Reg. No. 140.01

The Flame-Retardant Process Used WILL NOT Be Removed By Washing

Fred's Studio Tents & Canopies, Inc.

Plant Supervisor

Product Description 40x100 Series SE Pole Tent Customer Invoice # 17713

Cost Impact: The code change proposal will not increase or decrease the cost of construction No additional cost.

F243-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 3104.2 Flame propagation performance treatment. Before a permit is granted, the owner or agent shall file with the fire code official a certificate ~~executed~~provided by the product manufacturer certifying the materials have been tested by an approved testing laboratory. The certificate shall indicate that the floor coverings, tents, membrane structures and their appurtenances, which include sidewalls, drops and tarpaulins, are composed of materials meeting the flame propagation performance of Test Method 2 of NFPA 701. Additionally, it shall indicate that the bunting and combustible decorative materials and effects are composed of material meeting the flame propagation performance criteria of Test Method 1 or Test Method 2 of NFPA 701, as applicable. Alternatively, the materials shall be treated with a flame retardant in an approved manner and meet the flame propagation performance criteria of the applicable test method of NFPA 701. The flame propagation performance criteria shall be effective for the period specified by the permit.

3104.4 Certification. An affidavit or affirmation shall be submitted to the fire code official and either a copy retained on the premises on which the tent or air-supported structure is located or label affixed to the tent or air supported structure. The affidavit shall attest to the names and address of the manufacturers of the tent or air-supported structure and either of the following information relative to the flame propagation performance criteria of the fabric:

~~1. Names and address of the manufacturers of the tent or air-supported structure.~~

~~1.2. Either with t~~The date the fabric was last treated with flame-retardant solution, the trade name or kind of chemical used in treatment, name of person or firm treating the material and name of testing agency and test standard by which the fabric was tested, or

~~2.3. The material meets NFPA 701 test Method 1 or 2 without treatment.~~

Committee Reason: Approval of the modification is based on the improvement of the language to match the intent of the requirements. Approval of the proposal is based upon the proponent's published reason and that it provides specific guidance on older and newer tents. (Vote: 10-4)

Assembly Action:

None

F243-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Tim Earl, representing GBH International (tearl@gbhinternational.com) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Fire Code

3104.3 Label. Membrane structures or tents shall have a permanently affixed label bearing the following information:

1. The identification of size and fabric or material.
2. The names and addresses of the manufacturers of the tent or air-supported structure.
3. Statement that the fabric or material in addition to information required in ~~meets the requirements of~~ Section 3104.2.
4. If treated, the date the fabric or material was last treated with flame-retardant solution, the trade name or kind of chemical used in treatment, name or person or firm treating the fabric or material, and name of testing agency and test standard by which the fabric or material was tested.
5. If not treated, statement that no treatment was applied when the fabric or material met the requirements of Section 3104.2 of this Chapter.

~~**3104.4 Certification Affidavit.** An affidavit or affirmation shall be submitted to the fire code official and either a copy retained on the premises on which the tent or air-supported structure is located or label affixed to the tent or air supported structure. The affidavit shall attest to the names and address of the manufacturers of the tent or air-supported structure and either of the following information relative to the flame propagation performance criteria of the fabric: The affidavit required by Section 3104.2 shall contain all of the information specified in Section 3104.3.~~

- 1- ~~The date the fabric was last treated with flame-retardant solution, the trade name or kind of chemical used in treatment, name of person or firm treating the material and name of testing agency and test standard by which the fabric was tested, or trade name or kind of chemical used in treatment, name of person or firm treating the material and name of testing agency and test standard by which the fabric was tested, or~~
- 2- ~~The material meets NFPA 701 test Method 1 or 2 without treatment~~

Commenter's Reason: This Public Comment cleans up the requirements regarding the required affidavit and label. The intent of the original proposal is preserved, but the Public Comment lists in a more straightforward fashion the information which the affidavit and label must contain.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There is no additional cost as this is currently what the industry is doing.

Public Comment 2:

Proponent: Marcelo Hirschler, GBH International, representing GBH International (mmh@gbhint.com) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Fire Code

3104.3 Label. Membrane structures or tents shall have a permanently affixed label bearing the identification of size and fabric or material in addition to information required in Section 3104.4 of this Chapter.

3104.4 Certification Affidavit. An affidavit ~~or affirmation~~ shall be submitted to the fire code official and ~~either~~ a copy retained on the premises on which the tent or air-supported structure is located ~~or label affixed to the tent or air supported structure~~. The affidavit shall attest to the names and address of ~~the manufacturers~~ the manufacturers of the tent or air-supported structure ~~and either of the following information relative to the flame propagation performance criteria of the fabric, a statement that the fabric or material met the requirements of Section 3104.2 and one of the following:~~

1. ~~The date~~ if the fabric or material was treated, the date that it was last treated with flame-retardant solution, the trade name or kind of chemical used in treatment, name of person or firm treating the material and the name of testing agency and test standard by which the fabric or material was tested, ~~or trade name or kind of chemical used in treatment, name of person or firm treating the material and name of testing agency and test standard by which the fabric was tested, or~~ The material meets NFPA 701 test Method 1 or 2 without treatment.
2. If the fabric or material was not treated, a statement that the fabric or material met the requirements of Section 3104.2 without treatment.

Commenter's Reason: This public comment does the following:

1. It makes no changes to 3104.3, which requires that the label contain all the information in 3104.4.
2. It eliminates the contradictory requirement in 3104.4 that there be either an affidavit or a label. There must be both, as made clear by 3104.3. This does not change the requirements but cleans up a contradiction.
3. It retains all the information required by the proposal but also adds that the affidavit (and the label) must confirm not just that the fabric or material was tested but that it passed the appropriate test, as required by 3104.2. Note that passing NFPA 701 method 1 does not ensure passing NFPA 701 method 2.
4. This public comment does not address 3104.2, which is addressed by an alternate public comment.

The final wording is difficult to read in cdpAccess and it is shown below.

3104.4 Affidavit. An affidavit shall be submitted to the fire code official and a copy retained on the premises on which the tent or air-supported structure is located. The affidavit shall attest to the names and address of the manufacturers of the tent or air-supported structure, a statement that the fabric or material met the requirements of Section 3104.2 and one of the following.

1. If the fabric or material was treated, the date that it was last treated with flame-retardant solution, the trade name or kind of chemical used in treatment, name of person or firm treating the material and the name of testing agency and test standard by which the fabric or material was tested.

2. If the fabric or material was not treated, a statement that the fabric or material met the requirements of Section 3104.2 without treatment.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This public comment simply clarifies what is required in the label and the affidavit and clears an inconsistency in the code.

Public Comment 3:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Fire Code

3104.2 Flame propagation performance treatment. Before a permit is granted, the *owner* or agent shall file with the *fire code official* a certificate provided by the product manufacturer ~~certifying to verify that~~ the materials have been tested ~~and certified~~ by an *approved* testing laboratory. The certificate shall indicate that the floor coverings, tents, membrane structures and their appurtenances, which include sidewalls, drops and tarpaulins, are composed of materials meeting the flame propagation performance of Test Method 2 of NFPA 701. Additionally, it shall indicate that the bunting and combustible decorative materials and effects are composed of material meeting the flame propagation performance criteria of Test Method 1 or Test Method 2 of NFPA 701, as applicable. Alternatively, the materials shall be treated with a flame retardant in an *approved* manner and meet the flame propagation performance criteria of the applicable test method of NFPA 701. ~~The certificate shall indicate compliance with the testing requirements of Chapter 16 of NFPA 701.~~ The flame propagation performance criteria shall be effective for the period specified by the permit.

Commenter's Reason: This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>
This public comment incorporates into section 3104.2 the changes approved by the committee from proposal F242, which was submitted by FCAC. It also revises the statement of who is responsible for issuing the certificate of testing: the approved testing laboratory tests and certifies and the manufacturer provides the certification to the fire code official. Note that the term "provided" is the preferred term to "issued" as used in F242.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This is simply editorially combining the concepts in F242 and F243. Both proposals were approved by the committee.

F243-18

F245-18

IFC: 105.6, 202, 3101.1, SECTION 3106, 3106.1, 3106.2, 3106.3, 3106.4, 3106.5, 3106.6, 3106.7, 3106.8, 3106.9, 3106.10, 3106.10.1

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (FCAC@iccsafe.org)

2018 International Fire Code

Add new text as follows

105.6 Inflatable Amusement Device. Inflatable Amusement Device. The fire code official is authorized to require an operational permit to operate an inflatable amusement device.

Exception: Operation on private property for an event not open to the public.

Add new definition as follows

INFLATABLE AMUSEMENT DEVICE. A device made of flexible fabric or other combustible materials that is inflated by one or more air-blowers providing internal air pressure to maintain its shape. Such a device is designed for recreational activities that allow occupants to bounce, climb, slide, negotiate an obstacle course or participate in interactive play.

Revise as follows

3101.1 Scope. Tents, temporary special event structures and *membrane structures* shall comply with this chapter. The provisions of Section 3103 are applicable only to temporary tents and membrane structures. The provisions of Sections 3104 and 3106 are applicable to temporary and permanent tents and membrane structures. The provisions of Section 3105 are applicable to temporary special event structures. The provisions of Section 3106 are applicable to inflatable amusement devices. The provisions of Section 3107 are applicable to outdoor assembly events. Other temporary structures shall comply with the International Building Code.

Add new text as follows

SECTION 3106 INFLATABLE AMUSEMENT DEVICES

3106.1 Scope. Inflatable amusement devices shall comply with Sections 3106.2 through 3106.10.1.

3106.2 General. Inflatable amusement devices shall be designed, anchored, operated and maintained in accordance with the manufacturer's instructions. A complete copy of the manufacturer's instructions shall be filed with the operational permit and, where required, available at the site of operation for review.

3106.3 Permit required. Where required by the fire code official, the operation of an inflatable amusement device shall require a permit as set forth in Section 105.6

3106.4 Use period. Inflatable amusement devices shall not be operated for a period of more than 14 consecutive days at a single location.

3106.5 Combustible materials. The fabrics, textiles, containment netting and combustible small mesh materials used in the construction of the inflatable amusement device shall meet the flame propagation criteria of Test Method 2 of NFPA 701.

3106.6 Operation. Inflatable amusement devices shall be operated within the environmental conditions specified in the manufacturer's installation and operating instructions for wind and weather. Operators shall be familiar with the weather and wind conditions that exceed manufacturer's operating limits for an inflatable amusement device. Operators shall evacuate and deflate the device and not resume operations until conditions are within the manufacturer's operating limits.

3106.7 Permanent safety label. Every inflatable amusement device shall display one or more permanent labels demonstrating compliance with the requirements in this section.

3106.8 Required operators. The minimum number of approved operators to safely supervise operation of the device, as required by the manufacturer's instructions for each inflatable amusement device, shall be present at all times when the inflatable amusement device is in use.

3106.9 Electrical equipment and wiring. Electrical equipment, blower motors and temporary wiring for electrical power or lighting shall comply with the applicable provisions of NFPA 70. Extension cords and flexible cords shall be listed and labeled in accordance with UL 817. Electrical equipment, blower-motors and wiring utilized outdoors shall be listed and labeled for outdoor use.

3106.10 Portable generators. Portable generators shall comply with the applicable provisions of NFPA 70 and with the portable generator requirements of this code.

3106.10.1 Portable fire extinguishers. Each generator shall be provided with an approved portable fire extinguisher complying with Section 906 and placed in an approved location.

Reason: This proposal has been prepared through discussions with code officials, industry representatives and other stakeholders. Past events were analyzed related to outdoor “bounce houses” that were uplifted by wind gusts while occupied thereby resulting in injury to children and/or adults that were trapped inside. These new code requirements are simple and intended to improve the authority of code officials to ensure public safety when inflatable amusement devices are used for public gatherings or events.

This proposal introduces basic safety requirements for inflatable amusement devices also known as “bounce houses”. There have been numerous reported incidents of accidents and injuries involving these devices caused by weather events such as sustained or wind gusts and/or improper set-up, anchorage or use where the “bounce house” is uplifted, carried away and/or overturned with children or adults inside.

Chapter Scoping section modified to reference proposed new section.

This new section adds an “optional” operational permit requirement intended to cover public events and excludes operation on private (residential) property.

This section adds basic fire and electrical safety requirements for the construction, placement and operation of portable inflatable amusement devices. The section addresses safety requirements for both outdoor and indoor use of these devices.

A definition for inflatable amusement devices is also included to correlate the type of devices covered by these new IFC code requirements.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will not increase or decrease the cost of construction

This proposal adds requirements for inflatable amusement devices. This use of these devices and the requirements proposed have no relation to building construction or building construction costs.

F245-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The committee stated that they had issues with the proposal regarding indoor vs. outdoor uses, time period, fire extinguishers, and the location of portable generators. (Vote: 12-2)

Assembly Action:

None

F245-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

105.6 Inflatable Amusement Device. ~~Inflatable Amusement Device. The fire code official is authorized to require an operational permit.~~ An operational permit is required to operate an inflatable amusement device.

Exception: ~~Operation on private property for an event not open to the public.~~

INFLATABLE AMUSEMENT DEVICE. A device made of flexible fabric or other combustible materials that is inflated by one or more air-blowers providing internal air pressure to maintain its shape. Such a device is designed for recreational activities that allow occupants to bounce, climb, slide, negotiate an obstacle course or participate in interactive play.

3101.1 Scope. Tents, temporary special event structures and *membrane structures* shall comply with this chapter. The provisions of Section 3103 are applicable only to temporary tents and membrane structures. The provisions of Sections 3104 and 3106 are applicable to temporary and permanent tents and membrane structures. The provisions of Section 3105 are applicable to temporary special event structures. The provisions of Section 3106 are applicable to inflatable amusement devices. The provisions of Section 3107 are applicable to outdoor assembly events. Other temporary structures shall comply with the International Building Code.

SECTION 3106 INFLATABLE AMUSEMENT DEVICES

3106.1 Scope. Inflatable amusement devices shall comply with Sections 3106.2 through 3106.10.1.

3106.2 General. Inflatable amusement devices shall be designed, anchored, operated and maintained in accordance with the manufacturer's instructions. A complete copy of the manufacturer's instructions shall be filed with the operational permit and, where required, available at the site of operation for review.

3106.3 Permit required. Where required by the fire code official, the operation of an inflatable amusement device shall require a permit as set forth in Section 105.6

3106.4 Use period. ~~Inflatable amusement devices shall not be operated for a period of more than 14 consecutive days at a single location.~~

3106.5 Combustible materials. The fabrics, textiles, containment netting and combustible small mesh materials used in the construction of the inflatable amusement device shall meet the flame propagation criteria of Test Method 2 of NFPA 701.

3106.6 Operation. Inflatable amusement devices shall be operated within the environmental conditions specified in the manufacturer's installation and operating instructions for wind and weather. Operators shall be familiar with the weather and wind conditions that exceed manufacturer's operating limits for an inflatable amusement device. Operators shall evacuate and deflate the device and not resume operations until conditions are within the manufacturer's operating limits.

3106.7 Permanent safety label. Every inflatable amusement device shall display one or more permanent labels

demonstrating compliance with the requirements in this section.

3106.8 Required operators. The minimum number of approved operators to safely supervise operation of the device, as required by the manufacturer's instructions for each inflatable amusement device, shall be present at all times when the inflatable amusement device is in use.

~~**3106.9 Electrical equipment and wiring.** Electrical equipment, blower motors and temporary wiring for electrical power or lighting shall comply with the applicable provisions of NFPA 70. Extension cords and flexible cords shall be listed and labeled in accordance with UL 817. Electrical equipment, blower motors and wiring utilized outdoors shall be listed and labeled for outdoor use.~~

~~**3106.10 Portable generators.** Portable generators shall comply with the applicable provisions of NFPA 70 and with the portable generator requirements of this code.~~

~~**3106.10.1 Portable fire extinguishers.** Each generator shall be provided with an approved portable fire extinguisher complying with Section 906 and placed in an approved location.~~

Commenter's Reason: This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at:

<https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

This public comment introduces basic safety requirements for inflatable amusement devices also known as "bounce houses". There have been numerous reported incidents of accidents and injuries involving these devices caused by weather events such as sustained or wind gusts and/or improper set-up, anchorage or use where the "bounce house" is uplifted, carried away and/or overturned with children or adults inside.

Chapter Scoping section modified to reference proposed new section.

This new section adds an "optional" operational permit requirement intended to cover only outdoor assembly events (definition: **OUTDOOR ASSEMBLY EVENT.** An outdoor gathering of persons for any purpose). The changes to section **106.6 Permits** addresses concerns raised by the IFC Technical Committee.

The deletion of section **3106.4 Use period** in this Public Comment addresses concerns raised by the IFC Technical Committee.

This section adds basic safety requirements for the construction, placement and operation of portable inflatable amusement devices. The section addresses safety requirements for only outdoor use of these devices. Any indoor use would be governed by existing code requirements for interior finish/decorations, fire protection systems, egress, etc.

A definition for inflatable amusement devices is also included to correlate the type of devices covered by these new IFC code requirements.

The deletion of section **3106.9 Electrical equipment and wiring** in this Public Comment addresses concerns raised by the IFC Technical Committee. Electrical safety requirements are covered by IFC Chapter 6 and the NEC.

The deletion of section **3106.10 Portable generators** in this Public Comment addresses concerns raised by the IFC Technical Committee. Portable generator requirements are covered by IFC Chapter 6 and the NEC.

The deletion of section **3106.10.1 Portable Fire Extinguishers** in this Public Comment addresses concerns raised by the IFC Technical Committee. Portable fire extinguisher requirements are covered by IFC Section 906 and NFPA 10 (by reference).

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal adds requirements for inflatable amusement devices. This use of these devices and the requirements proposed have no relation to building construction or building construction costs.

F245-18

F254-18

IFC: 3205.4

Proposed Change as Submitted

Proponent: Mark Chubb, Telgian Corp., representing Telgian Corp. (mchubb@telgian.com)

2018 International Fire Code

Add new text as follows

3205.4 Aisle maintenance. When restocking is not being conducted, aisles shall be kept clear of storage, waste material and debris. Fire department access doors, aisles and *exit* doors shall not be obstructed. During restocking operations using manual stocking methods, a minimum unobstructed aisle width of 24 inches (610 mm) shall be maintained in 48-inch (1219 mm) or smaller aisles, and a minimum unobstructed aisle width of one-half of the required aisle width shall be maintained in aisles greater than 48 inches (1219 mm). During mechanical stocking operations, a minimum unobstructed aisle width of 44 inches (1118 mm) shall be maintained in accordance with Section 3206.10.

Exception: In high-piled combustible storage protected by automatic sprinkler systems designed and installed to deliver 0.60 gpm/sq ft over the most remote 2,000 sq ft and not less than 0.70 gpm/sq ft from the four most demanding sprinklers in accordance with 903.3.1.1, displays and wing stacks not exceeding 48-inches in height provided they do not obstruct or reduce the clear width of the aisle to less than 48-inches.

Reason: The proposed exception recognizes and incorporates language consistent with the provisions of NFPA 13--2016, 20.3.1(13), which represent the most prevalent fire protection design criteria for many big box retail facilities. Extensive large-scale fire testing demonstrates that such displays do not compromise the effectiveness of sprinkler systems to control or extinguish fires in high-piled combustible storage when sprinkler systems satisfy these criteria.

Bibliography: NFPA 13, Standard for the Installation of Sprinkler Systems, 2016 edition. Quincy, MA: National Fire Protection Association.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Although the proposed change will not increase or decrease the cost of construction, it will facilitate operations that increase retail revenue in facilities that satisfy the specified fire protection design criteria.

F254-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 3205.4 Aisle maintenance. When restocking is not being conducted, aisles shall be kept clear of storage, waste material and debris. Fire department access doors, aisles and exit doors shall not be obstructed. During restocking operations using manual stocking methods, a minimum unobstructed aisle width of 24 inches (610 mm) shall be maintained in 48-inch (1219 mm) or smaller aisles, and a minimum unobstructed aisle width of one-half of the required aisle width shall be maintained in aisles greater than 48 inches (1219 mm). During mechanical stocking operations, a minimum unobstructed aisle width of 44 inches (1118 mm) shall be maintained in accordance with Section 3206.10.

Exception: In high-piled ~~single- and double-row rack storage of combustible storage materials~~ protected by automatic sprinkler systems designed and installed ~~to deliver 0.60 gpm/sq ft over the most remote 2,000 sq ft and not less than 0.70 gpm/sq ft from the four most demanding sprinklers in accordance with 903.3.1.1, in accordance with the requirements of NFPA 13 governing the use of k=25.2 (360) sprinklers,~~ displays and wing stacks not exceeding 48-inches in height provided they do not obstruct or reduce the clear width of the aisle to less than 48-inches...

Committee Reason: Approval of the modification is based on the improvement of the language to elaborate that it applies to both single and double row racks and is tied to the performance of the type of fire sprinkler that is being used.. Approval of the proposal is based upon the proponent's published reason and that the addition of the exception provides a method by which the actual use of a aisle can be addressed by a heightened fire sprinkler system design. (Vote: 12-1)

Assembly Action:

None

F254-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Kevin Scott, representing KH Scott and Associates LLC. (khscottassoc@gmail.com) ; Ellie Klausbruckner, representing Klausbruckner and Associates (ek@klausbruckner.com) ; Mark Chubb, representing Telgian Corp. (mchubb@telgian.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

3205.4 Aisle maintenance. When restocking is not being conducted, aisles shall be kept clear of storage, waste material and debris. Fire department access doors, aisles and exit doors shall not be obstructed. During restocking operations using manual stocking methods, a minimum unobstructed aisle width of 24 inches (610 mm) shall be maintained in 48-inch (1219 mm) or smaller aisles, and a minimum unobstructed aisle width of one-half of the required aisle width shall be maintained in aisles greater than 48 inches (1219 mm). During mechanical stocking operations, a minimum unobstructed aisle width of 44 inches (1118 mm) shall be maintained in accordance with Section 3206.10.

Exception: ~~In high-piled single- and double-row rack storage of combustible materials protected by automatic sprinkler systems designed and installed in accordance with the requirements of NFPA 13 governing the use of k=25.2 (360) sprinklers, displays and wing stacks not exceeding 48-inches in height provided they do not obstruct or~~

Displays and wing stacks shall be permitted in aisles provided the following conditions are met:

1. The storage area consists of single-row or double-row racks.
2. The displays and wing stacks are less than 48 inches (1219 mm) in height.
3. The displays and wing stacks do not reduce the clear width of the aisle to less than 48-inches (1219 mm).
4. The storage area is protected by an automatic sprinkler system in accordance with NFPA 13 utilizing extended coverage sprinklers with a nominal K-factor of K=25.2 (360).

Commenter's Reason: This item was Approved as Modified by the committee. This Public Comment accomplishes two goals. 1) The new text becomes a 2nd paragraph rather than an exception. The section already specifies when the aisle width can be reduced for functions such as restocking. So it is not really an exception, it is another situation where the reduced aisle width is allowed.

2) The revision clarifies the requirements based on the design criteria in NFPA 13.

This situation occurs routinely in big box retail facilities. This revision provides the criteria the inspector needs to allow the operation to continue. When the criteria is met, testing has confirmed that the impact is negligible and can be allowed without a negative impact on the fire sprinkler protection.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction. This is an operational function in these retail facilities. It will not affect construction, but it will allow these displays to occur safely.

F254-18

F262-18 Part I

IFC: Chapter 33

Proposed Change as Submitted

Proponent: Paul Coats, American Wood Council, representing American Wood Council (pcoats@awc.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD THE IFC COMMITTEE, PART II WILL BE HEARD BY THE IBC-G COMMITTEE. PLEASE SEE THE TENTATIVE HEARING ORDERS FOR THE RESPECTIVE COMMITTEES.

2018 International Fire Code

CHAPTER 33 FIRE SAFETY DURING CONSTRUCTION AND DEMOLITION

SECTION 3301 GENERAL

3301.1 Scope. This chapter shall apply to structures in the course of construction, *alteration* or demolition, including those in underground locations. ~~Compliance with NFPA 241 is required for items not specifically addressed herein.~~

3301.2 Purpose. This chapter prescribes minimum safeguards for construction, *alteration* and demolition operations to provide reasonable safety to life and property from fire during such operations.

3302 REQUIREMENTS

3302.1 Requirements. Fire safety during construction and demolition shall be in accordance with Chapter 33 of the International Building Code. Compliance with NFPA 241 is required for items not specifically addressed therein.

Delete without substitution

~~SECTION 3302 DEFINITIONS~~

~~SECTION 3303 TEMPORARY HEATING EQUIPMENT~~

~~SECTION 3304 PRECAUTIONS AGAINST FIRE~~

~~SECTION 3305 FLAMMABLE AND COMBUSTIBLE LIQUIDS~~

~~SECTION 3306 FLAMMABLE GASES~~

~~SECTION 3307 EXPLOSIVE MATERIALS~~

~~SECTION 3308 OWNER'S RESPONSIBILITY FOR FIRE PROTECTION~~

~~SECTION 3309 FIRE REPORTING~~

~~SECTION 3310 ACCESS FOR FIRE FIGHTING~~

~~SECTION 3311 MEANS OF EGRESS~~

~~SECTION 3312 WATER SUPPLY FOR FIRE PROTECTION~~

~~SECTION 3313 STANDPIPES~~

~~SECTION 3314 AUTOMATIC SPRINKLER SYSTEM~~

~~SECTION 3315 PORTABLE FIRE EXTINGUISHERS~~

~~SECTION 3316 MOTORIZED CONSTRUCTION EQUIPMENT~~

SECTION 3317 SAFEGUARDING ROOFING OPERATIONS

Reason: This change takes the current requirements of Chapter 33 of the IFC and incorporates them into Chapter 33 of the IBC. It makes no changes in technical requirements and retains all requirements of both codes. Explanations of each editorial change is given section by section at the end of this reason statement.

The purview of the fire code committee for sections currently under their purview (indicated by an “[F]” before the appropriate sections), and the authority of the fire code official where the fire code official’s approval is currently required, are preserved. The practice of having key fire safety provisions in the IBC that are maintained by the IFC committee and enforced by the fire code official is already established. Many provisions of Chapter 9 do this.

Requirements for fire safety are currently found in both the IBC and the IFC, with considerable overlap. For instance, requirements for fire extinguishers, means of egress, standpipes, sprinkler systems, and water supply are currently in both codes.

Most significant construction fires are the result of noncompliance with current code requirements. The consolidation of these chapters into the IBC will reduce the likelihood of code violations leading to fire, and will be beneficial for several other reasons. First, there are jurisdictions that do not adopt the IFC and the requirements will be more accessible to them. Second, enforcement activities for key provisions such as fire watches, a fire prevention program superintendent and plan, temporary heating equipment safety, cooking areas, rubbish and debris disposal, hot work precautions, roofing precautions, and access for firefighting—all which appear in the IFC but not the IBC—are less likely to be neglected. Third, problems in correlation of overlapping requirements will be eliminated.

Here is a section-by-section explanation of modifications:

Chapter 33 title: changed to reflect the inclusion of IFC fire safety provisions.

3301.1: General: the scope is expanded to include the current scope of the Chapter 33 of the IFC, including required compliance with NFPA 241 for items not specifically addressed.

3301.2: Purpose: the IBC currently has no Purpose section, this is brought over from the IFC and modified to make it clear that fire safety is one purpose among others.

3301.3 Storage and placement: renumbering only.

3302.3 Fire safety during construction: deleted since requiring compliance with Chapter 33 of the IFC is no longer necessary; all the fire safety provisions of Chapter 33 of the IFC are being added here.

3303.7 Fire safety during demolition: deleted since requiring compliance with Chapter 33 of the IFC is no longer necessary; all the fire safety provisions of Chapter 33 of the IFC are being added here.

3309 TEMPORARY HEATING EQUIPMENT: all subsections 3309.1 through 3309.6 are unchanged from parallel provisions in Section 3303 of the IFC, except to add references to the IFC where appropriate.

3310 PRECAUTIONS AGAINST FIRE: all subsections 3310.1 through 3310.8 are unchanged from parallel provisions in Section 3304 of the IFC, except to add reference to the IFC where appropriate and editorial modifications to preserve the authority of the fire code official in subsections 3310.1, 3310.3, 3310.5.2, and 3310.8.

3311 FLAMMABLE AND COMBUSTIBLE LIQUIDS: all subsections 3311.1 through 3311.6 are unchanged from parallel provisions in Section 3305 of the IFC, except to add references to the IFC where appropriate.

3312 FLAMMABLE GASES: all subsections 3312.1 through 3312.2.1 are unchanged from parallel provisions in Section 3306 of the IFC, except to add references to the IFC where appropriate.

3313 EXPLOSIVE MATERIALS: all subsections 3313.1 through 3313.3 are unchanged from parallel provisions in Section 3307 of the IFC, except to add references to the IFC where appropriate, and editorial modifications to preserve the authority of the fire code official in subsection 3313.3.

3314 OWNER'S RESPONSIBILITY FOR FIRE PROTECTION: all subsections 3314.1 through 3314.8 are unchanged from parallel provisions in Section 3308 of the IFC, except to add references to the IFC where appropriate, and editorial modifications to preserve the authority of the fire code official in subsection 3314.3.

3315 FIRE REPORTING: Subsection 3315.1 is unchanged from parallel provisions in Section 3309 of the IFC except to editorial modification to preserve the authority of the fire code official.

3316 ACCESS FOR FIRE FIGHTING: Subsections 3316.1 AND 3316.2 are unchanged from parallel provisions in Section 3310 of the IFC, except to add a reference to the IFC where appropriate in 3316.2 and an editorial modification to preserve the authority of the fire code official in subsection 3316.1.

3317 FIRE EXTINGUISHERS is current IBC Section 3309, which parallel the current provisions of IFC 3315 Portable Fire Extinguishers. The requirements were identical except for minor editorial wording such as "not less than" vs. "not fewer than," and "including, but not limited to" in one of the items. The wording of the IFC was used, and an editorial change was made to 3317.1 to retain the authority of the fire code official in addition to the building official for enforcement, since the same requirement was found in both codes.

(Current IBC subsection 3309.2 Fire hazards was deleted; it is no longer necessary since all fire safety provisions of Chapter 33 of the IFC are being added.)

3318 MEANS OF EGRESS is current IBC Section 3310, which parallels the current provisions of IFC 3311 Means of Egress.

3318.1 Stairways required: renumbered only.

3318.2 Maintenance of means of egress: the requirements of this subsection were essentially the same as IFC Section 3311.2, but the wording differed, especially for the exception. The word "required" in front of means of egress was brought over from the fire code, and the exception was modified to incorporate accessible means of egress, which appeared in the fire code. The revisions were made to incorporate the intent of both codes, which were thought to be the same. Editorial changes were made to retain the authority of the fire code official for approval since similar provisions for temporary means of egress were found in both codes.

3319 STANDPIPES is current IBC Section 3311, which parallel the current provisions of IFC 3313. Subsections 3319.1, 3319.2, and 3319.3 have been renumbered only.

3320 AUTOMATIC SPRINKLER SYSTEM is current IBC Section 3312, which parallel the current provisions of IFC 3314.

3320.1 Completion before occupancy: editorially modified to retain references to code sections in the IBC and IFC as they appear in their respective codes, and to retain the authority of both the building officials and fire code official from the respective codes.

3320.2 Operation of valves: renumbered only. "Shall be permitted" as used by the IBC was retained instead of "shall be allowed" per the IFC.

3321 WATER SUPPLY FOR FIRE PROTECTION is current IBC Section 3313, which parallel the current provisions of IFC 3312.

3321.1 Where required: editorial changes were made to make it clear that approvals are needed from both the building official and the fire code official, since approval is currently required by each code.

3314 FIRE WATCH DURING CONSTRUCTION was deleted since the identical requirement appears in proposed Section 3310.5.1, brought over from the IFC.

3322 MOTORIZED CONSTRUCTION EQUIPMENT is current section 3316 of the IFC.

3322.1 Conditions of use: an editorial change was made in item 4 to retain the authority of the fire code official.

3323 SAFEGUARDING ROOFING OPERATIONS is current section 3317 the IFC. Editorial changes were made to subsections 3323.1 and 3323.1 to make appropriate reference to the IFC for referenced code sections.

Here are the current IFC sections and their corresponding sections in this proposal:

IFC Section 3301: it remains in the IFC.

IFC Section 3302: deleted as unnecessary to follow IBC convention.

IFC 3303: proposed IBC 3309

IFC 3304: proposed IBC 3310

IFC 3305: proposed IBC 3311

IFC 3306: proposed IBC 3312

IFC 3307: proposed IBC 3313

IFC 3308: proposed IBC 3314

IFC 3309: proposed IBC 3315

IFC 3310: proposed IBC 3316

IFC 3311: proposed IBC 3318

IFC 3312: proposed IBC 3321

IFC 3313: proposed IBC 3319

IFC 3314: proposed IBC 3320

IFC 3315: proposed IBC 3317

IFC 3316: proposed IBC 3322

IFC 3317: proposed IBC 3323

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Currently the IBC requires that all the fire safety requirements of Chapter 33 of the IFC be enforced (IBC Section 3302.3). Therefore the moving of these provisions into the IBC will have no effect on the cost of construction.

Analysis: NFPA 56 and NFPA 241 are already referenced in the I-codes. Note that there has been erratum that changed the edition of NFPA 241 referenced in the 2018 IFC to the 2013 edition.

F262-18 Part I

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved based upon concern that these provisions are already referenced in the IBC and relocation of requirements is not necessary. In addition this is consistent with the action taken on Part II of this proposal. (Vote: 13-0)

Assembly Action:

None

F262-18 Part I

Individual Consideration Agenda

Public Comment 1:

Proponent: Paul Coats, PE, CBO, representing American Wood Council (pcoats@awc.org) requests As Modified by This Public Comment.

Replace as follows:

2018 International Building Code

3302.3 Fire safety during construction. Fire safety during construction shall comply with the applicable requirements of this code and the applicable provisions of Chapter 33 of the International Fire Code. Compliance with the fire safety provisions of NFPA 241 is required for items not specifically addressed.

3303.7 Fire safety during demolition. Fire safety during demolition shall comply with the applicable requirements of this code and the applicable provisions of Chapter 33 of the International Fire Code. Compliance with the fire safety provisions of NFPA 241 is required for items not specifically addressed.

Commenter's Reason: The direct reference to NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations, is retained from the original proposal. Compliance with NFPA 241 is required in the scope of Chapter 33 of the IFC, which is referenced already in these sections. Therefore there is no change in requirements. However, a direct reference to NFPA 241 in the IBC may have benefit for jurisdictions that do not adopt the IFC or are governed by statutes that delineate enforcement responsibilities according to code. This would allow building officials to enforce the provisions of NFPA 241 if necessary.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction. Compliance with Chapter 33 of the IFC, which in turn requires compliance with NFPA 241 in its scope, is already required by Sections 3302.3 and 3303.7. Therefore there is no change in requirements that would affect the cost of construction.

F262-18 Part I

F262-18 Part II

IBC: Chapter 33, 3301.1, 3301.2, 3302.3, 3303.7, 3309, 3310, 3311, 3312, 3313, 3314, 3315 (New), 3316(New), 322(New), 3323 (New), Chapter 35

Proposed Change as Submitted

Proponent: Paul Coats, American Wood Council, representing American Wood Council (pcoats@awc.org)

2018 International Building Code

Revise as follows

CHAPTER **33 SAFEGUARDS AND FIRE PREVENTION DURING CONSTRUCTION**

SECTION 3301 GENERAL

3301.1 Scope. The provisions of this chapter shall govern safety during construction, alteration, and demolition operations, including structures in underground locations, and the protection of adjacent public and private properties. Compliance with NFPA 241 is required for items not specifically addressed herein.

3301.2 Purpose. This chapter prescribes minimum safeguards for construction, alteration and demolition operations, including minimum safeguards to provide reasonable safety to life and property from fire during such operations.

~~3301.2~~3301.3 Storage and placement. Construction equipment and materials shall be stored and placed so as not to endanger the public, the workers or adjoining property for the duration of the construction project.

SECTION 3302 CONSTRUCTION SAFEGUARDS

~~3302.3 Fire safety during construction.~~ ~~Fire safety during construction shall comply with the applicable requirements of this code and the applicable provisions of Chapter 33 of the International Fire Code.~~

SECTION 3303 DEMOLITION

Delete without substitution

~~3303.7 Fire safety during demolition.~~ ~~Fire safety during demolition shall comply with the applicable requirements of this code and the applicable provisions of Chapter 33 of the International Fire Code.~~

SECTION 3309 TEMPORARY HEATING EQUIPMENT

Add new text as follows

3309.1 Listed. Temporary heating devices shall be listed and labeled. The installation, maintenance and use of temporary heating devices shall be in accordance with the listing and the manufacturer's instructions.

3309.2 Oil-fired heaters. Oil-fired heaters shall comply with Section 603 of the International Fire Code.

3309.3 LP-gas heaters. Fuel supplies for liquefied-petroleum gas-fired heaters shall comply the International Fuel Gas Code and Chapter 61 of the International Fire Code.

3309.4 Refueling. Refueling operations for liquid-fueled equipment or appliances shall be conducted in accordance with Section 5705 of the International Fire Code. The equipment or appliance shall be allowed to cool prior to refueling.

3309.5 Installation. Clearance to combustibles from temporary heating devices shall be maintained in accordance with the labeled equipment. When in operation, temporary heating devices shall be fixed in place and protected from damage, dislodgement or overturning in accordance with the manufacturer's instructions.

3309.6 Supervision. The use of temporary heating devices shall be supervised and maintained only by competent

personnel.

SECTION 3310 PRECAUTIONS AGAINST FIRE

3310.1 Smoking. Smoking shall be prohibited except in areas approved by the fire code official. Signs shall be posted in accordance with Section 310 of the International Fire Code. In areas approved by the fire code official where smoking is permitted, ashtrays approved by the fire code official shall be provided in accordance with Section 310 of the International Fire Code.

3310.2 Combustible debris, rubbish and waste. Combustible debris, rubbish and waste material shall comply with the requirements of Sections 3310.2.1 through 3310.2.4.

3310.2.1 Combustible waste material accumulation. Combustible debris, rubbish and waste material shall not be accumulated within buildings.

3310.2.2 Combustible waste material removal. Combustible debris, rubbish and waste material shall be removed from buildings at the end of each shift of work.

3310.2.3 Rubbish containers. Where rubbish containers with a capacity exceeding 5.33 cubic feet (40 gallons) (0.15 m³) are used for temporary storage of combustible debris, rubbish and waste material, they shall have tightfitting or self-closing lids. Such rubbish containers shall be constructed entirely of materials that comply with either of the following:

1. Noncombustible materials.
2. Materials that meet a peak rate of heat release not exceeding 300 kW/m² when tested in accordance with ASTM E1354 at an incident heat flux of 50 kW/m² in the horizontal orientation.

3310.2.4 Spontaneous ignition. Materials susceptible to spontaneous ignition, such as oily rags, shall be stored in a listed disposal container.

3310.3 Burning of combustible debris, rubbish and waste. Combustible debris, rubbish and waste material shall not be disposed of by burning on the site unless approved by the fire code official.

3310.4 Open burning. Open burning shall comply with Section 307 of the International Fire Code.

3310.5 Fire watch. Where required by the fire code official or the prefire plan established in accordance with Section 3314.3, a fire watch shall be provided for building demolition and for building construction that is hazardous in nature, such as temporary heating or hot work.

3310.5.1 Fire watch during construction. Where required by the fire code official, a fire watch shall be provided during nonworking hours for new construction that exceeds 40 feet (12 192 mm) in height above the lowest adjacent grade.

3310.5.2 Fire watch personnel. Trained personnel shall be provided to serve as an on-site fire watch. Fire watch personnel shall be provided with not fewer than one means for notification of the fire department which is acceptable to the fire code official, and the sole duty of such personnel shall be to perform constant patrols and watch for the occurrence of fire. The combination of fire watch duties and site security duties is acceptable. Fire watch personnel shall be trained in the use of portable fire extinguishers.

3310.5.3 Fire watch location and records. The fire watch shall include areas specified by the prefire plan established in accordance with Section 3314.3. The fire watch personnel shall keep a record of all time periods of duty, including a log entry each time the site was patrolled and each time a structure under construction was entered and inspected. The records and log entries shall be made available for review by the fire code official upon request.

3310.6 Cutting and welding. Welding, cutting, open torches and other hot work operations and equipment shall comply with Chapter 35 of the International Fire Code.

3310.7 Electrical. Temporary wiring for electrical power and lighting installations used in connection with the construction, alteration or demolition of buildings, structures, equipment or similar activities shall comply with NFPA 70.

3310.8 Cooking. Cooking shall be prohibited except in designated cooking areas approved by the fire code official. Signs with a minimum letter height of 3 inches (76 mm) and a minimum brush stroke of 1/2 inch (13 mm) shall be posted in

conspicuous locations in designated cooking areas and state:

DESIGNATED COOKING AREA

COOKING OUTSIDE OF A DESIGNATED COOKING

AREA IS PROHIBITED

SECTION 3311 FLAMMABLE AND COMBUSTIBLE LIQUIDS

3311.1 Storage of flammable and combustible liquids. Storage of flammable and combustible liquids shall be in accordance with Section 5704 of the International Fire Code.

3311.2 Class I and Class II liquids. The storage, use and handling of flammable and combustible liquids at construction sites shall be in accordance with Section 5706.2 of the International Fire Code. Ventilation shall be provided for operations involving the application of materials containing flammable solvents.

3311.3 Housekeeping. Flammable and combustible liquid storage areas shall be maintained clear of combustible vegetation and waste materials. Such storage areas shall not be used for the storage of combustible materials.

3311.4 Precautions against fire. Sources of ignition and smoking shall be prohibited in flammable and combustible liquid storage areas. Signs shall be posted in accordance with Section 310 of the International Fire Code.

3311.5 Handling at point of final use. Class I and II liquids shall be kept in safety containers approved by the fire code official.

3311.6 Leakage and spills. Leaking vessels shall be immediately repaired or taken out of service and spills shall be cleaned up and disposed of properly.

SECTION 3312 FLAMMABLE GASES

3312.1 Storage and handling. The storage, use and handling of flammable gases shall comply with Chapter 58 of the International Fire Code.

3312.2 Cleaning with flammable gas. Flammable gases shall not be used to clean or remove debris from piping open to the atmosphere.

3312.2.1 Pipe cleaning and purging. The cleaning and purging of flammable gas piping systems, including cleaning new or existing piping systems, purging piping systems into service and purging piping systems out of service, shall comply with NFPA 56.

Exceptions:

1. Compressed gas piping systems other than fuel gas piping systems where in accordance with Chapter 53 of the International Fire Code.
2. Piping systems regulated by the International Fuel Gas Code.
3. Liquefied petroleum gas systems in accordance with Chapter 61 of the International Fire Code.

SECTION 3313 EXPLOSIVE MATERIALS

3313.1 Storage and handling. Explosive materials shall be stored, used and handled in accordance with Chapter 56 of the International Fire Code.

3313.2 Supervision. Blasting operations shall be conducted in accordance with Chapter 56 of the International Fire Code.

3313.3 Demolition using explosives. Fire hoses approved by the fire code official for use by demolition personnel shall be maintained at the demolition site wherever explosives are used for demolition. Such fire hoses shall be connected to an water supply approved by the fire code official and shall be capable of being brought to bear on post-detonation fires anywhere on the site of the demolition operation.

SECTION 3314 OWNER'S RESPONSIBILITY FOR FIRE PROTECTION

3314.1 Program development and maintenance. The owner or owner's authorized agent shall be responsible for the development, implementation and maintenance of a written plan establishing a fire prevention program at the project site applicable throughout all phases of the construction, repair, alteration or demolition work. The plan shall address the requirements of this chapter and other applicable portions of this code, the duties of staff, and staff training requirements. The plan shall be made available for review by the fire code official upon request.

3314.2 Program superintendent. The owner shall designate a person to be the fire prevention program superintendent who shall be responsible for the fire prevention program and ensure that it is carried out through completion of the project. The fire prevention program superintendent shall have the authority to enforce the provisions of this chapter and other provisions as necessary to secure the intent of this chapter. Where guard service is provided in accordance with NFPA 241, the superintendent shall be responsible for the guard service.

3314.3 Prefire plans. The fire prevention program superintendent shall develop and maintain an prefire plan approved by the fire code official and in cooperation with the fire chief. The fire chief and the fire code official shall be notified of changes affecting the utilization of information contained in such prefire plans.

3314.4 Training. Training of responsible personnel in the use of fire protection equipment shall be the responsibility of the fire prevention program superintendent. Records of training shall be kept and made a part of the written plan for the fire prevention program.

3314.5 Fire protection devices. The fire prevention program superintendent shall determine that all fire protection equipment is maintained and serviced in accordance with this code. The quantity and type of fire protection equipment shall be approved by the fire code official. Fire protection equipment shall be inspected in accordance with the fire protection program.

3314.6 Hot work operations. The fire prevention program superintendent shall be responsible for supervising the permit system for hot work operations in accordance with Chapter 35 of the International Fire Code.

3314.7 Impairment of fire protection systems. Impairments to any fire protection system shall be in accordance with Section 901 of the International Fire Code.

3314.7.1 Smoke detectors and smoke alarms. Smoke detectors and smoke alarms located in an area where airborne construction dust is expected shall be covered to prevent exposure to dust or shall be temporarily removed. Smoke detectors and alarms that were removed shall be replaced upon conclusion of dust-producing work. Smoke detectors and smoke alarms that were covered shall be inspected and cleaned, as necessary, upon conclusion of dust-producing work.

3314.8 Temporary covering of fire protection devices. Coverings placed on or over fire protection devices to protect them from damage during construction processes shall be immediately removed upon the completion of the construction processes in the room or area in which the devices are installed.

SECTION 3315 FIRE REPORTING

3315.1 Emergency telephone. Emergency telephone facilities with ready access shall be provided in an a location approved by the fire code official at the construction site, or an equivalent means of communication approved by the fire code official shall be provided. The street address of the construction site and the emergency telephone number of the fire department shall be posted adjacent to the telephone. Alternatively, where an equivalent means of communication has been approved by the fire code official, the site address and fire department emergency telephone number shall be posted at the main entrance to the site, in guard shacks and in the construction site office.

SECTION 3316 ACCESS FOR FIRE FIGHTING

3316.1 Required access. Vehicle access approved by the fire code official for firefighting shall be provided to all construction or demolition sites. Vehicle access shall be provided to within 100 feet (30 480 mm) of temporary or permanent fire department connections. Vehicle access shall be provided by either temporary or permanent roads, capable of supporting vehicle loading under all weather conditions. Vehicle access shall be maintained until permanent fire\ apparatus access roads are available.

3316.2 Key boxes. Key boxes shall be provided as required by Chapter 5 of the International Fire Code.

SECTION 33093317 FIRE EXTINGUISHERS

~~[F] 3309.13317.1~~ **Where required.** Structures under construction, *alteration* or demolition shall be provided with not fewer than one ~~approved~~ portable fire extinguisher in accordance with Section 906, approved by the building official and the fire code official, and sized for not less than ordinary hazard as follows:

1. At each *stairway* on all floor levels where combustible materials have accumulated.
2. In every storage and construction shed.
3. Additional portable fire extinguishers shall be provided where special hazards exist, such as the storage and use of flammable and combustible liquids.

Delete without substitution

~~[F] 3309.2 Fire hazards.~~ The provisions of this code and the International Fire Code shall be strictly observed to safeguard against all fire hazards attendant upon construction operations.

SECTION 33103318 MEANS OF EGRESS

~~3310.13318.1~~ **Stairways required.** Where building construction exceeds 40 feet (12 192 mm) in height above the lowest level of fire department vehicle access, a temporary or permanent *stairway* shall be provided. As construction progresses, such *stairway* shall be extended to within one floor of the highest point of construction having secured decking or flooring.

~~[F] 3310.23318.2~~ **Maintenance of means of egress.** ~~Means~~ Required means of egress and required accessible *means of egress* shall be maintained at all times during construction, demolition, remodeling or *alterations* and *additions* to any building.

Exception: Existing *means of egress* need not be maintained where ~~approved~~

temporary *means of egress* and temporary accessible means of egress systems and facilities, approved by the building official and the fire code official, are provided.

SECTION 33113319 STANDPIPES

~~[F] 3311.13319.1~~ **Where required.** In buildings required to have standpipes by Section 905.3.1, not fewer than one standpipe shall be provided for use during construction. Such standpipes shall be installed prior to construction exceeding 40 feet (12 192 mm) in height above the lowest level of fire department vehicle access. Such standpipes shall be provided with fire department hose connections at locations adjacent to *stairways* complying with Section ~~3310.1-3318.1~~. As construction progresses, such standpipes shall be extended to within one floor of the highest point of construction having secured decking or flooring.

~~[F] 3311.23319.2~~ **Buildings being demolished.** Where a building is being demolished and a standpipe exists within such a building, such standpipe shall be maintained in an operable condition so as to be available for use by the fire department. Such standpipe shall be demolished with the building but shall not be demolished more than one floor below the floor being demolished.

~~[F] 3311.33319.3~~ **Detailed requirements.** Standpipes shall be installed in accordance with the provisions of Chapter 9.

Exception: Standpipes shall be either temporary or permanent in nature, and with or without a water supply, provided that such standpipes conform to the requirements of Section 905 as to capacity, outlets and materials.

SECTION 33123320 AUTOMATIC SPRINKLER SYSTEM

~~[F] 3312.13320.1~~ **Completion before occupancy.** In buildings where an *automatic sprinkler system* is required by this code or the International Fire Code, it shall be unlawful to occupy any portion of a building or structure until the *automatic sprinkler system* installation has been tested and approved by the building and fire code official, except as provided in Section ~~111.3-111.3~~ of this code or Section 105.3.4 of the International Fire Code.

~~[F] 3312.23320.2~~ **Operation of valves.** Operation of sprinkler control valves shall be permitted only by properly authorized personnel and shall be accompanied by notification of duly designated parties. When the sprinkler protection is being regularly turned off and on to facilitate connection of newly completed segments, the sprinkler control valves shall be checked at the end of each work period to ascertain that protection is in service.

SECTION 33133321 WATER SUPPLY FOR FIRE PROTECTION

~~[F] 3313-13321.1~~ **Where required.** ~~An approved~~ water supply for fire protection, either temporary or permanent, shall be approved by the building official and fire code official and made available as soon as combustible material arrives on the site.

~~SECTION 3314 FIRE WATCH DURING CONSTRUCTION~~

SECTION 3322 MOTORIZED CONSTRUCTION EQUIPMENT

3322.1 Conditions of use. Internal-combustion-powered construction equipment shall be used in accordance with all of the following conditions:

1. Equipment shall be located so that exhausts do not discharge against combustible material.
2. Exhausts shall be piped to the outside of the building.
3. Equipment shall not be refueled while in operation.
4. Fuel for equipment shall be stored in an area outside of the building which is approved by the fire code official.

SECTION 3323 SAFEGUARDING ROOFING OPERATIONS

3323.1 General. Roofing operations utilizing heat-producing systems or other ignition sources shall be conducted in accordance with Sections 3323.2 and 3323.3 and Chapter 35 of the International Fire Code.

3323.2 Asphalt and tar kettles. Asphalt and tar kettles shall be operated in accordance with Section 303 of the International Fire Code.

3323.3 Fire extinguishers for roofing operations. Fire extinguishers shall comply with Section 906. There shall be not less than one multiple-purpose portable fire extinguisher with a minimum 3-A 40-B:C rating on the roof being covered or repaired.

CHAPTER 35 REFERENCED STANDARDS

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy MA 02169-7471

56--17:

Standard for Fire and Explosion Prevention during Cleaning and Purging of Flammable Gas Piping Systems

241--13:

Standard for Safeguarding Construction, Alteration, and Demolition Operations

Reason: This change takes the current requirements of Chapter 33 of the IFC and incorporates them into Chapter 33 of the IBC. It makes no changes in technical requirements and retains all requirements of both codes. Explanations of each editorial change is given section by section at the end of this reason statement.

The purview of the fire code committee for sections currently under their purview (indicated by an "[F]" before the appropriate sections), and the authority of the fire code official where the fire code official's approval is currently required, are preserved. The practice of having key fire safety provisions in the IBC that are maintained by the IFC committee and enforced by the fire code official is already established. Many provisions of Chapter 9 do this.

Requirements for fire safety are currently found in both the IBC and the IFC, with considerable overlap. For instance, requirements for fire extinguishers, means of egress, standpipes, sprinkler systems, and water supply are currently in both codes.

Most significant construction fires are the result of noncompliance with current code requirements. The consolidation of these chapters into the IBC will reduce the likelihood of code violations leading to fire, and will be beneficial for several other reasons. First, there are jurisdictions that do not adopt the IFC and the requirements will be more accessible to them. Second, enforcement activities for key provisions such as fire watches, a fire prevention program superintendent

and plan, temporary heating equipment safety, cooking areas, rubbish and debris disposal, hot work precautions, roofing precautions, and access for firefighting—all which appear in the IFC but not the IBC—are less likely to be neglected. Third, problems in correlation of overlapping requirements will be eliminated.

Here is a section-by-section explanation of modifications:

Chapter 33 title: changed to reflect the inclusion of IFC fire safety provisions.

3301.1: General: the scope is expanded to include the current scope of the Chapter 33 of the IFC, including required compliance with NFPA 241 for items not specifically addressed.

3301.2: Purpose: the IBC currently has no Purpose section, this is brought over from the IFC and modified to make it clear that fire safety is one purpose among others.

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3309 TEMPORARY HEATING EQUIPMENT: all subsections 3309.1 through 3309.6 are unchanged from parallel provisions in Section 3303 of the IFC, except to add references to the IFC where appropriate.

3310 PRECAUTIONS AGAINST FIRE: all subsections 3310.1 through 3310.8 are unchanged from parallel provisions in Section 3304 of the IFC, except to add reference to the IFC where appropriate and editorial modifications to preserve the authority of the fire code official in subsections 3310.1, 3310.3, 3310.5.2, and 3310.8.

3311 FLAMMABLE AND COMBUSTIBLE LIQUIDS: all subsections 3311.1 through 3311.6 are unchanged from parallel provisions in Section 3305 of the IFC, except to add references to the IFC where appropriate.

3312 FLAMMABLE GASES: all subsections 3312.1 through 3312.2.1 are unchanged from parallel provisions in Section 3306 of the IFC, except to add references to the IFC where appropriate.

3313 EXPLOSIVE MATERIALS: all subsections 3313.1 through 3313.3 are unchanged from parallel provisions in Section 3307 of the IFC, except to add references to the IFC where appropriate, and editorial modifications to preserve the authority of the fire code official in subsection 3313.3.

3314 OWNER'S RESPONSIBILITY FOR FIRE PROTECTION: all subsections 3314.1 through 3314.8 are unchanged from parallel provisions in Section 3308 of the IFC, except to add references to the IFC where appropriate, and editorial modifications to preserve the authority of the fire code official in subsection 3314.3.

3315 FIRE REPORTING: Subsection 3315.1 is unchanged from parallel provisions in Section 3309 of the IFC except to editorial modification to preserve the authority of the fire code official.

3316 ACCESS FOR FIRE FIGHTING: Subsections 3316.1 AND 3316.2 are unchanged from parallel provisions in Section 3310 of the IFC, except to add a reference to the IFC where appropriate in 3316.2 and an editorial modification to preserve the authority of the fire code official in subsection 3316.1.

3317 FIRE EXTINGUISHERS is current IBC Section 3309, which parallel the current provisions of IFC 3315 Portable Fire Extinguishers. The requirements were identical except for minor editorial wording such as “not less than” vs. “not fewer than,” and “including, but not limited to” in one of the items. The wording of the IFC was used, and an editorial change was made to 3317.1 to retain the authority of the fire code official in addition to the building official for enforcement, since the same requirement was found in both codes.

(Current IBC subsection 3309.2 Fire hazards was deleted; it is no longer necessary since all fire safety provisions of Chapter 33 of the IFC are being added.)

3318 MEANS OF EGRESS is current IBC Section 3310, which parallels the current provisions of IFC 3311 Means of Egress.

3318.1 Stairways required: renumbered only.

3318.2 Maintenance of means of egress: the requirements of this subsection were essentially the same as IFC Section 3311.2, but the wording differed, especially for the exception. The word "required" in front of means of egress was brought over from the fire code, and the exception was modified to incorporate accessible means of egress, which appeared in the fire code. The revisions were made to incorporate the intent of both codes, which were thought to be the same. Editorial changes were made to retain the authority of the fire code official for approval since similar provisions for temporary means of egress were found in both codes.

3319 STANDPIPES is current IBC Section 3311, which parallel the current provisions of IFC 3313. Subsections 3319.1, 3319.2, and 3319.3 have been renumbered only.

3320 AUTOMATIC SPRINKLER SYSTEM is current IBC Section 3312, which parallel the current provisions of IFC 3314.

3320.1 Completion before occupancy: editorially modified to retain references to code sections in the IBC and IFC as they appear in their respective codes, and to retain the authority of both the building officials and fire code official from the respective codes.

3320.2 Operation of valves: renumbered only. "Shall be permitted" as used by the IBC was retained instead of "shall be allowed" per the IFC.

3321 WATER SUPPLY FOR FIRE PROTECTION is current IBC Section 3313, which parallel the current provisions of IFC 3312.

3321.1 Where required: editorial changes were made to make it clear that approvals are needed from both the building official and the fire code official, since approval is currently required by each code.

3314 FIRE WATCH DURING CONSTRUCTION was deleted since the identical requirement appears in proposed Section 3310.5.1, brought over from the IFC.

3322 MOTORIZED CONSTRUCTION EQUIPMENT is current section 3316 of the IFC.

3322.1 Conditions of use: an editorial change was made in item 4 to retain the authority of the fire code official.

3323 SAFEGUARDING ROOFING OPERATIONS is current section 3317 the IFC. Editorial changes were made to subsections 3323.1 and 3323.1 to make appropriate reference to the IFC for referenced code sections.

Here are the current IFC sections and their corresponding sections in this proposal:

IFC Section 3301: it remains in the IFC.

IFC Section 3302: deleted as unnecessary to follow IBC convention.

IFC 3303: proposed IBC 3309

IFC 3304: proposed IBC 3310

IFC 3305: proposed IBC 3311

IFC 3306: proposed IBC 3312

IFC 3307: proposed IBC 3313

IFC 3308: proposed IBC 3314

IFC 3309: proposed IBC 3315

IFC 3310: proposed IBC 3316

IFC 3311: proposed IBC 3318

IFC 3312: proposed IBC 3321

IFC 3313: proposed IBC 3319

IFC 3314: proposed IBC 3320

IFC 3315: proposed IBC 3317

IFC 3316: proposed IBC 3322

IFC 3317: proposed IBC 3323

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Currently the IBC requires that all the fire safety requirements of Chapter 33 of the IBC be enforced (IBC Section 3302.3). Therefore the moving of these provisions into the IBC will have no effect on the cost of construction.

Analysis: NFPA 56 and NFPA 241 are already referenced in the I-codes. Note that there has been erratum that changed the edition of NFPA 241 referenced in the 2018 IFC to the 2013 edition.

F262-18 Part II

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal would be difficult to enforce and time consuming. Some jurisdictions do not have a fire department. Putting the burden on the owner and the construction manager is the proper way to handle this situation. This complicates and muddies the code and makes the construction manager's job more difficult. (Vote: 14-0)

Assembly Action:

None

F262-18 Part II

Proposed Change as Submitted

Proponent: Jeffrey Shapiro, representing Self (jeff.shapiro@intlcodeconsultants.com)

2018 International Fire Code

Revise as follows

SECTION 33083303 OWNER'S RESPONSIBILITY FOR RESPONSIBILITY FOR FIRE PROTECTION

~~3308-1~~**3303.1 Program development and maintenance.** The *owner* or *owner's* authorized agent shall be responsible for the development, implementation and maintenance of a written plan establishing a fire prevention program at the project site applicable throughout all phases of the construction, repair, *alteration* or demolition work. The plan shall address the requirements of this chapter and other applicable portions of this code, the duties of staff, and staff training requirements. The plan shall be made available for review by the *fire code official* upon request.

~~3308-2~~**3303.2 Program superintendent.** The *owner* shall designate a person to be the fire prevention program superintendent who shall be responsible for the fire prevention program and ensure that it is carried out through completion of the project. The fire prevention program superintendent shall have the authority to enforce the provisions of this chapter and other provisions as necessary to secure the intent of this chapter. Where guard service is provided in accordance with NFPA 241, the superintendent shall be responsible for the guard service.

Add new text as follows

3303.3 Daily fire safety inspection. The fire prevention program superintendent shall be responsible for completion of a daily fire safety inspection at the project site. Each day, all building and outdoor areas shall be inspected to ensure compliance with the inspection list in this section. The results of each inspection shall be documented and maintained on site until a certificate of occupancy has been issued. Documentation shall be immediately available on site for presentation to the fire code official upon request.

Failure to properly conduct, document and maintain documentation required by this section shall constitute an unlawful act in accordance with Section 110.1 and shall result in the issuance of a notice of violation in accordance with Section 110.3 to the fire prevention program superintendent. Upon the third offence in any 30-day period, offense, the fire code official is authorized to issue a stop work order shall be issued in accordance with Section 112, and work shall not resume until satisfactory assurances of future compliance have been presented to and approved by the fire code official.

1. Any contractors entering the site to perform hot work each day have been instructed in hot work safety requirements in Chapter 35 and hot work is only performed in areas approved by the fire prevention superintendent.
2. Temporary heating equipment is maintained away from combustible materials in accordance with the equipment manufacturer's instructions.
3. Combustible debris, rubbish and waste material is removed from the building in areas where work is not being performed.
4. Temporary wiring does not have exposed conductors.
5. Flammable liquids and other hazardous materials are stored in locations that have been approved by the fire prevention superintendent when not involved in work that is being performed.
6. Fire apparatus access roads required by Section 3310 are maintained clear of obstructions that reduce the width of the usable roadway to less than 20 feet.
7. Fire hydrants are clearly visible from access roads and are not obstructed.
8. The location of fire department connections to standpipe and in-service sprinkler systems are clearly identifiable from the access road and such connections are not obstructed.
9. Standpipe systems are in service and continuous to the highest work floor, as specified in Section 3313.
10. Portable fire extinguishers are available in locations required by Section 3315 and 3317.3.

~~3308-3~~**3303.4 Prefire plans.** The fire prevention program superintendent shall develop and maintain an *approved* prefire plan in cooperation with the fire chief. The fire chief and the *fire code official* shall be notified of changes affecting the utilization of information contained in such prefire plans.

~~3308-4~~**3303.5 Training.** Training of responsible personnel in the use of fire protection equipment shall be the responsibility of the fire prevention program superintendent. Records of training shall be kept and made a part of the

written plan for the fire prevention program.

3308-53303.6 Fire protection devices. The fire prevention program superintendent shall determine that all fire protection equipment is maintained and serviced in accordance with this code. The quantity and type of fire protection equipment shall be *approved*. Fire protection equipment shall be inspected in accordance with the fire protection program.

3308-63303.7 Hot work operations. The fire prevention program superintendent shall be responsible for supervising the permit system for hot work operations in accordance with Chapter 35.

3308-73303.8 Impairment of fire protection systems. Impairments to any *fire protection system* shall be in accordance with Section 901.

3308-7-13303.8.1 Smoke detectors and smoke alarms. Smoke detectors and smoke alarms located in an area where airborne construction dust is expected shall be covered to prevent exposure to dust or shall be temporarily removed. Smoke detectors and alarms that were removed shall be replaced upon conclusion of dust-producing work. Smoke detectors and smoke alarms that were covered shall be inspected and cleaned, as necessary, upon conclusion of dust-producing work.

3308-83303.9 Temporary covering of fire protection devices. Coverings placed on or over fire protection devices to protect them from damage during construction processes shall be immediately removed upon the completion of the construction processes in the room or area in which the devices are installed.

Reason: The number and magnitude of construction fires in the past few years has been well documented in NFPA loss reports and on national news. Many of these fires are not "accidental," but are instead the result of inexcusable carelessness...failing to follow basic fire safety practices. For some reason, it seems that there has been a loss of attention to fire safety at construction sites. Although major construction fires represent a relatively small percentage of the overall population of buildings under construction at any given time, the consequences of these fires is seeming to impact nearby buildings and neighborhoods with increasing frequency and increasing levels of damage. Contractors are busy trying to stay on schedule. Fire inspectors show up to look at specific inspection tasks, such as sprinkler inspections, without having time to look at construction fire safety concerns. Building inspectors are on tight inspection schedules and may not have time or be trained to look for fire safety concerns. It seems that nobody is focused on construction site fire safety. Ultimately, this responsibility falls on the owner and the fire prevention program superintendent to ensure compliance, and there needs to be a viable way to verify that the responsible parties are doing their code-required jobs.

Hence, this proposal is intended to serve as a hammer to make sure that there is a motivation to pay attention to basic fire safety requirements and to pin this responsibility on the owner and the fire prevention program superintendent. By requiring daily inspections and documentation, any fire or building inspector can simply request to see the checklist when at the site for any reason, and a clear enforcement path is specified when non-compliance is encountered. While it's true that someone could just do the paperwork exercise, the liability associated with fraudulently documenting compliance in the event of an incident would be significant, and presumably, there will be cases where code officials will spot check compliance.

Unfortunately, there is no perfect solution to this issue. But this proposal represents a significant step forward with regard to getting responsible parties to pay attention to a significant and ongoing issue.

This proposal also recommends relocating Section 3308 to Section 3303. This is perhaps the most important part of Chapter 33, and the requirements need to be right up front.

Cost Impact: The code change proposal will increase the cost of construction. The additional time required for personnel to complete the tasks required by this section will increase the cost of construction.

F263-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 3303.3 Daily fire safety inspection. The fire prevention program superintendent shall be responsible for completion of a daily fire safety inspection at the project site. Each day, all building and outdoor areas shall be inspected to ensure compliance with the inspection list in this section. The results of each inspection shall be documented and maintained on site until a certificate of occupancy has been issued. Documentation shall be immediately available on site for presentation to the fire code official upon request.

Failure to properly conduct, document and maintain documentation required by this section shall constitute an unlawful act in accordance with Section 110.1 and shall result in the issuance of a notice of violation in accordance with Section 110.3 to the fire prevention program superintendent. Upon the third ~~offense in any 30-day period,~~ offense, the fire code official is authorized to issue a stop work order ~~shall be issued~~ in accordance with Section 112, and work shall not resume until satisfactory assurances of future compliance have been presented to and approved by the fire code official.

1. Any contractors entering the site to perform hot work each day have been instructed in hot work safety requirements in Chapter 35 and hot work is only performed in areas approved by the fire prevention superintendent.
2. Temporary heating equipment is maintained away from combustible materials in accordance with the equipment manufacturer's instructions.
3. Combustible debris, rubbish and waste material is removed from the building in areas where work is not being performed.
4. Temporary wiring does not have exposed conductors.
5. Flammable liquids and other hazardous materials are stored in locations that have been approved by the fire prevention superintendent when not involved in work that is being performed.
6. Fire apparatus access roads required by Section 3310 are maintained clear of obstructions that reduce the width of the usable roadway to less than 20 feet.
7. Fire hydrants are clearly visible from access roads and are not obstructed.
8. The location of fire department connections to standpipe and in-service sprinkler systems are clearly identifiable from the access road and such connections are not obstructed.
9. Standpipe systems are in service and continuous to the highest work floor, as specified in Section 3313.
10. Portable fire extinguishers are available in locations required by Section 3315 and 3317.3.

Committee Reason: The proposal was approved based upon the need for more tools for the code official to address hazards on construction sites. This provides a daily emphasis on the jobsite that they have a plan in place that needs to be followed. The checklist was felt to be helpful especially for alterations where the building may be occupied. The modification simply provides the authority to the fire code official to issue a stop work order versus it being mandatory after 30 days. This gives more flexibility to address each situation individually. There was some concern that this should be focused upon larger projects. There is a concern with movement of administrative provisions outside of Chapter 1. Some concern that projects may be shutdown based upon paperwork not being complete. There was also a suggestion that this be refined to coordinate the checklist with what is already required in Chapter 33. (Vote: 11-3)

Assembly Action:

None

F263-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Catlett, J.D. Catlett Code Consulting, LLC, representing BOMA International (jcatlett@boma.org) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Fire Code

3303.3 Daily fire safety inspection. The fire prevention program superintendent shall be responsible for completion of a daily fire safety inspection at the project site. Each day, all building and outdoor areas shall be inspected to ensure compliance with the inspection list in this section. The results of each inspection shall be documented and maintained on site until a certificate of occupancy has been issued. Documentation shall be immediately available on site for presentation to the fire code official upon request.

~~Failure to properly conduct, document and maintain documentation required by this section shall constitute an unlawful act in accordance with Section 110.1 and shall result in the issuance of a notice of violation in accordance with Section 110.3 to the fire prevention program superintendent. Upon the third offense, the fire code official is authorized to issue a stop work order in accordance with Section 112, and work shall not resume until satisfactory assurances of future compliance have been presented to and approved by the fire code official. be subject to actions by the fire code official as provided in Sections 110 and 112.~~

1. Any contractors entering the site to perform hot work each day have been instructed in hot work safety requirements in Chapter 35 and hot work is only performed in areas approved by the fire prevention superintendent.
2. Temporary heating equipment is maintained away from combustible materials in accordance with the equipment manufacturer's instructions.
3. Combustible debris, rubbish and waste material is removed from the building in areas where work is not being performed.
4. Temporary wiring does not have exposed conductors.
5. Flammable liquids and other hazardous materials are stored in locations that have been approved by the fire prevention superintendent when not involved in work that is being performed.
6. Fire apparatus access roads required by Section 3310 are maintained clear of obstructions that reduce the width of the usable roadway to less than 20 feet.
7. Fire hydrants are clearly visible from access roads and are not obstructed.
8. The location of fire department connections to standpipe and in-service sprinkler systems are clearly identifiable from the access road and such connections are not obstructed.
9. Standpipe systems are in service and continuous to the highest work floor, as specified in Section 3313.
10. Portable fire extinguishers are available in locations required by Section 3315 and 3317.3.

Commenter's Reason: BOMA agrees with the intended language that adds the fire safety checklist to the responsibilities of a construction operation. However, administrative provisions should not be part of technical provisions. Sections 110 and 112 provide adequate direction and authority to address violations of the IFC. Additionally, the code should allow the fire official flexibility to gauge the level of violation of this section without direction that three violations constitute actions by the fire code official to stop work. A single violation could be egregious enough to warrant a stop-work order if fire safety violations noted on site constitute an immediate hazard. On the other hand, failing to check a box while it is obvious that onsite fire safety practices are being observed and promoted should not be grounds alone for stopping work.

The provisions as written do not establish a time frame for non-compliance. An example would be if the checklist is regularly completed and site fire safety compliance is obvious, but on three days during a six month period the checklist were not available due to oversight or misplacement by the job superintendent, the project would be subject to a stop-work order. The fire code official should have the flexibility to gauge the over-all compliance when considering stopping work. Although the provisions do not mandate action by the fire code official, an overzealous or new fire code official/fire inspector may cause project disruption without considering all of the elements addressed above.

BOMA feels that steps to insure compliance belong in the administrative provisions of the IFC and that the technical provisions should address desired technical outcomes.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There is no cost impact as this public comment simply references existing requirements in Chapter 1. The overall code change will increase the cost of construction due to the requirement for daily inspections.

Public Comment 2:

Proponent: William Koffel, representing Self (wkoffel@koffel.com) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Fire Code

3303.3 Daily fire safety inspection. The fire prevention program superintendent shall be responsible ~~for to verify~~

completion of a daily fire safety inspection at the project site. Each day, all building and outdoor areas shall be inspected to ensure compliance with the inspection list in this section. The results of each inspection shall be documented and maintained on site until a certificate of occupancy has been issued. Documentation shall be immediately available on site for presentation to the fire code official upon request.

Exception: The frequency of inspection are not required to occur daily where the frequency of inspections are performed and documented in accordance with an approved fire prevention program.

~~Failure to properly conduct, document and maintain documentation required by this section shall constitute an unlawful act in accordance with Section 110.1 and shall result in the issuance of a notice of violation in accordance with Section 110.3 to the fire prevention program superintendent. Upon the third offense, the fire code official is authorized to issue a stop work order in accordance with Section 112, and work shall not resume until satisfactory assurances of future compliance have been presented to and approved by the fire code official.~~

1. Any contractors entering the site to perform hot work each day have been instructed in hot work safety requirements in Chapter 35 and hot work is only performed in areas approved by the fire prevention superintendent.
2. Temporary heating equipment is maintained away from combustible materials in accordance with the equipment manufacturer's instructions.
3. Combustible debris, rubbish and waste material is removed from the building in areas where work is not being performed.
4. Temporary wiring does not have exposed conductors.
5. Flammable liquids and other hazardous materials are stored in locations that have been approved by the fire prevention superintendent when not involved in work that is being performed.
6. Fire apparatus access roads required by Section 3310 are maintained clear of obstructions that reduce the width of the usable roadway to less than 20 feet.
7. Fire hydrants are clearly visible from access roads and are not obstructed.
8. The location of fire department connections to standpipe and in-service sprinkler systems are clearly identifiable from the access road and such connections are not obstructed.
9. Standpipe systems are in service and continuous to the highest work floor, as specified in Section 3313.
10. Portable fire extinguishers are available in locations required by Section 3315 and 3317.3.

3303.3.1 Violations. Failure to properly conduct, document and maintain documentation required by Section 3303.3 shall constitute an unlawful act in accordance with Section 110.1 and shall result in the issuance of a notice of violation in accordance with Section 110.3 to the fire prevention program superintendent. Upon the third offense, the fire code official is authorized to issue a stop work order in accordance with Section 112, and work shall not resume until satisfactory assurances of future compliance have been presented to and approved by the fire code official.

Commenter's Reason: The Public Comment accomplishes two objectives:

First, the language as approved by the Committee implies the the fire prevention program superintendent must be the one who performs and documents the inspections. On many construction projects, the actual inspections are delegated to a contractor. The owner, through the fire prevention program superintendent, should be responsible to verify that the inspections are being performed and documented. The proposed language clarifies what is believed to be the intent of the submitter of the proposal.

Secondly, an inspection frequency of daily may not be appropriate in all instances. In most instances the exception is likely to be used to allow inspections to be performed less than daily and that may be appropriate for some construction sites. However, there may be instances in which the fire prevention program will require inspections to be more frequent than daily. By referring to the approved fire prevention program, a dialogue must occur between the owner and the fire official to determine the key components of the fire prevention program and the fire official will approve the program.

Note for clarity of the new exception the second paragraph was moved to a new subsection 3303.3.1.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The impact of the Public Comment language will not increase the cost of construction and in some instances might decrease the cost of construction because it may decrease the frequency of some inspections.

F264-18

IFC: 3304.5, 3304.5.1, 3304.5.2, 3304.5.2.1, 3304.5.2.2, 3304.5.2.3, 3304.5.3, 3308.5.4, 3304.8, 3308.1, 3308.1.1, 3308.2, 3308.3, 3308.4, 3308.5, , 3308.6, 3308.7, 3308.8, 501.3, 501.3.1, 202

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Fire Code

Revise as follows

3304.5 Fire watch. Where required by the *fire code official* or the ~~pre-fire site safety~~ plan established in accordance with Section ~~3308.3~~3308.1, a fire watch shall be provided for building demolition and for building construction that is hazardous in nature, such as temporary heating or hot work: construction.

3304.5.1 Fire watch during construction. ~~Where required by the fire code official, a~~ fire watch shall be provided during nonworking hours for new construction that exceeds 40 feet (12 192 mm) in height above the lowest adjacent grade at any point along the building perimeter, any new multi-story construction with an aggregate area exceeding 50,000 sq. ft. per story or as required by the fire code official.

3304.5.2 Fire watch personnel. ~~Trained personnel shall be provided to serve as an on-site fire watch. Fire watch personnel shall be provided with not fewer than one approved means for notification of the fire department, and the sole duty of such personnel shall be to perform constant patrols and watch for the occurrence of fire. The combination of fire watch duties and site security duties is acceptable. Fire watch personnel shall be trained in the use of portable fire extinguishers in accordance with this section.~~

Add new text as follows

3304.5.2.1 Duties. The primary duty of fire watch personnel shall be to perform constant patrols and watch for the occurrence of fire. The combination of fire watch duties and site security duties is acceptable.

3304.5.2.2 Training. Personnel shall be trained to serve as an on-site fire watch. Training shall include the use of portable fire extinguishers. Fire extinguishers and fire reporting shall be in accordance with Section 3309.

3304.5.2.3 Means of notification. Fire watch personnel shall be provided with not fewer than one approved means for notifying the fire department.

Revise as follows

3304.5.3 Fire watch location and records. The fire watch shall include areas specified by the ~~pre-fire site safety~~ plan established in accordance with Section 3308.3. ~~The fire watch personnel shall keep a record of all time periods of duty, including a log entry each time the site was patrolled and each time a structure under construction was entered and inspected. The records and log entries shall be made available for review by the fire code official upon request.~~3308.

3304.5.4 Fire Watch Records. Fire watch personnel shall keep a record of all time periods of duty, including the log entry each time the site was patrolled, and each time a structure was entered and inspected. Records shall be made available for review by the fire code official upon request.

3304.8 Cooking. Cooking shall be prohibited except in *approved* designated cooking areas separated from combustible materials by a minimum of ten feet. Signs with a minimum letter height of 3 inches (76 mm) and a minimum brush stroke of 1/2 inch (13 mm) shall be posted in conspicuous locations in designated cooking areas and state:
DESIGNATED COOKING AREA

COOKING OUTSIDE OF A DESIGNATED COOKING AREA IS PROHIBITED

3308.1 Program development and maintenance. The owner or owner's authorized agent shall be responsible for the development, implementation and maintenance of ~~a~~an approved written site safety plan establishing a fire prevention program at the project site applicable throughout all phases of the construction, repair, alteration or demolition work. The plan shall address the requirements of this chapter and other applicable portions of this code, the duties of staff, and staff training requirements. The plan shall be submitted and approved before a building permit is issued. Any changes to the plan shall be made available for review by the fire code official upon request.submitted for approval.

Add new text as follows

3308.1.1 Components of Site Safety Plans. Site Safety Plans shall include the following as applicable:

1. Name and contact information of Site Safety Director
2. Documentation of the training of the Site Safety Director and fire watch personnel
3. Procedures for reporting emergencies
4. Fire Department Vehicle Access routes
5. Location of fire protection equipment including portable fire extinguishers, standpipes, fire department connections and fire hydrants.
6. Smoking and cooking policy, designated areas to be used when approved, and signage locations in accordance with 3304.8.
7. Location and safety considerations for temporary heating equipment
8. Hot work permit plan
9. Plans for control of combustibile waste material
10. Locations and methods for storage and use of flammable and combustibile liquids and other hazardous materials
11. Provisions for site security
12. Changes that affect this plan
13. Other site-specific information required by the Fire Code Official

Revise as follows

3308.2 ~~Program superintendent.~~Site Safety Director. ~~The owner shall designate a person to be the fire prevention program superintendent who~~ site safety director. ~~The site safety director shall be responsible for the fire prevention program and ensure that it is carried out through completion of the project. The fire prevention program superintendent ensuring compliance with the site safety plan. The site safety director shall have the authority to enforce the provisions of this chapter and other provisions as necessary to secure the intent of this chapter. Where guard service is provided in accordance with NFPA 241, the superintendent~~ site safety director shall be responsible for the guard service.

3308.3 ~~Prefire plans.~~Qualifications. ~~The fire prevention program superintendent shall develop and maintain an approved~~ prefire plan in cooperation with the fire chief. The fire chief and the fire code official shall be notified of changes affecting the utilization of information contained in such prefire plans. ~~Site Safety Director shall acquire training specific to their roles and responsibilities. Upon request, the training and qualifications of the Site Safety Director shall be submitted to the Fire Code Official for approval.~~

3308.4 Training. ~~Training of fire watch and other responsible personnel in the use of fire protection equipment shall be the responsibility of the fire prevention program superintendent.~~ site safety director. ~~Records of training shall be kept and made a part of the written plan for the fire prevention program.~~ site safety plan.

3308.5 Fire protection devices. ~~The fire prevention program superintendent shall determine~~ Site Safety Director shall ensure ~~that all fire protection equipment is maintained and serviced in accordance with this code. The quantity and type of fire protection equipment shall be approved. Fire protection equipment shall be inspected in accordance with the fire protection program.~~

3308.5 Fire protection devices. ~~The fire prevention program superintendent shall determine that all fire protection equipment is maintained and serviced in accordance with this code. The quantity and type of fire protection equipment shall be approved. Fire protection equipment shall be inspected in accordance with the fire protection program.~~

3308.6 Hot work operations. ~~The fire prevention program superintendent shall be responsible for supervising the permit system for~~ Site Safety Director shall ensure hot work operations and permit procedures are ~~in accordance with Chapter 35.~~

3308.7 Impairment of fire protection systems. ~~Impairments~~ The Site Safety Director shall ensure impairments to any fire protection system shall be ~~are~~ in accordance with Section 901.

3308.8 Temporary covering of fire protection devices. ~~Coverings placed on or over fire protection devices to protect them from damage during construction processes shall be immediately removed upon the completion of the construction processes in the room or area in which the devices are installed.~~

501.3 Construction documents. ~~Construction documents for proposed fire apparatus access, location of fire lanes, security gates across fire apparatus access roads and construction documents and hydraulic calculations for fire hydrant~~

systems shall be submitted to the fire department for review and approval prior to construction.

Add new text as follows

501.3.1 Site Safety Plan. The owner or owner's authorized agent shall be responsible for the development, implementation and maintenance of an approved written site safety plan in accordance with Section 3308.

SITE SAFETY PLAN

A plan developed to establish a fire prevention program at a construction site.

Reason: Fires in buildings under construction have, unfortunately, become routine. Fire departments across the United States are being stressed beyond their limits by these fires, and communities are being subjected to all of the negative consequences of losing major projects and draining fire protection resources. Virtually every national organization with a stake in this issue are wrestling with solutions. Part of the solution is to provide on-site safety supervision throughout the construction project. This code change will refine and clarify current requirements, and will require that the site safety plans be submitted with other construction documents in order to inform the building officials of their existence and their requirements. Specifically:

3304.5 This section has been reformatted for clarity.

3304.5.1 Makes a fire watch mandatory for buildings above 40 ft. in height or multi-story construction with an aggregate area exceeding 50,000 sq. ft. These buildings are large enough to create a significant loss to a community, endanger firefighters, and consume resources at an extraordinary rate if the building burns.

3304.5.2.1 maintains the requirement that the primary role of fire watch personnel is to watch for fires, but may also serve as security.

3305.2.2 Maintains current requirements for training fire watch personnel

3304.5.2.3 Requires the fire watch person to have a means to notify the fire department.

3304.8 introduces a requirement for separating the construction site from cooking operations.

3308.1 introduces a new requirement for the site safety plan to be submitted for approval before a building permit is issued. This is intended to highlight the importance of having a plan, and getting it into the hands of the inspectors before the building is actually under construction.

3308.1.1 outlines the content required for a site safety plan.

3308.2 simply changes the nomenclature from "fire prevention program superintendent" to "site safety director".

3308.3 requires the site safety director to be trained in the duties of the job

3308.4 updates the verbiage of the existing requirements

3308.5 updates the language and removes an ambivalent requirement for the "quantity and type of fire protection equipment" to be approved; it also removes language about inspecting the equipment because that is deemed to be redundant language

3308.6 inserts a reference to Chapter 35 for hot work and updates the language.

Section 501.3.1 is updated to require a site safety plan and place responsibility on the owner.

Finally, a definition for site safety plan is added.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will increase the cost of construction

it's likely that this code change will have a minimal, but increased cost impact. Many construction sites already comply with these provisions; for those that don't, the cost of added security and development of a site safety plan will be additional costs.

F264-18

Public Hearing Results

Errata:

3304.5.2.2 Training. Personnel shall be trained in to serve as an on-site fire watch. Training shall include the use of portable fire extinguishers. Fire extinguishers and fire reporting shall be in accordance with Section 3309.

3304.5.3 Fire watch location and records. The fire watch shall include areas specified by the prefire site safety plan plan established in accordance with Section 3308.

~~3308.5.4~~ **3304.5.4 Fire Watch Records.** Fire watch personnel shall keep a record of all time periods of duty, including the log entry each time the site was patrolled, and each time a structure was entered and inspected. Records shall be made available for review by the fire code official upon request.

Committee Action:

As Submitted

Committee Reason: This proposal was approved as it was seen a good companion change to code change proposal F263-18. In addition, the term "site safety plan" was seen as better terminology than "pre-fire plan." It was agreed that requiring the site safety plan to be approved by the fire code official is necessary. Allowing security to be used for fire watch was seen as a good use of resources. (Vote: 14-0)

Assembly Action:

None

F264-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Catlett, representing BOMA International (jcatlett@boma.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

3308.1 Program development and maintenance. The owner or owner s authorized agent shall be responsible for the development, implementation and maintenance of an approved written site safety plan establishing a fire prevention program at the project site applicable throughout all phases of the construction, repair, alteration or demolition work. The plan shall address the requirements of this chapter and other applicable portions of this code, the duties of staff, and staff training requirements. The plan shall be submitted and approved before a building permit is issued, Any changes to the plan shall be submitted for approval. Where required by the fire code official, a pre-construction meeting shall be required before construction proceeds beyond the foundation.

Commenter's Reason: The code change adds necessary fire safety protection for construction projects. However, it stops short of one of the most important elements; communication. This public comment adds an important element that many fire code officials may have not considered. Having a pre-construction or post foundation permit conference to discuss the site safety plan allows for the direct communication to lay the ground rules and open communications for all parties to the safe building team. This is not a mandate for departments with limited staffing or resources. However, it brings in a concept found in the IEBC that promotes discussion and understanding of requirements.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction adding a meeting at the fire code officials request will not add to the cost of construction.

Public Comment 2:

Proponent: John Catlett, representing BOMA International (jcatlett@boma.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

3304.5.2 Fire watch personnel. Fire watch personnel shall be provided in accordance with this section. Buildings or campus facilities that employ twenty-four hour security, have an on-site police department, or that maintain an on-site fire department shall be approved by the fire code official where it has been demonstrated that they meet the requirements of this section and are able to perform the functions set out by this code.

Commenter's Reason: As the provisions are currently written, one would believe that the owner or their designee would be required to employ a separate and distinct fire watch or service when construction exceeds the thresholds established. Many large buildings, college and university campuses, large campus type manufacturing facilities, and similar establishments have on site security forces capable of serving as a fire watch. For example, Colonial Williamsburg located in Virginia has a dedicated police force responsible for all of the buildings and facilities that make up Colonial Williamsburg. As part of the site safety plan approval process, the fire code official can evaluate the capabilities of their staff to carry out the requirements of a fire watch and ability to adequately provide coverage. Many large buildings and manufacturing facilities provide the same. The added language provides clarity for these types of special operations without adding the additional cost of an outside fire watch.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The public comment may reduce the cost of construction because it may provide additional persons that can undertake the fire watch from the building or facility without having to pay outside personnel or the fire department.

Public Comment 3:

Proponent: Billie Zidek, APPA, representing APPA requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

3304.5 Fire watch. Where required by the *fire code official* or the site safety plan established in accordance with Section 3308.1, a fire watch shall be provided for building ~~demolition and~~ Type III and V building construction or for building construction that is hazardous in nature, such as temporary heating or hot work.

3304.5.1 Fire watch during construction. A fire watch shall be provided during nonworking hours for ~~new construction~~ construction defined in Section 3304.5 that is new and that exceeds 40 feet (12 192 mm) in height above the lowest adjacent grade at any point along the building perimeter, any new multi-story construction with an aggregate area exceeding 50,000 sq. ft. per story or as required by the fire code official. Unoccupied buildings under renovation or construction that have functioning fire alarm system as approved by the fire code official are exempt from this requirement.

3308.3 Qualifications. The Site Safety Director shall acquire training specific to their roles and responsibilities. Upon request, the training and qualifications of the Site Safety Director shall be submitted to the Fire Code Official ~~for approval~~.

Commenter's Reason: APPA applauds efforts to improve fire safety at the construction site. However, the emphasis for fire watches should be placed on Type III and V buildings and/or those where hot work and temporary heating is part of the construction. We have proposed recommended language in 3304.5.

The language in this proposal as currently written does not address buildings undergoing renovations or construction where existing fire alarm systems are functioning and active. Under such circumstances the need for a fire watch certainly does not exist. We have proposed recommended language in 3304.5.1 that would remove the Fire watch requirement under such conditions.

We also note that Section 3308.3 would require under F264-18 that Fire Code Officials approve the training and qualifications of the Site Safety Director, however, there is no description or explanation of the criteria used by the Fire Code Official to substantiate director training and qualifications. We recommend changes to the language that would still require the director's credentials to be submitted to fire code officials, but not for approval.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. These changes should partially reduce the increase in cost of construction that the original proposal would produce.

Public Comment 4:

Proponent: Tien Peng, representing National Ready Mixed Concrete Association (tpeng@nrmca.org) requests As Submitted.

Commenter's Reason: In a real, unexpected structural fire, at greater risk are people who cannot respond or evacuate in a timely manner people sleeping in their apartment homes, large groups of children, and the elderly. Evacuation of large buildings is more difficult because of lengthier evacuation routes. Further, fires in large buildings may present more difficult fire control problems because of inaccessibility to the more remote interior spaces of these extremely large R-Occupancies.

Even from the American Wood Council's own document, Basic Fire Precautions During Construction of Large Buildings highlight the need for concern: National fire organizations, including US Fire Administration and the National Fire Protection Association have been monitoring losses for construction fires in large buildings for decades. The trend and pattern of these fires is significant since it shows that a greater percentage of them result in large financial losses than fires in completed, occupied buildings.

if they were to follow their own recommendations, The Fire Safety Plan should identify the required security measures, which may include: Employing 24-hour security guards on larger sites with post orders that include recorded rounds, and supported by intrusion detection systems, and Site security cannot be underestimated. Observation of conditions after hours, and especially when there are abnormal weather conditions, is essential in reducing the possibility of fire. In view of the fact that arson is a significant contributor to fire loss on construction sites then security measures become very critical in protecting the site, certainly seems we are all in fact supportive of this proposal.

Bibliography: <https://constructionfiresafety.org/topics/basic-fire-precautions-during-construction-of-large-buildings>

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction Site security in off hours would be a cost but certainly offset by reduced safety risk and theft.

F264-18

F266-18

IFC: 3308.4

Proposed Change as Submitted

Proponent: Stephen DiGiovanni, representing ICC Ad Hoc Committee on Tall Wood Buildings (TWB) (TWB@iccsafe.org)

2018 International Fire Code

3308.4 Fire safety requirements for buildings of Types IV-A, IV-B, and IV-C construction. Buildings of Types IV-A, IV-B, and IV-C construction designed to be greater than six stories above grade plane shall comply with the following requirements during construction unless otherwise approved by the fire code official.

1. Standpipes shall be provided in accordance with Section 3313.
 2. A water supply for fire department operations, as approved by the fire chief.
 3. Where building construction exceeds six stories above grade plane, at least one layer of noncombustible protection where required by Section 602.4 of the International Building Code shall be installed on all building elements more than 4 floor levels, including mezzanines, below active mass timber construction before erecting additional floor levels.
 4. Where building construction exceeds six stories above grade plane required exterior wall coverings shall be installed on all floor levels more than 4 floor levels, including mezzanines, below active mass timber construction before erecting additional floor level.
- Exception: Shafts and vertical exit enclosures.**

Reason: The Ad Hoc Committee on Tall Wood Buildings (TWB) was created by the ICC Board to explore the science of tall wood buildings and take action on developing code changes for tall wood buildings. The TWB has created several code change proposals with respect to the concept of tall buildings of mass timber and the background information is at the end of this Statement. Within the statement are important links to information, including documents and videos, used in the deliberations which resulted in these proposals.

The TWB has developed a number of proposals to potentially increase the permitted height and area for Type IV structures, specifically mass timber buildings adding additional Types IV-A, IV-B & IV-C. One of the basic requirements incorporated into these proposed increased heights and areas is the added active and passive protection features to these structures.

The goal of this proposal is to provide guidance and requirements for when this combustible building is most vulnerable, while under construction prior to fire protection systems have been installed.

Over the recent years we have experienced a number of fires while combustible buildings have been under construction. It is understood the vast majority of these fires did occur in structures of light-frame structural wood members which present a significant fire hazard when exposed. Even with this fact we cannot simply ignore the potential risk of fire in combustible construction simply due to the size of the timber element and the potentially longer period of time for ignition as the potentially fuel load of a mass timber building can be substantial.

The TWB had a great deal of discussion regarding the proposed requirements regarding water supply to the buildings of combustible construction sites. On one hand, there was a desire to establish a minimum water flow of 250 gpm with a minimum pressure. But the counter discussion identified that these combustible building construction sites may have various degrees of hazards on the site and was not restrictive to just the structure. Mass timber construction typically proceeds with little stored combustible material on the site, mass timber is generally installed as it arrives. Thus, there may be more or fewer site hazards than on a typical construction site utilizing combustible materials. Moreover, protection of the installed material must occur before the project moves above certain specified numbers of levels. This is very different from conventional construction processes.

With this understanding, the TWB is proposing project developers meet and confer with the local fire service to establish the fire department's response needs, in terms of water flow and pressure, for the specific building, while under construction, and job site.

While sub-sections 1 and 2 apply to the delivery of water to the job site, and/or structure, sub-sections 3 and 4 are specific to the passive protection related to the structure. Due to the proposed increased heights and areas, the TWB felt it was important to require interior and exterior passive protection as the construction progressed. This would insure the lower portions of the combustible structure had redundant, active and passive, protection as greater heights were added.

Two figures are shown below to illustrate the requirements of sub-sections 3 and 4 of this proposal. Since both buildings will exceed six-stories, protection must be provided during construction. The solid thick lines indicate building elements that are required to be protected. Solid thin lines indicate elements that are in-place, but are not required to be protected and dashed lines indicate elements that have not yet been placed. Figure 1 is shown to illustrate when protection is first required on a building under construction. When level 6 is the active level of mass timber construction, protection of the building elements and the exterior wall coverings are required before level 7 panels can be placed. In Figure 2, the progress of protection on each successive level is indicated as construction continues. In this example, level 14 is the active level of mass timber construction, so prior to placement of floor panels at level 15, protection is required on level 9.

New paragraph for the reason statement: Two figures are shown below to illustrate the requirements of sub-sections 3 and 4 of this proposal. Since both buildings will exceed six-stories, protection must be provided during construction. The solid thick lines indicate building elements that are required to be protected. Solid lines indicate elements that are in-place, but are not required to be protected and dashed lines indicate elements that have not yet been placed. Figure 1 is shown to indicate when protection is first required to be provided on a building under construction. When level 6 is the active level, protection of the building elements and the exterior wall coverings are required before level 7 panels can be placed. In Figure 2, the progress of protection on each successive level is indicated as construction continues. In this example, level 14 is the active level, so prior to placement of floor panels at level 15, protection is required on level 9.

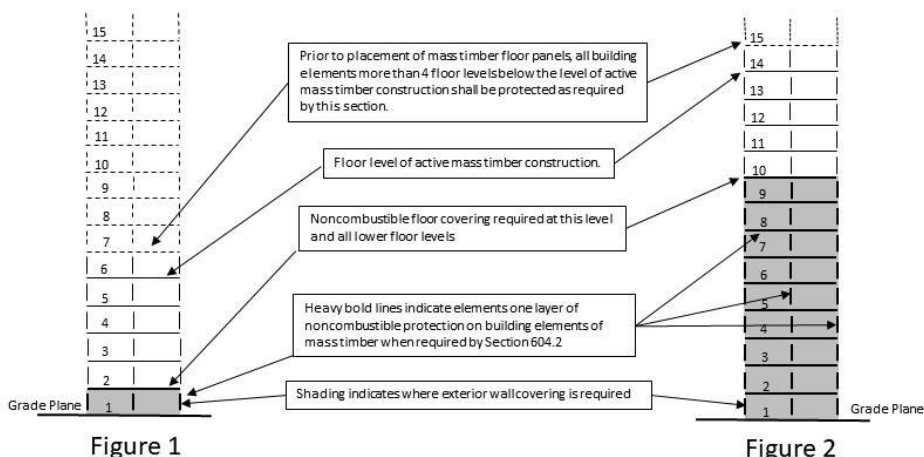


Figure 1

Figure 2

**Examples of Protection During Construction
For Mass Timber Buildings Greater Than
6 Stories Above Grade Plane**

The TWB strongly feels these code change proposals should be adopted as a whole package. By adopting a few of the code change proposals without the complete package potentially ignores the details required to insure these proposed projects are designed, built and maintained properly now and in the future. **Background information:** The ICC Board approved the establishment of an ad hoc committee for tall wood buildings in December of 2015. The purpose of the ad hoc committee is to explore the science of tall wood buildings and to investigate the feasibility and take action on developing code changes for tall wood buildings. The committee is comprised of a balance of stakeholders with additional opportunities for interested parties to participate in the four Work Groups established by the ad hoc committee, namely: Code; Fire; Standards/Definitions; and Structural. For more information, be sure to visit the ICC website <https://www.iccsafe.org/codes-tech-support/cs/icc-ad-hoc-committee-on-tall-wood-buildings/> (link active and up to date as of 12/27/17). As seen in the "Meeting Minutes and Documents" and "Resource Documents" sections of the committee web page, the ad hoc committee reviewed a substantial amount of information in order to provide technical justification for code proposals.

The ad hoc committee developed proposals for the followings code sections. The committee believes this package of code changes will result in regulations that adequately address the fire and life safety issues of tall mass timber buildings.

IBC Code Section	Description
403.3.2	Water supply requirements for fire pumps in high rise buildings of Type IVA and IVB construction.
504.3	Allowable building height (feet) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT construction.
504.4	Allowable building height (stories) for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
506.2	Allowable building area for buildings of Type IVA, IVB and IVC construction. No changes to Type IV HT.
508.4.4.1 509.4.1.1 (new)	Requirements for mass timber building elements serving as fire barriers or horizontal assemblies in buildings of Type IVB or IVC construction.
602.4	Type of Construction requirements for new proposed types of construction: Types IVA, IVB and IVC. No changes to Type IV HT construction. Includes definitions for new terms: Mass timber and Noncombustible protection (mass timber). THIS IS THE KEY CODE CHANGE PROPOSAL WHICH OUTLINES THE CONSTRUCTION REQUIREMENTS FOR THE PROPOSED NEW TYPE OF MASS TIMBER BUILDINGS. THE PROPOSAL ALSO ADDRESSES CONCEALED SPACES, ADHESIVE PERFORMANCE AND EXTERIOR WALL PROTECTION.
703.8 (new)	The performance method to determine the increase to the fire resistance rating provided by noncombustible protection applied to the mass timber building element.
703.9 (new)	Requirements for sealants and adhesives to be placed at abutting edges and intersections of mass timber building elements. The reason statement references a Group B proposal to Chapter 17 for special inspection requirements of sealants and adhesives.
718.2.1	Requirements on the use of mass timber building elements used for Fireblocking.
722.7 (new)	Requirements for the fire resistance rating of mass timber elements, including minimum required protection and gypsum board attachment requirements.
3102	Requirements for membrane structures using Type IV HT construction.
3314.7 (new)	New special precautions during construction of buildings of Types IVA, IVB and IVC construction: Standpipes; Water supply for fire department connections; Noncombustible protection required for mass timber elements as construction height increases.
Appendix	Requirements for walls, floors and roofs of Type IV HT construction in buildings located in Fire Districts.
IFC Code Section	Description
701.6	Requirements which stipulate the owner's responsibility to maintain inventory of all required fire resistance rated construction in buildings of Types IVA and IVB construction. This includes an annual inspection and proper repair where necessary.
Proposed changes to be submitted in 2019 Group B	
IBC Chapter 17	Required special inspections of mass timber construction <ul style="list-style-type: none"> • Structural • Sealants and adhesives (see IBC 703.8)
IBC Chapter 23	An update to referenced standard APA PRG 320 Standard for Performance –rated Cross-laminated Timber which is currently undergoing revision to ensure the adequacy of the adhesives under fire conditions.

In addition, fire tests designed to simulate the three new construction types (Types IVA, IVB and IVC) in the ad hoc committee proposals were conducted at the Alcohol Tobacco and Firearms test lab facility. The TWB was involved in the design of the tests, and many members witnessed the test in person or online. The results of the series of 5 fire tests provide additional support for these proposals, and validate the fire performance for each of the types of construction proposed by the committee. The fire tests consisted of one-bedroom apartments on two levels, with both apartments having a corridor leading to a stair. The purpose of the tests was to address the contribution of mass timber to a fire, the performance of connections, the performance of through-penetration fire stops, and to evaluate conditions for responding fire personnel.

To review a summary of the fire tests, please visit:

<http://bit.ly/ATF-firetestreport>

To watch summary videos of the fire tests, which are accelerated to run in 3 ½ minutes, please visit:

<http://bit.ly/ATF-firetestvideos>

Both of these links were confirmed active on 12/27/17.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This section provides information that was not previously set forth in the code, and does not change the requirements of current code, thus there is no cost impact when compared with present requirements.

F266-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 3308.4 Fire safety requirements for buildings of Types IV-A, IV-B, and IV-C construction. Buildings of Types IV-A, IV-B, and IV-C construction designed to be greater than six stories above grade plane shall comply with the following requirements during construction unless otherwise approved by the fire code official.

1. Standpipes shall be provided in accordance with Section 3313.
2. A water supply for fire department operations, as approved by the fire chief.
3. Where building construction exceeds six stories above grade plane, at least one layer of noncombustible protection where required by Section 602.4 of the International Building Code shall be installed on all building elements more than 4 floor levels, including mezzanines, below active mass timber construction before erecting additional floor levels.

Exception: Shafts and vertical exit enclosures shall not be considered a part of the active mass timber construction.

4. Where building construction exceeds six stories above grade plane required exterior wall coverings shall be installed on all floor levels more than 4 floor levels, including mezzanines, below active mass timber construction before erecting additional floor level.

Exception: Shafts and vertical exit enclosures shall not be considered a part of the active mass timber construction.

Committee Reason: This proposal was approved as part of the tall wood building proposals and provides the necessary construction fire safety related provisions. The modification merely makes it clear as to how the exceptions are to apply. The intention is that they only affect items 3 and 4. Shafts and vertical exit enclosures are not constructed with CLT and are not considered when reviewing the progress of construction. (Vote: 13-0)

Assembly Action:

None

F266-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Stephen DiGiovanni, representing Ad Hoc Committee for Tall Wood Buildings (sdigiovanni@clarkcountynv.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

3308.4 Fire safety requirements for buildings of Types IV-A, IV-B, and IV-C construction. Buildings of Types IV-A, IV-B, and IV-C construction designed to be greater than six stories above grade plane shall comply with the following requirements during construction unless otherwise approved by the fire code official.

1. Standpipes shall be provided in accordance with Section 3313.
2. A water supply for fire department operations, as approved by the fire code official and the fire chief.
3. Where building construction exceeds six stories above grade plane, at least one layer of noncombustible protection where required by Section 602.4 of the International Building Code shall be installed on all building elements more than 4 floor levels, including mezzanines, below active mass timber construction before erecting additional floor levels.

Exception: Shafts and vertical exit enclosures shall not be considered a part of the active mass timber construction.

4. Where building construction exceeds six stories above grade plane required exterior wall coverings shall be installed on all floor levels more than 4 floor levels, including mezzanines, below active mass timber construction before erecting additional floor level.

Exception: Shafts and vertical exit enclosures shall not be considered a part of the active mass timber construction.

Commenter's Reason: The original code change proposal was approved by the committee. However, during committee discussions, there was concern that Item 2, which discusses the water supply required for fire department operations during construction, should require also approval by the fire code official. There is concern that, with the many various ways that jurisdictions administer the fire code, not including the fire code official could be make the review and approval process awkward in some instances. This Public Comment simply adds the fire code official to Item 2, to satisfy this concern.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This section provides information that was not previously set forth in the code, and does not change the requirements of current code, thus there is no cost impact when compared with present requirements.

Public Comment 2:

Proponent: Dan Nichols, representing ICC Code Correlation Committee (ccc@iccsafe.org).

Commenter's Reason: The Code Correlation Committee (CCC) is not taking a position on this code change. The CCC submitted this public comment in order to bring a correlation issue to the attention of the full voting membership for the Public Comment Hearings and the Online Governmental Consensus Vote to allow the voting membership to coordinate actions on a package of code changes submitted dealing with tall wood buildings of mass timber construction. This package includes the parent proposal G108-18; if disapproved, the related proposals G28-18, G75-18, G80-18, G84-18, G89-18, FS5-18, FS6-18, FS73-18, FS81-18 and F266-18, will not be correlated with any existing code text if they are approved.

The Code Correlation Committee is a standing committee of the International Code Council whose objectives, procedures and organization are set forth in Council Policy CP#44-13. The objective of the Code Correlation Committee is to maintain technical and editorial consistency among the International Codes and to assist staff in the evaluation and processing of code change proposals and comments that are exclusively editorial.

F266-18

F267-18 Part I

IFC: SECTION 3318, 3318.1, 3318.1.1, 3318.1.2, NFPA

Proposed Change as Submitted

Proponent: Stephen Skalko, Stephen V. Skalko, P.E. & Associates, LLC, representing Masonry Alliance for Codes and Standards (svskalko@svskalko-pe.com); William Hall, Portland Cement Association, representing Alliance For Concrete Codes and Standards (jhall@cement.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD THE IFC COMMITTEE, PART II WILL BE HEARD BY THE IBC-G COMMITTEE. PLEASE SEE THE TENTATIVE HEARING ORDERS FOR THE RESPECTIVE COMMITTEES.

2018 International Fire Code

Add new text as follows

SECTION 3318 PROTECTION OF COMBUSTIBLE CONSTRUCTION

3318.1 Fire safety requirements for buildings of Type III and V construction. Buildings of Types III and V construction designed to be four or more stories above grade plane shall meet the following requirements during construction unless otherwise approved by the fire official.

3318.1.1 Exposed interior combustible framing. Where portions of the building construction exceeds 40-feet in height above fire department vehicle access, exposed interior combustible framing members shall be protected during the construction process by a thermal barrier of 1/2-inch gypsum wallboard or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275 in accordance with Section 2603.4 of the International Building Code. Concealed spaces shall comply with Section 718 of the International Building Code.

The thermal barrier shall be installed on all exposed interior surfaces of combustible framing members below the 40-feet of height, including mezzanines, so that no more than two floors of combustible framing members for the building are exposed before erecting an additional floor level. When the building construction commences above the 40-feet of height, the thermal barrier shall be installed on all exposed interior combustible framing members, including mezzanines, so that a total of no more than one floor of combustible framing members for the building is exposed on the interior before erecting an additional floor level.

3318.1.2 Exposed exterior combustible framing. Where portions of the building construction exceeds 40-feet above fire department vehicle access, including mezzanines, exposed exterior combustible framing members below the 40-feet of height, shall be covered by a noncombustible material or exterior wall covering in accordance with Section 1404 of the International Building Code so that no more than two floors of exterior combustible framing are exposed before erecting additional floor levels. The noncombustible material or exterior wall covering shall continue to be installed on all exposed exterior combustible framing above the 40-feet of height, including mezzanines, so that a total of no more than one floor of combustible framing members are exposed on the exterior before erecting additional floor levels.

Add new standard(s) follows

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy MA 02169-7471

275—17:

Standard Method of Fire Tests for the Evaluation of Thermal Barriers

Analysis: A review of the standard proposed for inclusion in the code, NFPA 275-17, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

Reason: As light wood frame buildings of Type III and V construction continue to be built to large heights and areas as allowed in Tables 504.3, 504.4 and 506.2 of the code, there has been a notable increase in fires, especially for Group R2 Residential Occupancies constructed of combustible framing, while the building is under construction. This has resulted in significant loss of property for the building under construction and nearby properties exposed to the fire in part because important fire safety features such as passive fire protection for the combustible framing is not complete and automatic sprinkler system upon which these larger and taller buildings depend are not operational.

Besides the damage to the building under construction and to nearby properties some of these fires have required major street closures including interstates, and tied up firefighting resources to the extent that other areas of the communities were left under-protected for extended periods. An example is the major fire in Los Angeles with five stories of wood framing over a two-story concrete podium on December 8, 2014 that not only resulted in millions of dollars in damage to the building under construction, but also damaged adjacent buildings. The apartment building known as the DaVinci was a complete loss after the fire that was fueled by the five stories of wood frame construction. More than 250 firefighters were dispatched to the scene. The burning of the structure's wooden frame forced the closure of northbound Harbor Freeway (Hwy 110) and affected local streets causing major traffic disruptions for commuters and to the nearby business and residences. Buildings nearby were damaged by exposure to fire from the radiant heat as well as damage inside because the fire activated sprinklers in these adjacent buildings. It has been reported that the heat also melted or damaged computers and partition cubicles in neighboring buildings as well. The glazing in hundreds of windows of a nearby building was also damaged.

There are numerous examples of other large combustible framed apartment and condominium building that experienced significant fires and damage while the building was under construction that illustrate the fire risk these large buildings pose. The following is a list of six such incidences in 2017. This list is not necessarily inclusive of all similar large combustible building fires in 2017 while under construction.

1. Metropolitan Apartments, Raleigh NC March 17, 2017- 5-story apartments on concrete podium.
2. The Royale at City Place, Overland Park, KS March 20, 2017 - 5-story apartments
3. Fuse 47, College Park, MD April 24, 2017 - 5-story apartments on concrete podium.
4. Treadmark, Boston MA, June 28, 2017 - 6-story condominiums
5. Kelowna, BC, Canada July 8, 2017 - 6-story apartments on concrete podium
6. Edison on the Charles, Waltham, MA July 23, 2017 - 5-story apartments

The goal of this proposal is to provide guidance and requirements for protection when this combustible building is most vulnerable, while under construction and prior to passive and active fire protection being installed. Recently the ICC Tall Wood Building Ad Hoc Committee discussed similar fire protection measures for Mass Timber Buildings under construction. The TWB Committee recognized the risks associated with taller buildings of combustible construction and the hazards they pose for fire department exterior and interior attack tactics

To reduce the risk of these construction fires this proposal will require the exposed combustible framing members be covered with a thermal barrier on the inside of the building and the planned exterior wall covering on the outside. The thermal barrier protection is similar to the requirements for exposed foam plastic insulation (a combustible material) in 2603.4. If combustible framing should be ignited during construction both the thermal barrier and the exterior wall coverings reduce exposure of other combustible materials from the fire incident.

The passive protection should be provided when the construction reaches the 40-foot height above the fire department vehicle access. The 40-foot threshold is consistent with the threshold when standpipes for construction are required by 3311.1. These levels of fire protection are consistent with the fire risks associated with these larger buildings of combustible construction, and upon which the building code provisions are based. Also, like the standpipe requirements, the passive protection must be extended as each floor is added.

Cost Impact: The code change proposal will increase the cost of construction

This proposal is expected to increase the cost of construction due to the passive fire protection having to be completed on lower floors before construction can begin higher up in the building. This increased cost however is necessary to reduce the risk of damage to adjacent properties due to fire exposure which results in economic hardship for repairs and disruption to businesses and residences, to minimize the impact to the public from traffic disruptions due to the size of the conflagrations, and to reduce the demand for fire service response due to these larger taller combustible framed buildings while under construction.

Analysis: The referenced standard, NFPA 275-17, is currently referenced in other 2018 I-codes.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Although the intent of the proposal was clear it would be cost prohibitive to require this level of protection during construction. The provisions are too broadly applied to smaller buildings. Finally, this proposal would require protection from rain and snow to allow this concept to work in most cases which is not practical. The revisions in code change proposals F263-18 and F264-18 were preferred over this proposal.(Vote: 14-0)

Assembly Action:

None

F267-18 Part I

Individual Consideration Agenda

Public Comment 1:

Proponent: Stephen Skalko, representing Alliance for Concrete Codes and Standards (svskalko@svskalko-pe.com); William Hall, Alliance for Concrete Codes and Standards, representing Alliance for Concrete Codes and Standards (jhall@cement.org)requests As Submitted.

Commenter's Reason: G267-18 should be Approved as Submitted. This action is based on the evidence of construction fires involving Types III and V buildings.

According to the National Fire Protection Association report, *Large-Loss Fires in the United States 2016*, (Stephen Badger, November 2017), there were five large loss fires involving apartments and a hotel under construction. These five fires resulted in about \$67 million dollars in losses and affected not only the buildings in question, but in several cases, fire spread to adjoining properties and destroyed other buildings.

The NFPA report has not been released for 2017 but, based on the six fires involving buildings under construction listed in the reason statement in support of F267-18, it is likely this trend will continue. This will be due in part because the fires in the NFPA 2016 report have similar characteristics to the ones listed for 2017 namely the buildings in 2016 were under construction and some involved unprotected wood frame construction.

It is important that corrective measures be taken now to eliminate this deficiency in the building and fire code regarding buildings of Type III and V under construction. The question is not one of practicality but of safety to the public and the fire service and the reduction of property losses due to these types of fires. Though it may require changes to construction methods and increase the cost of construction, the trend based on the fire incidences occurring with regularity for these types of buildings is apparent.

Recommend APPROVAL AS SUBMITTED for F267-18

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. This proposal is expected to increase the cost of construction due to the passive fire protection having to be completed on lower floors before construction can begin higher up in the building. This increased cost however is necessary to reduce the risk of damage to adjacent properties due to fire exposure which results in economic hardship for repairs and disruption to businesses and residences, to minimize the impact to the public from traffic disruptions due to the size of the conflagrations, and to reduce the demand for fire service response due to these larger taller combustible framed buildings while under construction.

F267-18 Part I

F267-18 Part II

IBC: SECTION 3314, 3314.1 , 3314.1.1, 3314.1.2

Proposed Change as Submitted

Proponent: Stephen Skalko, Stephen V. Skalko, P.E. & Associates, LLC, representing Masonry Alliance for Codes and Standards (svskalko@svskalko-pe.com); William Hall, Portland Cement Association, representing Alliance For Concrete Codes and Standards (jhall@cement.org)

2018 International Building Code

Add new text as follows

SECTION 3314 PROTECTION OF COMBUSTIBLE CONSTRUCTION

3314.1 Fire safety requirements for buildings of Type III and V construction. Buildings of Types III and V construction designed to be four or more stories above grade plane shall meet the following requirements during construction unless otherwise approved by the fire official.

3314.1.1 Exposed interior combustible framing. Where portions of the building construction exceeds 40-feet in height above fire department vehicle access, exposed interior combustible framing members shall be protected during the construction process by a thermal barrier of 1/2-inch gypsum wallboard or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275 in accordance with Section 2603.4. Concealed spaces shall comply with Section 718.

The thermal barrier shall be installed on all exposed interior surfaces of combustible framing members below the 40-feet of height, including mezzanines, so that no more than two floors of combustible framing members for the building are exposed before erecting an additional floor level. When the building construction commences above the 40-feet of height, the thermal barrier shall be installed on all exposed interior combustible framing members, including mezzanines, so that a total of no more than one floor of combustible framing members for the building is exposed on the interior before erecting an additional floor level.

3314.1.2 Exposed exterior combustible framing. Where portions of the building construction exceeds 40-feet above fire department vehicle access, including mezzanines, exposed exterior combustible framing members below the 40-feet of height, shall be covered by a noncombustible material or exterior wall covering in accordance with Section 1404 so that no more than two floors of exterior combustible framing are exposed before erecting additional floor levels. The noncombustible material or exterior wall covering shall continue to be installed on all exposed exterior combustible framing above the 40-feet of height, including mezzanines, so that a total of no more than one floor of combustible framing members are exposed on the exterior before erecting additional floor levels.

Reason: As light wood frame buildings of Type III and V construction continue to be built to large heights and areas as allowed in Tables 504.3, 504.4 and 506.2 of the code, there has been a notable increase in fires, especially for Group R2 Residential Occupancies constructed of combustible framing, while the building is under construction. This has resulted in significant loss of property for the building under construction and nearby properties exposed to the fire in part because important fire safety features such as passive fire protection for the combustible framing is not complete and automatic sprinkler system upon which these larger and taller buildings depend are not operational.

Besides the damage to the building under construction and to nearby properties some of these fires have required major street closures including interstates, and tied up firefighting resources to the extent that other areas of the communities were left under-protected for extended periods. An example is the major fire in Los Angeles with five stories of wood framing over a two-story concrete podium on December 8, 2014 that not only resulted in millions of dollars in damage to the building under construction, but also damaged adjacent buildings. The apartment building known as the DaVinci was a complete loss after the fire that was fueled by the five stories of wood frame construction. More than 250 firefighters were dispatched to the scene. The burning of the structure's wooden frame forced the closure of northbound Harbor Freeway (Hwy 110) and affected local streets causing major traffic disruptions for commuters and to the nearby business and residences. Buildings nearby were damaged by exposure to fire from the radiant heat as well as damage inside because the fire activated sprinklers in these adjacent buildings. It has been reported that the heat also melted or damaged computers and partition cubicles in neighboring buildings as well. The glazing in hundreds of windows of a nearby building was also damaged.

There are numerous examples of other large combustible framed apartment and condominium building that experienced significant fires and damage while the building was under construction that illustrate the fire risk these large buildings pose. The following is a list of six such incidences in 2017. This list is not necessarily inclusive of all similar large combustible building fires in 2017 while under construction.

1. Metropolitan Apartments, Raleigh NC March 17, 2017- 5-story apartments on concrete podium.
2. The Royale at City Place, Overland Park, KS March 20, 2017 - 5-story apartments
3. Fuse 47, College Park, MD April 24, 2017 - 5-story apartments on concrete podium.
4. Treadmark, Boston MA, June 28, 2017 - 6-story condominiums
5. Kelowna, BC, Canada July 8, 2017 - 6-story apartments on concrete podium
6. Edison on the Charles, Waltham, MA July 23, 2017 - 5-story apartments

The goal of this proposal is to provide guidance and requirements for protection when this combustible building is most vulnerable, while under construction and prior to passive and active fire protection being installed. Recently the ICC Tall Wood Building Ad Hoc Committee discussed similar fire protection measures for Mass Timber Buildings under construction. The TWB Committee recognized the risks associated with taller buildings of combustible construction and the hazards they pose for fire department exterior and interior attack tactics

To reduce the risk of these construction fires this proposal will require the exposed combustible framing members be covered with a thermal barrier on the inside of the building and the planned exterior wall covering on the outside. The thermal barrier protection is similar to the requirements for exposed foam plastic insulation (a combustible material) in 2603.4. If combustible framing should be ignited during construction both the thermal barrier and the exterior wall coverings reduce exposure of other combustible materials from the fire incident.

The passive protection should be provided when the construction reaches the 40-foot height above the fire department vehicle access. The 40-foot threshold is consistent with the threshold when standpipes for construction are required by 3311.1. These levels of fire protection are consistent with the fire risks associated with these larger buildings of combustible construction, and upon which the building code provisions are based. Also, like the standpipe requirements, the passive protection must be extended as each floor is added.

Cost Impact: The code change proposal will increase the cost of construction

This proposal is expected to increase the cost of construction due to the passive fire protection having to be completed on lower floors before construction can begin higher up in the building. This increased cost however is necessary to reduce the risk of damage to adjacent properties due to fire exposure which results in economic hardship for repairs and disruption to businesses and residences, to minimize the impact to the public from traffic disruptions due to the size of the conflagrations, and to reduce the demand for fire service response due to these larger taller combustible framed buildings while under construction.

F267-18 Part II

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This is a problem that needs a solution, but this is not it. It is a significant change to construction methods. Not sure how this would work with light frame construction. The moisture issue is significant and need to be addressed. The comparison of light frame wood construction to mass timber construction is incorrect. There is a need to address construction fires in all construction types, and especially wood construction. There are other proposals that may better address these concerns. A dry wall crew would have to continuously come in and out of the job site. This would substantially increase the cost of construction. (Vote: 14-0)

Assembly Action:

None

F267-18 Part II

Individual Consideration Agenda

Public Comment 1:

Proponent: Stephen Skalko, representing Alliance for Concrete Codes and Standards (svskalko@svskalko-pe.com); William Hall, Alliance for Concrete Codes and Standards, representing Alliance for Concrete Codes and Standards (jhall@cement.org) requests As Submitted.

Commenter's Reason: G267-18 should be Approved as Submitted. This action is based on the reasons given by the General Committee in their disapproval. The General Committee acknowledged there is a problem and a need to address construction fires and especially wood construction. Based on the evidence of construction fires involving Types III and V buildings we concur.

According to the National Fire Protection Association report, *Large-Loss Fires in the United States 2016*, (Stephen Badger, November 2017), there were five large loss fires involving apartments and a hotel under construction. These five fires resulted in about \$67 million dollars in losses and affected not only the buildings in question, but in several cases, fire spread to adjoining properties and destroyed other buildings.

The NFPA report has not been released for 2017 but, based on the six fires involving buildings under construction listed in the reason statement in support of F267-18, it is likely this trend will continue. This will be due in part because the fires in the NFPA 2016 report have similar characteristics to the ones listed for 2017 namely the buildings in 2016 were under construction and some involved unprotected wood frame construction.

It is important that corrective measures be taken now to eliminate this deficiency in the building and fire code regarding buildings of Type III and V under construction. Though it may require changes to construction methods and increase the cost of construction, the trend based on the fire incidences occurring with regularity for these types of buildings is apparent.

Recommend APPROVAL AS SUBMITTED for F267-18

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. This proposal is expected to increase the cost of construction due to the passive fire protection having to be completed on lower floors before construction can begin higher up in the building. This increased cost however is necessary to reduce the risk of damage to adjacent properties due to fire exposure which results in economic hardship for repairs and disruption to businesses and residences, to minimize the impact to the public from traffic disruptions due to the size of the conflagrations, and to reduce the demand for fire service response due to these larger taller combustible framed buildings while under construction.

F267-18 Part II

F270-18

IFC: 3314.1; IBC: 3312.1; IEBC: 1507.1

Proposed Change as Submitted

Proponent: Stephen Skalko, Stephen V. Skalko, P.E. & Associates, LLC, representing Masonry Alliance for Codes and Standards (svskalko@svskalko-pe.com)

2018 International Fire Code

Add new text as follows

3314.1 Completion during construction. Where an automatic sprinkler system is required by this code in buildings of Type III or V construction, and will be 4 or more stories above grade plane, the portion of the building or structure that is more than 40-feet in height above fire department vehicle access shall not begin construction until automatic sprinkler protection, either temporary or permanent, is provided for all stories below. As construction progresses such automatic sprinkler protection shall be extended to within one floor of the highest point of construction having secured decking or flooring.

2018 International Building Code

3312.1 Completion during construction. Where an automatic sprinkler system is required by this code in buildings of Type III or V construction, and will be 4 or more stories above grade plane, the portion of the building or structure that is more than 40-feet in height above fire department vehicle access shall not begin construction until automatic sprinkler protection, either temporary or permanent, is provided for all stories below. As construction progresses such automatic sprinkler protection shall be extended to within one floor of the highest point of construction having secured decking or flooring.

2018 International Existing Building Code

1507.1 Completion during construction. Where an automatic sprinkler system is required by this code in buildings of Type III or V construction, and will be 4 or more stories above grade plane, the portion of the building or structure that is more than 40-feet in height above fire department vehicle access shall not begin construction until automatic sprinkler protection, either temporary or permanent, is provided for all stories below. As construction progresses such automatic sprinkler protection shall be extended to within one floor of the highest point of construction having secured decking or flooring.

Reason: Automatic sprinkler protection systems continue to be the major factor that permits buildings to be built to larger heights and areas as allowed in Tables 504.3, 504.4 and 506.2 of the code. With these increases there has been a notable increase in fires, especially for Group R2 Residential Occupancies constructed of combustible framing, while the building is under construction. This has resulted significant loss of property for the building under construction and nearby properties exposed to the fire in part because important fire safety features such as passive fire protection for the combustible framing is not complete and automatic sprinkler system upon which these larger and taller buildings depend are not operational.

Besides the damage to the building under construction and to nearby properties some of these fires have required major street closures including interstates, and tied up firefighting resources to the extent that other areas of the communities were left under-protected for extended periods. An example is the major fire in Los Angeles with five stories of wood framing over a two-story concrete podium on December 8, 2014 that not only resulted in millions of dollars in damage to the building under construction, but also damaged adjacent buildings. The apartment building known as the DaVinci was a complete loss after the fire that was fueled by the five stories of wood frame construction. More than 250 firefighters were dispatched to the scene. The burning of the structure's wooden frame forced the closure of northbound Harbor Freeway (Hwy 110) and affected local streets causing major traffic disruptions for commuters and to the nearby business and residences. Buildings nearby were damaged by exposure to fire from the radiant heat as well as damage inside because the fire activated sprinklers in these adjacent buildings. It has been reported that the heat also melted or damaged computers and partition cubicles in neighboring building as well. The glazing in hundreds of windows of a nearby building was also damaged.

There are numerous examples of other large combustible framed apartment and condominium building fires while the building was under construction that illustrate the fire risk these large buildings pose. The following is a list of six such incidences in 2017. This list is not necessarily inclusive of all similar large combustible building fires in 2017.

1. Metropolitan Apartments, Raleigh NC March 17, 2017- 5-story apartment on pedestal

2. The Royale at City Place, Overland Park, KS March 20, 2017 – 5-story apartments
3. Fuse 47, College Park, MD April 24, 2017 – 5-story apartment on pedestal
4. Treadmark, Boston MA, June 28, 2017 – 6-story condominiums
5. Kelowna, BC, Canada July 8, 2017 – 6-story apartments
6. Edison on the Charles, Waltham, MA July 23, 2017 – 5-story apartments

Section 3311.1 of the code requires at least one operational standpipes be in place when portions of buildings requiring standpipes are 40 feet or more above the lowest level of fire department vehicle access. This proposal takes a similar approach to the standpipe requirement for fire safety by requiring sprinkler protection, either temporary or permanent, be provided when the construction reaches the 40-foot height above the fire department vehicle access. This level of fire protection is consistent with the fire risks associated with these larger buildings of combustible construction, and upon which the building code provisions are based. Also, like the standpipe requirements, the sprinkler system must be extended as each floor is provided with decking or flooring.

Cost Impact: The code change proposal will increase the cost of construction

This proposal is expected to increase the cost of construction due to the sprinkler protection system having to be completed on lower floors before construction can begin higher up in the building. This increased cost however is necessary to reduce the risk of damage to adjacent properties due to fire exposure which results in economic hardship for repairs and disruption to businesses and residences, to minimize the impact to the public from traffic disruptions due to the size of the conflagrations, and to reduce the demand for fire service response due to these larger taller combustible framed buildings while under construction.

Analysis: The topic covered in this proposal is scoped to the IFC Code Development committee and therefore have been added to correlate in the duplicated sections within the IBC and IEBC.

F270-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This concept was felt to be impractical and costly for wood construction. In addition, there would be concern for requiring such protection for colder climates. The temporary sprinkler systems would be an added modification that would need to be removed later. Also, there was some concern that the temporary measures used for sprinkler activation may create a false sense of security of the effectiveness of such systems. (Vote: 14-0)

Assembly Action:

None

F270-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Stephen Skalko, representing Masonry Alliance for Codes and Standards (svskalko@svskalko-pe.com)requests As Submitted.

Commenter's Reason: G270-18 should be Approved as Submitted. This action is based on the evidence of construction fires involving Types III and V buildings.

According to the National Fire Protection Association report, *Large-Loss Fires in the United States 2016*, (Stephen Badger, November 2017), there were five large loss fires involving apartments and a hotel under construction. These five fires resulted in about \$67 million dollars in losses and affected not only the buildings in question, but in several cases, fire spread to adjoining properties and destroyed other buildings.

The NFPA report has not been released for 2017 but, based on the six fires involving buildings under construction listed in the reason statement in support of F267-18, it is likely this trend will continue. This will be due in part because the fires in the NFPA 2016 report have similar characteristics to the ones listed for 2017 namely the buildings in 2016 were under construction and some involved unprotected wood frame construction. In addition, in most cases the fire protection system was not installed yet or operational.

It is important that corrective measures be taken now to eliminate this deficiency in the building and fire code regarding buildings of Type III and V under construction. The question is not one of practicality or cost, as indicated by the Committee, but of safety to the public and the fire service and the reduction of property losses due to these types of fires. In addition, the technology exists to provide sprinkler systems where exposed to cold climates and subject to freezing conditions. Though it may require changes to construction methods or scheduling of sprinkler installations, and increase the cost of construction, the trend based on the fire incidences occurring with regularity for these types of buildings is apparent and necessitates such actions during construction.

Recommend APPROVAL AS SUBMITTED for F270-18

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. This proposal is expected to increase the cost of construction due to the active fire protection system having to be completed on lower floors before construction can begin higher up in the building. This increased cost however is necessary to reduce the risk of damage to adjacent properties due to fire exposure which results in economic hardship for repairs and disruption to businesses and residences, to minimize the impact to the public from traffic disruptions due to the size of the conflagrations, and to reduce the demand for fire service response due to these larger taller combustible framed buildings while under construction.

F270-18

F276-18

IBC: 307.1.1, 311.2, 311.3;

IFC: 903.2.4.2 (New) (IBC:[F]903.2.4.2), 903.2.9.3 (New) (IBC:[F]903.2.9.3), Chapter 40 (New), 5001.1, 5701.2

IMC: [F] 502.9.5

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org); Ed Kulik, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Building Code

Revise as follows

[F] 307.1.1 Uses other than Group H. An occupancy that stores, uses or handles hazardous materials as described in one or more of the following items shall not be classified as Group H, but shall be classified as the occupancy that it most nearly resembles.

1. Buildings and structures occupied for the application of flammable finishes, provided that such buildings or areas conform to the requirements of Section 416 and the International Fire Code.
2. Wholesale and retail sales and storage of flammable and combustible liquids in mercantile occupancies conforming to the International Fire Code.
3. Closed piping system containing flammable or combustible liquids or gases utilized for the operation of machinery or equipment.
4. Cleaning establishments that utilize combustible liquid solvents having a flash point of 140°F (60°C) or higher in closed systems employing equipment *listed* by an *approved* testing agency, provided that this occupancy is separated from all other areas of the building by 1-hour *fire barriers* constructed in accordance with Section 707 or 1-hour *horizontal assemblies* constructed in accordance with Section 711, or both.
5. Cleaning establishments that utilize a liquid solvent having a flash point at or above 200°F (93°C).
6. Liquor stores and distributors without bulk storage.
7. Refrigeration systems.
8. The storage or utilization of materials for agricultural purposes on the premises.
9. Stationary storage battery systems installed in accordance with the International Fire Code.
10. Corrosive personal or household products in their original packaging used in retail display.
11. Commonly used corrosive building materials.
12. Buildings and structures occupied for aerosol product storage shall be classified as Group S-1, provided that such buildings conform to the requirements of the International Fire Code.
13. Display and storage of nonflammable solid and nonflammable or noncombustible liquid hazardous materials in quantities not exceeding the maximum allowable quantity per *control area* in Group M or S occupancies complying with Section 414.2.5.
14. The storage of black powder, smokeless propellant and small arms primers in Groups M and R-3 and special industrial explosive devices in Groups B, F, M and S, provided such storage conforms to the quantity limits and requirements prescribed in the International Fire Code.
15. Stationary fuel cell power systems installed in accordance with the International Fire Code.
16. Capacitor energy storage systems in accordance with the International Fire Code.
17. Group B higher education laboratory occupancies complying with Section 428 and Chapter 38 of the International Fire Code
18. Distilling or brewing of beverages conforming to the requirements of the International Fire Code.
19. The storage of beer, distilled spirits and wines in barrels and casks conforming to the requirements of the International Fire Code.

311.2 Moderate-hazard storage, Group S-1. Storage Group S-1 occupancies are buildings occupied for storage uses that are not classified as Group S-2, including, but not limited to, storage of the following:

Aerosol products, Levels 2 and 3
Aircraft hangar (storage and repair)
Bags: cloth, burlap and paper
Bamboos and rattan
Baskets
Belting: canvas and leather
Beverages: over 16-percent alcohol content
Books and paper in rolls or packs
Boots and shoes
Buttons, including cloth covered, pearl or bone
Cardboard and cardboard boxes
Clothing, woolen wearing apparel
Cordage
Dry boat storage (indoor)
Furniture
Furs
Glues, mucilage, pastes and size
Grains
Horns and combs, other than celluloid
Leather
Linoleum
Lumber
Motor vehicle repair garages complying with the maximum allowable quantities of hazardous materials listed in Table 307.1(1) (see Section 406.8)
Photo engravings
Resilient flooring
Self-service storage facility (mini-storage)
Silks
Soaps
Sugar
Tires, bulk storage of
Tobacco, cigars, cigarettes and snuff
Upholstery and mattresses
Wax candles

311.3 Low-hazard storage, Group S-2. Storage Group S-2 occupancies include, among others, buildings used for the storage of noncombustible materials such as products on wood pallets or in paper cartons with or without single thickness divisions; or in paper wrappings. Such products are permitted to have a negligible amount of plastic *trim*, such as knobs, handles or film wrapping. Group S-2 storage uses shall include, but not be limited to, storage of the following:

Asbestos
Beverages up to and including 16-percent alcohol ~~in metal, glass or ceramic containers~~
Cement in bags
Chalk and crayons
Dairy products in nonwaxed coated paper containers
Dry cell batteries
Electrical coils
Electrical motors
Empty cans
Food products
Foods in noncombustible containers
Fresh fruits and vegetables in nonplastic trays or containers
Frozen foods
Glass
Glass bottles, empty or filled with noncombustible liquids
Gypsum board
Inert pigments
Ivory
Meats
Metal cabinets
Metal desks with plastic tops and *trim*
Metal parts
Metals
Mirrors
Oil-filled and other types of distribution transformers
Parking garages, open or enclosed
Porcelain and pottery
Stoves
Talc and soapstones
Washers and dryers

2018 International Fire Code

Add new text as follows

903.2.4.2 Group F-1 Distilled Spirits. An automatic sprinkler system shall be provided throughout a Group F-1 fire area used for the manufacture of distilled spirits.

903.2.9.3 Group S-1 Distilled spirits or wine. An automatic sprinkler system shall be provided throughout a Group S-1 fire area used for the bulk storage of distilled spirits or wine.

CHAPTER **40 STORAGE OF DISTILLED SPIRITS AND WINES**

SECTION 4001 GENERAL

4001.1 General. The storage of distilled spirits and wines in barrels and casks shall comply with this chapter in addition to other applicable requirements of this code.

4001.1.1 Nonapplicability. Chapter 50 and Chapter 57 of this code are not applicable to the storage of distilled spirits and wines in barrels and casks as identified in Section 5001.1, Exception 10, and Section 5701.2, Item 10.

SECTION 4002 DEFINITIONS

4002.1 Terms defined in Chapter 2. Words and terms used in this chapter and defined in Chapter 2 shall have the meanings ascribed to them as defined therein.

SECTION 4003 PRECAUTIONS AGAINST FIRE

4003.1 Spill Control. Drainage or containment systems shall be provided by means of curbs, scuppers, special drains, or other suitable means to prevent the flow of spills throughout the building.

4003.2 Ventilation. Ventilation shall be provided for rooms and spaces where distilled spirits and wines in barrels and

casks are stored in accordance with the International Mechanical Code and one of the following:

1. The rooms and spaces shall be ventilated at a rate sufficient to maintain the concentration of vapors within the area at or below 25% of the LFL. This shall be confirmed by sampling of the actual vapor concentration under normal operating conditions. The sampling shall be conducted throughout the enclosed storage area extending to or toward the bottom and the top of the enclosed storage area. The vapor concentration used to determine the required ventilation rate shall be the highest measured concentration during the sampling procedure. The sampling shall be conducted manually or by installation of a continuously monitoring flammable vapor detection system.
2. The rooms and spaces shall be provided exhaust ventilation at a rate of not less than 1 cfm/ft² (0.3 m³/min) of solid floor area. The exhaust ventilation shall be accomplished by natural or mechanical means, with discharge of the exhaust to a safe location outside the building.

4003.3 Sources of ignition. Sources of ignition shall be controlled in accordance with Sections 4003.3.1 through 4003.4.

4003.3.1 Smoking. Smoking shall be prohibited and "No Smoking" signs provided as follows:

1. In rooms or areas where hazardous materials are stored or dispensed or used in open systems in amounts requiring a permit in accordance with Section 105.6 and 105.7
2. Within 25 feet (7620mm) of outdoor storage, dispensing or open use areas.
3. Facility or areas within facilities that have been designated as totally "no smoking" shall have "No Smoking" signs placed at all entrances to the facility or area. Designated areas within such facilities where smoking is permitted either permanently or temporarily shall be identified with signs designating that smoking is permitted in these areas only.
4. In rooms or areas where flammable or combustible hazardous materials are stored, dispensed or used.

Signs required by this section shall be in English as a primary language or in symbols allowed by this code and shall comply with Section 310.

4003.3.2 Open Flame. Open flames and high-temperature devices shall not be used in a manner that creates a hazardous condition and shall be listed for use with the hazardous materials stored or used.

4003.3.3 Industrial trucks. Powered industrial trucks used in areas designated as hazardous (classified) locations in accordance with NFPA 70 shall be listed and labeled for use in the environment intended in accordance with NFPA 505.

4003.3.4 Electrical. Electrical wiring and equipment shall be installed and maintained in accordance with Section 605 and NFPA 70.

4003.4 Lightning. Structures containing barrel storage should be protected from lightning. The lightning protection equipment shall be installed in accordance with NFPA 780 and NFPA 70.

SECTION 4004 STORAGE

4004.1 Storage. Storage shall be in accordance with this section and Section 315.

4004.2 Empty containers. The storage of empty containers previously used for the storage of flammable or combustible liquids, unless free from explosive vapors, shall be stored as required for filled containers.

4004.3 Basement storage. Class I liquids shall be allowed to be stored in basements in amounts not exceeding the maximum allowable quantity over control area for use-open systems in Table 5003.1.1(1), provided that automatic suppression and other fire protection are provided in accordance with Chapter 9. Class II and IIIA liquids shall also be allowed to be stored in basements, provided that automatic suppression and other fire protection are provided in accordance with Chapter 9.

4004.4 Bulk beverage storage areas. There shall be no storage of combustible materials in the bulk beverage storage areas not related to the beverage storage activities.

SECTION 4005 FIRE PROTECTION

4005.1 Automatic sprinkler system. The storage of distilled spirits and wines shall be protected by an approved automatic sprinkler system as required by Chapter 9.

4005.2 Portable Fire Extinguishers. Approved portable fire extinguishers shall be provided in accordance with Section 906.

SECTION 4006 SIGNAGE

4006.1 Hazard identification signs. Unless otherwise exempted by the fire code official, visible hazard identification signs as specified in NFPA 704 for the specific material contained shall be placed on stationary containers and above ground tanks and at entrances to locations where hazardous materials are stored, dispensed, used or handled in quantities requiring a permit and at specific entrances and locations designated by the fire code official.

4006.1.1 Maintenance and style. Signs and markings required by Section 4006.1 shall not be obscured or removed, shall be in English as a primary language or in symbols allowed by this code, shall be durable, and the size, color, and lettering shall be approved.

Revise as follows

5001.1 Scope. Prevention, control and mitigation of dangerous conditions related to storage, dispensing, use and handling of hazardous materials shall be in accordance with this chapter.

This chapter shall apply to all hazardous materials, including those materials regulated elsewhere in this code, except that where specific requirements are provided in other chapters, those specific requirements shall apply in accordance with the applicable chapter. Where a material has multiple hazards, all hazards shall be addressed.

Exceptions:

1. In retail or wholesale sales occupancies, the quantities of medicines, foodstuff or consumer products and cosmetics containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solutions not being flammable shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons (5 L).
2. Quantities of alcoholic beverages in retail or wholesale sales occupancies shall not be limited providing the liquids are packaged in individual containers not exceeding 1.3 gallons (5 L).
3. Application and release of pesticide and agricultural products and materials intended for use in weed abatement, erosion control, soil amendment or similar applications where applied in accordance with the manufacturers' instructions and label directions.
4. The off-site transportation of hazardous materials where in accordance with Department of Transportation (DOTn) regulations.
5. Building materials not otherwise regulated by this code.
6. Refrigeration systems (see Section 605).
7. Stationary storage battery systems regulated by Section 1206.2.
8. The display, storage, sale or use of fireworks and *explosives* in accordance with Chapter 56.
9. *Corrosives* utilized in personal and household products in the manufacturers' original consumer packaging in Group M occupancies.
10. The storage of ~~beer~~, distilled spirits and wines in ~~wooden~~ barrels and casks.
11. The use of wall-mounted dispensers containing alcohol-based hand rubs classified as Class I or II liquids where in accordance with Section 5705.5.

5701.2 Nonapplicability. This chapter shall not apply to liquids as otherwise provided in other laws or regulations or chapters of this code, including:

1. Specific provisions for flammable liquids in motor fuel-dispensing facilities, repair garages, airports and marinas in Chapter 23.
2. Medicines, foodstuffs, cosmetics and commercial or institutional products containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solution not being flammable, provided that such materials are packaged in individual containers not exceeding 1.3 gallons (5 L).
3. Quantities of alcoholic beverages in retail or wholesale sales or storage occupancies, provided that the liquids are packaged in individual containers not exceeding 1.3 gallons (5 L).
4. Storage and use of fuel oil in tanks and containers connected to oil-burning equipment. Such storage and use shall be in accordance with Section 603. For abandonment of fuel oil tanks, this chapter applies.
5. Refrigerant liquids and oils in refrigeration systems (see Section 605).
6. Storage and display of aerosol products complying with Chapter 51.
7. Storage and use of liquids that do not have a fire point when tested in accordance with ASTM D92.
8. Liquids with a *flash point* greater than 95°F (35°C) in a water-miscible solution or dispersion with a water and inert (noncombustible) solids content of more than 80 percent by weight, which do not sustain combustion.
9. Liquids without *flash points* that can be flammable under some conditions, such as certain halogenated hydrocarbons and mixtures containing halogenated hydrocarbons.
10. The storage of beer, distilled spirits and wines in ~~wooden~~ barrels and casks.
11. Commercial cooking oil storage tank systems located within a building and designed and installed in accordance with Section 608 and NFPA 30.

Add new standard(s) follows

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy MA 02169-7471

780-17:

Standard f or the Installation of Lightning Protection Systems

2018 International Mechanical Code

Revise as follows

[F] 502.9.5 Flammable and combustible liquids. Exhaust ventilation systems shall be provided as required by Sections 502.9.5.1 through 502.9.5.5 for the storage, use, dispensing, mixing and handling of flammable and combustible liquids. Unless otherwise specified, this section shall apply to any quantity of flammable and combustible liquids.

Exception-Exceptions:

1. This section shall not apply to flammable and combustible liquids that are exempt from the International Fire Code.
2. The storage of beer, distilled spirits and wines in barrels and casks conforming to the requirements of the International Fire Code.

Reason: Currently, due to changes over several code change cycles, there is confusion on how to treat distilled spirits in Building Code and for applicable safety requirements of the International Fire Code. Coordination between the codes on these spirits still have the properties of flammable liquids and proper safeguards must be provided for the occupancies housing **[F] COMBUSTIBLE LIQUID**. A liquid having a closed cup flash point at or above 100°F (38°C). Combustible liquids shall be su

Class II. Liquids having a closed cup flash point at or above 100°F (38°C) and below 140°F (60°C).

Class IIIA. Liquids having a closed cup flash point at or above 140°F (60°C) and below 200°F (93°C).

Class IIIB. Liquids having a closed cup flash point at or above 200°F (93°C).

The category of combustible liquids does not include compressed gases or cryogenic fluids.

[F] FLAMMABLE LIQUID. A liquid having a closed cup flash point below 100°F (38°C). Flammable liquids are further categorized. The Class I category is subdivided as follows:

Class IA. Liquids having a flash point below 73°F (23°C) and a boiling point below 100°F (38°C).

Class IB. Liquids having a flash point below 73°F (23°C) and a boiling point at or above 100°F (38°C).

Class IC. Liquids having a flash point at or above 73°F (23°C) and below 100°F (38°C). The category of flammable liquids does not include cryogenic fluids.

Image-1-Alcohol-Levels



Image-2-Alcohol-Levels



The International Building Code classifies the various activities into Groups. The manufacturing of beverages with over 16 percent alcohol is classified as an F-2; the manufacturing of beverages 16 percent alcohol or less is classified as an F-2:

306.2 Moderate-hazard factory industrial, Group F-1. Factory industrial uses that are not classified as Factory Industrial F Moderate Hazard and shall include, but not be limited to, the following:

Beverages: over 16-percent alcohol content

306.3 Low-hazard factory industrial, Group F-2. Factory industrial uses that involve the fabrication or manufacturing of not finishing, packing or processing do not involve a significant fire hazard shall be classified as F-2 occupancies and shall include,

Beverages: up to and including 16-percent alcohol content

The storage of beverages with up to and including 16-percent alcohol in metal, glass or ceramic containers is classified as

311.3 Low -hazard storage, Group S-2. Storage Group S-2 occupancies include, among others, buildings used for the storage of products on wood pallets or in paper cartons with or without single thickness divisions; or in paper wrappings. Such products include plastic trim, such as knobs, handles or film wrapping. Group S-2 storage uses shall include, but not be limited to, storage of

Beverages up to and including 16-percent alcohol in metal, glass or ceramic containers

However, there is no Group S classification listed for storage of beverages with over 16 percent alcohol and there are no distilling activities or bulk storage of distilled spirits in Section 307 High Hazard Group H.

311.2 Moderate-hazard storage, Group S-1. Storage Group S-1 occupancies are buildings occupied for storage uses that are but not limited to, storage of the following:

???

[F] 307.1.1 Uses other than Group H. An occupancy that stores, uses or handles hazardous materials as described in one classified as Group H, but shall be classified as the occupancy that it most nearly resembles.

2. Wholesale and retail sales and storage of flammable and combustible liquids in mercantile occupancies conforming to the IBC

6. Liquor stores and distributors without bulk storage.

The lack of a S-1 Group designation for storage activities for beverages over 16-percent alcohol or any bulk storage recognized "Uses other than Group H" causes disputes between code officials as to application of a Group H to storage of the finished process.

In the International Fire Code there is confusion about the applicability of Chapter 50 Hazardous Materials-General Provisions Combustible Liquids provisions to distilled spirits because of the exception for distilled spirits and wines stored in wooden barrels. The issue is arising because of the growing popularity of "boutique" or "craft" distillers.

A review of the International Fire Code Commentary concerning the distilled spirits in wooden barrels exception finds the conflict between the codes:

5001.1 Scope.

Prevention, control and mitigation of dangerous conditions related to storage, dispensing, use and handling of hazardous materials in this chapter.

This chapter shall apply to all hazardous materials, including those materials regulated elsewhere in this code, except that where other chapters, those specific requirements shall apply in accordance with the applicable chapter. Where a material has multiple requirements addressed.

Exceptions:

10. The storage of distilled spirits and wines in wooden barrels and casks.

IFC Commentary:

"Exception 10 covers the storage of distilled spirits and wines in wooden barrels and casks. This statement may appear to exclude from being a Group H occupancy. However, the IBC will still classify the storage area as a Group H occupancy if the amounts (MAQs) per control area listed in Table 307.1(1) of that code for flammable or combustible liquids. All requirements for a Group H occupancy are applicable; however, any requirements from the code (fire code) are not."

5701.1 Scope and application. Prevention, control and mitigation of dangerous conditions related to storage, use, dispensing of combustible liquids shall be in accordance with Chapter 50 and this chapter.

5701.2 Nonapplicability. This chapter shall not apply to liquids as otherwise provided in other laws or regulations or chapters.

10. The storage of distilled spirits and wines in wooden barrels and casks.

IFC Commentary:

"Item 10 makes the storage of distilled spirits and wines in wooden barrels and casks exempt from this chapter. Although these liquids, the containers do not pose the rupture hazard that other containers do. Barrels and casks will leak their contents and that secure the staves expand and loosen. Even this hazard feature is generally mitigated by the operation of automatic spiriting progressing to the point where the metal bands get hot enough to expand. A similar exception also appears in Section 5001.1

In summary, when you manufacture distilled spirits you are an F-1 occupancy. When you manufacture wine or beer you are an S-2 occupancy. When you store distilled spirits in retail packaging you are not an H occupancy but when you store any beverage with over 16% alcohol in bulk, (includes some wines), you have an H occupancy. As far as risk goes, manufacturing of distilled spirits is an F-1 regardless of amount but an H if stored in bulk. This may be the case for the IFC, if you store your distilled spirits in bulk in wooden barrels Chapter 50 and 57 do not apply so there are no code

This proposal attempts to address this confusion recognizing the main safety issues are the need for automatic fire suppression and need for containment of spills. In 2005 the Distilled Spirits Council of The United States (DISCUS) released guidelines for facilities which addressed fire protection, ventilation and secondary containment requirements. Those guidelines were proposed for the International Fire Code.

It is proposed to make the following Group designation changes to the International Building Code:

Add a classification under S-1 for storage of beverages over 16% alcohol whether in bulk or retail packaging.

Modify the classification under S-2 to apply to all beverages up to and including 16-percent alcohol regardless of container

Modify Section [F] 307.1.1 "Uses other than Group H" to add classifications for distilling, brewing or storage of these materials

In the International Fire Code, it is proposed to strike the word "wooden" and addition of the "word beer" in the exceptions in

10. The storage of beer, distilled spirits and wines in ~~wooden~~ barrels and casks.

In the International Mechanical Code it is proposed to strike the word "wooden" from Section [F] 502.9.5 "Flammable and combustible

In conjunction with the Group classification cleanup and striking the word wooden in both the IFC and IMC, protection feature sprinkler thresholds for the manufacture of distilled spirits or bulk storage of distilled spirits regardless of square footage the International Fire Code for the Storage of Distilled Spirits and Wines.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC) and the ICC Building Code Action Committee (BCAC) Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CA there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>. BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open numerous Working Group meetings and conference calls for the current code development cycle, which included members interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/building-code-action-committee-bcac/>.

Bibliography: Recommended Fire Protection Practices for Distilled Spirits Beverage Facilities, Third Edition Prepared Under the Auspices of The Distilled Spirits Council of the United States, Inc.

<http://www.discus.org/policy/fireprotection/>

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal will likely break even on the cost of construction by clarifying what the appropriate Group designation is, elimination of the unnecessary H classifications, and clarifying what protection levels are necessary.

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This proposal was approved as the exceptions for Group H occupancies are needed and the chapter addressing the specific hazards is necessary. (Vote: 13-1)

Assembly Action:

None

F276-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Linda Purcell, representing architecture PML, Increquests As Submitted.

Commenter's Reason: F276-18

Architectural opinion, related to **use** of facilities and separation of occupancies in facilities that produce distilled spirits above 16% ABV in process and storage, above the 240 gallon limit (sprinkled building).

The intent of the code is to provide a constructed project that provides minimum life safety of users and occupants familiar, and unfamiliar, with the building. *We have no control over the use of the space after the owner takes possession.*

Based on our observed use of distilleries, and H3 rooms, after they are owner occupied, architecture PML, Inc., strongly believes that any measure of life safety that we can provide during design, as required by code, and additional life and operational safety that might be required, or supported by industry best practices, and, as would be dictated by common sense, **should be incorporated into the design, AND SUPPORTED BY THE CODE**

Regarding Occupancy Classification and separation of Occupancies--- If no separation is required between any other Occupancy classification those areas currently required to be H3 Occupancy (for the purposes of *distilled spirits*) there will be significant life safety risks to users, visitors, and even adjacent properties. We strongly recommend that separation between H3 and other occupancies continue to be required, as they are currently required in the code we are most familiar with, the 2015 IBC.

Linda Purcell, AIA

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction considering that other requirements for life safety apply outside of the IBC requirements, this actually may increase the costs to the owners, as the H3 area is specifically defined by FRR (walls) separating occupancy. Without definition of the H3 area, the actual coverage area, and protection from spark, including explosion proof devices, could be much more extensive.

Public Comment 2:

Proponent: Scott Moore, representing Dalkita, Inc. (scott@dalkita.com)requests Disapprove.

Commenter's Reason: The proponents of this measure claim that current code fails to safely regulate distilleries and that the code is unclear. This is a patently false presumption. The current code is clear. The current code does provide for safe regulation of distilleries. However, the subject is complex requiring additional rigor in design and review. This proposal would eliminate the application of H-3 or H-2 occupancy classification to distilleries using and storing Flammable Liquids in excess of the MAQs (Maximum Allowable Quantities). If approved, this proposal will create a clear and present danger to public health, safety, and welfare.

The proponents further state that their intention is to reduce or eliminate unnecessary regulations regarding distilleries. In fact, this proposal will have the opposite affect and increase regulation on not only distilleries but wineries and breweries adding significant construction costs.

It is true that summarizing code requirements for distilleries into a concise package would reduce the efforts needed to design and review such facilities. However, this proposal barely scratches the surface of applicable requirements for safe distilleries found in the current I-codes and NFPA documents they reference. This oversimplification will lead to further misunderstanding of these facilities and guide users of the code toward negligent omission of requirements not addressed in the proposed chapter 40. Safe design of distilleries, particularly micro-distilleries, is a serious matter. They are essentially Flammable Liquids factories in or adjacent to restaurants.

It is true that Ethanol, potable or not, needs to be regulated differently than other non-water miscible Flammable Liquids. This proposal continues the current code approach of discounting graduating flammability properties of varying concentrations of ethanol and water mixtures. A more helpful start to addressing this in the codes would be to identify the fact that 1C water miscible liquid MAQs would more appropriately be higher than 1B liquid MAQs. This proposal ignores the physics of the material being regulated and instead applies regulations in a more arbitrary manner than the current code.

Specific items found in this proposal that present an imminent threat to human life by eliminating regulations currently in place are enumerated below.

IBC 307.1.1(18) (19) would permit unlimited quantities of 1B Flammable Liquid, 95% ethanol with a sea level flash point of 63 degF, in ANY occupancy, including A.

IBC 307.1.1(19) would quadruple the allowable building area for storage of 1C and 1B flammable liquids in barrels (wooden and steel) by shifting the occupancy from H-3 to S-1. Wood soaked in Flammable Liquid a High-hazard commodity. Proper storage of this should be in reduced area compartmentalization as per the current code.

IFC 4001.1.1, 5001.1(10), and 5701.2(10) omit the word wooden in regard to barrels thereby treating, for instance, 55 gallon non-relieving steel barrels the same as wooden barrels. Steel barrels, when exposed to heat, will rupture explosively. Wooden barrels will not.

Specific items found in this proposal that impose additional unnecessary and costly regulation on the beer wine and spirits industry are enumerated below.

IFC 903.2.4.2 and 903.2.9.3 will regulate very small micro-distilleries, with under 120 gallons of spirit, out of business by requiring sprinklers in these facilities where current code does not.

IFC 903.2.9.3 will regulate most wineries out of business by requiring sprinklers for storage of wine where current code does not. Wine, beer, and all other ethanol mixtures under 20% ABV at sea level are non-ignitable per FM Data sheets 729 and 732. Non-ignitable water miscible ethanol mixtures should not be and are not currently regulated as combustible and flammable liquids.

IFC 4003.1 requires drainage and spill control THROUGHOUT the building. Current code only requires these features in parts of the building where Flammable Liquids are actually used and stored and makes exceptions for small quantities.

IFC 4003.2 needlessly requires ethanol vapor monitors for storage of non-ignitable wine. It requires ethanol monitors for storage of spirits in barrels. This is not only unnecessary when proper ventilation calculations are performed but, it also relies on sensors that require proper maintenance and periodic calibration for a critical safety system that could otherwise be provided as fool proof. The other option requires an excessive ventilation rate of 1cfm/sf in barrel storage. Current code requires only 0.06cfm/sf which we have found to be more than adequate to maintain ethanol vapor concentrations at less than 25% of the LFL.

IFC 4003.3.3 requires use of type EX fork trucks even if it has been proven that ventilation will maintain concentrations of Flammable Liquid vapor below 25% of the LFL. Current code acknowledges this and permits type E for trucks where appropriate.

IFC 4004.3 prohibits storage of beer and wine in basements. The current code does not. Beer and wine should be treated entirely different from distilled spirits.

IFC 4005.1 needlessly requires sprinklers for the storage of wine and spirits in bottles. Current code does not.

IMC 502.9.5 exception 2 reverses earlier proposal requirements for ventilation. This is simply confusing.

Below is a partial list of micro-distillery disasters over the past 10 years. Most of these did not meet current code but would be compliant under this new proposal.

Wigle distillery, Pittsburgh - 1 hospitalized

BJ Hookers Distillery, Harris County TX - 1 air lifted to hospital

Island Beach Distillery, Lacey Township, NJ - 1 taken to burn center

Silver Trails Distillery, Marshal County KY - 1 dead, 1 with over a year in recovery

Full Throttle Saloon, Sturgis SD - burned to the ground 2-8-15

Twister Distillery, Moore, OK - 1 hospitalized

Alchemical Solutions, Ashland OR - Neighboring residents experienced smoke related health problems

Tuthilltown Spirits, Gardiner, NY - Destroyed building, no injuries

Current IFC chapters 50 and 57 do not mean that there are no code requirements for barrels as is stated by the proponents of this measure. Rather, per the commentary, wooden barrels are only exempt from the provisions of those two chapters. This means that, under the current code where spirits are stored in wooden barrels, emergency alarms, sprinklers, 25% of the perimeter on an exterior wall, and occupancy separation are required. While 1cfm/sf of ventilation, spill control, secondary containment and explosion control are not.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The proposal will significantly increase the cost to construct distilleries by requiring additional unneeded features. It will particularly damage the wine and beer industries with added construction and operational costs by treating wine and beer, which are not flammable, the same as distilled spirits which is.

Public Comment 3:

Proponent: James Patterson, Denver Fire Department, representing Denver Fire Department requests Disapprove.

Commenter's Reason: The removal of the H classification for volumes exceeding the maximum allowable quantities does not benefit the craft distillers and weakens the code by removing required separations, and standby power requirements for required mechanical ventilation. If a distilling occupancy is not an H occupancy regardless of the alcohol quantities within the occupancy, it can be combined with other occupancies as a non-separated occupancy (such as an assembly banquet hall with a still located in the center as an operational decorative piece) that would allow the public to enter a potentially dangerous situation.

The blanket requirement for fire sprinklers without regard to quantities below the maximum allowable quantities will place an increased burden on the very small/hobby craft distillers. Current requirements allow a distiller to avoid sprinklers by maintaining a maximum allowable quantity below the 120 gallons for a non-sprinklered occupancy and volumes in 1.3 gallon or less containers are not counted in the allowable 120 gallons.

The removal of the requirement for barrels and casks to be "wooden" could create more hazardous storage scenarios such as ethanol in plastic or non-relieving metal barrels.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction.

The proposal's requirement for sprinkler in any distilling occupancy will increase the cost for very small operations.

The proposal's removal of the requirements for an H occupancy would decrease the cost for larger distilling operations.

Public Comment 4:

Proponent: David Tomecek, representing Self (thepyro13@hotmail.com) requests Disapprove.

Commenter's Reason: The proponents of this code change are right to recognize that the application of IBC, IFC and other International Codes to craft-level facilities (i.e., breweries, cideries, wineries, distilleries) can be confusing. However, the approach taken is problematic in that it incorrectly counteracts corrective steps taken in previous editions of the IBC/IFC, confuses the hazards and protections necessary for differing parts of the alcoholic beverage manufacturing industry and appears to misunderstand the issues associated with wooden barrels and casks versus other containers. The proposed change correctly notes that the code-making progress made with respect to alcoholic beverage manufacturing and storage has been somewhat inconsistent. The author would add that the myths and legends of the alcoholic beverage industry, along with misunderstandings of long-standing exceptions within the codes, are not helpful in interpreting and applying requirements. As written, this proposal extends many of those misunderstandings and will codify them in a way that is detrimental to the safety of building occupants, their neighbors and emergency response personnel.

There are two major issues that work against the proposal one involving the split between various portions of the alcoholic beverage industry and the other involving the exceptions often afforded wooden barrels and casks.

The IBC currently includes a threshold value of 16%, which was intentionally inserted to the IBC in the 2003 Edition (at that time it was 12%, revised to 16% in the 2009 Edition). The threshold was ostensibly introduced to address construction of spec warehouses and allow owners, designers and code officials to determine what might be allowed in the two classifications of Group S occupancies. However, that threshold was also introduced into the manufacturing side via incorporation into the Group F occupancies.

Both the 12% and 16% values have support from fire research and appropriately delineate between ethanol-containing liquids that are effectively non-hazardous and those that are, in fact, flammable/combustible liquids. The previous 12% value aligned with beverage manufacturing as it stood at the time carbonated beverages for retail sales tended to have alcohol by volume (ABV) percentages at or below 12% and non-carbonated beverages were typically above that value. Carbonated beverages such as beer, malt liquor, cider, low-alcohol wine, certain post-fermentation carbonated mixtures (e.g., wine coolers, hard lemonades and sodas) and similar liquids fell into the lower category, while non-carbonated liquids fell into the higher category. This natural split in the industry tends to follow the flammability of ethanol solutions. Ethanol solutions tend to become difficult to ignite, even at elevated temperatures, around 11%. The combination of the two elements made the use of 12% a good value.

The increase to 16% appears to have come from consideration of the fermentation process and recognition of the influence on the flammability of ethanol solutions. Beer, cider and low- to mid-strength wine have been found to be difficult to ignite based on a combination of their low ethanol concentration and presence of carbon dioxide in the mixture, effectively making the solution a non-hazard. The carbon dioxide developed during the fermentation process is sufficiently incorporated into the liquid that it carries through that process into short-term storage and final packaging into containers (during which time more CO₂ might be added). Fire testing of finished product, particularly beer, has been performed since the 1950s, and more recent testing of liquids taken at each step of the fermentation process have demonstrated similar results. That is, all have been found to be difficult to ignite such that they act like a non-combustible liquid. The 16% threshold aligns with the point at which most yeasts die off, and therefore adequate carbon dioxide to compensate for increased ethanol vapor production is not created. In effect, this natural boundary value creates a solid delineation point between hazardous and non-hazardous processes, and therefore should not be eliminated or modified. It is recognized that some super-yeasts exist in the beer and wine manufacturing areas, but the makers using these yeasts are relatively limited and can seek relief individually.

Once the fermentation threshold is exceeded or the fermented liquid is modified, such as with distillation, the influence of carbon dioxide falls off quickly and the ethanol solution becomes a flammable/combustible liquid that has no offsetting influence. Therefore, it should be treated as such and have no exception given, particularly an unlimited exception as included in the proposal.

The issue relative to wooden barrels and casks tends to revolve around the myth that wooden barrels are not a hazard. The author of this comment has noted a myriad of opinions that wooden barrels do not burn and/or wooden barrels don't fail when burned. That perspective appears to be emphasized by the IFC Commentary section noted in the proposal (for IFC Section 5702.1). But that assertion is wholly incorrect. The historical evidence from a variety of the respected research agencies is that wooden barrels do, in fact, burn and fail, but do so in a way that does not fit within the generalized approach of catastrophic failure anticipated by NFPA 30, *Flammable and Combustible Liquids Code* and IFC Chapters 50 and 57. The failure methods and resulting hazard from wooden barrels/casks was noted in a series of tests performed by the National Bureau of Fire Underwriters in the late 1940s and subsequently confirmed by tests performed by the National Fire Protection Association, the predecessor of today's FM Global, individual industry leaders (manufacturers or consortiums thereof) and public entities in states with concentrated manufacturing (e.g., Tennessee, Kentucky, Indiana and Iowa). More recently, the failure mechanisms of wooden barrels/casks were reconfirmed in tests performed by FM Global in the mid-2010s. Similar research for fall survivability, impact resistance, manufacturing quality control and other issues confirmed that wooden barrels and casks are a unique hazard that is outside the realm of generalized codes.

It is from this perspective that wooden barrels and casks have been excepted from NFPA 30 and fire codes for decades, and regulation has been deferred to insurance agencies, state regulating organizations and federal rule makers. The unique qualities of wooden barrels/casks are not present in other types, however. Barrels/casks made of metal (mostly steel, generally known as kegs), plastic, clay, concrete and other materials have been found to react to fire more closely to other containers covered by NFPA 30/IFC, and therefore are included in those controls.

Additionally, the introduction of an exception for *any* type of barrel, particularly plastic ones, as included in the proposal sets a dangerous precedence, as well. Many spirits manufacturers that create liqueurs often use plastic barrels as process vessels. High-concentration of ethanol are often shipped in intermediate bulk containers (IBCs) and are often used by spirits manufacturers to augment their own supply or as an input to their particular beverage. Mid-sized plastic containers, such as portable tanks, are used for short-term storage and processing. These makers would naturally ask why they can store spirits in plastic barrels but are regulated in those other containers. The proposed section would actually lend credence to allowing other plastic containers to be unregulated, which is obviously counterintuitive to current practice and known hazards. Other barrel/cask types have similar concerns, but the plastic items are the best example.

Those issues alone suggest that the proposal should be disapproved. However, additional concerns also exist relative to storage of alcoholic beverages as proposed:

- The proposed spill control section (IFC 4003.1) runs counter to language in other sections. In general, the IFC exempts containers less than 55 gallons in groupings of less than an aggregate of 1,000 gallons from spill control and secondary containment (see, for example 2015 IFC, Section 5004.2.1 and 5004.2.2). Since most barrels are less than 55 gallons, this chapter would place a restriction on alcoholic beverage storage not applied to other facilities.
- From a design approach, Section 4003.2, Item 1 is nonsensical. Because the evaporation rate from barrels is environment-dependent, predicting a ventilation cannot be done unless a conservative approach is taken. To comply with Item 1, the facility would need to be built and sampled to achieve compliance which obviously cannot be done without first obtaining a permit and occupancy of the building which cannot be done without providing the ventilation system.
- The specification of a hazardous location industrial truck for storage areas is overly burdensome and is an overstatement of the requirements from NFPA 505. NFPA 505 allows for determination of the type of industrial truck based on the potential operating environment, including consideration of other safety features. If one were to implement the ventilation and detection from Section 4003.2, for example, NFPA 505 would not dictate a classified location industrial truck.
- IFC, Section 4004.3 does not make sense. In effect, the change to Section 307.1.1 of the IBC would eliminate a maximum allowable quantity as being applicable to the storage. That, in turn, means that there is no MAQ to apply within Section 4004.3. But if there is an MAQ applicable in Section 4004.3, it begs the question of how it would otherwise be applicable in other portions of the IBC/IFC.

Aside from the issues related to storage, the proposal makes the leap to eliminate a Group H occupancy for distilleries altogether. This is incongruous with general practice in that the distilling process is, in reality, no different from the production of ethanol for other purposes (e.g., pharmaceuticals, chemical processing, foodstuffs, beauty and health products, etc.). Given the hazards associated with ethanol in general, carving special permissions without controls for this business segment without allowing it for others flies in the face of the general practice of the ICC. Further, that portion of the proposal seems to dismiss the idea of protecting neighboring tenants/owners and the increased risk to emergency responders, given that most craft distilleries are located in leased properties in close proximity to, or directly adjoined to, surrounding tenants or structures. Where insurance requirements and industry practices, as well as some local amendments in place around the country, dictate required physical separation (either with fire rated construction or distance), the IBC would be extremely permissive by comparison.

On the whole, the proposed modifications would unnecessarily increase protection for segments of the industry that need no such protections and would severely compromise the protections that should be afforded for other segments. Therefore, it is highly recommended that this proposal be disapproved and the effort toward consolidating requirements be revisited.

Bibliography: Distilled Spirits Council of the United States (DSCUS) *Recommended Fire Protection Practices for Distilled Spirits Beverage Facilities*

FM Global Loss Prevention Data Sheet (FM LPDS) 8-8, *Distilled Spirits Storage*

FM LPDS 7-74, *Distilleries*

XL Catlin GAPS Guidelines GAP.8.1.0.1, *Barrel Storage of Distilled Spirits*

XL Catlin GAPS Guidelines GAP.17.23.3.2, *Distilleries*

2003 International Building Code and International Fire Code

2009 International Building Code and International Fire Code

2015 International Building Code and International Fire Code

NFPA 30, *Flammable and Combustible Liquids Code*

Fire Hazards and Fire Fighting in Whiskey Warehouses, Kentucky Inspection Bureau, 1957

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The proposed changes will significantly and unnecessarily increase the cost of construction for certain portions of the industry (beer, cider, low- to mid-level wines, etc.). Manufacturing facilities for higher ethanol concentrations may see a limited reduction in construction cost, but the predicted long-term losses within communities due to fire will offset those individual gains via the larger economy.

F277-18

IFC: 202, Chapter 40 (New), Chapter 80

Proposed Change as Submitted

Proponent: Joe Scibetta, representing Self (jscibetta@buildingreports.com)

2018 International Fire Code

Add new definition as follows

ANIMAL HOUSING FACILITY Area of a building or structure, including interior and adjacent exterior spaces, where animals are fed, rested, worked, exercised, treated, exhibited, or used for production.

Add new text as follows

CHAPTER **40 ANIMAL HOUSING FACILITIES**

4001 GENERAL

4001.1 Scope. Fire protection for animal housing facilities, including agricultural buildings where livestock and poultry are housed, shall comply with the provisions of this chapter.

4002 DEFINITION

4002.1 Definitions. The following term is defined in Chapter 2:
ANIMAL HOUSING FACILITY

4003 PRECAUTIONS

4003.1 Sources of Ignition. Smoking or the use of heating or other devices employing an open flame, or the use of spark-producing equipment is prohibited in all areas of an animal housing facility, including agricultural buildings housing livestock or poultry.

4003.2 Waste Removal and Housekeeping. A procedure to ensure cleanliness and orderliness, including the removal of animal waste, shall be maintained. Permanent storage shall be prohibited in aisles, hallways, or other types of corridors.

4004 FIRE PROTECTION AND LIFE SAFETY

4004.1 Standards. Animal housing facilities shall be in accordance with the applicable provisions of the standards referenced in Table 4004.1. .

Table 4004.1
Fire and Life Safety Standards for Animal Housing

<u>Standard</u>	<u>Subject</u>
<u>NFPA 101</u>	<u>The Life Safety Code</u>
<u>NFPA 150</u>	<u>Standard on Fire and Life Safety in Animal Housing Facilities</u>

Add new standard(s) follows

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy MA 02169-7471

150-16:

Standard on Fire and Life Safety in Animal Housing Facilities

Reason: Currently, the IFC does not recognize this special type of occupancy. While housing for poultry and livestock in agricultural buildings is addressed, non-agricultural facilities where animals are housed and attended to by humans are not addressed. This proposed chapter would address the fire protection and life safety concerns in all types of animal housing, including agricultural buildings that house poultry and livestock. It is important for the IFC to recognize the special operations that take place in these unique facilities, where a secondary population is wholly reliant on a primary population for the necessary, prompt attention required during a fire emergency. This language will allow the IFC to correlate with NFPA 1 and NFPA 101, which both address this special occupancy, and will provide a vital directional path from the IFC to the only standard in our industry that addresses the specific requirements for fire protection and life safety in an animal housing facility, namely NFPA 150. Such correlation and recognition by the IFC would be vital in advancing the work of property protection and life safety in this important sector of our industry.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. These facilities already exist but are simply not yet addressed in the IFC.

F277-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved as it would be difficult to enforce as building and fire officials are already overburdened. The standard has provisions that seem difficult to enforce such as facilitating the safe movement of animals out of a building during emergencies and inspecting for animal waste removal. In general the standard is actually more restrictive than certain portions of the building code. The code was written with the primary intention of protecting people. In addition, there was concern that the definition animal housing facility was too broad. (Vote: 14-0)

Assembly Action:

None

F277-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Robert Solomon, National Fire Protection Association, representing National Fire Protection Association requests As Modified by This Public Comment.

Replace as follows:

2018 International Fire Code

ANIMAL HOUSING FACILITY

Area of a building or structure, including interior and adjacent exterior spaces, where animals are fed, rested, worked, exercised, treated, exhibited, or used for production. Such facilities include but are not limited to barns and stables; kennels; animal shelters; animal hospitals and veterinary facilities; zoos; laboratories; agricultural facilities housing animals; and mercantile or business occupancies with animals.

SECTION 319 ANIMAL HOUSING FACILITIES

319.1 General. Animal housing facilities where occupants are expected to delay their emergency egress to care for animals, the means of egress requirements shall comply with the applicable provisions of NFPA 150.

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy MA 02169-7471

150-16:

Standard on Fire and Life Safety in Animal Housing Facilities

Commenter's Reason: In lieu of stand-alone chapter it is suggested that a section on Animal Housing Facilities would fit better in Chapter 3 of the Code. The revised wording provides additional clarification to the types of facilities which are considered animal housing facilities. The revised wording also provides further clarification that NFPA 150 will be used in addition to the requirements of the IBC and IFC, maintaining the priority of the code on protecting people. The addition of this section is paramount to addressing protecting people in animal housing facilities. The code currently does not adequately address facilities in which people may delay evacuation for the care of animals. The addition of this section will help to protect human life in animal housing facilities by addressing the specific hazard.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The change may increase the cost of construction due to the increased level of life safety for the occupants.

F277-18

F300-18

IFC: 5601.1.3

Proposed Change as Submitted

Proponent: William Koffel, representing American Pyrotechnics Association (wkoffel@koffel.com)

2018 International Fire Code

Revise as follows

5601.1.3 Fireworks. The possession, manufacture, storage, sale, handling and use of fireworks are prohibited.

Exceptions:

1. Storage and handling of fireworks as allowed in Section 5604.
2. Manufacture, assembly and testing of fireworks as allowed in Section 5605.
3. The use of fireworks for fireworks displays as allowed in Section 5608.
4. The possession, storage, sale, handling and use of specific types of Division 1.4G fireworks where allowed by applicable laws, ordinances and regulations, provided that such fireworks and facilities comply with ~~NFPA 1124~~ Section 5609, CPSC 16 CFR Parts 1500 and 1507, and DOTn 49 CFR Parts 100-185, as applicable for consumer fireworks.

Reason: The current edition of NFPA 1124 does not contain requirements that address the retail sales and storage of consumer fireworks.

This is a companion change to a proposal that expands Section 5609 to address consumer fireworks in a comprehensive manner without a reference to NFPA 1124.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The requirements for Section 5609 are fairly consistent with industry practice and the provisions in previous editions of NFPA 1124.

F300-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 5601.1.3 Fireworks. The possession, manufacture, storage, sale, handling and use of fireworks are prohibited.

Exceptions:

1. Storage and handling of fireworks as allowed in Section 5604.
2. Manufacture, assembly and testing of fireworks as allowed in Section 5605.
3. The use of fireworks for fireworks displays as allowed in Section 5608.
4. The possession, storage, sale, handling and use of specific types of Division 1.4G fireworks where allowed by applicable laws, ordinances and regulations, provided that such fireworks and facilities comply with the 2006 edition of NFPA 1124, Section 5609, CPSC 16 CFR Parts 1500 and 1507, and DOTn 49 CFR Parts 100-185, as applicable for consumer fireworks.

Add new standard as follows:

NFPA 1124-06: Code for the Manufacture, Transportation, and Storage of Fireworks and Pyrotechnic Articles

Committee Reason: This proposal was approved with a modification to address the needs of firework sales. Although the current edition of NFPA 1124 does not address such sales jurisdictions need guidance on how to regulate. The committee felt that by referencing the 2006 edition of NFPA 1124 would provide the necessary requirements to regulate the sale of fireworks where such sales are legal. (Vote: 8-5)

Assembly Action:

None

F300-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Robert Solomon, NFPA, representing National Fire Protection Association requests As Modified by This Public Comment.

Modify as follows:

2018 International Fire Code

5601.1.3 Fireworks. The possession, manufacture, storage, sale, handling and use of fireworks are prohibited.

Exceptions:

1. Storage and handling of fireworks as allowed in Section 5604.
2. Manufacture, assembly and testing of fireworks as allowed in Section 5605.
3. The use of fireworks for fireworks displays as allowed in Section 5608.
4. ~~The possession, storage, sale, handling and use of specific types of Division 1.4G fireworks where allowed by applicable laws, ordinances and regulations, provided that such fireworks and facilities comply with the 2006 Edition of NFPA 1124,, CPSC 16 CFR Parts 1500 and 1507, and DOTn 49 CFR Parts 100-185, as applicable for consumer fireworks.~~

5609.1 General. Where the display or temporary storage of fireworks 1.4G (consumer fireworks) is allowed by ~~Section 5601.1.3, Exception 4,~~ such display or storage shall comply with the applicable requirements of NFPA 1124.

Commenter's Reason: Delete sub-item 4 in its entirety. This section is referencing an outdated edition of an NFPA Standard, which negates over ten years of code development by both the NFPA Technical Committee on Pyrotechnics and the NFPA Standards Council. In 2007 the Fire Protection Research Foundation (FPRF) published a hazard assessment research report (see bibliography). As a result of that report, the NFPA Standards Council identified nine safety concerns

that were outlined in their October 2008 decision on this subject. In this decision they identified a process by which a series of approval committees would be tasked with reviewing any related research, reports, findings, or combination thereof, which would substantiate and provide a scientific basis for the nine areas identified; one of which included the submission of sprinkler design criteria for the protection of retail facilities that store and sell consumer fireworks. After nearly ten years and multiple requests without an adequate response, in their 2014 decision, the NFPA Standards Council temporarily withdrew NFPA 1124 and ceased development and removed all language pertaining to storage and retail sale of consumer fireworks. It is the view of the NFPA Standards Council that there should be no standards for the storage and retail sale of consumer fireworks until such time that the remaining research needs have been addressed. If the IFC is to address the retail sale of consumer fireworks, it must do so without referencing a 12 year-old standard which contains requirements that have not been scientifically proven. See bibliography for the 2008 and 2014 Standards Council Decisions.

Bibliography: FPRF Report

<https://www.nfpa.org/-/media/Files/News-and-Research/Resources/Research-Foundation/pyrotechnicsliteraturereview.ashx?la=en>

SC Decision 08-19

<https://www.nfpa.org/-/media/Files/Codes-and-standards/standards-council/fd08738d0819nfpa1124.ashx?la=en&hash=549EAD8F126BE580E2A021F056DFB94097289D0F>

SC Decision 14-1

https://www.nfpa.org/Assets/files/AboutTheCodes/1124/FD14_3_31_D14_1_APA_NFPA1124.pdf

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There is no cost impact from this change.

Staff Analysis: Public comments to code change proposals F300-18 and F303-18 propose revisions to Section 5601.1.3 and 5609. The actions taken need to address these differences.

F300-18

F303-18

IFC: 5609

Proposed Change as Submitted

Proponent: William Koffel, representing American Pyrotechnics Association (wkoffel@koffel.com)

2018 International Fire Code

Revise as follows

SECTION 5609 TEMPORARY STORAGE OF CONSUMER RETAIL SALES AND STORAGE OF CONSUMER FIREWORKS

5609.1 General. Where the ~~display or temporary retail sales and associated storage~~ of fireworks 1.4G (consumer fireworks) is allowed by Section 5601.1.3, Exception 4, such display or storage shall comply with the applicable requirements of ~~NFPA 1124~~ this section.

Add new text as follows

5609.2 Retail sales of consumer fireworks. Retail sales of consumer fireworks in both new and existing buildings, structures, and facilities shall comply with the requirements of this section unless otherwise indicated.

5609.2.1 Special Requirements for Retail Sales of Consumer Fireworks. Retail sales of consumer fireworks, including their related storage and display for sale of such fireworks, shall be in accordance with this section.

5609.2.1.1 Occupancy classification. Retail sales of consumer fireworks in bulidings complying with this Section shall be classified as Use Group M.

5609.2.1.2 Prohibition. The retail sales of fireworks and novelties that do not comply with the regulations of the U.S. Consumer Product Safety Commission as set forth in 16 CFR 1500 and 1507 and the regulations of the U.S. Department of Transportation as set forth in 49 CFR 100 to 178, including their related storage and display for sale, shall be prohibited.

5609.2.2 Third party testing. Consumer fireworks shall be tested and certified by an approved, independent third party testing agency for compliance with the regulations of the Consumer Product Safety Commission (CPSC) as set forth in 16 CFR 1500 and 1507, using a test sampling plan that meets CPSC requirements.

5609.2.3 Permits. Where required by state or local laws, ordinances, or regulations, a permit for the following shall be obtained for the storage of consumer fireworks in connection with the retail display or sale of consumer fireworks to the public.

5609.2.4 Fire department access. Any portion of an exterior wall shall be accessible within 150 ft. (45.7 m) of a public way or an approved fire department access road.

5609.2.5 Smoking. Smoking shall be regulated in accordance with Sections 5609.2.5.1 and 5609.2.5.2

5609.2.5.1 Location. Smoking shall not be permitted inside or within 50 ft. (15.5 m) of sales facility

5609.2.5.2 Signage. At least one sign that reads as follows, in letters at least 2 in. (51 mm) high on a contrasting background, shall be conspicuously posted at each entrance or within 10 ft. (3.05 m) of every aisle directly serving the fireworks sales area:

FIREWORKS

NO SMOKING

5609.2.6 Retail sales displays. Retail displays of fireworks shall be in accordance with Sections 5609.2.6.1 through 5609.6.3.3.

5609.6.1 Height of sales display. Partitions, counters, shelving, cases and similar space dividers shall not exceed 6 ft. (1.8 m) in height above the floor surface inside the perimeter of the retail sales area. Where located along the perimeter

of the consumer fireworks retail sales area, the maximum height of sales display shall be limited to 12 ft. (3.6 m).

5609.2.6.2 Flame breaks. Where continuous displays of consumer fireworks are located on shelving, cases, counters, and similar display fixtures, a flame break shall be provided so that the maximum distance between flame breaks does not exceed 16 ft (4.9 m) where measured along the length of the display.

5609.2.6.2.1 Extension of Flame break. The flame break shall extend be in accordance with the following:

1. From the display surface to not less than 6 in. (150 mm) above the full height of the displayed merchandise or to the underside of the display surface directly above.

2. For the full depth of the displayed merchandise.

5609.2.6.2.2 Mixed packaging. Where packaged fireworks merchandise is displayed on the same level as individual unpackaged fireworks devices, the flame break required in 5609.2.7.2.1 shall not be required where in accordance with both of the following:

1. The length of the display level containing individual unpackaged fireworks devices is interrupted by packaged fireworks merchandise, or open space, or any combination thereof, having a continuous length of not less than 8 ft. (2.4 m).
2. The distance between flame breaks does not exceed 32 ft. (9.8 m).

5609.2.6.2.3 Continous storage. Where a merchandise display level contains packaged fireworks merchandise, such merchandise shall be permitted to be displayed in a continuous length on the same level, where the display does not exceed 32 ft. (9.8 m) without the flame break required in 5609.2.6.2.1.

5609.6.2.4 Aisle. An aisle having a minimum width of 48 in. (1.2 m) shall be permitted to substitute for the flame break.

5609.2.6.2.5 Displays facing aisles. Where displays of merchandise face aisles that run along both long sides of the display fixtures or display surface, a flame break shall be installed lengthwise between the abutting display fixtures or along the approximate longitudinal centerline of the display surface so as to separate the merchandise facing one of the aisles from the merchandise that abuts it facing the other aisle.

5609.2.6.2.6 Freestanding displays. Freestanding display racks, pallets, tables, or bins containing packaged fireworks merchandise shall be permitted without flame breaks, provided the dimensions of the area occupied by the fireworks merchandise do not exceed 4 ft. (1.2 m) in width, 8 ft. (2.4 m) in length, and 6 ft. (1.8 m) in height, and the displayed fireworks merchandise is separated from other displays of merchandise by aisles having a minimum clear width of 4 ft. (1.2 m).

5609.2.6.2.7 Displays of hardboard panels. Where both of the facing vertical surfaces of the abutting display fixtures are constructed of perforated hardboard panels not less than ¼ in. (6 mm) thick that are separated from each other by an open space not less than 1 ½ in. (38 mm) wide, a flame break shall not be required.

5609.2.6.2.8 Permanent sales facilities. In Permanent Sales Facilities the longitudinal flame break shall not be required where the display fixture or surface is adjacent to an aisle that is not used for public egress.

5609.2.6.3 Shelving. Shelving shall be in accordance with 5609.2.6.3.1 through 5609.2.6.3.3

5609.2.6.3.1 General. Shelving or other surfaces used to support fireworks display merchandise shall be permitted to have not more than 10 percent of the area of the shelf contain holes or other openings.

5609.2.6.3.2 Openings. The 10 percent limitation on the area of holes or other openings in the shelf used to support fireworks display merchandise shall not be applicable under the following conditions:

1. Where both of the facing vertical surfaces of the abutting display fixtures are constructed of perforated hardboard panels not less than ¼ in. (6 mm) thick and separated from each other by an open space not less than 1 ½ in. (38 mm) wide.
2. Where such merchandise is suspended from or fastened to the shelf or surface or is displayed as packaged merchandise on the surface or in bins.

5609.2.6.3.3 Flame breaks and solid display. Flame breaks and solid display surfaces shall not be required for

packaged fireworks merchandise displayed in bins or display racks or on pallets or tables located at the end of a row of display fixtures where the following conditions are met:

1. Such end displays are separated from the ends of the display fixtures by an open space not less than 3 in. (76 mm) wide.
2. The fireworks merchandise occupies an area having dimensions not greater than the width of the end of the row of display fixtures and a depth not greater than 30 in. (910 mm).
3. The minimum required widths of the adjacent aisles are maintained, but in no case is the aisle width less than 48 in. (1.2m).

5609.2.7 Covered fuses. Only consumer fireworks meeting the criteria for covered fuses shall be permitted.

5609.2.7.1 Packaged fireworks. A consumer fireworks device shall be considered as having a covered fuse if the fireworks device is contained within a packaged arrangement, container, or wrapper that is configured such that the fuse of the fireworks device cannot be touched directly by a person handling the fireworks without the person having to puncture or tear the packaging or wrapper, unseal or break open a package or container, or otherwise damage or destroy the packaging material, wrapping, or container within which the fireworks are contained.

5609.2.8 Aerial Devices. Aerial devices shall be packaged and displayed for sale in a manner that will limit travel distance of ejected pyrotechnic components if ignition of the fireworks occurs.

5609.2.9 Other Materials. Combustible materials and merchandise shall not be stored directly above the consumer fireworks in retail sales.

5609.2.10 Training. All personnel handling consumer fireworks shall receive safety training related to the performance of their duties.

5609.3 Retail Sales of Consumer Fireworks in Permanent Sales Facilities. Permanent sales facilities for retail sale of consumer fire works shall comply with Sections 5609.3.1 through 5609.3.7.3.

5609.3.1 Quantity Limitations. The floor area occupied by the retail displays of consumer fireworks in Permanent Sales Facilities shall not exceed 40 percent of the available floor area within the retail sales area.

5609.3.2 Construction of Permanent Sales Facilities. New permanent sales facilities shall not exceed one story in height.

5609.3.3 Multiple-Tenant buildings

. Multiple-tenant buildings shall comply with Sections 5609.3.3.1 and 5609.3.3.2.

5609.3.3.1 Buildings with other tenants. Where new permanent sales facilities are located in a building containing other tenants, the permanent sales facility shall be separated from the other tenants by fire barriers with a minimum fire resistance rating of two hours and having no openings.

5609.3.3.2 Sprinkler protection. Where the new permanent sales facilities are protected with an automatic sprinkler system complying with 903.3.1.1, the fire resistance rating of the fire barrier required by 5609.3.3.1 shall be permitted to be not less than 1 hour.

5609.3.4 Fire protection. An automatic sprinkler system complying with 903.3.1.1 shall be provided throughout permanent sales facilities in which fireworks sales are conducted as follows:

1. In new permanent sales facilities greater than 3000 ft² (276 m²) in area
2. In existing permanent sales facilities greater than 7500 ft² (694 m²) in area

5609.3.5 Storage rooms. Storage rooms, containing consumer fireworks in a new Permanent Sales Facilities shall be protected with an automatic sprinkler system complying with 903.3.1.1 or separated from the retail sales area by a fire barrier having a fire resistance rating of not less than 1 hour.

5609.3.6 Fire alarms. A fire alarm system shall be provided in accordance with Section 907.

5609.3.7 Separation distances. Separation distances shall be provided in accordance with Section 5609.3.7.1 through 5609.3.7.3 as applicable.

5609.3.7.1 New facilities

New Permanent Sales Facilities shall be separated from adjacent permanent buildings and structures in accordance with Table 5609.3.7.1.

5609.3.7.2 Existing facilities. Existing Permanent Sales Facilities shall be separated from adjacent permanent buildings and structures by not less than 10 ft (3.05m) or shall be separated by a wall with a 1-hour fire resistance rating.

**Table 5609.3.7.1
SEPARATION DISTANCE BETWEEN NEW PERMANENT BUILDINGS AND STRUCTURES**

Separation distance		Exterior Wall Fireresistance Rating (hr)	Exterior Wall Opening Protection Rating (hr)
<u>Ft</u>	<u>M</u>		
<u>< 10</u>	<u><3.05</u>	<u>2</u>	<u>1-1/2</u>
<u>>10 - <60</u>	<u>>3.05- <18.3</u>	<u>1</u>	<u>3/4</u>
<u>> 60</u>	<u>>18.3</u>	<u>0</u>	<u>0</u>

5609.3.7.3 Parking.. No motor vehicle or trailer used for the storage of consumer fireworks shall be parked with 10 ft. (3 m) of a permanent sales facility, except when the vehicle or trailer is delivering, loading, or unloading fireworks or other merchandise and materials used, stored, or displayed for sale in the facility.

5609.3.8 Means of Egress. Means of egress in permanent retail sales facilities shall be in accordance with Sections 5609.3.8.1 through 5609.3.8.3.

5609.3.8.1 Number of exits. The minimum number of exits provided from the retail sales area shall be not less than three.

5609.3.8.2 Exit access travel distance. Exits provided for permanent sales facilities shall be located so that the exit access travel distance does not exceed 75 ft. (22.9 m).

5609.3.8.3 Emergency lighting. Emergency lighting shall be provided for permanent sales facilities.

5609.3.9 Operations. Operations of retail sales of consumer fireworks in permanent facilities shall be in accordance with Sections 3609.3.9.1 through 5609.3.9.3.

5609.3.9.1 Distances from Entrances and Exits. Distance to entrances and exits shall comply with Sections 5609.3.9.1.1 and 5609.3.9.1.2.

5609.3.9.1.1 Public entrances. No consumer fireworks shall be displayed for sale or stored within 5 ft (1.5 m) of any public entrance in an enclosed building or structure.

5609.3.9.1.2 Private entrances. No consumer fireworks shall be displayed for sale or stored within 2 ft (0.6 m) of any exit or private entrance in an enclosed building or structure.

5609.3.9.2 Security. Fire works shall be kept Secure in permanent sales facilities in accordance with Sections 5609.3.9.2.1 through 5609.3.9.2.3.

5609.3.9.2.1 Non business hours. Permanent sales facilities shall be secured when unoccupied and not open for business, unless fireworks are not kept in the facility during such times.

5609.3.9.2.2 Removal and transferring. The fireworks displayed or stored in a permanent sales facilities shall be allowed to be removed and transferred to a temporary storage structure or location.

5609.3.9.2.3 Ignition sources. Fireworks shall not be ignited, discharged, or otherwise used within 300 ft. (91.5 m) of a permanent sales facilities.

5609.3.9.3 Display and Handling. Not less than 50 percent of the available floor area within the retail sales area shall be open space that is unoccupied by retail displays and used only for aisles and cross-aisles.

5609.4 Requirements for Retail Sales of Consumer Fireworks in Temporary Sales Facilities. The retail sales of consumer fire works in temporary sales facilities shall be in accordance with Sections 5609.4.1 through 5609.4.6.4.

5609.4.1 Construction of Temporary Sales Facilities. New Temporary Sales Facilities shall not exceed one story in height.

Exception: Temporary Sales Facility stands greater than 1600 ft2 (148 m2) in area that also meet the construction requirements for a permanent structure.

5609.4.2 Sale from vehicles. The sale of consumer fireworks from vehicles including automobiles, trucks, motor homes and travel trailers is not permitted except when the vehicle meets the requirements for a Temporary Sales Facility stand.

5609.4.3 Signage. In addition to the signage required in 5609.2.6 at least one sign that reads as follows, in letters at least 4 in. (102 mm) high on a contrasting background, shall be conspicuously posted on the exterior the temporary sales facility:

NO FIREWORKS DISCHARGE

WITHIN 100 FEET

5609.4.4 Separation Distances. Temporary sales facilities shall be located as specified in Table 5609.4.4 and in accordance with Sections 5609.4.4.1 and 5609.4.4.2.

5609.4.4.1 Clearance to Combustibles. The area located within 10 ft. (9 m) of a temporary sales facilities shall be kept free of accumulated dry grass, dry brush, and combustible debris.

5609.4.4.2 Parking. No motor vehicle or trailer used for the storage of consumer fireworks shall be parked within 10 ft. (3 m) of a Temporary Sales Facilities, except when the vehicle or trailer is delivering, loading, or unloading fireworks or other merchandise and materials used, stored, or displayed for sale in the facility.

**Table 5609.4.4
MINIMUM SEPARATION DISTANCES FOR TEMPORARY SALES FACILITIES**

Type	Separation Distance											
	Buildings		Combustibles		Tents		Vehicle Parking		Stands		Storage of Fireworks	
	Ft	M	Ft	M	Ft	M	Ft	M	Ft	M	Ft	M
Tents	20	6.1	20	6.1	20	6.1	10	3.05	20	6.1	20	6.1
Stands	20	6.1	10	3.05	20	6.1	10	3.05	20	6.1	20	6.1

5609.4.5 Means of Egress. Means of egress and temporary retail sales of consumer fire works shall be in compliance with Sections 5609.4.5.1 through 5609.4.5.6.

5609.4.5.1 Number of Exits. The minimum number of exits provided from the retail sales area shall be not less than three for Temporary Sales Facilities that are larger than 1,200 ft2. All other Temporary Sales Facilities shall have a minimum of two exits, regardless of area.

5609.4.5.2 Egress through storage rooms. Required means of egress from the retail sales area shall not be allowed to pass through storage rooms or areas.

5609.4.5.3 Egress Travel Distance. Egress travel distance shall be in accordance with Sections 5609.4.5.3.1 and 5609.4.5.3.2.

5609.4.5.3.1 Exits provided for Temporary Sales. Facilities tents shall be located so that the exit access travel distance does not exceed 75 ft. (22.9 m).

5609.4.5.3.2 Exits provided for Temporary Sales. Facilities stands shall be located so that the exit access travel distance does not exceed 35 ft. (10.6 m).

5609.4.5.4 Aisles. Aisles shall have a minimum clear width of 48 in. (1.2 m) except in temporary sales facilities stands where the interior is not accessible to the public, the minimum clear width of aisles shall be 28 in. (710 mm).

5609.4.5.5 Dead-end aisles. Dead-end aisles shall be prohibited.

5609.4.5.6 Emergency Lighting. Emergency lighting shall be provided for temporary sales facilities. Emergency lighting shall not be required in Temporary Sales Facilities that are not open for business after dusk or for Temporary Sales Facilities stands where the interior is not accessible to the public.

5609.4.6 Sales Display. Consumer fireworks shall be displayed in a manner that prevents the fireworks from being handled by persons other than those operating, supervising, or working in the Temporary Sales Facilities stand where the stand does not allow access to the interior by the public.

5609.4.7 Portable Generators. Portable generators shall be in accordance with Sections 5609.4.7.1 through 5609.4.7.4.

5609.4.7.1 Fuel. Fuel for generators shall be permitted to be Class I, Class II, or Class III liquids and shall be limited to not more than 5 gallons (18.9 L) unless the generator fuel storage is located at least 50 ft. (15.2 m) from the temporary sales facility.

5609.4.7.2 Limitations. Portable generators supplying power to Temporary Sales Facilities shall use only Class I or Class III combustible liquid fuels.

5609.4.7.3 Separation of generators. Portable generators shall be located not less than 20 ft. (6.1 m) from the Temporary Sales Facilities.

5609.4.7.4 Separation of fuels. Generator fuels shall be stored not less than 20 ft. (6.1 m) from the Temporary Sales Facilities.

5609.5 Requirements for Retail Sales of Consumer Fireworks in Stores. Retail sale of consumer fireworks shall comply with Section 5609.5.1 through 5609.5.6

5609.5.1 Applicability. The requirements of Section 5609.4 do not apply where both of the following conditions exist:

1. The area of the retail sales floor occupied by the retail displays of consumer fireworks does not exceed 25 percent of the area of the retail sales floor in the building or 600 ft² (55.5m²), whichever is less.
2. The consumer fireworks are displayed and sold in a manner approved by the fire code official and comply with the applicable provisions of this code, federal and state law, and local ordinances.

5609.5.2 Requirements. Consumer fireworks displayed for sale in stores shall comply with all of the following:

1. Such fireworks shall be under the visual supervision of a store employee or other responsible party while the store is open to the public.
2. Such fireworks shall be packaged fireworks merchandise.
3. Such fireworks shall be packaged and displayed for sale in a manner that will limit travel distance of ejected pyro-technical components if ignition of the fireworks occurs.
4. Where consumer fireworks meeting the description of aerial devices and audible ground devices are sold, such devices shall be displayed for sale in an area of the store that is physically separated from the rest of the store in a manner that restricts entry by the public, and the area of the store shall be provided with not less than two means of egress, so located that there is no common path of travel and the distance to reach an egress point from the area does not exceed 35 ft (10.7m).

5609.5.3 Automatic Sprinkler System. The store shall be protected with an automatic sprinkler system in accordance

with 903.3.1.1 in accordance with the following:

1. New stores greater than 3000 ft² (552.2 m²) in area
2. Existing stores greater than 7500 ft² (694 m²) in area

5609.5.4 Fire Alarm System. A fire alarm system shall be provided as required by Section 907. In addition, in stores greater than 3000 ft² (280 m²), a public address system or a means for manually activating audible and visible alarm indicating devices located throughout the facility shall be provided at a constantly attended location when the store is occupied.

5609.5.5 Storage Rooms. Storage rooms containing consumer fireworks in a store shall be protected with an automatic sprinkler system complying with 903.3.1.1 or shall be separated from the retail sales area by a fire barrier having a fire resistance rating of not less than 1 hour.

5609.5.6 Means of Egress. Exits provided for stores shall be located so that the exit access travel distance from the area where consumer fireworks are displayed does not exceed 75 ft. (22.9 m).

5609.6 Storage of Consumer Fireworks. The storage of consumer fireworks shall comply with Sections 5609.6.1 through 5609.6.9.3

5609.6.1 Non applicability. This section shall not apply to buildings or facilities where the net weight of the pyrotechnic content of consumer fireworks stored does not exceed 125 lb., or 250 lb. where the building is protected throughout with an automatic sprinkler system complying with 903.3.1.1

5609.6.2 Storage locations. Consumer fireworks storage buildings shall not also be used as a magazine for the storage of other explosive materials. Consumer fireworks shall be permitted to be stored in a magazine.

5609.6.3 Reworking and processing. Any reworking or processing of consumer fireworks shall only be permitted to be performed in a building meeting the requirements of NFPA 1124 for Process Buildings.

5609.6.4 Occupancy restrictions. Consumer fireworks storage buildings shall not be used for residential occupancies and shall not be located in residential areas.

5609.6.5 Finished products. Finished consumer fireworks at a manufacturing or distribution facility shall be stored in consumer fireworks storage buildings, trailers, semitrailers, metal shipping containers, or magazines.

5609.6.6 Receiving and packaging. Receiving, picking, packing, packaging, and shipping shall be permitted in consumer fireworks storage buildings or areas.

5609.6.7 Separation Distances. Consumer fireworks storage or work buildings at distribution facilities shall be separated from adjacent permanent buildings and structures in accordance with Table 5609.6.7

**Table 5609.6.7
SEPARATION DISTANCE FOR CONSUMER FIREWORKS STORAGE OR WORK BUILDINGS**

Separation distances		Exterior Wall Fireresistance Rating (hr)	Exterior Wall Opening Protection Rating (hr)
Ft	M		
<u>< 10</u>	<u>< 3.05</u>	<u>2</u>	<u>1-1/2</u>
<u>>10 - <60</u>	<u>>3.05- <18,3</u>	<u>1</u>	<u>3/4</u>
<u>> 60</u>	<u>>18.3</u>	<u>0</u>	<u>0</u>

5609.6.8 Operations. Operations shall be in accordance with Sections 5609.8.1 through 5609.6.8.

5609.6.8.1 Receiving and storing. Receiving, storing, picking from cartons, packing into cartons, packaging into retail packages including assortments, shipping, and other similar operations involving finished consumer fireworks shall be permitted in consumer fireworks storage or work buildings, rooms, or areas that meet the requirements of this chapter.

5609.6.8.2 Picking, sorting and packaging. Picking, sorting, packaging, packing, and other similar operations involving

finished consumer fireworks shall be conducted in consumer fireworks work buildings or consumer fireworks work rooms or areas in consumer fireworks storage buildings that meet the requirements of this chapter.

5609.6.8.3 Locking doors and windows. Exterior doors and windows shall be kept locked when the building is not occupied or otherwise attended.

5609.6.8.4 Consumer fireworks. 5609.6.8.4 Consumer fireworks shall be in accordance with the following:

1. Consumer fireworks shall be stored in DOT-approved packaging.
2. Cartons shall be stacked neatly and in a stable manner.
3. Consumer fireworks returned to these buildings shall be permitted to be stored temporarily in cartons until repackaging or repacking can be performed.
4. Firearms, unless carried by authorized personnel or law enforcement personnel, shall not be permitted inside a consumer fireworks storage or work building, room, or area or within 50 ft. (15.2 m) of stored consumer fireworks.

5609.6.9 Housekeeping. Housekeeping shall comply with Section 5609.6.9.1 through 5609.6.9.3.

5609.6.9.1 Loose black powder. Loose black powder or other exposed pyrotechnic composition shall be prohibited. If loose composition is discovered, it shall be removed immediately and disposed of in an approved manner.

5609.6.9.2 Fireworks storage or work areas. Consumer fireworks storage or work buildings, rooms, or areas shall comply with all of the following:

1. Interiors shall be kept clean, dry and free of grit and rubbish.
2. Tools used for cleaning up loose pyrotechnic composition shall not have spark-producing metal parts.
3. Sweepings shall be disposed of in an approved manner.

5609.6.9.3 Clearance. The area around consumer fireworks storage or work buildings shall be kept clear of brush, dried vegetation, rubbish, and similar combustibles for a distance of at least 25 ft. (7.6 m).

Reason: The current edition of NFPA 1124 no longer contains requirements addressing the retail sales and storage of consumer fireworks. Whereas almost every state allows the sale of some consumer fireworks, the fire official has no requirements to enforce that specifically address such facilities. The proposal is not about whether the sale of consumer fireworks should be permitted; but rather, where they are permitted the proposal provides a minimum set of requirements that a fire official can apply to provide an acceptable level of safety.

The requirements contained in this proposal are not as comprehensive as the standalone requirements contained in previous editions of NFPA 1124. Instead, the approach taken was to rely on other sections of the IFC to address provisions such as illumination of the means of egress, portable fire extinguishers, electrical equipment, etc. Instead, the proposed revisions focus on requirements that are mostly unique to consumer fireworks facilities such as flame breaks and covered fuses.

The proposal contains a set of general requirements that apply to all facilities in which consumer fireworks are sold (5609.2). The general provisions are then followed by requirements unique to three separate types of facilities: permanent sales facilities (5609.3); temporary sales facilities (5609.4); and retail stores in which consumer fireworks are displayed and sold along with other goods and merchandise (5609.5). The storage related to the sale of consumer fireworks is covered in Section 5609.6.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The transition from the requirements of NFPA 1124 to the proposed requirements for Section 5609 should not impact the cost of construction.

F303-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved based upon the action taken on code change proposal F300-18. There was some discussion regarding the verbiage in this proposal that it needs to better clarify how to deal with new and existing buildings. In addition, there was concern with the application of the provisions for temporary sales. Finally, Section 5609.4.5 of the proposal does not reference Chapter 10 of the coded for means of egress. (Vote: 14-0)

Assembly Action:

None

F303-18

Individual Consideration Agenda

Public Comment 1:

Proponent: William Koffel, representing American Pyrotechnics Association (wkoffel@koffel.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Fire Code

FLAME BREAK

A solid material, without holes, utilized to retard the spread of flame.

5601.1.3 Fireworks. The possession, manufacture, storage, sale, handling and use of fireworks are prohibited.

Exceptions:

- 1.Storage and handling of fireworks as allowed in Section 5604.
- 2.Manufacture, assembly and testing of fireworks as allowed in Section 5605.
- 3.The use of fireworks for fireworks displays as allowed in Section 5608.
- 4.The possession, storage, sale, handling and use of specific types of Division 1.4G fireworks where allowed by applicable laws, ordinances and regulations, provided that such fireworks and facilities comply with ~~NFPA 1124~~Section 5609, CPSC 16 CFR Parts 1500 and 1507, and DOTn 49 CFR Parts 100-185, as applicable for consumer fireworks.

SECTION 5609 TEMPORARY RETAIL SALES AND ASSOCIATED STORAGE OF

CONSUMER FIREWORKS

5609.1 General. Where the display or ~~temporary~~ storage of fireworks 1.4G (consumer fireworks) is allowed by Section 5601.1.3, Exception 4, such display ~~or and~~ storage shall comply with the applicable requirements of the 2006 edition of NFPA 1124, and this section.

5609.2 Retail sales of consumer fireworks. Retail sales of consumer fireworks in both new and existing facilities shall comply with this Sections 5609.2.1 through 5609.2.5

5609.2.1 Occupancy Classification. Retail sales of consumer fireworks shall be limited to buildings of Use Group M.

5609.2.2 Permits. Where required by state or local laws, ordinances, or regulations, a permit shall be obtained for the storage of consumer fireworks in connection with the retail display or sale of consumer fireworks to the public.

5609.2.3 Flame Breaks. Where continuous displays of consumer fireworks are located on shelving, cases, counters, and similar display fixtures, a flame break shall be provided such that the maximum distance between flame breaks does not exceed 16 ft. (4.9 m.) where measured along the length of the display.

5609.2.3.1 Minimum dimensions. The flame break shall extend as follows:

1. The display surface to not less than 6 in. (150 mm) above the full height of the displayed merchandise or to the underside of the display surface directly above.
2. For the full depth of the displayed merchandise.

5609.2.3.2 Mixed packaging types. Where packaged fireworks merchandise is displayed on the same level as individual unpackaged fireworks devices, the flame break required in 5609.2.3 shall not be required where both of the following criteria are met:

1. The length of the display level containing individual unpackaged fireworks devices is interrupted by packaged fireworks merchandise, or open space, or any combination thereof, having a continuous length of not less than 8 ft. (2.4 m).
2. The distance between flame breaks does not exceed 32 ft. (9.8 m).

5609.2.3.3 Display of packaged fireworks. Where a merchandise display level contains packaged fireworks merchandise, such merchandise shall be permitted to be displayed in a continuous length on the same level, where the display does not exceed 32 ft. (9.8 m) without the flame break required in 5609.2.3.

5609.2.3.4 Aisle alternative. An aisle having a minimum width of 48 in. (1.2 m) shall be permitted to substitute for the flame break.

5609.2.3.5 Abutting displays. Where displays of merchandise face aisles that run along both long sides of the display fixtures or display surface, a flame break shall be installed lengthwise between the abutting display fixtures or along the approximate longitudinal centerline of the display surface so as to separate the merchandise facing one of the aisles from the merchandise that abuts it facing the other aisle.

5609.2.3.6 Freestanding displays. Freestanding display racks, pallets, tables, or bins containing packaged fireworks merchandise shall be permitted without flame breaks, provided the dimensions of the area occupied by the fireworks merchandise do not exceed 4 ft. (1.2 m) in width, 8 ft. (2.4 m) in length, and 6 ft. (1.8 m) in height, and the displayed fireworks merchandise is separated from other displays of merchandise by aisles having a minimum clear width of 4 ft. (1.2 m).

5609.2.3.7 Hardboard panel separation. Where both of the facing vertical surfaces of the abutting display fixtures are constructed of perforated hardboard panels not less than ¼ in. (6 mm) thick that are separated from each other by an open space not less than 1 ½ in. (38 mm) wide, a flame break shall not be required.

5609.2.3.8 Non-public aisle. The longitudinal flame break shall not be required where the display fixture or surface is adjacent to an aisle that is not used for public egress.

5609.2.4 Covered Fuses. Only consumer fireworks meeting the criteria for covered fuses shall be permitted. A consumer fireworks device shall be considered as having a covered fuse if the fireworks device is contained within a packaged arrangement, container, or wrapper that is configured such that the fuse of the fireworks device cannot be touched directly by a person handling the fireworks without the person having to puncture or tear the packaging or wrapper, unseal or break open a package or container, or otherwise damage or destroy the packaging material, wrapping, or container within which the fireworks are contained.

5609.2.5 Automatic Sprinkler System. An automatic sprinkler system complying with 903.1.1 shall be provided throughout facilities in which fireworks sales are conducted in the following buildings:

1. New facilities greater than 3000 ft² (276 m²) in area
2. Existing facilities greater than 7500 ft² (694 m²) in area

5609.3 Storage of Consumer Fireworks Storage of consumer fireworks in both new and existing buildings, structures, and facilities shall comply with the requirements of Sections 5609.3.1 and 5609.3.2.

5609.3.1 Automatic Sprinkler System. An automatic sprinkler system complying with 903.1.1 shall be provided in consumer fireworks storage buildings greater than 12,000 ft². (1115 m²).

5609.3.2 Design Criteria The automatic sprinkler system shall be designed using the following criteria for the areas in which the consumer fireworks are stored in DOT-approved packaging:

1. Consumer fireworks stored in DOT-approved packaging shall be considered as a Class IV commodity.
2. Consumer fireworks stored to a height not greater than 10 ft. (3 m) in racks, or 12 ft. (3.7 m) otherwise, shall be classified as an Ordinary Hazard (Group 2) occupancy.
3. Consumer fireworks stored to a height not greater than 12 ft. (3.7 m) in racks, but greater than 10 ft. (3 m), shall be classified as an Extra Hazard (Group 1) occupancy.
4. Consumer fireworks stored to a height greater than 12 ft. (3.7 m) shall be protected by an automatic sprinkler system, acceptable to the fire code official, that is designed using a fire control approach or a special design approach.

Commenter's Reason: Instead of providing the detailed requirements contained in the Public Proposal, the Code Development Committee chose to reference the 2006 Edition of NFPA 1124. However, the 2006 Edition of NFPA 1124 does not contain requirements for flame breaks and covered fuses. In the 2006 Edition of NFPA 1124, the threshold for when automatic sprinkler protection is required uses a higher area than what is contained in the original printing of the 2013 Edition of NFPA 1124. The Public Comment (and original Public Proposal) used the smaller area threshold consistent with the 2013 Edition of NFPA 1124.

In taking the action that was taken, the Code Development Committee requested that the FCAC review the action taken and suggest additional changes. In meeting with the FCAC, it was recommended the the requirements for flame breaks, covered fuses, and the sprinkler threshold requirements be added to Section 5609.

It should also be noted that based upon the action taken by the Code Development Committee it was impossible to revise F303 during the Code Development Hearings. As such, the clean-up necessary for Section 5609 had to be accomplished by a Public Comment. If the Public Comment is not accepted, Section 5609 will simply reference NFPA 1124, without specifying the edition, and it will not contain the additional protection provided by flame breaks, covered fuses, and more restrictive sprinkler system thresholds.

The Public Comment addresses the need to revise Section 5609 based upon the Committee Recommendation for Approval as Modified of F300-18. A correlative edit has been made to Exception 4 to Section 5601.1.3 to re-insert Section 5609 as originally proposed.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The additional cost will be that associated with flame breaks and the more restrictive sprinkler system thresholds. Most, if not all, consumer fireworks sold in the USA should not be protected with covered fuses which is not a construction cost.

Staff Analysis: Public comments to code change proposals F300-18 and F303-18 propose revisions to Section 5601.1.3 and 5609. The actions taken need to address these differences.

F303-18

F304-18

IFC: TABLE 5703.6.2, Chapter 80

Proposed Change as Submitted

Proponent: Bob Torbin, OmegaFlex, representing OmegaFlex (bob.torbin@omegaflex.net)

2018 International Fire Code

Revise as follows

**TABLE 5703.6.2
PIPING STANDARDS**

PIPING USE	STANDARD
Power Piping	ASME B31.1
Process Piping	ASME B31.3
Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids	ASME B31.4
Building Services Piping	ASME B31.9
Double Containment Piping	UL971A: UL1369

Add new standard(s) follows

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook IL 60062

971A -2006:

**Outline of Investigation for Metallic Underground Fuel Pipe
1369-18:**

Aboveground Piping Requirements

Reason: This proposal covers metallic and composite primary carrier, secondary containment, and integral primary/secondary piping systems (piping and fittings) intended for above and below ground use in applications for the distribution of petroleum-based flammable and combustible liquids. The intent and design of double containment systems are focused on preventing fuel/liquid leaks that could result in severe fire hazards.

The primary metallic (316 stainless steel) tubing is a zero-permeation pipe which is highly resistant to corrosion with exceptional crush resistance. The UV stabilized Nylon 12 protective containment layer offers exceptional resistance to hydrocarbons, chemical and water exposure, and carries a 50 psig rating. An EFEP secondary barrier jacket layer is bonded to the Nylon 12 protective layer to offer secondary containment with exceptional permeation resistance for product compatibility. The interstitial space between the tubing and jacket allows continuous monitoring for leak detection, with a 50 psig rating for pressurized systems. The self-flaring fitting provides a metal to metal sealing surface with excellent reliability and is field-attachable using standard hand tools. This class of piping product has been used (above and below grade) for a variety of fuels for several years without failure for many applications such as marinas, gasoline stations and small power generators.

Cost Impact: The code change proposal will decrease the cost of construction. The use of a listed encasement system results in cost savings because the piping and encasement are installed simultaneously. This avoids the labor cost of separately installing the conduit and piping. In addition, the sealing and venting methods (when required) are also integrated within the encasement system, thus eliminating the need to separately assemble and/or install sealing and venting components within standard conduit.

Analysis: A review of the standards proposed for inclusion in the code, UL 971A -2006 and UL 1369-18, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

F304-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This proposal was approved based upon the proponent's reason statement and would allow for another type of double contained pipe. (Vote: 14-0)

Assembly Action:

None

F304-18

Individual Consideration Agenda

Public Comment 1:

Proponent: CP28 Administration.

Commenter's Reason: The administration of ICC Council Policy 28 (CP28) is not taking a position on this code change. This public comment is being submitted to bring a procedural requirement to the attention of the ICC voting membership. In accordance with Section 3.6.3.1.1 of ICC Council Policy 28 (partially reproduced below), the new referenced standard UL1369-18: Aboveground Piping Requirements, must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

(CP28) 3.6.3.1.1 Proposed New Standards. In order for a new standard to be considered for reference by the Code, such standard shall be submitted in at least a consensus draft form in accordance with Section 3.4. If the proposed new standard is not submitted in at least consensus draft form, the code change proposal shall be considered incomplete and shall not be processed. The code change proposal shall be considered at the Committee Action Hearing by the applicable code development committee responsible for the corresponding proposed changes to the code text. If the committee action at the Committee Action Hearing is either As Submitted or As Modified and the standard is not completed, the code change proposal shall automatically be placed on the Public Comment Agenda with the recommendation stating that in order for the public comment to be considered, the new standard shall be completed and readily available prior to the Public Comment Hearing

F304-18

F314-18

IFC: 5707.4

Proposed Change as Submitted

Proponent: Andrew Klein, representing Booster Fuels (andrew@asklein.com)

2018 International Fire Code

Revise as follows

5707.4 Mobile fueling areas. Mobile fueling shall not occur on public streets, *public ways* or inside *buildings*. Fueling on the roof level of parking structures or other *buildings* is prohibited unless adequate and direct access from grade-level is provided as determined by the fire code official.

Reason: There are some sites where a building or underground parking structure is below a grade-level parking lot. Fueling at such a location does not hinder emergency vehicle access, and fueling may be performed safely. This proposal provides the fire code official the ability to permit fueling at such locations when adequate emergency vehicle access is provided.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This code change proposal simply clarifies where mobile fueling is permitted.

F314-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved based upon concerns related to the potential for the accumulation of vapors. A modification was presented that provided more detail regarding issues such as ventilation, location and spill control but further review is necessary. In particular it needs to be clear that all conditions presented by the modification would apply. (Vote: 14-0)

Assembly Action:

None

F314-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Andrew Klein, representing Booster Fuels and Shell (andrew@asklein.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Fire Code

5707.4 Mobile fueling areas. Mobile fueling shall not occur on public streets, *public ways* or inside *buildings*. Fueling on the roof level of parking structures or other *buildings* is prohibited.

Exception: The fire code official is authorized to permit mobile fueling inside and on the roof level of buildings and garages that are classified as Group H-3 in accordance with Section 307.5 of the International Building Code.

Commenter's Reason: There is an industry need for mobile fueling of fleet vehicles that are garaged in parking structures. As technology advances and cities look to reduce traffic congestion, fleets of vehicles owned by car sharing companies have increased dramatically in recent years. Gasoline is still the preferred fuel source for most of these vehicles, even the autonomous ones that are being developed and tested. Car sharing businesses need code requirements to support developing technology and city needs so that they can move forward with confidence investing in infrastructure.

Fueling inside of a building is no different than any other use of flammable liquids inside of a building. Permitting mobile fueling inside of buildings constructed as H-3 Occupancies is consistent with the intent of the Code and provides the necessary requirements and guidance when constructing facilities for such purposes.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Jurisdictions may already permit fueling inside of buildings that are classified as Group H-3 occupancies through alternative means and methods. This Public Comment codifies what is already being done so that owners of ride sharing fleets can continue with confidence when expanding their fleets and the facilities that garage them.

F314-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: There was general concern for dispensing fuel on a public way. In particular there is concern for such operations occurring in residential neighborhoods without additional data to better understand the risks. It was pointed out that the language appears to limit time of day but not location. There was a sense from some that the fire code official should be allowed some discretion to allow fueling in public ways under certain conditions. (Vote: 11-3)

Assembly Action:

None

F316-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Andrew Klein, representing Shell (andrew@asklein.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Fire Code

5707.4 Mobile fueling areas. Mobile fueling shall not occur on public streets, *public ways* or inside *buildings*. Fueling on the roof level of parking structures or other *buildings* is prohibited.

Exception: The fire code official is authorized to permit mobile fueling on public streets and public ways where all of the following conditions are met:

1. Mobile fueling has been permitted by the authority having jurisdiction over public streets.
2. Mobile fueling activities do not obstruct vehicular or pedestrian traffic.
3. The safety and emergency response plan requires compliance with all applicable parking and traffic vehicle laws.

Commenter's Reason: Many jurisdictions rely on ride sharing programs to reduce congestion and eliminate the need for costly, expanded infrastructure improvements. In order for ride sharing programs to be viable, vehicles often need to be distributed throughout cities so that users of the program can access them. Fueling such vehicles presents many issues from rampant fraud and abuse of fuel cards to the inconvenience of members having to refuel at gas stations. When jurisdictions request that fueling of vehicles parked along the street be permitted, the Code must provide guidance to the fire code official as to how to permit such an activity.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The mobile fueling activities will not affect construction costs of buildings.

Public Comment 2:

Proponent: Jim Tidwell, representing FILLD (jimtidwell@tccfire.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Fire Code

5707.4 Mobile fueling areas. Mobile fueling shall not occur on public streets, *public ways* or inside *buildings*. Fueling on the roof level of parking structures or other *buildings* is prohibited.

Exception: The Fire Code Official is authorized to permit mobile fueling on public streets where all the following apply:

1. The fueling operation is at an approved location or geographic area
2. The mobile fueling vehicle and the vehicle being fueled are in compliance with all parking, traffic and vehicle laws
3. The mobile fueling operation do not obstruct vehicle or pedestrian traffic
4. Containment for spilled fuel is in place while the fueling operation is in process
5. Approved overfill protection is provided
6. The mobile fueling vehicle is positioned with respect to the vehicle being fueled to prevent traffic from driving over the delivery hose
7. Fueling operations take place during a time of day and day of week approved by the fire code official

Commenter's Reason: While mobile fueling services are relatively new, they are quickly becoming highly desirable and, in many cases, a necessary part of our daily lives. The industry has now completed more than a million fueling events with no reportable spills, fires or other incidents related to the fueling activity. This is clearly an indication that mobile fueling is not a significant risk to our communities.

Our proposal to the code development committee was contained in a floor modification identical to this public comment. The proposal was recommended for disapproval by the committee, we believe, because there was a lack of information relative to the risks of mobile fueling. One of the challenges in developing regulations for new processes or activities is that we tend to address perceived risks, and don't have the data to base the requirements on actual risks. This was the case when the 2018 requirements were developed for mobile fueling and has persisted until now. To address this knowledge gap, we engaged Jensen Hughes to conduct a risk assessment of mobile fueling, and specifically asked them to analyze the practice of on-street fueling and compare that risk to the risks associated with fixed site (service station) fueling activities. The report is available by request to any jurisdiction wishing to view it, but is obviously too voluminous to include here.

Specific to this proposal are the following passages from the report:

The purpose of the report: "Specifically, the assessment compares the risks associated with fuel dispensing operations at a fixed motor fuel dispensing facility ("service station") that directly complies with the requirements of the applicable codes and standards, and a mobile fueling operation (as conducted by Filld) located on a public street."

"These results support the consideration that mobile fueling operations do not increase the fire risk to life and property beyond that already permitted by other fueling operations currently permitted in codes and standards."

The report goes on to state that "The results of the consequence analysis show that mobile fueling operations can limit the risk of property damage to a level that is at least as good as or better than that implicit to the spatial separation requirements of IFC and NFPA 30A for fixed dispensing facilities (3.0 m)."

Based upon the risk analysis, fires per fueling event involving mobile fueling are predicted to be less frequent than those at fixed facilities, and the result of any fire that does occur will be no more harmful than those emanating from fixed fueling facilities.

The report uses industry standard practices to calculate both frequency and severity of events. The calculations are based upon historical data gleaned from valid sources, including NFPA, International Association of Oil and Gas Producers, and the Petroleum Equipment Institute, to name a few. Utilizing historical data rather than relying upon theoretical failure rates adds credibility to the findings.

Even though we believe the practice of mobile fueling poses no additional risk to our communities, the proposed change provides ample opportunity for the code official to implement requirements specific to the jurisdiction, including location, time of day, day of week, etc. Because the proposal doesn't mandate the code official to permit mobile fueling on streets, additional requirements based upon the local risk profile and response capabilities may be implemented. For instance, meaningful distinctions between truck type, aggregate fuel capacity, and driver training and certification, among other factors, give rise to meaningful differences in hazard/risk profiles. This proposal provides for a reasonable level of safety while providing enough flexibility to the local code official to address local concerns.

We ask the ICC membership to carefully study this report, which clearly indicates that mobile fueling is at least as safe as currently permitted fixed site fueling. Based upon that fact, and based upon the fact that this proposal includes strict requirements for this activity, it would be inappropriate for the code to require a higher level of protection for a lower risk activity. Please vote in support of this public comment.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposal doesn't involve construction, therefore there can be no impact on the cost of construction.

F328-18

IFC: , O101, O101.1, O101.2, O101.3, O101.4, O101.5, O102

Proposed Change as Submitted

Proponent: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org)

2018 International Fire Code

Add new text as follows

O101 QUALIFICATIONS

O101.1 Fire Marshal/Fire code official. The fire marshal/fire code official shall have experience as a firefighter or fire officer, architect, fire protection engineer, inspector, fire protection contractor or some combination of these fields. In addition, the fire marshal/fire code official shall have experience and/or formal training in supervisory skills. The fire code official shall be certified as a fire code official, fire marshal, or fire protection engineer through a recognized licensure or certification program. With the exception of architects and fire protection engineers, certification or licensure for fire marshal shall demonstrate the qualifications outlined in NFPA 1037. The fire marshal/fire code official shall be appointed or hired by the fire chief or executive management of the governing authority.

O101.2 Chief fire inspector. The fire marshal/fire code official is authorized to designate chief fire inspectors to serve as supervisors or fire service officers to administer the provisions of the International Fire Code and to supervise plans examiners and inspectors. Each supervisor or fire service officer in the role of chief fire inspector shall have experience as a firefighter or fire officer, architect, fire protection engineer, inspector, fire protection contractor, or some combination of these fields. In addition, when chief fire inspectors are appointed, they shall have experience or formal training in supervisory skills. The chief fire inspector shall be certified or licensed through a recognized licensure or certification program as a fire inspector, fire safety inspector, fire code plans examiner, fire protection engineer, or in an equivalent field of expertise. With the exception of architects and fire protection engineers, certification or licensure programs for chief fire inspector shall demonstrate qualifications in accordance with NFPA 1037 or NFPA 1031.

O101.3 Fire code plans examiner. The fire marshal/fire code official shall appoint or hire such number of officers, plans examiners, assistants and other employees as shall be authorized by the jurisdiction. To be appointed or hired as a fire code plans examiner experience as a firefighter, fire officer, fire inspector, building inspector/plans examiner, fire protection contractor, fire protection engineer or engineer in training, or architect is required. An Associate Degree in Fire Protection or Building Construction Technology shall be deemed an acceptable alternative for the necessary experience. The fire code plans examiner shall be certified or licensed through a recognized licensure or certification program as a fire code plans examiner, combination fire inspector/plans examiner, fire protection engineer, or in an equivalent field of expertise. With the exception of architects and fire protection engineers, certification or licensure programs for fire inspector or plans examiner shall demonstrate qualifications in accordance with NFPA 1031. Entry level employees or trainees shall be permitted to be hired and assigned to work under the direction and authority of the fire marshal/fire code official while obtaining the required experience and certification(s).

O101.4 Fire inspector. The fire marshal/fire code official is authorized to appoint or hire such number of officers, inspectors, assistants and other employees as shall be authorized by the jurisdiction. A person shall not be appointed or hired as fire code inspector who has not had experience as a firefighter, fire officer, fire protection contractor, fire protection engineer or engineer in training, or architect. Completion of 15 semester units or 22 quarter units from a recognized college in Fire Protection or Building Construction Technology shall be an acceptable alternative to the one year of experience. The fire code inspector shall be certified or licensed through a recognized licensure or certification program as a fire inspector, combination fire inspector/plans examiner, fire safety inspector, fire protection engineer, or in an equivalent field of expertise. With the exception of architects and fire protection engineers, certification or licensure programs for fire inspector or plans examiner shall demonstrate qualifications in accordance with NFPA 1031. Entry level employees or trainees shall be permitted to be hired and assigned to work under the direction and authority of the fire marshal/fire code official while obtaining the required experience and certification(s).

O101.5 Termination of employment. Employees in the position of fire marshal, fire code official, chief fire inspector, fire inspector, or fire code plans examiner shall not be removed from office except for cause after full opportunity has been given to be heard on specific charges before such applicable governing authority.

O102 REFERENCED STANDARDS

NFPA 1031-2014 Standard for Professional Qualifications for Fire Inspector and Plan Examiner

Reason: This proposed change is result of an evaluation of previous work by the CTC that was based on the “NIST Charleston Sofa Store Fire Recommendations”. This work and the follow-up work of the FCAC addresses the NIST and other investigative reports on the fire that occurred on the evening of June 18, 2007 in the Sofa Super Store in Charleston, South Carolina to identify issues that can be addressed by the International Codes.

In connection with their investigation, NIST analyzed the fire ground, consulted with other experts, and performed computer simulations of fire growth alternatives. Based on these analyses, NIST concluded that the following sequence of events is likely to have occurred. A fire began in packing material and discarded furniture outside an enclosed loading dock area. The fire spread to the loading dock, then into both the retail showroom and warehouse spaces. During the early stages of the fire in the two latter locations, the fire spread was slowed by the limited supply of fresh air. This under-ventilation led to generation of a large mass of pyrolyzed and only partially oxidized effluent. The smoke and combustible gases flowed into the interstitial space below the roof and above the suspended ceiling of the main retail showroom. As this space filled with unburned fuel, the hot smoke also seeped through the suspended ceiling into the main showroom and formed a hot smoke layer below the suspended ceiling. Up to this time, the extent of fire spread into the interstitial space was not visible to fire fighters in the store. If the fire spread had been visible to the fire fighters in the store, it would have provided a direct indication of a fire hazard in the showroom. Meanwhile, the fire at the back of the main showroom and the gas mixture below the suspended ceiling were both still fuel rich. When the front windows were broken out or vented, the inflow of additional air allowed the heat release rate of the fire to intensify rapidly and added air to the layer of unburned fuel below the suspended ceiling enabling the ignition of the unburned fuel/air mixture. The fire swept from the rear to the front of the main showroom extremely quickly, and then into the west and east showrooms. Nine fire fighters were killed in the Sofa Super Store fire. NIST developed eleven recommendations to help mitigate such future losses.

Recommendation 3 of the NIST report reads as follows:

“Qualified Fire Inspectors and Building Plan Examiners: NIST recommends that all state and local jurisdictions ensure that fire inspectors and building plan examiners are professionally qualified to a national standard such as NFPA 1031 Standard for Professional Qualifications for Fire Inspector and Plan Examiner. Professional qualification may be demonstrated through a nationally accepted certification examination, such as the Fire Plan Examiner; Fire Inspector I and II, and Certified Fire Marshal.”

Following a review of recommendation 3 of the NIST report a new Appendix K is proposed. This proposal is similar in scope and intent to Section A101.3 of Appendix A of the International Building Code where suggested qualifications for building official, chief inspector, inspector and plan examiner are established.

The purpose of this proposal is to provide optional criteria for qualifications of employees who enforce the Fire Code through inspections and plan examinations. A jurisdiction that wants to make this appendix a mandatory part of the code would need to specifically list this appendix in its adoption ordinance. In recognition of the fact that some jurisdictions are mandated by applicable state law to employ only persons licensed by the state to perform certain duties, the proposal was drafted as an Appendix.

This proposal would not require fire inspectors or fire plan examiners to have had previous experience in Fire Code enforcement, but would merely require that they possess experience in a related job category. As with the efforts by the CTC, it is not the intent of the FCAC to prohibit a plan review and inspection staff from hiring and training entry level employees. The training of such entry level should simply be supervised by trained and certified personnel.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal should not have any direct impact on the cost of construction. This proposal deals with the jurisdiction that serves as the authority having jurisdiction and the qualifications of personnel involved with applying and enforcing the fire code. If there are any cost impacts to construction it would possibly be the permitting costs necessary to adequately staff the fire code enforcement authority with qualified personnel.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal was disapproved as it was felt better addressed by human resources. In addition, there was not a direct connection made by NIST from the Charleston fire regarding qualification requirements by the jurisdiction. The state fire marshal's office may have specific requirements which may conflict with this appendix. Also, the legal language regarding termination appears beyond the scope of the IFC. Some did support the concept since this provides some guidance and as this is an appendix would have to be specifically adopted to apply. (Vote: 8-6)

Assembly Action:

None

F328-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael O'Brian, FCAC, representing FCAC (fcac@iccsafe.org) requests As Submitted.

Commenter's Reason: As noted in the reason statement for the original proposal, this proposed change was the result of an evaluation of previous work by the Code Technology Committee (CTC) based on the "NIST Charleston Sofa Store Fire Recommendations". This work and the follow-up work of the FCAC addresses the NIST and other investigative reports on the fire that occurred on the evening of June 18, 2007 in the Sofa Super Store in Charleston, South Carolina to identify issues that can be addressed by the International Codes.

NIST analyzed the fire ground, consulted with other experts, and performed computer simulations of fire growth alternatives. Based on these analyses, NIST reached conclusions concerning the sequence of events likely to have occurred and developed eleven recommendations to help mitigate such future losses.

Recommendation 3 of the NIST report read as follows:

"Qualified Fire Inspectors and Building Plan Examiners: NIST recommends that all state and local jurisdictions ensure that fire inspectors and building plan examiners are professionally qualified to a national standard such as NFPA 1031 Standard for Professional Qualifications for Fire Inspector and Plan Examiner. Professional qualification may be demonstrated through a nationally accepted certification examination, such as the Fire Plan Examiner; Fire Inspector I and II, and Certified Fire Marshal."

Following a review of recommendation 3 of the NIST report and previous work by the CTC, the FCAC developed a new Appendix O and submitted the proposal. The intent and content of the proposal is similar to Section A101.3 of Appendix A of the International Building Code where suggested qualifications for building official, chief inspector, inspector and plan examiner are established.

The purpose of the submitted proposal was and is to provide optional criteria for qualifying employees who enforce the Fire Code through inspections and plan examinations in order to help ensure that the design, construction, and maintenance of buildings and structures are verified by personnel capable of detecting and requiring the correction of code violations. These criteria are similar to the personnel qualifications of NFPA 1730 "Standard on Organization and Deployment of Fire Prevention Inspection and Code Enforcement, Plan Review, Investigation, and Public Education Operation", NFPA 1031 "Standard for Professional Qualifications for Fire Inspector and Plans Examiner", and NFPA 1037 "Standard on Fire Marshal Professional Qualifications". The major difference is that the proposal gives emphasis to certification or licensure which would bring some level of credibility and independent verification of those qualifications. As noted in the proposal's reason statement, a jurisdiction that wants to make this appendix a mandatory part of the code would need to specifically list this appendix in its adoption ordinance. The proposal was drafted as an Appendix at least in part in recognition of the fact that some jurisdictions are mandated by applicable state law to employ only persons licensed by the state to perform certain duties.

The proposal as submitted would not require fire inspectors or fire plan examiners to have had previous experience in Fire Code enforcement, but would merely require that they possess experience in a related job category. As noted in the proposal's reason statement, it was not and is not the intent of the FCAC to prohibit a plan review and inspection staff from hiring and training entry level employees. The training of such entry level personnel should simply be supervised by trained and certified personnel.

This public comment is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings and in 2018 FCAC held 2 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/>

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal should not have any direct impact on the cost of construction. This proposal deals with the jurisdiction that serves as the authority having jurisdiction and the qualifications of personnel involved with applying and enforcing the fire code. If there are any cost impacts to construction it would possibly be the permitting costs necessary to adequately staff the fire code enforcement authority with qualified personnel.

F328-18

SP1-18

ISPSC: 202

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing Association of Pool & Spa Professionals (jhatfield@apsp.org)

2018 International Swimming Pool and Spa Code

Revise as follows

SWIMOUT. An underwater seat area that is placed completely outside of the ~~perimeter shape~~ diving envelope of the pool. Where located at the deep end, swimouts are permitted to be used as the deep-end means of entry or exit to the pool.

Reason: A swimout is not required to be outside of the perimeter shape of a pool. Many times they are located on those areas but they are not required to be. This revised wording agrees with Figure 322.2.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal will not increase the cost of construction as it clarifies the original intent and normal practice of where swimouts are installed.

SP1-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The definition needs to clarify that a swimout has to be outside the diving envelope. The Committee agrees with the need for the proposal as it is not possible for a swimout to be outside the perimeter of a pool. (Vote:12-0)

Assembly Action:

None

SP1-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Gene Novak, Comm of Massachusetts, representing Metro West Building Officials Association requests As Modified by This Public Comment.

Modify as follows:

2018 International Swimming Pool and Spa Code

SWIMOUT. An underwater seat area that is placed completely outside of the diving envelope of the pool. Where located at the deep end, swimouts are permitted to be used as the deep-end means of entry or exit to the pool.

A swimout is similar to an underwater seat or bench, but is utilized exclusively as an entry/exit access, swimouts are permitted to be used as the means of entry or exit to or from the pool..

Commenter's Reason: Seat is already defined in the definition section of the code and defining a swimout as a seat is problematic for the following reasons: 1. A swimout is a required means of entry/exit from the swimming pool where as a seat or bench is not. By defining a swimout as a seat we are allowing for bathers to utilize the swimout as a seat. If this is a required entry/exit it should be treated solely as such including the definitions. 2. By allowing a swimout which is defined as a seat outside the diving envelope we are allowing shallow areas in the deep end of the swimming pool, this is contrary to other sections of the code, which disallow seats in deep areas over 5 feet in later parts of the ISPSC. 3. I am unaware of any other definition that is defined by another definition i.e. swimout equates to a seat. This is confusing contradictory language. Further it is foreseeable that an obstinate bather may sit/bath on the swimout obstructing a requires entry/exit access point, we must be clear as this is a primary life safety element of the swimming pool.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Will not increase nor decrease cost, rather clarify the definitions specifically the distinction between how a swimout is different from a seat/bench. Mainly the purpose and use of the feature.

SP1-18

SP5-18

ISPSC: 305.1.1

Proposed Change as Submitted

Proponent: Pennie Feehan, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (PMGCAC@iccsafe.org)

2018 International Swimming Pool and Spa Code

Add new text as follows

305.1.1 Construction fencing required. The construction sites for in-ground swimming pools and spas shall be provided with construction fencing to surround the site from the time that any excavation occurs up to the time that the permanent barrier is completed. The fencing shall be not less than 4 feet in height.

Reason: Usually, a pool contractor is not responsible for the fencing whether permanent or temporary during construction of a pool. A pool can be under construction for several weeks (or more) which presents a fall hazard/drowning hazard where there is not some type of barrier in place. Sometimes a pool is completed and the builder has moved onto the next job without any barrier around the completed pool. This new section requires a temporary barrier until the permanent barrier is erected. The specifics about what type of barrier is acceptable are left up to the contractor with oversight by the code official. It is not the intent of this proposal to require a temporary barrier to be constructed to the same way as the code's requirements for a permanent barrier.

This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). The PMG CAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance the International Codes or portions thereof that were under the purview of the PMG CAC. In 2017 the PMG CAC held one face-to-face meeting and 11 conference call meetings. Numerous interested parties attended the committee meetings and offered their input.

Cost Impact: The code change proposal will increase the cost of construction. Rental of temporary construction fencing and its installation will add cost to a pool project for those contractors who have not already been taking precautions to secure the excavation/pool construction site. One national average for rental installation for 120' x 6 foot high of chain link fencing panels and bases for 1 month is \$480. Job site conditions and project site location could greatly affect the cost.

SP5-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Safety fencing is needed for every excavation. Most contractors should be doing this anyhow.
(Vote:12-0)

Assembly Action:

None

SP5-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Timothy Pate, representing Colorado Chapter Code Change Committee (tpate@broomfield.org) requests Disapprove.

Commenter's Reason: This proposal added a requirement to require construction fencing around the excavation for all swimming pools. This type of requirement does not exist in either the IRC or the IBC for excavations for foundations for any new structure. It does not make sense to require construction fencing only around excavations for swimming pools when codes do not require this for all excavations. The approval language also does not have any specific details other than the fencing needs to be at least 4" high - nothing to explain what it looks like. The committee reason states that it will be up to the contractor and code official to come up with those specific requirements. This also does not make sense since a builder will have different requirements even in adjacent jurisdictions. This proposal should be overturned and disapproved.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This will reduce construction cost since contractor will not be required to install construction fencing.

SP5-18

SP8-18

ISPSC: 305.3, 305.3.1, 305.3.2, 305.3.3, 305.3.4, 305.4

Proposed Change as Submitted

Proponent: Dawn Anderson, representing self (gonedawning@yahoo.com); Dan Buuck, representing National Association of Home Builders (dbuuck@nahb.org); David Collins, representing the American Institute of Architects (dcollins@preview-group.com); Marsha Mazz, representing U.S. Access Board (mazz@Access-Board.gov); Dominic Marinelli, representing United Spinal Association (DMarinelli@accessibility-services.com)

2018 International Swimming Pool and Spa Code

Revise as follows

305.3 ~~Gates~~ Doors and gates. ~~Access~~ Doors and gates in barriers shall comply with the requirements of Sections 305.3.1 through 305.3.3 and shall be equipped to accommodate a locking device. Pedestrian access doors and gates shall open outward away from the pool or spa, shall be self-closing and shall have a self-latching device.

305.3.1 Utility or service doors and gates. ~~Gates~~ Doors and gates not intended for pedestrian use, such as utility or service doors and gates, shall remain locked when not in use.

305.3.2 Double or multiple doors and gates. Double doors and gates or multiple doors and gates shall have not fewer than one leaf secured in place and the adjacent leaf shall be secured with a self-latching device. ~~The gate and barrier shall not have openings larger than 3/2 inch (12.7 mm) within 18 inches (457 mm) of the latch release mechanism. The self-latching device shall comply with the requirements of Section 305.3.3.~~ device.

Delete and substitute as follows

~~305.3.3 Latches.~~ ~~Where the release mechanism of the self-latching device is located less than 54 inches (1372 mm) from grade, the release mechanism shall be located on the pool or spa side of the gate not less than 3 inches (76 mm) below the top of the gate, and the gate and barrier shall not have openings greater than 3/2 inch (12.7 mm) within 18 inches (457 mm) of the release mechanism.~~

305.3.3 Latch release. For doors and gates in barrier, the door and gate latch release mechanisms shall be in accordance with the following:

1. Where door and gate latch release mechanisms are accessed from the outside of the barrier and are not of the self-locking type, such mechanism shall be located above the finished floor or ground surface in accordance with the following:
 - 1.1. At public pools and spas, not less than 52 inches (1219 mm) and not greater than 54 inches (1372 mm).
 - 1.2. At residential pools and spas, not less 54 inches (1372 mm)
2. Where door and gate latch release mechanisms are of the self-locking type such as where the lock is operated by means of a key, an electronic opener or the entry of a combination into an integral combination lock, the lock operation control and the latch release mechanism shall be located above the finished floor or ground surface in accordance with the following:
 - 2.1. At public pools and spas, not less than 34 inches and not greater than 48 inches (1219 mm).
 - 2.2. At residential pools and spas, at not greater than 54 inches (1372 mm).
3. At private pools, where the only latch release mechanism of a self-latching device for a gate is located on the pool and spa side of the barrier, the release mechanism shall be located at a point that is at least 3 inches (76 mm) below the top of the gate.

Add new text as follows

305.3.4 Barriers adjacent to latch release mechanisms. Where a latch release mechanism is located on the inside of a barrier, openings in the door, gate and barrier within 18 inches (457 mm) of the latch, shall not be greater than 1/2 inch (12.7 mm) in any dimension.

Revise as follows

305.4 Structure wall as a barrier. Where a wall of a dwelling or structure serves as part of the barrier and where doors, gates or windows provide direct access to the pool or spa through that wall, one of the following shall be required:

1. Operable windows having a sill height of less than 48 inches (1219 mm) above the indoor finished floor, doors and ~~doors-gates~~ shall have an alarm that produces an audible warning when the window, door or their screens are opened. The alarm shall be *listed* and *labeled* as a water hazard entrance alarm in accordance with UL 2017.
2. In dwellings ~~or structures~~ not required to be Accessible units, Type A units or Type B units, the operable parts of the alarm deactivation switches shall be located at not less than 54 inches (1372 mm) ~~or more~~ above the finished floor.
3. In dwellings ~~or structures~~ that are required to be Accessible units, Type A units or Type B units, the operable parts of the alarm deactivation switches shall be located not greater than 54 inches (1372 mm) and not less than 48 inches (1219 mm) above the finished floor.
4. In structures other than dwellings, the operable parts of the alarm deactivation switches shall be located not greater than 54 inches (1372 mm) and not less than 48 inches (1220 mm) above the finished floor.
- ~~2-5.~~ A *safety cover* that is *listed* and *labeled* in accordance with ASTM F1346 is installed for the pools and spas.
- ~~3-6.~~ An *approved* means of protection, such as self-closing doors with self-latching devices, is provided. Such means of protection shall provide a degree of protection that is not less than the protection afforded by Item 1 or 2.

Reason: Section 305.3.3 deals with latches for all gates providing access to a pool. Section 305.4 deals with alarms for doors and windows in a barrier. The current text seems to be applicable more for residential pools than public pools. There are several reason for this proposal. Pools can be interior or exterior, so latch provisions should apply to doors as well as gates. The last sentence of 305.3.2 is not needed since Section 305.3 requires compliance with the whole section. Section 305.3.3 is dealing with a situation where you reach over a gate to open the latch. Fences around public pools are typically much higher. The requirements for latches should follow the IBC Section 1010.1.9.2. This section includes an exception for operable parts of manual latches to be above 48" so that they latch is outside the reach of children.

Section 305.4 Item 1 deals with the deactivation switch for alarms on doors or windows in a pool barrier. The same allowance for height protection for children is permitted. Dwelling units are separated from structures because this wall could be on a common corridor or in another building for pools that serve hotels, apartment buildings or other community buildings. In public areas these alarm shut offs must be accessible or addressed as employee only elements under Section 1103.2.2.

2018 IBC

1010.1.9.2 Hardware height. Door handles, pulls, latches, locks and other operating devices shall be installed 34 inches (864 mm) minimum and 48 inches (1219 mm) maximum above the finished floor. Locks used only for security purposes and not used for normal operation are permitted at any height.

Exception: Access doors or gates in barrier walls and fences protecting pools, spas and hot tubs shall be permitted to have operable parts of the release of latch on self-latching devices at 54 inches (1370 mm) maximum above the finished floor or ground, provided the self-latching devices are not also self-locking devices operated by means of a key, electronic opener or integral combination lock.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is a clarification of the height for pool latches and alarms only. There is no change to the cost for construction.

SP8-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The Committee agreed with the published reason statement. (Vote:10-2)

Assembly Action:

None

SP8-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jennifer Hatfield, representing Association of Pool & Spa Professionals (jhatfield@apsp.org) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Swimming Pool and Spa Code

305.3 Doors and gates. Doors and gates in barriers shall comply with the requirements of Sections 305.3.1 through 305.3.3 and shall be equipped to accommodate a locking device. Pedestrian access ~~doors and gates~~ shall open outward away from the pool or spa. All doors and gates shall be self-closing and shall have a self-latching device.

Commenter's Reason: We believe an unintended consequence of the original proposal could be interpreting this section to now saying the door on a residential house must open inward, away from the pool (into the house). When the home is part of the barrier, the doors sometimes open out of the house, towards the pool. Purchasing and installing a new door to swing away from the pool is not cost-neutral.

This change simply makes a small change to ensure doors of a home, when used as a barrier would not be required to open outward away from the pool and spa.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Without the public comment concerns exist that the original proposal will have an increase cost to construction if a door on a home has to be changed to address which direction it swings.

SP8-18

SP23-18

ISPSC: 324 (New), 324.1 (New), Chapter 11

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing Association of Pool & Spa Professionals (jhatfield@apsp.org)

2018 International Swimming Pool and Spa Code

Add new text as follows

324 INDOOR AIR QUALITY

324.1 General. Indoor pool and spa air handling system design, construction, and installation shall comply with ASHRAE 62.1.

Add new standard(s) follows

ASHRAE ASHRAE 62.1-2016 Ventilation for Acceptable Air Quality

Reason: By requiring air handling systems to be designed and installed in compliance with ASHRAE Standard 62.1 2013, *Ventilation for Acceptable Indoor Air Quality*, an indoor pool or spa will have minimum ventilation rates to ensure the indoor air quality is acceptable to human occupants so to minimize adverse health effects.

This also provides consistency with the Model Aquatic Health Code published by the Centers for Disease Control and Prevention, which requires compliance with the ASHRAE Standard when addressing indoor pool or spa air handling systems.

Bibliography: See sections 4.2.2.3.3 & 4.6.2 of the Model Aquatic Health Code, which reference and require compliance with the ASHRAE 62.1 Standard.

<https://www.cdc.gov/mahc/editions/current.html>

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Simply aligning with MAHC requirements for consistency when addressing indoor facilities.

Analysis: The referenced standard, ASHRAE 62.1-2016, is currently referenced in the 2018 IMC.

SP23-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The Committee agreed with the published reason statement. (Vote:12-0)

Assembly Action:

None

SP23-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jennifer Hatfield, representing Association of Pool & Spa Professionals (jhatfield@apsp.org) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Swimming Pool and Spa Code

324.1 General. Indoor public pool and spa air handling system design, construction, and installation shall comply with ASHRAE 62.1.

Commenter's Reason: This section should only apply to public pools so in an abundance of caution this public comment simply clarify s the original intent of the proposal.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The code change proposal will not increase or decrease the cost of construction because these indoor pool facilities already have to meet the ASHRAE 62.1 Standard. This simply aligns the ISPSC with what is already required via other codes, including the MAHC and International Mechanical Code.

Public Comment 2:

Proponent: DONALD SURRENA, NATIONAL ASSOCIATION OF HOME BUILDERS, representing National Association of Home Builders (dsurrena@nahb.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Swimming Pool and Spa Code

324.1 General. Indoor pool and spa air handling system design, construction, and installation shall comply with requirements of the IMC or ASHRAE 62.1.

324.1 General. Indoor pool and spa air handling system design, construction, and installation shall comply with ASHRAE 62.1.

Commenter's Reason: Modifying the proposal to allow the IMC or ASHRAE 62.1 adds an option for compliance.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This adds an option for compliance which would have the potential to possibly lower the cost of construction.

SP23-18

SP39-18

ISPSC: 504.2

Proposed Change as Submitted

Proponent: John Kelly, representing self (john.kelly@idph.iowa.gov)

2018 International Swimming Pool and Spa Code

Add new text as follows

504.2 Timer. The operation of the hydrotherapy jets shall be limited by a cycle timer having a maximum setting of 15 minutes. The cycle timer shall be located not less than 5 feet away, adjacent to, and within sight of the spa.

Reason: The ISPSC allows spas to operate at a temperature of up to 104 degrees F. The elevated temperature allowed for spas increases the risk of deaths from hyperthermia and drowning and the jet currents further increase the heat transfer rate.

A study on "The Health Hazards of Saunas and Spas and How to Minimize Them" noted that many people should limit their stays in spas to 5 or 10 minutes and that even healthy adults would be well advised not to stay in spas for more than 10 to 15 minutes.

Under Section 4.12.1.10 of the Model Aquatic Health Code the agitation system shall be connected to a timer to limit the cycle to 15 minutes. This is consistent with requirements found in many state and local health codes.

The ISPSC should recognize the risk of hyperthermia particularly with the elevated temperatures it allows for spas and given the increased heat transfer created by the hydrotherapy jets and limit the jet cycle accordingly and consistent with the Model Aquatic Health Code.

Bibliography: The Health Hazards of Saunas and Spas and How to Minimize Them
Edward Press, MD, MPH

American Journal of Public Health, August 1991, Volume 81, No. 8

2016 Model Aquatic Health Code, 2nd Edition, July 2016

U.S. Department of Health and Human Services, Centers for Disease Control and Prevention

Cost Impact: The code change proposal will increase the cost of construction
The Model Aquatic Health Code and most state and local health codes already contain a requirement for a timer so for most areas there will be no added cost. In areas with no state or local requirement there would be a small cost associated with the installation of the timer. Including the requirement within the ISPSC will provide consistency in the requirements and help address the risk in those areas where no health codes are in place.

SP39-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 504.2 Timer. The operation of the hydrotherapy jets shall be limited by a cycle timer having a maximum setting of 10 ~~15~~ minutes. The cycle timer shall be located not less than 5 feet away, adjacent to, and within sight of the spa.

Committee Reason: For the Modification: Lessening the time better accommodates use by children who would be more susceptible to long term exposure to heat.

For the Proposal: Making this a code requirement increases the level of safety that is needed for spas. (Vote: 10-1)

Assembly Action:

None

SP39-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jennifer Hatfield, representing Association of Pool & Spa Professionals (jhatfield@apsp.org) requests As Submitted.

Commenter's Reason: The concern is that the proposal as modified is not consistent with the Model Aquatic Health Code and the fact 15 mins has long been the standard utilized in these heated spas.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. Most jurisdictions already have requirements for a timer in these type of public settings, but where a jurisdiction does not currently require a timer a slight increase in cost will occur.

SP39-18

SP40-18

ISPSC: 509.2

Proposed Change as Submitted

Proponent: John Kelly, Iowa Department of Public Health, representing self

2018 International Swimming Pool and Spa Code

Revise as follows

509.2 Operational signs. Operational signs shall include, but not be limited to, the following messages as required by the local jurisdiction:

1. Children under age 5 and persons using alcohol or drugs that cause drowsiness shall not use spas.
2. Pregnant women and persons with heart disease, high blood pressure or other health problems should not use spas without prior consultation with a health provider.
3. Children under 14 years of age shall be supervised by an adult.
4. Use of the spa when alone is prohibited (if no lifeguards on site).
- ~~1-5.~~ Do not allow the use of or operate spa if the suction outlet cover is missing, damaged or loose.
- ~~2-6.~~ Check spa temperature before each use. Do not enter the spa if the temperature is above 104°F (40°C).
- ~~3-7.~~ Keep breakable out of the spa area.
- ~~4-8.~~ Spa shall not be operated during severe weather conditions.
- ~~5-9.~~ Never place electrical appliances within 5 feet (1524 mm) of the spa.
- ~~6-10.~~ No diving.

Reason: The spa signage currently required by the ISPSC does not contain any language warning those particularly vulnerable to injury or death associated with the elevated temperature of the spa. The spa signage in the Model Aquatic Health Code (see attachment) places warnings and restrictions on those that are particularly vulnerable to the elevated temperature of a spa. The annex of the Model Aquatic Health Code notes that "Small children are still developing internal temperature regulation, and infants in particular have a small body mass compared to body surface area." It also notes that spa seating is not designed to accommodate younger children in a seated position. As such children under the age of 5 should not use a spa and children under the age of 14 should be supervised by an adult.

A study on health hazards of spas (see attachment) noted that when analyzing deaths associated with spas the chief risk factors identified were alcohol ingestion, heart disease, seizure disorders, and cocaine ingestion. These factors accounted for about 45% of the fatalities. It further noted that 61 of the 151 spa related deaths occurred in children under 12 years of age.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The signage is already required. The proposal only changes what it stated on the sign.

SP40-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: ~~4. Use of the spa when alone is prohibited (if no life guards on site).~~

Committee Reason: For the Modification:

Not allowing only one person to use a spa is too restrictive given that the spa timer is limited to 10 minutes operation per cycle. See previous action on SP39-18 for AM which modified timer operation from 15 minutes to 10 minutes.

For the Proposal:

The added warnings are standard practice in the industry and are necessary to advise persons who might be of a greater health risk when using spas. (Vote:9-3)

Assembly Action:

Disapproved

SP40-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Assembly Action requests Disapprove.

Commenter's Reason: This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action. The assembly action for Disapprove was successful by a vote of 59.8% (64) to 40.2% (43) by eligible members online during the period of May 9 - May 23, 2018.

SP40-18

SP43-18

ISPCS: SECTION 609, 609.1, 609.2, 609.2.1, 609.2.2, 609.3, 609.3.1, 609.3.2, 609.3.3, 609.4, 609.4.1, 609.7

Proposed Change as Submitted

Proponent: John Kelly, Iowa Department of Public Health, representing self

2018 International Swimming Pool and Spa Code

Revise as follows

SECTION 609 TOILET ROOMS DRESSING AND BATHROOMS SANITARY FACILITIES

609.1 General. ~~Toilet Dressing and bath sanitary facilities shall be provided in accordance with the minimum requirements of the International Building Code and International Plumbing Code and Sections 609.2 through 609.9.~~ 609.9.

609.2 Number of fixtures. ~~Pools shall have toilet facilities with the number of fixtures in accordance with Section 609.2.1 or 609.2.2. The minimum number of required water closets, urinals, lavatory, and drinking fountain fixtures shall be provided as required by the International Building Code and International Plumbing Code and the dressing facilities and number of cleansing and rinse showers shall be provided in accordance with Sections 609.2.1, 609.2.2, and 609.3.1.~~

609.2.1 Water area less than 7500-4000 square feet. Facilities that have less than ~~7500-4000~~ gross square feet (~~697-372~~ m²) of water area available for bather access shall have dressing facilities and not less than one water closet for males, one urinal for males, one lavatory for males, one one cleansing shower for males, two water closets for females, one lavatory for females and one cleansing shower for females.

609.2.2 Water area 7500-4000 square feet or more. Facilities that have ~~7500-4000~~ gross square feet (~~697-372~~ m²) or more of water area available for bather access shall have dressing facilities and not less than 0.7 water closet for males, one urinal for males, 0.85 lavatory for males, one one cleansing shower for males, two water closets for females, one lavatory for females and one cleansing shower for females for every 7500-4000 square feet (697-372 m²) or portion thereof. Where the result of the fixture calculation is a portion of a whole number, the result shall be rounded up to the nearest whole number.

609.3 Showers. Showers shall be in accordance with Sections 609.3.1 through ~~609.3.5~~ 609.3.5.

609.3.1 Deck Rinse shower. ~~Not In addition to the requirement for cleansing showers in 609.2.1 and 609.2.2, not less than one and not more than half of the total number of showers required by Section 609.2~~ rinse shower shall be located provided on the deck of or at the entrance of each pool.

Delete without substitution

609.3.2 Anti-scald device. ~~Where heated water is provided to showers, the shower water supply shall be controlled by an anti-scald device.~~

609.3.4 Flow rate. ~~Each showerhead shall have a water flow of not less than 2 gallons per minute (7.6 lpm).~~

Revise as follows

609.3.5 Temperature. At each cleansing showerhead, the heated shower water temperature shall be not less than 90°F (32°C) and not greater than 120°F (49°C). Water supplied to rinse showers shall not be required to be heated.

609.4 Soap dispensers. Soap dispensers shall be in accordance with ~~Sections 609.4.1 and 609.4.2.~~ Section 609.4.1.

609.4.1 Liquid or powder. Soap dispensers shall be provided ~~in each toilet facility, at each lavatory and cleansing shower.~~ Soap dispensers shall dispense liquid or powdered soap. Reusable cake soap is prohibited. Soap dispensers and soap shall not be provided at rinse showers.

609.7 Sanitary napkin receptacles. Sanitary napkin receptacles shall be provided in each water closet compartment for females and in the area of the cleansing showers for female use only.

Reason: The minimum number of plumbing fixtures required by the IBC/IPC and the ISPCS are inconsistent. The requirements of the IBC/IPC are the appropriate requirements and are based on the occupancy type and design

occupant load and are widely accepted, applied, and proven across many different jurisdictions for various occupancy type and design occupant loads. The ISPSC should be change to be consistent with the requirements of the IBC/IPC. Given that many patrons share a common body of water in swimming pools and spa, in addition to the plumbing fixtures required by the IBC/IPC, it is appropriate to require both cleansing showers and rinse showers to reduce the transmission of recreational water illnesses and to reduce the development of chloramines.

The Model Aquatic Health Code (MAHC) provides requirements for the number of cleansing showers under section 4.10.4.2.1 and rinse showers under section 4.10.4.3.1. As the number of showers are related to health concerns associated with transmission of recreational water illnesses and the health effects associated with chloramines, the ISPSC should be changed to be consistent with the requirements of the MAHC in relation to the minimum number of showers required.

Bibliography: 2016 Model Aquatic Health Code, 2nd Edition, July 2016
U.S. Department of Health and Human Services, Center for Disease Control and Prevention

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Typically Swimming Pools and Spas must already meet building code, plumbing code, and health code requirements so it will eliminate confusion caused by inconsistencies between the applicable codes but should not change the number of fixtures installed.

SP43-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This would be a large cost impact for facilities of 4000 to 7500 square feet. No justification was provided for this level of cost increase. (Vote: 12-0)

Assembly Action:

None

SP43-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jennifer Hatfield, representing Association of Pool & Spa Professionals (jhatfield@apsp.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Swimming Pool and Spa Code

609.2.1 Water area less than ~~4000-7500~~ square feet. Facilities that have less than ~~4000-7500~~ gross square feet (~~372-697~~ m²) of water area available for bather access shall have dressing facilities and not less than one cleansing shower for males and one cleansing shower for females.

609.2.2 Water area ~~4000-7500~~ square feet or more. Facilities that have ~~4000-7500~~ gross square feet (~~372-697~~ m²) or more of water area available for bather access shall have dressing facilities and not less than one cleansing shower for males and one cleansing shower for females for every ~~4000-7500~~ square feet (~~372-697~~ m²) or portion thereof. Where the result of the fixture calculation is a portion of a whole number, the result shall be rounded up to the nearest whole number.

Commenter's Reason: This public comment addresses why the committee disapproved the proposal; which was the large cost impact on facilities of 4000 to 7500 square feet. By reverting back to the 7500 square feet, the committee concern is addressed. Further, the proposal is consistent with changes approved under SP 29, resulting in a need for the proposal at large with this modification.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This does not change requirements but ensures consistency with what is also required in applicable codes.

SP43-18

FG1-18

IFGC: 202

Proposed Change as Submitted

Proponent: James Ranfone, representing American Gas Association (jranfone@aga.org)

THIS CODE CHANGE PROPOSAL HAS BEEN PLACED ON THE IMC COMMITTEE AGENDA. PLEASE SEE THE IMC HEARING ORDER.

2018 International Fuel Gas Code

Revise as follows

[M] PIPING. Where used in this code, "piping" refers to either pipe or tubing, or both.

Reason: Definitions should not contain technical requirements. The code in other sections provide the list of acceptable materials. The deletion would coordinate with the definition as revised in the 2018 National Fuel Gas Code.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The definition changes do not impact the code's installation requirements.

FG1-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval was based on the proponent's published reason statement. (Vote 11-0)

Assembly Action:

None

FG1-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Marcelo Hirschler, GBH International, representing GBH International (mmh@gbhint.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fuel Gas Code

[M] PIPING. Where used in this code, "piping" refers to either pipe or tubing, or both.

A rigid conduit of iron, steel, copper, copper-alloy, or plastic, used to convey ~~fuel gas or other a~~ fluid.

Semirigid conduit of copper, copper-alloy, aluminum, plastic or steel, used to convey ~~fuel gas or other a~~ fluid.

Commenter's Reason: The proposal needs to be revised because these are the definitions of pipe and of tubing contained in the IMC (note that the definitions are preceded by [M], in the IFGC indicating that they are the responsibility of the IMC and are copied into the IFGC also).

I assume the change is intended to apply to the IFGC and not to the IMC. That goes against the approach of getting uniformity of definitions in ICC codes.

The IFGC is used to address conveying of fuel gas but the IMC deals to a large extent with other fluids, namely water and other aqueous fluids. Therefore the definition proposed for the IFGC would not be appropriate for the IMC.

The proposed changes, which could apply to both codes, reinstate the original wording and add the words "used to convey a fluid", from the proposal,

If it is ruled that this code proposal, with this public comment, cannot apply to the IMC, the code proposal should be disapproved.

The statements in the reason for the original proposal are not correct.

"Definitions should not contain technical requirements." ICC definitions are enforceable and often contain requirements, as opposed to ASTM or NFPA definitions.

"The deletion would coordinate with the definition as revised in the 2018 National Fuel Gas Code." That is only true for pipe and not for tubing.

The National Fuel Gas Code (NFPA 54), in its 2018 edition has the following definitions:

Pipe: Rigid conduit used to convey fuel gas or other fluids.

Tubing. Semirigid conduit of copper, steel, aluminum, corrugated stainless steel tubing (CSST), or plastic.

Furthermore, these definitions do not apply to a mechanical code from the NFPA, but strictly to the fuel gas code.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This is a definition and does not impose any requirements: it states facts.

FG1-18

FG9-18

IFGC: 301.12

Proposed Change as Submitted

Proponent: Kelly Cobeen, Wiss Janney Elstner Associates, Inc., representing Federal Emergency Management Agency/Applied Technology Council Seismic Code Support Committee (KCobeen@wje.com); Michael Mahoney, Federal Emergency Management Agency, representing Federal Emergency Management Agency (mike.mahoney@fema.dhs.gov)

2018 International Fuel Gas Code

Revise as follows

301.12 Seismic resistance. Where earthquake loads are applicable in accordance with the International Building Code, ~~the supports, fuel gas appliance and system supports, anchorage, and bracing~~ shall be designed and installed for the seismic forces in accordance with Chapter 16 of that code.

Reason: The added text clarifies the IBC location where specific seismic requirements are defined. This is simply intended to make the seismic design provisions more easily used, consistent with the intent as stated in 2015 NEHRP Recommended Provisions Section 1.1.2, to preserve life safety by maintaining the position of components through anchorage, bracing and strength.

Bibliography: NEHRP Recommended Seismic Provisions for New Buildings and Other Structures, 2015 Edition (FEMA P-1050-1).

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The proposed wording clarifies the intent of the code and does not impose any new requirements that were not already in effect.

FG9-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Adding a Chapter 16 reference will cause confusion. This will not allow the IRC earthquake provisions and instead will require one and two family dwellings to comply with the IRC. The IBC allows the IRC as an optional code and this proposal negates that. (Vote 11-0)

Assembly Action:

None

FG9-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael Mahoney, representing Federal Emergency Management Agency (mike.mahoney@fema.dhs.gov) requests As Submitted.

Commenter's Reason:

The Federal Emergency Management Agency (FEMA), under its Seismic Code Support Committee (SCSC), submitted FG9-18 to clarify seismic support anchorage requirements for the components relevant to that code (by adding anchorage and bracing) and to provide a more specific reference to the earthquake loads of Chapter 16 of the IBC.

This code change proposal was opposed due to confusion on whether the reference to Chapter 16 of the IBC would adversely impact use of the International Residential Code. While we attempted to explain that the seismic loads in Chapter 16 also serve as the basis for the IRC, we were not successful and the proposed code changes was recommended for disapproval.

For a nearly identical proposed code change to the International Plumbing Code, P5-18, we were able to explain that the reference to the IBC did not impact residential construction, and this change was recommended for approval unanimously.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This code change proposal simply attempts to better explain existing code language, so there is no cost impact.

FG9-18

FG10-18

IFGC: 304.13(IFGS)

Proposed Change as Submitted

Proponent: James Ranfone, representing American Gas Association (jranfone@aga.org)

2018 International Fuel Gas Code

Add new text as follows

304.13(IFGS) Existing Appliances. Existing appliance installations shall be inspected to verify compliance with the provisions of Section 304 and Chapter 5 where a component of the building envelope is modified as described by one or more of 304.13 (1) through (6). Where the appliance installation does not comply with Section 304 and Chapter 5, the installation shall be altered as necessary to be in compliance with Section 304 and Chapter 5.

1. The building is modified under a weatherization program.
2. A building permit is issued for a building addition or exterior building modification.
3. Three or more window assemblies are replaced.
4. Three or more storm windows are installed over existing windows.
5. One or more exterior door and frame assemblies are replaced.
6. A building air barrier is installed or replaced.

Reason: AGA is proposing an extract of section 9.1.24 from ANSI Z223.1, National Fuel Gas Code. The code requirement would address renovations to existing buildings that could impact the supply of combustion air and the performance of venting systems. AGA is aware of weatherization programs that fail to consider the importance of ensuring that existing gas appliance installations continue to meet the IFGC combustion air and venting requirements when efforts to reduce air infiltration are undertaken. This proposal is offered solely for coordinating the IFGC with ANSI Z223.1 (NFGC). This text is offered "as is" for the IFGC and it is not intended that such text be modified from a technical standpoint. The subject text was revised in the 2018 NFGC (ANSI Z223.1) and this proposal will cause the IFGC text to be consistent with such revised text in ANSI Z223.1 (NFGC).

Bibliography: ANSI Z223.1 National Fuel Gas Code, American Gas Association, 2018

Cost Impact: The code change proposal will increase the cost of construction. The new section will require inspections and possible modifications.

FG10-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: There is a safety issue that all agree needs to be addressed. This proposal should move forward and receive feedback from the public comment phase of the process. (Vote 6-5)

Assembly Action:

Disapproved

FG10-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ted Williams, representing American Gas Association (twilliams@aga.org) requests As Submitted.

Commenter's Reason: The proposal is needed for building occupant safety where weatherization and other activities to tighten the building envelope to air infiltration for the purposes of energy efficiency may reduce the availability of gas-fired appliance combustion and ventilation air. This tightening of building envelopes without review of combustion air requirements may place occupants at risk from incomplete combustion and improper venting, both of which would be addressed by review of the combustion air requirements associate with IFGC Section 305 and Chapter 5. As a member of the standards development committees of Building Performance Institute (BPI) and Air Conditioning Contractors of America (ACCA) and commenter of record on standards actions related to building energy efficiency, I know that these organizations do not take direct responsibility for energy efficiency measures that may affect occupant safety and instead defer to the IFGC and National Fuel Gas Code to address changing needs that may be caused by energy efficiency measures. Without the change proposed in FG10-18, which was approved by the IFGC Committee, the energy efficiency measures implemented in these other documents and in energy efficiency programs and practices may be out of step with safety requirements presumed for the building prior to envelope modifications.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The change would increase the cost of construction for weatherization and rehabs where building envelopes where tightened to infiltration of outdoor air and where alternative means of providing combustion and ventilation air for safe operation of combustion appliances. This increased cost would be more than offset by alleviating risks to building occupants from insufficient air for combustion.

Public Comment 2:

Proponent: DONALD SURRENA, NATIONAL ASSOCIATION OF HOME BUILDERS, representing National Association of Home Builders (dsurrena@nahb.org) requests Disapprove.

Commenter's Reason: The proposal will add significant cost to confirm compliance with section 3 and chapter 5 of the IFGC for all existing appliances to be inspected in a single family home and verify compliance when work is done as listed in items 1 through 6. Existing appliances that have no bearing on the work being done or the contractor doing the work. As an example having three windows replaced in an existing home or replacing one door will have no effect on an existing gas appliance. These requirements are excessive and will become a disincentive for home owners to get a permit or to contact the building department. This proposal should be disapproved.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. This proposal will require the use of a third party inspection of all gas appliances, new or existing, in an existing home.

Public Comment 3:

Proponent: Assembly Action requests Disapprove.

Commenter's Reason: This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action. The assembly action for Approve as Submitted was successful by a vote of 82.8% (111) to 17.2% (23) by eligible members online during the period of May 9 - May 23, 2018.

FG10-18

FG14-18

IFGC: 404.5

Proposed Change as Submitted

Proponent: Guy McMann, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO)
(gmcman@jeffco.us)

2018 International Fuel Gas Code

Revise as follows

404.5 Fittings in concealed locations. Fittings installed in concealed locations shall be limited to the following types:

1. ~~Threaded~~ Right-hand- threaded elbows, tees, couplings, plugs and ~~couplings-caps~~.
2. Brazed fittings.
3. Welded fittings.
4. Fittings listed to ANSI LC-1/CSA 6.26 or ANSI LC-~~4,4~~.

Reason: Not all fittings are in the list. Unions are not permitted to be concealed and left-right couplings are still being used. These couplings are a form of union.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal is editorial in nature.

FG14-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 404.5 Fittings in concealed locations.

Fittings installed in concealed locations shall be limited to the following types:

1. ~~Threaded Right-hand threaded~~ elbows, tees, couplings, plugs and caps.
2. Brazed fittings.
3. Welded fittings.
4. Fittings listed to ANSI LC-1/CSA 6.26 or ANSI LC-4.

Committee Reason: Couplings and plugs needed to be added. Right/left couplings are still being used and should be allowed. (Vote 10-1)

Assembly Action:

As Submitted

FG14-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Assembly Action requests As Submitted.

Commenter's Reason: This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action. The assembly action for Disapprove was successful by a vote of 57.8% (63) to 42.2% (46) by eligible members online during the period of May 9 - May 23, 2018.

Public Comment 2:

Proponent: Ted Williams, representing American Gas Association (twilliams@aga.org) requests As Modified by Committee.

Commenter's Reason: As the original proposal advocated, couplings and plugs in concealed locations need to be included in list of limitations. The modification to include all threaded fittings is needed for general coverage of elbows, tees, couplings, plugs, and caps in concealed locations. During discussion of this modification, floor commentary was confused over this issue and potential applicability of the modification language over the proposal as submitted. No compelling need for disapproving of the modification was offered.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Changes to the list of fittings installed in concealed locations will not affect construction cost.

FG14-18

FG15-18

IFGC: 404.6

Proposed Change as Submitted

Proponent: James Ranfone, representing American Gas Association (jranfone@aga.org)

2018 International Fuel Gas Code

Delete and substitute as follows

~~**404.6 Underground penetrations prohibited.** Gas piping shall not penetrate building foundation walls at any point below grade. Gas piping shall enter and exit a building at a point above grade and the annular space between the pipe and the wall shall be sealed.~~

404.6 Piping through foundation wall. Underground piping where installed below grade through the foundation or basement wall of a building shall be encased in a protective pipe sleeve. The annular space between the gas piping and the sleeve shall be sealed.

Reason: A change adopted into the 2015 edition prohibits gas piping from penetrating a foundation or basement wall below grade. This change was adopted without evidence that such penetrations have resulted in a safety concern. Below grade penetrations have a long been permitted and have proven to be a safe installation method. The revised language would reinstate this allowance. At least one State, Georgia, has amended the IFGC to delete the prohibition and allow below grade penetration like the proposed text. GA text is as follows: "404.6 Piping through foundation wall. Underground piping where installed below grade through the foundation or basement wall of a building, shall be encased is a protective pipe sleeve. The annular space between the gas piping and the sleeve shall be sealed."

Cost Impact: The code change proposal will decrease the cost of construction. The change will reduce the need to bring piping above ground in some installations. That will reduce the length of piping required as well as reduce the number of fittings used.

FG15-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval was based on proponent's published reason statement. Gas can enter building through other pipe penetrations. Above ground pipe is subject to damage. (Vote 7-4)

Assembly Action:

Disapproved

FG15-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ted Williams, representing American Gas Association (twilliams@aga.org) requests As Submitted.

Commenter's Reason: Opponents to the Committee action for Approve as Submitted once again provided no data or direct evidence to support the prohibition of below-grade through-foundation wall penetrations of gas piping, which Section 404.6 prohibits, even though millions of current gas piping installations use below-grade through-foundation wall penetrations. Opponents had no answers to Committee questions about whether or not other foundation penetrations can convey leaking gas from outside of the building and for which no protection from leaking gas might affect accumulation of gas within the structure. Opponents cited site-specific conditions that might compromise efforts at sealing below-grade through-foundation wall penetrations (such as in seismically active areas or areas with expansive soils) but offered no modifications to Section 404.6 to address these site-specific conditions and avoid the continued conflict with current installations of gas piping and installation practices that allow below-grade through-foundation wall penetrations. When asked by Committee members to assess the increased risk of exposing additional piping by requiring above-grade building entry of gas piping, no response was offered, even though such practices add risks to integrity of the piping system.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. By allowing the conventional practice of gas piping entering buildings through foundation walls below grade, the additional cost of added piping to enter the building above grade (and protecting that piping from impact, which is not required but would prudently be considered) can be avoided.

Public Comment 2:

Proponent: Assembly Action requests Disapprove.

Commenter's Reason: This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action. The assembly action for Disapprove was successful by a vote of 58.8% (67) to 41.2% (47) by eligible members online during the period of May 9 - May 23, 2018.

FG15-18

M3-18

IMC: 202

Proposed Change as Submitted

Proponent: Charles Stock, representing Spunstrand Inc

2018 International Mechanical Code

Revise as follows

THERMAL RESISTANCE (R-value). A measure of the ability to retard the flow of heat and represented in units of $\text{ft}^2 \times \text{°F} \times \text{h} / \text{BTU}$ or $\text{K} \times \text{m}^2 / \text{W}$. The R-value is the reciprocal of thermal conductance.

Reason: In recent years specifying engineers, third party product listing groups, builders, and end users have all been bombarded with questionable thermal performance claims by product manufacturers. All of this recent noise has left many wondering if they are getting the performance their projects actually require. This proposed addition of recognized/acceptable units for R-value's is an additional step towards clarifying and unifying what is and what is not actual a trusted measure of thermal performance properties. These units are published for clarification in the International Energy Conservation code for this very reason. Failing to add this clarification to the International Mechanical Code could result in the continued use of misleading or insufficiently insulated products being used in the market.

Bibliography: 2015 ICC International Energy Conservation Code, ICC, 2015

Cost Impact: The code change proposal will not increase or decrease the cost of construction. By adding further clarification, this proposal should simply assist in making sure that expected performance and value already being purchased is actually being delivered.

M3-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposal is redundant with the IECC. Code officials should not be required to make such calculations. (Vote 10-1)

Assembly Action:

None

M3-18

Individual Consideration Agenda

Public Comment 1:

Proponent: David Collins, representing International Code Council Sustainability, energy and high performance code action committee (sehpcac@iccsafe.org)requests As Modified by This Public Comment.

Replace as follows:

2018 International Mechanical Code

R-VALUE (THERMAL RESISTANCE) A measure of the ability to retard the flow of heat. The R-value is the reciprocal of thermal conductanceThe inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area (h ft² F/Btu) [(m² K)/W].

Commenter's Reason: This proposal contains information that is intended to be used by the design professional. The building official is not required to make the actual calculations, though the building official can easily verify that the correct formula was used to determine the R-value. The SEHPCAC proposed modification is critical as it makes it less likely that the definition can be used to game the system.

This public comment was submitted by the ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors in July of 2011 to pursue opportunities and to improve and enhance assigned International Codes or portions thereof. Each year the SEHPCAC has historically held 3 open face-to face meetings and numerous Working Group meetings, conference calls and webinars. These meetings, conference calls and webinars are public and are convened to facilitate discussion and debate of proposed changes and public comments to the codes by members of the committee, as well as interested parties.This proposal contains information that is intended to be used by the design professional. The building official is not required to make the actual calculations, though the building official can easily verify that the correct formula was used to determine the R-value. The SEHPCAC proposed modification makes it less likely that the definition can be used to game the system.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

By adding further clarification, this proposal should simply assist in making sure that expected performance and value already being purchased is actually being delivered.

M3-18

M4-18

IMC: 202, 202, 202

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Daikin US (JBENGINEER@aol.com)

2018 International Mechanical Code

Revise as follows

FLAMMABILITY CLASSIFICATION (REFRIGERANT). ~~Refrigerants shall be assigned to one of the three classes 1, 2 or 3 in accordance with ASHRAE 34. For Classes 2 and 3, the heat of combustion shall be calculated assuming that combustion products are in the gas phase and in their most stable state. The alphabetical/numerical designation used to identify the flammability of refrigerants.~~

REFRIGERANT SAFETY CLASSIFICATIONS. ~~Groupings The alphabetical/numerical designation that indicate both the toxicity and flammability classes in accordance with Section 1103.1. The classification group is made up of a letter (A or B) that indicates the toxicity class, followed by a number (1, 2 or 3) that indicates the flammability class. Refrigerant blends are similarly classified, based on the compositions at their worst cases of fractionation, as separately determined for toxicity and flammability. In some cases, the worst case of fractionation is the original formulation of refrigerants.~~

TOXICITY CLASSIFICATION CLASSIFICATION (REFRIGERANT). ~~Refrigerants shall be classified for toxicity in one of two classes in accordance with ASHRAE 34. An alphabetic designation used to identify the toxicity of refrigerants. Class A indicates a refrigerant with lower toxicity. Class B indicates a refrigerant with higher toxicity.~~

Reason: The current definitions of “flammability classification” and “toxicity classification” are improper since these contain mandatory code requirements. The definitions should only define the term, not contain requires with the use of the word “shall.” The definition of refrigerant safety classifications is incorrect because ASHRAE 34 was revised regarding the means of identifying the classification of refrigerants.

The classification or group of refrigerant is an alphabetical/numerical designation that is used to identify the flammability and toxicity of a given refrigerant. There were two new classifications added to ASHRAE 34, A2L and B2L. These designations were previously subclasses. Now they are a full class of refrigerant.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. These are definition changes.

M4-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval was based on the proponent's published reason statement. (Vote 9-2)

Assembly Action:

None

M4-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Connor Barbaree, representing ASHRAE (cbarbaree@ashrae.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

REFRIGERANT SAFETY CLASSIFICATIONS GROUP CLASSIFICATION. The alphabetical/numerical designation that indicate ~~indicates~~ both the toxicity and flammability ~~classification~~ ~~classifications~~ of refrigerants.

Toxicity. See Toxicity classification (Refrigerant).

Flammability. See Flammability classification (Refrigerant).

TOXICITY CLASSIFICATION (REFRIGERANT). An ~~alphabetic~~ alphabetical designation used to identify the toxicity of refrigerants. Class A indicates a refrigerant with lower toxicity. Class B indicates a refrigerant with higher toxicity.

FLAMMABILITY CLASSIFICATION (REFRIGERANT). The alphabetical/numerical designation used to identify the flammability of refrigerants.

Indicates a refrigerant with no flame propagation.

Indicates a refrigerant with lower flammability and lower burning velocity.

Indicates a refrigerant with lower flammability.

Indicates a refrigerant with higher flammability.

Commenter's Reason: Per ASHRAE 34, the two refrigerant classifications for flammability and toxicity are combined into a safety group classification. These proposed modifications to M4-18 make the terminology consistent between ASHRAE 34 and the IMC content, for the classification definitions and also the proposed revisions of M88-18 for the headers of Table 1103.1.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
No technical changes so no impact on cost.

M4-18

M6-18

IMC: 301.18

Proposed Change as Submitted

Proponent: Kelly Cobeen, Wiss Janney Elstner Associates, Inc, representing Federal Emergency Management Agency/Applied Technology Council - Seismic Code Support Committee (KCobeen@wje.com); Michael Mahoney, Federal Emergency Management Agency, representing Federal Emergency Management Agency (mike.mahoney@fema.dhs.gov)

2018 International Mechanical Code

Revise as follows

301.18 Seismic resistance. Where earthquake loads are applicable in accordance with the International Building Code, mechanical system supports, anchorage, and bracing, shall be designed and installed for ~~the~~ seismic forces in accordance with Chapter 16 of the International Building Code.

Reason: The added text clarifies the IBC location where specific seismic requirements are defined. This is intended to simply make the seismic design provisions more easily used, consistent with the intent as stated in 2015 NEHRP Recommended Provisions Section 1.1.2, to preserve life safety by maintaining the position of components through anchorage, bracing and strength.

Bibliography: NEHRP Recommended Seismic Provisions for New Buildings and Other Structures. 2015 Edition (FEMA P-1050-1), Federal Emergency Management Agency, Washington, D.C.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The proposals clarifies the intent of the code and does not impose any new requirements that were not already in effect.

M6-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Code officials already know how to apply the IBC. (Vote 6-5)

Assembly Action:

None

M6-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael Mahoney, representing Federal Emergency Management Agency (mike.mahoney@fema.dhs.gov) requests As Submitted.

Commenter's Reason:

The Federal Emergency Management Agency (FEMA), under its Seismic Code Support Committee (SCSC), submitted M6-18 to clarify seismic support anchorage requirements for the components relevant to that code (by adding anchorage and bracing) and to provide a more specific reference to the earthquake loads of Chapter 16 of the IBC.

This code change proposal was opposed, with the committee comment being "readers already know how to use the IBC". Given the amount of confusion we see in the application of this code section, we disagree. This code change proposal simply tries to clarify seismic support anchorage requirements for the components relevant to that code (by adding anchorage and bracing) and to provide a more specific reference to the earthquake loads of Chapter 16 of the IBC.

The fact that this code change proposal was recommended for disapproval by a vote of 6 to 5 shows that many on the committee agreed with our proposal.

For a nearly identical proposed code change to the International Plumbing Code, P5-18, we were able to explain that the reference to the IBC did not impact residential construction, and this change was recommended for approval unanimously.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This code change proposal simply tries to clarify an existing code language regarding seismic support anchorage requirements .

M6-18

M13-18

IMC: 202, 403.3.1, 403.3.2, 403.3.2.1

Proposed Change as Submitted

Proponent: Mike Moore, representing The Home Ventilating Institute (mmoore@newportventures.net)

2018 International Mechanical Code

Add new definition as follows

BALANCED VENTILATION SYSTEM. A ventilation system where the total outdoor air supply air flow and total exhaust air flow are simultaneously within 10% of their average.

Revise as follows

403.3.1 Other buildings intended to be occupied. The design of local exhaust systems and ventilation systems for outdoor air for occupancies other than Group R-2, R-3 and R-4 ~~three stories and less above grade plane~~ shall comply with Sections 403.3.1.1 through 403.3.1.5.

403.3.2 Group R-2, R-3 and R-4 occupancies, ~~three stories and less occupancies.~~ The design of local exhaust systems and ventilation systems for outdoor air in Group R-2, R-3 and R-4 occupancies ~~three stories and less in height above grade plane~~ shall comply with Sections 403.3.2.1 through 403.3.2.5.

403.3.2.1 Outdoor air for dwelling units. ~~An outdoor air~~ A balanced ventilation system ~~consisting of a mechanical exhaust system, supply system or combination thereof~~ shall be installed to provide outdoor air for each dwelling unit. ~~Local exhaust or supply systems, including outdoor air ducts connected to the return side of an air handler, are permitted to serve as such a system.~~ The balanced ventilation system shall be designed to provide the required rate of outdoor air continuously during the period that the building is occupied. The minimum continuous outdoor airflow rate shall be determined in accordance with Equation 4-9.

~~0.01A_{floor}N_{br} + 1~~ $Q_{OA} = 0.01A_{floor} + 7.5(N_{br} + 1)$
where:

(Equation 4-9)

Q_{OA} = outdoor airflow rate, cfm

A_{floor} = floor area, ft²

N_{br} = number of bedrooms; not to be less than one

Exception: The outdoor air ventilation system is not required to operate continuously where the system has controls that enable operation for not less than 1 hour of each 4-hour period. The average outdoor air flow rate over the 4-hour period shall be not less than that prescribed by Equation 4-9.

Reason: Chapter 4 requires *outdoor air* to be provided by an *outdoor air* ventilation system. For dwelling units other than those in low-rise buildings of R-2, R-3, and R-4 occupancies, this ventilation system is required to be balanced (Section 403.3.1.5). Outdoor air is defined as "Ambient air that enters a building through a ventilation system, through intentional openings for natural ventilation, or by infiltration." Unless a ventilation system is balanced, it will introduce transfer air from neighboring units, which can negate much of the benefit of ventilation. This proposal will align the requirements for low-rise mechanical ventilation units with existing requirements for mid- and high-rise ventilation units (i.e., dwelling units in buildings of all R2, R3, and R4 occupancies would need balanced ventilation systems to provide outdoor air). Further, it will permit lower ventilation rates for mid- and high-rise dwelling units than currently allowed, thereby saving significant energy.

Precedents and rationale for this proposal include:

1. **Exhaust dwelling unit ventilation systems** are not permitted for mid-rise or high-rise dwelling units in the IMC (Section 403.3.5.1 requires that systems be balanced), were not permitted for mid- or high-rise dwelling units that were in compliance with ASHRAE 62.1, and should not be permitted low-rise buildings of R-2, R-3, and R-4 occupancies either. Such systems establish pressure imbalances across dwelling units, and the majority of the makeup air introduced by such systems is not outdoor air, but is transfer air from adjacent units or corridors.
2. **Exhaust dwelling unit ventilation with dedicated passive vent air inlets** should also not be permitted in any attached dwelling unit, because research has shown that these systems consistently fail to provide the targeted outdoor air flow rates. Industry experience with dedicated makeup air inlets and a recent study conducted by the Northwest Energy Efficiency Alliance,[1] have demonstrated that occupants generally keep inlets closed. The same study concluded that, “the analysis of inlet vents failed to show clear benefits from their usage.” A separate study sponsored by the U.S. Department of Energy also found dedicated passive air inlets to be ineffective: “airflow from the passive vents was 13%-36% of the exhaust ventilation rate.... most of the makeup air comes from unintentional sources—from leaks in the exterior envelope, neighboring apartments, or the corridor.”[2] Further, this study demonstrated that verifying the targeted outdoor air flow rate at dedicated outdoor air inlets was not possible in the dwelling units tested.
3. **Supply-only** outdoor air systems with or without dedicated makeup air outlets solve some of the problems with exhaust systems (e.g., providing a known source of filtered outdoor air), but they too induce pressure differentials that can lead to transfer of odors and pollutants across dwelling units and between dwelling units and corridors/common areas, diminishing the benefit of providing filtered outdoor air.
4. Unlike exhaust-only systems, exhaust with dedicated passive vent outdoor air inlets, and supply-only systems, **balanced mechanical ventilation systems** do not induce pressure differentials across attached dwelling units and do not introduce transfer air with outdoor air. The IMC already requires that high-rise dwelling unit “ventilation systems shall be balanced by an approved method” (2015 IMC Section 403.3.1.5). Reducing pressure differentials not only reduces the transfer of odor and pollutants between dwelling units and corridors/common areas, but it also limits the migration of moisture through building assemblies via air leakage, which can lead to condensation, mold, and durability problems. Additionally, balanced systems are able to provide filtered air directly from the outdoors and to temper the outdoor air (if provided with a heat or energy recovery core), increasing the likelihood of system operation by occupants.

Bibliography: [1] Eklund, K., Kunkle, R., Banks, A., and Hales, D. 2015. Pacific Northwest Residential Ventilation Effectiveness Study. WSUEEP14-020.

[2] Maxwell, S., Berger, D., and Zuluaga, M. 2016. Evaluation of Passive Vents in New Construction Multifamily Buildings. (Subcontractor Report, NREL/SR-5500-64758). Golden, CO: National Renewable Energy Laboratory.

Cost Impact: The code change proposal will increase the cost of construction

This proposal will increase the costs of engineering and construction where similar requirements do not already exist. For example, the IMC already requires that ventilation air be balanced for mid- and high-rise dwelling units. The requirement for balanced ventilation can be achieved by coupling an in-line supply fan with an exhaust fan that has a similar exhaust rate. Where balanced ventilation is not already required by the IMC, exhaust fans are required. Assuming that the exhaust fan is already installed, the incremental cost is associated with the supply fan, supply fan ducting, and the control/wiring to run both the supply and exhaust fan off a single switch. An in-line supply fan costs around \$120 *retail*. Ducting for the in-line supply fan can be estimated at ~\$19 per linear foot, or ~\$100 for a short, 5' run from the exterior. In-line supply fans are frequently specified to provide outdoor air in multifamily projects - especially in warm and mild climates. Where this is the case, the only incremental costs associated with this proposal would be for the wiring and switch to control the supply and exhaust fan simultaneously. Any incremental costs incurred are expected to decrease as balanced systems become more common; furthermore, the incremental costs are offset by the expected improvement in air quality and its associated health benefits.

M13-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: 10% is inappropriate. The proposal would negate some of the advances in building tightness. Balancing reports are not for system design. Removing the story limit makes the code less restrictive. Commercial ventilation requirements are needed for buildings above three stories. (Vote 9-2)

Assembly Action:

None

M13-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Mike Moore, representing Broan (mmoore@newportventures.net) requests As Modified by This Public Comment.

Replace as follows:

2018 International Mechanical Code

403.1 Ventilation system. Mechanical ventilation shall be provided by a method of supply air and return or *exhaust air* except that mechanical ventilation air requirements for Group R-2, R-3 and R-4 occupancies three stories and less in height above grade plane shall be provided by an exhaust system, supply system or combination thereof. The amount of supply air shall be approximately equal to the amount of return and *exhaust air*. The system shall not be prohibited from producing negative or positive pressure. The system to convey *ventilation air* shall be designed and installed in accordance with Chapter 6.

403.3.2.1 Outdoor air for dwelling units. An outdoor air mechanical ventilation system consisting of a mechanical exhaust system, supply system or combination thereof shall be installed for each dwelling unit. Local exhaust or supply systems, including outdoor air ducts connected to the return side of an air handler, are permitted to serve as such a system. The outdoor air ventilation system shall be designed to provide the required rate of outdoor air continuously during the period that the building is occupied. The minimum continuous outdoor airflow rate shall be determined in accordance with Equation 4-9.

$$Q_{OA} = 0.01A_{floor} + 7.5(N_{br} + 1)$$

where:

(Equation 4-9)

Q_{OA} = outdoor airflow rate, cfm

A_{floor} = floor area, ft²

N_{br} = number of bedrooms; not to be less than one

Exception: The outdoor air ventilation system is not required to operate continuously where the system has controls that enable operation for not less than 1 hour of each 4-hour period. The average outdoor air flow rate over the 4-hour period shall be not less than that prescribed by Equation 4-9.

Commenter's Reason: Prior to 2015, whenever outdoor air was required for any building or occupancy type within the scope of the IMC, the outdoor air was required to be provided by a method of supply air and return or exhaust air (see Section 403.1). Beginning in 2015, as a result of a proposal that I authored, exhaust-only systems were explicitly permitted to serve this function for dwelling units in low-rise Group R-2, R-3, and R-4 occupancies. I proposed this rollback to the 2015 IMC to better align the ASHRAE 62.2 requirements for low-rise multifamily dwelling units with the IMC requirements. But since that time, research sponsored by the U.S. Department of Energy showed that exhaust-only systems with dedicated passive outdoor air inlets provided only a small fraction (on average less than 25% across dwelling units in 3 buildings) of outdoor air through the inlets. As such, the exception for exhaust-only ventilation as written, even with trickle vents, can no longer be justified; and at a minimum, the code should revert to its pre-2015 language with respect to requiring supply air and return or exhaust air when mechanical ventilation is provided for dwelling units. This public comment would have the effect of reinstating the pre-2015 requirement for dwelling units to have supply air and return or exhaust air whenever mechanical ventilation is required for outdoor air.

Bibliography: See original proposal for the DOE reference cited in the reason statement.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The code change proposal will increase the cost of construction where exhaust-only systems were being specified to provide outdoor air. The incremental cost associated with a supply fan is about \$120 retail. Ducting for the in-line supply fan can be estimated at ~\$19 per linear foot. In-line supply fans are frequently specified to provide outdoor air in multifamily projects - especially in warm and mild climates. Where this is the case, no incremental costs are incurred; furthermore, any incremental costs are offset by the expected improvement in air quality and its associated health benefits.

M13-18

M20-18

IMC: 401.2, 403.1

Proposed Change as Submitted

Proponent: Shaunna Mozingo, representing City of Cherry Hills Village, Colorado Code Consulting (smozingo@coloradocode.net)

2018 International Mechanical Code

Revise as follows

401.2 Ventilation required. Every occupied space shall be ventilated by natural means in accordance with Section 402 or by mechanical means in accordance with Section 403. ~~Where the air infiltration rate in a dwelling unit is less than 5 air changes per hour when tested with a blower door at a pressure of 0.2-inch water column (50 Pa) in accordance with Section R402.4.1.2 of the International Energy Conservation Code, the dwelling unit shall be ventilated by Dwelling units complying with the air leakage requirements of the International Energy Conservation Code or ASHRAE 90.1 shall be ventilated by mechanical means in accordance with Section 403.~~ Ambulatory care facilities and Group I-2 occupancies shall be ventilated by mechanical means in accordance with Section 407.

403.1 Ventilation system. Mechanical ventilation shall be provided by a method of supply air and return or *exhaust air* except that mechanical ventilation air requirements for Group R-2, R-3 and R-4 occupancies ~~three stories and less in height above grade plane~~ shall be provided by an exhaust system, supply system or combination thereof. The amount of supply air shall be approximately equal to the amount of return and *exhaust air*. The system shall not be prohibited from producing negative or positive pressure. The system to convey *ventilation air* shall be designed and installed in accordance with Chapter 6.

Reason: After receiving many questions on the ventilation requirements for R-2 dwellings it has become clear that this section of the IMC is not easily understood, agreed with or being enforced as written. A stakeholder group was put together to tackle the issue and to see how we could change the ventilation requirements to be better understood. The group consisted of members from CAPMO, PNNL, Commissioning Agents, Mechanical Engineers, Code Officials, energy raters and energy advocates. The mantra of the meeting was: "We either agree that it isn't required or agree that it is - then we change it."

Here were the discussed issues that we saw:

1: The lack of understanding of R-2's over 3 stories or 3 stories and less. (IECC definitions of residential and commercial buildings). Most people aren't looking at these definitions in the IECC so they all assume that since an "R-2" is built out of the IBC it is considered a commercial building in the IECC. When they get to the IMC and it starts talking about 3 stories or less and over 3 stories they don't understand why the buildings are treated differently for ventilation or any other requirement. While, from a building science perspective it can make sense why these buildings are separated this way, a lot of education time is spent on this very issue.

RESIDENTIAL BUILDING. For this code, includes detached one- and two-family dwellings and multiple single-family dwellings (townhouses) as well as Group R-2, R-3 and R-4 buildings three stories or less in height above grade plane.

COMMERCIAL BUILDING. For this code, all buildings that are not included in the definition of "Residential building."

2: IMC wording that is confusing, especially for people who also read the IRC Mechanical and the IECC because they aren't worded the same and it makes it hard to know what the requirements are. Some confusion came in by code officials who were requiring mechanical ventilation for all R-2s, commercial or residential, because they felt that the section below was stating that all envelopes had to be as tight as 3ach/50 even if they weren't tested. We had to go to ICC for an interpretation of the issues because 50% of the people believed mechanical ventilation was required for any R-2 and 50% believed it was only required for R-2s 3 stories or less.

401.2 Ventilation required.

Every occupied space shall be ventilated by natural means in accordance with Section 402 or by mechanical means in accordance with Section 403. Where the air infiltration rate in a dwelling unit is less than 5 air changes per hour when tested with a blower door at a pressure of 0.2-inch water column (50 Pa) in

accordance with Section R402.4.1.2 of the International Energy Conservation Code, the dwelling unit shall be ventilated by mechanical means in accordance with Section 403. Ambulatory care facilities and I-2 occupancies shall be ventilated by mechanical means in accordance with Section 407.

403.1 Ventilation system.

Mechanical ventilation shall be provided by a method of supply air and return or exhaust air except that mechanical ventilation air requirements for Group R-2, R-3 and R-4 occupancies three stories and less in height above grade plane shall be provided by an exhaust system, supply system or combination thereof. The amount of supply air shall be approximately equal to the amount of return and exhaust air. The system shall not be prohibited from producing negative or positive pressure. The system to convey ventilation air shall be designed and installed in accordance with Chapter 6.

3: ICC's code opinion:

From: Jason Toves <jtoves@ICCSafe.ORG> **Sent:** Wednesday, April 12, 2017 1:07 PM **To:** Shaunna Mozingo **Cc:** Renee Testroet **Subject:** RE: Section 401.2 - 2015 IMC

Ms. Mozingo,

Following are the responses to your questions.

April 12, 2017

RE: 15 IMC 401.2

Q1: Are R-2 occupancies in commercial buildings, as defined in the 2015 IECC, required to have a blower door test performed per Section 401.2 of the 2015 IMC?

A1: No, Section 401.2 of the IMC does not require blower door testing of R-2 occupancies in commercial buildings. It requires mechanical ventilation when R-2 occupancies are tested in accordance with Section R402.4.1.2 of the International Energy Conservation Code and the air infiltration rate is less than 5 air changes per hour, without requiring such testing.

Q2: Are R-2 occupancies in commercial buildings, as defined in the 2015 IECC, required to be mechanically ventilated per Section 401.2 of the 2015 IMC?

A2: No, Section 401.2 requires either natural ventilation per Section 402 or mechanical ventilation per Section 403. Section 401.2 only requires mechanical ventilation when R-2 occupancies are tested in accordance with Section R402.4.1.2 of the International Energy Conservation Code and the air infiltration rate is less than 5 air changes per hour, without requiring mechanical ventilation for R-2 occupancies in commercial buildings.

It should be noted that Section R402.4.1.2 of the 2015 International Energy Conservation Code applies to "Residential Buildings" (as defined in the IECC) only.

So now you decide, should ventilation actually be required in R-2 occupancies over 3 stories the same as it should be in buildings of less than 3 stories? Why should it be different when both codes require a tight building envelope with continuous air barriers?

The overarching feeling from the group was: *"Everyone is building tight. Hinging mechanical ventilation on a test is causing a problem. It should just be required for all R occupancies."*

We played around with the wording and finally just decided that it was easiest to just say that if your envelope complies with an energy code you must provide mechanical ventilation. It was that simple so that is what we did.

Cost Impact: The code change proposal will increase the cost of construction

This proposal will increase the cost of construction but depending on the method chosen to mechanically ventilate (balanced, exhaust only, supply only), the cost typically only includes the cost of a timer/timers for an exhaust fan that is already required in a bathroom so that it runs continuously or down to 25% of the time. There are definitely climates where an exhaust only or supply only system are not recommended but there are more and more options for an economical balanced system that doesn't rely on an ERV or HRV, even though those costs are coming down as well.

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval was based on proponent's published reason statement. Proposal adds option for ASHRAE 90.1 and connects the IMC to the IECC. (Vote 6-5)

Assembly Action:

Disapproved

M20-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Mike Moore, representing Broan (mmoore@newportventures.net) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Mechanical Code

401.2 Ventilation required. Every occupied space shall be ventilated by natural means in accordance with Section 402 or by mechanical means in accordance with Section 403. Dwelling units complying with the air leakage requirements of the International Energy Conservation Code or ASHRAE 90.1 shall be ventilated by mechanical means in accordance with Section 403. Ambulatory care facilities and Group I-2 occupancies shall be ventilated by mechanical means in accordance with Section 407.

403.1 Ventilation system. Mechanical ventilation shall be provided by a method of supply air and return or *exhaust air except that mechanical ventilation air requirements for Group R-2, R-3 and R-4 occupancies three stories or less in height above grade plane shall be provided by an exhaust system, supply system or combination thereof.* The amount of supply air shall be approximately equal to the amount of return and *exhaust air*. The system shall not be prohibited from producing negative or positive pressure. The system to convey *ventilation air* shall be designed and installed in accordance with Chapter 6.

Commenter's Reason: M20 does a great service by providing a rational simplification to the code, namely connecting the dots that tightly constructed dwelling units should be provided with mechanical ventilation. Unfortunately, M20 also rolls back mechanical ventilation requirements for high-rise dwelling units by removing the Section 403.1 requirement for supplying outdoor air to high-rise dwelling units and instead, permitting exhaust-only systems to serve this role. Approval of M20 without modification would represent a big step back for ensuring minimum acceptable indoor air quality for high-rise dwelling units.

Prior to 2015, whenever outdoor air was required for any building or occupancy type within the scope of the IMC, Section 403.1 required the outdoor air to be provided by a method of supply air and return or exhaust air. Beginning in 2015, as a result of a proposal that I authored, exhaust-only systems were explicitly permitted to serve this function for dwelling units in low-rise Group R-2, R-3, and R-4 occupancies. I proposed this rollback to the 2015 IMC to better align the IMC requirements for low-rise multifamily dwelling units with the ASHRAE 62.2-2013 requirements for low-rise multifamily dwelling units. But since that time, field research sponsored by the U.S. Department of Energy showed that exhaust-only systems with dedicated passive outdoor air inlets provided only a small fraction of outdoor air through the inlets (on average less than 25% across dwelling units in 3 buildings studied) and that a significant percentage of the so-called outdoor air was actually coming from adjacent spaces in the form of (stale) transfer air. As such, the current exception for exhaust-only ventilation of low-rise dwelling units can no longer be justified for low-rise dwelling units and should definitely not be extended to high-rise dwelling units.

This public comment removes M20's expansion of the exception approving exhaust-only outdoor air ventilation systems for high-rise dwelling units but retains the other benefits of M20 (i.e., the logical simplification of dwelling unit mechanical ventilation requirements for tightly-constructed dwelling units).

Bibliography: 1. Maxwell, S., Berger, D., and Zuluaga, M. 2016. Evaluation of Passive Vents in New Construction Multifamily Buildings. (Subcontractor Report, NREL/SR-5500-64758). Golden, CO: National Renewable Energy Laboratory.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction

The code change proposal will increase the cost of construction for high-rise dwelling units that are not currently specifying mechanical ventilation to provide outdoor air. The incremental cost associated with a supply fan is about \$120 retail. Ducting for an in-line supply fan can be estimated at ~\$19 per linear foot. Any incremental costs are offset by the expected improvement in air quality and its associated health benefits.

Public Comment 2:

Proponent: DONALD SURRENA, NATIONAL ASSOCIATION OF HOME BUILDERS, representing National Association of Home Builders (dsurrena@nahb.org) requests Disapprove.

Commenter's Reason: This proposal removes the concept of natural ventilation. The ability to open a window to get fresh air into your home. Instead a fan or fans run in perpetuity. All residential dwelling will have to rely on a mechanical system for fresh air. A system that is prone to and bound to fail. A system that will put an unnecessary burden on low income home buyers and the homes of our most vulnerable restricted income owners, our older homeowners. A study done by Florida Solar showed an excessive failure rate for mechanical systems. The cost of construction increases with the install of the system and a further cost continues to maintain the system for as long as it can be afforded, what is the final result? To get fresh air into the home the windows are opened.

A quote from the Florida Solar Energy Center on page 18 stated "So one not surprising but notable finding is that even if a ventilation is initially installed, a percentage of homeowners will likely choose not to use it."

This proposal is too restricting and will increase the cost of construction for its initial installation and its continuing maintenance costs into the future. Being able to calculate natural ventilation should not be eliminated and the need for mechanical ventilation in all homes should not be mandated.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction This proposal would require the installation of additional ventilation fans in all climate zones.

M20-18

M21-18

IMC: Table TABLE 403.3.1.1, 502.20, 502.20.1

Proposed Change as Submitted

Proponent: Gary Sadler, SalonSafe, LLC + Upland Architects, Inc, representing SalonSafe, LLC; Adam Rebello, representing Salon Safe LLC (adamr@55upland.com)

2018 International Mechanical Code

Revise as follows

**TABLE 403.3.1.1
MINIMUM VENTILATION RATES**

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY#/1000 FT² a	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT² a	EXHAUST AIRFLOW RATE CFM/FT² a
Correctional facilities				
Booking/waiting	50	7.5	0.06	—
Cells				
without plumbing fixtures	25	5	0.12	—
with plumbing fixtures ⁹	25	5	0.12	1.0
Day room	30	5	0.06	—
Dining halls (see "Food and beverage service")	—	—	—	—
Guard stations	15	5	0.06	—
Dry cleaners, laundries				
Coin-operated dry cleaner	20	15	—	—
Coin-operated laundries	20	7.5	0.12	—
Commercial dry cleaner	30	30	—	—
Commercial laundry	10	25	—	—
Storage, pick up	30	7.5	0.12	—
Education				
Art classroom ⁹	20	10	0.18	0.7
Auditoriums	150	5	0.06	—
Classrooms (ages 5-8)	25	10	0.12	—
Classrooms (age 9 plus)	35	10	0.12	—
Computer lab	25	10	0.12	—
Corridors (see "Public spaces")	—	—	—	—
Day care (through age 4)	25	10	0.18	—
Lecture classroom	65	7.5	0.06	—
Lecture hall (fixed seats)	150	7.5	0.06	—

Locker/dressing rooms ⁹	—	—	—	0.25
Media center	25	10	0.12	—
Multiuse assembly	100	7.5	0.06	—
Music/theater/dance	35	10	0.06	—
Science laboratories ⁹	25	10	0.18	1.0
Smoking lounges ^b	70	60	—	—
Sports locker rooms ⁹	—	—	—	0.5
Wood/metal shops ⁹	20	10	0.18	0.5
Food and beverage service				
Bars, cocktail lounges	100	7.5	0.18	—
Cafeteria, fast food	100	7.5	0.18	—
Dining rooms	70	7.5	0.18	—
Kitchens (cooking) ^b	20	7.5	0.12	0.7
Hotels, motels, resorts and dormitories				
Bathrooms/toilet—private ⁹	—	—	—	25/50 ^f
Bedroom/living room	10	5	0.06	—
Conference/meeting	50	5	0.06	—
Dormitory sleeping areas	20	5	0.06	—
Gambling casinos	120	7.5	0.18	—
Lobbies/prefunction	30	7.5	0.06	—
Multipurpose assembly	120	5	0.06	—
Offices				
Conference rooms	50	5	0.06	—
Main entry lobbies	10	5	0.06	—
Office spaces	5	5	0.06	—
Reception areas	30	5	0.06	—
Telephone/data entry	60	5	0.06	—
Private dwellings, single and multiple				
Garages, common for multiple units ^b	—	—	—	0.75
Kitchens ^b	—	—	—	25/100 ^f
Living areas ^c	Based on number of bedrooms. First bedroom, 2; each additional bedroom, 1	0.35 ACH but not less than 15 cfm/person	—	—
Toilet rooms and bathrooms ⁹	—	—	—	20/50 ^f
Public spaces				
Corridors	—	—	0.06	—
Courtrooms	70	5	0.06	—
Elevator car	—	—	—	1.0
Legislative chambers	50	5	0.06	—
Libraries	10	5	0.12	—

Museums (children's)	40	7.5	0.12	—
Museums/galleries	40	7.5	0.06	—
Places of religious worship	120	5	0.06	—
Shower room (per shower head) ^g	—	—	—	50/20 ^f
Smoking lounges ^b	70	60	—	—
Toilet rooms — public ^g	—	—	—	50/70 ^e
Retail stores, sales floors and showroom floors				
Dressing rooms	—	—	—	0.25
Mall common areas	40	7.5	0.06	—
Sales	15	7.5	0.12	—
Shipping and receiving	2	10	0.12	—
Smoking lounges ^b	70	60	—	—
Storage rooms	—	—	0.12	—
Warehouses (see "Storage")	—	10	0.06	—
Specialty shops				
Automotive motor-fuel dispensing stations ^b	—	—	—	1.5
Barber	25	7.5	0.06	0.5
Beauty salons ^b	25	20	0.12	0.6
Nail salons ^{b, h, i}	25	20	0.12	0.6
Embalming room ^b	—	—	—	2.0
Pet shops (animal areas) ^b	10	7.5	0.18	0.9
Supermarkets	8	7.5	0.06	—
Sports and amusement				
Bowling alleys (seating areas)	40	10	0.12	—
Disco/dance floors	100	20	0.06	—
Game arcades	20	7.5	0.18	—
Gym, stadium, arena (play area)	7	20	0.18	—
Health club/aerobics room	40	20	0.06	—
Health club/weight room	10	20	0.06	—
Ice arenas without combustion engines	—	—	0.30	0.5
Spectator areas	150	7.5	0.06	—
Swimming pools (pool and deck area)	—	—	0.48	—
Storage				
Repair garages, enclosed parking garages ^{b, d}	—	—	—	0.75
Refrigerated warehouses/freezers	—	10	—	0.75
Warehouses	—	10	0.06	—

Theaters				
Auditoriums (see "Education")	—	—	—	—
Lobbies	150	5	0.06	—
Stages, studios	70	10	0.06	—
Ticket booths	60	5	0.06	—
Transportation				
Platforms	100	7.5	0.06	—
Transportation waiting	100	7.5	0.06	—
Workrooms				
Bank vaults/safe deposit	5	5	0.06	—
Computer (without printing)	4	5	0.06	—
Copy, printing rooms	4	5	0.06	0.5
Darkrooms	—	—	—	1.0
Meat processing ^c	10	15	—	—
Pharmacy (prep. area)	10	5	0.18	—
Photo studios	10	5	0.12	—

For SI: 1 cubic foot per minute = 0.0004719 m³/s, 1 ton = 908 kg, 1 cubic foot per minute per square foot = 0.00508 m³/(s • m²), °C = [(°F) -32]/1.8, 1 square foot = 0.0929 m².

- a. Based on *net occupiable floor area*.
- b. Mechanical exhaust required and the recirculation of air from such spaces is prohibited. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1, Item 3).
- c. Spaces unheated or maintained below 50°F are not covered by these requirements unless the occupancy is continuous.
- d. Ventilation systems in enclosed parking garages shall comply with Section ~~404.404~~.
- e. Rates are per water closet or urinal. The higher rate shall be provided where the exhaust system is designed to operate intermittently. The lower rate shall be permitted only where the exhaust system is designed to operate continuously while occupied.
- f. Rates are per room unless otherwise indicated. The higher rate shall be provided where the exhaust system is designed to operate intermittently. The lower rate shall be permitted only where the exhaust system is designed to operate continuously while occupied.
- g. Mechanical exhaust is required and recirculation from such spaces is prohibited except that recirculation shall be permitted where the resulting supply airstream consists of not more than 10 percent air recirculated from these spaces. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1, Items 2 and 4).
- h. For nail salons, each manicure and pedicure station shall be provided with a *source capture system* capable of exhausting not less than 50 cfm per ~~station~~ station as measured not more than 12 inches (305 mm) horizontally and vertically from the point of chemical application. Exhaust inlets shall be located in accordance with Section 502.20 ~~and 502.20.1~~. Where ~~one or more~~ required source capture systems operate continuously during occupancy, the exhaust rate and outdoor airflow rate from such systems shall be permitted to be applied to the exhaust flow rate and outdoor airflow rate required by Table 403.3.1.1 for the nail salon.
- i. Where nail salon services or a nail salon occupancy is ancillary to the main occupancy classification and a source capture system is provided in accordance with Section 502.20 and 502.20.1, the minimum ventilation rates for the main occupancy classification shall be permitted according to Table 403.3.1.1.

502.20 Manicure and pedicure stations. Manicure and pedicure stations shall be provided with ~~an a source capture~~ exhaust system in accordance with Table 403.3.1.1, Note h. Manicure tables and pedicure stations ~~not provided with~~ factory-installed exhaust inlets shall be provided with fixed in-place, immovable exhaust inlets located not more than 12 inches (305 mm) horizontally and vertically from the point of chemical ~~application~~ application and shall not draw fumes or contaminants past the human face. The source capture exhaust system shall be prohibited from recirculating air and shall discharge exhaust in accordance with Section 501.3 and shall also comply with the provisions of Section 502.20.1.

Add new text as follows

502.20.1 Makeup Air. Makeup air shall be supplied during the operation of source capture exhaust systems that are provided for manicure tables and pedicure stations . The amount of makeup air supplied to the building from all sources shall be approximately equal to the amount of exhaust air for all exhaust systems for the building. The makeup air shall not reduce the effectiveness of the exhaust system. Makeup air shall be provided by gravity or mechanical means or both. Mechanical makeup air systems shall be automatically controlled to start and operate simultaneously with the exhaust system. Makeup air intake opening locations shall comply with Section 401.4. and Makeup air temperature shall comply with Section 508.1.

Reason: INTRODUCTION

"Many of us go to nail salons to relax and to be pampered. We don't think of these places as potentially hazardous work environments, yet for many manicurists, regular on-the-job exposure to toxic chemicals is a reality. Workers often experience headaches, dizziness, rashes and other acute symptoms. Some chemicals are known to cause cancer and reproductive, developmental, and respiratory harm" (a)

The intent of these suggested modifications is to (1) better clarify the requirements for a source capture exhaust system at manicure and pedicure stations where ambiguity exists, and to (2) better ensure the effectiveness of the exhaust system in removing harmful fumes and contaminants at the source and providing a healthy, safe environment for nail salon workers and their clients.

1. PROPOSED MODIFICATION TO TABLE 403.3.1.1 note h.

REASON: The suggested modification to note h in Table 403.3.1.1 attempts to clarify the minimum distance from which the exhaust rate is to be measured and give the AHJ or design professional better criteria by which to test and confirm code compliance. Also the balancing of exhausted air with makeup air is required by the IMC, therefore, the outdoor airflow rate should be permitted to be applied to the outdoor airflow rate required by Table 403.3.1.1 for the same reasons the exhaust rate is currently permitted to be applied when the source capture system is running continuously during occupancy.

2. PROPOSED ADDITION of note j TO TABLE 403.3.1.1

REASON: The addition of note j attempts to address increasing instances where nail services are offered in places like a retail or business occupancy where those nail services are not the primary business or occupancy. In these circumstances, if a source capture system is installed in accordance with Section 502.20 and 502.20.1, additional equipment and higher operating costs to comply with the greater nail salon ventilation rates would be reduced.

3. PROPOSED MODIFICATION TO SECTION 502.20 Manicure and Pedicure Stations

REASON: Work practices are an important part of achieving successful control of fume exposures; in particular, positioning the exhaust inlet close to the source of chemical application.

It is easy to confuse a fan's ability to blow a jet of air with it's ability to draw air into an exhaust inlet. That's why an exhaust inlet must be close to the source of the contamination to be an effective source capture system. Frequent changes in the location and position of the exhaust inlet from the source of chemical application can diminish the exhaust system's ability to draw air into the exhaust inlet at the code-required minimum air flow rate.

Therefore, it is suggested that the code require the exhaust inlets to be fixed in-place and immovable (for both factory and field installations) to ensure the desired maximum source capture effectiveness without depending on user control or placement.

Although a 50CFM exhaust rate at 12 inches (horizontally and vertically) from the source of chemical application is effective in capturing fumes and other contaminants, it's important to recognize that even when this requirement is met, the possibility of fumes to be drawn past the face of the technician and consumer still exist. This suggested modification helps to eliminate this possibility.

It is important to clarify that source capture exhaust is to be discharged to the outdoors and not recirculated. This requirement is consistent with other exhaust systems regulated by the IMC. We suggest including a reference to existing Section 501.3 to better clarify this requirement.

4. PROPOSED NEW SUB-SECTION: 502.20.1 Makeup Air.

REASON: The suggested addition of a new sub-section intends to recognize and reinforce the requirement for balancing the exhausted air with makeup air and help provide guidance on intake opening locations and makeup air temperature by referencing existing Sections 401.4 and 508.1 respectively.

Bibliography: a. California Healthy Nail Salon Collaborative - website "THE NEED FOR HEALTHY NAIL SALONS" - <https://cahealthynailsalons.org/healthy-salons/>

Cost Impact: The code change proposal will not increase or decrease the cost of construction. These code change proposals will only remove ambiguity and provide better guidance for design professionals, the AHJ and end-users alike.

M21-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Section 502.20 already requires the 12 inch distance limit. Notes h and i appear to allow reduction of exhaust and outdoor air rates. Tying makeup air to commercial kitchens is not correct and balanced systems are already required. (Vote 10-1)

Assembly Action:

None

M21-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Gary Sadler, SalonSafe, LLC, representing SalonSafe, LLC requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

**TABLE 403.3.1.1
MINIMUM VENTILATION RATES**

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY#/1000 FT² a	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT² a	EXHAUST AIRFLOW RATE CFM/FT² a
Correctional facilities				
Booking/waiting	50	7.5	0.06	-
Cells				
without plumbing fixtures	25	5	0.12	-
with plumbing fixtures ⁹	25	5	0.12	1.0
Day room	30	5	0.06	-
Dining halls (see "Food and beverage service")	-	-	-	-
Guard stations	15	5	0.06	-
Dry cleaners, laundries				
Coin-operated dry cleaner	20	15	-	-
Coin-operated laundries	20	7.5	0.12	-
Commercial dry cleaner	30	30	-	-
Commercial laundry	10	25	-	-
Storage, pick up	30	7.5	0.12	-
Education				
Art classroom ⁹	20	10	0.18	0.7
Auditoriums	150	5	0.06	-
Classrooms (ages 5-8)	25	10	0.12	-
Classrooms (age 9 plus)	35	10	0.12	-
Computer lab	25	10	0.12	-
Corridors (see "Public spaces")	-	-	-	-
Day care (through age 4)	25	10	0.18	-

Lecture classroom	65	7.5	0.06	-
Lecture hall (fixed seats)	150	7.5	0.06	-
Locker/dressing rooms ⁹	-	-	-	0.25
Media center	25	10	0.12	-
Multiuise assembly	100	7.5	0.06	-
Music/theater/dance	35	10	0.06	-
Science laboratories ⁹	25	10	0.18	1.0
Smoking lounges ^b	70	60	-	-
Sports locker rooms ⁹	-	-	-	0.5
Wood/metal shops ⁹	20	10	0.18	0.5
Food and beverage service				
Bars, cocktail lounges	100	7.5	0.18	-
Cafeteria, fast food	100	7.5	0.18	-
Dining rooms	70	7.5	0.18	-
Kitchens (cooking) ^b	20	7.5	0.12	0.7
Hotels, motels, resorts and dormitories				
Bathrooms/toilet-private ⁹	-	-	-	25/50 ^f
Bedroom/living room	10	5	0.06	-
Conference/meeting	50	5	0.06	-
Dormitory sleeping areas	20	5	0.06	-
Gambling casinos	120	7.5	0.18	-
Lobbies/prefunction	30	7.5	0.06	-
Multipurpose assembly	120	5	0.06	-
Offices				
Conference rooms	50	5	0.06	-
Main entry lobbies	10	5	0.06	-
Office spaces	5	5	0.06	-
Reception areas	30	5	0.06	-
Telephone/data entry	60	5	0.06	-
Private dwellings, single and multiple				
Garages, common for multiple units ^b	-	-	-	0.75
Kitchens ^b	-	-	-	25/100 ^f
Living areas ^c	Based on number of bedrooms. First bedroom, 2; each additional bedroom, 1	0.35 ACH but not less than 15 cfm/person	-	-
Toilet rooms and bathrooms ⁹	-	-	-	20/50 ^f
Public spaces				
Corridors	-	-	0.06	-
Courtrooms	70	5	0.06	-
Elevator car	-	-	-	1.0
Legislative chambers	50	5	0.06	-
Libraries	10	5	0.12	-
Museums (children's)	40	7.5	0.12	-

Museums/galleries	40	7.5	0.06	-
Places of religious worship	120	5	0.06	-
Shower room (per shower head) ^g	-	-	-	50/20 ^f
Smoking lounges ^b	70	60	-	-
Toilet rooms - public ^g	-	-	-	50/70 ^e
Retail stores, sales floors and showroom floors				
Dressing rooms	-	-	-	0.25
Mall common areas	40	7.5	0.06	-
Sales	15	7.5	0.12	-
Shipping and receiving	2	10	0.12	-
Smoking lounges ^b	70	60	-	-
Storage rooms	-	-	0.12	-
Warehouses (see "Storage")	-	10	0.06	-
Specialty shops				
Automotive motor-fuel dispensing stations ^b	-	-	-	1.5
Barber	25	7.5	0.06	0.5
Beauty salons ^b	25	20	0.12	0.6
Nail salons ^{b, h, j}	25	20	0.12	0.6
Embalming room ^b	-	-	-	2.0
Pet shops (animal areas) ^b	10	7.5	0.18	0.9
Supermarkets	8	7.5	0.06	-
Sports and amusement				
Bowling alleys (seating areas)	40	10	0.12	-
Disco/dance floors	100	20	0.06	-
Game arcades	20	7.5	0.18	-
Gym, stadium, arena (play area)	7	20	0.18	-
Health club/aerobics room	40	20	0.06	-
Health club/weight room	10	20	0.06	-
Ice arenas without combustion engines	-	-	0.30	0.5
Spectator areas	150	7.5	0.06	-
Swimming pools (pool and deck area)	-	-	0.48	-
Storage				
Repair garages, enclosed parking garages ^{b, d}	-	-	-	0.75
Refrigerated warehouses/freezers	-	10	-	0.75
Warehouses	-	10	0.06	-
Theaters				
Auditoriums (see "Education")	-	-	-	-

Lobbies	150	5	0.06	-
Stages, studios	70	10	0.06	-
Ticket booths	60	5	0.06	-
Transportation				
Platforms	100	7.5	0.06	-
Transportation waiting	100	7.5	0.06	-
Workrooms				
Bank vaults/safe deposit	5	5	0.06	-
Computer (without printing)	4	5	0.06	-
Copy, printing rooms	4	5	0.06	0.5
Darkrooms	-	-	-	1.0
Meat processing ^c	10	15	-	-
Pharmacy (prep. area)	10	5	0.18	-
Photo studios	10	5	0.12	-

For SI: 1 cubic foot per minute = 0.0004719 m³/s, 1 ton = 908 kg, 1 cubic foot per minute per square foot = 0.00508 m³/(s ⋅ m²), °C = [(°F) - 32]/1.8, 1 square foot = 0.0929 m².

- a. Based on *net occupiable floor area*.
- b. Mechanical exhaust required and the recirculation of air from such spaces is prohibited. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1, Item 3).
- c. Spaces unheated or maintained below ~~50°F~~ 50 F are not covered by these requirements unless the occupancy is continuous.
- d. Ventilation systems in enclosed parking garages shall comply with Section 404.
- e. Rates are per water closet or urinal. The higher rate shall be provided where the exhaust system is designed to operate intermittently. The lower rate shall be permitted only where the exhaust system is designed to operate continuously while occupied.
- f. Rates are per room unless otherwise indicated. The higher rate shall be provided where the exhaust system is designed to operate intermittently. The lower rate shall be permitted only where the exhaust system is designed to operate continuously while occupied.
- g. Mechanical exhaust is required and recirculation from such spaces is prohibited except that recirculation shall be permitted where the resulting supply airstream consists of not more than 10 percent air recirculated from these spaces. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1, Items 2 and 4).
- h. For nail salons, each manicure and pedicure station shall be provided with a *source capture system* capable of exhausting not less than 50 cfm per station ~~as measured not more than 12 inches (305 mm) horizontally and vertically from the point of chemical application.~~ Exhaust inlets shall be located in accordance with Section 502.20 and 502.20.1. Where required source capture systems operate continuously during occupancy, the exhaust rate and outdoor airflow rate from such systems shall be permitted to be applied to the exhaust flow rate and outdoor airflow rate required by Table 403.3.1.1 for the nail salon.
- i. Where nail salon services or a nail salon occupancy is ancillary to the main occupancy classification and a source capture system is provided in accordance with Section 502.20 and 502.20.1, the minimum ventilation rates for the main occupancy classification shall be permitted according to Table 403.3.1.1.

502.20.1 Makeup Air. Makeup air shall be supplied during the operation of source capture exhaust systems that are provided for manicure tables and pedicure stations. ~~The amount of makeup air supplied to the building from all sources shall be approximately equal to the amount of exhaust air for all exhaust systems for the building. The makeup air shall not reduce the effectiveness of the exhaust system. Makeup air shall be provided by gravity or mechanical means or both. Mechanical makeup air systems shall be automatically controlled to start and operate simultaneously with the exhaust system. Makeup air intake opening locations shall comply with Section 401.4. The temperature differential between makeup air and Makeup air temperature shall comply with Section 508.1 the air in the conditioned space shall not exceed 10 degrees F (6 degrees C) except where the added heating and cooling loads of the makeup air do not exceed the capacity of the HVAC system.~~

Commenter's Reason: PROPOSED CHANGES BASED ON COMMITTEE REASONS FOR DISAPPROVAL:

1. PROPOSED MODIFICATION TO note h DELETES THE REQUIREMENT FOR THE 12 DISTANCE LIMIT ALREADY REQUIRED BY SECTION 502.20.

2. THE FOOTNOTES to TABLE 403.3.1.1 WERE MIS-NUMBERED. THIS HAS BEEN CORRECTED AND SHOULD ADDRESS THE COMMENT THE COMMITTEE HAD REGARDING note h and note i.

3. PROPOSED MODIFICATION TO 502.20.1 REMOVES THE REFERENCE TO 508.1 AND CLARIFIES REQUIREMENTS FOR MAKEUP AIR TEMPERATURE.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal will not increase the cost of construction because no additional labor, materials, equipment, appliances or devices are mandated beyond what is currently required by the code.

M21-18

M23-18

IMC: 403.3.1.2

Proposed Change as Submitted

Proponent: Anthony Floyd, City of Scottsdale, representing City of Scottsdale (afloyd@scottsdaleaz.gov)

2018 International Mechanical Code

Revise as follows

403.3.1.2 Exhaust ventilation. Exhaust airflow rate shall be provided in accordance with the requirements of Table 403.3.1.1. Outdoor air introduced into a space by an exhaust system shall be considered as contributing to the outdoor airflow required by Table 403.3.1.1. Intermittently operated exhaust fans in toilet rooms, bathrooms and shower rooms shall be provided with a delay-shutoff timer, occupant sensor or humidity sensor control.

Reason: This code change provides compliance options for intermittently operated exhaust fans when the facility is occupied (occupant or humidity sensor activation) and for a limited period of time after the user leaves the room (delay timer, occupant or humidity sensor deactivation). Delay timer, occupant and humidity sensor exhaust fan controls are a consistent and effective means of removing moisture and pollutants from toilet, bath and shower facilities in private dwellings and public spaces in accordance with IMC Table 403.3.1.1.

The humidity level in a restroom or shower facility can be a perfect breeding ground for mold, mildew and micro-organisms that can negatively impact occupant health. Excess moisture has tremendous potential for damaging a building. It cracks and peels paint, ruins gypsum wallboard, causes exterior paint failure, warps doors and rusts cabinets and fixtures. Without control, it can even cause deterioration of joists and framing. As it condenses on windows, walls, ceilings and cabinets, it attracts dirt. It encourages mildew on tile grout and generally provides an environment for increased bacterial growth.

According to the Home Ventilation Institute, an intermittently operated exhaust fan needs to run at least 20 minutes after each shower to sufficiently remove moisture from an average size bathroom. Exhaust systems reduce the risk of mildew and mold growth which is a sanitation and durability concern in dwellings and public spaces, regardless of climate. Delay timer, occupant and humidity sensor controlled exhaust fans are more effective than a manually operated fan or an operable window that is usually left closed during the winter and summer months of the year.

Automatic shut-off controls help to ensure exhaust fan operates when toilet, bath and shower facilities are in use and for a limited period of time after the user leaves the room. Automatic controls also save energy by ensuring fans don't unnecessarily run after removal of moisture and pollutants.

Bibliography:

1. ASHRAE 62.1-2016 Ventilation and Acceptable Indoor Air Quality
2. Home Ventilating Institute - <http://www.hvi.org/publications/HowMuchVent.cfm>

Cost Impact: The code change proposal will increase the cost of construction. A basic dial delay timer switch costs \$15, a basic occupant sensor costs \$10 and a basic humidity sensor switch costs \$46. Timer, occupant and moisture controlled exhaust fans reduce the potential of making costly moisture damage repairs to correct problems that is easy to avoid with sufficient local exhaust.

M23-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This would apply to rooms in single family dwellings, but, the code does not require fans in these rooms. How long must the fan operate? Operation details are missing. (Vote 7-4)

Assembly Action:

None

M23-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing City of Scottsdale (jbenigneer@aol.com); Anthony Floyd, City of Scottsdale, representing City of Scottsdale (afloyd@scottsdaleaz.gov)requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

403.3.1.2 Exhaust ventilation. Exhaust airflow rate shall be provided in accordance with the requirements of Table 403.3.1.1. Outdoor air introduced into a space by an exhaust system shall be considered as contributing to the outdoor airflow required by Table 403.3.1.1. Intermittently operated exhaust fans in ~~toilet rooms~~, bathrooms and shower rooms shall be provided with a delay-shutoff timer, occupant sensor or humidity sensor control. The delay-shutoff timer or occupant sensor control shall operate the exhaust fan for not less than 20-minutes after activation.

Commenter's Reason: This was a good change that is necessary to control humidity and odor. It is well established that an exhaust fan needs an additional 20 minutes to evacuate the humidity or odor after the use of the bathroom or shower room.

The Committee stated that fans are not always required for bathrooms and shower rooms. While fans may not be required in these rooms, this section addresses when a fan is installed. Therefore, the requirement is appropriate. The modification addresses the length of time required for the operation of the fan.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction There is a slight increase in cost for a time delay switch to be installed.

Public Comment 2:

Proponent: David Collins, representing International Code Council Sustainability, energy and high performance code action committee (sehpcac@iccsafe.org)requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

403.3.1.2 Exhaust ventilation. Exhaust airflow rate shall be provided in accordance with the requirements of Table 403.3.1.1. Outdoor air introduced into a space by an exhaust system shall be considered as contributing to the outdoor airflow required by Table 403.3.1.1. Intermittently operated exhaust fans in ~~toilet rooms~~, bathrooms and shower rooms shall be provided with a delay-shutoff timer, occupant sensor or humidity sensor control. The delay-shutoff timer or occupied sensor control shall operate the exhaust fan for not less than 20 minutes after activation.

Commenter's Reason: This was a good proposed change that is necessary to control humidity and odor. It is well established that an exhaust fan needs and additional 20 minutes to evacuate the humidity or odor after the use of a bathroom, or shower room.

The Mechanical Committee stated that fans are not always required for bathrooms and shower rooms. While fans may not be required in these rooms, this section addresses when a fan is installed. Therefore, the requirement is appropriate. This modification addresses the length of time required for the operation of the fan.

This public comment was submitted by the ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors in July of 2011 to pursue opportunities and to improve and enhance assigned International Codes or portions thereof. Each year the SEHPCAC has historically held 3 open face-to face meetings and numerous Working Group meetings, conference calls and webinars. These meetings, conference calls and webinars are public and are convened to facilitate discussion and debate of proposed changes and public comments to the codes by members of the committee, as well as interested parties.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The increased cost of construction due to this code change and public comment is minor relative to total construction cost.

M23-18

M25-18

IMC: Table TABLE 403.3.1.1

Proposed Change as Submitted

Proponent: Connor Barbaree, ASHRAE, representing ASHRAE (cbarbaree@ashrae.org)

2018 International Mechanical Code

Revise as follows

**TABLE 403.3.1.1
MINIMUM VENTILATION RATES**

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY#/1000 FT² a	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT² a	EXHAUST AIRFLOW RATE CFM/FT² a
Correctional facilities				
Booking/waiting	50	7.5	0.06	—
Cells				
without plumbing fixtures	25	5	0.12	—
with plumbing fixtures ⁹	25	5	0.12	1.0
Day room	30	5	0.06	—
Dining halls (see "Food and beverage service")	—	—	—	—
Guard stations	15	5	0.06	—
Dry cleaners, laundries				
Coin-operated dry cleaner	20	15	—	—
Coin-operated laundries	20	7.5	0.12	—
Commercial dry cleaner	30	30	—	—
Commercial laundry	10	25 <u>5</u>	0.12	—
Storage, pick up	30	7.5	0.12	—
Education				
Art classroom ⁹	20	10	0.18	0.7
Auditoriums	150	5	0.06	—
Classrooms (ages 5-8)	25	10	0.12	—
Classrooms (age 9 plus)	35	10	0.12	—
Computer lab	25	10	0.12	—
Corridors (see "Public spaces")	—	—	—	—
Day care (through age 4)	25	10	0.18	—
Lecture classroom	65	7.5	0.06	—
Lecture hall (fixed seats)	150	7.5	0.06	—
Locker/dressing rooms ⁹	—	—	—	0.25
Media center	25	10	0.12	—
Multiuse assembly	100	7.5	0.06	—
Music/theater/dance	35	10	0.06	—
Science laboratories ⁹	25	10	0.18	1.0
Smoking lounges ^b	70	60	—	—
Sports locker rooms ⁹	—	—	—	0.5

Wood/metal shops ^g	20	10	0.18	0.5
Food and beverage service				
Bars, cocktail lounges	100	7.5	0.18	—
Cafeteria, fast food	100	7.5	0.18	—
Dining rooms	70	7.5	0.18	—
Kitchens (cooking) ^b	20	7.5	0.12	0.7
Hotels, motels, resorts and dormitories				
Bathrooms/toilet—private ^g	—	—	—	25/50 ^f
Bedroom/living room	10	5	0.06	—
Conference/meeting	50	5	0.06	—
Dormitory sleeping areas	20	5	0.06	—
Gambling casinos	120	7.5	0.18	—
Lobbies/prefunction	30	7.5	0.06	—
Multipurpose assembly	120	5	0.06	—
Offices				
Conference rooms	50	5	0.06	—
Main entry lobbies	10	5	0.06	—
Office spaces	5	5	0.06	—
Reception areas	30	5	0.06	—
Telephone/data entry	60	5	0.06	—
Private dwellings, single and multiple				
Garages, common for multiple units ^b	—	—	—	0.75
Kitchens ^b	—	—	—	25 50/100 ^f
Living areas ^c	Based on number of bedrooms. First bedroom, 2; each additional bedroom, 1	0.35 ACH but not less than 15 cfm/person	—	—
Toilet rooms and bathrooms ^g	—	—	—	20 25/50 ^f
Public spaces				
Corridors	—	—	0.06	—
Courtrooms	70	5	0.06	—
Elevator car	—	—	—	1.0
Legislative chambers	50	5	0.06	—
Libraries	10	5	0.12	—
Museums (children's)	40	7.5	0.12	—
Museums/galleries	40	7.5	0.06	—
Places of religious worship	120	5	0.06	—
Shower room (per shower head) ^g	—	—	—	50/20 ^f
Smoking lounges ^b	70	60	—	—
Toilet rooms — public ^g	—	—	—	50/70 ^e

Retail stores, sales floors and showroom floors				
Dressing rooms	—	—	—	0.25
Mall common areas	40	7.5	0.06	—
Sales	15	7.5	0.12	—
Shipping and receiving	2	10	0.12	—
Smoking lounges ^b	70	60	—	—
Storage rooms	—	—	0.12	—
Warehouses (see “Storage”)	—	10	0.06	—
Specialty shops				
Automotive motor-fuel dispensing stations ^b	—	—	—	1.5
Barber	25	7.5	0.06	0.5
Beauty salons ^b	25	20	0.12	0.6
Nail salons ^{b, h}	25	20	0.12	0.6
Embalming room ^b	—	—	—	2.0
Pet shops (animal areas) ^b	10	7.5	0.18	0.9
Supermarkets	8	7.5	0.06	—
Sports and amusement				
Bowling alleys (seating areas)	40	10	0.12	—
Disco/dance floors	100	20	0.06	—
Game arcades	20	7.5	0.18	—
Gym, stadium, arena (play area)	7	20	0.18	—
Health club/aerobics room	40	20	0.06	—
Health club/weight room	10	20	0.06	—
Ice arenas without combustion engines	—	—	0.30	0.5
Spectator areas	150	7.5	0.06	—
Swimming pools (pool and deck area)	—	—	0.48	—
Storage				
Repair garages, enclosed parking garages ^{b,d}	—	—	—	0.75
Refrigerated warehouses/freezers	—	10	—	0.75
Warehouses	—	10	0.06	—
Theaters				
Auditoriums (see “Education”)	—	—	—	—
Lobbies	150	5	0.06	—
Stages, studios	70	10	0.06	—
Ticket booths	60	5	0.06	—
Transportation				
Platforms	100	7.5	0.06	—
Transportation waiting	100	7.5	0.06	—

Workrooms				
Bank vaults/safe deposit	5	5	0.06	—
Computer (without printing)	4	5	0.06	—
Copy, printing rooms	4	5	0.06	0.5
Darkrooms	—	—	—	1.0
Meat processing ^c	10	15	—	—
Pharmacy (prep. area)	10	5	0.18	—
Photo studios	10	5	0.12	—

For SI: 1 cubic foot per minute = 0.0004719 m³/s, 1 ton = 908 kg, 1 cubic foot per minute per square foot = 0.00508 m³/(s • m²), °C = [(°F) -32]/1.8, 1 square foot = 0.0929 m².

- a. Based on *net occupiable floor area*.
- b. Mechanical exhaust required and the recirculation of air from such spaces is prohibited. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1, Item 3).
- c. Spaces unheated or maintained below 50°F are not covered by these requirements unless the occupancy is continuous.
- d. Ventilation systems in enclosed parking garages shall comply with Section 404.
- e. Rates are per water closet or urinal. The higher rate shall be provided where the exhaust system is designed to operate intermittently. The lower rate shall be permitted only where the exhaust system is designed to operate continuously while occupied.
- f. Rates are per room unless otherwise indicated. The higher rate shall be provided where the exhaust system is designed to operate intermittently. The lower rate shall be permitted only where the exhaust system is designed to operate continuously while occupied.
- g. Mechanical exhaust is required and recirculation from such spaces is prohibited except that recirculation shall be permitted where the resulting supply airstream consists of not more than 10 percent air recirculated from these spaces. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1, Items 2 and 4).
- h. For nail salons, each manicure and pedicure station shall be provided with a *source capture system* capable of exhausting not less than 50 cfm per station. Exhaust inlets shall be located in accordance with Section 502.20. Where one or more required source capture systems operate continuously during occupancy, the exhaust rate from such systems shall be permitted to be applied to the exhaust flow rate required by Table 403.3.1.1 for the nail salon.

Reason: This proposal seeks to update the existing ventilation rate table in the IMC. Standard 62.1 is the source material for this table, and this updates table 403.3.1.1 to match the appropriate ventilation rates in 62.1-2016.

Bibliography: ASHRAE Standard 62.1-2016

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This will not increase the cost of construction.

M25-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This update is based on technical justification from the ASHRAE process and makes the table consistent with the exhaust rates in Section 403.3.2.3. (Vote 11-0)

Assembly Action:

None

M25-18

Individual Consideration Agenda

Public Comment 1:

Proponent: DONALD SURRENA, NATIONAL ASSOCIATION OF HOME BUILDERS, representing National Association of Home Builders (dsurrena@nahb.org) requests Disapprove.

Commenter's Reason: There was no technical data presented to support these increases. This proposal doubles the requirements for kitchens and increases the requirements by 25% for bathrooms. Just because the criteria changes in ASHRAE 62.2 does not indicate there has been a problem in residential construction. The proponent has given no technical data to show there is a need for this increase.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. By changing the ventilation rates for kitchen and bathroom ventilation the whole house ventilation rate will also increase requiring further design and larger equipment, thereby increasing the cost of construction.

M25-18

M27-18

IMC: 403.3.1.1, 403.3.1.1.1, 403.3.1.1.2, 403.3.1.1.2.1, 403.3.1.1.2.2, 403.3.1.1.2.3, 403.3.1.1.2.4 , 403.3.1.1.2.4.1, 403.3.1.1.2.4.2, 403.3.1.1.2.4.3, 403.3.1.1.2.5, 403.3.1.1.2.6, 403.3.1.1.2.7

Proposed Change as Submitted

Proponent: Michael McFarland, enVerid Systems, representing enVerid Systems (mmcfarland@enverid.com)

2018 International Mechanical Code

Add new text as follows

403.3.1.1 Outdoor Airflow Rate. The outdoor air flow rate shall comply with the ventilation rate procedure specified in Section 403.3.1.1.1 or the indoor air quality procedure specified in Section 403.3.1.1.2.

Revise as follows

403.3.1.1-403.3.1.1.1 Outdoor airflow rate-Ventilation Rate Procedure. Ventilation systems shall be designed to have the capacity to supply the minimum outdoor airflow rate, determined in accordance with this section. In each occupiable space, the ventilation system shall be designed to deliver the required rate of outdoor airflow to the *breathing zone*. The occupant load utilized for design of the ventilation system shall be not less than the number determined from the estimated maximum occupant load rate indicated in Table ~~403.3.1.1-403.3.1.1.1~~. Ventilation rates for occupancies not represented in Table ~~403.3.1.1-403.3.1.1.1~~ shall be those for a listed *occupancy* classification that is most similar in terms of occupant density, activities and building construction; or shall be determined by an *approved* engineering analysis. The ventilation system shall be designed to supply the required rate of *ventilation air* continuously during the period the building is occupied, except as otherwise stated in other provisions of the code.

With the exception of smoking lounges, the ventilation rates in Table ~~403.3.1.1-403.3.1.1.1~~ are based on the absence of smoking in occupiable spaces. Where smoking is anticipated in a space other than a smoking lounge, the ventilation system serving the space shall be designed to provide ventilation over and above that required by Table ~~403.3.1.1-403.3.1.1.1~~ in accordance with accepted engineering practice.

Exception: The occupant load is not required to be determined based on the estimated maximum occupant load rate indicated in Table ~~403.3.1.1-403.3.1.1.1~~ where *approved* statistical data document the accuracy of an alternate anticipated occupant density.

Add new text as follows

403.3.1.1.2 Indoor Air Quality Procedure. Ventilation systems shall be designed to have the capacity to supply the breathing zone outdoor airflow rate determined in accordance with Sections 403.3.1.1.2.1 through 403.3.1.1.2.7.

403.3.1.1.2.1 Contaminant Sources. Each contaminant of concern, for purposes of the design, shall be identified. For each contaminant of concern, indoor sources and outdoor sources shall be identified, and the emission rate for each contaminant of concern from each source shall be determined. Where two or more contaminants of concern target the same organ system, these contaminants shall be considered to be a contaminant mixture.

403.3.1.1.2.2 Contaminant Concentration. For each contaminant of concern, a concentration limit and its corresponding exposure period and an appropriate reference to a cognizant authority shall be specified. For each contaminant mixture of concern, the ratio of the concentration of each contaminant to its concentration limit shall be determined, and the sum of these ratios shall be not greater than one.

Exception: Consideration of odors in determining concentration limits shall not be required.

403.3.1.1.2.3 Perceived Indoor Air Quality. The design level of indoor air acceptability shall be specified in terms of the percentage of building occupants, visitors, or both expressing satisfaction with perceived IAQ.

403.3.1.1.2.4 Design Approach. Zone and system outdoor airflow rates shall be the larger of those determined in accordance with Section 403.3.1.1.2.4.1 and either Section 403.3.1.1.2.4.2 or 403.3.1.1.2.4.3, based on emission rates, concentration limits, and other relevant design parameters.

403.3.1.1.2.4.1 Mass Balance Analysis. Using a steady-state or dynamic mass-balance analysis, the minimum outdoor airflow rates required to achieve the concentration limits specified in Section 403.3.1.1.2.2 shall be determined for each contaminant or contaminant mixture of concern within each zone served by the system.

403.3.1.1.2.4.2 Subjective Evaluation. Using a subjective occupant evaluation conducted in the completed building, the minimum outdoor airflow rates required to achieve the level of

acceptability specified in Section 403.3.1.1.2.3 shall be determined within each zone served by the system.

403.3.1.1.2.4.3 Similar Zone. The minimum outdoor airflow rates shall be not less than those found in accordance with Section 403.3.1.1.2.4.2 for a substantially similar zone.

403.3.1.1.2.5 Air cleaning. Based on contaminant of concern sources and concentrations, particulate or gaseous air cleaning might be specified. Particulate matter filters and air cleaners shall report a third-party efficiency reporting value (MERV) in accordance with ASHRAE Standard 52.2. Gaseous scrubbers and air cleaners shall report a third-party efficiency test for the contaminants of concern in accordance with an approved standard and a third-party certification of no by-products production such as ozone, formaldehyde, and other VOCs. Devices that add pollutants to the indoor air, even in small quantities, are prohibited under this procedure.

403.3.1.1.2.6 Combined IAQ Procedure and Ventilation Rate Procedure. Where the IAQ Procedure is used in conjunction with the Ventilation Rate Procedure and applied to a zone or system, the Ventilation Rate Procedure shall be used to determine the required zone minimum outdoor airflow, and the IAQ Procedure shall be used to determine the additional outdoor air or air cleaning necessary to achieve the concentration limits of the contaminants and contaminant mixtures of concern.

403.3.1.1.2.7 Documentation. Where the IAQ Procedure is used, the following information shall be included in the design documentation: the contaminants and contaminant mixtures of concern considered in the design process, the sources and emission rates of the contaminants of concern, the concentration limits and exposure periods and the references for these limits, and the analytical approach used to determine ventilation rates and air-cleaning requirements. The contaminant monitoring and occupant or visitor evaluation plans shall also be included in the documentation.

Reason: This proposal is to add ASHRAE 62.1 Indoor Air Quality Procedure (IAQP) as an alternative to determining outside airflow rates for mechanical ventilation (in buildings *other than* R-2, R-3, and R-4 three stories or less). Currently, the IMC Section 403 for mechanical ventilation only allows for ASHRAE 62.1 Ventilation Rate Procedure, as outlined in IMC 2018, Section 403.3.1.1. In this proposal, "403.3.1.1 Outdoor Airflow Rate" would become "403.3.1.1.1 Ventilation Rate Procedure" and all of its subsections would remain unchanged (except subsection numbering would change, for example, the first subsection would be 403.3.1.1.1.1, and so on, but these changes were not submitted to avoid confusion in the proposal). A new section "403.3.1.1.2 Indoor Air Quality Procedure" is added and uses the ASHRAE 62.1 IAQP text. In addition, Section "403.3.1.1 Outdoor Airflow Rate" will now simply introduce the two ventilation compliance options - 403.3.1.1.1 Ventilation Rate Procedure and 403.3.1.1.2 Indoor Air Quality Procedure.

The reasoning for adding ASHRAE 62.1 IAQP for determining outdoor airflow rates is as follows:

ASHRAE 62.1 is generally considered a leading authority on the topic of building ventilation. The standard has had the Indoor Air Quality Procedure (IAQP) since 1981, and has refined and improved it over the years. Adoption of this procedure is rapidly increasing among building owners, large corporations, property management firms, universities, and government institutions in the US and internationally (examples include: Apple, Google, Cisco, Morgan Stanley, Boston Properties, Hines, CBRE, ArcBest, United States GSA, United States American Embassy School, Univ of Miami, Univ of Tennessee, Harvard University, LSU, Diplomat Resorts, Air Liquide, Azrieli, Bank Leumi, China Europe International Business School, Elbit, and others). In addition, major mechanical engineering firms (MEP firms) have adopted the technology in their HVAC designs for clients, including Syska Hennessey, AHA, TLC Engineering, Haltom Engineering, and HRVAC Consulting Engineering, among others.

The rise in adoption is primarily due to new sorbent-based air cleaning technologies that address all molecular contaminants of concern inside buildings, and therefore can be used to clean and recycle indoor air so that less outside air is required for ventilation. There are several significant health and energy efficiency benefits to using less outside air:

1) "Fresh air" is no longer so fresh in big cities and near highways and airports. Studies show that living and working near a highway dramatically increases your risk of cardiovascular disease due to the higher concentrations of ultrafine particles and gases from automobiles that pass through normal particle filters. In addition, many major metropolitan areas frequently have high ozone action days as well as generally high particle pollution. Using typical mechanical ventilation rates specified in the IMC, many buildings replace their entire volume of indoor air with outside air every 1-2 hours, and therefore expose occupants to high volumes of these pollutants. With IAQP, air cleaning

technologies can be taken into consideration for managing indoor contaminant concentrations and lower outside airflow may be possible, which could reduce the influx of outdoor pollutants. Furthermore, some sorbent-based air cleaning technologies can remove outdoor pollutants such as ozone which are not captured by typical outside air filtration.

2) Energy codes are rightfully becoming more stringent, but are more and more difficult to achieve. Finding economical means to meet these energy codes is important. In addition, indoor environment quality needs to be maintained. According to the US EIA, HVAC accounts for nearly half of the energy consumption in US commercial buildings. In many climates, heating and/or cooling outside air ventilation can account for 30-50% of total HVAC energy consumption. When using IAQP with indoor air cleaning, outside airflow rates generally can be decreased quite significantly - often 60-70%, resulting in a 20-30% savings in annual HVAC energy consumption. This is a significant savings and is incremental to most other energy saving techniques.

3) Although building codes are followed at design and build stages, they are not typically followed in building operations. A high percentage of buildings are being operated with zero ventilation during summer and winter. In a survey to members of the International Facility Management Association (IFMA), 62% of them admitted to closing the outside air damper. The real percentage in the field is likely higher since those who close the outside air damper may have chosen not to complete the survey. There are numerous reasons for shutting off ventilation in a building: a) facility managers trying to reduce energy consumption due to financial incentives awarded for reducing utility bills, b) avoiding complaints when HVAC systems cannot manage the extra load introduced by outside air on extreme temperature days, c) HVAC designers will typically design systems to meet the load for 99% of the hours in the year, but this means roughly 90 hours - or 3 hours everyday for 30 days of a hot summer - require more cooling (or heating) capacity than the system can handle and therefore causing facility managers to simply close the outside air damper for the entire summer (or winter), and a very common situation is d) improperly positioned "freeze stats" that trigger the outside airflow to be closed off when temperatures reach 35 degrees F or lower. The best solution would be better enforcement of codes after occupancy. However, if these buildings had used IAQP with indoor air cleaning, at least the air cleaning would still be occurring even if outside airflow has been closed off and occupants would have better indoor air quality.

4) Lastly, the most significant reduction in HVAC load is on peak days. Thus, peak capacity of HVAC equipment can often be reduced by 20%, or even as high as 40%. This presents a significant capital expense savings in the construction or renovation of buildings, and in most designs, the addition of the sorbent-based air cleaning products will cause a net savings overall.

For all these reasons, the IMC should catch up to the ASHRAE 62.1 standard and include the Indoor Air Quality Procedure. The proposal uses this procedure almost verbatim, plus one additional section requiring filters and air cleaners to report third-party efficiency tests based on ASHRAE standardized tests 52.2 and 145.2. This section is added to ensure that the filters and air cleaners have proved their effectiveness for all contaminants of concern.

Bibliography: ASHRAE 62.1 - 2016, Section 6.3 and Appendices C and E.

Cost Impact: The code change proposal will decrease the cost of construction. The ASHRAE 62.1 Indoor Air Quality Procedure will likely be used when it can reduce the cost of construction, and this should occur in most sites due to reduction in chillers, AHU capacity, coolant piping size, outside air duct sizes, relief air ducts, and boiler/heating capacity.

M27-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: It would difficult for code officials to determine compliance with such a complex IAQ procedure. Compliance would have to be demonstrated by engineers. This would create a possible conflict with the action taken on M20-18. (Vote 10-1)

Assembly Action:

None

M27-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Connor Barbaree, representing ASHRAE (cbarbaree@ashrae.org) requests As Modified by This Public Comment.

Replace as follows:

2018 International Mechanical Code

403.2 Outdoor air required. The minimum outdoor airflow rate shall be determined in accordance with Section 403.3 or in accordance with the Indoor Air Quality Procedure prescribed in Section 6.3 of ASHRAE Standard 62.1..

Exception: Where the *registered design professional* demonstrates that an engineered ventilation system design will prevent the maximum concentration of contaminants from exceeding that obtainable by the rate of outdoor air ventilation determined in accordance with Section 403.3, the minimum required rate of outdoor air shall be reduced in accordance with such engineered system design.

Commenter's Reason: This proposal is to clarify the existing mechanical code and specifically Section 403.2. Currently, code enforcement officials must have a copy of the "Commentary" to the International Mechanical Code to know that the "Exception" in Section 403.2 is primarily referring to the Indoor Air Quality Procedure prescribed in ASHRAE 62.1 (please see the attachment, which is a copy of p4-9 from the 2015 International Mechanical Code Commentary book). The Commentary explains that this "Exception" is referring to ASHRAE 62.1 Indoor Air Quality Procedure.

To make the Code easier to use and easier to enforce, we propose that Section 403.2 make a direct reference to the Indoor Air Quality Procedure prescribed in ASHRAE 62.1, without relying on the Commentary. In other words, the Indoor Air Quality Procedure is stated within the body of the IMC, thereby not limiting its appearance to only within the Commentary portion of the Code.

Please note that the original proposal had the same intent, but added all of the text of the Indoor Air Quality Procedure from ASHRAE Standard 62.1 into new and existing Code Sections. This was deemed as complex by the International Mechanical Code, as well as would violate ASHRAE copyright permissions, and so we have revised this proposal appropriately by simply referencing ASHRAE 62.1.

Bibliography: ANSI/ASHRAE Standard 62.1

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This gives the user of the code the option to use a different path and therefore will not increase the cost of construction.

Public Comment 2:

Proponent: Michael McFarland, representing enVerid Systems (mmcfarland@enverid.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Mechanical Code

403.2 Outdoor air required. The minimum outdoor airflow rate shall be determined in accordance with Section 403.3.

Exception: Where the *registered design professional* demonstrates that an engineered ventilation system design, such as in accordance with the Indoor Air Quality Procedure prescribed in Section 6.3 of ASHRAE Standard 62.1, will prevent the maximum concentration of contaminants from exceeding that obtainable by the rate of outdoor air ventilation determined in accordance with Section 403.3, the minimum required rate of outdoor air shall be reduced in accordance with such engineered system design.

Commenter's Reason: The International Mechanical Code Committee felt that the original proposal was too complex. I have modified this proposal appropriately by providing a much simpler change to the code without changing the overall intent of the proposal. The Code Committee also thought the original proposal would conflict with proposal M20, but this new modification makes no changes to the sections addressed in M20. In addition, M20 is specific to R2, R3, and R4 buildings, and this proposal does not apply to those.

This modified proposal makes no change to what is or is not compliant, nor does it change code enforcement, but it does provide more clarity to code officials and engineers. Currently, Section 403.2 in the IMC includes a paragraph labeled "Exception". This paragraph refers to an "engineered ventilation solution" but provides no guidance as to what that is. The only clarification currently provided is in the Commentary to the Code, where it explains that an "engineered ventilation solution" is the Indoor Air Quality Procedure prescribed in ASHRAE 62.1 (please see the attachment, which is a copy of p4-9 from the 2015 International Mechanical Code Commentary book).

To make the Code easier to use and easier to enforce, we propose that Section 403.2 make a direct reference to the Indoor Air Quality Procedure prescribed in ASHRAE 62.1, without relying solely on the Commentary. In other words, the Indoor Air Quality Procedure would be stated within the body of the IMC, thereby not limiting its appearance to only within the Commentary portion of the Code. In this way, code officials and code users will know what is meant by an "engineered ventilation solution."

Bibliography: The attachment is from the following:

2015 INTERNATIONAL MECHANICAL CODE® COMMENTARY, INTERNATIONAL CODE COUNCIL, 2015, p4-9.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal simply provides a clarification in the Code, and does not create any change to what is or is not compliant to the Code. Thus, there is no change to the cost of construction.

M27-18

M32-18

IMC: 202, 403.3.2.1

Proposed Change as Submitted

Proponent: Craig Conner, representing self (craig.conner@mac.com); Joseph Lstiburek, representing Self (joe@buildingscience.com)

2018 International Mechanical Code

Add new definition as follows

BALANCED VENTILATION. Any combination of concurrently operating mechanical exhaust and mechanical supply whereby the total mechanical exhaust airflow rate and the total mechanical supply airflow rate are substantially the same.

Revise as follows

403.3.2.1 Outdoor air for dwelling units. An outdoor air ventilation system consisting of a mechanical exhaust system, supply system or combination thereof shall be installed for each dwelling unit. Local exhaust or supply systems, including outdoor air ducts connected to the return side of an air handler, are permitted to serve as such a system. The outdoor air ventilation system shall be designed to provide the required rate of outdoor air continuously during the period that the building is occupied. The minimum continuous outdoor airflow rate shall be determined in accordance with Equation 4-9.

(Equation 4-9)

$$Q_{OA} = 0.01 A_{floor} + 7.5(N_{br} + 1)$$

where:

Q_{OA} = outdoor airflow rate, cfm

A_{floor} = conditioned floor area, ft²

N_{br} = number of bedrooms; not to be less than one

Exception-Exceptions:

1. The outdoor air ventilation system is not required to operate continuously where the system has controls that enable operation for not less than 1 hour of each 4-hour period. The average outdoor air flow rate over the 4-hour period shall be not less than that prescribed by Equation 4-9.
2. The minimum mechanical ventilation rate determined in accordance with Equation 4.9 shall be reduced by 25%, provided that all of the following conditions apply:
 - 2.1. A ducted system supplies recirculated air directly to each bedroom and the largest common area.
 - 2.2. For continuously operating systems, not less than 70% of the air volume in the conditioned space is recirculated each hour through the ducted system, or for intermittently operated systems, an equivalent air recirculation is provided during each four-hour period.
 - 2.3. The whole-house ventilation system is a balanced ventilation system.

Reason: This code change credits the better performance of whole-building dilution ventilation systems that are distributed, mixed and balanced.

Distributed, mixed and balanced ventilation is more effective at controlling indoor contaminants than typical exhaust ventilation that provides no distribution and mixing. Exhaust ventilation can draw in contaminants from garages, attics, crawlspaces, soil and wall assemblies in single-family detached and multi-family construction as well as from neighboring units in multi-family construction. Ventilation that does not provide distribution and mixing can allow high levels of contaminant concentration in various spaces within houses, especially rooms where people spend a lot of time with doors closed such as bedrooms. Distribution and mixing homogenizes interior conditions reducing potentially harmful high intermittent contaminant concentrations in interior spaces. There are multiple ways to get to 70% mixing; for example, a recirculation mode that ensures that a central space conditioning system fan operates at least 20 minutes per hour would often meet the criteria for 70% air recirculation.

This code change does not penalize exhaust ventilation, it justifiably credits balanced ventilation. Exhaust only ventilation should not be given the same indoor air quality credit since typical exhaust ventilation systems result in less air change than balanced ventilation systems and do not provide as effective control of contaminants.

Cost Impact: The code change proposal will decrease the cost of construction. The lower required ventilation rate recognizes that more effective ventilation requires less ventilation. This option could lower the cost of both construction and operation.

M32-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The word "substantially" in the definition is vague. The "largest common area" in exception 2, part 2.1 is not defined. (Vote 6-5)

Assembly Action:

None

M32-18

Individual Consideration Agenda

Public Comment 1:

Proponent: David Collins representing International Code Council Sustainability, energy and high performance Code Action Committee (SEHPCAC@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

403.3.2.1 Outdoor air for dwelling units. An outdoor air ventilation system consisting of a mechanical exhaust system, supply system or combination thereof shall be installed for each dwelling unit. Local exhaust or supply systems, including outdoor air ducts connected to the return side of an air handler, are permitted to serve as such a system. The outdoor air ventilation system shall be designed to provide the required rate of outdoor air continuously during the period that the building is occupied. The minimum continuous outdoor airflow rate shall be determined in accordance with Equation 4-9.

Q_{OA} =
0.01A_{floor} + 7.5(
N_{br} +
1)
where:

(Equation 4-9)

Q_{OA} = outdoor airflow rate, cfm

A_{floor} = conditioned floor area, ft²

N_{br} = number of bedrooms; not to be less than one

Exceptions:

- period. outdoor air ventilation system is not required to operate continuously where the system has controls that enable operation for not less than 1 hour of each 4-hour period. The average outdoor air flow rate over the 4-hour period shall be not less than that prescribed by Equation 4-9.
2. The minimum mechanical ventilation rate determined in accordance with Equation 4.9 shall be reduced by 25%, provided that all of the following conditions apply:
 - 2.1. A ducted system supplies recirculated air directly to each bedroom and the largest of the great room, family room, dining room or similar common area areas.
 - 2.2. For continuously operating systems, not less than 70% of the air volume in the conditioned space is recirculated each hour through the ducted system, or for intermittently operated systems, an equivalent air recirculation is provided during each four-hour period.
 - 2.3. The whole-house ventilation system is a balanced ventilation system.

BALANCED VENTILATION. Any combination of concurrently operating mechanical exhaust and mechanical supply whereby the total mechanical exhaust airflow rate is within 10 percent of the total mechanical supply airflow rate.

Commenter's Reason: This public comment addresses the specific concerns expressed by the Hearing Committee. 10 percent adequately accommodates the discrepancies in the capacities of airflow measurement equipment.

This public comment was submitted by the ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors in July of 2011 to pursue opportunities and to improve and enhance assigned International Codes or portions thereof. Each year the SEHPCAC has historically held 3 open face-to face meetings and numerous Working Group meetings, conference calls and webinars. These meetings, conference calls and webinars are public and are convened to facilitate discussion and debate of proposed changes and public comments to the codes by members of the committee, as well as interested parties.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. The lower required ventilation rate recognizes that more effective ventilation requires less ventilation. This option could lower the cost of both construction and operation.

Public Comment 2:

Proponent: Craig Conner, representing self (craig.conner@mac.com); Joseph Lstiburek, representing self (joe@buildingsscience.com) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Mechanical Code

BALANCED VENTILATION. Any combination of concurrently operating mechanical exhaust and mechanical supply whereby the total mechanical exhaust airflow rate ~~and is within 10% of the total mechanical supply airflow rate~~ ~~are substantially the same.~~

403.3.2.1 Outdoor air for dwelling units. An outdoor air ventilation system consisting of a mechanical exhaust system, supply system or combination thereof shall be installed for each dwelling unit. Local exhaust or supply systems, including outdoor air ducts connected to the return side of an air handler, are permitted to serve as such a system. The outdoor air ventilation system shall be designed to provide the required rate of outdoor air continuously during the period that the building is occupied. The minimum continuous outdoor airflow rate shall be determined in accordance with Equation 4-9.

QOA=
0.01A_{floor}+7.5(
N_{br} +
1)

$$Q_{OA} = 0.01A_{\text{floor}} + 7.5(N_{br} + 1)$$

where:

(Equation 4-9)

Q_{OA} = outdoor airflow rate, cfm

A_{floor} = ~~conditioned~~ floor area, ft²

N_{br} = number of bedrooms; not to be less than one

Exceptions:

1. The outdoor air ventilation system is not required to operate continuously where the system has controls that enable operation for not less than 1 hour of each 4-hour period. The average outdoor air flow rate over the 4-hour period shall be not less than that prescribed by Equation 4-9..
2. The minimum mechanical ventilation rate determined in accordance with Equation 4.9 shall be reduced ~~by 25%~~ by 30%, provided that ~~all~~ both of the following conditions apply:
 - 2.1. A ducted system supplies ~~recirculated ventilation air~~ directly to each bedroom and ~~the largest common area.~~
 - 2.2. ~~For continuously operating systems, not less than 70% of the air volume in the conditioned space is recirculated each hour through the ducted system, or for intermittently operated systems, an equivalent air recirculation is provided during each four hour period to one or more of the following rooms:~~
 - 2.1.1. Living room
 - 2.1.2. Dining room
 - 2.1.3. Kitchen.
 - 2.2.2-3. The whole-house ventilation system is a balanced ventilation system.

Commenter's Reason: The words "substantially the same" are made less subjective by substituting "within 10%", as requested by the committee.

Following the verbal recommendation of the committee, the word "conditioned" was eliminated from "conditioned floor area" .

The new 2.1 better describes "the largest common area" as "the living room, dining room or kitchen", meeting the committee request.

The text of exception 2.2 was deleted because the new 2.1 made it redundant and because the previous language of 2.2 was complicated.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This modification provides potentially reduced construction and operating costs to those who choose to use balanced ventilation.

M32-18

M33-18

IMC: 403.3, ASHRAE

Proposed Change as Submitted

Proponent: Mike Moore, representing The Home Ventilating Institute (mmoore@newportventures.net)

2018 International Mechanical Code

Revise as follows

403.3 Outdoor air and local exhaust airflow rates. Group R-2, R-3 and R-4 occupancies three stories and less in height above grade plane shall be provided with outdoor air and local exhaust in accordance with Section 403.3.2-~~or~~ ASHRAE 62.2. Other buildings intended to be occupied shall be provided with outdoor air and local exhaust in accordance with Section 403.3.1.

Add new standard(s) follows

ASHRAE

ASHRAE
1791 Tullie Circle NE
Atlanta GA 30329

62.2-2016:

Ventilation and Acceptable Indoor Air Quality in Residential Buildings with Addenda b, d, k, l, q, and s

Reason: This proposed modification would provide ventilation system designers/specifiers of low-rise dwelling units with the OPTION of using ASHRAE Standard 62.2 to comply with the ventilation requirements of the IMC without requiring designers/specifiers to use the standard. ASHRAE 62.2 is the ANSI standard for establishing minimum acceptable indoor air quality for dwelling units. There are several reasons that designers/specifiers may want to use ASHRAE 62.2 instead of the IMC for compliance, including: greater flexibility for specifying climate-appropriate ventilation controls, ability to achieve energy and cost savings for homeowners by shifting operation of the ventilation system to times when ambient temperature and humidity are favorable, flexibility to specify innovative systems that can be demonstrated to provide equivalent exposure to pollutants, ability to down-size and save money on balanced ventilation equipment versus what may be required by the code, and 62.2's use by code-plus programs such as ENERGY STAR and LEED.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Costs of compliance with 62.2 versus alternative compliance paths will vary based on the application. This proposal gives builders the OPTION of using 62.2, meaning there will be no required increase or decrease in the cost of construction.

M33-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval was based on the proponent's published reason statement. (Vote 9-2)

Assembly Action:

None

M33-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Craig Conner, representing self (craig.conner@mac.com) requests Disapprove.

Commenter's Reason: ASHRAE 62.2-2016 is not a usable document for codes. It is overly complex and contains several questionable sections. All residential proposals for including 62.2 were disapproved and there is currently not reference to ASHRAE 62.2 in the I-codes.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Parts of ASHRAE 62.2-2016 would be more costly. Parts are difficult to use and would be more costly to apply. Enforcing parts of ASHRAE 62.2-2016 would be difficult as this would be the only reference in the I-codes. It becomes another document for code staff to read. Even as an option it adds complexity to code enforcement. Since it is an option, perhaps it could be judged neutral on costs.

M33-18

M34-18

IMC: 501.2, 504.1, 505.3,

Proposed Change as Submitted

Proponent: Guy McMann, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcman@jeffco.us)

2018 International Mechanical Code

Revise as follows

501.2 Independent system required. Single or combined mechanical exhaust systems for environmental air shall be independent of all other exhaust systems. Dryer, ~~domestic kitchen and hazardous~~ exhaust shall be independent of all other systems. Type I exhaust systems shall be independent of all other exhaust systems except as provided in Section 506.3.5. Single or combined Type II exhaust systems for food-processing operations shall be independent of all other exhaust systems. ~~Kitchen Commercial kitchen~~ exhaust systems shall be constructed in accordance with ~~Section 505 for domestic cooking operations and Sections 506 through 509, for commercial cooking operations.~~

504.1 Installation. Clothes dryers shall be exhausted in accordance with the manufacturer's instructions. Dryer exhaust systems shall ~~be independent of all other systems and shall~~ convey the moisture and any products of combustion to the outside of the building.

Exception: This section shall not apply to listed and labeled condensing (ductless) clothes dryers.

505.3 Exhaust ducts. Domestic cooking exhaust equipment shall discharge to the outdoors through sheet metal ducts constructed of galvanized steel, stainless steel, aluminum or copper. Such ducts shall have smooth inner walls, shall be air tight, ~~and shall be equipped with a backdraft damper, and shall be independent of all other exhaust systems.~~ Installations in Group I-1 and I-2 occupancies shall be in accordance with the International Building Code and Section 904.13 of the International Fire Code.

Exceptions:

1. In other than Groups I-1 and I-2, where installed in accordance with the manufacturer's instructions and where mechanical or natural ventilation is otherwise provided in accordance with Chapter 4, listed and labeled ductless range hoods shall not be required to discharge to the outdoors.
2. Ducts for domestic kitchen cooking appliances equipped with downdraft exhaust systems shall be permitted to be constructed of Schedule 40 PVC pipe and fittings provided that the installation complies with all of the following:
 - 2.1. The duct shall be installed under a concrete slab poured on grade.
 - 2.2. The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel.
 - 2.3. The PVC duct shall extend not more than 1 inch (25 mm) above the indoor concrete floor surface.
 - 2.4. The PVC duct shall extend not more than 1 inch (25 mm) above grade outside of the building.
 - 2.5. The PVC ducts shall be solvent cemented.

Delete without substitution

~~**510.4 Independent system.** Hazardous exhaust systems shall be independent of other types of exhaust systems.~~

Reason: This is strictly an editorial clean up as the code doesn't have to keep repeating itself.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This is strictly editorial.

M34-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval was based on the proponent's published reason statement. (Vote 10-1)

Assembly Action:

None

M34-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jason Phelps, representing Self (jason.phelps@hillsboro-oregon.gov) requests Disapprove.

Commenter's Reason: This code proposal is not just editorial clean up as suggested. Why is domestic kitchen exhaust and hazardous exhaust grouped together? It doesn't make any sense. Why is the reference to 505 removed but the reference to 506-509 remain?

These changes add confusion to the code in an attempt to clean it up. I suggest we leave these codes as currently written.

Section 510.4 can absolutely NOT be deleted. This is the only code section in 510 that specifically states the requirement for independent exhaust. If this is allowed to be deleted, the only place the requirement would remain is in an obscure section in the beginning of section 501 where it is grouped with domestic kitchen exhaust. This is not wise. Redundancy is a key safety component in industry, where these systems are used and it should be a key safety component in the code as well. If editorial code clean up means deleting important sections, then I urge your disapproval.

I was at the committee action hearings, and the only reason this passed is because the committee was exhausted from just finishing all the changes in ventilation and this one just kind of slipped through.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The original code proposal was editorial only and did not affect the cost of construction and this public comment does not change that."

M34-18

M40-18

IMC: 506.3.2.5

Proposed Change as Submitted

Proponent: Connor Barbaree, ASHRAE, representing ASHRAE (cbarbaree@ashrae.org)

2018 International Mechanical Code

Revise as follows

506.3.2.5 Grease duct test. Prior to the use or concealment of any portion of a grease duct system, a leakage test shall be performed. Ducts shall be considered to be concealed where installed in shafts or covered by coatings or wraps that prevent the ductwork from being visually inspected on all sides. The permit holder shall be responsible to provide the necessary *equipment* and perform the grease duct leakage test. ~~A light test.~~ One of the following tests shall be performed to determine that all welded and brazed joints are liquid tight.

1. A water spray test as prescribed in this section
2. Where approved, a light test as prescribed in this section
3. An approved equivalent test

A light test shall be performed by passing a lamp having a power rating of not less than 100 watts through the entire section of ductwork to be tested. The lamp shall be open so as to emit light equally in all directions perpendicular to the duct walls. A test shall be performed for the entire duct system, including the hood-to-duct connection. The duct work shall be permitted to be tested in sections, provided that every joint is tested. For *listed* factory-built grease ducts, this test shall be limited to duct joints assembled in the field and shall exclude factory welds.

A water test shall be performed by simulating a grease duct cleaning operation by use of a pressure washer that is designed for grease duct cleaning and that operates at a pressure of not less than 1500 psi. The water shall be applied directly to all areas to be tested. Water applied to the duct interior surfaces shall not be visible on any exterior surfaces of the duct during the test.

Reason: The flexibility within this proposal will allow the code official some discretion to decide which duct test has worked best in the past and which to apply to the current installation. Based upon information from industry, code officials and end users, there are alternative methods of duct leakage testing currently being used successfully by industry. The intent of the language is to not limit the user to the light test or prohibit other methods where approved by local authority having jurisdiction. As an example, the State of Minnesota 2015 Mechanical and Fuel Gas Code has options of a light, air or water test. Additionally, there has been questions regarding the effectiveness of the light test to find pinhole leaks and leaks around over-lapping joints.

ASHRAE Standard 154-2016 "Ventilation for Commercial Cooking Operations" included the alternate water or approved equivalent tests during the last revision cycle. The proposed language harmonizes the two documents.

A recent committee member reported to the Standard 154 committee regarding comments from IKECA regarding leak testing. IKECA's recommendation was a water pressure test. Their comments included that the light test is ineffective, especially on pinhole leaks covered by slag. The water pressure washing without detergent prior to wrapping the duct is the most effective method to find leaks. Contractors bristle at this initially, but when told that this is the same conditions the duct will be subjected to at the first duct cleaning they are more receptive. As a result, some contractors are beginning to require that this test be performed before wrapping to ensure there are no leaks, and this helps them in that they are not called back at a later date to fix leaking exhaust ducts.

Bibliography: ASHRAE Standard 154-2016 "Ventilation for Commercial Cooking Operations"

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The proposal will not increase the cost of construction.

M40-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Item # 3 is vague regarding an equivalent test. There is no consensus on the water test procedure. (Vote 11-0)

Assembly Action:

None

M40-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Connor Barbaree, representing ASHRAE (cbarbaree@ashrae.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

506.3.2.5 Grease duct test. Prior to the use or concealment of any portion of a grease duct system, a leakage test shall be performed. Ducts shall be considered to be concealed where installed in shafts or covered by coatings or wraps that prevent the ductwork from being visually inspected on all sides. The permit holder shall be responsible to provide the necessary *equipment* and perform the grease duct leakage test. One of the following tests shall be performed to determine that all welded and brazed joints are liquid tight.

1. A water spray test as prescribed in this section
2. Where approved, a light test as prescribed in this section
- ~~3. An approved equivalent test~~

A light test shall be performed by passing a lamp having a power rating of not less than 100 watts through the entire section of ductwork to be tested. The lamp shall be open so as to emit light equally in all directions perpendicular to the duct walls. A test shall be performed for the entire duct system, including the hood-to-duct connection. The duct work shall be permitted to be tested in sections, provided that every joint is tested. For *listed* factory-built grease ducts, this test shall be limited to duct joints assembled in the field and shall exclude factory welds.

A water test shall be performed by simulating a grease duct cleaning operation by use of a pressure washer that is designed for grease duct cleaning and that operates at a pressure of not less than 1500 psi. The water shall be applied directly to all areas to be tested. Water applied to the duct interior surfaces shall not be visible on any exterior surfaces of the duct during the test.

Commenter's Reason: The removal of the third alternate approved equivalent addresses concerns represented by the Mechanical committee and opponents of this proposal at the Committee Action Hearings. This leaves the choice of tests to a water wash down test or the traditional light test. The water wash down test is very much supported by factory-built duct manufacturers, grease duct cleaners (IKECA), and the ASHRAE kitchen ventilation technical committee (TC5.10). A vast array of field experience from these groups has shown to expose duct leaks during grease duct cleaning operations (using pressure washer spray guns) that were originally commissioned only with a light test.

The light test simply cannot reach all areas of a given duct run. This proposal and public comment still leaves the option for the AHJ to make the determination on which leakage test is appropriate for a given duct system. The reality is that a duct system will eventually see a water wash down test during routine cleaning and maintenance, but unfortunately as the code is written now, only after the restaurant is fully operational and the finished space is complete.

Bibliography: ASHRAE Standard 154-2016 "Ventilation for Commercial Cooking Operations"
NFPA 96 "Standard for Ventilation Control & Fire Protection of Commercial Cooking"

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. This code change proposal and public comment only adds cost if a water test is chosen. A water wash down test costs more than a light test, but the building owner will incur this cost routinely during cleaning and maintenance. It is more beneficial to the building owner to make sure that no water leaks during the construction phase as opposed to post construction that will cause downtime and become more costly to fix.

Public Comment 2:

Proponent: Keith Page, representing Hart & Cooley / Selkirk - Engineering Manager requests As Modified by This Public Comment.

Further modify as follows:

2018 International Mechanical Code

506.3.2.5 Grease duct test. Prior to the use or concealment of any portion of a grease duct system, a leakage test shall be performed. Ducts shall be considered to be concealed where installed in shafts or covered by coatings or wraps that prevent the ductwork from being visually inspected on all sides. The permit holder shall be responsible to provide the necessary *equipment* and perform the grease duct leakage test. One of the following tests shall be performed to determine that all welded and brazed joints are liquid tight.

1. A water spray test as prescribed in this section
2. Where approved, a light test as prescribed in this section
- ~~3. An approved equivalent test~~

A light test shall be performed by passing a lamp having a power rating of not less than 100 watts through the entire section of ductwork to be tested. The lamp shall be open so as to emit light equally in all directions perpendicular to the duct walls. A test shall be performed for the entire duct system, including the hood-to-duct connection. The duct work shall be permitted to be tested in sections, provided that every joint is tested. For *listed* factory-built grease ducts, this test shall be limited to duct joints assembled in the field and shall exclude factory welds.

A water test shall be performed by simulating a grease duct cleaning operation by use of a pressure washer that is designed for grease duct cleaning and that operates at a pressure of not less than 1500 psi. The water shall be applied directly to all areas to be tested. Water applied to the duct interior surfaces shall not be visible on any exterior surfaces of the duct during the test.

Commenter's Reason: I propose to remove the third alternate "approved equivalent" since it was vague and rather leave the choice of tests as a water wash down test or the traditional light test. The water wash down test is very much supported by factory-built duct manufacturers, grease duct cleaners (IKECA), and the ASHRAE kitchen ventilation technical committee (TC5.10). A vast array of field experience from these groups has shown to expose duct leaks during grease duct cleaning operations (using pressure washer spray guns) that were originally commissioned with only the light test. The light test simply cannot reach all areas of any given duct run. This proposal still leaves the option for the AHJ to make the determination on which leakage test is appropriate for a given duct system. The reality is that a duct system will eventually see a water wash down test during routine cleaning and maintenance, but unfortunately as the code text is now, only after the restaurant is fully operational and the finished space is complete,

Bibliography: ASHRAE Standard 154-2016 "Ventilation for Commercial Cooking Operations"
NFPA 96 "Standard for Ventilation Control & Fire Protection of Commercial Cooking"

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. This only adds cost if the water test is chosen. A water wash down test costs more than a light test does, but the building owner will eventually endure that cost routinely during cleaning and maintenance. It is better to make sure no water leaks out during the construction phase than to find out when the restaurant is fully finished and operating causing water damage and down time.

M40-18

M50-18

IMC: 505.3

Proposed Change as Submitted

Proponent: John Williams, Chair, representing Healthcare Committee (AHC@iccsafe.org)

2018 International Mechanical Code

Revise as follows

505.3 Exhaust ducts. Domestic cooking exhaust equipment shall discharge to the outdoors through sheet metal ducts constructed of galvanized steel, stainless steel, aluminum or copper. Such ducts shall have smooth inner walls, shall be air tight, shall be equipped with a backdraft damper, and shall be independent of all other exhaust systems. Installations in Group I-1 and I-2 occupancies shall be in accordance with the International Building Code and Section 904.13 of the International Fire Code.

Exceptions:

1. ~~In other than Groups I-1 and I-2, where~~ Where installed in accordance with the manufacturer's instructions and where mechanical or natural ventilation is otherwise provided in accordance with Chapter 4, listed and labeled ductless range hoods shall not be required to discharge to the outdoors.
2. Ducts for domestic kitchen cooking appliances equipped with downdraft exhaust systems shall be permitted to be constructed of Schedule 40 PVC pipe and fittings provided that the installation complies with all of the following:
 - 2.1. The duct shall be installed under a concrete slab poured on grade.
 - 2.2. The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel.
 - 2.3. The PVC duct shall extend not more than 1 inch (25 mm) above the indoor concrete floor surface.
 - 2.4. The PVC duct shall extend not more than 1 inch (25 mm) above grade outside of the building.
 - 2.5. The PVC ducts shall be solvent cemented.

Reason: In Section 505.3, Exception #1 language was incorrectly added that would prohibit Group I-1 and I-2 occupancies from having recirculating hoods. As long as proper mechanical or natural ventilation is provided, the hood is installed per manufacturer's instructions, and it meets the ventilation requirements, there is no justification on why these hoods cannot be re-circulating.

Cost Impact: The code change proposal will decrease the cost of construction. This exception where permitted in Groups I-1 and I-2 could result in a reduction of shaft and duct requirements to vent the hood to the outside, possibly through several floors.

M50-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Group I-1 and I-2 occupancies should still have exhaust to outdoors. (Vote 11-0)

Assembly Action:

None

M50-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Williams, representing Healthcare Committee (ahc@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

505.3 Exhaust ducts. Domestic cooking exhaust equipment shall discharge to the outdoors through sheet metal ducts constructed of galvanized steel, stainless steel, aluminum or copper. Such ducts shall have smooth inner walls, shall be air tight, shall be equipped with a backdraft damper, and shall be independent of all other exhaust systems. Installations in Group I-1 and I-2 occupancies shall be in accordance with the International Building Code and Section 904.13 of the International Fire Code.

Exceptions:

1. ~~Where in other than Groups I-1 and I-2, where~~ installed in accordance with the manufacturer's instructions and where mechanical or natural ventilation is otherwise provided in accordance with Chapter 4, listed and labeled ductless range hoods shall not be required to discharge to the outdoors.
2. ~~In Groups I-1 and I-2, where installed in accordance Sections 407.2.6 and 420.8 of the International Building Code, and where mechanical ventilation is provided in accordance with Chapter 4, listed and labeled ductless range hoods shall not be required to discharge to the outdoors.~~
- ~~2.3.~~ Ducts for domestic kitchen cooking appliances equipped with downdraft exhaust systems shall be permitted to be constructed of Schedule 40 PVC pipe and fittings provided that the installation complies with all of the following:
 - ~~2.1-3.1.~~ The duct shall be installed under a concrete slab poured on grade.
 - ~~2.2-3.2.~~ The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel.
 - ~~2.3-3.3.~~ The PVC duct shall extend not more than 1 inch (25 mm) above the indoor concrete floor surface.
 - ~~2.4-3.4.~~ The PVC duct shall extend not more than 1 inch (25 mm) above grade outside of the building.
 - ~~2.5-3.5.~~ The PVC ducts shall be solvent cemented.

Commenter's Reason: While we see the committee's opinion that common use kitchens in Groups I-1 and I-2 should exhaust to the outdoors, there is no justification provided for this decision. NFPA 96 currently allows re-circulating hoods for commercial cooking applications, which produce far higher levels of output than what the types of kitchens addressed in this public comment.

In order to try to address the committee's concerns we have made the following changes.

First, we are limiting the non-ducting applications to a cooking facility serving 30 or fewer residents with the references to Section 407.2.5 and 420.8. These applications use domestic cooking appliances and a UL 300A hood, with built-in fire suppression. This is a limited application in highly supervised areas with many other restrictions on the cooking equipment including shut offs, sprinklers, extinguishers, etc.

This limitation will require larger commercial-style cooking operations in Groups I-1 and I-2 to still be vented to the outdoors.

Second, we have removed the option to provide natural ventilation, meaning that mechanical ventilation must be provided in order to use a ductless hood, and users won't be able to rely on an "open window" in the middle of winter.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This exception where permitted in Groups I-1 and I-2 could result in a reduction of shaft and duct requirements to vent the hood to the outside, possibly through several floors.

Public Comment 2:

Proponent: John Williams, representing Healthcare Committee (ahc@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

505.3 Exhaust ducts. Domestic cooking exhaust equipment shall discharge to the outdoors through sheet metal ducts constructed of galvanized steel, stainless steel, aluminum or copper. Such ducts shall have smooth inner walls, shall be air tight, shall be equipped with a backdraft damper, and shall be independent of all other exhaust systems. Installations in Group I-1 and I-2 occupancies shall be in accordance with the International Building Code and Section 904.13 of the International Fire Code.

Exceptions:

1. ~~Where~~ In other than Groups I-1 and I-2, where installed in accordance with the manufacturer's instructions and where mechanical or natural ventilation is otherwise provided in accordance with Chapter 4, listed and labeled ductless range hoods shall not be required to discharge to the outdoors.
2. Within individual Group I-1 dwelling or sleeping units, where installed in accordance with the manufacturer's instructions and where mechanical or natural ventilation is otherwise provided in accordance with Chapter 4, listed and labeled ductless range hoods shall not be required to discharge to the outdoors.
- ~~2-3.~~ Ducts for domestic kitchen cooking appliances equipped with downdraft exhaust systems shall be permitted to be constructed of Schedule 40 PVC pipe and fittings provided that the installation complies with all of the following:
 - ~~2-1-3.1.~~ The duct shall be installed under a concrete slab poured on grade.
 - ~~2-2-3.2.~~ The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel.
 - ~~2-3-3.3.~~ The PVC duct shall extend not more than 1 inch (25 mm) above the indoor concrete floor surface.
 - ~~2-4-3.4.~~ The PVC duct shall extend not more than 1 inch (25 mm) above grade outside of the building.
 - ~~2-5-3.5.~~ The PVC ducts shall be solvent cemented.

Commenter's Reason: The committee's disapproval was related to common use kitchen in Groups I-1 and I-2. This proposed exception is for Group I-1 individual apartments that are similar in nature to any residential apartment where re-circulating hoods are typically used. There is no justification to require exterior exhaust in this application. However, the way that the code is currently written for Group I-1, these domestic cooking appliances, with domestic hoods would be required to vent outside.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This exception where permitted in Group I-1 could result in a reduction of shaft and duct requirements to vent the hood to the outside, possibly through several floors.

M50-18

M51-18

IMC: 505.3, 505.7

Proposed Change as Submitted

Proponent: John Williams, Chair, representing Healthcare Committee (AHC@iccsafe.org)

2018 International Mechanical Code

Revise as follows

505.3 Exhaust ducts. Domestic cooking exhaust equipment shall discharge to the outdoors through sheet metal ducts constructed of galvanized steel, stainless steel, aluminum or copper. Such ducts shall have smooth inner walls, shall be air tight, shall be equipped with a backdraft damper, and shall be independent of all other exhaust systems. ~~Installations in Group I-1 and I-2 occupancies shall be in accordance with the International Building Code and Section 904.13 of the International Fire Code.~~

Exceptions:

1. In other than Groups I-1 and I-2, where installed in accordance with the manufacturer's instructions and where mechanical or natural ventilation is otherwise provided in accordance with Chapter 4, listed and labeled ductless range hoods shall not be required to discharge to the outdoors.
2. Ducts for domestic kitchen cooking appliances equipped with downdraft exhaust systems shall be permitted to be constructed of Schedule 40 PVC pipe and fittings provided that the installation complies with all of the following:
 - 2.1. The duct shall be installed under a concrete slab poured on grade.
 - 2.2. The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel.
 - 2.3. The PVC duct shall extend not more than 1 inch (25 mm) above the indoor concrete floor surface.
 - 2.4. The PVC duct shall extend not more than 1 inch (25 mm) above grade outside of the building.
 - 2.5. The PVC ducts shall be solvent cemented.

Add new text as follows

505.7 Domestic cooking systems. Cooktops and ranges installed in the following occupancies shall be protected in accordance with Section 904.13.1 of the International Fire Code.

1. In Group I-1 occupancies where domestic cooking facilities are installed in accordance with Section 420.8 of the International Building Code.
2. In Group I-2, Condition 1 occupancies where domestic cooking facilities are installed in accordance with Section 407.2.6 of the International Building Code.
3. In Group R-2 college dormitories where domestic cooking facilities are installed in accordance with Section 420.10 of the International Building Code.

Reason: M45-15 as modified created the last sentence to IMC Section 505.3. The last sentence in 505.3 is an incorrect and circular reference. There are no exhaust hood requirements in IBC 407 or 410 (Group I-2 and I-1 respectively) - those sections send you to IMC for exhaust hood. The intent seems to be more as a reference to the protection in the hood in IFC Section 904.13. See new Section 505.7 for a better reference that is a copy of text already in IFC 904.13. Our intent is that if the other proposals related to domestic cooking in Group I-1 and I-2 are accepted that the references would be coordinated in the IMC and IFC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This is an editorial correction of references.

M51-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Disapproval was consistent with the recommendation for M50-18. (Vote 11-0)

Assembly Action:

None

M51-18

Individual Consideration Agenda

Public Comment 1:

Proponent: John Williams, representing Healthcare Committee (ahc@iccsafe.org) requests As Submitted.

Commenter's Reason: While code proposals M50 and M51 were both dealing with Groups I-1 and I-2, the reasons are not interrelated. Therefore the committee reason for disapproval of this code proposal was incorrect. This is not a technical change, but an editorial correction of references. The new language is a copy of IFC Section 904.13. The deleted reference in Section 505.3 are to sections that have nothing to do with exhaust hood installation.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This is already a requirement in the IFC. There will be no change of requirements.

M51-18

M62-18

IMC: 511, 511.1, 511.1.1, 511.1.5

Proposed Change as Submitted

Proponent: Robert Davidson, Davidson Code Concepts, LLC, representing Self (rjd@davidsoncodeconcepts.com)

2018 International Mechanical Code

SECTION 511 DUST, STOCK AND REFUSE CONVEYING SYSTEMS

Revise as follows

511.1 Dust, stock and refuse conveying systems. Dust, stock and refuse conveying systems shall comply with the provisions of Section 510 and Sections 511.1.1 through 511.2 and the International Fire Code.

511.1.1 Collectors and separators. Collectors and separators involving such systems as centrifugal separators, bag filter systems and similar devices, and associated supports shall be constructed of noncombustible materials and shall be located on the exterior of the building or structure. A collector or separator shall not be located nearer than 10 feet (3048 mm) to combustible construction or to an unprotected wall or floor opening, unless the collector is provided with a metal vent pipe that extends above the highest part of any roof with a distance of 30 feet (9144 mm).

Exceptions:

1. Collectors such as "Point of Use" collectors, close extraction weld fume collectors, spray finishing booths, stationary grinding tables, sanding booths, and integrated or machine-mounted collectors shall be permitted to be installed indoors provided that the installation is in accordance with the International Fire Code and NFPA 70.
2. Collectors in independent exhaust systems handling combustible dusts shall be permitted to be installed indoors provided that such collectors are installed in compliance with the International Fire Code and NFPA 70.

511.1.5 Explosion relief vents control. ~~A safety or explosion relief vent~~ Explosion control shall be provided in accordance with the requirements of the International Fire Code on all systems that convey combustible refuse or stock ~~of an explosive nature, that produce combustible dusts in such a manner that the concentration and conditions create a fire or explosion hazard based on a Dust Hazard Analysis prepared~~ in accordance with ~~the requirements~~ Section 2203.2 of the International Building Fire Code.

Reason: This proposal is follow up work correlating the IBC, IMC and IFC provisions with the work done on Chapter 22 Combustible Dust and Chapter 37 Combustible Fibers in the IFC along with Section 426 of the IBC. Last cycle IBC Section 426 and Chapter 22 Combustible Dust-Producing Operations were updated to apply the new NFPA 652 Standard on the Fundamentals of Combustible Dust as the lead document when identifying and managing combustible dust hazards. In this proposal Section 511.1 has been modified to add "and the International Fire Code" in the top scoping section. In looking at 511.1 and the following sections the IFC would only apply for the exceptions to Section 511.1.1 when it should apply generally regardless of whether or not a system is located inside or on th exterior of a facility.

Section 511.1.5 is modified to rename it "Explosion Control" which is the correct terminology, the necessary protection features are much more than just "relief vents". "Explosion control" has been inserted as the lead requirement to be applied with linkage to the IFC as the correct document for installing explosion control. In addition language has been added "that produce combustible dusts in such a manner that the concentration and conditions create a fire or explosion hazard based on a Dust Hazard Analysis prepared" which is a phrase being applied and updated in other areas of the codes foor the required assessment of the potential hazard. Finally, the pointer to Section 2203.2 of the IFC leads the designer and the code official to the linkage with NFPA 652.

Cost Impact: The code change proposal will not increase or decrease the cost of construction Updating the language to correlate with other changes in the codes is not expected to increase or decrease the cost of construction, however, increasing clarification in code application provides an opportunity to reduce costs.

M62-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval was based on the proponent's published reason statement. (Vote 11-0)

Assembly Action:

None

M62-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jeffrey Shapiro, representing Self (jeff.shapiro@intlcodeconsultants.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

511.1.5 Explosion control. Explosion control shall be provided in accordance with the requirements of the International Fire Code on all systems that convey combustible dust or combustible refuse or stock that ~~produce~~ produces combustible dusts in such a manner that the concentration and conditions could create a fire or explosion hazard. Determination of concentrations or conditions that are deemed to not create a fire or explosion hazard shall be based on a Dust Hazard Analysis prepared in accordance with Section 2203.2 of the International Fire Code.

Commenter's Reason: The revision clarifies that ducts conveying combustible dust, not just refuse or stock that produces combustible dust, require explosion control consideration. In addition, the revision defaults to the need for explosion control in all cases unless a dust hazard analysis demonstrates otherwise, recognizing that some may choose to just provide explosion control or venting, as opposed to preparing a dust hazard analysis.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The change is intended to clarify and enhance application of the original proposal.

M62-18

M64-18

IMC: 601.5

Proposed Change as Submitted

Proponent: Brent Ursenbach, representing Salt Lake County Planning and Development Services (bursenbach@slco.org)

2018 International Mechanical Code

601.5 Return air openings. Return air openings for heating, ventilation and air-conditioning systems shall comply with all of the following:

1. Openings shall not be located less than 10 feet (3048 mm) measured in any direction from an open combustion chamber or draft hood of another appliance located in the same room or space.
2. Return air shall not be taken from a hazardous or insanitary location or a refrigeration room as defined in this code.
3. The amount of return air taken from any room or space shall be not greater than the flow rate of supply air delivered to such room or space.
4. Return and transfer openings shall be sized in accordance with the appliance or equipment manufacturer's installation instructions, ACCA Manual D or the design of the registered design professional.
5. Return air taken from one dwelling unit shall not be discharged into another dwelling unit.
6. Taking return air from a crawl space shall not be accomplished through a direct connection to the return side of a forced air furnace. Transfer openings in the crawl space enclosure shall not be prohibited.
7. Return air shall not be taken from a closet, bathroom, toilet room, kitchen, garage, boiler room, furnace room or unconditioned attic.
8. Return air shall not be taken from indoor swimming pool enclosures and associated deck areas.

Exceptions:

1. Where the air from such spaces is dehumidified in accordance with Section 403.2.1, Item 2.
2. Dedicated HVAC systems serving only such spaces.

Exceptions:

1. Taking return air from a kitchen is not prohibited where such return air openings serve the kitchen and are located not less than 10 feet (3048 mm) from the cooking appliances.
2. Taking return air from a kitchen is not prohibited in a dwelling unit where the kitchen and living spaces are in a single room and the cooking appliance is electric and located not less than 5 feet in any direction from the return air intake opening.
- ~~2-3.~~ Dedicated forced air systems serving only the garage shall not be prohibited from obtaining return air from the garage.

Reason: There is an increasing trend towards smaller living spaces, including studio apartment, extended stay hotels, small homes and even tiny homes. Where the cooking appliance and living space are combined in a single space, requiring 10' between to return air inlet and the small cooking appliance serves no purpose. Cooking odors, even from burned food, will spread throughout the room, no matter how far the return is located from the appliance.

As some may be concerned with air-flow towards a return inlet impacting the flame of a gas burner, this exception is limited to electric appliances.

Cost Impact: The code change proposal will decrease the cost of construction

This proposal will in some cases, reduce the length of return air duct required, reduce duct ceiling drops, resulting in a material and labor savings.

M64-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval was based on the proponent's published reason statement. (Vote 6-4)

Assembly Action:

None

M64-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ted Williams, representing American Gas Association (twilliams@aga.org) requests Disapprove.

Commenter's Reason: The proponent did not provide sound rationale for providing an exception for electric cooking appliances. Since cooking effluent is the contaminant source of concern and is independent of cooking appliance energy source, an exception for electric cooking appliances is unwarranted.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The restriction and exception of cooking appliances by fuel type will not affect construction costs.

M64-18

M67-18

IMC: 602.2.1.7

Proposed Change as Submitted

Proponent: Brian Helms, Charlotte Pipe and Foundry, Plastics Division, representing Charlotte Pipe and Foundry (brian.helms@charlottepipe.com)

2018 International Mechanical Code

Revise as follows

602.2.1.7 Plastic plumbing piping and tubing. Plastic piping and tubing used in plumbing systems shall be listed and labeled as having a flame spread index not greater than 25 and a smoke-developed index not greater than 50 when tested in accordance with all requirements of ASTM E84 or UL 723. Mounting methods, supports and test specimen dimensions that are not specified in ASTM E84 or UL 723 shall be prohibited.

Exception: Plastic water distribution piping and tubing listed and labeled in accordance with UL 2846 as having a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread distance not greater than 5 feet (1524 mm), and installed in accordance with its listing.

Reason: A growing issue in the plumbing industry is that the ASTM E 84 test protocol is being modified to test combustible piping materials. At the direction of plastics manufacturers, test labs will modify mounting methods, supports and test specimen dimensions to achieve results that are in compliance with the 25/50 benchmarks the code requires. These results are then used to secure a listing by third party certifiers to serve as proof to code officials of compliance to the flame spread and smoke developed index requirements found in the code.

The question of whether a piping material is in compliance to the flame spread and smoke developed requirements of the code is often further blurred as third party certifiers provide listings indicating that materials meet the 25/50 requirements using modified test methods. Third party certifiers disclose this information in their full listing or report, but this is not always easily identified or even accessible to officials. An inspector seeing ASTM E 84 on a pipe would likely assume that it meets the requirement of the code without fully knowing or understanding the restrictions that exist in the listing. In fact, listing agencies assume that the inspector will analyze the listing and make their own determination on compliance. This code change proposal provides notice to the official that simply adding the ASTM E 84 or UL 723 marking to the wall of the pipe does not necessarily mean that the product was tested in full compliance with the standard in the manner that the code intends.

Charlotte Pipe has conducted ASTM E 84 tests at two different test facilities and found that results below the 25/50 flame spread and smoke developed index are not achievable when performed to the full requirements of ASTM E 84. Our testing has shown that CPVC and PVC piping will not pass the ASTM E 84 without modification of the mounting method, supports or test specimen dimensions.

If the practice of accepting modified test results is allowed to continue, then the requirements of the code will not be achieved. ASTM E 84 is a comparison test, and the 25/50 flame spread and smoke developed index is not a requirement of the standard, but of the code itself. If the 25/50 requirement is too restrictive, then an effort should be made to change the code. If the ASTM E 84 test method is flawed, change the standard. However, we can no longer allow the use of modified tests and third party listings to circumvent the requirements of the code which exist to preserve the health and safety of the public.



July 24, 2017
Revised September 25, 2017

Mr. Bill Morris
Charlotte Pipe and Foundry Company
2109 Randolph Rd
Charlotte, NC, 28207-1521
USA

Our Reference: SV30755/4787930429

Subject: Report of Surface Burning Characteristics Tests on Samples As
Submitted By Charlotte Pipe and Foundry Company

Dear Mr. Morris:

This is a Report summarizing the results of tests conducted under the Commercial Inspection and Testing Services (CITS) program of UL LLC (UL) identified as Assignment No. 4787930429.

GENERAL:

The results relate only to items tested.

METHOD:

Each test was conducted in accordance with Standard ANSI/UL723, Tenth Edition, dated September 10, 2008 with revisions through August 12, 2013, "Test for Surface Burning Characteristics of Building Materials", (ASTM E84).

The test determines the Surface Burning Characteristics of the material, specifically the flame spread and smoke developed indices when exposed to fire.

UL LLC
333 Pfingsten Road, Northbrook, IL 60062-2096 USA
T: 847.272.8800 / F: 847.272.8129 / W: UL.com

The maximum distance the flame travels along the length of the sample from the end of the igniting flame is determined by observation. The Flame Spread Index of the material is derived by plotting the progression of the flame front on a time-distance basis, ignoring any flame front recession, and using the equations described below:

- A. $CFS = 0.515 A_T$ when A_T is less than or equal to 97.5 minute-foot.
- B. $CFS = 4900/(195-A_T)$ when A_T is greater than 97.5 minute-foot.

Where A_T = total area under the time distance curve expressed in minute-foot.

The Smoke Developed Index (SDI) is determined by rounding the Calculated Smoke Developed (CSD) as described in UL 723. The CSD is determined by the output of photoelectric equipment operating across the furnace flue pipe. A curve is developed by plotting the values of light absorption (decrease in cell output) against time. The CSD is derived by expressing the net area under the curve for the material tested as a percentage of the area under the curve for untreated red oak.

The CSD is expressed as:

$$CSD = (A_m/A_{ro}) \times 100$$

Where:

- CSD = Calculated Smoke Developed
- A_m = The area under the curve for the test material.
- A_{ro} = The area under the curve for untreated red oak.

SAMPLES:

The samples utilized in this investigation were neither prepared nor selected by a Laboratories' representative such that no verification of composition can be provided.

Sample Description

System
6 inch CPVC Schedule 40 ChemDrain pipe
1/2 inch CTS CPVC pipe
2 inch CTS CPVC pipe
1/2 inch CTS CPVC pipe

Project: 4787930429
Tested by: ABRAN GARCIA

File: SV30755
Engineer: JAMILA SHAWON

TestCode: 06201714
Date: 2017-06-20

TEST METHOD: The test was conducted in accordance with UL 723, Tenth Edition.

Client Name:	Charlotte Pipe and Foundry Company		
Test Duration:	10 minutes	Test No.:	7A
Mounting:	Rods & Wire	Test Type:	CITS
		Hot Test:	No
		Burn-Out Required:	No
Test Sample:	2 inch CTS CPVC pipe two (2) lengths, each consisting of three (3) 8' sections Supported with rods or bars and netting per Sec. X1.1.2.3		

FLAME SPREAD RESULTS

Flame Spread Data

Distance (Feet)		Time (Sec)
Ignition		206
0.5		426
1		502
1.5		568

Calculated Flame Spread (CFS): 1.50
Flame Spread Index (FSI): 0

Time to Ignition (sec): 206
Maximum Flame Spread (ft): 1.5
Area Under the Flame Spread Curve (ft.-min.): 2.9

SMOKE RESULTS

Calculated Smoke Developed (CSD): 277.4
Smoke Developed Index (SDI): 300

Area Under the Smoke Curve (Obs.-min.): 238.04
Area Under Red Oak Curve (Obs.-min.): 85.82

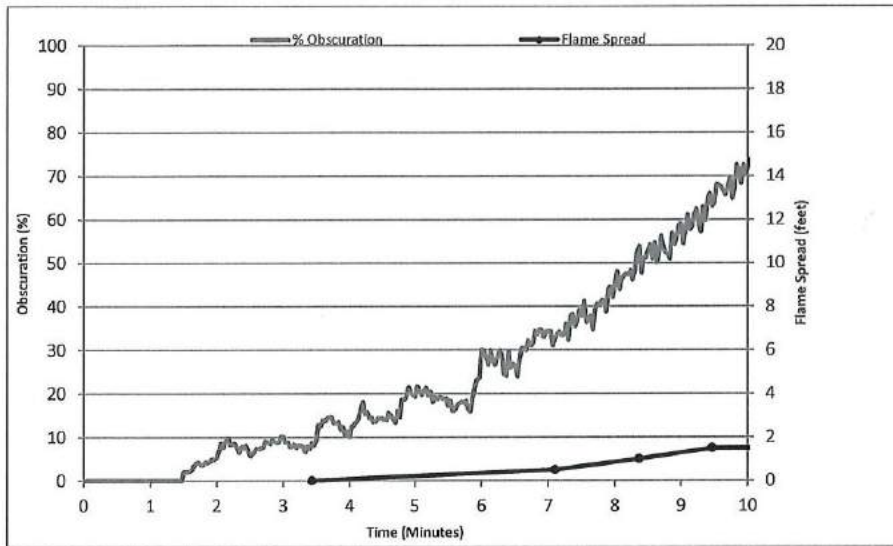
Post-Test Observations

Discoloration (Feet From Burner): 24
Melt (Feet From Burner): 14
Char (Feet From Burner): 6

Notes: Sample stayed on the wire. Did not fall through

Flame Spread / Smoke Results

Charlotte Pipe and Foundry Company
2 inch CTS CPVC pipe



Test Num.: 7A
SV30755 / 4787930429
06201714

Flame Spread Index: 0
Smoke Developed Index: 300
Max. Flame Spread (ft.): 1.5

Project: 4787930429
Tested by: ABRAN GARCIA

File: SV30755
Engineer: JAMILA SHAWON

TestCode: 06211707
Date: 2017-06-21

TEST METHOD: The test was conducted in accordance with UL 723, Tenth Edition.

Client Name:	Charlotte Pipe and Foundry Company		
Test Duration:	10 minutes	Test No.:	8B
Mounting:	Rods	Test Type:	CITS
		Hot Test:	No
		Burn-Out Required:	No

Test Sample: 2 inch CTS CPVC pipe one (1) length, each consisting of four (4) 2' sections on the burner end and two (2) 8' sections
Supported with 1/4" metal rod only

FLAME SPREAD RESULTS

Flame Spread Data

Distance (Feet)	Time (Sec)
-----------------	------------

Calculated Flame Spread (CFS): 0.00
Flame Spread Index (FSI): 0
Time to Ignition (sec): None
Maximum Flame Spread (ft): 0.0
Area Under the Flame Spread Curve (ft.-min.): 0.0

SMOKE RESULTS

Calculated Smoke Developed (CSD): 16.5
Smoke Developed Index (SDI): 15
Area Under the Smoke Curve (Obs.-min.): 14.16
Area Under Red Oak Curve (Obs.-min.): 85.82

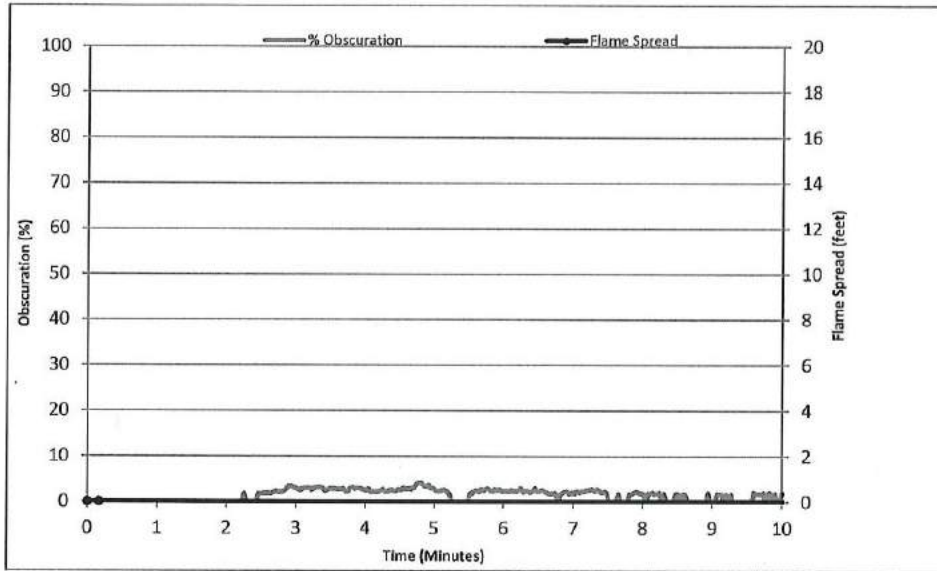
Post-Test Observations

Discoloration (Feet From Burner): 24
Melt (Feet From Burner): 16
Char (Feet From Burner): 8

Notes: Sample collapsed from burner to 1 foot mark 280 seconds. From 1 foot to 3 foot mark collapsed at 319 seconds.

Flame Spread / Smoke Results

Charlotte Pipe and Foundry Company
2 inch CTS CPVC pipe



Test Num.: 8B
SV30755 / 4787930429
06211707

Flame Spread Index: 0
Smoke Developed Index: 15
Max. Flame Spread (ft.): 0.0

Cost Impact: The code change proposal will not increase or decrease the cost of construction
None

M67-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: A product that is listed and labeled is assumed to meet the requirements of the standard with no need to state the conditions of the standard in the code text. The proposed last sentence addresses abuses in testing.

Assembly Action:

None

M67-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Brian Helms, representing Charlotte Pipe and Foundry (brian.helms@charlottepipe.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

602.2.1.7 Plastic plumbing piping and tubing. Plastic piping and tubing used in plumbing systems shall be listed and labeled as having a flame spread index not greater than 25 and a smoke-developed index not greater than 50 when tested in accordance with ~~all requirements of~~ ASTM E84 or UL 723. Mounting methods, supports and test specimen dimensions that are not specified in ASTM E84 or UL 723 shall be prohibited.

Exception: Plastic water distribution piping and tubing listed and labeled in accordance with UL 2846 as having a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread distance not greater than 5 feet (1524 mm), and installed in accordance with its listing.

Commenter's Reason: This comment deletes redundant text from the original proposal. The proposal addresses the growing issue of modified ASTM E84 testing of combustible materials.

At the direction of plastics manufacturers, test labs will modify mounting methods, supports and test specimen dimensions to achieve results that are in compliance with the 25/50 benchmarks the code requires. These results are then used to secure a listing by third party certifiers to serve as proof to code officials of compliance to the flame spread and smoke developed index requirements found in the code.

The question of whether a piping material is in compliance to the flame spread and smoke developed requirements of the code is often further blurred as third party certifiers provide listings indicating that materials meet the 25/50 requirements using modified test methods. Third party certifiers disclose this information in their full listing or report, but this is not always easily identified or even accessible to officials. An inspector seeing ASTM E 84 on a pipe would likely assume that it meets the requirement of the code without fully knowing or understanding the restrictions that exist in the listing. In fact, listing agencies assume that the inspector will analyze the listing and make their own determination on compliance. This code change proposal provides notice to the official that simply adding the ASTM E84 or UL 723 marking to the wall of the pipe does not necessarily mean that the product was tested in full compliance with the standard in the manner that the code intends.

If the practice of accepting modified test results is allowed to continue, then the requirements of the code will not be achieved. ASTM E 84 is a comparison test, and the 25/50 flame spread and smoke developed index is not a requirement of the standard, but of the code itself. If the 25/50 requirement is too restrictive, then an effort should be made to change the code. If the ASTM E 84 test method is flawed, change the standard. However, we can no longer allow the use of modified tests and third party listings to circumvent the requirements of the code which exist to preserve the health and safety of the public.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This code change proposal will not increase or decrease the cost of construction and is intended to clarify existing language by identifying and prohibiting testing practices that circumvent the existing code requirements

M67-18

M70-18

IMC: 603.2, ACCA

Proposed Change as Submitted

Proponent: David Bixby, Air Conditioning Contractors of America (ACCA), representing Air Conditioning Contractors of America (bixster1953@yahoo.com)

2018 International Mechanical Code

Revise as follows

603.2 Duct sizing. Ducts installed within a single dwelling unit shall be sized in accordance with ACCA Manual D, the appliance manufacturer's installation instructions or other approved methods; Zoned duct systems shall also comply with ACCA Manual Zr. Ducts installed within all other buildings shall be sized in accordance with the ASHRAE *Handbook of Fundamentals* or other equivalent computation procedure.

Add new standard(s) follows

ACCA

Air Conditioning Contractors of
America
2800 Shirlington Road, Suite 300
Arlington VA 22206

ANSI/ACCA 11 Manual Zr - 2018:

Residential HVAC System Zoning

Reason: Currently there is no coverage in the mechanical code to address the design of zoned duct systems. ACCA Manual Zr provides procedures for designing zoned comfort systems for single family detached homes, duplex and triplex homes, row houses, town houses, and large multi-family structures that are compatible with ACCA Manual J procedures for residential load calculations. In addition, use of Manual Zr will avoid the potential for an improperly designed zoned duct system to adversely impact the safe operation and durability of the heating/cooling equipment. For code officials, Manual Zr has three normative sections to determine clear compliance. Manual Zr is also a consensus-based ANSI standard. A proposal to add ACCA Manual Zr to Chapter 15, Referenced Standards, has also been submitted.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
No cost impacts.

M70-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposed standard is a design guide. (Vote 8-3)

Assembly Action:

None

M70-18

Individual Consideration Agenda

Public Comment 1:

Proponent: David Bixby, Air Conditioning Contractors of America, representing Air Conditioning Contractors of America (david.bixby@acca.org)requests As Submitted.

Commenter's Reason: ACCA's public comment provides the ICC with the final published ANSI/ACCA 11 Manual Zr - 2018: *Residential HVAC System Zoning*. The final version is identical to the draft standard submitted with our original proposal. ACCA Manual Zr provides procedures for designing zoned comfort systems for single family detached homes, duplex and triplex homes, row houses, town houses, and large multi-family structures that are compatible with ACCA Manual J, Residential Load Calculations.

Three "Normative" sections provide the following ANSI/ACCA requirements as shown below.

Section N1 - General Requirements for Residential Zoned Systems. Zoning principles and design principles that apply to all types of zoning systems.

Section N2 - Requirements for Zone Damper Systems. Design principles that are peculiar to zone damper systems.

Section N3 - Requirements for Ductless Equipment, Unitary Equipment, and Hot Water Heat.

In addition to the above required sections, there are other informational sections, calculation tools, and examples relevant to the standard. This format is similar to ANSI/ACCA Manuals D, J and S, which are already specified by the code and are currently enforced per their own "Normative" sections.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This will not affect the cost of a zoned comfort system as Manual Zr represents a minimum requirement for designing and installing such systems based on nationally-recognized core competencies for such construction.

Public Comment 2:

Proponent: Patrick McLaughlin, representing Air-Conditioning, Heating & Refrigeration Institute (pmclaugma@aol.com)requests As Submitted.

Commenter's Reason: The Air Conditioning, Heating & Refrigeration Institute is in strong support of adoption of Manual Zr. It's members participated with ACCA in the development of Manual Zr to help insure proper zoned duct system installation. Referencing Manual Zr in the duct system section will also provide a valuable resource to the code official.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Properly designed zoned duct systems will have long term cost benefit.

M70-18

M71-18

IMC: 602.2.1.8

Proposed Change as Submitted

Proponent: Jay Peters, Codes and Standards International, representing The Copper Development Association (peters.jay@me.com)

2018 International Mechanical Code

Revise as follows

602.2.1.8 Pipe and duct insulation within plenums. Pipe and duct insulation contained within plenums, including insulation adhesives, shall have a flame spread index of not more than 25 and a smoke developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723, using the specimen preparation and mounting procedures of ASTM E2231. Pipe and duct insulation shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250°F(121°C). Pipe and duct insulation shall be listed and labeled. Pipe and duct insulation shall not be used to reduce the maximum flame spread and smoke-developed indexes specified in Section 602.2.1.7 except where tested as a composite assembly of the pipe, tubing, insulation, coatings and adhesives in accordance with ASTM E84 or UL 723.

Reason:

Fire walls, partitions, and similar protective assemblies are tested as composite assemblies, not as individual components. It is critical to have the best understanding possible of how an installed system will perform in the field which equates to replicating those conditions, especially in a plenum. This proposal clarifies that when materials do not meet minimum plenum safety requirements, simply covering them with plenum rated insulation may not be adequate protection, depending on the properties of the material being protected. Some insulation manufacturers market insulation materials for plenums, utilizing a "modified" E84 test, yet the code does not have provisions to use modified tests. Although there are insulation products that meet the flame and smoke requirements for plenums, the materials wrapped within them may begin to degrade, deteriorate and off-gas toxic fumes and substances into plenum spaces due to the high heat, even when protected. This off-gas could result in potential health and life-safety issues for occupants and first responders. All materials within plenums must meet the minimum plenum criteria and the code specifically identifies the proper tests. The IMC does not currently allow for "modified" test procedures in plenums.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal clarifies that installations must meet the existing code provisions.

M71-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 602.2.1.8 Pipe and duct insulation within plenums.

Pipe and duct insulation contained within plenums, including insulation adhesives, shall have a flame spread index of not more than 25 and a smoke developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723, using the specimen preparation and mounting procedures of ASTM E2231. Pipe and duct insulation shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250°F(121°C). Pipe and duct insulation shall be listed and labeled. Pipe and duct insulation shall not be used to reduce the maximum flame spread and smoke-developed indexes ~~specified in Section 602.2.1.7~~ except where the pipe or duct and its related insulation, coatings, and adhesives are tested as a composite assembly in accordance with section 602.2.1.7. ~~of the pipe, ducts, tubing, insulation, coatings and adhesives in accordance with ASTM E84 or UL 723.~~

Committee Reason: Approval was based on the proponent's published reason statement. The modification references a code section instead of test standards. (Vote 11-0)

Assembly Action:

None

M71-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Charles Haack, representing North American Insulation Manufacturers Association (chaack@naima.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

602.2.1.8 Pipe and duct insulation within plenums. Pipe and duct insulation contained within plenums, including insulation adhesives, shall have a flame spread index of not more than 25 and a smoke developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723, using the specimen preparation and mounting procedures of ASTM E2231. Pipe and duct insulation shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411 at the temperature to which they are exposed in service. The test temperature shall not fall below ~~250°F(121°C)~~ 250°F(121°C). Pipe and duct insulation shall be listed and labeled. ~~Pipe~~ Where composite pipe and duct insulation assemblies are installed, they shall not be used to reduce the maximum flame spread and smoke-developed indexes except where the pipe or duct and its related insulation, coatings, and adhesives are tested ~~be tested~~ as a composite assembly in accordance with ~~section 602.2.1.7.~~ ASTM E84 or UL 723, and shall be listed for application in plenums.

Commenter's Reason: The proposed text is confusing and overly prescriptive. The purpose of evaluating composite pipe and duct insulation systems is not to reduce the maximum flame spread allowed under 602.2.1.7. The purpose is to comply with the flame spread and smoke developed requirements in Chapter 6 for use in plenums. Similar language is already contained in 602.2.1 Exception 5.3.

Also, identifying a list of components to be included in the composite assembly is overly prescriptive, and does not reflect all potential composite assemblies. For example, as written, it states that pipe and tubing shall be tested together, along with insulation, coatings and adhesives. Also, no mention is made of tapes. The additional language proposed here is derived from IMC 602.2.1 Exception 5.3.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The code change proposal will not increase or decrease the cost of construction. This proposal clarifies that installations must meet the existing code provisions.

M71-18

M72-18

IMC 607.4 (IBC 717.4)

Proposed Change as Submitted

Proponent: Joseph Sandman, representing self (josephs@fioptics.com)

THIS CODE CHANGE PROPOSAL HAS BEEN PLACED ON THE IBC-FS AGENDA. PLEASE SEE THE IBC-FS HEARING ORDER.

2018 International Mechanical Code

Revise as follows

[BF] 607.4 Access and identification. Fire and smoke dampers shall be provided with an *approved* means of access, ~~large enough~~ to permit inspection and maintenance of the damper and its operating parts. Dampers equipped with fusible links, internal operators, or both shall be provided with an access door that is not less than 12 inches (305mm) square or provided with a removable duct section. The access shall not affect the integrity of fire-resistance-rated assemblies. The access openings shall not reduce the fire-resistance rating of the assembly. Access points shall be permanently identified on the exterior by a label having letters not less than 0.5 inch (12.7 mm) in height reading: FIRE/SMOKE DAMPER, SMOKE DAMPER or FIRE DAMPER. Access doors in ducts shall be tight fitting and suitable for the required duct construction.

Reason: Fire and smoke dampers are an important part of a HVAC ductwork system, in the event of a fire they are designed to close and prevent the spread of fire and smoke throughout the building duct work system, giving the building occupants enough time to evacuate and also providing the fire department sufficient time to enter the building and extinguish the fire safely.

The NFPA requires all fire and smoke dampers be periodically inspected, maintained and tested per their guidelines to assure these dampers function properly in the event of a fire.

The NFPA requires that fire and smoke dampers are inspected and maintained through an access door that provides full unobstructed access to these dampers. These access doors are mounted on the ductwork as close as possible to the damper. Access doors work well for large fire and smoke dampers because the ductwork size is large enough to except an adequate sized access door, the problem is with the smaller fire and smoke dampers, the ductwork is too small to mount an adequate size access door. NFPA 80 addresses this problem by mandating the minimum size access door shall be no smaller than 12 inch square or you must supply a removable ductwork section, this removable section provides the technician performing the inspection with the unobstructed access needed to properly inspect and maintain the smaller fire and smoke dampers.

Our concerns are with the smaller fire and smoke dampers, because in many cases the removable ductwork sections for these dampers are not being provided as mandated by the NFPA 80, rather inadequate small access doors are being installed in the ductwork system next to the fire and smoke damper. Small access doors don't provide the access needed to properly inspect and maintain the fire and smoke dampers. The inadequacies of these access doors is nothing new in the HVAC industry, in many cases when it becomes time for the periodic damper inspections the maintenance technician will ignore and pass over the small fire and smoke dampers knowing that it's virtually impossible to perform the inspection through the access doors. We are asking for your help in addressing this problem, these fire and smoke dampers are much to important to be ignored, they save lives and countless dollars in property damage, the solutions are known they are just not being implemented.

My recommendation would be to adopt the National Fire Protection Association (NFPA) standards as set forth in NFPA 80 - **19.2.3 Access.** Dampers equipped with fusible links, internal operators, or both shall be provided with an access door that is not less than 12 in. (305mm) square or provided with a removable duct section.

Cost Impact: The code change proposal will not increase or decrease the cost of construction The proposed change will reduce the time for inspecting and servicing fire dampers by 50%.

M72-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The proposal increases ability to inspect and service dampers. Approval is consistent with recommendation for FS66-18. The proposed text is more enforceable because it states dimensions instead of "large enough." (Vote 14-0)

Assembly Action:

None

M72-18

Individual Consideration Agenda

Public Comment 1:

Proponent: William Koffel, representing Air Movement and Control Association (wkoffel@koffel.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

607.4 Access and identification. ~~Fire Access and identification of fire and smoke dampers shall be provided with an approved means of access, to permit inspection and maintenance of the damper and its operating parts. Dampers equipped with fusible links, internal operators, or both shall be provided with an access door that is not less than 12 inches (305mm) square or provided with a removable duct section. The access shall not affect the integrity of fire-resistance-rated assemblies. The access openings shall not reduce the fire-resistance-rating of the assembly. Access points shall be permanently identified on the exterior by a label having letters not less than 0.5 inch (12.7 mm) in height reading: FIRE/SMOKE DAMPER, SMOKE DAMPER or FIRE DAMPER. Access doors in ducts shall be tight fitting and suitable for the required duct construction.~~

comply with Sections 717.4.1 through 717.4.2.

607.4.1 Access Fire and smoke dampers shall be provided with an approved means of access that is large enough to permit inspection and maintenance of the damper and its operating parts. Dampers equipped with fusible links, internal operators, or both shall be provided with an access door that is not less than 12 inches (305 mm) square or provided with a removable duct section.

607.4.1.1 The access shall not affect the integrity of fire-resistance-rated assemblies. The access openings shall not reduce the fire-resistance-rating of the assembly. Access doors in ducts shall be tight fitting and suitable for the required duct construction.

607.4.1.2 Restricted Access Where space constraints or physical barriers restrict access to a damper for periodic inspection and testing, the damper shall be a single- or multi-blade damper and shall comply with the remote inspection requirements of NFPA 80 or NFPA 105.

607.4.2 Identification Access points shall be permanently identified on the exterior of a label having letters not less than 1/2 inch (12.7 mm) in height reading: FIRE/SMOKE DAMPER, SMOKE DAMPER or FIRE DAMPER.

Commenter's Reason: The Public Comment merely revises the IMC to be consistent with the Committee Recommendation for Approval as Modified for FS66-18. The Committee Reason Statement for M72-18 indicated the desire of the Committee to be consistent with the action on FS66-18. The proposed language in the Public Comment was not submitted as a modification during the Committee Action Hearings since I felt that it was substantive. However, I promised the Committee that a Public Comment would be submitted to make the IMC consistent with the IBC language resulting from the action on FS66-18.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The language is consistent with requirements proposed for the 2021 Edition of the IBC.

M72-18

M73-18

IMC: 602.2.1.7

Proposed Change as Submitted

Proponent: Marcelo Hirschler, GBH International, representing GBH International (gbhint@aol.com)

2018 International Mechanical Code

Revise as follows

602.2.1.7 Plastic plumbing piping and tubing. Plastic piping and tubing used in plumbing systems shall be listed and labeled as having a flame spread index not greater than 25 and a smoke-developed index not greater than 50 when tested in accordance with ASTM E84 or UL 723. The testing shall be conducted without water within the pipe.

Exception: Plastic water distribution piping and tubing listed and labeled in accordance with UL 2846 as having a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread distance not greater than 5 feet (1524 mm), and installed in accordance with its listing.

Reason: This proposal should be simple clarification but it highlights the fact that many approvals (even at ICC ES) are based on testing in accordance with a "modified" version of ASTM E84. One of the key modifications is the use of water within the pipes during testing. ASTM E84 does not authorize the use of water during testing of pipes (or of any other product). The reports indicate that a "modified" version of ASTM E84 has been used for the testing but that does not follow the intent (or the letter) of either ASTM E84 or the IMC. The intent of the use of products in plenums is for comparative testing of the products as received for inclusion in the plenum, and that does not include water.

This proposal has language very similar to that in M77 from the last cycle, and has the same effect. M77 was approved as submitted at the Public Comment hearing but failed in the Online Governmental Consensus Voting Process. I attach the full proposal and comment section for M77, with its associated information.

The language in M77 at the last cycle discussed the inclusion of "any liquid" within the pipe. The present proposal is more specific in that it states that it is not allowed to include water because that is the liquid that is being used. Note that fires in plenums typically occur during construction or renovation, when pipes are not full of water (or any other liquid). Note also that this section is generic for any plastic pipe in plenums and not exclusive to those carrying water.

The proposal was disapproved by the mechanical code committee because they felt it was not necessary for the code to clarify what is in the test standards. A variety of ICC ES approvals show that, in fact, products are being approved when tested with water, meaning that the clarification is important to ensure that there is an understanding that such "modifications" are not acceptable.

Cost Impact: The code change proposal will increase the cost of construction

The effect of this change is that some pipe materials that are in use today with incorrect fire testing and/or incorrect listings will have to be replaced in new construction by safer materials tested in proper accordance with ASTM E84.

M73-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval was based on the proponent's published reason statement. (Vote 10-1)

Assembly Action:

None

M73-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Michael Cudahy, representing self (mikec@cmservices.com)requests Disapprove.

Commenter's Reason: The inclusion of individual testing requirement language in parts of the code is not appropriate and was rejected during the previous cycle's Online Governmental Consensus Voting Process.

The appropriate venue to determine testing conditions is the standards, using the standards writing consensus process, monitored by the standards writing organizations and not during a brief code hearing discussion. Will we now include every potential test condition after every standard method listed anywhere in the code? Where does it end?

Leave it to the appropriate process. We again urge rejection.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

We are asking that the code not be changed, and no cost change could result.

Public Comment 2:

Proponent: Forest Hampton, representing Lubrizol Advanced Materials, Inc. (forest.hampton@lubrizol.com)requests Disapprove.

Commenter's Reason: A similar proposal, M77-18, adding standards language to this section of the code was ultimately defeated during the online governmental consensus vote in the last cycle. I urge the committee to uphold this consensus and disapprove this proposal and keep standards writing at ASTM and not in the code.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

My public comment removes the proposed new language and reverts the code language back to what it was in the 2018 code and therefore has no impact on cost.

Public Comment 3:

Proponent: DONALD SURRENA, NATIONAL ASSOCIATION OF HOME BUILDERS, representing National Association of Home Builders (dsurrena@nahb.org)requests Disapprove.

Commenter's Reason: Proponent is trying to put a lab requirement in an installation code. The proposal doesn't belong here. This requirement should be in standards that are mentioned but not in the code or be done by the manufacturer.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This requirement does not belong in the code, but should be in the standards or be done by the manufacturer.

M73-18

M74-18

IMC: 604.3

Proposed Change as Submitted

Proponent: Mike Fischer, Kellen Company, representing The Center for the Polyurethanes Industry of the American Chemistry Council (mfischer@kellencompany.com)

2018 International Mechanical Code

Revise as follows

604.3 Coverings and linings. ~~Coverings~~ Duct coverings and linings, including adhesives where used, shall have a flame spread index not more than 25 and a smoke-developed index not more than 50, when tested in accordance with ASTM E84 or UL 723, using the specimen preparation and mounting procedures of ASTM E2231. Duct coverings and linings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250°F (121°C). Coverings and linings shall be listed and labeled.

Exception: Polyurethane foam insulation that is spray applied to the exterior of ducts in attics and crawlspaces shall be subject to all of the following requirements:

1. The foam plastic insulation shall have a flame spread index not greater than 25 and a smoke developed index not greater than 450, when tested in accordance with ASTM E84 or UL 723, using the specimen preparation and mounting procedures of ASTM E2231.
2. The foam plastic insulation shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250°F (121°C).
3. The foam plastic insulation complies with the requirements of Section 2603 of the International Building Code.
4. The foam plastic insulation is protected against ignition in accordance with the requirements of Section 2603.4.1.6 of the International Building Code.

Reason: The proposal is the same as M98-15 PC1. M98 was approved as modified by the committee. PC1 was approved during the Public Comment hearing but failed to get the necessary majority in the online vote. The proposal adds an exception allowing a greater smoke-developed index for some applications of foam plastic insulation on the exterior surfaces of ducts in attics or crawlspaces under certain specified conditions. The exception applies only to foam insulation meeting the requirements of IBC Section 2603 and the ignition barrier requirements in IBC Section 2603.4.1.6. This additional option is consistent with the options in Section M1601.3 of the IRC.

Additionally, this proposal allows a reduction in stringency of the flame spread requirement under certain conditions- specifically it provides for the use of foam plastic insulation for duct coverings in a manner consistent with the provisions for foam plastics in crawlspaces using surface burning characteristics in IBC Section 2603, and the ignition barrier requirements of IBC 2603.4.1.6. The proposal also maintains the appropriate requirements for hot surface performance testing of ASTM C411.

Cost Impact: The code change proposal will decrease the cost of construction. The proposal will permit greater flexibility in material selection.

M74-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval was based on the proponent's published reason statement. (Vote 7-4)

Assembly Action:

None

M74-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Charles Haack, representing North American Insulation Manufacturers Association (chaack@naima.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

604.3 Coverings and linings. Duct coverings and linings, including adhesives where used, shall have a flame spread index not more than 25 and a smoke-developed index not more than 50, when tested in accordance with ASTM E84 or UL 723, using the specimen preparation and mounting procedures of ASTM E2231. Duct coverings and linings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411 at the temperature to which they are exposed in service. The test temperature shall not fall below ~~250°F-250 F (121°C121 C)~~. Coverings and linings shall be listed and labeled.

Exception: Polyurethane foam insulation that is spray applied to the exterior of ducts in attics and crawlspaces shall be subject to all of the following requirements:

1. The foam plastic insulation shall have a flame spread index not greater than 25 and a smoke developed index not greater than ~~450~~50, when tested in accordance with ASTM E84 or UL 723, using the specimen preparation and mounting procedures of ASTM E2231.
2. The foam plastic insulation shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411 at the temperature to which they are exposed in service. The test temperature shall not fall below ~~250°F-250 F (121°C121 C)~~.
3. The foam plastic insulation complies with the requirements of Section 2603 of the International Building Code.
4. The foam plastic insulation is protected against ignition in accordance with the requirements of Section 2603.4.1.6 of the International Building Code.
5. Coverings and linings shall be listed and labeled.

Commenter's Reason: This proposal allows a greater smoke developed index for spray applied foam plastics, without providing sufficient safeguards against smoldering combustion under fire exposure conditions. The ASTM C411 testing only addresses in-service conditions, not fire scenarios. The "hot surface temperature" in the test refers to the surface temperature of the pipe, not an ambient external fire which will have much higher temperatures.

Smoldering, which often occurs in combustible materials prior to ignition, can generate large quantities of smoke. One of the options permitted under 2603.4.1.6 (item 4 of this new exception) is "corrosion-resistant steel having a base metal thickness of 0.016 inch (0.4 mm);". While this might delay flaming ignition, it would expose the foamed plastics to much higher temperatures in an external fire condition.

In addition, the requirement for coverings and linings to be listed and labeled appears to have inadvertently been lost because the exemption is to the entire base requirement. It is restored here

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The code change proposal will not increase or decrease the cost of construction. This proposal clarifies that installations must meet the existing code provisions.

M74-18

M78-18 Part I

IMC: 602.1,

Proposed Change as Submitted

Proponent: Robert Schwarz, representing EnergyLogic, Inc. (robby@nrglogic.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IMC COMMITTEE AND PART II WILL BE HEARD BY THE IRC M/P COMMITTEE. PLEASE SEE THE HEARING ORDERS FOR THESE COMMITTEES.

2018 International Mechanical Code

Revise as follows

602.1 General. Supply, return, exhaust, relief and ventilation air plenums shall be limited to uninhabited crawl spaces, areas above a ceiling or below the floor, attic spaces, and mechanical equipment rooms, ~~and the framing cavities addressed in Section 602.3~~ Plenums shall be limited to one fire area. Air systems shall be ducted from the boundary of the fire area served directly to the air-handling equipment. Fuel-fired appliances shall not be installed within a

Delete without substitution

~~**602.3 Stud cavity and joist space plenums.** Stud wall cavities and the spaces between solid floor joists to be utilized as air plenums shall comply with the following conditions:~~

- ~~1. 1. Such cavities or spaces shall not be utilized as a *plenum* for supply air.~~
- ~~2. 2. Such cavities or spaces shall not be part of a required fire resistance rated assembly.~~
- ~~3. 3. Stud wall cavities shall not convey air from more than one floor level.~~
- ~~4. 4. Stud wall cavities and joist space plenums shall comply with the floor penetration protection requirements of the International Building Code.~~
- ~~5. 5. Stud wall cavities and joist space plenums shall be isolated from adjacent concealed spaces by *approved* fire blocking as required in the International Building Code.~~
- ~~6. 6. Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air plenums.~~

Reason: This code change proposal will create alignment between the IECC and the IMC as the IECC does not allow building cavities to be used as duct work that is seeing pressure from the air handling unit. It is impossible to control the air that is being pushed and pulled through building cavities that are used as ducts. When you pan a floor system for example, the air that is returning to the furnace comes from many more places than the room the intended. Air, having a tremendous ability to transport moisture, energy, and pollutants needs to be better controlled than is possible by using building cavities as duct work and therefore HVAC systems need to be fully ducted. The Energy Code recognizes the Building durability, efficiency, and safety concerns with gaining better control of air flow that is being pushed and pulled by the hair handling. Moisture control, energy control, pollutant control, house and room pressure control are all gained by fully ducting HVAC systems and not allowing building cavities to be used as duct work.

Cost Impact: The code change proposal will increase the cost of construction
This Code proposal will increase the code of construction because it will require fully ducted HVAC systems which improving durability, safety, and efficiency of the building we build

M78-18 Part I

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Stud wall cavities are currently allowed for interior walls. (Vote 10-1)

Assembly Action:

None

M78-18 Part I

Individual Consideration Agenda

Public Comment 1:

Proponent: Robert Schwarz, EnergyLogic, representing EnergyLogic, Inc. (robby@nrglogic.com); Shaunna Mozingo (sdmozingo@shaunnamozingo.com) requests As Submitted.

Commenter's Reason: The Committee's reason statement for disapproval stated that no evidence was provided that building cavities used as duct work cause a problem. In addition, they stated that air leakage in these cavities is within the thermal envelope, thus there is no loss. The Department of Energy (D.O.E.) has published statistics indicating that the average duct system leaks between 20% and 40%. This leakage is often connected directly to the outdoors causing pressure differentials in buildings that create building safety, durability, health, and efficiency issues.

When you google "Building Cavities as Ductwork" you find a number of articles from nationally recognized building scientist as well as trade groups, DOE, EnergyStar, code groups and others that all point out that utilizing building cavities to carry pressurize air from the supply or to the return side of the furnace is a bad idea. My original reason statement spoke to the reality of uncontrolled pressures in leaky building cavities and the fact that the Energy Code recognizes the building durability, efficiency, and safety concerns associated with uncontrolled air flow that is being pushed and pulled through building cavities by the air handling unit.

I have summarized these concerns and provided links to resources for the information listed below that supports and provides evidence that duct leakage through building cavities is a problem. I urge you to do your own research for I am sure you will conclude as I have that using a building cavity as the duct system in a building is more detrimental than beneficial. By simply installing a true duct in the cavity the issue is solved.

From the Building America Solution Center

Building Cavities Not Used as Supply or Return Ducts

- "Cavities (or interstitial spaces) within walls are also sometimes used as supply or return air pathways. These cavities often connect inside air with outside air from an attic or crawlspace. It is very difficult to make such cavity spaces airtight. When cavity spaces are used as return air pathways or supply air ducts, a few issues will arise. Because cavity spaces are leaky, building pressure imbalances across the building envelope will occur, driving building infiltration. A cavity space used as a return air pathway will pull pollutants into the building from unknown sources. Another issue (less talked about) with using cavity spaces as return air pathways is fire safety. Building materials such as wood products do not meet the flame and smoke spread criteria as do approved duct materials. Using cavities as return or supply ducts is not a fire hazard in itself but will encourage a fire to spread throughout the building. In humid climates, a cavity space used as a return air pathway will pull humid air into the cavity space, possibly encouraging mold or rotting of building materials."
- <https://bas.c.pnnl.gov/resource-guides/building-cavities-not-used-supply-or-return-ducts#quicktabs-guides=1>

Perhaps the Worst HVAC Duct Idea Ever — The Panned Joist Return,. Allison Bailes on August 18, 2011

- **"Panned joist return ducts are almost always terribly leaky. Those junctions between wood and metal are difficult to seal, and the thermal expansion and contraction of the wood will often cause sealing materials to fail."**
- <https://www.energyvanguard.com/blog/43723/Perhaps-the-Worst-HVAC-Duct-Idea-Ever-The-Panned-Joist-Return>

From Building Science Corporation:

Inf-801: What's Wrong With this Practice? Using unsealed wall cavities or panned floor joists as return plenum

- “The negatively pressurized cavities will draw air through any cracks to try to alleviate the pressure difference. This means that the return system will suck on the walls—and any contaminants that might be in the walls—and redistribute them to the living space. By negatively pressuring the walls in a hot-humid climate, warm humid air could be drawn into the walls from the exterior, and condensation is likely to occur on the cooler air-conditioned surfaces.”
- <https://buildingscience.com/documents/information-sheets/information-sheet-wrong-using-unsealed-wall-cavities-or-panned-floor-joists-as-return-plenium>

Info-603 Duct sealing

- “The only place air should be able to leave the supply duct system and the furnace or air handling unit is at the supply registers. The only place air should be able to enter the return duct system and the furnace or air handling unit is at the return grilles. A forced air system should be able to be pressure tested the way a plumber pressure tests a plumbing system for leaks. Builders don’t accept leaky plumbing systems, so they should not accept leaky duct systems.”
- <https://buildingscience.com/documents/information-sheets/information-sheet-duct-sealing>

DOE Building Technologies Program Study Measure Guideline: Sealing and Insulating of Ducts in Existing Homes

- One reason is that building cavities are very prone to air leakage: gaps in framing and/or drywall are very common, and many building cavities have electrical and plumbing penetrations. Using building cavities as ductwork on the return air side can also result in pollutants entering the air stream and being distributed throughout the home.
- Building Cavities are difficult to impossible to seal to the standards called for by the IECC.

“Duct leakage can also lead to pressure imbalances within homes. Such imbalances not only can affect comfort and efficiency but can also impact health and durability. In homes with some types of combustion equipment, for example, large return duct leaks in a basement system can cause negative pressures which, in turn, can interfere with proper draft. Under these conditions, exhaust gases can be sucked into the home. Other risks of pressure imbalances include buildup of moisture (and associated problems like mold) in parts of buildings.”

<https://www.nrel.gov/docs/fy12osti/53494.pdf>

Washington State University, “Improving Forced Air Heating Systems”

<https://docplayer.net/30025411-Supplement-a-improving-forced-air-heating-systems.html>

According to Energy Star: “Supply-side leakage to the outside can cause a negative pressure difference in the building with reference to outside. Return-side leakage, on the other hand, can cause a positive pressure difference in the building with reference to the outside. On average, such leakage can cause a 10% to 20% increase in heating and cooling energy use, along with a 20% to 50% decrease in heating and cooling equipment efficiency.”

In houses with forced-air heating and cooling systems, ducts are used to distribute conditioned air throughout the house. In a typical house, however, about 20 to 30 percent of the air that moves through the duct system is lost due to leaks, holes, and poorly connected ducts. The result is higher utility bills and difficulty keeping the house comfortable, no matter how the thermostat is set.

https://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_ducts

<http://www.norbord.com/na/blog/supply-or-return-ducting-in-building-cavities/>

Building Code Assistant Project

<https://bcapcodes.org/tools/code-builder/residential/ducts/>

U.S. Threatened by Leaky Ducts

<https://www.energy.gov/energysaver/articles/us-threatened-leaky-ducts>

DOE: Leaky Ducts are Top Energy Waster

<https://www.achrnews.com/articles/124595-doe-leaky-ducts-are-top-energy-waster>

Minimizing Energy Losses in Ducts

Ducts that leak heated air into unheated spaces can add hundreds of dollars a year to your heating and cooling bills, but you can reduce that loss by sealing and insulating your ducts.

<https://www.energy.gov/energysaver/minimizing-energy-losses-ducts>

Duct Leakage Can Create 3 Big Problems in Your Home

3 major effects that duct leakage can have on your home

- **1. Makes your home less efficient.** When your home has duct leaks, conditioned air escapes before it gets to your living spaces. This decreases your home's efficiency levels in two ways. First, your furnace and air conditioner waste energy on conditioning air that is never actually used. Second, your heating and cooling system has to work harder and longer to maintain your desired home temperature levels, which can severely increase operating costs.
- **2. Makes your home less comfortable.** Duct leakage makes it difficult for your home to heat and cool properly. Depending on where the leakage is located, some rooms might never receive enough conditioned air, which can create uneven temperature levels in your home. In addition, unconditioned air can leak into your ducts and alter your home's temperature levels.
- **3. Worsens your home's air quality.** Another side effect of unconditioned air leaking into your ducts is that it can worsen your home's air quality. That's because the air that leaks inside is unfiltered, and it can contain all sorts of contaminants. This is especially problematic when duct leaks occur in parts of your home that are commonly dusty (such as your attic).

<https://www.hydesac.com/duct-leakage-can-create-3-big-problems-in-your-home/>

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The code change proposal will increase the cost of construction. This Code proposal will increase the cost of construction because it will require fully ducted HVAC systems which improving durability, safety, and efficiency of the building we build

M78-18 Part I

M78-18 Part II

IRC: M1601.1.1

Proposed Change as Submitted

Proponent: Robert Schwarz, representing EnergyLogic, Inc. (robby@nrglogic.com)

2018 International Residential Code

Revise as follows

M1601.1.1 Above-ground duct systems. Above-ground *duct systems* shall conform to the following:

1. 1.*Equipment* connected to *duct systems* shall be designed to limit discharge air temperature to not greater than 250°F (121°C).
2. 2.Factory-made ducts shall be listed and labeled in accordance with UL 181 and installed in accordance with the manufacturer's instructions.
3. 3.Fibrous glass duct construction shall conform to the SMACNA *Fibrous Glass Duct Construction Standards* or NAIMA *Fibrous Glass Duct Construction Standards*.
4. 4.Field-fabricated and shop-fabricated metal and flexible duct constructions shall conform to the SMACNA HVAC *Duct Construction Standards—Metal and Flexible* except as allowed by Table M1601.1.1. Galvanized steel shall conform to ASTM A653.
5. 5.The use of gypsum products to construct return air ducts or plenums is permitted, provided that the air temperature does not exceed 125°F (52°C) and exposed surfaces are not subject to condensation.
6. 6.*Duct systems* shall be constructed of materials having a flame spread index of not greater than 200.
7. ~~7.Stud wall cavities and the spaces between solid floor joists to be used as air plenums shall comply with the following conditions:~~
8. ~~7.1.7.These cavities or spaces shall~~ Building framing cavities shall not be used as
a plenum for supply air.
 1. ~~7.2.These cavities or spaces shall not be part of a required fire resistance rated assembly.~~
 2. ~~7.3.Stud wall cavities shall not convey air from more than one floor level.~~
 3. ~~7.4.Stud wall cavities and joist space plenums shall be isolated from adjacent concealed spaces by tight-fitting fireblocking in accordance with Section R602.8.~~
 4. ~~7.5.Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air ducts or plenums.~~
9. 8.Volume dampers, equipment and other means of supply, return and exhaust air adjustment used in system balancing shall be provided with access.

Reason: There is a conflict in the International Residential code in chapter 11 and chapter 16. Chapter 11 states in section N1103.3.5 "Mandatory - Building framing cavities shall not be used as ducts or plenums". Chapter 16 as shown above is allowing air to travel in plenums uncontained by ductwork. This code change directly addresses this conflict by deleting confusing and conflicting language in number 7 of section M1601.1.1 and replacing it with the language that has been used successfully in another section of the code.

Air is a fluid like water is a fluid. Code will not stand for a plumbing system that leaks but allows a minimum level of duct leakage even though the air that is carried through the duct system carries heat, moisture, and pollutants that can be detrimental to the building occupant and the structure. Many have read the language in chapter 11 of the IRC in the last two cycles of the code to mean that both the supply side and the return side of an HVAC system need to be fully ducted. However, chapter 16 and the commentary has left a window of opportunity for contractors to continue to utilize building cavities for return air plenums that are directly carrying air from the furnace blower rather than a plenum that contains duct that contains the air from the air handling unit. To be crystal clear, this code change proposal is largely in response to that and is designed to confirm that all HVAC duct systems are fully ducted to ensure life safety, long term durability, cost effectiveness, comfort and efficiency as they are all impacted by air under pressure being forced through un-ducted building cavities.

A number of papers have been written about the decrease in efficiency and comfort as well as the increase in building durability issues and cost of ownership associated with air traveling through and out of un-ducted building cavities. Much of this air also is pulled into and out of the building due to the connection of the cavity to the outside or adjacent spaces such as garages and attics. Negative pressure is a significant issue for combustion safety is a home which is more likely to impact atmospherically vented appliances through the leakage associated with building cavities used as returns. For all of these reasons and more, all air pushed or pulled by an HVAC blower motors should be contained inside a sealed duct system. The duct system intern can be run through a plenum to the locating in a building it is supplying and returning from.

Cost Impact: The code change proposal will not increase or decrease the cost of construction

There is zero cost impact because the IECC and Chapter 11 of the IRC in section R403.3.5 /N1103.3.5 state "Mandatory - Building framing cavities shall not be used as ducts or plenums". In addition, the Applicability/General section of all codes states "..... Where, in any specific case, different sections of this code specify different materials, methods of construction, or other requirements, the most restrictive shall govern." Since building cavities cannot be used as ducts or plenums then any cost associated with this construction practice should have already been absorbed.

M78-18 Part II

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: No evidence was provided that these cavities cause a problem. Air leakage in these cavities is within the thermal envelope, thus there is no loss. (Vote 10-0)

Assembly Action:

None

M78-18 Part II

Individual Consideration Agenda

Public Comment 1:

Proponent: Robert Schwarz, EnergyLogic, representing EnergyLogic, Inc. (robby@nrglogic.com); Shaunna Mozingo (sdmozingo@shaunnamozingo.com) requests As Submitted.

Commenter's Reason: The Committee's reason statement for disapproval stated that no evidence was provided that building cavities used as duct work cause a problem. In addition, they stated that air leakage in these cavities is within the thermal envelope, thus there is no loss. The Department of Energy (D.O.E.) has published statistics indicating that the average duct system leaks between 20% and 40%. This leakage is often connected directly to the outdoors causing pressure differentials in buildings that create building safety, durability, health, and efficiency issues.

When you google "Building Cavities as Ductwork" you find a number of articles from nationally recognized building scientist as well as trade groups, DOE, EnergyStar, code groups and others that all point out that utilizing building cavities to carry pressurize air from the supply or to the return side of the furnace is a bad idea. My original reason statement spoke to the reality of uncontrolled pressures in leaky building cavities and the fact that the Energy Code recognizes the building durability, efficiency, and safety concerns associated with uncontrolled air flow that is being pushed and pulled through building cavities by the air handling unit.

I have summarized these concerns and provided links to resources for the information listed below that supports and provides evidence that duct leakage through building cavities is a problem. I urge you to do your own research for I am sure you will conclude as I have that using a building cavity as the duct system in a building is more detrimental than beneficial. By simply installing a true duct in the cavity the issue is solved.

From the Building America Solution Center

Building Cavities Not Used as Supply or Return Ducts

- "Cavities (or interstitial spaces) within walls are also sometimes used as supply or return air pathways. These cavities often connect inside air with outside air from an attic or crawlspace. It is very difficult to make such cavity spaces airtight. When cavity spaces are used as return air pathways or supply air ducts, a few issues will arise. Because cavity spaces are leaky, building pressure imbalances across the building envelope will occur, driving building infiltration. A cavity space used as a return air pathway will pull pollutants into the building from unknown sources. Another issue (less talked about) with using cavity spaces as return air pathways is fire safety. Building materials such as wood products do not meet the flame and smoke spread criteria as do approved duct materials. Using cavities as return or supply ducts is not a fire hazard in itself but will encourage a fire to spread throughout the building. In humid climates, a cavity space used as a return air pathway will pull humid air into the cavity space, possibly encouraging mold or rotting of building materials."
- <https://basc.pnnl.gov/resource-guides/building-cavities-not-used-s-supply-or-return-ducts#quicktabs-guides=1>

Perhaps the Worst HVAC Duct Idea Ever — The Panned Joist Return,. Allison Bailes on August 18, 2011

- "Panned joist return ducts are almost always terribly leaky. Those junctions between wood and metal are difficult to seal, and the thermal expansion and contraction of the wood will often cause sealing materials to fail."
- <https://www.energyvanguard.com/blog/43723/Perhaps-the-Worst-HVAC-Duct-Idea-Ever-The-Panned-Joist-Return>

From Building Science Corporation:

Inf-801: What's Wrong With this Practice? Using unsealed wall cavities or panned floor joists as return plenum

- “The negatively pressurized cavities will draw air through any cracks to try to alleviate the pressure difference. This means that the return system will suck on the walls—and any contaminants that might be in the walls—and redistribute them to the living space. By negatively pressuring the walls in a hot-humid climate, warm humid air could be drawn into the walls from the exterior, and condensation is likely to occur on the cooler air-conditioned surfaces.”
- <https://buildingscience.com/documents/information-sheets/information-sheet-wrong-using-unsealed-wall-cavities-or-panned-floor-joists-as-return-plenium>

Info-603 Duct sealing

- “The only place air should be able to leave the supply duct system and the furnace or air handling unit is at the supply registers. The only place air should be able to enter the return duct system and the furnace or air handling unit is at the return grilles. A forced air system should be able to be pressure tested the way a plumber pressure tests a plumbing system for leaks. Builders don’t accept leaky plumbing systems, so they should not accept leaky duct systems.”
- <https://buildingscience.com/documents/information-sheets/information-sheet-duct-sealing>

DOE Building Technologies Program Study Measure Guideline: Sealing and Insulating of Ducts in Existing Homes

- One reason is that building cavities are very prone to air leakage: gaps in framing and/or drywall are very common, and many building cavities have electrical and plumbing penetrations. Using building cavities as ductwork on the return air side can also result in pollutants entering the air stream and being distributed throughout the home.
- Building Cavities are difficult to impossible to seal to the standards called for by the IECC.

“Duct leakage can also lead to pressure imbalances within homes. Such imbalances not only can affect comfort and efficiency but can also impact health and durability. In homes with some types of combustion equipment, for example, large return duct leaks in a basement system can cause negative pressures which, in turn, can interfere with proper draft. Under these conditions, exhaust gases can be sucked into the home. Other risks of pressure imbalances include buildup of moisture (and associated problems like mold) in parts of buildings.”

<https://www.nrel.gov/docs/fy12osti/53494.pdf>

Washington State University, “Improving Forced Air Heating Systems”

<https://docplayer.net/30025411-Supplement-a-improving-forced-air-heating-systems.html>

According to Energy Star: “Supply-side leakage to the outside can cause a negative pressure difference in the building with reference to outside. Return-side leakage, on the other hand, can cause a positive pressure difference in the building with reference to the outside. On average, such leakage can cause a 10% to 20% increase in heating and cooling energy use, along with a 20% to 50% decrease in heating and cooling equipment efficiency.”

In houses with forced-air heating and cooling systems, ducts are used to distribute conditioned air throughout the house. In a typical house, however, about 20 to 30 percent of the air that moves through the duct system is lost due to leaks, holes, and poorly connected ducts. The result is higher utility bills and difficulty keeping the house comfortable, no matter how the thermostat is set.

https://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_ducts

<http://www.norbord.com/na/blog/supply-or-return-ducting-in-building-cavities/>

Building Code Assistant Project

<https://bcapcodes.org/tools/code-builder/residential/ducts/>

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Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The code change proposal will increase the cost of construction. This Code proposal will increase the cost of construction because it will require fully ducted HVAC systems which improving durability, safety, and efficiency of the building we build

M78-18 Part II

M81-18

IMC: SECTION 920.4 (New)

Proposed Change as Submitted

Proponent: John Williams, Chair, representing Healthcare Committee (AHC@iccsafe.org)

2018 International Mechanical Code

SECTION 920 UNIT HEATERS

920.1 General. Unit heaters shall be installed in accordance with the listing and the manufacturer's instructions. Oil-fired unit heaters shall be tested in accordance with UL 731.

920.2 Support. Suspended-type unit heaters shall be supported by elements that are designed and constructed to accommodate the weight and dynamic loads. Hangers and brackets shall be of noncombustible material. Suspended-type oil-fired unit heaters shall be installed in accordance with NFPA 31.

920.3 Ductwork. A unit heater shall not be attached to a warm-air duct system unless *listed* for such installation.

Add new text as follows

920.4 Prohibited Uses. In Group I-2 and ambulatory care facilities, suspended-type unit heaters are prohibited in corridors, exit access stairways and ramps, exit stairways and ramps and patient sleeping areas.

Reason: Suspended type heaters should not be in the means of egress because of the element of risk for these types of heaters, such as open flame, carbon monoxide and other products of combustion. Fuel being piped to these heaters could be an additional risk. The defend in place concept relies on the means of egress to temporarily house residents and patients (K523).

This proposal is submitted by the ICC Committee on Healthcare (CHC). The CHC was established by the ICC Board to evaluate and assess contemporary code issues relating to healthcare facilities. This is a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. In 2017 the CHC held 2 open meetings and numerous conference calls, *which included members of the committees as well as any interested parties, to discuss and debate the proposed changes.* Information on the CHC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CHC effort can be downloaded from the CHC website at: <https://www.iccsafe.org/codes-tech-support/cs/icc-committee-on-healthcare/>.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The elimination of this type of heater unit will not add cost to these types of facilities.

M81-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This aligns the IMC with health care regulations to avoid conflicts. (Vote 9-2)

Assembly Action:

None

M81-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

920.4 Prohibited Uses. In Group I-2 and ambulatory care facilities, suspended-type unit heaters are prohibited in corridors, exit access stairways and ramps, exit stairways and ramps and patient sleeping areas.

Exception: Electric unit heaters that meet applicable safety standards.

Commenter's Reason: This public comment provides a necessary exception. Electric unit heaters should not be banned.

Looking at the original reason statement, and at certain safety codes such as NFPA 101, the key concern is emissions and impact on indoor air quality. However, the current proposal bans electric unit heaters (with no emissions) as well. Electric unit heaters meet all applicable safety codes and do not produce any indoor air emissions. Therefore, they do not harm indoor air quality and should be allowed for use in these areas.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. If these electric unit heaters are allowed to be used, the costs will be increased compared to a situation where such unit heaters are banned. However, the areas will have to be heated by some sort of heating system, so there is a cost to run ductwork or piping to those areas.

M81-18

M88-18

IMC: Chapter 2, SECTION 202, 202, 202 (New), 202, Chapter 11, SECTION 1101, 1101.2, SECTION 1103, 1103.1, TABLE 1103.1, SECTION 1104, 1104.3, 1104.3.1, 1104.3.1.1 (New), 1104.3.1.1.1 (New), 1104.3.1.1.2 (New), 1104.3.1.1.3 (New), 1104.3.1.1.4 (New)

Proponent: Connor Barbaree, ASHRAE, representing ASHRAE (cbarbaree@ashrae.org)

2018 International Mechanical Code

CHAPTER 2 DEFINITIONS

SECTION 202 GENERAL DEFINITIONS

Revise as follows:

FLAMMABILITY CLASSIFICATION (REFRIGERANT). ~~Refrigerants shall be assigned to one of the three classes 1, 2 or 3 in accordance with ASHRAE 34. For Classes 2 and 3, the heat of combustion shall be calculated assuming that combustion products are in the gas phase and in their most stable state. The alphabetical/numerical designation used to identify the flammability of refrigerants.~~

Class 1. ~~Refrigerants that do not show flame propagation when tested in air at 14.7 psia (101 kPa) and 140°F (60°C). Indicates a refrigerant with no flame propagation.~~

Class 2L. Indicates a refrigerant with lower flammability and lower burning velocity.

Class 2. ~~Refrigerants having a lower flammability limit (LFL) of more than 0.00625 pound per cubic foot (0.10 kg/m³) at 140°F (60°C) and 14.7 psia (101 kPa) and a heat of combustion of less than 8169 Btu/lb (19 000 kJ/kg). Indicates a refrigerant with lower flammability.~~

Class 3. ~~Refrigerants that are highly flammable, having a LFL of less than or equal to 0.00625 pound per cubic foot (0.10 kg/m³) at 140°F (60°C) and 14.7 psia (101 kPa) or a heat of combustion greater than or equal to 8169 Btu/lb (19 000 kJ/kg). Indicates a refrigerant with higher flammability.~~

Add new definition as follows:

REFRIGERANT CONCENTRATION LIMIT (REFRIGERANT) (RCL) The refrigerant concentration limit, in air, intended to reduce the risks of acute toxicity, asphyxiation, and flammability hazards in normally occupied, enclosed spaces.

Revise as follows:

REFRIGERANT SAFETY CLASSIFICATIONS GROUP CLASSIFICATION. ~~Groupings that indicate the toxicity and flammability classes in accordance with Section 1103.1. The classification group is made up of a letter (A or B) that indicates the toxicity class, followed by a number (1, 2 or 3) that indicates the flammability class. Refrigerant blends are similarly classified, based on the compositions at their worst cases of fractionation, as separately determined for toxicity and flammability. In some cases, the worst case of fractionation is the original formulation. The alphabetical/numerical designation that indicates both toxicity and flammability classifications of refrigerants.~~

Toxicity. See "Toxicity classification (Refrigerant)."

Flammability. See "Flammability classification (Refrigerant)."

TOXICITY CLASSIFICATION-CLASSIFICATION (REFRIGERANT). ~~Refrigerants shall be classified for toxicity in one of two classes in accordance with ASHRAE 34: An alphabetical designation used to identify the toxicity of refrigerants. Class A indicates a refrigerant with lower toxicity. Class B indicates a refrigerant with higher toxicity.~~

CHAPTER 11 REFRIGERATION

SECTION 1101 GENERAL

1101.2 Factory-built equipment and appliances. *Listed and labeled* self-contained, factory-built *equipment* and appliances shall be tested in accordance with UL 207, 412, 471 ~~or 1995-, 484, 541, 1995, 60335-2-24, 60335-2-40 or 60335-2-89.~~ Such *equipment* and appliances are deemed to meet the design, manufacture and factory test requirements of this code if installed in accordance with their listing and the manufacturer's instructions.

SECTION 1103 REFRIGERATION SYSTEM CLASSIFICATION

1103.1 Refrigerant classification. Refrigerants shall be classified in accordance with ASHRAE 34 as listed in Table 1103.1. Each refrigerant shall be assigned to one of the following refrigerant safety group classifications: A1, A2L, A2, A3, B1, B2L, B2, or B3. For refrigerants that do not have values in Table 1103.1, the safety group, RCL value, and OEL value shall be determined in accordance with ASHRAE 34 and approved.

TABLE 1103.1

REFRIGERANT CLASSIFICATION, AMOUNT AND OEL

CHEMICAL REFRIGERANT	FORMULA	CHEMICAL NAME OF BLEND	REFRIGERANT SAFETY GROUP CLASSIFICATION	AMOUNT OF REFRIGERANT PER OCCUPIED SPACE				[F] DEGREES OF HAZARD ^a
				RCL			OEL ^e	
				lb per 1000 ft ³ Pounds per 1,000 cubic feet	ppm	g/m ³	ppm	
R-11 ^d	CCl ₃ F	trichlorofluoromethane	A1	0.39	1,100	6.2	C1,000	2-0-0 ^b
R-12 ^d	CCl ₂ F ₂	dichlorodifluoromethane	A1	5.6	18,000	90	1,000	2-0-0 ^b
R-13 ^d	CClF ₃	chlorotrifluoromethane	A1	—	—	—	1,000	2-0-0 ^b
R-13B1 ^d	CBrF ₃	bromotrifluoromethane	A1	—	—	—	1,000	2-0-0 ^b
R-14	CF ₄	tetrafluoromethane (carbon tetrafluoride)	A1	25	110,000	400	1,000	2-0-0 ^b
R-22	CHClF ₂	chlorodifluoromethane	A1	13	59,000	210	1,000	2-0-0 ^b
R-23	CHF ₃	trifluoromethane (fluoroform)	A1	7.3	41,000	120	1,000	2-0-0 ^b
R-30	CH ₂ Cl ₂	dichloromethane (methylene chloride)	B1	—	—	—	—	—
R-32	CH ₂ F ₂	difluoromethane (methylene fluoride)	A2L A2 ^f	4.8	36,000	77	1,000	1-4-0
R-40	CH ₃ Cl	chloromethane (methyl chloride)	B2	—	—	—	—	—
R-50	CH ₄	methane	A3	—	—	—	1,000	—
R-113 ^d	CCl ₂ FCClF ₂	1,1,2-trichloro-1,2,2-trifluoroethane	A1	1.2	2,600	20	1,000	2-0-0 ^b
R-114 ^d	CClF ₂ CClF ₂	1,2-dichloro-1,1,2,2-tetrafluoroethane	A1	8.7	20,000	140	1,000	2-0-0 ^b
R-115	CClF ₂ CF ₃	chloropentafluoroethane	A1	47	120,000	760	1,000	—
R-116	CF ₃ CF ₃	hexafluoroethane	A1	34	97,000	550	1,000	1-0-0
R-123	CHCl ₂ CF ₃	2,2-dichloro-1,1,1-trifluoroethane	B1	3.5	9,100	57	50	2-0-0 ^b
R-124	CHClFCF ₃	2-chloro-1,1,1,2-tetrafluoroethane	A1	3.5	10,000	56	1,000	2-0-0 ^b
R-125	CHF ₂ CF ₃	pentafluoroethane	A1	23	75,000	370	1,000	2-0-0 ^b
R-134a	CH ₂ FCF ₃	1,1,1,2-tetrafluoroethane	A1	13	50,000	210	1,000	2-0-0 ^b
R-141b	CH ₃ CCl ₂ F	1,1-dichloro-1-fluoroethane	—	0.78	2,600	12	500	2-1-0
R-142b	CH ₃ CClF ₂	1-chloro-1, 1-difluoroethane	A2	5.1	20,000	83	1,000	2-4-0
R-143a	CH ₃ CF ₃	1,1,1-trifluoroethane	A2L A2 ^f	4.5	21,000	70	1,000	2-0-0 ^b
R-152a	CH ₃ CHF ₂	1,1-difluoroethane	A2	2.0	12,000	32	1,000	1-4-0
R-170	CH ₃ CH ₃	ethane	A3	0.54	7,000	8.7	1,000	2-4-0
R-E170	CH ₃ OCH ₃	Methoxymethane (dimethyl ether)	A3	1.0	8,500	16	1,000	—
R-218	CF ₃ CF ₂ CF ₃	octafluoropropane	A1	43	90,000	690	1,000	2-0-0 ^b
R-227ea	CF ₃ CHFCF ₃	1,1,1,2,3,3,3-heptafluoropropane	A1	36	84,000	580	1,000	—
R-236fa	CF ₃ CH ₂ CF ₃	1,1,1,3,3,3-hexafluoropropane	A1	21	55,000	340	1,000	2-0-0 ^b
R-245fa	CHF ₂ CH ₂ CF ₃	1,1,1,3,3-pentafluoropropane	B1	12	34,000	190	300	2-0-0 ^b
R-290	CH ₃ CH ₂ CH ₃	propane	A3	0.56	5,300	9.5	1,000	2-4-0
R-C318	-(CF ₂) ₄ -	octafluorocyclobutane	A1	41	80,000	660	1,000	—
R-400 ^d	zeotrope	R-12/114 (50.0/50.0)	A1	10	28,000	160	1,000	2-0-0 ^b
R-400 ^d	zeotrope	R-12/114 (60.0/40.0)	A1	11	30,000	170	1,000	—
R-401A	zeotrope	R-22/152a/124 (53.0/13.0/34.0)	A1	6.6	27,000	110	1,000	2-0-0 ^b
R-401B	zeotrope	R-22/152a/124 (61.0/11.0/28.0)	A1	7.2	30,000	120	1,000	2-0-0 ^b
R-401C	zeotrope	R-22/152a/124 (33.0/15.0/52.0)	A1	5.2	20,000	84	1,000	2-0-0 ^b
R-402A	zeotrope	R-125/290/22 (60.0/2.0/38.0)	A1	17	66,000	270	1,000	2-0-0 ^b
R-402B	zeotrope	R-125/290/22 (38.0/2.0/60.0)	A1	15	63,000	240	1,000	2-0-0 ^b
R-403A	zeotrope	R-290/22/218 (5.0/75.0/20.0)	A2	7.6	33,000	120	1,000	2-0-0 ^b
R-403B	zeotrope	R-290/22/218 (5.0/56.0/39.0)	A1	18	70,000	290	1,000	2-0-0 ^b
R-404A	zeotrope	R-125/143a/134a (44.0/52.0/4.0)	A1	31	130,000	500	1,000	2-0-0 ^b

R-405A	zeotrope	R-22/152a/142b/C318 (45.0/7.0/5.5/2.5)	—	16	57,000	260	1,000	—
R-406A	zeotrope	R-22/600a/142b (55.0/4.0/41.0)	A2	4.7	21,000	25	1,000	—
R-407A	zeotrope	R-32/125/134a (20.0/40.0/40.0)	A1	19	83,000	300	1,000	2-0-0 ^b
R-407B	zeotrope	R-32/125/134a (10.0/70.0/20.0)	A1	21	79,000	330	1,000	2-0-0 ^b
R-407C	zeotrope	R-32/125/134a (23.0/25.0/52.0)	A1	18	81,000	290	1,000	2-0-0 ^b
R-407D	zeotrope	R-32/125/134a (15.0/15.0/70.0)	A1	16	68,000	250	1,000	2-0-0 ^b
R-407E	zeotrope	R-32/125/134a (25.0/15.0/60.0)	A1	17	80,000	280	1,000	2-0-0 ^b
R-407F	zeotrope	R-32/125/134a (30.0/30.0/40.0)	A1	20	95,000	320	1,000	—
R-408A	zeotrope	R-125/143a/22 (7.0/46.0/47.0)	A1	21	95,000	340	1,000	2-0-0 ^b
R-409A	zeotrope	R-22/124/142b (60.0/25.0/15.0)	A1	7.1	29,000	110	1,000	2-0-0 ^b
R-409B	zeotrope	R-22/124/142b (65.0/25.0/10.0)	A1	7.3	30,000	120	1,000	2-0-0 ^b
R-410A	zeotrope	R-32/125 (50.0/50.0)	A1	26	140,000	420	1,000	2-0-0 ^b
R-410B	zeotrope	R-32/125 (45.0/55.0)	A1	27	140,000	430	1,000	2-0-0 ^b
R-411A	zeotrope	R-127/22/152a (1.5/87.5/11.0)	A2	2.9	14,000	46	990	—
R-411B	zeotrope	R-1270/22/152a (3.0/94.0/3.0)	A2	2.8	13,000	45	980	—
R-412A	zeotrope	R-22/218/142b (70.0/5.0/25.0)	A2	5.1	22,000	82	1,000	—
R-413A	zeotrope	R-218/134a/600a (9.0/88.0/3.0)	A2	5.8	22,000	94	1,000	—
R-414A	zeotrope	R-22/124/600a/142b (51.0/28.5/4.0/16.5)	A1	6.4	26,000	100	1,000	—
R-414B	zeotrope	R-22/124/600a/142b (50.0/39.0/1.5/9.5)	A1	6.0	23,000	95	1,000	—
R-415A	zeotrope	R-22/152a (82.0/18.0)	A2	2.9	14,000	47	1,000	—
R-415B	zeotrope	R-22/152a (25.0/75.0)	A2	2.1	12,000	34	1,000	—
R-416A	zeotrope	R-134a/124/600 (59.0/39.5/1.5)	A1	3.9	14,000	62	1,000	2-0-0 ^b
R-417A	zeotrope	R-125/134a/600 (46.6/50.0/3.4)	A1	3.5	13,000	56	1,000	2-0-0 ^b
R-417B	zeotrope	R-125/134a/600 (79.0/18.3/2.7)	A1	4.3	15,000	70	1,000	—
R-417C	zeotrope	R-125/134a/600 (19.5/78.8/1.7)	A1	5.4	21,000	87	1,000	—
R-418A	zeotrope	R-290/22/152a (1.5/96.0/2.5)	A2	4.8	22,000	77	1,000	—
R-419A	zeotrope	R-125/134a/E170 (77.0/19.0/4.0)	A2	4.2	15,000	67	1,000	—
R-419B	zeotrope	R-125/134a/E170 (48.5/48.0/3.5)	A2	4.6	17,000	74	1,000	—
R-420A	zeotrope	R-134a/142b (88.0/12.0)	A1	12	45,000	190	1,000	2-0-0 ^b
R-421A	zeotrope	R-125/134a (58.0/42.0)	A1	17	61,000	280	1,000	2-0-0 ^b
R-421B	zeotrope	R-125/134a (85.0/15.0)	A1	21	69,000	330	1,000	2-0-0 ^b
R-422A	zeotrope	R-125/134a/600a (85.1/11.5/3.4)	A1	18	63,000	290	1,000	2-0-0 ^b
R-422B	zeotrope	R-125/134a/600a (55.0/42.0/3.0)	A1	16	56,000	250	1,000	2-0-0 ^b
R-422C	zeotrope	R-125/134a/600a (82.0/15.0/3.0)	A1	18	62,000	290	1,000	2-0-0 ^b
R-422D	zeotrope	R-125/134a/600a (65.1/31.5/3.4)	A1	16	58,000	260	1,000	2-0-0 ^b
R-422E	zeotrope	R-125/134a/600a (58.0/39.3/2.7)	A1	16	57,000	260	1,000	—
R-423A	zeotrope	R-134a/227ea (52.5/47.5)	A1	19	59,000	310	1,000	2-0-0 ^c
R-424A	zeotrope	R-125/134a/600a/600/601a (50.5/47.0/0.9/1.0/0.6)	A1	6.2	23,000	100	970	2-0-0 ^b
R-425A	zoetrope	R-32/134a/227ea (18.5/69.5/12.0)	A1	16	72,000	260	1,000	2-0-0 ^b
R-426A	zeotrope	R-125/134a/600a/601a (5.1/93.0/1.3/0.6)	A1	5.2	20,000	83	990	—
R-427A	zeotrope	R-32/125/143a/134a (15.0/25.0/10.0/50.0)	A1	18	79,000	290	1,000	2-1-0
R-428A	zeotrope	R-125/143a/290/600a (77.5/20.0/0.6/1.9)	A1	23	83,000	370	1,000	—

R-429A	zeotrope	R-E170/152a/600a (60.0/10.0/30.0)	A3	0.81	6,300	13	1,000	—
R-430A	zeotrope	R-152a/600a (76.0/24.0)	A3	1.3	8,000	21	1,000	—
R-431A	zeotrope	R-290/152a (71.0/29.0)	A3	0.69	5,500	11	1,000	—
R-432A	zeotrope	R-1270/E170 (80.0/20.0)	A3	0.13	1,200	2.1	700	—
R-433A	zeotrope	R-1270/290 (30.0/70.0)	A3	0.34	3,100	5.5	880	—
R-433B	zeotrope	R-1270/290 (5.0-95.0)	A3	0.51	4,500	8.1	950	—
R-433C	zeotrope	R-1270/290 (25.0-75.0)	A3	0.41	3,600	6.6	790	—
R-434A	zeotrope	R-125/143a/600a (63.2/18.0/16.0/2.8)	A1	20	73,000	320	1,000	—
R-435A	zeotrope	R-E170/152a (80.0/20.0)	A3	1.1	8,500	17	1,000	—
R-436A	zeotrope	R-290/600a (56.0/44.0)	A3	0.50	4,000	8.1	1,000	—
R-436B	zeotrope	R-290/600a (52.0/48.0)	A3	0.51	4,000	8.1	1,000	—
R-437A	zeotrope	R-125/134a/600/601 (19.5/78.5/1.4/0.6)	A1	5.0	19,000	82	990	—
R-438A	zeotrope	R-32/125/134a/600/601a (8.5/45.0/44.2/1.7/0.6)	A1	4.9	20,000	79	990	—
R-439A	zeotrope	R-32/125/600a (50.0/47.0/3.0)	A2	4.7	26,000	76	990	—
R-440A	zeotrope	R-290/134a/152a (0.6/1.6/97.8)	A2	1.9	12,000	31	1,000	—
R-441A	zeotrope	R-170/290/600a/600 (3.1/54.8/6.0/36.1)	A3	0.39	3,200	6.3	1,000	—
R-442A	zeotrope	R-32/125/134a/152a/227ea (31.0/31.0/30.0/3.0/5.0)	A1	21	100,000	330	1,000	—
R-443A	zeotrope	R-1270/290/600a (55.0/40.0/5.0)	A3	0.19	1,700	3.1	580	—
R-444A	zeotrope	R-32/152a/1234ze(E) (12.0/5.0/83.0)	A2L A2 ^f	5.1	21,000	81	850	—
R-444B	zeotrope	R-32/152a/1234ze(E) (41.5/10.0/48.5)	A2L A2 ^f	4.3	23,000	69	890	—
R-445A	zeotrope	R-744/134a/1234ze(E) (6.0/9.0/85.0)	A2L A2 ^f	4.2	16,000	67	930	—
R-446A	zeotrope	R-32/1234ze(E)/600 (68.0/29.0/3.0)	A2L A2 ^f	2.5	16,000	39	960	—
R-447A	zeotrope	R-32/125/1234ze(E) (68.0/3.5/28.5)	A2L A2 ^f	2.6	16,000	42	900	—
R-448A	zeotrope	R-32/125/1234yf/134a/1234ze(E) (26.0/26.0/20.0/21.0/7.0)	A1	24	110,000	390	890	—
R-449A	zeotrope	R-32/125/1234yf/134a (24.3/24.7/25.3/25.7)	A1	23	100,000	370	830	—
R-450A	zeotrope	R-134a/1234ze(E) (42.0/58.0)	A1	20	72,000	320	880	—
R-451A	zeotrope	R-1234yf/134a (89.8/10.2)	A2L A2 ^f	5.3	18,000	81	520	—
R-451B	zeotrope	R-1234yf/134a (88.8/11.2)	A2L A2 ^f	5.3	18,000	81	530	—
R-452A	zeotrope	R-32/125/1234yf (11.0/59.0/30.0)	A1	27	100,000	440	780	—
R-500 ^e	azeotrope	R-12/152a (73.8/26.2)	A1	7.6	30,000	120	1,000	2-0-0 ^b
R-501 ^d	azeotrope	R-22/12 (75.0/25.0)	A1	13	54,000	210	1,000	—
R-502 ^e	azeotrope	R-22/115 (48.8/51.2)	A1	21	73,000	330	1,000	2-0-0 ^b
R-503 ^e	azeotrope	R-23/13 (40.1/59.9)	—	—	—	—	1,000	2-0-0 ^b
R-504 ^d	azeotrope	R-32/115 (48.2/51.8)	—	28	140,000	450	1,000	—
R-507A	azeotrope	R-125/143a (50.0/50.0)	A1	32	130,000	520	1,000	2-0-0 ^b
R-508A	azeotrope	R-23/116 (39.0/61.0)	A1	14	55,000	220	1,000	2-0-0 ^b
R-508B	azeotrope	R-23/116 (46.0/54.0)	A1	13	52,000	200	1,000	2-0-0 ^b
R-509A	azeotrope	R-22/218 (44.0/56.0)	A1	24	75,000	390	1,000	2-0-0 ^b
R-510A	azeotrope	R-E170/600a (88.0/12.0)	A3	0.87	7,300	14	1,000	—
R-511A	azeotrope	R-290/E170 (95.0/5.0)	A3	0.59	5,300	9.5	1,000	—
R-512A	azeotrope	R-134a/152a (5.0/95.0)	A2	1.9	11,000	31	1,000	—
R-513A	azeotrope	R-1234yf/134a (56.0/44.0)	A1	20	72,000	320	650	—
R-600	CH ₃ CH ₂ CH ₂ CH ₃	butane	A3	0.15	1,000	2.4	1,000	1-4-0
R-600a	CH(CH ₃) ₂ CH ₃	2-methylpropane (isobutane)	A3	0.59	4,000	9.6	1,000	2-4-0
R-601	CH ₃ CH ₂ CH ₂ CH ₂ CH ₃	pentane	A3	0.18	1,000	2.9	600	—
R-601a	(CH ₃) ₂ CHCH ₂ CH ₃	2-methylbutane (isopentane)	A3	0.18	1,000	2.9	600	—
R-610	ethoxyethane (ethyl ether)	CH ₃ CH ₂ OCH ₂ CH ₃	—	—	—	—	400	—
R-611	methyl formate	HCOOCH ₃	B2	—	—	—	100	—

R-717	NH ₃	ammonia	<u>B2L</u> <u>B2^f</u>	0.014	320	0.22	25	3-3-0 ^c
R-718	H ₂ O	water	A1	—	—	—	—	0-0-0
R-744	CO ₂	carbon dioxide	A1	4.5	40,000	72	5,000	2-0-0 ^b
R-1150	CH ₂ =CH ₂	ethene (ethylene)	A3	—	—	—	200	1-4-2
R-1233zd(E)	CF ₃ CH=CHCl	trans-1-chloro-3,3,3-trifluoro-1-propene	A1	5.3	16,000	85	800	—
R-1234yf	CF ₃ CF=CH ₂	2,3,3,3-tetrafluoro-1 propene	<u>A2L</u> <u>A2^f</u>	4.7	16,000	75	500	—
R-1234ze(E)	CF ₃ CH=CHF	trans-1,3,3,3-tetrafluoro-1 -propene	<u>A2L</u> <u>A2^f</u>	4.7	16,000	75	800	—
R-1270	CH ₃ CH=CH ₂	Propene (propylene)	A3	0.1	1,000	1.7	500	1-4-1

For SI: 1 pound = 0.454 kg, 1 cubic foot = 0.0283m³

- a. Degrees of hazard are for health, fire, and reactivity, respectively, in accordance with NFPA 704.
- b. Reduction to 1-0-0 is allowed if analysis satisfactory to the code official shows that the maximum concentration for a rupture or full loss of refrigerant charge would not exceed the IDLH, considering both the refrigerant quantity and room volume.
- c. For installations that are entirely outdoors, use 3-1-0.
- d. Class I ozone depleting substance; prohibited for new installations.
- e. Occupational Exposure Limit based on the OSHA PEL, ACGIH TLV-TWA, the TERA WEEL or consistent value on a time-weighted average (TWA) basis (unless noted C for ceiling) for an 8 hr/d and 40 hr/wk. ~~The ASHRAE Standard 34 flammability classification for this refrigerant is 2L, which is a subclass of Class 2.~~

SECTION 1104 SYSTEM APPLICATION REQUIREMENTS

1104.3 Refrigerant restrictions. Refrigerant applications, maximum quantities and use shall be restricted in accordance with Sections 1104.3.1 through 1104.3.4.

1104.3.1 Air-conditioning for human comfort. In other than industrial occupancies where the quantity in a single independent circuit does not exceed the amount in Table 1103.1, Group B1, B2, ~~B2L~~ and B3 refrigerants shall not be used in high-probability systems for air-conditioning for human comfort. Refrigerating systems containing Group A2L refrigerants shall comply with Section 1104.3.1.1.

Add new text as follows:

1104.3.1.1 Group A2L Refrigerants. High-probability systems using Group A2L refrigerants for human comfort applications shall comply with Sections 1104.3.1.1.1 through 1104.3.1.1.4. Nonoccupiable spaces with refrigerant containing equipment, including piping, shall comply with the amounts indicated in Table 1103.1, except as permitted by Section 1104.3.1.1.3.

1104.3.1.1.1 Listing and Installation Requirements. Where required per Section 1104.3.1.1, refrigerating systems shall be listed, labeled, and installed in accordance with the manufacturer's instructions, and any markings on the equipment restricting the installation. The nameplate shall include a symbol indicating that a flammable refrigerant is used, as specified by the product listing. A label indicating that a flammable refrigerant is used shall be placed adjacent to service ports and other locations where service involving components containing refrigerant is performed, as specified by the product listing.

A refrigerant detector shall be provided in accordance with Section 1104.3.1.1.4 where one or more of the following conditions are met:

1. For Commercial, Public Assembly and Large Mercantile occupancies where the refrigerant charge of any independent circuit exceeds 22 lb (10 kg).
2. For Institutional and Residential occupancies where the refrigerant charge of any independent circuit exceeds 6.6 lb (3 kg).
3. Where using the provisions of Section 1104.3.1.1.3.
4. Where a refrigerant detector is required by the product listing.

When the refrigerant detector senses a rise in refrigerant concentration above the value specified in Section 1104.3.1.1.4, all of the following shall apply:

1. A minimum flow rate of supply air shall be provided in accordance with the following equation: $Q \geq 1001 \times M / LFL$, (for SI: $Q \geq 60000 \times M / LFL$), where Q is the supply air flow rate ft³/min (m³/h), M is the refrigerant charge lb (kg), and LFL is the lower flammability limit lb per 1000 ft³ (g/m³).
2. The compressor and all other electrical devices shall be turned off, excluding the control power transformers, control systems, and the supply air fan. The supply air fan shall continue to operate for not less than 5 minutes after the refrigerant detector has sensed a drop in the refrigerant concentration below the value specified in Section 1104.3.1.1.4.
3. Any device that controls air flow located within the product or in duct work that supplies air to the

occupied space shall be fully opened. Any device that controls air flow shall be listed.

4. Heaters and electrical devices located in the ductwork shall be turned off

1104.3.1.1.2 Ignition Sources. Open flame-producing devices shall not be permanently installed in the ductwork that serves the space. Continuously operating hot surfaces exceeding 1292°F (700°C) shall not be located within the ductwork that serves the space. Unclassified electrical devices shall not be located within the ductwork that serves the space.

1104.3.1.1.3 Refrigerant Containing Equipment Located Indoors. For refrigeration compressors and pressure vessels located in an indoor space that is accessible only during service and maintenance it shall be permissible to exceed the amounts indicated in Table 1103.1 where all of the following conditions apply:

Exceptions:

1. The largest single circuit charge does not exceed 6.6 lb (3 kg) for Residential and Institutional occupancies, and does not exceed 22 lb (10 kg) for C
2. The space where compressors and pressure vessels are located is provided with an air distribution system in accordance with the following equation: $Q \geq 1001 \times M / LFL$, (for SI: $Q \geq 60000 \times M / LFL$), where Q is the supply air flow rate ft³/min (m³/h), M is the refrigerant charge lb (kg), and LFL is the lower flammable limit lb per 1000 ft³ (g/m³).
3. Exhaust air is removed from the air distribution system at a minimum rate of 4 air changes per hour and the system has provisions for makeup air. Exhaust air that is removed from the air distribution system is either discharged outside of the building envelope, or discharged to an indoor space, provided that the refrigerant concentration will not exceed the amount indicated in Table 1103.1.
4. The air distribution system is started when the refrigerant detector senses refrigerant in accordance with Section 1104.3.1.1.4. The location of the refrigerant detector is in accordance with Section 1104.3.1.1.4. The air distribution system continues to operate for not less than 30 minutes after the refrigerant detector has sensed a drop in the refrigerant concentration below the value specified in Section 1104.3.1.1.4 (1.).
5. The inlet for return air to the air distribution system is located where refrigerant from a leak is expected to accumulate. The inlet elevation is within 12 inches (30 cm) of the lowest elevation in the space where the compressor or pressure vessel is located.
6. In addition to the requirements of Section 1104.3.1.1.2 there are no open flame producing devices or continuously operating hot surfaces exceeding 1292°F (700°C) that are located within space where the equipment is installed.

1104.3.1.1.4 Refrigerant Detectors.

Refrigerant detectors shall comply with all of the following:

1. The refrigerant detector set point to activate the functions required by Section 1104.3.1.1.1 shall be at a value not exceeding 25% of the lower flammable limit (LFL).
2. One or more refrigerant detectors shall be located such that refrigerant will be detected if the refrigerating system is operating, or not operating. For refrigerating systems that are connected to the occupied space through ductwork, refrigerant detectors shall be located within the listed equipment. For refrigerating systems that are directly connected to the occupied space without ductwork, the refrigerant detector shall be located in the equipment, or shall be located in the occupied space at a height of not more than 12 inches (30 cm) above the floor and within a horizontal distance of not more 3.3 ft (1.0 m) with a direct line of sight of the unit.
3. The refrigerant detector as installed, including any sampling tubes, shall cause the functions required by Section 1104.3.1.1.1 within a time not to exceed 10 seconds, after exposure to a refrigerant concentration exceeding 25% of the LFL.
4. The refrigerant detector shall provide a means for automatic operational self-test as provided in the product listing. Use of a refrigerant test gas is not required. If a failure is detected, a trouble alarm shall be activated and the actions required by Section 1104.3.1.1.1 shall be initiated.
5. The refrigerant detector shall be tested during installation to verify the alarm set point and response time as required by Section 1104.3.1.1.4 items 1 and 3. After installation, the refrigerant detector shall be tested to verify the alarm set point and response time annually or at an interval not exceeding the manufacturer's installation instructions, whichever is less.

Reason:

The proposed code changes include technical content based on ASHRAE Standard 34-2016 with Addendum G and ASHRAE Standard 15-2016 with Addendum D. The revisions in these two ASHRAE addenda are dependent and must be correlated as shown in this code change proposal. Upon publication, these addenda will be incorporated into the 2019 editions of ASHRAE 34 and ASHRAE 15.

There was a considerable amount of industry research into the use of flammable refrigerants that occurred in 2016 and 2017, following the announcement in June 2016 of a collaborative research effort between ASHRAE, AHRI, and US DOE. ASHRAE SSPC15 relied upon this body of knowledge in drafting the addenda to the 2016 edition of Standard 15.

The refrigerant safety group classification is an alphabetical/numerical designation that is used to identify both the toxicity and flammability classifications of a given refrigerant. There are two new safety group classifications added to ASHRAE 34: A2L and B2L. Previously 2L was a sub-class of class 2 as an interim measure to implement changes to refrigerant flammability classification into ASHRAE 34 prior to making associated changes to a future edition of ASHRAE 15; but now 2L is a separate class and safety requirements must be revised to distinguish between class 2 and class 2L.

The current definitions of “flammability classification” and “toxicity classification” are improper since both contain mandatory code requirements. The definitions should only define the term, not contain code requirements with the use of the word “shall.” The current definition of refrigerant safety classifications is incorrect due to revisions to ASHRAE 34. The attempt to define the technical requirements of flammability are not correct. ASHRAE 34 goes into extensive requirements as to how to test and classify a refrigerant regarding flammability. The code should leave the technical requirements to ASHRAE 34 which is accomplished in Section 1103.1. The definition only has to identify the meanings of the classification categories. These terms used are found in the body of ASHRAE 34. The addition of “refrigerant” to the term “flammability classification” and “toxicity classification” clarify that the definitions only apply to refrigerants. Flammability and toxicity are terms also used in the ventilation sections of the code. These definitions do not apply to the use of those terms in Chapter 5.

Additional UL standards are added in Section 1101.2, because without product safety standards that include provisions for equipment using Group A2L refrigerants, the proposal would have no means of implementation, since it relies upon the use of listed and labeled equipment. Rapid refrigerant detection of Group A2L flammable refrigerants, and air movement to enable rapid mixing of released refrigerant, are at the core of the requirements presented in this code proposal.

Bibliography:

Addendum G to ASHRAE Standard 34-2016

Addendum D ASHRAE Standard 15-2016

Cost Impact

The code change proposal will not increase or decrease the cost of construction .

While this proposal may introduce new requirements for A2L refrigerants, the type of refrigerant utilized within a building is up to the owner and designer. Therefore this proposal does not necessarily increase the cost of construction.

Internal ID: 1535

Public Hearing Results

Committee Action:

Disapproved

Committee Reason:

The ASHRAE 15 committee is still working on this text and should be allowed to complete its work before changing the code. (Vote 11-0)

Assembly Action:

None

M88-18

Individual Consideration Agenda

Public Comment 1:

Proponent:

Connor Barbaree, ASHRAE, representing ASHRAE (cbarbaree@ashrae.org) requests As Modified by This Public Comment

Modify as follows:

2018 International Mechanical Code

REFRIGERANT CONCENTRATION LIMIT (REFRIGERANT) (RCL) The refrigerant concentration limit, in air, intended to reduce the risks of acute toxicity, asphyxiation, and flammability hazards in normally occupied, enclosed spaces.

SECTION 1103 REFRIGERATION SYSTEM CLASSIFICATION

1103.1 Refrigerant classification.

Refrigerants shall be classified in accordance with ASHRAE 34 as listed in Table 1103.1. Each refrigerant shall be assigned to one of the following refrigerant safety group classifications: A1, A2L, A2, A3, B1, B2L, B2, or B3. For refrigerants that do not have values in Table 1103.1, the safety group, RCL value, and OEL value shall be determined in accordance with ASHRAE 34 and approved.

TABLE 1103.1

REFRIGERANT CLASSIFICATION, AMOUNT AND OEL

CHEMICAL REFRIGERANT	FORMULA	CHEMICAL NAME OF BLEND	REFRIGERANT	SAFETY GROUP CLASSIFICATION	AMOUNT OF REFRIGERANT PER OCCUPIED SPACE			
					RCL			OEL ^e
					lb per 1000 ft ³	ppm	g/m ³	
R-11 ^d	CCl ₃ F	trichlorofluoromethane	A1	0.39	1,100	6.2	C1,000	2-0-0 ^b
R-12 ^d	CCl ₂ F ₂	dichlorodifluoromethane	A1	5.6	18,000	90	1,000	2-0-0 ^b
R-13 ^d	CClF ₃	chlorotrifluoromethane	A1	-	-	-	1,000	2-0-0 ^b
R-13B1 ^d	CBrF ₃	bromotrifluoromethane	A1	-	-	-	1,000	2-0-0 ^b
R-14	CF ₄	tetrafluoromethane (carbon tetrafluoride)	A1	25	110,000	400	1,000	2-0-0 ^b
R-22	CHClF ₂	chlorodifluoromethane	A1	13	59,000	210	1,000	2-0-0 ^b
R-23	CHF ₃	trifluoromethane (fluoroform)	A1	7.3	41,000	120	1,000	2-0-0 ^b
R-30	CH ₂ Cl ₂	dichloromethane (methylene chloride)	B1	-	-	-	-	-
R-32	CH ₂ F ₂	difluoromethane (methylene fluoride)	A2L	4.8	36,000	77	1,000	1-4-0
R-40	CH ₃ Cl	chloromethane (methyl chloride)	B2	-	-	-	-	-
R-50	CH ₄	methane	A3	-	-	-	1,000	-
R-113 ^d	CCl ₂ FCClF ₂	1,1,2-trichloro-1,2,2-trifluoroethane	A1	1.2	2,600	20	1,000	2-0-0 ^b
R-114 ^d	CClF ₂ CClF ₂	1,2-dichloro-1,1,2,2-tetrafluoroethane	A1	8.7	20,000	140	1,000	2-0-0 ^b
R-115	CClF ₂ CF ₃	chloropentafluoroethane	A1	47	120,000	760	1,000	-
R-116	CF ₃ CF ₃	hexafluoroethane	A1	34	97,000	550	1,000	1-0-0
R-123	CHCl ₂ CF ₃	2,2-dichloro-1,1,1-trifluoroethane	B1	3.5	9,100	57	50	2-0-0 ^b
R-124	CHClFCF ₃	2-chloro-1,1,1,2-tetrafluoroethane	A1	3.5	10,000	56	1,000	2-0-0 ^b
R-125	CHF ₂ CF ₃	pentafluoroethane	A1	23	75,000	370	1,000	2-0-0 ^b
R-134a	CH ₂ FCF ₃	1,1,1,2-tetrafluoroethane	A1	13	50,000	210	1,000	2-0-0 ^b
R-141b	CH ₃ CCl ₂ F	1,1-dichloro-1-fluoroethane	-	0.78	2,600	12	500	2-1-0

R-142b	CH ₃ CClF ₂	1-chloro-1, 1-difluoroethane	A2	5.1	20,000	83	1,000	2-4-0
R-143a	CH ₃ CF ₃	1,1,1-trifluoroethane	A2L	4.5	21,000	70	1,000	2-0-0 ^b
R-152a	CH ₃ CHF ₂	1,1-difluoroethane	A2	2.0	12,000	32	1,000	1-4-0
R-170	CH ₃ CH ₃	ethane	A3	0.54	7,000	8.7	1,000	2-4-0
R-E170	CH ₃ OCH ₃	Methoxymethane (dimethyl ether)	A3	1.0	8,500	16	1,000	-
R-218	CF ₃ CF ₂ CF ₃	octafluoropropane	A1	43	90,000	690	1,000	2-0-0 ^b
R-227ea	CF ₃ CHFCF ₃	1,1,1,2,3,3,3-heptafluoropropane	A1	36	84,000	580	1,000	-
R-236fa	CF ₃ CH ₂ CF ₃	1,1,1,3,3,3-hexafluoropropane	A1	21	55,000	340	1,000	2-0-0 ^b
R-245fa	CHF ₂ CH ₂ CF ₃	1,1,1,3,3-pentafluoropropane	B1	12	34,000	190	300	2-0-0 ^b
R-290	CH ₃ CH ₂ CH ₃	propane	A3	0.56	5,300	9.5	1,000	2-4-0
R-C318	-(CF ₂) ₄ -	octafluorocyclobutane	A1	41	80,000	660	1,000	-
R-400 ^d	zeotrope	R-12/114 (50.0/50.0)	A1	10	28,000	160	1,000	2-0-0 ^b
R-400 ^d	zeotrope	R-12/114 (60.0/40.0)	A1	11	30,000	170	1,000	-
R-401A	zeotrope	R-22/152a/124 (53.0/13.0/34.0)	A1	6.6	27,000	110	1,000	2-0-0 ^b
R-401B	zeotrope	R-22/152a/124 (61.0/11.0/28.0)	A1	7.2	30,000	120	1,000	2-0-0 ^b
R-401C	zeotrope	R-22/152a/124 (33.0/15.0/52.0)	A1	5.2	20,000	84	1,000	2-0-0 ^b
R-402A	zeotrope	R-125/290/22 (60.0/2.0/38.0)	A1	17	66,000	270	1,000	2-0-0 ^b
R-402B	zeotrope	R-125/290/22 (38.0/2.0/60.0)	A1	15	63,000	240	1,000	2-0-0 ^b
R-403A	zeotrope	R-290/22/218 (5.0/75.0/20.0)	A2	7.6	33,000	120	1,000	2-0-0 ^b
R-403B	zeotrope	R-290/22/218 (5.0/56.0/39.0)	A1	18	70,000	290	1,000	2-0-0 ^b
R-404A	zeotrope	R-125/143a/134a (44.0/52.0/4.0)	A1	31	130,000	500	1,000	2-0-0 ^b
R-405A	zeotrope	R-22/152a/142b/C318 (45.0/7.0/5.5/2.5)	-	16	57,000	260	1,000	-
R-406A	zeotrope	R-22/600a/142b (55.0/4.0/41.0)	A2	4.7	21,000	25	1,000	-
R-407A	zeotrope	R-32/125/134a (20.0/40.0/40.0)	A1	19	83,000	300	1,000	2-0-0 ^b
R-407B	zeotrope	R-32/125/134a (10.0/70.0/20.0)	A1	21	79,000	330	1,000	2-0-0 ^b

R-407C	zeotrope	R-32/125/134a (23.0/25.0/52.0)	A1	18	81,000	290	1,000	2-0-0 ^b
R-407D	zeotrope	R-32/125/134a (15.0/15.0/70.0)	A1	16	68,000	250	1,000	2-0-0 ^b
R-407E	zeotrope	R-32/125/134a (25.0/15.0/60.0)	A1	17	80,000	280	1,000	2-0-0 ^b
R-407F	zeotrope	R-32/125/134a (30.0/30.0/40.0)	A1	20	95,000	320	1,000	-
R-408A	zeotrope	R-125/143a/22 (7.0/46.0/47.0)	A1	21	95,000	340	1,000	2-0-0 ^b
R-409A	zeotrope	R-22/124/142b (60.0/25.0/15.0)	A1	7.1	29,000	110	1,000	2-0-0 ^b
R-409B	zeotrope	R-22/124/142b (65.0/25.0/10.0)	A1	7.3	30,000	120	1,000	2-0-0 ^b
R-410A	zeotrope	R-32/125 (50.0/50.0)	A1	26	140,000	420	1,000	2-0-0 ^b
R-410B	zeotrope	R-32/125 (45.0/55.0)	A1	27	140,000	430	1,000	2-0-0 ^b
R-411A	zeotrope	R-127/22/152a (1.5/87.5/11.0)	A2	2.9	14,000	46	990	-
R-411B	zeotrope	R-1270/22/152a (3.0/94.0/3.0)	A2	2.8	13,000	45	980	-
R-412A	zeotrope	R-22/218/142b (70.0/5.0/25.0)	A2	5.1	22,000	82	1,000	-
R-413A	zeotrope	R-218/134a/600a (9.0/88.0/3.0)	A2	5.8	22,000	94	1,000	-
R-414A	zeotrope	R-22/124/600a/142b (51.0/28.5/4.0/16.5)	A1	6.4	26,000	100	1,000	-
R-414B	zeotrope	R-22/124/600a/142b (50.0/39.0/1.5/9.5)	A1	6.0	23,000	95	1,000	-
R-415A	zeotrope	R-22/152a (82.0/18.0)	A2	2.9	14,000	47	1,000	-
R-415B	zeotrope	R-22/152a (25.0/75.0)	A2	2.1	12,000	34	1,000	-
R-416A	zeotrope	R-134a/124/600 (59.0/39.5/1.5)	A1	3.9	14,000	62	1,000	2-0-0 ^b
R-417A	zeotrope	R-125/134a/600 (46.6/50.0/3.4)	A1	3.5	13,000	56	1,000	2-0-0 ^b
R-417B	zeotrope	R-125/134a/600 (79.0/18.3/2.7)	A1	4.3	15,000	70	1,000	-
R-417C	zeotrope	R-125/134a/600 (19.5/78.8/1.7)	A1	5.4	21,000	87	1,000	-
R-418A	zeotrope	R-290/22/152a (1.5/96.0/2.5)	A2	4.8	22,000	77	1,000	-
R-419A	zeotrope	R-125/134a/E170 (77.0/19.0/4.0)	A2	4.2	15,000	67	1,000	-
R-419B	zeotrope	R-125/134a/E170 (48.5/48.0/3.5)	A2	4.6	17,000	74	1,000	-
R-420A	zeotrope	R-134a/142b (88.0/12.0)	A1	12	45,000	190	1,000	2-0-0 ^b

R-421A	zeotrope	R-125/134a (58.0/42.0)	A1	17	61,000	280	1,000	2-0-0 ^b
R-421B	zeotrope	R-125/134a (85.0/15.0)	A1	21	69,000	330	1,000	2-0-0 ^b
R-422A	zeotrope	R-125/134a/600a (85.1/11.5/3.4)	A1	18	63,000	290	1,000	2-0-0 ^b
R-422B	zeotrope	R-125/134a/600a (55.0/42.0/3.0)	A1	16	56,000	250	1,000	2-0-0 ^b
R-422C	zeotrope	R-125/134a/600a (82.0/15.0/3.0)	A1	18	62,000	290	1,000	2-0-0 ^b
R-422D	zeotrope	R-125/134a/600a (65.1/31.5/3.4)	A1	16	58,000	260	1,000	2-0-0 ^b
R-422E	zeotrope	R-125/134a/600a (58.0/39.3/2.7)	A1	16	57,000	260	1,000	-
R-423A	zeotrope	R-134a/227ea (52.5/47.5)	A1	19	59,000	310	1,000	2-0-0 ^c
R-424A	zeotrope	R-125/134a/600a/600/601a (50.5/47.0/0.9/1.0/0.6)	A1	6.2	23,000	100	970	2-0-0 ^b
R-425A	zoetrope	R-32/134a/227ea (18.5/69.5/12.0)	A1	16	72,000	260	1,000	2-0-0 ^b
R-426A	zeotrope	R-125/134a/600a/601a (5.1/93.0/1.3/0.6)	A1	5.2	20,000	83	990	-
R-427A	zeotrope	R-32/125/143a/134a (15.0/25.0/10.0/50.0)	A1	18	79,000	290	1,000	2-1-0
R-428A	zeotrope	R-125/143a/290/600a (77.5/20.0/0.6/1.9)	A1	23	83,000	370	1,000	-
R-429A	zeotrope	R-E170/152a/600a (60.0/10.0/30.0)	A3	0.81	6,300	13	1,000	-
R-430A	zeotrope	R-152a/600a (76.0/24.0)	A3	1.3	8,000	21	1,000	-
R-431A	zeotrope	R-290/152a (71.0/29.0)	A3	0.69	5,500	11	1,000	-
R-432A	zeotrope	R-1270/E170 (80.0/20.0)	A3	0.13	1,200	2.1	700	-
R-433A	zeotrope	R-1270/290 (30.0/70.0)	A3	0.34	3,100	5.5	880	-
R-433B	zeotrope	R-1270/290 (5.0-95.0)	A3	0.51	4,500	8.1	950	-
R-433C	zeotrope	R-1270/290 (25.0-75.0)	A3	0.41	3,600	6.6	790	-
R-434A	zeotrope	R-125/143a/600a (63.2/18.0/16.0/2.8)	A1	20	73,000	320	1,000	-
R-435A	zeotrope	R-E170/152a (80.0/20.0)	A3	1.1	8,500	17	1,000	-
R-436A	zeotrope	R-290/600a (56.0/44.0)	A3	0.50	4,000	8.1	1,000	-
R-436B	zeotrope	R-290/600a (52.0/48.0)	A3	0.51	4,000	8.1	1,000	-
R-437A	zeotrope	R-125/134a/600/601 (19.5/78.5/1.4/0.6)	A1	5.0	19,000	82	990	-
R-438A	zeotrope	R-32/125/134a/600/601a (8.5/45.0/44.2/1.7/0.6)	A1	4.9	20,000	79	990	-
R-439A	zeotrope	R-32/125/600a (50.0/47.0/3.0)	A2	4.7	26,000	76	990	-
R-440A	zeotrope	R-290/134a/152a (0.6/1.6/97.8)	A2	1.9	12,000	31	1,000	-

R-441A	zeotrope	R-170/290/600a/600 (3.1/54.8/6.0/36.1)	A3	0.39	3,200	6.3	1,000	-
R-442A	zeotrope	R-32/125/134a/152a/227ea (31.0/31.0/30.0/3.0/5.0)	A1	21	100,000	330	1,000	-
R-443A	zeotrope	R-1270/290/600a (55.0/40.0/5.0)	A3	0.19	1,700	3.1	580	-
R-444A	zeotrope	R-32/152a/1234ze(E) (12.0/5.0/83.0)	A2L	5.1	21,000	81	850	-
R-444B	zeotrope	R-32/152a/1234ze(E) (41.5/10.0/48.5)	A2L	4.3	23,000	69	890	-
R-445A	zeotrope	R-744/134a/1234ze(E) (6.0/9.0/85.0)	A2L	4.2	16,000	67	930	-
R-446A	zeotrope	R-32/1234ze(E)/600 (68.0/29.0/3.0)	A2L	2.5	16,000	39	960	-
R-447A	zeotrope	R-32/125/1234ze(E) (68.0/3.5/28.5)	A2L	2.6	16,000	42	900	-
R-448A	zeotrope	R-32/125/1234yf/134a/1234ze(E) (26.0/26.0/20.0/21.0/7.0)	A1	24	110,000	390	890	-
R-449A	zeotrope	R-32/125/1234yf/134a (24.3/24.7/25.3/25.7)	A1	23	100,000	370	830	-
R-450A	zeotrope	R-134a/1234ze(E) (42.0/58.0)	A1	20	72,000	320	880	-
R-451A	zeotrope	R-1234yf/134a (89.8/10.2)	A2L	5.3	18,000	81	520	-
R-451B	zeotrope	R-1234yf/134a (88.8/11.2)	A2L	5.3	18,000	81	530	-
R-452A	zeotrope	R-32/125/1234yf (11.0/59.0/30.0)	A1	27	100,000	440	780	-
R-500 ^e	azeotrope	R-12/152a (73.8/26.2)	A1	7.6	30,000	120	1,000	2-0-0 ^b
R-501 ^d	azeotrope	R-22/12 (75.0/25.0)	A1	13	54,000	210	1,000	-
R-502 ^e	azeotrope	R-22/115 (48.8/51.2)	A1	21	73,000	330	1,000	2-0-0 ^b
R-503 ^e	azeotrope	R-23/13 (40.1/59.9)	-	-	-	-	1,000	2-0-0 ^b
R-504 ^d	azeotrope	R-32/115 (48.2/51.8)	-	28	140,000	450	1,000	-
R-507A	azeotrope	R-125/143a (50.0/50.0)	A1	32	130,000	520	1,000	2-0-0 ^b
R-508A	azeotrope	R-23/116 (39.0/61.0)	A1	14	55,000	220	1,000	2-0-0 ^b
R-508B	azeotrope	R-23/116 (46.0/54.0)	A1	13	52,000	200	1,000	2-0-0 ^b
R-509A	azeotrope	R-22/218 (44.0/56.0)	A1	24	75,000	390	1,000	2-0-0 ^b
R-510A	azeotrope	R-E170/600a (88.0/12.0)	A3	0.87	7,300	14	1,000	-
R-511A	azeotrope	R-290/E170 (95.0/5.0)	A3	0.59	5,300	9.5	1,000	-
R-512A	azeotrope	R-134a/152a (5.0/95.0)	A2	1.9	11,000	31	1,000	-

R-513A	azeotrope	R-1234yf/134a (56.0/44.0)	A1	20	72,000	320	650	-
R-600	CH ₃ CH ₂ CH ₂ CH ₃	butane	A3	0.15	1,000	2.4	1,000	1-4-0
R-600a	CH(CH ₃) ₂ CH ₃	2-methylpropane (isobutane)	A3	0.59	4,000	9.6	1,000	2-4-0
R-601	CH ₃ CH ₂ CH ₂ CH ₂ CH ₃	pentane	A3	0.18	1,000	2.9	600	-
R-601a	(CH ₃) ₂ CHCH ₂ CH ₃	2-methylbutane (isopentane)	A3	0.18	1,000	2.9	600	-
R-610	ethoxyethane (ethyl ether)	CH ₃ CH ₂ OCH ₂ CH ₃	-	-	-	-	400	-
R-611	methyl formate	HCOOCH ₃	B2	-	-	-	100	-
R-717	NH ₃	ammonia	B2L	0.014	320	0.2 2	25	3-3-0 ^c
R-718	H ₂ O	water	A1	-	-	-	-	0-0-0
R-744	CO ₂	carbon dioxide	A1	4.5	40,000	72	5,000	2-0-0 ^b
R-1150	CH ₂ =CH ₂	ethene (ethylene)	A3	-	-	-	200	1-4-2
R-1233zd(E)	CF ₃ CH=CHCl	trans-1-chloro-3,3,3-trifluoro-1-propene	A1	5.3	16,000	85	800	-
R-1234yf	CF ₃ CF=CH ₂	2,3,3,3-tetrafluoro-1-propene	A2L	4.7	16,000	75	500	-
R-1234ze(E)	CF ₃ CH=CHF	trans-1,3,3,3-tetrafluoro-1-propene	A2L	4.7	16,000	75	800	-
R-1270	CH ₃ CH=CH ₂	Propene (propylene)	A3	0.1	1,000	1.7	500	1-4-1

For SI: 1 pound = 0.454 kg, 1 cubic foot = 0.0283m³

- Degrees of hazard are for health, fire, and reactivity, respectively, in accordance with NFPA 704.
- Reduction to 1-0-0 is allowed if analysis satisfactory to the code official shows that the maximum concentration for a rupture or full loss of refrigerant charge would not exceed the IDLH, considering both the refrigerant quantity and room volume.
- For installations that are entirely outdoors, use 3-1-0.
- Class I ozone depleting substance; prohibited for new installations.
- Occupational Exposure Limit based on the OSHA PEL, ACGIH TLV-TWA, the TERA WEEL or consistent value on a time-weighted average (TWA) basis (unless noted C for ceiling) for an 8 hr/d and 40 hr/wk.

SECTION 1104 SYSTEM APPLICATION REQUIREMENTS

1104.3 Refrigerant restrictions.

Refrigerant applications, maximum quantities and use shall be restricted in accordance with Sections 1104.3.1 through 1104.3.4.

1104.3.1 Air-conditioning for human comfort.

In other than industrial occupancies where the quantity in a single independent circuit does not exceed the amount in Table 1103.1, Group B1, B2, B2L and B3 refrigerants shall not be used in high-probability systems for air-conditioning for human comfort. Refrigerating systems containing Group A2L refrigerants shall comply with Section 1104.3.1.1.

1104.3.1.1 Group A2L Refrigerants.

High-probability systems using Group A2L refrigerants for human comfort applications shall comply with Sections 1104.3.1.1.1 through 1104.3.1.1.4. Nonoccupiable spaces with refrigerant containing equipment, including piping, shall comply with the amounts indicated in Table 1103.1, except as permitted by Section 1104.3.1.1.3.

1104.3.1.1.1 Listing and Installation Requirements.

Where required per Section 1104.3.1.1, refrigerating systems shall be listed, labeled, and installed in accordance with the manufacturer's instructions, and any markings on the equipment restricting the installation. The nameplate shall include a symbol indicating that a flammable refrigerant is used, as specified by the product listing. A label indicating that a flammable refrigerant is used shall be placed adjacent to service ports and other locations where service involving components containing refrigerant is performed, as specified by the product listing. A refrigerant detector shall be provided in accordance with Section 1104.3.1.1.4 where ~~one or more of any of~~ the following conditions ~~are met~~ apply:

1. ~~1.~~ For Commercial, Public Assembly and Large Mercantile occupancies where the refrigerant charge of any independent circuit exceeds ~~22 lb (10 kg)~~.
2. ~~2.~~ For Institutional and Residential occupancies where ~~0.212 X LFL (lb) where LFL is in lb/1000 ft³ (6 X LFL (kg) where LFL is in KG/m³) unless the concentration of refrigerant in a complete discharge from any independent circuit will not exceed 50% of the RCL.~~
3. ~~2.~~ For Institutional occupancies.
4. ~~3.~~ For residential occupancies, where the refrigerant charge of any independent circuit exceeds ~~6.6 lb (3 kg)~~ ~~0.212 x LFL where LFL is in lb/1000 ft³ (6 x LFL where LFL is in kg/m³)~~.
5. ~~3-4.~~ Where using the provisions of Section 1104.3.1.1.3.
6. ~~4-5.~~ Where a refrigerant detector is required by the product listing.

~~When the refrigerant detector senses a rise in refrigerant concentration above the value specified in Section 1104.3.1.1.4, all of the following shall apply:~~

1. ~~1. A minimum flow rate of supply air shall be provided in accordance with the following equation: $Q \geq 1001 \times M / LFL$, (for SI: $Q \geq 60000 \times M / LFL$), where Q is the supply air flow rate ft³/min (m³/h), M is the refrigerant charge lb (kg), and LFL is the lower flammability limit lb per 1000 ft³ (g/m³).~~
2. ~~2. The compressor and all other electrical devices shall be turned off, excluding the control power transformers, control systems, and the supply air fan. The supply air fan shall continue to operate for not less than 5 minutes after the refrigerant detector has sensed a drop in the refrigerant concentration below the value specified in Section 1104.3.1.1.4.~~
3. ~~3. Any device that controls air flow located within the product or in duct work that supplies air to the occupied space shall be fully opened. Any device that controls air flow shall be listed.~~
4. ~~4. Heaters and electrical devices located in the ductwork shall be turned off~~

1104.3.1.1.1 Detector activation.

When the refrigerant detector senses a rise in refrigerant concentration above the value specified in Section 1104.3.1.1.4, all of the following shall apply:

1. 1. A minimum flow rate of supply air shall be provided in accordance with the following equation: $Q \geq 1001 \times M / LFL$, (for SI: $Q \geq 60000 \times M / LFL$), where Q is the supply air flow rate ft³/min (m³/h), M is the refrigerant charge lb (kg), and LFL is the lower flammability limit lb per 1000 ft³ (kg/m³).
2. 2. The compressor and all other electrical devices shall be turned off, excluding the control power transformers, control systems, and the supply air fan. The supply air fan shall continue to operate for not less than 5 minutes after the refrigerant detector has sensed a drop in the refrigerant concentration below the value specified in Section 1104.3.1.1.4.
3. 3. Any device that controls air flow located within the product or in duct work that supplies air to the occupied space shall be fully opened. Any device that controls air flow shall be listed.
4. 4. Heaters and electrical devices located in the ductwork shall be turned off. The heaters and electrical devices shall remain off for not less than 5 minutes after the refrigerant detector has sensed a drop in the refrigerant concentration below the value specified in Section 1104.3.1.1.4.

1104.3.1.1.2 Ignition Sources.

Open flame-producing devices shall not be permanently installed in the ductwork that serves the space. Continuously operating hot surfaces exceeding ~~4292~~ 1290°F (700°C) shall not be located within the ductwork that serves the space unless there is an airflow of not less than 200 feet per minute (1 m/s) across the heating device(s) and there is proof of airflow before the heating device(s) is energized. Unclassified electrical devices shall not be located within the ductwork that serves the space.

1104.3.1.1.3 Refrigerant Containing Equipment Located Indoors.

For refrigeration compressors and pressure vessels located in an indoor space that is accessible only during service and maintenance it shall be permissible to exceed the amounts indicated in Table 1103.1 where all of the following conditions apply:

Exceptions:

1. The largest single circuit charge does not exceed 6.6 lb (3 kg) for Residential and Institutional occupancies, and does not exceed 22 lb (10 kg) for [Commercial, Public Assembly and Large Mercantile occupancies](#).
2. The space where compressors and pressure vessels are located is provided with an air distribution system in accordance with the following equation: $Q \geq 4004 \frac{1000}{M} \times M / LFL$, (for SI: $Q \geq 60000 \times M / LFL$), where Q is the supply air flow rate ft³/min (m³/h), M is the refrigerant charge lb (kg), and LFL is the lower [flammable flammability](#) limit lb per 1000 ft³ (g/m³).
3. ~~Exhaust air is removed from the air distribution system at a minimum rate of 4 air changes per hour and the~~ [The air distribution](#) system has provisions for makeup air. Exhaust air that is removed from the air distribution system is either discharged outside of the building envelope, or discharged to an indoor space, provided that the refrigerant concentration will not exceed the amount indicated in Table 1103.1.
4. 1104.3.1.1.4.tribution system is started when the refrigerant detector senses refrigerant in accordance with Section 1104.3.1.1.4. The location of the refrigerant detector is in accordance with Section 1104.3.1.1.4. The air distribution system continues to operate for not less than 30 minutes after the refrigerant detector has sensed a drop in the refrigerant concentration below the value specified in Section 1104.3.1.1.4 (1.).
5. accumulate. for return air to the air distribution system is located where refrigerant from a leak is expected to accumulate. The inlet elevation is within 12 inches (30 cm) of the lowest elevation in the space where the compressor or pressure vessel is located.
6. In addition to the requirements of Section 1104.3.1.1.2 there are no open flame producing devices [that do not contain a flame arrestor](#) or continuously operating hot surfaces exceeding 1292°F (700°C) that are located within space where the equipment is installed.

1104.3.1.1.4 Refrigerant Detectors.

1. Refrigerant detectors shall comply with all of the following:
2. 1. The refrigerant detector set point to activate the functions required by Section 1104.3.1.1.1 [1](#) and [1104.3.1.1.3](#) shall be at a value not exceeding 25% of the lower [flammable flammability](#) limit (LFL).
3. 2. One or more refrigerant detectors shall be located such that refrigerant will be detected if the refrigerating system is operating, or not operating. For refrigerating systems that are connected to the occupied space through ductwork, refrigerant detectors shall be located within the listed equipment. For refrigerating systems that are directly connected to the occupied space without ductwork, the refrigerant detector shall be located in the equipment, or shall be located in the occupied

- space at a height of not more than 12 inches (30 cm) above the floor and within a horizontal distance of not more 3.3 ft (1.0 m) with a direct line of sight of the unit.
4. 3. The refrigerant detector as installed, including any sampling tubes, shall cause the functions required by Section 1104.3.1.1.1 within a time not to exceed ~~40~~ 15 seconds, ~~after exposure to a~~ when a refrigerant concentration ~~exceeding~~ exceeds 25% of the LFL.
 5. 4. The refrigerant detector shall provide a means for automatic operational self-test as provided in the product listing. Use of a refrigerant test gas is not required. If a failure is detected, a trouble alarm shall be activated and the actions required by Section 1104.3.1.1.1 shall be initiated.
 6. 5. The refrigerant detector shall be tested during installation to verify the alarm set point and response time as required by Section 1104.3.1.1.4 items 1 and 3. After installation, the refrigerant detector shall be tested to verify the alarm set point and response time annually or at an interval not exceeding the manufacturer's installation instructions, whichever is less.

Commenter's Reason:

During the first hearing ASHRAE requested that this change be rejected since the ASHRAE 15 Committee (SSPC 15) was still finalizing the requirements of Addendum d to ASHRAE 15 regarding the use of Group A2L refrigerants for high probability systems for human comfort. This proposed modification reflects the changes made by the Committee to ASHRAE 15 regarding A2L refrigerants. The acceptance of this change will result in the Mechanical Code being consistent with ASHRAE 15. It will also allow the expanded use of low global warming potential refrigerants.

The only definition included in this modification is the addition of the term, "REFRIGERANT CONCENTRATION LIMIT (REFRIGERANT) (RCL)" and revision to the term "Refrigerant Safety Classification". These two definitions are required by this change proposal. The other definitions in the original M88 are not absolutely required by this proposal, and were already added to the code in code change proposal M4-18, which was recommended for approval by the Committee.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This change would allow the use of A2L refrigerants in high probability systems. This is an option, not a requirement. Hence, there is no increase or decrease in the cost of construction.

M88-18

M93-18

IMC: 1101.1, 1101.1.1 (New), 1101.1.2 (New), 1101.6, TABLE 1103.1, 1104.2.2, 1104.3.3, 1104.3.4, 1105.6.3, 1105.8, 1105.9, 1106.3, 1106.4, 1108.2

Proponent: Jeffrey Shapiro, representing International Institute of Ammonia Refrigeration
(jeff.shapiro@intlcodeconsultants.com)

2018 International Mechanical Code

Revise as follows:

1101.1 Scope. This chapter shall govern the design, installation, construction and repair of refrigeration systems that vaporize and liquefy a fluid during the refrigerating cycle. ~~Refrigerant piping design and installation, including pressure vessels and pressure relief devices, shall conform to this code.~~ Permanently installed refrigerant storage systems and other components shall be considered as part of the refrigeration system to which they are attached.

Add new text as follows:

1101.1.1 Refrigerants other than ammonia. Refrigerant piping design and installation, including pressure vessels and pressure relief devices, for systems containing a refrigerant other than ammonia shall comply with this chapter and ASHRAE 15.

1101.1.2 Ammonia refrigerant. Refrigeration systems using ammonia as the refrigerant shall comply with IAR 2, IAR 3, IAR 4 and IAR 5, and shall not be required to comply with this chapter.

Delete without substitution:

~~**1101.6 General.** Refrigeration systems shall comply with the requirements of this code and, except as modified by this code, ASHRAE 15. Ammonia refrigerating systems shall comply with this code and, except as modified by this code, ASHRAE 15, IAR 2, IAR 3, IAR 4 and IAR 5.~~

Revise as follows:

TABLE 1103.1

REFRIGERANT CLASSIFICATION, AMOUNT AND OEL

CHEMICAL REFRIGERANT	FORMULA	CHEMICAL NAME OF BLEND	REFRIGERANT CLASSIFICATION	AMOUNT OF REFRIGERANT PER OCCUPIED SPACE				[F] DEGREES OF HAZARD ^a
				Pounds per 1,000 cubic feet	ppm	g/m ³	OEL ^e	
R-11 ^d	CCl ₃ F	trichlorofluoromethane	A1	0.39	1,100	6.2	C1,000	2-0-0 ^b
R-12 ^d	CCl ₂ F ₂	dichlorodifluoromethane	A1	5.6	18,000	90	1,000	2-0-0 ^b
R-13 ^d	CClF ₃	chlorotrifluoromethane	A1	—	—	—	1,000	2-0-0 ^b
R-13B1 ^d	CBrF ₃	bromotrifluoromethane	A1	—	—	—	1,000	2-0-0 ^b
R-14	CF ₄	tetrafluoromethane (carbon tetrafluoride)	A1	25	110,000	400	1,000	2-0-0 ^b
R-22	CHClF ₂	chlorodifluoromethane	A1	13	59,000	210	1,000	2-0-0 ^b
R-23	CHF ₃	trifluoromethane (fluoroform)	A1	7.3	41,000	120	1,000	2-0-0 ^b
R-30	CH ₂ Cl ₂	dichloromethane (methylene chloride)	B1	—	—	—	—	—
R-32	CH ₂ F ₂	difluoromethane (methylene fluoride)	A2 ^{fc}	4.8	36,000	77	1,000	1-4-0
R-40	CH ₃ Cl	chloromethane (methyl chloride)	B2	—	—	—	—	—
R-50	CH ₄	methane	A3	—	—	—	1,000	—
R-113 ^d	CCl ₂ FCClF ₂	1,1,2-trichloro-1,2,2-trifluoroethane	A1	1.2	2,600	20	1,000	2-0-0 ^b
R-114 ^d	CClF ₂ CClF ₂	1,2-dichloro-1,1,2,2-tetrafluoroethane	A1	8.7	20,000	140	1,000	2-0-0 ^b
R-115	CClF ₂ CF ₃	chloropentafluoroethane	A1	47	120,000	760	1,000	—
R-116	CF ₃ CF ₃	hexafluoroethane	A1	34	97,000	550	1,000	1-0-0
R-123	CHCl ₂ CF ₃	2,2-dichloro-1,1,1-trifluoroethane	B1	3.5	9,100	57	50	2-0-0 ^b
R-124	CHClFCF ₃	2-chloro-1,1,1,2-tetrafluoroethane	A1	3.5	10,000	56	1,000	2-0-0 ^b
R-125	CHF ₂ CF ₃	pentafluoroethane	A1	23	75,000	370	1,000	2-0-0 ^b
R-134a	CH ₂ FCF ₃	1,1,1,2-tetrafluoroethane	A1	13	50,000	210	1,000	2-0-0 ^b
R-141b	CH ₃ CCl ₂ F	1,1-dichloro-1-fluoroethane	—	0.78	2,600	12	500	2-1-0
R-142b	CH ₃ CClF ₂	1-chloro-1, 1-difluoroethane	A2	5.1	20,000	83	1,000	2-4-0
R-143a	CH ₃ CF ₃	1,1,1-trifluoroethane	A2 ^{fc}	4.5	21,000	70	1,000	2-0-0 ^b
R-152a	CH ₃ CHF ₂	1,1-difluoroethane	A2	2.0	12,000	32	1,000	1-4-0
R-170	CH ₃ CH ₃	ethane	A3	0.54	7,000	8.7	1,000	2-4-0
R-E170	CH ₃ OCH ₃	Methoxymethane (dimethyl ether)	A3	1.0	8,500	16	1,000	—
R-218	CF ₃ CF ₂ CF ₃	octafluoropropane	A1	43	90,000	690	1,000	2-0-0 ^b
R-227ea	CF ₃ CHFCF ₃	1,1,1,2,3,3,3-heptafluoropropane	A1	36	84,000	580	1,000	—
R-236fa	CF ₃ CH ₂ CF ₃	1,1,1,3,3,3-hexafluoropropane	A1	21	55,000	340	1,000	2-0-0 ^b
R-245fa	CHF ₂ CH ₂ CF ₃	1,1,1,3,3-pentafluoropropane	B1	12	34,000	190	300	2-0-0 ^b
R-290	CH ₃ CH ₂ CH ₃	propane	A3	0.56	5,300	9.5	1,000	2-4-0
R-C318	-(CF ₂) ₄ -	octafluorocyclobutane	A1	41	80,000	660	1,000	—
R-400 ^d	zeotrope	R-12/114 (50.0/50.0)	A1	10	28,000	160	1,000	2-0-0 ^b
R-400 ^d	zeotrope	R-12/114 (60.0/40.0)	A1	11	30,000	170	1,000	—
R-401A	zeotrope	R-22/152a/124 (53.0/13.0/34.0)	A1	6.6	27,000	110	1,000	2-0-0 ^b
R-401B	zeotrope	R-22/152a/124 (61.0/11.0/28.0)	A1	7.2	30,000	120	1,000	2-0-0 ^b
R-401C	zeotrope	R-22/152a/124 (33.0/15.0/52.0)	A1	5.2	20,000	84	1,000	2-0-0 ^b
R-402A	zeotrope	R-125/290/22 (60.0/2.0/38.0)	A1	17	66,000	270	1,000	2-0-0 ^b
R-402B	zeotrope	R-125/290/22 (38.0/2.0/60.0)	A1	15	63,000	240	1,000	2-0-0 ^b
R-403A	zeotrope	R-290/22/218 (5.0/75.0/20.0)	A2	7.6	33,000	120	1,000	2-0-0 ^b
R-403B	zeotrope	R-290/22/218 (5.0/56.0/39.0)	A1	18	70,000	290	1,000	2-0-0 ^b
R-404A	zeotrope	R-125/143a/134a (44.0/52.0/4.0)	A1	31	130,000	500	1,000	2-0-0 ^b
R-405A	zeotrope	R-22/152a/142b/C318 (45.0/7.0/5.5/2.5)	—	16	57,000	260	1,000	—
R-406A	zeotrope	R-22/600a/142b (55.0/4.0/41.0)	A2	4.7	21,000	25	1,000	—
R-407A	zeotrope	R-32/125/134a (20.0/40.0/40.0)	A1	19	83,000	300	1,000	2-0-0 ^b

R-407A	zeotrope	R-32/125/134a (20.0/40.0/40.0)	A1	19	83,000	300	1,000	2-0-0 ^b
R-407B	zeotrope	R-32/125/134a (10.0/70.0/20.0)	A1	21	79,000	330	1,000	2-0-0 ^b
R-407C	zeotrope	R-32/125/134a (23.0/25.0/52.0)	A1	18	81,000	290	1,000	2-0-0 ^b
R-407D	zeotrope	R-32/125/134a (15.0/15.0/70.0)	A1	16	68,000	250	1,000	2-0-0 ^b
R-407E	zeotrope	R-32/125/134a (25.0/15.0/60.0)	A1	17	80,000	280	1,000	2-0-0 ^b
R-407F	zeotrope	R-32/125/134a (30.0/30.0/40.0)	A1	20	95,000	320	1,000	—
R-408A	zeotrope	R-125/143a/22 (7.0/46.0/47.0)	A1	21	95,000	340	1,000	2-0-0 ^b
R-409A	zeotrope	R-22/124/142b (60.0/25.0/15.0)	A1	7.1	29,000	110	1,000	2-0-0 ^b
R-409B	zeotrope	R-22/124/142b (65.0/25.0/10.0)	A1	7.3	30,000	120	1,000	2-0-0 ^b
R-410A	zeotrope	R-32/125 (50.0/50.0)	A1	26	140,000	420	1,000	2-0-0 ^b
R-410B	zeotrope	R-32/125 (45.0/55.0)	A1	27	140,000	430	1,000	2-0-0 ^b
R-411A	zeotrope	R-127/22/152a (1.5/87.5/11.0)	A2	2.9	14,000	46	990	—
R-411B	zeotrope	R-1270/22/152a (3.0/94.0/3.0)	A2	2.8	13,000	45	980	—
R-412A	zeotrope	R-22/218/142b (70.0/5.0/25.0)	A2	5.1	22,000	82	1,000	—
R-413A	zeotrope	R-218/134a/600a (9.0/88.0/3.0)	A2	5.8	22,000	94	1,000	—
R-414A	zeotrope	R-22/124/600a/142b (51.0/28.5/4.0/16.5)	A1	6.4	26,000	100	1,000	—
R-414B	zeotrope	R-22/124/600a/142b (50.0/39.0/1.5/9.5)	A1	6.0	23,000	95	1,000	—
R-415A	zeotrope	R-22/152a (82.0/18.0)	A2	2.9	14,000	47	1,000	—
R-415B	zeotrope	R-22/152a (25.0/75.0)	A2	2.1	12,000	34	1,000	—
R-416A	zeotrope	R-134a/124/600 (59.0/39.5/1.5)	A1	3.9	14,000	62	1,000	2-0-0 ^b
R-417A	zeotrope	R-125/134a/600 (46.6/50.0/3.4)	A1	3.5	13,000	56	1,000	2-0-0 ^b
R-417B	zeotrope	R-125/134a/600 (79.0/18.3/2.7)	A1	4.3	15,000	70	1,000	—
R-417C	zeotrope	R-125/134a/600 (19.5/78.8/1.7)	A1	5.4	21,000	87	1,000	—
R-418A	zeotrope	R-290/22/152a (1.5/96.0/2.5)	A2	4.8	22,000	77	1,000	—
R-419A	zeotrope	R-125/134a/E170 (77.0/19.0/4.0)	A2	4.2	15,000	67	1,000	—
R-419B	zeotrope	R-125/134a/E170 (48.5/48.0/3.5)	A2	4.6	17,000	74	1,000	—
R-420A	zeotrope	R-134a/142b (88.0/12.0)	A1	12	45,000	190	1,000	2-0-0 ^b
R-421A	zeotrope	R-125/134a (58.0/42.0)	A1	17	61,000	280	1,000	2-0-0 ^b
R-421B	zeotrope	R-125/134a (85.0/15.0)	A1	21	69,000	330	1,000	2-0-0 ^b
R-422A	zeotrope	R-125/134a/600a (85.1/11.5/3.4)	A1	18	63,000	290	1,000	2-0-0 ^b
R-422B	zeotrope	R-125/134a/600a (55.0/42.0/3.0)	A1	16	56,000	250	1,000	2-0-0 ^b
R-422C	zeotrope	R-125/134a/600a (82.0/15.0/3.0)	A1	18	62,000	290	1,000	2-0-0 ^b
R-422D	zeotrope	R-125/134a/600a (65.1/31.5/3.4)	A1	16	58,000	260	1,000	2-0-0 ^b
R-422E	zeotrope	R-125/134a/600a (58.0/39.3/2.7)	A1	16	57,000	260	1,000	—
R-423A	zeotrope	R-134a/227ea (52.5/47.5)	A1	19	59,000	310	1,000	2-0-0 ^c
R-424A	zeotrope	R-125/134a/600a/600/601a (50.5/47.0/0.9/1.0/0.6)	A1	6.2	23,000	100	970	2-0-0 ^b
R-425A	zoetrope	R-32/134a/227ea (18.5/69.5/12.0)	A1	16	72,000	260	1,000	2-0-0 ^b
R-426A	zeotrope	R-125/134a/600a/601a (5.1/93.0/1.3/0.6)	A1	5.2	20,000	83	990	—
R-427A	zeotrope	R-32/125/143a/134a (15.0/25.0/10.0/50.0)	A1	18	79,000	290	1,000	2-1-0
R-428A	zeotrope	R-125/143a/290/600a (77.5/20.0/0.6/1.9)	A1	23	83,000	370	1,000	—
R-429A	zeotrope	R-E170/152a/600a (60.0/10.0/30.0)	A3	0.81	6,300	13	1,000	—
R-430A	zeotrope	R-152a/600a (76.0/24.0)	A3	1.3	8,000	21	1,000	—
R-431A	zeotrope	R-290/152a (71.0/29.0)	A3	0.69	5,500	11	1,000	—
R-432A	zeotrope	R-1270/E170 (80.0/20.0)	A3	0.13	1,200	2.1	700	—
R-433A	zeotrope	R-1270/290 (30.0/70.0)	A3	0.34	3,100	5.5	880	—

R-433B	zeotrope	R-1270/290 (5.0-95.0)	A3	0.51	4,500	8.1	950	—
R-433C	zeotrope	R-1270/290 (25.0-75.0)	A3	0.41	3,600	6.6	790	—
R-434A	zeotrope	R-125/143a/600a (63.2/18.0/16.0/2.8)	A1	20	73,000	320	1,000	—
R-435A	zeotrope	R-E170/152a (80.0/20.0)	A3	1.1	8,500	17	1,000	—
R-436A	zeotrope	R-290/600a (56.0/44.0)	A3	0.50	4,000	8.1	1,000	—
R-436B	zeotrope	R-290/600a (52.0/48.0)	A3	0.51	4,000	8.1	1,000	—
R-437A	zeotrope	R-125/134a/600/601 (19.5/78.5/1.4/0.6)	A1	5.0	19,000	82	990	—
R-438A	zeotrope	R-32/125/134a/600/601a (8.5/45.0/44.2/1.7/0.6)	A1	4.9	20,000	79	990	—
R-439A	zeotrope	R-32/125/600a (50.0/47.0/3.0)	A2	4.7	26,000	76	990	—
R-440A	zeotrope	R-290/134a/152a (0.6/1.6/97.8)	A2	1.9	12,000	31	1,000	—
R-441A	zeotrope	R-170/290/600a/600 (3.1/54.8/6.0/36.1)	A3	0.39	3,200	6.3	1,000	—
R-442A	zeotrope	R-32/125/134a/152a/227ea (31.0/31.0/30.0/3.0/5.0)	A1	21	100,000	330	1,000	—
R-443A	zeotrope	R-1270/290/600a (55.0/40.0/5.0)	A3	0.19	1,700	3.1	580	—
R-444A	zeotrope	R-32/152a/1234ze(E) (12.0/5.0/83.0)	A2 ^f	5.1	21,000	81	850	—
R-444B	zeotrope	R-32/152a/1234ze(E) (41.5/10.0/48.5)	A2 ^f	4.3	23,000	69	890	—
R-445A	zeotrope	R-744/134a/1234ze(E) (6.0/9.0/85.0)	A2 ^f	4.2	16,000	67	930	—
R-446A	zeotrope	R-32/1234ze(E)/600 (68.0/29.0/3.0)	A2 ^f	2.5	16,000	39	960	—
R-447A	zeotrope	R-32/125/1234ze(E) (68.0/3.5/28.5)	A2 ^f	2.6	16,000	42	900	—
R-448A	zeotrope	R-32/125/1234yf/134a/1234ze(E) (26.0/26.0/20.0/21.0/7.0)	A1	24	110,000	390	890	—
R-449A	zeotrope	R-32/125/1234yf/134a (24.3/24.7/25.3/25.7)	A1	23	100,000	370	830	—
R-450A	zeotrope	R-134a/1234ze(E) (42.0/58.0)	A1	20	72,000	320	880	—
R-451A	zeotrope	R-1234yf/134a (89.8/10.2)	A2 ^f	5.3	18,000	81	520	—
R-451B	zeotrope	R-1234yf/134a (88.8/11.2)	A2 ^f	5.3	18,000	81	530	—
R-452A	zeotrope	R-32/125/1234yf (11.0/59.0/30.0)	A1	27	100,000	440	780	—
R-500 ^e	azeotrope	R-12/152a (73.8/26.2)	A1	7.6	30,000	120	1,000	2-0-0 ^b
R-501 ^d	azeotrope	R-22/12 (75.0/25.0)	A1	13	54,000	210	1,000	—
R-502 ^e	azeotrope	R-22/115 (48.8/51.2)	A1	21	73,000	330	1,000	2-0-0 ^b
R-503 ^e	azeotrope	R-23/13 (40.1/59.9)	—	—	—	—	1,000	2-0-0 ^b
R-504 ^d	azeotrope	R-32/115 (48.2/51.8)	—	28	140,000	450	1,000	—
R-507A	azeotrope	R-125/143a (50.0/50.0)	A1	32	130,000	520	1,000	2-0-0 ^b
R-508A	azeotrope	R-23/116 (39.0/61.0)	A1	14	55,000	220	1,000	2-0-0 ^b
R-508B	azeotrope	R-23/116 (46.0/54.0)	A1	13	52,000	200	1,000	2-0-0 ^b
R-509A	azeotrope	R-22/218 (44.0/56.0)	A1	24	75,000	390	1,000	2-0-0 ^b
R-510A	azeotrope	R-E170/600a (88.0/12.0)	A3	0.87	7,300	14	1,000	—
R-511A	azeotrope	R-290/E170 (95.0/5.0)	A3	0.59	5,300	9.5	1,000	—
R-512A	azeotrope	R-134a/152a (5.0/95.0)	A2	1.9	11,000	31	1,000	—
R-513A	azeotrope	R-1234yf/134a (56.0/44.0)	A1	20	72,000	320	650	—
R-600	CH ₃ CH ₂ CH ₂ CH ₃	butane	A3	0.15	1,000	2.4	1,000	1-4-0
R-600a	CH(CH ₃) ₂ CH ₃	2-methylpropane (isobutane)	A3	0.59	4,000	9.6	1,000	2-4-0
R-601	CH ₃ CH ₂ CH ₂ CH ₂ CH ₃	pentane	A3	0.18	1,000	2.9	600	—
R-601a	(CH ₃) ₂ CHCH ₂ CH ₃	2-methylbutane (isopentane)	A3	0.18	1,000	2.9	600	—
R-610	ethoxyethane (ethyl ether)	CH ₃ CH ₂ OCH ₂ CH ₃	—	—	—	—	400	—
R-611	methyl formate	HCOOCH ₃	B2	—	—	—	100	—
R-717	NH ₃	ammonia	B2 ^f	0.014	320	0.22	25	3-3-0 ^e
R-718	H ₂ O	water	A1	—	—	—	—	0-0-0
R-744	CO ₂	carbon dioxide	A1	4.5	40,000	72	5,000	2-0-0 ^b
R-1150	CH ₂ =CH ₂	ethene (ethylene)	A3	—	—	—	200	1-4-2
R-1233zd(E)	CF ₃ CH=CHCl	trans-1-chloro-3,3,3-trifluoro-1-propene	A1	5.3	16,000	85	800	—
R-1234yf	CF ₃ CF=CH ₂	2,3,3,3-tetrafluoro-1 propene	A2 ^f	4.7	16,000	75	500	—
R-1234ze(E)	CF ₃ CH=CHF	trans-1,3,3,3-tetrafluoro-1-propene	A2 ^f	4.7	16,000	75	800	—
R-1270	CH ₃ CH=CH ₂	Propene (propylene)	A3	0.1	1,000	1.7	500	1-4-1

For SI: 1 pound = 0.454 kg, 1 cubic foot = 0.0283m³

- a. Degrees of hazard are for health, fire, and reactivity, respectively, in accordance with NFPA 704.
- b. Reduction to 1-0-0 is allowed if analysis satisfactory to the code official shows that the maximum concentration for a rupture or full loss of refrigerant charge would not exceed the IDLH, considering both the refrigerant quantity and room volume.
- c. ~~For installations that are entirely outdoors, use 3-1-0.~~ The ASHRAE Standard 34 flammability classification for this refrigerant is 2L, which is a subclass of Class 2.
- d. Class I ozone depleting substance; prohibited for new installations.
- e. Occupational Exposure Limit based on the OSHA PEL, ACGIH TLV-TWA, the TERA WEEL or consistent value on a time-weighted average (TWA) basis (unless noted C for ceiling) for an 8 hr/d and 40 hr/wk.
- f. ~~The ASHRAE Standard 34 flammability classification for this refrigerant is 2L, which is a subclass of Class 2.~~

1104.2.2 Industrial occupancies and refrigerated rooms. This section applies only to rooms and spaces that: are within industrial occupancies; contain a refrigerant evaporator; are maintained at temperatures below 68°F (20°C); and are used for manufacturing, food and beverage preparation, meat cutting, other processes and storage. Where a machinery room would otherwise be required by Section 1104.2, a machinery room shall not be required where all of the following conditions are met:

1. The space containing the machinery is separated from other occupancies by tight construction with tight-fitting doors.
2. Access is restricted to authorized personnel.
3. Refrigerant detectors are installed as required for machinery rooms in accordance with Section 1105.3.

Exceptions Exception:

1. Refrigerant detectors are not required in unoccupied areas that contain only continuous piping that does not include valves, valve assemblies, equipment, or equipment connections.
2. ~~Where approved alternatives are provided, refrigerant detectors for ammonia refrigeration are not required for rooms or areas that are always occupied, and for rooms or areas that have high humidity or other harsh environmental conditions that are incompatible with detection devices.~~
4. Surfaces having temperatures exceeding 800°F (427°C) and open flames are not present where any Group A2, B2, A3 or B3 refrigerant is used (see Section 1104.3.4).
5. All electrical *equipment* and appliances conform to Class 1, Division 2, *hazardous location* classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant ; ~~other than ammonia~~, in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
6. All refrigerant-containing parts in systems with a total connected compressor power exceeding 100 horsepower (hp) (74.6 kW) except evaporators used for refrigeration or dehumidification, condensers used for heating, control and pressure relief valves for either, low-probability pumps and connecting piping are located either outdoors or in a *machinery room*.

1104.3.3 All occupancies. The total of all Group A2, B2, A3 and B3 refrigerants ~~other than R-717, ammonia~~, shall not exceed 1,100 pounds (499 kg) except where *approved*.

1104.3.4 Protection from refrigerant decomposition. Where any device having an open flame or surface temperature greater than 800°F (427°C) is used in a room containing more than 6.6 pounds (3 kg) of refrigerant in a single independent circuit, a hood and exhaust system shall be provided in accordance with Section 510. Such exhaust system shall exhaust *combustion* products to the outdoors.

Exception: A hood and exhaust system shall not be required where any of the following apply:

1. The refrigerant is R-~~717~~, R- 718 or R-744.
2. The *combustion* air is ducted from the outdoors in a manner that prevents leaked refrigerant

from being combusted.

1105.6.3 Ventilation rate. ~~For other than ammonia systems, the mechanical~~ Mechanical ventilation systems shall be capable of exhausting the minimum quantity of air both at normal operating and emergency conditions, as required by Sections 1105.6.3.1 and 1105.6.3.2. ~~The minimum required emergency ventilation rate for ammonia shall be 30 air changes per hour in accordance with IIAR2.~~ Multiple fans or multispeed fans shall be allowed to produce the emergency ventilation rate and to obtain a reduced airflow for normal ventilation.

Delete without substitution:

~~**1105.8 Ammonia discharge.** Pressure relief valves for ammonia systems shall discharge in accordance with ASHRAE 15.~~

Revise as follows:

[F] 1105.9 Emergency pressure control system. ~~Permanently installed refrigeration systems containing more than 6.6 pounds (3 kg) of flammable, toxic or highly toxic refrigerant or ammonia~~ Emergency pressure control systems shall be provided ~~with an emergency pressure control system~~ in accordance with Section 605.10 of the International Fire Code.

Delete without substitution:

~~**1106.3 Ammonia room ventilation.** Ventilation systems in ammonia machinery rooms shall be operated continuously at the ventilation rate specified in Section 1105.6.3.~~

Exceptions:

- ~~1. Machinery rooms equipped with a vapor detector that will automatically start the ventilation system at the ventilation rate specified in Section 1105.6.3, and that will actuate an alarm at a detection level not to exceed 1,000 ppm.~~
- ~~2. Machinery rooms conforming to the Class 1, Division 2, hazardous location classification requirements of NFPA 70.~~

Revise as follows:

1106.4 Flammable refrigerants. Where refrigerants of Groups A2, A3, B2 and B3 are used, the *machinery room* shall conform to the Class 1, Division 2, *hazardous location* classification requirements of NFPA 70.

Exceptions-Exception:

- ~~1. Ammonia machinery rooms that are provided with ventilation in accordance with Section 1106.3.~~
2. Machinery rooms for systems containing Group A2L refrigerants that are in accordance with Section 1106.5.

1108.2 Test gases. Tests shall be performed with an inert dried gas including, but not limited to, nitrogen and carbon dioxide. Oxygen, air, combustible gases and mixtures containing such gases shall not be used.

~~**Exception:** The use of air is allowed to test R-717, ammonia, systems provided that they are subsequently evacuated before charging with refrigerant.~~

Reason:

IIAR is an ANSI accredited standards developer with a complete suite of standards to regulate ammonia refrigeration from initial design through decommissioning of systems. IIAR standards adopted by the IMC and IFC comprehensively regulate ammonia refrigeration, and there is no need to continue the complexity of overlapping requirements in the IMC.

When IIAR 2 was completely rewritten in 2014 to become both a code and a standard, a gap analysis was performed with the IMC and other model codes to confirm or facilitate alignment. The resulting IIAR 2 became a comprehensive document, intended to function as a standalone design regulation without reliance on a mechanical code. This is particularly valuable to jurisdictions in the U.S. and abroad that do not adopt a mechanical code.

A similar change was approved for the 2018 Uniform Mechanical Code. The 2018 UMC no longer covers ammonia refrigeration, instead deferring to IIAR standards. Likewise, ASHRAE is processing Addendum A to ASHRAE 15,

which deletes ammonia refrigeration requirements from that standard.

Cost Impact

The code change proposal will not increase or decrease the cost of construction .

IIAR standards are already adopted by the IMC, and thereby, compliance with these standards is already required. Deferral of ammonia systems to IIAR 2 will reduce the complexity of overlapping regulations and should not impact cost of construction.

Internal ID: 1190

Public Hearing Results

Committee Action:

As Submitted

Committee Reason:

Approval was based on the proponent's published reason statement. (Vote 11-0)

Assembly Action:

None

M93-18

Individual Consideration Agenda

Public Comment 1:

Proponent:

Connor Barbaree, representing ASHRAE (cbarbaree@ashrae.org) requests As Modified by This Public Comment

Modify as follows:

2018 International Mechanical Code

TABLE 1103.1

REFRIGERANT CLASSIFICATION, AMOUNT AND OEL

CHEMICAL REFRIGERANT	FORMULA	CHEMICAL NAME OF BLEND	REFRIGERANT CLASSIFICATION	AMOUNT OF REFRIGERANT PER OCCUPIED SPACE				[F] DEGREE S OF HAZARD ^a
				Pounds per 1,000 cubic feet	ppm	g/m ³	OEL ^e	
R-11 ^d	CCl ₃ F	trichlorofluoromethane	A1	0.39	1,100	6.2	C1,000	2-0-0 ^b
R-12 ^d	CCl ₂ F ₂	dichlorodifluoromethane	A1	5.6	18,000	90	1,000	2-0-0 ^b
R-13 ^d	CClF ₃	chlorotrifluoromethane	A1	-	-	-	1,000	2-0-0 ^b
R-13B1 ^d	CBrF ₃	bromotrifluoromethane	A1	-	-	-	1,000	2-0-0 ^b
R-14	CF ₄	tetrafluoromethane (carbon tetrafluoride)	A1	25	110,000	400	1,000	2-0-0 ^b
R-22	CHClF ₂	chlorodifluoromethane	A1	13	59,000	210	1,000	2-0-0 ^b
R-23	CHF ₃	trifluoromethane (fluoroform)	A1	7.3	41,000	120	1,000	2-0-0 ^b

R-30	CH ₂ Cl ₂	dichloromethane (methylene chloride)	B1	-	-	-	-	-
R-32	CH ₂ F ₂	difluoromethane (methylene fluoride)	A2 ^c	4.8	36,000	77	1,000	1-4-0
R-40	CH ₃ Cl	chloromethane (methyl chloride)	B2	-	-	-	-	-
R-50	CH ₄	methane	A3	-	-	-	1,000	-
R-113 ^d	CCl ₂ FCClF ₂	1,1,2-trichloro-1,2,2-trifluoroethane	A1	1.2	2,600	20	1,000	2-0-0 ^b
R-114 ^d	CClF ₂ CClF ₂	1,2-dichloro-1,1,2,2-tetrafluoroethane	A1	8.7	20,000	140	1,000	2-0-0 ^b
R-115	CClF ₂ CF ₃	chloropentafluoroethane	A1	47	120,000	760	1,000	-
R-116	CF ₃ CF ₃	hexafluoroethane	A1	34	97,000	550	1,000	1-0-0
R-123	CHCl ₂ CF ₃	2,2-dichloro-1,1,1-trifluoroethane	B1	3.5	9,100	57	50	2-0-0 ^b
R-124	CHClFCF ₃	2-chloro-1,1,1,2-tetrafluoroethane	A1	3.5	10,000	56	1,000	2-0-0 ^b
R-125	CHF ₂ CF ₃	pentafluoroethane	A1	23	75,000	370	1,000	2-0-0 ^b
R-134a	CH ₂ FCF ₃	1,1,1,2-tetrafluoroethane	A1	13	50,000	210	1,000	2-0-0 ^b
R-141b	CH ₃ CCl ₂ F	1,1-dichloro-1-fluoroethane	-	0.78	2,600	12	500	2-1-0
R-142b	CH ₃ CClF ₂	1-chloro-1, 1-difluoroethane	A2	5.1	20,000	83	1,000	2-4-0
R-143a	CH ₃ CF ₃	1,1,1-trifluoroethane	A2 ^c	4.5	21,000	70	1,000	2-0-0 ^b
R-152a	CH ₃ CHF ₂	1,1-difluoroethane	A2	2.0	12,000	32	1,000	1-4-0
R-170	CH ₃ CH ₃	ethane	A3	0.54	7,000	8.7	1,000	2-4-0
R-E170	CH ₃ OCH ₃	Methoxymethane (dimethyl ether)	A3	1.0	8,500	16	1,000	-
R-218	CF ₃ CF ₂ CF ₃	octafluoropropane	A1	43	90,000	690	1,000	2-0-0 ^b
R-227ea	CF ₃ CHFCF ₃	1,1,1,2,3,3,3-heptafluoropropane	A1	36	84,000	580	1,000	-
R-236fa	CF ₃ CH ₂ CF ₃	1,1,1,3,3,3-hexafluoropropane	A1	21	55,000	340	1,000	2-0-0 ^b
R-245fa	CHF ₂ CH ₂ CF ₃	1,1,1,3,3-pentafluoropropane	B1	12	34,000	190	300	2-0-0 ^b
R-290	CH ₃ CH ₂ CH ₃	propane	A3	0.56	5,300	9.5	1,000	2-4-0
R-C318	-(CF ₂) ₄ -	octafluorocyclobutane	A1	41	80,000	660	1,000	-
R-400 ^d	zeotrope	R-12/114 (50.0/50.0)	A1	10	28,000	160	1,000	2-0-0 ^b
R-400 ^d	zeotrope	R-12/114 (60.0/40.0)	A1	11	30,000	170	1,000	-
R-401A	zeotrope	R-22/152a/124 (53.0/13.0/34.0)	A1	6.6	27,000	110	1,000	2-0-0 ^b
R-401B	zeotrope	R-22/152a/124 (61.0/11.0/28.0)	A1	7.2	30,000	120	1,000	2-0-0 ^b
R-401C	zeotrope	R-22/152a/124 (33.0/15.0/52.0)	A1	5.2	20,000	84	1,000	2-0-0 ^b
R-402A	zeotrope	R-125/290/22 (60.0/2.0/38.0)	A1	17	66,000	270	1,000	2-0-0 ^b
R-402B	zeotrope	R-125/290/22 (38.0/2.0/60.0)	A1	15	63,000	240	1,000	2-0-0 ^b
R-403A	zeotrope	R-290/22/218 (5.0/75.0/20.0)	A2	7.6	33,000	120	1,000	2-0-0 ^b
R-403B	zeotrope	R-290/22/218 (5.0/56.0/39.0)	A1	18	70,000	290	1,000	2-0-0 ^b
R-404A	zeotrope	R-125/143a/134a (44.0/52.0/4.0)	A1	31	130,000	500	1,000	2-0-0 ^b

R-405A	zeotrope	R-22/152a/142b/C318 (45.0/7.0/5.5/2.5)	-	16	57,000	260	1,000	-
R-406A	zeotrope	R-22/600a/142b (55.0/4.0/41.0)	A2	4.7	21,000	25	1,000	-
R-407A	zeotrope	R-32/125/134a (20.0/40.0/40.0)	A1	19	83,000	300	1,000	2-0-0 ^b
R-407B	zeotrope	R-32/125/134a (10.0/70.0/20.0)	A1	21	79,000	330	1,000	2-0-0 ^b
R-407C	zeotrope	R-32/125/134a (23.0/25.0/52.0)	A1	18	81,000	290	1,000	2-0-0 ^b
R-407D	zeotrope	R-32/125/134a (15.0/15.0/70.0)	A1	16	68,000	250	1,000	2-0-0 ^b
R-407E	zeotrope	R-32/125/134a (25.0/15.0/60.0)	A1	17	80,000	280	1,000	2-0-0 ^b
R-407F	zeotrope	R-32/125/134a (30.0/30.0/40.0)	A1	20	95,000	320	1,000	-
R-408A	zeotrope	R-125/143a/22 (7.0/46.0/47.0)	A1	21	95,000	340	1,000	2-0-0 ^b
R-409A	zeotrope	R-22/124/142b (60.0/25.0/15.0)	A1	7.1	29,000	110	1,000	2-0-0 ^b
R-409B	zeotrope	R-22/124/142b (65.0/25.0/10.0)	A1	7.3	30,000	120	1,000	2-0-0 ^b
R-410A	zeotrope	R-32/125 (50.0/50.0)	A1	26	140,000	420	1,000	2-0-0 ^b
R-410B	zeotrope	R-32/125 (45.0/55.0)	A1	27	140,000	430	1,000	2-0-0 ^b
R-411A	zeotrope	R-127/22/152a (1.5/87.5/11.0)	A2	2.9	14,000	46	990	-
R-411B	zeotrope	R-1270/22/152a (3.0/94.0/3.0)	A2	2.8	13,000	45	980	-
R-412A	zeotrope	R-22/218/142b (70.0/5.0/25.0)	A2	5.1	22,000	82	1,000	-
R-413A	zeotrope	R-218/134a/600a (9.0/88.0/3.0)	A2	5.8	22,000	94	1,000	-
R-414A	zeotrope	R-22/124/600a/142b (51.0/28.5/4.0/16.5)	A1	6.4	26,000	100	1,000	-
R-414B	zeotrope	R-22/124/600a/142b (50.0/39.0/1.5/9.5)	A1	6.0	23,000	95	1,000	-
R-415A	zeotrope	R-22/152a (82.0/18.0)	A2	2.9	14,000	47	1,000	-
R-415B	zeotrope	R-22/152a (25.0/75.0)	A2	2.1	12,000	34	1,000	-
R-416A	zeotrope	R-134a/124/600 (59.0/39.5/1.5)	A1	3.9	14,000	62	1,000	2-0-0 ^b
R-417A	zeotrope	R-125/134a/600 (46.6/50.0/3.4)	A1	3.5	13,000	56	1,000	2-0-0 ^b
R-417B	zeotrope	R-125/134a/600 (79.0/18.3/2.7)	A1	4.3	15,000	70	1,000	-
R-417C	zeotrope	R-125/134a/600 (19.5/78.8/1.7)	A1	5.4	21,000	87	1,000	-
R-418A	zeotrope	R-290/22/152a (1.5/96.0/2.5)	A2	4.8	22,000	77	1,000	-
R-419A	zeotrope	R-125/134a/E170 (77.0/19.0/4.0)	A2	4.2	15,000	67	1,000	-
R-419B	zeotrope	R-125/134a/E170 (48.5/48.0/3.5)	A2	4.6	17,000	74	1,000	-

R-420A	zeotrope	R-134a/142b (88.0/12.0)	A1	12	45,000	190	1,000	2-0-0 ^b
R-421A	zeotrope	R-125/134a (58.0/42.0)	A1	17	61,000	280	1,000	2-0-0 ^b
R-421B	zeotrope	R-125/134a (85.0/15.0)	A1	21	69,000	330	1,000	2-0-0 ^b
R-422A	zeotrope	R-125/134a/600a (85.1/11.5/3.4)	A1	18	63,000	290	1,000	2-0-0 ^b
R-422B	zeotrope	R-125/134a/600a (55.0/42.0/3.0)	A1	16	56,000	250	1,000	2-0-0 ^b
R-422C	zeotrope	R-125/134a/600a (82.0/15.0/3.0)	A1	18	62,000	290	1,000	2-0-0 ^b
R-422D	zeotrope	R-125/134a/600a (65.1/31.5/3.4)	A1	16	58,000	260	1,000	2-0-0 ^b
R-422E	zeotrope	R-125/134a/600a (58.0/39.3/2.7)	A1	16	57,000	260	1,000	-
R-423A	zeotrope	R-134a/227ea (52.5/47.5)	A1	19	59,000	310	1,000	2-0-0 ^c
R-424A	zeotrope	R-125/134a/600a/600/601a (50.5/47.0/0.9/1.0/0.6)	A1	6.2	23,000	100	970	2-0-0 ^b
R-425A	zoetrope	R-32/134a/227ea (18.5/69.5/12.0)	A1	16	72,000	260	1,000	2-0-0 ^b
R-426A	zeotrope	R-125/134a/600a/601a (5.1/93.0/1.3/0.6)	A1	5.2	20,000	83	990	-
R-427A	zeotrope	R-32/125/143a/134a (15.0/25.0/10.0/50.0)	A1	18	79,000	290	1,000	2-1-0
R-428A	zeotrope	R-125/143a/290/600a (77.5/20.0/0.6/1.9)	A1	23	83,000	370	1,000	-
R-429A	zeotrope	R-E170/152a/600a (60.0/10.0/30.0)	A3	0.81	6,300	13	1,000	-
R-430A	zeotrope	R-152a/600a (76.0/24.0)	A3	1.3	8,000	21	1,000	-
R-431A	zeotrope	R-290/152a (71.0/29.0)	A3	0.69	5,500	11	1,000	-
R-432A	zeotrope	R-1270/E170 (80.0/20.0)	A3	0.13	1,200	2.1	700	-
R-433A	zeotrope	R-1270/290 (30.0/70.0)	A3	0.34	3,100	5.5	880	-
R-433B	zeotrope	R-1270/290 (5.0-95.0)	A3	0.51	4,500	8.1	950	-
R-433C	zeotrope	R-1270/290 (25.0-75.0)	A3	0.41	3,600	6.6	790	-
R-434A	zeotrope	R-125/143a/600a (63.2/18.0/16.0/2.8)	A1	20	73,000	320	1,000	-
R-435A	zeotrope	R-E170/152a (80.0/20.0)	A3	1.1	8,500	17	1,000	-
R-436A	zeotrope	R-290/600a (56.0/44.0)	A3	0.50	4,000	8.1	1,000	-
R-436B	zeotrope	R-290/600a (52.0/48.0)	A3	0.51	4,000	8.1	1,000	-
R-437A	zeotrope	R-125/134a/600/601 (19.5/78.5/1.4/0.6)	A1	5.0	19,000	82	990	-
R-438A	zeotrope	R-32/125/134a/600/601a (8.5/45.0/44.2/1.7/0.6)	A1	4.9	20,000	79	990	-
R-439A	zeotrope	R-32/125/600a (50.0/47.0/3.0)	A2	4.7	26,000	76	990	-
R-440A	zeotrope	R-290/134a/152a (0.6/1.6/97.8)	A2	1.9	12,000	31	1,000	-
R-441A	zeotrope	R-170/290/600a/600 (3.1/54.8/6.0/36.1)	A3	0.39	3,200	6.3	1,000	-
R-442A	zeotrope	R-32/125/134a/152a/227ea (31.0/31.0/30.0/3.0/5.0)	A1	21	100,000	330	1,000	-
R-443A	zeotrope	R-1270/290/600a (55.0/40.0/5.0)	A3	0.19	1,700	3.1	580	-

R-444A	zeotrope	R-32/152a/1234ze(E) (12.0/5.0/83.0)	A2 ^c	5.1	21,000	81	850	-
R-444B	zeotrope	R-32/152a/1234ze(E) (41.5/10.0/48.5)	A2 ^c	4.3	23,000	69	890	-
R-445A	zeotrope	R-744/134a/1234ze(E) (6.0/9.0/85.0)	A2 ^c	4.2	16,000	67	930	-
R-446A	zeotrope	R-32/1234ze(E)/600 (68.0/29.0/3.0)	A2 ^c	2.5	16,000	39	960	-
R-447A	zeotrope	R-32/125/1234ze(E) (68.0/3.5/28.5)	A2 ^c	2.6	16,000	42	900	-
R-448A	zeotrope	R-32/125/1234yf/134a/1234ze(E) (26.0/26.0/20.0/21.0/7.0)	A1	24	110,000	390	890	-
R-449A	zeotrope	R-32/125/1234yf/134a (24.3/24.7/25.3/25.7)	A1	23	100,000	370	830	-
R-450A	zeotrope	R-134a/1234ze(E) (42.0/58.0)	A1	20	72,000	320	880	-
R-451A	zeotrope	R-1234yf/134a (89.8/10.2)	A2 ^c	5.3	18,000	81	520	-
R-451B	zeotrope	R-1234yf/134a (88.8/11.2)	A2 ^c	5.3	18,000	81	530	-
R-452A	zeotrope	R-32/125/1234yf (11.0/59.0/30.0)	A1	27	100,000	440	780	-
R-500 ^e	azeotrope	R-12/152a (73.8/26.2)	A1	7.6	30,000	120	1,000	2-0-0 ^b
R-501 ^d	azeotrope	R-22/12 (75.0/25.0)	A1	13	54,000	210	1,000	-
R-502 ^e	azeotrope	R-22/115 (48.8/51.2)	A1	21	73,000	330	1,000	2-0-0 ^b
R-503 ^e	azeotrope	R-23/13 (40.1/59.9)	-	-	-	-	1,000	2-0-0 ^b
R-504 ^d	azeotrope	R-32/115 (48.2/51.8)	-	28	140,000	450	1,000	-
R-507A	azeotrope	R-125/143a (50.0/50.0)	A1	32	130,000	520	1,000	2-0-0 ^b
R-508A	azeotrope	R-23/116 (39.0/61.0)	A1	14	55,000	220	1,000	2-0-0 ^b
R-508B	azeotrope	R-23/116 (46.0/54.0)	A1	13	52,000	200	1,000	2-0-0 ^b
R-509A	azeotrope	R-22/218 (44.0/56.0)	A1	24	75,000	390	1,000	2-0-0 ^b
R-510A	azeotrope	R-E170/600a (88.0/12.0)	A3	0.87	7,300	14	1,000	-
R-511A	azeotrope	R-290/E170 (95.0/5.0)	A3	0.59	5,300	9.5	1,000	-
R-512A	azeotrope	R-134a/152a (5.0/95.0)	A2	1.9	11,000	31	1,000	-
R-513A	azeotrope	R-1234yf/134a (56.0/44.0)	A1	20	72,000	320	650	-
R-600	CH ₃ CH ₂ CH ₂ CH ₃	butane	A3	0.15	1,000	2.4	1,000	1-4-0
R-600a	CH(CH ₃) ₂ CH ₃	2-methylpropane (isobutane)	A3	0.59	4,000	9.6	1,000	2-4-0
R-601	CH ₃ CH ₂ CH ₂ CH ₂ CH ₃	pentane	A3	0.18	1,000	2.9	600	-
R-601a	(CH ₃) ₂ CHCH ₂ CH ₃	2-methylbutane (isopentane)	A3	0.18	1,000	2.9	600	-
R-610	ethoxyethane (ethyl ether)	CH ₃ CH ₂ OCH ₂ CH ₃	-	-	-	-	400	-
R-611	methyl formate	HCOOCH ₃	B2	-	-	-	100	-
R-718	H ₂ O	water	A1	-	-	-	-	0-0-0
R-744	CO ₂	carbon dioxide	A1	4.5	40,000	72	5,000	2-0-0 ^b
R-1150	CH ₂ =CH ₂	ethene (ethylene)	A3	-	-	-	200	1-4-2
R-1233zd(E)	CF ₃ CH=CHCl	trans-1-chloro-3,3,3-trifluoro-1-propene	A1	5.3	16,000	85	800	-

R-1234yf	CF ₃ CF=CH ₂	2,3,3,3-tetrafluoro-1 propene	A2 ^c	4.7	16,000	75	500	-
R-1234ze(E)	CF ₃ CH=CHF	trans-1,3,3,3-tetrafluoro-1 - propene	A2 ^c	4.7	16,000	75	800	-
R-1270	CH ₃ CH=CH ₂	Propene (propylene)	A3	0.1	1,000	1.7	500	1-4-1

For SI: 1 pound = 0.454 kg, 1 cubic foot = 0.0283m³

- a. aDegrees of hazard are for health, fire, and reactivity, respectively, in accordance with NFPA 704.
- b. Reduction to 1-0-0 is allowed if analysis satisfactory to the code official shows that the maximum concentration for a rupture or full loss of refrigerant charge would not exceed the IDLH, considering both the refrigerant quantity and room volume.
- c. ~~For installations that are entirely outdoors, use 3-1-0. The ASHRAE Standard 34 flammability classification for this refrigerant is 2L, which is a subclass of Class 2.~~
- d. Class I ozone depleting substance; prohibited for new installations.
- e. Occupational Exposure Limit based on the OSHA PEL, ACGIH TLV-TWA, the TERA WEEL or consistent value on a time-weighted average (TWA) basis (unless noted C for ceiling) for an 8 hr/d and 40 hr/wk.

Commenter's Reason:

This change proposal needs to be correlated with M88-18, M97-18, and M98-18, to reflect changes to the refrigerant flammability classifications published in Addendum G to ASHRAE Standard 34-2016, namely that 2L is no longer a sub-class of Class 2, making Class 2L its own class.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This update to reflect current safety classification of refrigerants does not impose any cost changes.

M93-18

M95-18

IMC: 1101.2, Table Table 1101.2, UL

Proposed Change as Submitted

Proponent: Jonathan Roberts, UL LLC, representing UL LLC (jonathan.roberts@ul.com)

2018 International Mechanical Code

Revise as follows

1101.2 Factory-built equipment and appliances. *Listed and labeled* self-contained, factory-built *equipment and appliances* shall be tested in accordance with ~~UL 207, 412, 471 or 1995~~ the applicable standards specified in Table 1101.2. Such *equipment and appliances* are deemed to meet the design, manufacture and factory test requirements of this code if installed in accordance with their listing and the manufacturer's instructions.

Add new text as follows

**Table 1101.2
Factory-built equipment and appliances**

<u>EQUIPMENT</u>	<u>STANDARD</u>
<u>Refrigeration fittings, including press-connect, flared, and threaded</u>	<u>UL 109 and UL 207</u>
<u>Air conditioning equipment</u>	<u>UL 1995 or UL/CSA 60335-2-40</u>
<u>Packaged terminal air conditioners</u>	<u>UL 484 or UL/CSA 60335-2-40</u>
<u>Split-system air conditioners</u>	<u>UL 1995 or UL/CSA 60335-2-40</u>
<u>Dehumidifiers</u>	<u>UL 474 or UL/CSA 60335-2-40</u>
<u>Unit coolers</u>	<u>UL 412 or UL/CSA 60335-2-89</u>
<u>Commercial refrigerators, freezers, beverage coolers, and walk-in coolers</u>	<u>UL 471 or UL/CSA 60335-2-89</u>
<u>Refrigerating units and walk-in coolers</u>	<u>UL 427 or UL 60335-2-89</u>
<u>Refrigerant-containing components and accessories</u>	<u>UL 207</u>

Add new standard(s) follows



UL LLC
333 Pfcngsten Road
Northbrook IL 60062-2096

109-97:

Tube Fittings for Flammable and Combustible Fluids, Refrigeration Service and Marine Use
427-11:

Standard for Refrigerating Units
474-15:

Standard for Dehumidifiers
484-14:

Standard for Room Air Conditioners
60335-2-89-17:

Household and Similar Electrical Appliances - Safety - Part 2-89: Particular Requirements for Commercial Refrigerating Appliances with an Incorporated or Remote Refrigerant Unit or Compressor
UL/CSA 60335-2-40 -17:

Household and Similar Electrical Appliances - Safety - Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers.

Reason: Establishing a table to identify the standards that apply to the various types of equipment and appliances will assist in uniform application of this code requirement. Adding UL 109, UL 427, UL 474, UL 484, UL 60335-2-89, and UL 60335-2-40, which are standards used in testing and listing refrigeration equipment, will make the code complete.

Cost Impact: The code change proposal will decrease the cost of construction
Reduce costs by providing clarity

Analysis: A review of the standard proposed for inclusion in the code, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

M95-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: EQUIPMENT STANDARDS

Refrigeration fittings, including press-connect, flared, and threaded	UL 109 and UL 207
Air conditioning equipment 40	UL 1995 or UL/CSA 60335-2-
Packaged terminal air conditioners <u>and heat pumps</u>	UL 484 or UL/CSA 60335-2-40
Split-system air conditioners <u>and heat pumps</u>	UL 1995 or UL/CSA 60335-2-40
Dehumidifiers 40	UL 474 or UL/CSA 60335-2-
Unit coolers 89	UL 412 or UL/CSA 60335-2-
Commercial refrigerators, freezers, beverage coolers, and walk-in coolers	UL 471 or UL/CSA 60335-2-89
Refrigerating units and walk-in coolers	UL 427 or UL 60335-2-89
Refrigerant-containing components and accessories	UL 207

Committee Reason: This cleans up the table and adds current standards. The modification adds heat pumps. (Vote 11-0)

Assembly Action:

None

M95-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Daikin US (JBEngineer@aol.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

UL

UL LLC
333 Pvingsten Road
Northbrook IL 60062-2096

**Table 1101.2
Factory-built equipment and appliances**

EQUIPMENT	STANDARD
Refrigeration fittings, including press-connect, flared, and threaded	UL 109 and UL 207
Air conditioning equipment	UL 1995 or UL/CSA 60335-2-40
Packaged terminal air conditioners	UL 484 or UL/CSA 60335-2-40
Split-system air conditioners	UL 1995 or UL/CSA 60335-2-40
Dehumidifiers	UL 474 or UL/CSA 60335-2-40
Unit coolers	UL 412 or UL/CSA 60335-2-89
Commercial refrigerators, freezers, beverage coolers, and walk-in coolers	UL 471 or UL/CSA 60335-2-89
Refrigerating units and walk-in coolers	UL 427 or UL 60335-2-89
Refrigerant-containing components and accessories	UL 207

1101.2 Factory-built equipment and appliances. *Listed and labeled* self-contained, factory-built *equipment* and appliances shall be tested in accordance with the applicable standards specified in Table 1101.2. Such *equipment* and appliances are deemed to meet the design, manufacture and factory test requirements of this code if installed in accordance with their listing and the manufacturer's instructions.

Commenter's Reason: The line on refrigerant fittings is unnecessary with the revised piping section proposed in M99. All of the appropriate standards are listed in M99 more specifically to their application.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This is an editorial change regarding the location of the reference standards. As such, there is no impact to the cost of construction.

M95-18

M96-18

IMC: 1104.2, 1104.2.1, 1104.3.1, 1104.3.2

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Daikin US (JBEngineer@aol.com)

2018 International Mechanical Code

Revise as follows

1104.2 Machinery room. Except as provided in Sections 1104.2.1 and 1104.2.2, all components containing the refrigerant shall be located either outdoors or in a *machinery room* where the quantity of refrigerant in an independent circuit of a system exceeds the amounts shown in Table 1103.1. For refrigerant blends not listed in Table 1103.1, the same requirement shall apply where the amount for any blend component exceeds that indicated in Table 1103.1 for that component. This requirement shall also apply where the combined amount of the blend components exceeds a limit of 69,100 parts per million (ppm) by volume. Machinery rooms required by this section shall be constructed and maintained in accordance with Section 1105 for Group A1 and B1 refrigerants and in accordance with Sections 1105 and 1106 for Group A2L, A2, B2L, B2, A3 and B3 refrigerants.

Exceptions:

1. Machinery rooms are not required for *listed equipment* and appliances containing not more than 6.6 pounds (3 kg) of refrigerant, regardless of the refrigerant's safety classification, where installed in accordance with the equipment's or appliance's listing and the *equipment* or *appliance* manufacturer's installation instructions.
2. Piping in conformance with Section 1107 is allowed in other locations to connect components installed in a *machinery room* with those installed outdoors.

1104.2.1 Institutional occupancies. The amounts shown in Table 1103.1 shall be reduced by 50 percent for all areas of institutional occupancies except kitchens, laboratories and mortuaries. The total of all Group A2, B2L, B2, A3 and B3 refrigerants shall not exceed 550 pounds (250 kg) in occupied areas or machinery rooms.

1104.3.1 Air-conditioning for human comfort. In other than industrial occupancies where the quantity in a single independent circuit does not exceed the amount in Table 1103.1, Group B1, B2L, B2 and B3 refrigerants shall not be used in high-probability systems for air-conditioning for human comfort.

1104.3.2 Nonindustrial occupancies. Group A2 and B2L, B2 refrigerants shall not be used in high-probability systems where the quantity of refrigerant in any independent refrigerant circuit exceeds the amount shown in Table 1104.3.2. Group A3 and B3 refrigerants shall not be used except where *approved*.

Exception: This section does not apply to laboratories where the floor area per occupant is not less than 100 square feet (9.3 m²).

Reason: ASHRAE 34 changed the classification of refrigerants. Two new groups were added, A2L and B2L. Previously, these types of refrigerants were subclasses of A2 and B2 respectively. With the change in designation, these sections needs to be updated to reflect the additional classifications of refrigerants. Both A2L and B2L refrigerants are flammable, however, they have a lower burning velocity. A2L refrigerants are used in high probability systems, whereas, B2L refrigerants are not.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This change reflect the change in classification of refrigerants.

M96-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal is not ready because the ASHRAE standard is still under development. Piecemeal fixes are premature. A public comment is encouraged after the ASHRAE work is complete. (Vote 10-1)

Assembly Action:

None

M96-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Daikin US (jbenigneer@aol.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

1104.2 Machinery room. Except as provided in Sections 1104.2.1 and 1104.2.2, all components containing the refrigerant shall be located either outdoors or in a *machinery room* where the quantity of refrigerant in an independent circuit of a system exceeds the amounts shown in Table 1103.1. For refrigerant blends not listed in Table 1103.1, the same requirement shall apply where the amount for any blend component exceeds that indicated in Table 1103.1 for that component. This requirement shall also apply where the combined amount of the blend components exceeds a limit of 69,100 parts per million (ppm) by volume. Machinery rooms required by this section shall be constructed and maintained in accordance with Section 1105 for Group A1 and B1 refrigerants and in accordance with Sections 1105 and 1106 for Group A2L, A2, B2L, B2, A3 and B3 refrigerants.

Exceptions:

1. Machinery rooms are not required for *listed equipment* and appliances containing not more than 6.6 pounds (3 kg) of refrigerant, regardless of the refrigerant's safety classification, where installed in accordance with the equipment's or appliance's listing and the *equipment or appliance* manufacturer's installation instructions.
2. Piping in conformance with Section 1107 is allowed in other locations to connect components installed in a *machinery room* with those installed outdoors.

1104.3.2 Nonindustrial occupancies. Group A2 ~~and B2L~~, and B2 refrigerants shall not be used in high-probability systems where the quantity of refrigerant in any independent refrigerant circuit exceeds the amount shown in Table 1104.3.2. Group A3 and B3 refrigerants shall not be used except where *approved*.

Exception: This section does not apply to laboratories where the floor area per occupant is not less than 100 square feet (9.3 m²).

Commenter's Reason: This is a companion change to M88-18 and the new definitions added in M4-18. There are locations within the chapter where A2L and B2L need to be added to the text. Otherwise, the new classification will fall through the cracks. The change on nonindustrial occupancies did not list B2L correctly. Previous modification proposed to Section 1104.2.1 and 1104.3.1 are not included in this modification since they are addressed in the Public Comment to M88-18.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction. This change is editorial in nature adding the refrigerant classification to the current code based on changes to ASHRAE 34.

M96-18

M97-18

IMC: TABLE 1103.1

Proponent: Julius Ballanco, representing Daikin US (JBENGINEER@aol.com)

2018 International Mechanical Code

Revise as follows:

TABLE 1103.1

REFRIGERANT CLASSIFICATION, AMOUNT AND OEL

CHEMICAL REFRIGERANT	FORMULA	CHEMICAL NAME OF BLEND	REFRIGERANT CLASSIFICATION	AMOUNT OF REFRIGERANT PER OCCUPIED SPACE				[F] DEGREES OF HAZARD ^a
				Pounds per 1,000 cubic feet	ppm	g/m ³	OEL ^e	
R-11 ^d	CCl ₃ F	trichlorofluoromethane	A1	0.39	1,100	6.2	1,000	2-0-0 ^b
R-12 ^d	CCl ₂ F ₂	dichlorodifluoromethane	A1	5.6	18,000	90	1,000	2-0-0 ^b
R-13 ^d	CClF ₃	chlorotrifluoromethane	A1	—	—	—	1,000	2-0-0 ^b
R-13B1 ^d	CBrF ₃	bromotrifluoromethane	A1	—	—	—	1,000	2-0-0 ^b
R-14	CF ₄	tetrafluoromethane (carbon tetrafluoride)	A1	25	110,000	400	1,000	2-0-0 ^b
R-22	CHClF ₂	chlorodifluoromethane	A1	13	59,000	210	1,000	2-0-0 ^b
R-23	CHF ₃	trifluoromethane (fluoroform)	A1	7.3	41,000	120	1,000	2-0-0 ^b
R-30	CH ₂ Cl ₂	dichloromethane (methylene chloride)	B1	—	—	—	—	—
R-32	CH ₂ F ₂	difluoromethane (methylene fluoride)	A2 ^f A2L	4.8	36,000	77	1,000	1-4-0
R-40	CH ₃ Cl	chloromethane (methyl chloride)	B2	—	—	—	—	—
R-50	CH ₄	methane	A3	—	—	—	1,000	—
R-113 ^d	CCl ₂ FCClF ₂	1,1,2-trichloro-1,2,2-trifluoroethane	A1	1.2	2,600	20	1,000	2-0-0 ^b
R-114 ^d	CClF ₂ CClF ₂	1,2-dichloro-1,1,2,2-tetrafluoroethane	A1	8.7	20,000	140	1,000	2-0-0 ^b
R-115	CClF ₂ CF ₃	chloropentafluoroethane	A1	47	120,000	760	1,000	—
R-116	CF ₃ CF ₃	hexafluoroethane	A1	34	97,000	550	1,000	1-0-0
R-123	CHCl ₂ CF ₃	2,2-dichloro-1,1,1-trifluoroethane	B1	3.5	9,100	57	50	2-0-0 ^b
R-124	CHClFCF ₃	2-chloro-1,1,1,2-tetrafluoroethane	A1	3.5	10,000	56	1,000	2-0-0 ^b
R-125	CHF ₂ CF ₃	pentafluoroethane	A1	23	75,000	370	1,000	2-0-0 ^b
R-134a	CH ₂ FCF ₃	1,1,1,2-tetrafluoroethane	A1	13	50,000	210	1,000	2-0-0 ^b
R-141b	CH ₃ CCl ₂ F	1,1-dichloro-1-fluoroethane	—	0.78	2,600	12	500	2-1-0
R-142b	CH ₃ CClF ₂	1-chloro-1, 1-difluoroethane	A2	5.1	20,000	83	1,000	2-4-0
R-143a	CH ₃ CF ₃	1,1,1-trifluoroethane	A2 ^f A2L	4.5	21,000	70	1,000	2-0-0 ^b
R-152a	CH ₃ CHF ₂	1,1-difluoroethane	A2	2.0	12,000	32	1,000	1-4-0
R-170	CH ₃ CH ₃	ethane	A3	0.54	7,000	8.7	1,000	2-4-0
R-E170	CH ₃ OCH ₃	Methoxymethane (dimethyl ether)	A3	1.0	8,500	16	1,000	—
R-218	CF ₃ CF ₂ CF ₃	octafluoropropane	A1	43	90,000	690	1,000	2-0-0 ^b
R-227ea	CF ₃ CHFCF ₃	1,1,1,2,3,3,3-heptafluoropropane	A1	36	84,000	580	1,000	—
R-236fa	CF ₃ CH ₂ CF ₃	1,1,1,3,3,3-hexafluoropropane	A1	21	55,000	340	1,000	2-0-0 ^b
R-245fa	CHF ₂ CH ₂ CF ₃	1,1,1,3,3-pentafluoropropane	B1	12	34,000	190	300	2-0-0 ^b
R-290	CH ₃ CH ₂ CH ₃	propane	A3	0.56	5,300	9.5	1,000	2-4-0
R-C318	-(CF ₂) ₄ -	octafluorocyclobutane	A1	41	80,000	660	1,000	—
R-400 ^d	zeotrope	R-12/114 (50.0/50.0)	A1	10	28,000	160	1,000	2-0-0 ^b
R-400 ^d	zeotrope	R-12/114 (60.0/40.0)	A1	11	30,000	170	1,000	—
R-401A	zeotrope	R-22/152a/124 (53.0/13.0/34.0)	A1	6.6	27,000	110	1,000	2-0-0 ^b
R-401B	zeotrope	R-22/152a/124 (61.0/11.0/28.0)	A1	7.2	30,000	120	1,000	2-0-0 ^b
R-401C	zeotrope	R-22/152a/124 (33.0/15.0/52.0)	A1	5.2	20,000	84	1,000	2-0-0 ^b
R-402A	zeotrope	R-125/290/22 (60.0/2.0/38.0)	A1	17	66,000	270	1,000	2-0-0 ^b
R-402B	zeotrope	R-125/290/22 (38.0/2.0/60.0)	A1	15	63,000	240	1,000	2-0-0 ^b
R-403A	zeotrope	R-290/22/218 (5.0/75.0/20.0)	A2	7.6	33,000	120	1,000	2-0-0 ^b
R-403B	zeotrope	R-290/22/218 (5.0/56.0/39.0)	A1	18	70,000	290	1,000	2-0-0 ^b
R-404A	zeotrope	R-125/143a/134a (44.0/52.0/4.0)	A1	31	130,000	500	1,000	2-0-0 ^b

R-405A	zeotrope	R-22/152a/142b/C318 (45.0/7.0/5.5/2.5)	—	16	57,000	260	1,000	—
R-406A	zeotrope	R-22/600a/142b (55.0/4.0/41.0)	A2	4.7	21,000	25	1,000	—
R-407A	zeotrope	R-32/125/134a (20.0/40.0/40.0)	A1	19	83,000	300	1,000	2-0-0 ^b
R-407B	zeotrope	R-32/125/134a (10.0/70.0/20.0)	A1	21	79,000	330	1,000	2-0-0 ^b
R-407C	zeotrope	R-32/125/134a (23.0/25.0/52.0)	A1	18	81,000	290	1,000	2-0-0 ^b
R-407D	zeotrope	R-32/125/134a (15.0/15.0/70.0)	A1	16	68,000	250	1,000	2-0-0 ^b
R-407E	zeotrope	R-32/125/134a (25.0/15.0/60.0)	A1	17	80,000	280	1,000	2-0-0 ^b
R-407F	zeotrope	R-32/125/134a (30.0/30.0/40.0)	A1	20	95,000	320	1,000	—
R-408A	zeotrope	R-125/143a/22 (7.0/46.0/47.0)	A1	21	95,000	340	1,000	2-0-0 ^b
R-409A	zeotrope	R-22/124/142b (60.0/25.0/15.0)	A1	7.1	29,000	110	1,000	2-0-0 ^b
R-409B	zeotrope	R-22/124/142b (65.0/25.0/10.0)	A1	7.3	30,000	120	1,000	2-0-0 ^b
R-410A	zeotrope	R-32/125 (50.0/50.0)	A1	26	140,000	420	1,000	2-0-0 ^b
R-410B	zeotrope	R-32/125 (45.0/55.0)	A1	27	140,000	430	1,000	2-0-0 ^b
R-411A	zeotrope	R-127/22/152a (1.5/87.5/11.0)	A2	2.9	14,000	46	990	—
R-411B	zeotrope	R-1270/22/152a (3.0/94.0/3.0)	A2	2.8	13,000	45	980	—
R-412A	zeotrope	R-22/218/142b (70.0/5.0/25.0)	A2	5.1	22,000	82	1,000	—
R-413A	zeotrope	R-218/134a/600a (9.0/88.0/3.0)	A2	5.8	22,000	94	1,000	—
R-414A	zeotrope	R-22/124/600a/142b (51.0/28.5/4.0/16.5)	A1	6.4	26,000	100	1,000	—
R-414B	zeotrope	R-22/124/600a/142b (50.0/39.0/1.5/9.5)	A1	6.0	23,000	95	1,000	—
R-415A	zeotrope	R-22/152a (82.0/18.0)	A2	2.9	14,000	47	1,000	—
R-415B	zeotrope	R-22/152a (25.0/75.0)	A2	2.1	12,000	34	1,000	—
R-416A	zeotrope	R-134a/124/600 (59.0/39.5/1.5)	A1	3.9	14,000	62	1,000	2-0-0 ^b
R-417A	zeotrope	R-125/134a/600 (46.6/50.0/3.4)	A1	3.5	13,000	56	1,000	2-0-0 ^b
R-417B	zeotrope	R-125/134a/600 (79.0/18.3/2.7)	A1	4.3	15,000	70	1,000	—
R-417C	zeotrope	R-125/134a/600 (19.5/78.8/1.7)	A1	5.4	21,000	87	1,000	—
R-418A	zeotrope	R-290/22/152a (1.5/96.0/2.5)	A2	4.8	22,000	77	1,000	—
R-419A	zeotrope	R-125/134a/E170 (77.0/19.0/4.0)	A2	4.2	15,000	67	1,000	—
R-419B	zeotrope	R-125/134a/E170 (48.5/48.0/3.5)	A2	4.6	17,000	74	1,000	—
R-420A	zeotrope	R-134a/142b (88.0/12.0)	A1	12	45,000	190	1,000	2-0-0 ^b
R-421A	zeotrope	R-125/134a (58.0/42.0)	A1	17	61,000	280	1,000	2-0-0 ^b
R-421B	zeotrope	R-125/134a (85.0/15.0)	A1	21	69,000	330	1,000	2-0-0 ^b
R-422A	zeotrope	R-125/134a/600a (85.1/11.5/3.4)	A1	18	63,000	290	1,000	2-0-0 ^b
R-422B	zeotrope	R-125/134a/600a (55.0/42.0/3.0)	A1	16	56,000	250	1,000	2-0-0 ^b
R-422C	zeotrope	R-125/134a/600a (82.0/15.0/3.0)	A1	18	62,000	290	1,000	2-0-0 ^b
R-422D	zeotrope	R-125/134a/600a (65.1/31.5/3.4)	A1	16	58,000	260	1,000	2-0-0 ^b
R-422E	zeotrope	R-125/134a/600a (58.0/39.3/2.7)	A1	16	57,000	260	1,000	—
R-423A	zeotrope	R-134a/227ea (52.5/47.5)	A1	19	59,000	310	1,000	2-0-0 ^c
R-424A	zeotrope	R-125/134a/600a/600/601a (50.5/47.0/0.9/1.0/0.6)	A1	6.2	23,000	100	970	2-0-0 ^b
R-425A	zoetrope	R-32/134a/227ea (18.5/69.5/12.0)	A1	16	72,000	260	1,000	2-0-0 ^b
R-426A	zeotrope	R-125/134a/600a/601a (5.1/93.0/1.3/0.6)	A1	5.2	20,000	83	990	—
R-427A	zeotrope	R-32/125/143a/134a (15.0/25.0/10.0/50.0)	A1	18	79,000	290	1,000	2-1-0

R-428A	zeotrope	R-125/143a/290/600a (77.5/20.0/0.6/1.9)	A1	23	83,000	370	1,000	—
R-429A	zeotrope	R-E170/152a/600a (60.0/10.0/30.0)	A3	0.81	6,300	13	1,000	—
R-430A	zeotrope	R-152a/600a (76.0/24.0)	A3	1.3	8,000	21	1,000	—
R-431A	zeotrope	R-290/152a (71.0/29.0)	A3	0.69	5,500	11	1,000	—
R-432A	zeotrope	R-1270/E170 (80.0/20.0)	A3	0.13	1,200	2.1	700	—
R-433A	zeotrope	R-1270/290 (30.0/70.0)	A3	0.34	3,100	5.5	880	—
R-433B	zeotrope	R-1270/290 (5.0-95.0)	A3	0.51	4,500	8.1	950	—
R-433C	zeotrope	R-1270/290 (25.0-75.0)	A3	0.41	3,600	6.6	790	—
R-434A	zeotrope	R-125/143a/600a (63.2/18.0/16.0/2.8)	A1	20	73,000	320	1,000	—
R-435A	zeotrope	R-E170/152a (80.0/20.0)	A3	1.1	8,500	17	1,000	—
R-436A	zeotrope	R-290/600a (56.0/44.0)	A3	0.50	4,000	8.1	1,000	—
R-436B	zeotrope	R-290/600a (52.0/48.0)	A3	0.51	4,000	8.1	1,000	—
R-437A	zeotrope	R-125/134a/600/601 (19.5/78.5/1.4/0.6)	A1	5.0	19,000	82	990	—
R-438A	zeotrope	R-32/125/134a/600/601a (8.5/45.0/44.2/1.7/0.6)	A1	4.9	20,000	79	990	—
R-439A	zeotrope	R-32/125/600a (50.0/47.0/3.0)	A2	4.7	26,000	76	990	—
R-440A	zeotrope	R-290/134a/152a (0.6/1.6/97.8)	A2	1.9	12,000	31	1,000	—
R-441A	zeotrope	R-170/290/600a/600 (3.1/54.8/6.0/36.1)	A3	0.39	3,200	6.3	1,000	—
R-442A	zeotrope	R-32/125/134a/152a/227ea (31.0/31.0/30.0/3.0/5.0)	A1	21	100,000	330	1,000	—
R-443A	zeotrope	R-1270/290/600a (55.0/40.0/5.0)	A3	0.19	1,700	3.1	580	—
R-444A	zeotrope	R-32/152a/1234ze(E) (12.0/5.0/83.0)	A2 ^f A2L	5.1	21,000	81	850	—
R-444B	zeotrope	R-32/152a/1234ze(E) (41.5/10.0/48.5)	A2 ^f A2L	4.3	23,000	69	890	—
R-445A	zeotrope	R-744/134a/1234ze(E) (6.0/9.0/85.0)	A2 ^f A2L	4.2	16,000	67	930	—
R-446A	zeotrope	R-32/1234ze(E)/600 (68.0/29.0/3.0)	A2 ^f A2L	2.5	16,000	39	960	—
R-447A	zeotrope	R-32/125/1234ze(E) (68.0/3.5/28.5)	A2 ^f A2L	2.6	16,000	42	900	—
R-448A	zeotrope	R-32/125/1234yf/134a/1234ze(E) (26.0/26.0/20.0/21.0/7.0)	A1	24	110,000	390	890	—
R-449A	zeotrope	R-32/125/1234yf/134a (24.3/24.7/25.3/25.7)	A1	23	100,000	370	830	—
R-450A	zeotrope	R-134a/1234ze(E) (42.0/58.0)	A1	20	72,000	320	880	—
R-451A	zeotrope	R-1234yf/134a (89.8/10.2)	A2 ^f A2L	5.3	18,000	81	520	—
R-451B	zeotrope	R-1234yf/134a (88.8/11.2)	A2 ^f A2L	5.3	18,000	81	530	—
R-452A	zeotrope	R-32/125/1234yf (11.0/59.0/30.0)	A1	27	100,000	440	780	—
R-500 ^e	azeotrope	R-12/152a (73.8/26.2)	A1	7.6	30,000	120	1,000	2-0-0 ^b
R-501 ^d	azeotrope	R-22/12 (75.0/25.0)	A1	13	54,000	210	1,000	—
R-502 ^e	azeotrope	R-22/115 (48.8/51.2)	A1	21	73,000	330	1,000	2-0-0 ^b
R-503 ^e	azeotrope	R-23/13 (40.1/59.9)	—	—	—	—	1,000	2-0-0 ^b
R-504 ^d	azeotrope	R-32/115 (48.2/51.8)	—	28	140,000	450	1,000	—
R-507A	azeotrope	R-125/143a (50.0/50.0)	A1	32	130,000	520	1,000	2-0-0 ^b
R-508A	azeotrope	R-23/116 (39.0/61.0)	A1	14	55,000	220	1,000	2-0-0 ^b
R-508B	azeotrope	R-23/116 (46.0/54.0)	A1	13	52,000	200	1,000	2-0-0 ^b
R-509A	azeotrope	R-22/218 (44.0/56.0)	A1	24	75,000	390	1,000	2-0-0 ^b
R-510A	azeotrope	R-E170/600a (88.0/12.0)	A3	0.87	7,300	14	1,000	—
R-511A	azeotrope	R-290/E170 (95.0/5.0)	A3	0.59	5,300	9.5	1,000	—
R-512A	azeotrope	R-134a/152a (5.0/95.0)	A2	1.9	11,000	31	1,000	—
R-513A	azeotrope	R-1234yf/134a (56.0/44.0)	A1	20	72,000	320	650	—
R-600	CH ₃ CH ₂ CH ₂ CH ₃	butane	A3	0.15	1,000	2.4	1,000	1-4-0
R-600a	CH(CH ₃) ₂ CH ₃	2-methylpropane (isobutane)	A3	0.59	4,000	9.6	1,000	2-4-0
R-601	CH ₃ CH ₂ CH ₂ CH ₂ CH ₃	pentane	A3	0.18	1,000	2.9	600	—

R-601a	(CH ₃) ₂ CHCH ₂ CH ₃	2-methylbutane (isopentane)	A3	0.18	1,000	2.9	600	—
R-610	ethoxyethane (ethyl ether)	CH ₃ CH ₂ OCH ₂ CH ₃	—	—	—	—	400	—
R-611	methyl formate	HCOOCH ₃	B2	—	—	—	100	—
R-717	NH ₃	ammonia	B2 ^f <u>B2L</u>	0.014	320	0.22	25	3-3-0 ^c
R-718	H ₂ O	water	A1	—	—	—	—	0-0-0
R-744	CO ₂	carbon dioxide	A1	4.5	40,000	72	5,000	2-0-0 ^b
R-1150	CH ₂ =CH ₂	ethene (ethylene)	A3	—	—	—	200	1-4-2
R-1233zd(E)	CF ₃ CH=CHCl	trans-1-chloro-3,3,3-trifluoro-1-propene	A1	5.3	16,000	85	800	—
R-1234yf	CF ₃ CF=CH ₂	2,3,3,3-tetrafluoro-1 propene	A2 ^f <u>A2L</u>	4.7	16,000	75	500	—
R-1234ze(E)	CF ₃ CH=CHF	trans-1,3,3,3-tetrafluoro-1 -propene	A2 ^f <u>A2L</u>	4.7	16,000	75	800	—
R-1270	CH ₃ CH=CH ₂	Propene (propylene)	A3	0.1	1,000	1.7	500	1-4-1

For SI: 1 pound = 0.454 kg, 1 cubic foot = 0.0283m³

- a. Degrees of hazard are for health, fire, and reactivity, respectively, in accordance with NFPA 704.
- b. Reduction to 1-0-0 is allowed if analysis satisfactory to the code official shows that the maximum concentration for a rupture or full loss of refrigerant charge would not exceed the IDLH, considering both the refrigerant quantity and room volume.
- c. For installations that are entirely outdoors, use 3-1-0.
- d. Class I ozone depleting substance; prohibited for new installations.
- e. Occupational Exposure Limit based on the OSHA PEL, ACGIH TLV-TWA, the TERA WEEL or consistent value on a time-weighted average (TWA) basis (unless noted C for ceiling) for an 8 hr/d and 40 hr/wk.
- f. ~~The ASHRAE Standard 34 flammability classification for this refrigerant is 2L, which is a subclass of Class 2.~~

Reason:

ASHRAE 34 changed the classification of refrigerants. Two new groups were added, A2L and B2L. Previously, these types of refrigerants were subclasses of A2 and B2 respectively. With the change in designation, the table needs to be updated to reflect the appropriate classification. Additionally, note f no longer applies.

Cost Impact

The code change proposal will not increase or decrease the cost of construction .

This only changes the classification of existing refrigerants.

Internal ID: 1075

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: There may be equipment listed for use with A2L refrigerants, but that doesn't mean that the equipment is safe. This proposal might lose some safety requirements. (Vote 11-0)

Assembly Action:

None

M97-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Daikin US (jbenigneer@aol.com)requests As Submitted.

Commenter's Reason: This Public Comment is being submitted in the event that M88-18 is not approved as amended by the membership. If M88-18 is approved as amended, this code change will be withdrawn. The changes to this table are identical to the changes found in M88-18, however, M88-18 is tied to the acceptance of Group A2L refrigerants for high probability system for comfort cooling. The code already has separate requirements for A2L refrigerants for use in machinery rooms. Hence, the table needs to be properly updated.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This change modifies the listing for A2L refrigerants. This is editorial in nature based on changes to ASHRAE 34.

Public Comment 2:

Proponent: Connor Barbaree, representing ASHRAE (cbarbaree@ashrae.org)requests As Submitted.

Commenter's Reason: Appendix G to ASHRAE Standard 34-2016 has been published, making 2L a class rather than a sub-class. Proposal M97-18 is contingent on acceptance and approval of either F79-18 or M88-18, and also M98-18.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The proposal only changes the classification of existing refrigerants.

M97-18

M98-18

IMC: 1103.1

Proposed Change as Submitted

Proponent: Julius Ballanco, representing Daikin US (JBENGINEER@aol.com)

2018 International Mechanical Code

Revise as follows

1103.1 Refrigerant classification. Refrigerants shall be classified in accordance with ASHRAE 34 as listed in Table 1103.1. Each refrigerant shall be assigned to a single group of refrigerants. The group of refrigerants shall be A1, A2L, A2, A3, B1, B2L, B2, and B3.

Reason: This proposed change adds general requirements found in ASHRAE 34. This added text will assist the code official in understanding how refrigerants are classified into a specific group of refrigerants. It will also make it clear to the code official that a refrigerant can only fall within one group of refrigerants.

ASHRAE 34 approved a change making A2L and B2L full groups of refrigerants. Previously, A2L was a subgroup of A2 and B2L was a subgroup of B2 refrigerants.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This change only impacts the classification of refrigerants.

M98-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: There needs to be more industry consensus. We should not jump ahead without being certain. Service personnel are afraid of the risks. ASHRAE needs to complete its work. (Vote 11-0)

Assembly Action:

None

M98-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Connor Barbaree, representing ASHRAE (cbarbaree@ashrae.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

1103.1 Refrigerant classification. Refrigerants shall be classified in accordance with ASHRAE 34 as listed in Table 1103.1. Each refrigerant shall be assigned to a single safety group of refrigerants. The ~~group of refrigerants~~ refrigerant safety groups shall be A1, A2L, A2, A3, B1, B2L, B2, and B3.

Commenter's Reason: Appendix G to ASHRAE Standard 34-2016 has been published, making 2L a class rather than a sub-class. Proposal M98-18 is contingent on acceptance and approval of either F79-18 or M88-18, and also M97-18.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

A change in the safety groups will not impact construction cost.

Public Comment 2:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Daikin US (jbenigneer@aol.com) requests As Submitted.

Commenter's Reason: This Public Comment is being submitted in the event that M88-18 is not approved as amended by the membership. If M88-18 is approved as amended, this code change will be withdrawn. The change to this section is identical to the change found in M88-18, however, M88-18 is tied to the acceptance of Group A2L refrigerants for high probability system for comfort cooling. The code already has a new definition of refrigerants, hence this section clarifies the different groups of refrigerants. Furthermore, Group A2L refrigerants are already identified in the code for use in machinery rooms.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This change is editorial in nature. It will properly identify the refrigerant types in accordance with the change made to ASHRAE 34.

M98-18

M99-18

IMC: 1107, 1107.1, 1107.2, 1107.3, 1107.4, Table <u>TABLE 1107.4</u>, 1107.4.1, 1107.5, Table TABLE 1107.5, 1107.5.1, Table TABLE 1107.5.1, 1107.6, 1107.7, SECTION 1108, 1108.1, 1108.1.1, 1108.2, 1108.3, 1108.3.1, 1108.3.2, 1108.3.2.1, 1108.3.2.2, 1108.3.3, 1108.3.4, 1108.3.5, 1108.4, 1108.5, 1108.6, 1108.7, 1108.8, 1108.9, SECTION 1109, 1109.1, 1109.2, 1109.2.1, 1109.2.2, 1109.2.3, 1109.2.4, 1109.2.5, 1109.2.6, 1109.3, 1109.3.1, 1109.3.2, Table TABLE 1109.3.2, 1109.3.3, 1109.4, 1109.4.1, 1109.4.3, 1109.5, 1109.6, 1109.7, 1109.8, 1109.8.1, 1109.8.2, 1109.8.3, 1109.8.4, 1110, 1110.1, 1110.2, 1110.3, 1110.4, 1110.5, 1110.5.1, 1110.5.2, 1110.6, 1110.7, 1110.8

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Daikin US (Chair, Refrigerant Piping Committee) (JBENGINEER@aol.com)

2018 International Mechanical Code

Delete and substitute as follows

~~SECTION 1107 REFRIGERANT PIPING~~

SECTION 1107 PIPING MATERIAL

1107.1 Piping. Refrigerant piping material for other than R-717 (ammonia) systems shall conform to the requirements in this section.

Piping material and installations for R-717 (ammonia) refrigeration systems shall comply with IAR 2.

1107.2 Used Materials. Used pipe, fittings, valves and other materials that are to be reused shall be clean and free of foreign materials and shall be approved for reuse.

1107.3 Material rating. Materials, joints and connections shall be rated for the operating temperature and pressure of the refrigerant system. Materials shall be suitable for the type of refrigerant and type of lubricant in the refrigerant system. Magnesium alloys shall not be used in contact with any halogenated refrigerants. Aluminum, zinc, magnesium, and their alloys shall not be used in contact with R-40 (methyl chloride).

1107.4 Piping materials standards. Refrigerant pipe shall conform to one or more of the standards listed in Table 1107.4. The exterior of the pipe shall be protected from corrosion and degradation.

**TABLE 1107.4
REFRIGERANT PIPE**

<u>Piping Material</u>	<u>Standard (See Chapter 15)</u>
<u>Aluminum Tube</u>	<u>ASTM B210, ASTM B210M, ASTM B491/B491M</u>
<u>Brass (Copper Alloy) Pipe</u>	<u>ASTM B43</u>
<u>Copper Pipe</u>	<u>ASTM B42, ASTM B302</u>
<u>Copper Tube^a</u>	<u>ASTM B68, ASTM B75, ASTM B88, ASTM B280, ASTM B819</u>
<u>Copper Linesets</u>	<u>ASTM B1003, ASTM B280</u>
<u>Steel Pipe^b</u>	<u>ASTM A53, ASTM A106</u>
<u>Steel Tube</u>	<u>ASTM A254, ASTM A334</u>

a. Soft annealed copper tubing larger than 1 $\frac{3}{8}$ in. (35 mm) O.D. shall not be used for field assembled refrigerant piping, unless it is protected from mechanical damage.

b. ASTM A53, Type F steel pipe shall not be used for refrigerant lines having an operating temperature less than -20°F (-29°C).

1107.4.1 Steel pipe Group A2, A3, B2, and B3. The minimum weight of steel pipe for Group A2, A3, B2, and B3 refrigerants shall be Schedule 80 for sizes 1-1/2 inch or less in diameter.

1107.5 Pipe fittings. Refrigerant pipe fittings shall be approved for installation with the piping materials to be installed, and shall conform to one of more of the standards listed in Table 1107.5 or shall be listed and labeled as complying with UL 207.

**TABLE 1107.5
REFRIGERANT PIPE FITTINGS**

Fitting Material	Standard (See Chapter 15)
Aluminum	ASTM B361
Brass (Copper Alloy)	ASME B16.15, ASME B16.24
Copper	ASME B16.15, ASME B16.18, ASME B16.22, ASME B16.24, ASME B16.26, ASME B16.50
Steel	ASTM A105, ASTM A181, ASTM A193, ASTM A234, ASTM A420, ASTM A707

1107.5.1 Copper brazed field swaged.. The minimum and maximum cup depth of field fabricated copper brazed swaged fitting connections shall comply with Table 1107.5.1.

**TABLE 1107.5.1
COPPER BRAZED SWAGED CUP DEPTHS**

Fitting Size (Inch)	Minimum Depth (Inch)	Maximum Depth (Inch)
1/8	0.15	0.23
3/16	0.16	0.24
1/4	0.17	0.26
3/8	0.20	0.30
1/2	0.22	0.33
5/8	0.24	0.36
3/4	0.25	0.38
1	0.28	0.42
1-1/4	0.31	0.47
1-1/2	0.34	0.51
2	0.40	0.60
2-1/2	0.47	0.71
3	0.53	0.80
3-1/2	0.59	0.89
4	0.64	0.96

1107.6 Valves. Valves shall be of materials that are compatible with the type of piping material, refrigerants, and oils in the system. Valves shall be listed and labeled and rated for the temperatures and pressures of the refrigerant systems in which the valves are installed.

1107.7 Flexible connectors, expansion and vibration compensators. Flexible connectors and expansion and vibration control devices shall be listed and labeled for use in refrigerant systems.

SECTION 1108 JOINTS AND CONNECTIONS

1108.1 Approval. joints and connections shall be of an approved type. Joints and connections shall be tight for the pressure of the refrigerant system when tested in accordance with Section 1110.

1108.1.1 Joints between different piping materials.. joints between different piping materials shall be made with approved adapter fittings. Joints between dissimilar metallic piping materials shall be made with a dielectric fitting or a dielectric union conforming to dielectric tests of ASSE 1079. Adapter fittings with threaded ends between different materials shall be joined with thread lubricant in accordance with Section 1108.3.4.

1108.2 Preparation of pipe ends. Pipe shall be cut square, reamed and chamfered, and shall be free of burrs and obstructions. Pipe ends shall have full-bore openings and shall not be undercut.

1108.3 Joint preparation and installation. Where required by Sections 1108.4 through 1108.9, the preparation and installation of brazed, flared, mechanical, press-connect, soldered, threaded and welded joints shall comply with Sections 1108.3.1 through 1108.3.5.

1108.3.1 Brazed joints. Joint surfaces shall be cleaned. An approved flux shall be applied where required by the braze filler metal manufacturer. The piping being brazed shall be purged of air to remove the oxygen and filled with one of the following inert gases: oxygen-free nitrogen, helium, or argon. The piping system shall be pre-purged with an inert gas for a minimum time corresponding to five volume changes through the piping system prior to brazing. The pre-purge rate shall be at a minimum velocity of 100 feet per minute. The inert gas shall be directly connected to the tube system being brazed to prevent the entrainment of ambient air. After the pre-purge, the inert gas supply shall be maintained through the piping during the brazing operation at a minimum pressure of 1.0 psi and a maximum pressure of 3.0 psi. The joint shall be brazed with a filler metal conforming to AWS A5.8.

1108.3.2 Mechanical joints. Mechanical joints shall be installed in accordance with the manufacturer's instructions.

1108.3.2.1 Flared joints. Flared fittings shall be installed in accordance with the manufacturer's instructions. The flared fitting shall be used with the tube material specified by the fitting manufacturer. The flared tube end shall be made by a tool designed for that operation.

1108.3.2.2 Press-connect joints. Press-connect joints shall be installed in accordance with the manufacturer's instructions.

1108.3.3 Soldered joints.. Joint surfaces to be soldered shall be cleaned and a flux conforming to ASTM B 813 shall be applied. The joint shall be soldered with a solder conforming to ASTM B 32. Solder joints shall be limited to refrigerant systems using Group A1 refrigerant and having a pressure of less than or equal to 200 psi.

1108.3.4 Threaded joints.. Threads shall conform to ASME B1.20.1, ASME B1.20.3, ASME B1.13M, or ASME B1.1. Thread lubricant, pipe-joint compound, or thread tape shall be applied on the external threads only and shall be approved for application on the piping material.

1108.3.5 Welded joints. Joint surfaces to be welded shall be cleaned by an approved procedure. Joints shall be welded with an approved filler metal.

1108.4 Aluminum tube. Joints between aluminum tubing or fittings shall be brazed, mechanical, press-connect, or welded joints conforming to Section 1108.3.

1108.5 Brass (copper alloy) pipe. Joints between brass pipe or fittings shall be brazed, mechanical, press-connect, threaded, or welded joints conforming to Section 1108.3.

1108.6 Copper pipe. Joints between copper or copper-alloy pipe or fittings shall be brazed, mechanical, press-connect, soldered, threaded, or welded joints conforming to Section 1108.3.

1108.7 Copper tube. Joints between copper or copper-alloy tubing or fittings shall be brazed, flared, mechanical, press-connect, or soldered joints.

1108.8 Steel pipe. Joints between steel pipe or fittings shall be mechanical joints, threaded, press-connect, or welded joints conforming to Section 1108.3.

1108.9 Steel tube. Joints between steel tubing or fittings shall be flared, mechanical, press-connect, or welded joints conforming to Section 1108.3.

SECTION 1109 REFRIGERANT PIPE INSTALLATION

1109.1 General. Refrigerant piping installations, other than R-717 (ammonia) refrigeration systems, shall comply with the requirements of this section. The design of refrigerant piping shall be in accordance with ASME B31.5.

1109.2 Piping location. Refrigerant piping shall comply with the installation location requirements of Sections 1109.2.1 through 1109.2.6. Refrigerant piping for group A2L and B2L shall also comply with the requirements of Section 1109.3.

Refrigerant piping for group A2, A3, B2 and B3 shall also comply with the requirements of Section 1109.4.

1109.2.1 Minimum height.. Exposed refrigerant piping installed in open spaces that afford passage shall be not less than 7 feet 3 inches (2210 mm) above the finished floor.

1109.2.2 Refrigerant pipe enclosure. Refrigerant piping shall be protected by locating it within the building elements or within protective enclosures.

Exception: Piping protection within the building elements or protective enclosure shall not be required in any of the following locations:

1. Where installed without ready access or located more than 7 feet 3 inches (2210 mm) above the finished floor.
2. Where located within 6 feet (1830 mm) of the refrigerant unit or appliance.
3. Where located in a machinery room complying with Section 1105.

1109.2.3 Prohibited locations. Refrigerant piping shall not be installed in any of the following locations:

1. Exposed within a fire-resistance-rated exit access corridor.
2. Interior exit stairway.
3. Interior exit ramp.
4. Exit passageway, or
5. Elevator, dumbwaiter or other shaft containing a moving object.

1109.2.4 Piping in concrete floors. Refrigerant piping installed in concrete floors shall be encased in pipe, conduit, or ducts. The piping shall be protected to prevent damage from vibration, stress and corrosion.

1109.2.5 Refrigerant pipe shafts. Refrigerant piping that penetrates two or more floor/ceiling assemblies shall be enclosed in a fire-resistance-rated shaft enclosure. The fire-resistance-rated shaft enclosure shall comply with Section 713 of the International Building Code.

Exceptions:

1. For systems using R718 refrigerant.
2. Piping in a direct system using Group A1 refrigerant where the refrigerant quantity does not exceed the limits of Table 1103.1 for the smallest occupied space through which the piping passes.
2. Piping located on the exterior of the building where vented to the outdoors.

1109.2.6 Exposed piping surface temperature. Exposed piping with ready access having surface temperatures greater than 120°F (49°C) or less than 5°F (-15°C) shall be protected from contact or shall have thermal insulation that limits the exposed insulation surface temperature to a range of 5°F (-15°C) to 120°F (49°C).

1109.3 Installation requirements for A2L and B2L refrigerants. Piping systems using Group A2L or B2L refrigerant shall comply with the requirements of Sections 1109.3.1 through 1109.3.3.

1109.3.1 Pipe protection. In addition to the requirements of Section 305.5, aluminum, copper, and steel tube used for Group A2L and B2L refrigerants and located in concealed locations where tubing is installed in studs, joists, rafters or similar member spaces and located less than 1-1/2 inches (38 mm) from the nearest edge of the member, shall be continuously protected by shield plates. Protective steel shield plates having a minimum thickness of 0.0575 inch (1.463 mm) (No. 16 gage) shall cover the area of the tube plus the area extending not less than 2 inches beyond both sides of the tube..

1109.3.2 Shaft ventilation. Refrigerant pipe shafts with systems using Group A2L or B2L refrigerants shall be naturally or mechanically ventilated. The shaft ventilation exhaust outlet shall comply with Section 501.3.1. Naturally ventilated shafts shall have a pipe, duct, or conduit not less than 4 inches in diameter that connects to the lowest point of the shaft and extends to the outdoors. The pipe, duct, or conduit shall be level or pitched downward to the outdoors. Mechanically ventilated shafts shall have a minimum airflow velocity in accordance with Table 1109.3.2. The mechanical ventilation shall be continuously operated or activated by a refrigerant detector. Systems utilizing a refrigerant detector shall activate the mechanical ventilation at a maximum refrigerant concentration of 25 percent of the lower flammable limit of the refrigerant. The detector, or a sampling tube that draws air to the detector, shall be located in an area where

refrigerant from a leak will concentrate. The shaft shall not be required to be ventilated for double wall refrigerant pipe where the interstitial space of the double wall pipe is vented to the outdoors.

TABLE 1109.3.2
SHAFT VENTILATION VELOCITY

<u>Cross Sectional Area of Shaft (sq. in.)</u>	<u>Minimum Ventilation Velocity (feet per minute)</u>
<u>≤ 20</u>	<u>100</u>
<u>> 20 - ≤ 250</u>	<u>200</u>
<u>> 250 - ≤ 1250</u>	<u>300</u>
<u>> 1250</u>	<u>400</u>

1109.3.3 Pipe identification. Refrigerant pipe located in areas other than the room or space where the refrigerating equipment is located shall be identified. The pipe identification shall be located at intervals not exceeding 20 feet on the refrigerant piping or pipe insulation. The identification shall indicate the refrigerant designation and safety group classification of refrigerant used in the piping system. For Group B2L refrigerants the identification shall also include the following statement: "DANGER - Toxic Refrigerant." The minimum height of lettering of the identification label shall be ½ inch.

1109.4 Installation requirements for A2, A3, B2, and B3 refrigerants. Piping systems using Group A2, A3, B2, or B3 refrigerant shall comply with the requirements of Section 1109.4.1 through 1109.4.3.

1109.4.1 Piping material. Piping material for Group A2, A3, B2, or B3 refrigerant located inside the building, except for machinery rooms, shall be copper pipe, brass pipe, or steel pipe. Pipe joints located in areas other than the machinery room shall be welded. Self-contained listed and labeled equipment or appliances shall have piping material based on the listing requirements.

1109.4.3 Shaft ventilation. Refrigerant pipe shafts with systems using Group A2, A3, B2, or B3 refrigerants shall be continuously mechanically ventilated. The shaft ventilation exhaust outlet shall comply with Section 501.3.1. Mechanically ventilated shafts shall have a minimum airflow velocity as specified in Table 1109.3.2. The shaft shall not be required to be ventilated for double wall refrigerant pipe where the interstitial space of the double wall pipe is vented to the outdoors.

1109.4.3 Pipe identification.. Refrigerant pipe shall be identified with the refrigerant designation and safety group classification of refrigerant used in the piping system and the following statement: "DANGER - Risk of Fire or Explosion, Flammable Refrigerant." For Group B2 and B3 refrigerants the identification shall also include the following statement: "DANGER - Toxic Refrigerant." The identification shall be at intervals not exceeding 5 feet on the refrigerant piping or pipe insulation. The minimum height of lettering of the identification label shall be 1 inch.

1109.5 Refrigerant pipe penetrations. The annular space between the outside of a refrigerant pipe and the inside of a pipe sleeve or opening in a building envelope wall, floor, or ceiling assembly penetrated by a refrigerant pipe shall be sealed in an approved manner with caulking material, foam sealant or closed with a gasketing system. The caulking material, foam sealant or gasketing system shall be designed for the conditions at the penetration location and shall be compatible with the pipe, sleeve and building materials in contact with the sealing materials. Refrigerant pipes penetrating fire-resistance-rated assemblies or membranes of fire-resistance-rated assemblies shall be sealed or closed in accordance with Section 714 of the International Building Code.

1109.6 Stress and strain. Refrigerant piping shall be installed so as to prevent strains and stresses that exceed the structural strength of the pipe. Where necessary, provisions shall be made to protect piping from damage resulting from vibration, expansion, contraction, and structural settlement.

1109.7 Condensate control. Refrigerating piping and fittings that, during normal operation, will reach a surface temperature below the dew point of the surrounding air, and are located in spaces or areas where condensation has the potential to cause a safety hazard to the building occupants, structure, electrical equipment or any other equipment or appliances, shall be insulated or protected in an approved manner to prevent damage from condensation.

1109.8 Stop valves. Stop valves shall be installed in specified locations in accordance with Sections 1109.8.1 and 1109.8.2. Stop valves shall be supported in accordance with Section 1109.8.3 and identified in accordance with Section 1109.8.4.

Exceptions:

1. Systems that have a refrigerant pump out function capable of storing the entire refrigerant charge in a receiver or heat exchanger.
2. Systems that are equipped with provisions for pump out of the refrigerant using either portable or permanently installed refrigerant recovery equipment.
3. Self-contained listed and labeled systems.

1109.8.1 Refrigerating systems containing more than 6.6 pounds (3.0 kg) of refrigerant. Stop valves shall be installed in the following locations on refrigerating systems containing more than 6.6 pounds (3.0 kg) of refrigerant:

1. The suction inlet of each compressor, compressor unit or condensing unit.
2. The discharge outlet of each compressor, compressor unit or condensing unit.
3. The outlet of each liquid receiver.

1109.8.2 Refrigerating systems containing more than 100 pounds (45 kg) of refrigerant. In addition to stop valves required by Section 1109.8.1, systems containing more than 100 pound (45 kg) of refrigerant shall have stop valves installed in the following locations:

1. Each inlet of each liquid receiver.
2. Each inlet and each outlet of each condenser, where more than one condenser is used in parallel

Exceptions:

1. Stop valves shall not be required on the inlet of a receiver in a condensing unit, nor on the inlet of a receiver that is an integral part of the condenser.
2. Systems utilizing nonpositive displacement compressors.

1109.8.3 Stop valve support. Stop valves shall be supported to prevent detrimental stress and strain on the refrigerant piping system. The piping system shall not be utilized to support stop valves on copper tubing or aluminum tubing 1 inch (25.4 mm) OD or larger in diameter.

1109.8.4 Identification. Stop valves shall be identified where their intended purpose is not obvious. Where valves are identified by a numbering or lettering system, legend(s) or key(s) for the valve identification shall be located in the room containing the indoor refrigeration equipment. The minimum height of lettering of the identification label shall be ½ inch (12.7 mm).

SECTION 1108 FIELD TEST

1110 REFRIGERANT PIPING SYSTEM TEST

1110.1 General. Refrigerant piping systems, other than R-717 (ammonia) refrigeration systems, that are erected in the field, shall be pressure tested for strength and leak tested for tightness, in accordance with the requirements of this section, after installation and before being placed in operation. Tests shall include both the high and low-pressure sides of each system.

Exception: Listed and labeled equipment, including compressors, condensers, vessels, evaporators, gas bulk storage tanks, safety devices, pressure gauges and control mechanisms, shall not be required to be tested.

1110.2 Exposure of refrigerant piping system. Refrigerant pipe and joints installed in the field shall be exposed for visual inspection and testing prior to being covered or enclosed.

1110.3 Test gases. The medium used for pressure testing the refrigerant system shall be one of the following inert gases: oxygen-free nitrogen, helium, or argon. For R-744 refrigerant systems carbon dioxide shall be allowed as the test medium. For R-718 refrigerant systems water shall be allowed as the test medium. Oxygen, air, combustible gases and mixtures containing such gases shall not be used as test medium. Systems erected on the premises with tubing not exceeding 5/8 inch (15.8 mm) OD shall be allowed to use the refrigerant identified on the nameplate label or marking as the test medium.

1110.4 Test apparatus. The means used to pressurize the refrigerant piping system shall have on its outlet side, a test pressure measuring device and either a pressure-limiting device or a pressure-reducing device. The test pressure

measuring device shall have an accuracy of ±3 percent or less of the test pressure, and shall have a resolution of 5% or less of the test pressure.

1110.5 Piping system pressure test and leak test. The refrigerant piping system shall be tested as a whole or separate tests shall be conducted for the low pressure-side and high pressure-side of the piping system. The refrigerant piping system shall be tested in accordance with both of the following methods:

1. The system shall be pressurized for a period of not less than 60 minutes to not less than the lower of the design pressures or the setting of the pressure relief device(s). The design pressures for testing shall be the pressure listed on the label nameplate of the condensing unit, compressor, compressor unit, pressure vessel, or other system component with a nameplate. Additional test gas shall not be added to the system after the start of the pressure test. The system shall not show loss of pressure on the test pressure measuring device during the pressure test. Where using refrigerant as a test medium in accordance with Section 1110.3, the test pressure shall be not less than the saturation dew point pressure at 77°F (25°C).
2. A vacuum of 500 microns shall be achieved. After achieving a vacuum, the system shall be isolated from the vacuum pump. The system pressure shall not rise above 1500 microns for a period of not less than 10 minutes.

1110.5.1 Joints and refrigerant-containing parts in air ducts. Joints and all refrigerant-containing parts of a refrigerating system located in an air duct of an air-conditioning system that conveys conditioned air to and from human-occupied spaces shall be tested at a pressure of 150 percent of the higher of the design pressure or pressure relief device setting.

1110.5.2 Limited charge systems. Limited-charge systems with a pressure relief device, erected on the premises, shall be tested at a pressure not less than one and one-half times the pressure setting of the relief device. Listed and labeled limited charge systems shall be tested at the equipment or appliance design pressure.

1110.6 Booster compressor. Where a compressor protected by a pressure relief device is used as a booster to obtain an intermediate pressure and such compressor discharges into the suction side of another compressor, the booster compressor shall be considered to be a part of the low pressure side of the system.

1110.7 Centrifugal/nonpositive displacement compressors. Where testing systems using centrifugal or other nonpositive displacement compressors, the entire system shall be considered to be the low pressure-side for test purposes.

1110.8 Contractor or engineer declaration. The installing contractor or registered design professional of record shall issue a certificate of test to the code official for all systems containing 55 pounds (25 kg) or more of refrigerant. The certificate shall give the test date, name of the refrigerant, test medium, and the field test pressure applied to the high pressure-side and the low pressure-side of the system. The certification of test shall be signed by the installing contractor or registered design professional and shall be made part of the public record.

Reason: I organized a group of 8 experts in the field of refrigerant piping to help develop this code change. I refer to them as the Refrigerant Piping Committee. However, I am submitting this change as the proponent. In addition to the Committee I created, I circulated a draft to other experts in the field of refrigeration. I received a number of comments through that review. Those comments have been incorporated in the final text that I am submitting. It is the intent of the Refrigerant Piping Committee to submit a similar change to ASHRAE 15 and the UMC. The goal is to update all refrigerant piping requirements addressing every type of refrigerant system other than ammonia.

This proposed change reorganizes and updates the requirements for refrigerant piping. Many of the requirements remain the same as in the current code. The change follows the format used in other chapters in the Mechanical Code and Plumbing Code for listing piping material, joints and connections, and installation requirement.

Section 1107 remains the piping material section, however, the title is changed to be consistent with other chapters. There is no need to repeat refrigerant. Section 1107.1 is the general section indicating that compliance to the section for material requirements. The exception to Section 1107.1 is necessary to clarify that the ammonia piping requirements are regulated by IAR 2. Without this statement, there could be confusion since Section 1101.6 states to apply IAR 2 except as modified by this code. The piping requirements do not apply to ammonia systems. Similar exception language appears in Section 1109.1 and 1110.1.

There is currently no section regarding used materials, yet other chapters include requirements for used materials. This section is similar to the used material requirements in other chapters.

Section 1107.3 is a general requirement for the piping material to be rated for the temperatures, pressures, and type of refrigerant. The aluminum exception for R-40 (methyl chloride) currently appears in Section 1107.5.5. The requirements have been expanded to include zinc and magnesium alloys since these materials are also susceptible to failure from R-40 (methyl chloride). Magnesium alloys cannot be used with any halogenated refrigerants since the material will react and fail. This prohibition has been added.

Section 1107.4 includes a table for listing all of the acceptable piping material. The appropriate standards for the piping material are listed in the table. While the word brass was previously converted to copper alloy throughout the code, ASTM B43 is still identified as a brass pipe standard. Therefore, brass was used with copper alloy included in parenthesis.

The current code has a restriction on the use of mechanical joints with annealed copper tubing. This is a hold over requirement that is out of date. ASME B31.5 has a different limitation. Note 1 to the table includes the requirements listed in ASME B31.5.

Note 2 of the table currently appears in Section 1107.5.1. The requirement remains the same.

Section 1107.5 includes a table of the fitting standards used in refrigerant piping systems. Some of the standards are new to this chapter since the previous requirements were weak with regard to referencing the appropriate fitting standards. There is also a general reference to UL 207. There are refrigerant fittings that do not meet the fitting standard, however, they are listed to UL 207. This is an appropriate standard for specialty type of refrigerant fittings.

Copper tubing is a common material used in refrigerant piping systems. A common joint is a swaged fitting which is made in the field. Since the swaging of copper expands the wall of the pipe, thus weakening the outer tube of the joint where not supported by the joint filler material and inner tube, the depth of the swage must be included. This depth is similar to the brazed fitting cup depths in the ASME B16.50 standard. The maximum depth allows a 50% increase in cup depth. A greater depth will result in too weak a pipe wall.

Section 1107.6 adds requirements for valves. The current code has valve installation requirements but is missing valve material requirements.

Section 1107.7 adds material requirements for flexible connectors and expansion and vibration compensators. These components are required to be listed and labeled for refrigerant systems.

Section 1108 is organized similar to the joints and connections section in Chapter 12. Many of the requirements are new since the current code requirements are not up to date. The section is organized with general requirements in the beginning, followed by joining methods, and completed with piping material allowances of various joining methods.

Section 1108.1 is the general section on joints requiring them to be approved and meet the tightness requirements to pass the system test.

Section 1108.1.1 lists requirements for joints between different materials. A reference to the testing requirements in ASSE 1079 is made in the section for joints between dissimilar metals. The standard has appropriate testing requirements for dielectric tests that can be used on refrigeration piping systems even though the standard appears to address water piping systems. Section 1108.2 is similar to the preparation of pipe ends found in other chapters. The same requirements would apply to refrigerant piping.

Section 1108.3 lists all of the acceptable joining methods. For brazing, there are requirements for using an inert gas inside the piping. This prevents oxidation on the interior of the piping. If there is excessive oxidation, it could result in obstruction of small piping or components in the system, as well as other system chemistry degradation, increasing the probability of future repair work. Reducing the frequency of opening refrigerating systems for repair reduces the exposure to numerous hazards and risks. For many of the joints, a reference to UL 207 is included. This standard covers the various refrigerant joining methods. The press-connect refrigerant fittings are listed to this standard, as are many mechanical joints.

Section 1108.3.4 includes all of the various threads that are used in refrigerant piping systems. This expands the listing of ASME standards for threaded joints.

Sections 1108.4 through 1108.9 list each material and the acceptable joining methods for the particular material.

The piping installation requirements are listed in a separate section from the material and joints and connections. The piping requirements have been expanded to address the necessary safety measures to assure a proper piping installation.

With a greater use of VRV and VRF systems, there is significantly more refrigerant piping installed inside a building. Additionally, with split systems and multi-split systems in multistory residential buildings, there is also a significant amount of piping installed.

There will be an expanded use of Group A2L refrigerants that are low global warming potential refrigerants. These refrigerants were previously listed as a subgroup of A2 refrigerants. As a separate group, the requirements need to be provided to address the installation of piping with Group A2L refrigerants.

The new section on piping is divided into four main subject matters. The first part of the section addresses piping requirements for all types of refrigerants being used. The second part is for Group A2L and B2L refrigerants. The third part is for piping requirements for Group A2, A3, B2, and B3 refrigerants. The last part has additional general requirements for piping installations.

Section 1109.1 includes a reference to ASME B31.5. This standard is currently referenced in Section 1107.1. There is no change regarding the application of ASME B31.5.

Section 1109.2 identifies which sections are applicable to which refrigerant groups.

Section 1109.2.1 is a rewording of the requirements currently found in Section 1107.2.

Section 1109.2.2 is a new section requiring refrigerant piping to be concealed within the building elements. While this is implied in the current code, it is not stated. Section 1109.2.2.1, allowing refrigerant piping to be exposed, is similar to the current allowance specified in Sections 1107.2 and 1107.3. The other allowance would be refrigerant piping located in a machinery room. Exposed piping is anticipated in a machinery room where access is restricted to authorized personnel.

Section 1109.2.3 is similar to current Section 1107.2. One of the changes is the allowance for refrigerant piping to be located in the ceiling of a corridor, hence, not exposed. This appears to be implied, however, when the ceiling space is considered a part of the corridor, it appears to be prohibited. Refrigerant piping, especially for multi-split systems is often installed in the ceiling of a corridor. If the RCL requirements are met, there is no hazard posed to the corridor.

Section 1109.2.4 is a duplication of the requirements currently found in Section 1107.2.1.

Section 1109.2.5 is a new section regulating the requirements for shaft containing refrigerant piping. A fire-resistance-rated shaft will be required when the refrigerant piping connects three or more stories. Other utilities can also be located within the same shaft. There are three exceptions proposed to the shaft requirements in Section 1109.2.5.1, one is when water is use, that is R718 refrigerant. The second is for the use of Group A1 refrigerants provided the smallest space in which the pipe pass meets the RCL requirements for the refrigerant. The last exception is for when the piping is installed on the outside of the building where any leak would vent to atmosphere.

Section 1109.2.6 is also a new requirement. This section is intended to protect an individual from directly contacting a hot or cold refrigerant pipe. The temperatures are based on avoiding burning the skin or causing frostbite or frost damage to the skin. One of the methods of protection would adding insulation around the pipe. This is the most common method of protection for exposed piping.

Section 1109.3 is a new section regulating the installation of piping using Group A2L or B2L refrigerants. These refrigerants are lower flammable, lower burning velocity refrigerants. While the refrigerant will burn, it doesn't ignite or burn very easily. Since it is flammable additional protection requirements are proposed.

Section 1109.3.1 will require continuous protection when the piping is located within 1-1/2 inches of the nearest edge of a member. Currently the code requires this level of protection in certain locations, such as the top plate and bottom plate. This section will require the protection where ever the piping is installed. The protection is intended to prevent the tubing from be punctured by a nail or screw.

Section 1109.3.2 requires ventilation of the shaft in which the refrigerant piping is located. A minimal movement of air will exhaust the leaking refrigerant out of the shaft. The velocity rates identified in Table 1109.3.2 are taken from a peer reviewed paper published by ASME, and ensure that density differences between air and refrigerant will not defeat the purpose to exhaust the released refrigerant out of the shaft, whether in horizontal or vertical shaft orientation.

The ventilation would only be required when there is a leak of refrigerant. A leak detector is required in the shaft to identify when a leak occurs. Another option would be to naturally ventilate the shaft or continuously ventilate the shaft. Since most refrigerants are heavier than air, they tend to move downward. If naturally ventilated, the refrigerant moves to outside the building. An exception to the ventilation requirements would be the use of double wall pipe. While this is not commonly installed, the possibility exists that there will be greater use of double wall pipe.

The final requirement in Section 1109.3.3 specifies the labeling requirements for the piping. Since B2L refrigerant is toxic, there are special requirements to label the pipe as containing toxic refrigerant.

Section 1109.4 has the special requirement for the more flammable and more toxic refrigerants. Section 1109.4.1 requires the systems to be installed using only pipe, not tubing. The added strength of the pipe will reduce any potential leak from a puncture. The exception to this requirement would be self-contained listed equipment. Some refrigerators and similar appliances are using Group A3 refrigerants. However, these appliances are tested and listed.

Section 1109.4.2 requires any shaft with these refrigerants to be continuously ventilated. The same velocity requirements apply to this group of refrigerants as Group A2L and B2L. There is also an exception for double wall pipe.

Section 1109.4.3 specifies the labeling requirements. The labels are similar to what is required in UL/CSA 60335-2-40.

Section 1109.5 is a new section regulating pipe penetrations. Any time a pipe penetrated a wall, floor, or ceiling, it must be sealed to prevent the passage of any refrigerant that may be leaking. There is a direct reference to the building code for penetrations of fire-resistance-rated assemblies.

Section 1109.6 is a new requirement for pipe protection. Similar language has been used for other piping systems in the Mechanical Code and the Plumbing Code. The requirements are also applicable to refrigerant piping.

Sections 1109.7 through 1109.8.4 are rewording and relocation of current Sections 1107.4, 1107.8, 1107.8.1, 1107.8.2, and 1107.8.3.

The Refrigerant Piping Committee spent a considerable amount of time rewriting and discussing the testing requirements. The basis for Section 1110 is the current Section 1108. The key elements of Section 1108 are captured in the new section. The significant differences relate to the test medium, the test equipment, and the pressure and vacuum test.

The test gas is specified as being either oxygen-free nitrogen, helium, or argon. These are the three inert gases used for testing refrigerant piping systems. Carbon dioxide refrigerant systems are permitted to be tested with carbon dioxide. Water refrigerant piping systems are permitted to be tested with water.

For smaller systems, refrigerant contractors have used the refrigerant for testing. This would be permitted for systems having 5/8 inch or smaller tubing.

The accuracy of the test gage is not currently specified. Most test gages used by refrigerant contractors have an accuracy within 2-1/2 percent. The allowance for up to 3 percent takes into consideration other gages that may be used.

For the testing of the system, the Committee believes it is important to run two tests; one is a pressure test, the other is a vacuum test. When testing with internal pressures, a one-way leak in the reverse direction may not be discovered. However, when a vacuum is placed on the system, the leak will be identified. The standard test for refrigerant systems is one hour for pressure and 10 minutes for a vacuum. These tests have been added to the section.

Cost Impact: The code change proposal will increase the cost of construction

The additional testing required for refrigerant piping will take additional time which equates to a high cost for labor.

M99-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This provides direction to the code officials to inspect for proper installations. Workers often braze without nitrogen purge, for example, and there is nothing to cite in current code. The code needs teeth to address bad practices. This adds safety provisions that are not in current code. The testing requirements are a worthy addition to the code. (Vote 6-5)

Assembly Action:

None

M99-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Daikin US (jbengineer@aol.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

1109.2 Piping location. Refrigerant piping shall comply with the installation location requirements of Sections 1109.2.1 through ~~1109.2.6~~ 1109.2.7. Refrigerant piping for group A2L and B2L shall also comply with the requirements of Section 1109.3. Refrigerant piping for group A2, A3, B2 and B3 shall also comply with the requirements of Section 1109.4.

1109.2.7 Pipe identification. Refrigerant pipe located in areas other than the room or space where the refrigerating equipment is located shall be identified. The pipe identification shall be located at intervals not exceeding 20 feet on the refrigerant piping or pipe insulation. The minimum height of lettering of the identification label shall be ½ inch. The identification shall indicate the refrigerant designation and safety group classification of refrigerant used in the piping system. For Group A2, A3, B2, and B3 refrigerant the identification shall also include the following statement: "DANGER - Risk of Fire or Explosion. Flammable Refrigerant." For any Group B refrigerant, the identification shall also include the following statement: "DANGER - Toxic Refrigerant."

1109.3.3 Pipe identification. ~~Refrigerant pipe located in areas other than the room or space where the refrigerating equipment is located shall be identified. The pipe identification shall be located at intervals not exceeding 20 feet on the refrigerant piping or pipe insulation. The identification shall indicate the refrigerant designation and safety group classification of refrigerant used in the piping system. For Group B2L refrigerants the identification shall also include the following statement: "DANGER - Toxic Refrigerant." The minimum height of lettering of the identification label shall be ½ inch.~~

1109.4.3 Pipe identification. ~~Refrigerant pipe shall be identified with the refrigerant designation and safety group classification of refrigerant used in the piping system and the following statement: "DANGER - Risk of Fire or Explosion. Flammable Refrigerant." For Group B2 and B3 refrigerants the identification shall also include the following statement: "DANGER - Toxic Refrigerant." The identification shall be at intervals not exceeding 5 feet on the refrigerant piping or pipe insulation. The minimum height of lettering of the identification label shall be 1 inch.~~

Commenter's Reason: The identification requirements should have been placed in the general piping installation requirements rather than the subsections on A2L and B2L, and A2, A3, B2, and B3. The also assures that Group B1 refrigerants are properly identified.

The remainder of the proposed requirement are unchanged. Only these sections require further clarification.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This is an editorial change moving the pipe identification requirements to the general piping section.

Public Comment 2:

Proponent: Connor Barbaree, representing ASHRAE (cbarbaree@ashrae.org) requests As Submitted.

Commenter's Reason: ASHRAE SSPC15 supports the intent of these extensive changes and has formed a working

group to incorporate the requirements into an addendum to ASHRAE 15.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The additional testing required for refrigerant piping will take additional time and incrementally add cost.

Public Comment 3:

Proponent: David Bixby, Air Conditioning Contractors of America, representing Air Conditioning Contractors of America (david.bixby@acca.org) requests Disapprove.

Commenter's Reason: ACCA opposes the Committee's approval of this proposal for the same reasons as the Committee disapproved proposals M96-18 and M97-18. The proponent's rationale states that he intends to submit a similar change to ASHRAE Standard 15. In addition, the proposal includes the expanded use of Group A2L refrigerants. ACCA believes that it is best for the code not to get too far ahead of ASHRAE standards on these matters and to wait for the ASHRAE standards changes to be finalized and published before such coverage is added to the code.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction.

Public comment is to disapprove the proposal so it will not impact cost if the proposal is disapproved.

M99-18

M102-18

IMC: 1107.5.6, 1107.5

Proposed Change as Submitted

Proponent: William Chapin, Professional Code Consulting, LLC, representing Professional Code Consulting, LLC (bill@profcc.us)

2018 International Mechanical Code

Add new text as follows

1107.5.6 PE-RT/AL/PE-RT. Polyethylene of raised temperature/aluminum/polyethylene of raised temperature (PE-RT/AL/PE-RT) tubing shall conform to ASTM FXXXX.

Revise as follows

1107.5 Materials for refrigerant pipe and tubing. Piping materials shall be as set forth in Sections 1107.5.1 through ~~1107.5.5-1107.5.6~~.

Reason: The ASTM F17 Subcommittee for composite pipe is creating the standard for PE-RT/AL/PE-RT tubing that is currently being used in HVAC/R line sets. The standard is expected to be published in the coming months. This standard ensures that the tubing is tested and rated for the application.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Cost can vary depending on system design.

Analysis: A review of the standard proposed for inclusion in the code, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

M102-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval was based on the proponent's published reason statement. (Vote 11-0)

Assembly Action:

None

M102-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Mueller Industries (JBEngineer@aol.com) requests Disapprove.

Commenter's Reason: There is no standard for the piping material identified. Furthermore, the piping material is plastic. Plastic pipe has not been allowed in refrigerant piping system because of the possible failure of the pipe during a fire. If there is a fire and the refrigerant load completely escapes during the fire, the firefighters are exposed to hydrogen fluoride. All of the surfaces are also exposed to hydrogen fluoride. Touching the surfaces will expose the skin to contamination.

Before the International Mechanical Code allows plastic piping material for refrigerant piping systems, this should be proposed to ASHRAE and ASME. There should also be research conducted on the impact during a fire of using this material. ASHRAE 15 currently does not have any provisions for plastic pipe for refrigerant systems. Similarly, ASME B31.5 does not recognize the use of plastic pipe for refrigerant piping systems. Just because there is a standard does not mean that the piping material is viable for refrigerant piping systems. There must be a full evaluation regarding the use of plastic pipe for refrigerant systems.

It should also be noted that the proposal is incomplete. There are no joining methods identified. There are no fitting standards provided. There is no protection requirements indicated. This is a poorly submitted code change that should not have been recommended for approval.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Since there is no standard and no product, there is no means of evaluating the impact to the cost of construction.

Public Comment 2:

Proponent: Tim Earl, representing GBH International (tearl@gbhinternational.com) requests Disapprove.

Commenter's Reason: This proposal references an ASTM standard that does not yet exist. It doesn't even contain a number, instead stating "ASTM FXXX."

The last ballot for this standard closed in June, and it received negative votes. That means that those votes will be addressed at the next committee meeting in November 2018. Based on those discussions, a new draft is likely to be circulated. That draft could be significantly different than the previous draft. At best, the final standard will be published sometime in 2019.

That means that, if the committee action stands, the version which is eventually published and referenced in the code does not even exist today, and could include clauses that have not yet been written. It would be completely irresponsible to reference a standard in the code before interested parties can actually read it. Clauses which violate CP28 and/or restrict certain segments of industry could appear in the next draft, and there would be no way to stop it.

There was no testimony on this proposal at Committee Action Hearings, and the committee simply approved it (inexplicably) based on the reason statement.

This proposal should not have been approved by the committee, and must be disapproved now as the standard is not available for review in its final form (since it doesn't even exist in its final form yet).

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

There is no cost impact in disapproving a code change to reference a standard which does not exist.

M102-18

M112-18

IMC: Table TABLE 1210.4, Table TABLE 1210.5, NSF

Proposed Change as Submitted

Proponent: Jeremy Brown, representing NSF International (brown@nsf.org)

2018 International Mechanical Code

**TABLE 1210.4
GROUND-SOURCE LOOP PIPE**

MATERIAL	STANDARD (see Chapter 15)
Chlorinated polyvinyl chloride (CPVC)	ASTM D2846; ASTM F441; ASTM F442
Cross-linked polyethylene (PEX)	ASTM F876; CSA B137.5
Polyethylene/aluminum/polyethylene (PE-AL-PE) pressure pipe	ASTM F1282; CSA B137.9
High-density polyethylene (HDPE)	ASTM D2737; ASTM D3035; ASTM F714; AWWA C901; CSA B137.1; CSA C448; NSF 358-1
Polypropylene (PP-R)	ASTM F2389; CSA B137.11; NSF 358-2
Polyvinyl chloride (PVC)	ASTM D1785; ASTM D2241
Raised temperature polyethylene (PE-RT)	ASTM F2623; ASTM F2769; CSA B137.18, <u>NSF 358-4</u>

**TABLE 1210.5
GROUND-SOURCE LOOP PIPE FITTINGS**

PIPE MATERIAL	STANDARD (see Chapter 15)
Chlorinated polyvinyl chloride (CPVC)	ASTM D2846; ASTM F437; ASTM F438; ASTM F439; CSA B137.6
Cross-linked polyethylene (PEX)	ASTM F877; ASTM F1807; ASTM F1960; ASTM F2080; ASTM F2159; ASTM F2434; CSA B137.5
Polyethylene/aluminum/polyethylene (PE-AL-PE)	ASTM F1282; ASTM F2434; CSA B137.9
High Density Polyethylene (HDPE)	ASTM D2683; ASTM D3261; ASTM F1055; CSA B137.1; CSA C448; NSF 358-1
Polypropylene (PP-R)	ASTM F2389; CSA B137.11; NSF 358-2
Polyvinyl chloride (PVC)	ASTM D2464; ASTM D2466; ASTM D2467; CSA B137.2; CSA B137.3
Raised temperature polyethylene (PE-RT)	ASTM D3261; ASTM F1807; ASTM F2098; ASTM F2159; ASTM F2735; ASTM F2769; CSA B137.1; CSA B137.18, <u>NSF 358-4</u>

NSF 358-4-2017:

Polyethylene of raised temperature (PE-RT) pipe and fittings for water-based ground-source (geothermal) heat pump systems

Reason: At the proposal deadline, NSF 358-4 was still a draft standard, but it is expected to be published prior to the public hearing. The balloted draft standard will be submitted with the proposal. Anyone may receive a complimentary copy of this draft standard for the purpose of reviewing this proposal by emailing brown@nsf.org. These tables contain the acceptable materials for geothermal ground loop pipe and fittings. PE-RT piping and associated fittings are already accepted materials with referenced standards. NSF 358-4 is a proposed ANSI standard written specifically to contain requirements for PE-RT geothermal piping and fittings. Companion standards NSF 358-1 (PE) and NSF 358-3(PP) are already approved in this table. NSF 358-4 addresses performance pressure testing, long term strength, chemical resistance, constant tensile load joint testing, suitability for burial and marking specific to geothermal PE-RT piping systems.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Adding an additional option will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

M112-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposed new standard is not yet published. (Vote 10-1)

Assembly Action:

None

M112-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jeremy Brown, representing NSF International (brown@nsf.org) requests As Submitted.

Commenter's Reason: NSF 358-4 was rejected by the committee because the standard was not completed at the time of this proposal's submittal. No one spoke against this standard from a technical standpoint. A draft standard was submitted to the committee at the time of proposal. The standard is complete without any changes from the draft submitted to the committee.

A copy of the standard may be viewed at http://www.nsf.org/newsroom_pdf/NSF_358-4-2018-watermarked.pdf. There is no controversy around this standard. It is the 4th in a suite of NSF Standards covering geothermal pipe and fittings. NSF 358-1 (Polyethylene) and NSF 358-2 (Polypropylene) are already referenced in Tables 1210.4 and Table 1210.5. NSF 358-3 (Crosslinked Polyethylene) was approved as submitted by the committee in P113.

NSF 358-4 Polyethylene of raised temperature (PE-RT) pipe and fittings for water-based ground-source (geothermal) heat pump systems should be added to provide an additional option to the code for this material.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Referencing this standard creates another option for demonstrating compliance. This is cost neutral.

M112-18

M119-18 Part II

IRC: M2103.1

Proposed Change as Submitted

Proponent: Chris Haldiman, representing Watts Water Technologies (chris.haldiman@wattswater.com)

2018 International Residential Code

M2103.1 Piping materials. Piping for embedment in concrete or gypsum materials shall be standard-weight steel pipe, copper and copper-alloy pipe and tubing, cross-linked polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX) pressure pipe, chlorinated polyvinyl chloride (CPVC), ~~polybutylene~~, cross-linked polyethylene (PEX) tubing, polyethylene of raised temperature (PE-RT) or polypropylene (PP) with a rating of not less than ~~100-80~~ psi at 180°F (~~690-552~~ kPa at 82°C).

Reason: A 100 psi rating is not necessary in hydronic applications, particularly when the tubing is encased in a hard concrete or a gypsum material. Hydronic heating systems are typically designed with operating pressures of 12 psi - 20 psi, and these systems contain expansion tanks incorporated in them that are factory set to 12 psi. Safety relief valves on the boilers are typically set at 30 psi or 50 psi.

ASTM Standard F2623, "Standard Specification for Polyethylene of Raised Temperature (PE-RT) SDR 9 Tubing", states in Section 1.4, "The tubing produced under this specification shall be permitted for use in general fluid transport, including hydronics and irrigations systems."

I believe the retention of 100 psi minimum was an oversight when ASTM F2623 PE-RT was added to Table 1202.4.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The code change proposal will not increase or decrease the cost of construction.

M119-18 Part II

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval was based on proponent's published reason statement. The revision aligns with the material standard. Boilers have 30 to 50 PSI relief valves to prevent higher pressures. (Vote 9-1)

Assembly Action:

Disapproved

M119-18 Part II

Individual Consideration Agenda

Public Comment 1:

Proponent: Assembly Action requests Disapprove.

Commenter's Reason: This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action. The assembly action for Disapprove was successful by a vote of 55.8% (63) to 44.2% (50) by eligible members online during the period of May 9 - May 23, 2018.

M119-18 Part II

NOTE: M119-18 Part I DID NOT RECEIVE A PUBLIC COMMENT AND IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY

M119-18 Part I

IMC: 1209.1

Proposed Change as Submitted

Proponent: Chris Haldiman, representing Watts Water Technologies (chris.haldiman@wattswater.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IMC COMMITTEE AND PART II WILL BE HEARD BY THE IRC M/P COMMITTEE. PLEASE SEE THE HEARING ORDERS FOR THESE COMMITTEES.

2018 International Mechanical Code

Revise as follows

1209.1 Materials. Piping for heating panels shall be standard-weight steel pipe, Type L copper tubing, polybutylene or other *approved* plastic pipe or tubing rated at ~~100-80 psi (689 kPa)~~ 552kPa at 180°F (82°C).

Reason: A 100 psi rating is not necessary in hydronic applications, particularly when the tubing is encased in a hard concrete or a gypsum material. Hydronic heating systems are typically designed with operating pressures of 12 psi - 20 psi, and these systems contain expansion tanks incorporated in them that are factory set to 12 psi. Safety relief valves on the boilers are typically set at 30 psi or 50 psi.

ASTM Standard F2623, "Standard Specification for Polyethylene of Raised Temperature (PE-RT) SDR 9 Tubing", states in Section 1.4, "The tubing produced under this specification shall be permitted for use in general fluid transport, including hydronics and irrigations systems."

I believe the retention of 100 psi minimum was an oversight when ASTM F2623 PE-RT was added to Table 1202.4.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The code change proposal will not increase or decrease the cost of construction.

M119-18 Part I

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The pressure should not be reduced to less than 100 psi. (Vote 7-4)

Assembly Action:

None

M119-18 Part I

M120-18

IMC: Table TABLE 1302.3, 1302.9, ASTM, UL

Proposed Change as Submitted

Proponent: Bob Torbin, OmegaFlex, representing OmegaFlex (bob.torbin@omegaflex.net)

2018 International Mechanical Code

Revise as follows

**TABLE 1302.3
FUEL OIL PIPING**

MATERIAL	STANDARD (see Chapter 15)
Copper or copper-alloy pipe	ASTM B42; ASTM B43; ASTM B302
Copper or copper-alloy tubing (Type K, L or M)	ASTM B75; ASTM B88; ASTM B280; ASME B16.51
Labeled pipe	(See Section 1302.4)
Nonmetallic pipe	ASTM D2996
Steel pipe	ASTM A53; ASTM A106
Steel tubing	ASTM A254; ASTM A539
Stainless steel tubing	ASTM A240; UL1369; UL971A

Add new text as follows

1302.9 Corrugated stainless steel tubing containment system. Corrugated stainless steel tubing that is factory-installed within a non-metallic containment system shall be listed and labeled in accordance with UL 1369 or UL 971A.

Add new standard(s) follows

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box
C700
West Conshohocken PA 19428
US

A240/A240M- 15a:

Standard Specification for Chromium and Chromium-nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications

UL

UL LLC
333 Pfingsten Road
Northbrook IL 60062-2096
US

971A-2006:

Outline of Investigation for Metallic Underground Fuel Pipe 1369-18:

Reason: The corrugated stainless steel tubing double-containment system, including termination fittings, is intended for use with fuel oil, as well as motor vehicle, aviation and marine fuels either above or below grade. The intent and design of double containment systems are focused on preventing fuel oil leaks that could result in severe fire hazards. The corrugated stainless steel primary tubing is a zero-permeation pipe which is highly resistant to corrosion with exceptional crush resistance. The UV stabilized Nylon 12 protective containment layer offers exceptional resistance to hydrocarbons, chemical and water exposure, and carries a 50 psig rating. An EFEP secondary barrier jacket layer is bonded to the Nylon 12 protective layer to offer secondary containment with exceptional permeation resistance for product compatibility. The interstitial space between the tubing and jacket allows continuous monitoring for leak detection,

with a 50 psig rating for pressurized systems. The self-flaring fitting provides a metal to metal sealing surface with excellent reliability and is field-attachable using standard hand tools. This class of piping product has been used for a variety of fuels for several years without failure, and is also permitted in the IFGC for similar applications for fuel gas systems (see Section 404.14).

Cost Impact: The code change proposal will decrease the cost of construction

The use of a listed encasement system results in cost savings because the piping and encasement are installed simultaneously. This avoids the labor cost of separately installing the conduit and piping. In addition, the sealing and venting methods (when required) are also integrated within the encasement system, thus eliminating the need to separately assemble and/or install sealing and venting components within standard conduit.

M120-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: ~~1302.9 Corrugated stainless steel tubing containment Piping systems. Corrugated stainless steel tubing that is factory installed within a non-metallic containment Aboveground pipe systems shall be listed and labeled in accordance with UL 1369. Underground pipe systems shall be listed and labeled in accordance with~~ ~~or~~ UL 971A.

Copper or copper-alloy pipe	ASTM B42; ASTM B43; ASTM B302
Copper or copper-alloy tubing (Type K, L or M)	ASTM B75; ASTM B88; ASTM B280; ASME B16.51
Labeled pipe	(See Section 1302.4)
Nonmetallic pipe	ASTM D2996
Steel pipe	ASTM A53; ASTM A106
Steel tubing	ASTM A254; ASTM A539
Stainless steel tubing	ASTM A240; UL1369; UL971A

Committee Reason: Approval was based on the proponent's published reason statement. The modification corrects the problems that were inconsistent with the code currently. (Vote 11-0)

Assembly Action:

None

M120-18

Individual Consideration Agenda

Public Comment 1:

Proponent: CP28 Administration.

Commenter's Reason: The administration of ICC Council Policy 28 (CP28) is not taking a position on this code change. This public comment is being submitted to bring a procedural requirement to the attention of the ICC voting membership. In accordance with Section 3.6.3.1.1 of ICC Council Policy 28 (partially reproduced below), the new referenced standard UL 1369-18 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

(CP28) 3.6.3.1.1 Proposed New Standards. In order for a new standard to be considered for reference by the Code, such standard shall be submitted in at least a consensus draft form in accordance with Section 3.4. If the proposed new standard is not submitted in at least consensus draft form, the code change proposal shall be considered incomplete and shall not be processed. The code change proposal shall be considered at the Committee Action Hearing by the applicable code development committee responsible for the corresponding proposed changes to the code text. If the committee action at the Committee Action Hearing is either As Submitted or As Modified and the standard is not completed, the code change proposal shall automatically be placed on the Public Comment Agenda with the recommendation stating that in order for the public comment to be considered, the new standard shall be completed and readily available prior to the Public Comment Hearing

M120-18

RB5-18

IRC: R105.2

Proposed Change as Submitted

Proponent: Jim Tidwell, Tidwell Code Consulting, representing Honeywell (jimtidwell@tccfire.com)

2018 International Residential Code

Revise as follows

R105.2 Work exempt from permit. Exemption from *permit* requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this *jurisdiction*. *Permits* shall not be required for the following:

Building:

1. One-story detached *accessory structures*, provided that the floor area does not exceed 200 square feet (18.58 m²).
2. Fences not over 7 feet (2134 mm) high.
3. Retaining walls that are not over 4 feet (1219 mm) in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge.
4. Water tanks supported directly upon *grade* if the capacity does not exceed 5,000 gallons (18 927 L) and the ratio of height to diameter or width does not exceed 2 to 1.
5. Sidewalks and driveways.
6. Painting, papering, tiling, carpeting, cabinets, counter tops and similar finish work.
7. Prefabricated swimming pools that are less than 24 inches (610 mm) deep.
8. Swings and other playground equipment.
9. Window awnings supported by an exterior wall that do not project more than 54 inches (1372 mm) from the exterior wall and do not require additional support.
10. Decks not exceeding 200 square feet (18.58 m²) in area, that are not more than 30 inches (762 mm) above *grade* at any point, are not attached to a dwelling and do not serve the exit door required by Section R311.4.

Electrical:

1. *Listed* cord-and-plug connected temporary decorative lighting.
2. Reinstallation of attachment plug receptacles but not the outlets therefor.
3. Replacement of branch circuit overcurrent devices of the required capacity in the same location.
4. Electrical wiring, devices, *appliances*, apparatus or *equipment* operating at less than 25 volts and not capable of supplying more than 50 watts of energy.
5. Minor repair work, including the replacement of lamps or the connection of *approved* portable electrical *equipment* to *approved* permanently installed receptacles.

Gas:

1. Portable heating, cooking or clothes drying *appliances*.
2. Replacement of any minor part that does not alter approval of *equipment* or make such *equipment* unsafe.
3. Portable-fuel-cell *appliances* that are not connected to a fixed piping system and are not interconnected to a power grid.

Mechanical:

1. Portable heating *appliances*.
2. Portable ventilation *appliances*.
3. Portable cooling units.
4. Steam, hot- or chilled-water piping within any heating or cooling *equipment* regulated by this code.
5. Replacement of any minor part that does not alter approval of *equipment* or make such *equipment* unsafe.
6. Portable evaporative coolers.
7. Self-contained refrigeration systems containing 10 pounds (4.54 kg) or less of ~~refrigerant~~ or non-flammable (A-1) refrigerant.
8. Self-contained refrigeration systems containing non-flammable (A-1) refrigerants that are actuated by motors of 1 horsepower (746 W) or less.
- ~~8-9.~~ Portable-fuel-cell *appliances* that are not connected to a fixed piping system and are not interconnected to a power grid.

Plumbing:

1. The stopping of leaks in drains, water, soil, waste or vent pipe; provided, however, that if any concealed trap, drainpipe, water, soil, waste or vent pipe becomes defective and it becomes necessary to remove and replace the same with new material, such work shall be considered as new work and a *permit* shall be obtained and inspection made as provided in this code.
2. The clearing of stoppages or the repairing of leaks in pipes, valves or fixtures, and the removal and reinstallation of water closets, provided such repairs do not involve or require the replacement or rearrangement of valves, pipes or fixtures.

Reason: The existing exemption for permitting residential size HVAC systems is founded on the fact that all refrigerants used in these systems have been non-flammable up until now. Changing out a system historically hasn't presented a significant risk. That changes with the introduction of flammable refrigerants. Changing out a system now may require significantly more design work to assure a safe installation. In addition, piping may need to be re-routed or replaced in some cases. If flammable refrigerants are used, it is no longer a simple equipment replacement, but a much more complex issue with significant safety risk. Requiring a permit will provide the jurisdiction with the opportunity to address that risk during the review and inspection process.

Cost Impact: The code change proposal will increase the cost of construction. While the actual cost of construction isn't impacted, the requirement for a permit will add to the final cost.

RB5-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Approval was based on the proponent's published reason statement. (Vote 6-2)

Assembly Action:

None

RB5-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Connor Barbaree, representing ASHRAE (cbarbaree@ashrae.org) requests As Modified by This Public Comment.

Replace as follows:

2018 International Residential Code

R105.2 Work exempt from permit. Exemption from *permit* requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this *jurisdiction*. *Permits* shall not be required for the following:

Building:

1. One-story detached *accessory structures*, provided that the floor area does not exceed 200 square feet (18.58 m²).
2. Fences not over 7 feet (2134 mm) high.
3. Retaining walls that are not over 4 feet (1219 mm) in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge.
4. Water tanks supported directly upon *grade* if the capacity does not exceed 5,000 gallons (18 927 L) and the ratio of height to diameter or width does not exceed 2 to 1.
5. Sidewalks and driveways.
6. Painting, papering, tiling, carpeting, cabinets, counter tops and similar finish work.
7. Prefabricated swimming pools that are less than 24 inches (610 mm) deep.
8. Swings and other playground equipment.
9. Window awnings supported by an exterior wall that do not project more than 54 inches (1372 mm) from the exterior wall and do not require additional support.
10. Decks not exceeding 200 square feet (18.58 m²) in area, that are not more than 30 inches (762 mm) above *grade* at any point, are not attached to a dwelling and do not serve the exit door required by Section R311.4.

Electrical:

1. *Listed* cord-and-plug connected temporary decorative lighting.
2. Reinstallation of attachment plug receptacles but not the outlets therefor.
3. Replacement of branch circuit overcurrent devices of the required capacity in the same location.
4. Electrical wiring, devices, *appliances*, apparatus or *equipment* operating at less than 25 volts and not capable of supplying more than 50 watts of energy.
5. Minor repair work, including the replacement of lamps or the connection of *approved* portable electrical *equipment* to *approved* permanently installed receptacles.

Gas:

1. Portable heating, cooking or clothes drying *appliances*.
2. Replacement of any minor part that does not alter approval of *equipment* or make such *equipment* unsafe.
3. Portable-fuel-cell *appliances* that are not connected to a fixed piping system and are not interconnected to a power grid.

Mechanical:

1. Portable heating *appliances*.
2. Portable ventilation *appliances*.
3. Portable cooling units.
4. Steam, hot- or chilled-water piping within any heating or cooling *equipment* regulated by this code.
5. Replacement of any minor part that does not alter approval of *equipment* or make such *equipment* unsafe.
6. Portable evaporative coolers.
7. Self-contained ~~refrigeration~~ refrigerating systems, containing Group A1 or A2L refrigerants in accordance with IMC Table 1103.1, with either of the following:
 - 7.1. 10.0 pounds (4.54 kg) or less a motor of 1.00 horsepower (746 W) or less. of refrigerant, or that are
 - 7.2. actuated by motor
8. Self-contained refrigerating systems, containing Group A2 or A3 refrigerants in accordance with IMC Table 1103.1, with either 0.331 pounds (150 g) or less refrigerant.
9. Portable-fuel-cell appliances that are not connected to a fixed piping system and are not interconnected to a power grid.

Plumbing:

1. The stopping of leaks in drains, water, soil, waste or vent pipe; provided, however, that if any concealed trap, drainpipe, water, soil, waste or vent pipe becomes defective and it becomes necessary to remove and replace the same with new material, such work shall be considered as new work and a *permit* shall be obtained and inspection made as provided in this code.
2. The clearing of stoppages or the repairing of leaks in pipes, valves or fixtures, and the removal and reinstallation of water closets, provided such repairs do not involve or require the replacement or rearrangement of valves, pipes or fixtures.

Commenter's Reason: Self-contained systems are all required to be listed and labeled in accordance with the relevant UL product safety standard. The UL standards have requirements for protection of refrigerant tubing, with more stringent requirements when flammable refrigerants are used, so the proponent's reason statement about re-routing piping do not make sense. Split-type refrigerating systems for cooling or split-type heat pumps, with field installed piping, are not exempt from permit requirements.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The actual cost of construction is not impacted. Some cases not qualifying for the exemption may require a permit with small impact on total cost.

Public Comment 2:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing National Association of Home Builders (jbengineer@aol.com); Donald Surrena, National Association of Home Builders, representing National Association of Home Builders (dsurrena@nahb.org) requests Disapprove.

Commenter's Reason: This change would be over reaching in applying to typical units that are installed without a permit. You can buy a window air conditioning unit, that is permanently installed through the wall, at many of

the major home super stores that use R32 as the refrigerant. R32 falls into the category of an A2L refrigerant. As such, it would not be exempt from the requirement for a permit.

Similarly, small mini-splits using R32 refrigerant would not be exempt from requiring a permit when they are replaced. However, a mini-split using R410A would be exempt. Both units are safe to use because of the small refrigerant charge size.

The proponent states that the original exemption was based on A1 refrigerants. There is no documentation to support this claim. The exemption is based on a small charge size that will not be detrimental to the occupants. That remains true for an A2L unit being installed.

All of the current units exempt, including units using Group A2L refrigerants, are listed to a consensus standard. Hence, the use of these smaller units in residences is safe without the need for a permit regardless of the refrigerant used.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction

A permit fee would not be required for the installation of small air conditioning units, including window air conditioners that are permanently installed.

RB5-18

RM3-18

IRC: M1307.7

Proposed Change as Submitted

Proponent: Pennie Feehan, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (PMGCAC@iccsafe.org)

2018 International Residential Code

Add new text as follows

M1307.7 Prohibited support. Gypsum board shall not be used as a support base under an appliance.

Reason: If appliances are installed resting on gypsum board, the board can compress, degrade from heat, moisture and vibration and crumble, with the result being movement and settling of the appliance which would put stress on gas piping, vent connectors, chimney connectors, electrical connections and ductwork. Gypsum board is not intended to be a support base for vertical deadloads.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal will not increase the cost of construction because no additional labor, materials, equipment, appliances or devices are mandated beyond what is currently required by the code.

RM3-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The support of appliances is already covered in the code. (Vote 6-3)

Assembly Action:

None

RM3-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Tim Earl, representing The Gypsum Association (tearl@gbhinternational.com) requests As Submitted.

Commenter's Reason: Gypsum panel products are not intended for use as appliance supports and will not perform adequately when misused in this way.

The members of the Gypsum Association, the manufacturers of these products, note the following reasons for not using their products in this application:

Gypsum panels do not have the compressive strength to support heavy loads over time and will eventually "crush" under the weight of the appliance. This can cause stress on fittings and connections that may lead to a life safety hazard.

If an appliance such as a refrigerator or water heater were to leak water onto the panel, this can not only further exacerbate the issue with compressive strength mentioned above, but also lead to the growth of mold, especially in panel products not intended for high moisture conditions. The mold is an additional life safety/health concern.

It was stated at the Committee Action Hearings that one jurisdiction places gypsum panel products under appliances because it is a thermal barrier or greater depending upon thickness and type. Indeed, for a single event fire exposure this is true. However, continual heat exposure as may occur under a furnace or water heater burner will degrade this ability over time by causing calcination (the release of chemically combined water from the gypsum matrix) - this is why gypsum panels are required to be a set distance from heat in a situation such as a grease duct. As this degradation occurs the panels will lose strength due to changes in their crystalline structure and become more likely to compress and create issues.

Some committee members cited as their reason for disapproval the fact that the mechanical code already prohibits this. A thorough review of the IMC showed that this is not true. The use of gypsum panel products as appliance supports is not currently prohibited in the code.

For the reasons above, we strongly encourage overturning the committee and approving the code change as submitted.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This proposal would not affect costs, as there are other alternatives to gypsum panels for this application which cost no more than gypsum panels.

RM3-18

RM5-18

IRC: M1309

Proposed Change as Submitted

Proponent: Craig Conner, representing self (craig.conner@mac.com); Jani Palmer (Palmer.Janise@epa.gov)

2018 International Residential Code

Add new text as follows

M1309 Radon testing. Radon testing shall be performed for radon zone 1, as defined in Appendix F. This section requires that tests be performed and the results be provided to the owner, but does not require a specific test result.

Exceptions:

1. Testing is not required where the authority having jurisdiction has defined the radon zone as Zone 2 or 3.
2. Testing is not required where the occupied space is located above an open space.

Testing shall be performed as specified in items 1 through 10:

1. Testing shall be performed after the dwelling passes its air tightness test.
2. Testing shall be performed after the radon control system installation is complete. If the system has an active fan, the residence shall be tested with the fan operating.
3. Testing shall be performed at the lowest floor level that will be occupied, whether or not the space is finished. Spaces that are physically separated and served by different HVAC systems shall be tested separately.
4. Testing shall not be performed in a closet, hallway, stairway, laundry room, furnace room, bathroom or kitchen.
5. Testing shall be performed with a commercially available radon test kit or with a continuous radon monitor that can be calibrated. Testing with test kits shall include two tests, and the test results shall be averaged. Testing shall be in accordance with the testing device manufacturer's instructions.
6. Testing shall be performed by the builder, a registered design professional, or an approved third party.
7. Testing shall be conducted over a period of not less than 48 hours or not less than the period specified by the testing device manufacturer, whichever is longer. The initial testing shall begin prior to occupancy, but need not be completed prior to occupancy.
8. Test results shall be provided directly to the owner by the test lab or testing party and shall be delivered either before or after occupancy.
9. An additional pre-paid test kit shall be provided to the owner to utilize at the owner's discretion. The test kit shall include mailing or emailing the results from the testing lab to the owner.
10. The owner or registered design professional shall be notified in writing prior to occupancy, stating one of the following:
 - 10.1. A radon test result of 4 pCi/L or above is the 'action level' set by EPA. The EPA recommends radon reduction measures to lower radon levels below 4 pCi/L."
 - 10.2. For a radon test result of 4 pCi/L or above [name of builder or authority having jurisdiction] recommends radon reduction measures to lower radon levels below 4 pCi/L."

Reason: Radon tests are the only way to know if a residence has significant levels of radon. The test kits are inexpensive and easy to use. This change is designed not to delay the sale or occupancy of the home. Testing in radon zone 1 provides information for areas that tend to have higher levels of radon.

Cost Impact: The code change proposal will increase the cost of construction. Multiple companies make inexpensive radon test kits. This change would require two tests which are averaged, plus a third test kit to be left with the owners. Three tests including pre-paid testing, postage and tax will cost less than \$80, often less than \$50.

RM5-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The text is proposed in wrong location. Belongs in an appendix or the building part of code, not in mechanical part. This puts pressure on the contractor after the home is built. The owner may not be in the picture. There might not be a design professional involved. Items 7 and 10 conflict. There is a need to address ongoing testing requirements. (Vote 10-0)

Assembly Action:

None

RM5-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Craig Conner, representing self (craig.conner@mac.com); Jani Palmer, representing US Environmental Protection Agency (palmer.janise@epa.gov); Gary Hodgden, representing himself (gary@aair.com); Bruce Snead representing himself (bsnead@ksu.edu) requests As Modified by This Public Comment.

Replace as follows:

2018 International Residential Code

AF103.13 Radon testing. Where radon-resistant construction is required for new construction, radon testing shall also be required for new construction.

Testing shall be performed as specified in items 1 through 10:

1. Testing shall be performed after the dwelling passes its air tightness test.
2. Testing shall be performed after the radon control system installation is complete. If the system has an active fan, the residence shall be tested with the fan operating.
3. Testing shall be performed at the lowest floor level that will be occupied, whether or not the space is finished. Spaces that are physically separated and served by different HVAC systems shall be tested separately.
4. Testing shall not be performed in a closet, hallway, stairway, laundry room, furnace room, bathroom or kitchen.
5. Testing shall be performed with a commercially available radon test kit or with a continuous radon monitor that can be calibrated. Testing with test kits shall include two tests, and the test results shall be averaged. Testing shall be in accordance with the testing device manufacturer's instructions.
6. Testing shall be performed by the builder, a registered design professional, or an approved third party.
7. Testing shall be conducted over a period of not less than 48 hours or not less than the period specified by the testing device manufacturer, whichever is longer.
8. Written radon test results shall be provided by the test lab or testing party. Written test results shall be included with construction documents.
9. An additional pre-paid test kit shall be provided to the owner to utilize at the owner's discretion. The test kit shall include mailing or emailing the results from the testing lab to the owner.
10. Where the radon test result is 4 pCi/L or greater, the fan for the radon vent pipe shall be installed as specified in Sections AF103.8 and AF103.12.

Exception: Testing is not required where the occupied space is located above an unenclosed open space.

Commenter's Reason: The only way to know for sure if a radon system works is to test it. The test is in effect the commissioning for a radon system. The tests are inexpensive.

This responds to several comments. Multiple people requested that that the radon test requirement be moved into the radon appendix, Appendix F. Some commented that there may not yet be an owner when the home is built, so this public comment allows test results to be provided with construction documents. The language in #7 and #10 was clarified.

This deletes mention of test results delivered after occupancy, which would be after the code enforcement authority has lapsed.

More than half the states have some kind of statewide radon requirement or have local jurisdictions that have adopted radon requirements. You can look at your state's radon requirement in the LawAtlas project. (<http://lawatlas.org/datasets/state-radon-laws> , click "explore", click your state)

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. Multiple companies make inexpensive radon test kits. This change would require two tests which are averaged, plus a third test kit to be left with the owners. Three tests including pre-paid testing, postage and tax will cost less than \$80, often less than \$50.

RM5-18

RM7-18

IRC: M1401.1

Proposed Change as Submitted

Proponent: David Bixby, Air Conditioning Contractors of America (ACCA), representing Air Conditioning Contractors of America (bixster1953@yahoo.com)

2018 International Residential Code

M1401.1 Installation. Heating and cooling *equipment* and *appliances* shall be installed in accordance with the manufacturer's instructions and the requirements of this code. HVAC systems shall be installed in compliance with ACCA 5 QI.

Reason: ACCA 5 QI details nationally-recognized minimum criteria for the proper installation of HVAC systems in new and existing residential and commercial buildings. This Standard provides a universally accepted definition for quality installation across a broad spectrum of the HVAC industry (e.g., manufacturers, distributors, contractors, user groups, customers, utilities, efficiency advocates, trade associations, professional societies, and governmental agencies). In this Standard, the QI elements focus on the application and how well the system is selected and actually installed. ACCA 5 QI is also a consensus-based ANSI standard. A proposal to add ACCA 5 QI to Chapter 44, Referenced Standards, has also been submitted.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
No cost impacts.

Analysis: A review of the standard proposed for inclusion in the code, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

RM7-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The requirement would add cost and complexity to installations and would prohibit homeowners from performing their own work. The standard is aimed at contractors, is not enforceable and is a best practice guide. (Vote 10-0)

Assembly Action:

None

RM7-18

Individual Consideration Agenda

Public Comment 1:

Proponent: David Bixby, Air Conditioning Contractors of America, representing Air Conditioning Contractors of America (david.bixby@acca.org) requests As Submitted.

Commenter's Reason: ACCA 5 QI is an ANSI standard which details the nationally-recognized minimum criteria for the proper design and installation of HVAC systems. It was developed with input from equipment OEM's, utilities, jurisdictions, energy efficiency advocates, and allied organizations. The requirement to comply with ACCA 5 QI would NOT prohibit homeowners from performing their own work. Homeowners who are knowledgeable in performing their own work, thereby serving in the contractor role, would benefit from following an easy to understand nationally-recognized minimum criteria. To that end, ACCA 5 QI is available to the public as a free download by going to the following link: www.acca.org/quality

Those who are currently knowledgeable in performing such work are already using the same minimum core requirements that are outlined in ACCA 5 QI. It would only add cost and complexity if installers (or homeowners) are not following industry accepted minimums. To do otherwise would be risking the safety, efficiency and performance of the installation, which could create more cost in the future as a result of poor design and installation.

For this Standard, core areas that characterize a quality installation include: **(1) Design Aspects**, such as heat gain/loss load calculations, equipment capacity selection; **(2) Distribution Aspects**, such as duct leakage, airflow balance; **(3) Equipment Installation Aspects**, such as electrical requirements, system controls, refrigerant charge, and system documentation; and **(4) Owner Education Aspects** for proper system documentation and owner/operator education.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposal would not increase cost of design and installation of HVAC systems as ACCA 5 QI contains the minimum nationally-recognized core competencies that are needed to perform a safe and efficient installation. If these minimum competencies are not followed, the cost and complexity would be adversely affected if not designed and installed properly.

RM7-18

RM9-18

IRC: M1411.3.1.2

Proposed Change as Submitted

Proponent: Guy McMann, Jefferson County Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcman@jeffco.us)

2018 International Residential Code

Add new text as follows

M1411.3.1.2 Appliance, equipment and insulation in pans. Where appliances, equipment or insulation are subject to water damage when auxiliary drain pans fill, that portion of the appliance, equipment and insulation shall be installed above the rim of the pan. Supports located inside of the pan to support the appliance or equipment shall be water resistant and approved.

Reason: This is editorial in nature and is missing from this code. This can be found in the IMC Section 307.2.3.2 and in the IPC. This addition will make the IRC consistent with the other codes.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This change is editorial in nature.

RM9-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This is consistent with the IMC requirements. The appliances need to be protected regardless of their location in residential or commercial. (Vote 8-2)

Assembly Action:

None

RM9-18

Individual Consideration Agenda

Public Comment 1:

Proponent: DONALD SURRENA, NATIONAL ASSOCIATION OF HOME BUILDERS, representing National Association of Home Builders (dsurrena@nahb.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Residential Code

M1411.3.1.2 Appliance, equipment and insulation in pans. Where appliances, equipment or insulation are subject to water damage when auxiliary drain pans fill, that portion of the appliance, equipment and insulation shall be installed above the rim of the pan. Supports located inside of the pan to support the appliance or equipment shall be water resistant ~~and approved~~.

Commenter's Reason: Removing and approved takes away the question of who approves as well as exactly what is approved.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This modification will not change the cost of construction.

RM9-18

RM12-18

IRC: M1503.3

Proposed Change as Submitted

Proponent: Mike Moore, Newport Ventures, representing Broan-NuTone (mmoore@newportventures.net)

2018 International Residential Code

M1503.3 Exhaust discharge. Domestic cooking exhaust equipment shall discharge to the outdoors through a duct. The duct shall have a smooth interior surface, shall be air tight, shall be equipped with a backdraft damper and shall be independent of all other exhaust systems. Ducts serving domestic cooking exhaust equipment shall not terminate in an attic or crawl space or areas inside the building.

Listed and labeled ductless range hoods shall not be required to discharge to the outdoors where all of the following conditions are met:

Exception: ~~Where installed in accordance with the manufacturer's instructions, and where mechanical or natural ventilation is otherwise provided, listed and labeled ductless range hoods shall not be required to discharge to the outdoors.~~

1. The equipment is installed in accordance with the manufacturer's instructions.
2. Mechanical or natural ventilation is otherwise provided in the cooking area.
3. The equipment is installed in a newly constructed dwelling unit other than single family, or is installed in an existing kitchen not having an existing range hood exhaust duct to the outdoors.

Reason: Cooking is typically the largest source of indoor air pollution in homes, with concentrations of key pollutants frequently exceeding U.S. National Ambient Air Quality Standards. Over time, exposure to these pollutants has been shown to reduce length and quality of life. Clearly, kitchen ventilation is needed to comply with the purpose of the IRC to "safeguard public safety, health, and general welfare through...ventilation" (among other means). Unless captured and exhausted at the source, cooking pollutants spread rapidly through a home and deposit themselves on surfaces, only to be released again into the breathing zone when disturbed at a later time. For new construction in detached buildings, where the builder elects to install a range hood, requiring that the range hood be ducted is a very low-cost item with high returns in terms of occupant health. For reasons of constructability and cost sensitivity (not health), this proposal would only permit ductless range hoods when they are installed in an attached dwelling unit of new construction or when they are installed in an existing kitchen that doesn't have an pre-existing range hood exhaust duct.

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20. Seaman, V. Y., Bennett, D. H., & Cahill, T. M. (2009). Indoor acrolein emission and decay rates resulting from domestic cooking events. *Atmospheric Environment*, 43(39), 6199-6204. doi: 10.1016/j.atmosenv.2009.08.043.
21. Zhang, Q. F., Gangupomu, R. H., Ramirez, D., & Zhu, Y. F. (2010). Measurement of Ultrafine Particles and Other Air Pollutants Emitted by Cooking Activities. *International Journal of Environmental Research and Public Health*, 7(4), 1744-1759. doi: 10.3390/ijerph7041744.

Cost Impact: The code change proposal will increase the cost of construction

Where builders are already installing ducts with range hoods, there will not be any increase in the cost of construction.

Where new, single-family dwelling units are not currently provided with ducts for their range hoods, this proposal would increase the cost of construction. Installed duct costs can be estimated at ~ \$9.85 per linear foot for 3.25"x10" galvanized sheet metal (RS Means, 2015, Section 23 31 13.13.0500), and a damper would cost about \$15 retail.

RM12-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The text is item 3 is hard to interpret. This proposal discriminates against single family dwellings. (Vote 10-0)

Assembly Action:

None

RM12-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Mike Moore, representing Broan (mmoore@newportventures.net) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Residential Code

M1503.3 Exhaust discharge. Domestic cooking exhaust equipment shall discharge to the outdoors through a duct. The duct shall have a smooth interior surface, shall be air tight, shall be equipped with a backdraft damper and shall be independent of all other exhaust systems. Ducts serving domestic cooking exhaust equipment shall not terminate in an attic or crawl space or areas inside the building.

Listed and labeled ductless range hoods shall not be required to discharge to the outdoors where all of the following conditions are met:

1. The equipment is installed in accordance with the manufacturer's instructions.
2. Mechanical or natural ventilation is otherwise provided in the cooking area.
3. The equipment is installed in a newly constructed dwelling unit ~~other than single family~~ that is not a detached one-family dwelling unit, or the equipment is installed in an existing kitchen not having an existing range hood exhaust duct to the outdoors.

Commenter's Reason: Per the original reason statement, exhausting kitchen pollutants at its source is one of the most significant measures that can be implemented to provide minimum acceptable indoor air quality in dwelling units. In detached single-family dwellings of new construction, a designer/builder has plenty of options for locating a kitchen exhaust fan to very simply exhaust it to the outdoors at a low first-cost.

This modification to the original proposal addresses the committee's objection regarding confusing language by clarifying the language in #3. The committee also objected to this proposal on the grounds that it unfairly discriminates against single family dwellings. From a public health perspective, the committee is correct that there is no good reason to exempt any dwelling unit from a requirement to duct kitchen exhaust equipment to the outdoors. However, requiring an exhaust duct for kitchen exhaust in all cases could be especially costly for some attached dwelling units that may have less options for cost-effectively ducting kitchen exhaust to the exterior. As such, I've restricted requirements to provide kitchen ducts with exhaust ducts to the exterior to the following scenarios: A) installation of a kitchen exhaust appliance in a new, detached, one-family dwelling unit and B) installation of a kitchen exhaust appliance in an existing kitchen with an existing range hood exhaust duct to the outdoors.

Bibliography: See original proposal for references.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. Where builders are already installing ducts with range hoods, there will not be any increase in the cost of construction. Where new, single-family dwelling units are not currently provided with ducts for their range hoods, this proposal would increase the cost of construction. Installed duct costs can be estimated at ~ \$9.85 per linear foot for 3.25" x10" galvanized sheet metal (RS Means, 2015, Section 23 31 13.13.0500), and a damper would cost about \$15 retail.

RM12-18

RM17-18

IRC: M1504.3

Proposed Change as Submitted

Proponent: Mike Moore, representing The Home Ventilating Institute (mmoore@newportventures.net)

2018 International Residential Code

Revise as follows

M1504.3 Exhaust openings. Air exhaust openings shall terminate as follows:

1. Not less than 3 feet (914 mm) from property lines.
2. Not less than 3 feet (914 mm) from gravity air intake openings, operable windows and doors.
3. Not less than 10 feet (3048 mm) from mechanical air intake openings except where either of the following apply:
 - 3.1. The exhaust opening is located not less than 3 feet (914 mm) above the air intake opening.
 - 3.2. The exhaust opening is part of a factory-built intake/exhaust combination termination fitting installed in accordance with the manufacturer's instructions, and the exhaust air is drawn from a living space.
4. Openings shall comply with Sections R303.5.2 and R303.6.

Reason: This proposal is very similar to a PMGCAC proposal on the same subject. The only difference is that this proposal does not include the word "approved" in front of "factory-built intake/exhaust termination combination fitting". In some jurisdiction, equipment or products requiring approval will trigger an "alternative means and methods" process to secure a permit. As explained in the reason statement below, these products have been determined to perform well across manufacturers and models. With good performance and insignificant deviation across products, there is no need to further scrutinize these products or delay permits for dwelling units that specify them. This is the position of the Home Ventilating Institute.

The rest of the reason statement echoes that in the PMGCAC proposal:

Intake/exhaust combination terminations are regularly installed with heating and energy recovery ventilators (H/ERVs) used for dwelling units. Their use reduces building penetrations, labor, and associated system costs. By reducing the number of penetrations, air leakage can also be reduced, resulting in space conditioning energy savings. Further, the durability of the structure can be improved through reducing entry pathways for bulk water.

Manufacturer tests conducted by Natural Resources Canada (NRC) have demonstrated that use of intake/exhaust combination terminations results in minimum cross-contamination of airflows (i.e., not exceeding 4%; see NRC report A1-007793¹). These results are aligned with ASHRAE 62.2 approval of such devices which limits cross-contamination to 10%, as verified by the manufacturer. If approved, this proposed modification to the IRC would limit application of intake/exhaust combination terminations to "approved", "factory-built" units. Approval of this proposed modification is expected to result in more affordable and architecturally-flexible terminations.

Note: The IRC defines living space as, "space within a *dwelling unit* utilized for living, sleeping, eating, cooking, bathing, washing and sanitation purposes". The use of the term "environmental air" was also considered, but was abandoned because "environmental air" can also include exhaust air from parking garages and clothes dryers, which we want to exclude from this exception.

Bibliography: Bibliography:

1. Ouazia, B. 2016. Evaluation of a dual hood performance in term of contaminant re-entrainment from exhaust to supply. A1-007793. National Research Council Canada. *For a copy of the report, please contact the proponent at the email address provided. Additional reports are available from the proponent upon request.*

Cost Impact: The code change proposal will decrease the cost of construction. This proposal can reduce the number of intake and exhaust penetrations required for a dwelling unit, thereby reducing the cost of construction.

RM17-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: There is no listing or product approval for the fitting. (Vote 8-1)

Assembly Action:

None

RM17-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Mike Moore, representing Broan (mmoore@newportventures.net) requests As Submitted.

Commenter's Reason: Four proposals were submitted at the committee hearings to address factory-built intake/exhaust combination termination fittings for use within dwelling units -- two to the IMC (M16 and M17) and two to the IRC (RM17 and RM27). M17 and RM27 contained essentially the same language that would permit these fittings if approved (i.e., successfully navigating an alternative means and methods evaluation process). M16 and RM17 contained essentially the same language that would permit these fittings without requiring an alternative means and methods evaluation process.

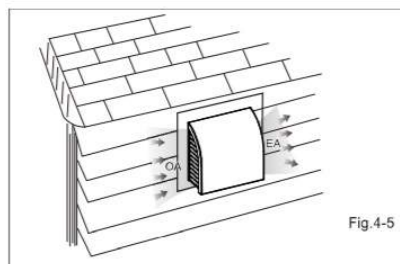
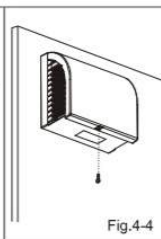
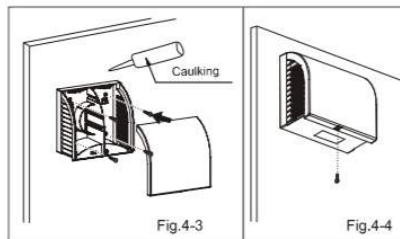
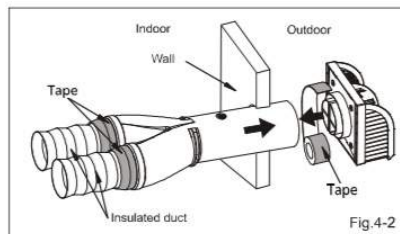
In Columbus, the IMC committee approved M17 as submitted. At a minimum, to facilitate coordination across codes, RM27 should also be approved as submitted. However, it can be argued that M17 and RM27 s requirements for a special approval process for these terminations introduce unnecessary costs, especially since third-party testing of such terminations has shown excellent separation of supply and exhaust streams (see original rationale for more information), and these devices have been provided by manufacturers for installation with dwelling unit ventilation systems for about 2 decades with no known failures reported. Until failures or deficiencies of such terminations are documented, there is no compelling reason to require an alternative means and methods process for approval which would add cost and time to projects with little to no benefit to the consumer. So, we are also requesting support of PCs to approve M16 and RM17 As Submitted, which will remove any requirements for special approval of these terminations. In summary, the requested action at the final hearings is As Submitted for the following proposals: M16, M17, RM17, and RM27.

INSTALLATION I (JOIST MOUNTING-I) CONTINUED

10. Install outdoor hood and connect with insulated ducts.

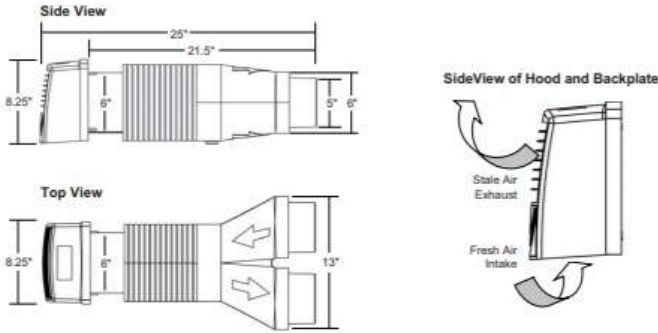
(1) Panasonic recommends the use of the optional Wall Cap (Model: FV-WC04VE1) which is easy to install with one wall penetration and keeps the airstreams separate to minimize short-circuiting. (Fig. 4-2~5)

For more details, please check the INSTALLATION INSTRUCTIONS of Wall Cap.



Dual Hood Part 99-190

With the Lifebreath Dual Hood, only one 6 in hole is required in the exterior wall to complete two connections: fresh air intake and stale air exhaust.

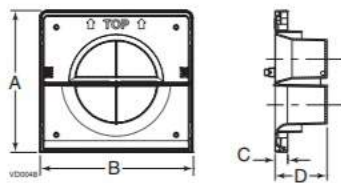


Note

- Tested by: National Research Council Canada
- Program: Building Regulations for Market Access Report Number: A1-007793
- Report Date: 15 February 2016
- Found to comply with requirement as set in the NBC

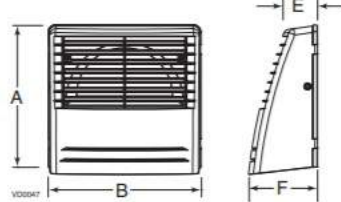
Dimensions of the Dual Outdoor Port Backplate

A	B	C	D
8 1/2" (214 mm)	9" (231 mm)	3/4" (19 mm)	3" (76 mm)

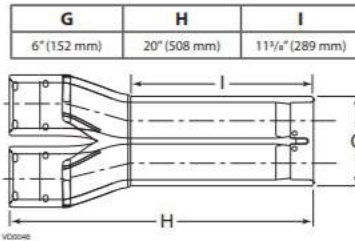
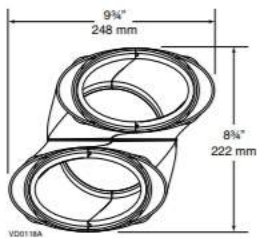


Dimensions of the Dual Outdoor Port

A	B	E	F
8 1/2" (214 mm)	9" (231 mm)	1 1/2" (48 mm)	3 1/4" (92 mm)

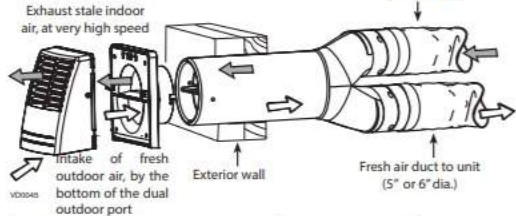


Dimensions of the Transition



Installation

NOTE: Always install the stale air duct from unit on top. Stale air duct from unit (5" or 6" dia.).



Specifications and ratings

- Part number: VTYIK1
- Material for transition: Expanded polystyrene, Grade 54 (building material)
- Material for dual outdoor port: White polypropylene
- Contamination rate: 3.2% between stale air to outdoors and fresh air from outdoors

Submitted by:		Date:	Project:
Quantity:	Model number:	Remarks:	Location:
			Architect:
			Engineer:
			Contractor:



Broan-NuTone LLC, 926 West State Street, Hartford, WI 53027 (1-877-862-7626)

VTYIK1d180118

Bibliography: See original proposal.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction See original proposal.

RM19-18

IRC: M1505.4.4

Proposed Change as Submitted

Proponent: Anthony Floyd, City of Scottsdale, representing City of Scottsdale (afloyd@scottsdaleaz.gov)

2018 International Residential Code

Revise as follows

M1505.4.4 Local exhaust rates. *Local exhaust* systems shall be designed to have the capacity to exhaust the minimum airflow rate determined in accordance with Table M1505.4.4. Intermittently operated exhaust fans in bathrooms and toilet rooms shall be provided with a delay-shutoff timer or humidity sensor control.

Exception: A delay-shutoff timer or humidity sensor control switch is not required for exhaust fans that function as a component of a programmed whole-house ventilation system.

Reason: This code change provides compliance options for intermittently operated exhaust fans when the bathroom is occupied (manual or humidity sensor activation) and for a limited period of time after the user leaves the room (delay timer or humidity sensor deactivation). Delay timer and humidity sensor exhaust fan controls are a consistent and effective means of removing indoor moisture and pollutants.

During a bath or shower, the humidity level in a bathroom can be a perfect breeding ground for mold, mildew and microorganisms that can negatively impact occupant health. Excess moisture has tremendous potential for damaging the structure. It cracks and peels paint, ruins gypsum wallboard, causes exterior paint failure, warps doors and rusts cabinets and fixtures. It can cause deterioration of joists and framing. As it condenses on windows, walls, ceilings and cabinets, it attracts dirt. It encourages mildew on tile grout and generally provides an environment for increased bacterial growth.

According to the Home Ventilation Institute, an intermittently operated exhaust fan needs to run at least 20 minutes after each shower to sufficiently remove moisture from an average size bathroom. Bathroom exhaust systems reduce the risk of mildew and mold growth, which is a sanitation and durability concern in all homes, regardless of climate. Delay timer and moisture sensor controlled exhaust fans are more effective than a manually operated fan or an operable window that is usually left closed during the winter and summer months of the year.

Automatic shut-off controls help to ensure exhaust fan operates when the bathroom is in use and for a limited period of time after the user leaves the room. Automatic controls also save energy by ensuring fans don't run unnecessarily after removal of moisture and pollutants.

Bibliography:

1. ASHRAE 62.2-2016 Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings
2. Home Ventilating Institute - <http://www.hvi.org/publications/HowMuchVent.cfm>

Cost Impact: The code change proposal will increase the cost of construction

A basic dial delay timer switch costs \$15, while a basic humidity sensor switch costs \$46. Timer and moisture controlled exhaust fans reduce the potential of making costly moisture damage repairs to correct problems that is easy to avoid with adequate local exhaust.

RM19-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal goes beyond minimum code. This is redundant with other sections in the code.
(Vote 10-0)

Assembly Action:

None

RM19-18

Individual Consideration Agenda

Public Comment 1:

Proponent: David Collins, representing International Code Council Sustainability, energy and high performance code action committee (sehpcac@iccsafe.org)requests As Modified by This Public Comment.

Modify as follows:

2018 International Residential Code

M1505.4.4 Local exhaust systems rates. *Local exhaust* systems shall be designed to have the capacity to exhaust the minimum airflow rate determined in accordance with Table M1505.4.4. Intermittently operated exhaust fans in bathrooms ~~and shall be provided with a humidity sensor control or a delay-shutoff timer capable of and configured to delay fan shutoff for not less than 20 minutes.~~ Intermittently operated exhaust fans in toilet rooms shall be provided with a delay-shutoff timer or humidity sensor control capable of delaying fan shutoff for not less than 20 minutes.

Exception: A delay-shutoff timer or humidity sensor control switch is not required for exhaust fans that function as a component of a programmed whole-house ventilation system.

Commenter's Reason: Contrary to the committee statement, this code change is not redundant with other sections in the code. This modification clarifies the requirements by making a distinction between exhaust fan controls in bathrooms for moisture removal and exhaust fan controls in toilet rooms for odor removal.

It is well established that an exhaust fan needs an additional 20 minutes to evacuate the humidity or odor after the use of a bathroom unless a humidity sensor control is employed for moisture removal. These requirements only apply when an exhaust fan is provided in a bathroom in lieu of an operable window and not part of a programmed whole-house ventilation system.

When employed, bathroom exhausts reduce the risk of mildew and mold growth, which is a sanitation and durability issue in homes, regardless of climate. Automatic shut-off controls help to ensure exhaust fan operates when the bathroom is in use and for a limited period of time after the user leaves the room. Automatic controls also save energy by ensuring fans don't run unnecessarily after removal of moisture and pollutants.

This public comment was submitted by the ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors in July of 2011 to pursue opportunities and to improve and enhance assigned International Codes or portions thereof. Each year the SEHPCAC has historically held 3 open face-to face meetings and numerous Working Group meetings, conference calls and webinars. These meetings, conference calls and webinars are public and are convened to facilitate discussion and debate of proposed changes and public comments to the codes by members of the committee, as well as interested parties.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. A basic dial delay timer switch costs \$15, while a basic humidity sensor switch costs \$46. Timer and moisture controlled exhaust fans reduce the potential of making costly moisture damage repairs to correct problems that is easy to avoid with adequate local exhaust.

Public Comment 2:

Proponent: Anthony Floyd, City of Scottsdale, representing City of Scottsdale (afloyd@scottsdaleaz.gov); Julius Ballanco, JB Engineering and Code Consulting, P.C. (jbenengineer@aol.com)requests As Modified by This Public Comment.

Further modify as follows:

2018 International Residential Code

M1505.4.4 Local exhaust ~~rates~~ systems. *Local exhaust* systems shall be designed to have the capacity to exhaust the minimum airflow rate determined in accordance with Table M1505.4.4. Intermittently operated exhaust fans in bathrooms with a shower or bathtub and shall be provided with a humidity sensor control or shall be provided with a timer switch capable of operating the exhaust fan for not less than 20 minutes after the fan is manually activated. ~~Intermittently operated exhaust fans in toilet rooms shall be provided with a delay-shutoff timer switch or humidity sensor control capable of operating the exhaust fan for not less than 20-minutes after the fan is manually activated.~~

Exception: A delay-shutoff timer or humidity sensor control switch is not required for exhaust fans that function as a component of a programmed whole-house ventilation system.

Commenter's Reason: Contrary to the committee statement, this code change is not redundant with other sections in the code. This modification clarifies the requirements by making a distinction between exhaust fan controls in bathrooms for moisture removal and exhaust fan controls in toilet rooms for odor removal.

It is well established that an exhaust fan needs an additional 20 minutes to evacuate the humidity or odor after the use of a bathroom unless a humidity sensor control is employed for moisture removal. These requirements only apply when an exhaust fan is provided in a bathroom in lieu of an operable window and not part of a programmed whole-house ventilation system.

When employed, bathroom exhausts reduce the risk of mildew and mold growth, which is a sanitation and durability issue in homes, regardless of climate. Automatic shut-off controls help to ensure exhaust fan operates when the bathroom is in use and for a limited period of time after the user leaves the room. Automatic controls also save energy by ensuring fans don't run unnecessarily after removal of moisture and pollutants.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. A basic dial delay timer switch costs \$15, while a basic humidity sensor switch costs \$46. Timer and moisture controlled exhaust fans reduce the potential of making costly moisture damage repairs to correct problems that is easy to avoid with adequate local exhaust.

RM19-18

RM22-18

IRC: 202, M1505.4.3

Proposed Change as Submitted

Proponent: Craig Conner, representing self (craig.conner@mac.com); Joseph Lstiburek, representing Self (joe@buildingscience.com)

2018 International Residential Code

BALANCED VENTILATION. Any combination of concurrently operating mechanical exhaust and mechanical supply whereby the total mechanical exhaust airflow rate and the total mechanical supply airflow rate are substantially the same.

Revise as follows

M1505.4.3 Mechanical ventilation rate. The whole house mechanical ventilation system shall provide outdoor air at a continuous rate as determined in accordance with Table M1505.4.3(1) or Equation 15-1.

Ventilation rate in cubic feet per minute = $(0.01 \times \text{total square foot area of house}) + [7.5 \times (\text{number of bedrooms} + 1)]$

(Equation 15-1)

Exception-Exceptions:

1. The whole-house mechanical ventilation system is permitted to operate intermittently where the system has controls that enable operation for not less than 25 percent of each 4-hour segment and the ventilation rate prescribed in Table M1505.4.3(1) is multiplied by the factor determined in accordance with Table M1505.4.3(2).
2. The minimum mechanical ventilation rate determined in accordance with Table M1505.4.3(1) or Equation 15-1 shall be reduced by 25%, provided that all of the following conditions apply:
 - 2.1. A ducted system supplies recirculated air directly to each bedroom and the largest common area.
 - 2.2. For continuously operating systems, not less than 70% of the air volume in the conditioned space is recirculated each hour through a ducted system, or for intermittently operating systems, an equivalent air recirculation is provided during each four hour period.
 - 2.3. The whole-house ventilation system is a balanced ventilation system.

Reason: This code change credits the better performance of whole-building dilution ventilation systems that are distributed, mixed and balanced.

Distributed, mixed and balanced ventilation is more effective at controlling indoor contaminants than typical exhaust ventilation that provides no distribution and mixing. Ventilation with effective distribution and mixing prevents or minimizes high levels of contaminant concentration in various spaces within houses, especially rooms where people spend a lot of time with doors closed such as bedrooms. Distribution and mixing homogenizes interior conditions reducing potentially harmful high intermittent contaminant concentrations in interior spaces. Complex field testing and contaminate transport software analysis have shown that 70% mixing combined with a 25% reduced balanced ventilation is equally as effective as a typical exhaust ventilation.

This code change does not penalize exhaust ventilation, it justifiably credits balanced ventilation. Exhaust only ventilation should not be given the same indoor air quality credit in energy rating calculations since typical exhaust ventilation systems result in less air change than balanced ventilation systems and do not provide as effective control of contaminants. This code change rectifies that inequity.

Technical justification for this proposed code change can be found in the following links:

https://buildingscience.com/sites/default/files/migrate/pdf/CP-0909_ASHRAE_Calibrated_Multizone_Airflow.pdf

https://buildingscience.com/sites/default/files/migrate/pdf/CP-0908_ASHRAE_Modifying_Ventilation_Airflow.pdf

https://buildingscience.com/sites/default/files/migrate/pdf/CP-0802_Field_Test_Room_to_Room.pdf

<http://www.nrcan.gc.ca/energy/efficiency/housing/home-improvements/18633>

https://www.nrc-cnrc.gc.ca/ctu-sc/files/doc/ctu-sc/ctu-n15_eng.pdf

Cost Impact: The code change proposal will decrease the cost of construction. Choosing to use a more effective type of ventilation will result in a lower ventilation rate which could reduce both construction and operating costs.

RM22-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The words "substantially the same" in the definition are subjective. The number of modifications offered indicate the need to revise this proposal in a public comment. (Vote 10-0)

Assembly Action:

None

RM22-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Craig Conner, representing Self (craig.conner@mac.com); Joseph Lstiburek, representing self (joe@buildingscience.com) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Residential Code

BALANCED VENTILATION. Any combination of concurrently operating mechanical exhaust and mechanical supply whereby the total mechanical exhaust airflow rate ~~and is within 10% of the total mechanical supply airflow rate are substantially the same.~~

M1505.4.3 Mechanical ventilation rate. The whole house mechanical ventilation system shall provide outdoor air at a continuous rate as determined in accordance with Table M1505.4.3(1) or Equation 15-1.

Ventilation rate in cubic feet per minute = $0.01 \times$ total square foot area of house + ~~7.5~~ number of bedrooms + 1

Exceptions:

(Equation 15-1)

1. The whole-house mechanical ventilation system is permitted to operate intermittently where the system has controls that enable operation for not less than 25 percent of each 4-hour segment and the ventilation rate prescribed in Table M1505.4.3(1) is multiplied by the factor determined in accordance with Table M1505.4.3(2).
2. The minimum mechanical ventilation rate determined in accordance with Table M1505.4.3(1) or Equation 15-1 shall be reduced by ~~25%~~ 30%, provided that ~~all both~~ of the following conditions apply:
 - 2.1. A ducted system supplies ~~recirculated ventilation~~ air directly to each bedroom and ~~the largest common area.~~
 - 2.2. ~~For continuously operating systems, not less than 70% of the air volume in the conditioned space is recirculated each hour through a ducted system, or for intermittently operating systems, an equivalent air recirculation is provided during each four hour period to one or more of the following rooms:~~
 - 2.1.1. Living room
 - 2.1.2. Dinning room
 - 2.1.3. Kitchen
 - ~~2.2.2.3.~~ The whole-house ventilation system is a balanced ventilation system.

Commenter's Reason: The words "substantially the same" are made less subjective by describing them as "within 10%" as requested by the committee.

The new 2.1 better describes the "largest common area" as the "living room, dining room or kitchen".

The text of exception 2.2 was deleted because the new 2.1 made it redundant and because the previous language of 2.2 was complicated.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This modification still provides potentially reduced construction and operating costs to those who choose to use balanced ventilation.

RM22-18

RM25-18

IRC: M1505.1, ASHRAE

Proposed Change as Submitted

Proponent: Mike Moore, representing The Home Ventilating Institute (mmoore@newportventures.net)

2018 International Residential Code

Revise as follows

M1505.1 General. Where local exhaust or whole-house mechanical ventilation is provided, the ~~equipment-ventilation system~~ shall be designed in accordance with this section, or the ventilation system shall be designed in accordance with ASHRAE 62.2.

Add new standard(s) follows

ASHRAE

ASHRE
1791 Tullie Circle NE
Atlanta GA 30329
US

62.2-2016:

Ventilation and Acceptable Indoor Air Quality in Residential Buildings with Addenda b, d, k, l, q, and s.

Reason: This proposed modification would provide builders with the OPTION of using ASHRAE Standard 62.2 to comply with the ventilation requirements of the IRC without requiring builders to use the standard. ASHRAE 62.2 is the ANSI standard for establishing minimum acceptable indoor air quality for dwelling units. There are several reasons that builders may want to use ASHRAE 62.2 instead of the IRC for compliance, including: greater flexibility for specifying climate-appropriate ventilation controls, ability to achieve energy and cost savings for homeowners by shifting operation of the ventilation system to times when ambient temperature and humidity are favorable, flexibility to specify innovative systems that can be demonstrated to provide equivalent exposure to pollutants, ability to down-size and save money on balanced ventilation equipment versus what may be required by the code, 62.2's use by code-plus programs such as ENERGY STAR and LEED, and ability to size the system as a function of measured dwelling unit air leakage instead of a one-size-fits-all approach.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Use of this standard is proposed as an OPTIONAL path. Costs associated with using 62.2 versus other compliance paths will vary based on the application. As such, this proposal will neither decrease nor increase the cost of construction.

RM25-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: ASHRAE 62.2 could supersede all of Chapter 15 and the builder could use 62.2 under the alternate approval provision in Chapter one. (Vote 10-0)

Assembly Action:

None

RM25-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Mike Moore, representing Broan (mmoore@newportventures.net) requests As Submitted.

Commenter's Reason: In Columbus, the IMC committee approved M33, which introduced the *option* for dwelling units to comply with the ventilation requirements of the IMC by following the requirements of ASHRAE 62.2, Ventilation and Acceptable Indoor Air Quality in Residential Buildings. To provide consistency across the IMC and IRC, dwelling units in the IRC should also have the *option* of complying with ventilation requirements of the IRC by following the requirements of ASHRAE 62.2. Further, approval of this proposal As Submitted is aligned with the ASHRAE/ICC memorandum of understanding signed in 2006, which states: *Both organizations agree to look for ways to develop appropriate code-enforceable language for ASHRAE standards and provide guidance to support the adoption of ASHRAE standards into ICC codes.*

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. Increasing options for compliance can decrease the cost of construction. See the original proposal for specific examples of potential cost savings and advantages of using ASHRAE 62.2 in place of the IRC ventilation requirements.

RM25-18

RM27-18

IRC: M1504.3

Proposed Change as Submitted

Proponent: Pennie Feehan, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (PMGCAC@iccsafe.org)

2018 International Residential Code

Revise as follows

M1504.3 Exhaust openings. Air exhaust openings shall terminate as follows:

1. Not less than 3 feet (914 mm) from property lines.
2. Not less than 3 feet (914 mm) from gravity air intake openings, operable windows and doors.
3. Not less than 10 feet (3048 mm) from mechanical air intake openings except where either of the following apply:
 - 3.1. the exhaust opening is located not less than 3 feet (914 mm) above the air intake opening.
 - 3.2. The exhaust opening is part of an approved factory-built intake/exhaust combination termination fitting installed in accordance with the manufacturer's instructions, and the exhaust air is drawn from a living space.
4. Openings shall comply with Sections R303.5.2 and R303.6.

Reason: Intake/exhaust combination terminations are regularly installed with heating and energy recovery ventilators (H/ERVs) used for dwelling units. Their use reduces building penetrations, labor, and associated system costs. By reducing the number of penetrations, air leakage can also be reduced, resulting in space conditioning energy savings. Further, the durability of the structure can be improved through reducing entry pathways for bulk water.

Manufacturer tests conducted by Natural Resources Canada (NRC) have demonstrated that use of intake/exhaust combination terminations results in minimum cross-contamination of airflows (i.e., not exceeding 4%; see NRC report A1-007793¹). These results are aligned with ASHRAE 62.2 approval of such devices, which limits cross-contamination to 10%, as verified by the manufacturer. If approved, this proposed modification to the IRC would limit application of intake/exhaust combination terminations to "approved", "factory-built" units. Approval of this proposed modification is expected to result in more affordable and architecturally flexible terminations.

Note: The IRC defines *living space* as, "space within a *dwelling unit* utilized for living, sleeping, eating, cooking, bathing, washing and sanitation purposes".

This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). The PMG CAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance the International Codes or portions thereof that were under the purview of the PMG CAC. In 2017 the PMG CAC held one face-to-face meeting and 11 conference call meetings. Numerous interested parties attended the committee meetings and offered their input.

Bibliography:

- Ouazia, B. 2016. Evaluation of a dual hood performance in term of contaminant re-entrainment from exhaust to supply. A1-007793. National Research Council Canada. *For a copy of the report, please contact the proponent at the email address provided. Additional reports are available from the proponent upon request.*

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal will not increase the cost of construction because no additional labor, materials, equipment, appliances or devices are mandated beyond what is currently required by the code.

RM27-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: These fittings are already allowed under the Chapter 1 alternate approval provisions. Some performance data is needed upon which to base an alternate approval. There is no test standard for such fittings. (Vote 8-1)

Assembly Action:

None

RM27-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Mike Moore, representing Broan (mmoore@newportventures.net) requests As Submitted.

Commenter's Reason: In Columbus, the IMC committee approved IMC proposal M17, which is basically the same proposal as RM27 but for the IMC. Third party testing of factory-built intake/exhaust combination termination fittings has shown excellent separation of supply and exhaust streams (see original rationale for more information), and these devices have been provided by manufacturers for installation with dwelling unit ventilation systems for about 2 decades, with no known failures reported. Included with this comment are examples of these units provided by major manufacturers of ventilation products.

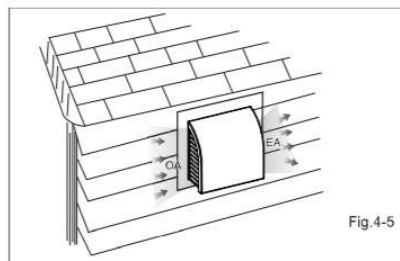
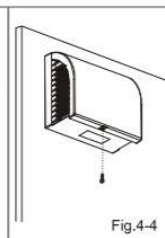
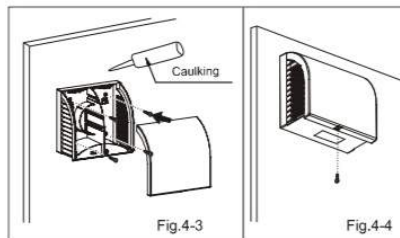
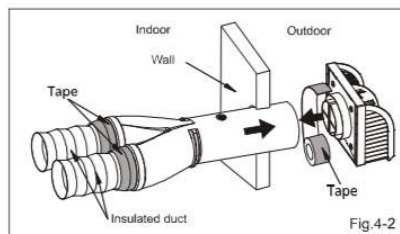
At a minimum, the IRC and IMC should be aligned to ensure that these terminations have a clear path to approval within the code (i.e., like M17, RM27 should be approved as submitted to ensure that the terminations are clearly eligible to be approved). Arguably, until failures or deficiencies of such terminations are documented, there is no compelling reason to require an alternative means and methods process for approval which would add cost and time to projects with little to no benefit to the consumer; so please also approve M16 and RM17 As Submitted which will remove any requirements for special approval of these terminations. In summary, the requested action at the final hearings is As Submitted for the following proposals: M16, M17, RM17, and RM27.

INSTALLATION I (JOIST MOUNTING-I) CONTINUED

10. Install outdoor hood and connect with insulated ducts.

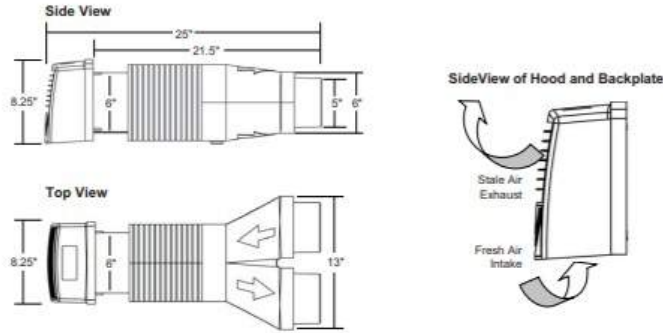
(1) Panasonic recommends the use of the optional Wall Cap (Model: FV-WC04VE1) which is easy to install with one wall penetration and keeps the airstreams separate to minimize short-circuiting. (Fig. 4-2~5)

For more details, please check the INSTALLATION INSTRUCTIONS of Wall Cap.



Dual Hood Part 99-190

With the Lifebreath Dual Hood, only one 6 in hole is required in the exterior wall to complete two connections: fresh air intake and stale air exhaust.

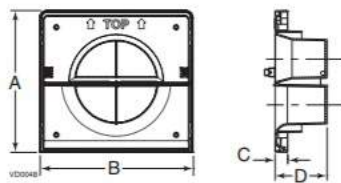


Note

- Tested by: National Research Council Canada
- Program: Building Regulations for Market Access Report Number: A1-007793
- Report Date: 15 February 2016
- Found to comply with requirement as set in the NBC

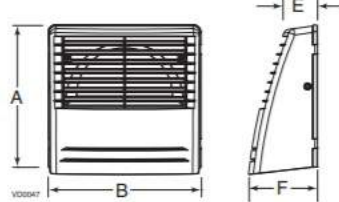
Dimensions of the Dual Outdoor Port Backplate

A	B	C	D
8 1/2" (214 mm)	9" (231 mm)	3/4" (19 mm)	3" (76 mm)

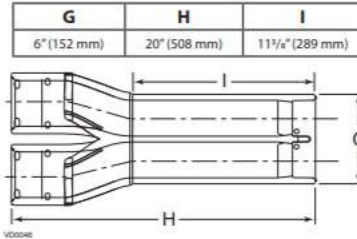
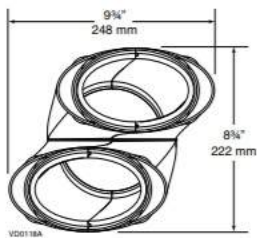


Dimensions of the Dual Outdoor Port

A	B	E	F
8 1/2" (214 mm)	9" (231 mm)	1 1/2" (48 mm)	3 1/4" (92 mm)

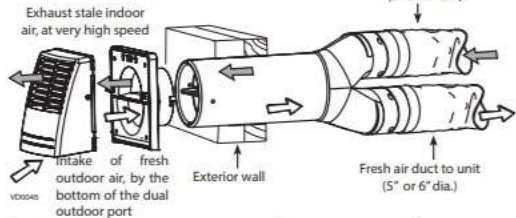


Dimensions of the Transition



Installation

NOTE: Always install the stale air duct from unit on top. Stale air duct from unit (5" or 6" dia.).



Specifications and ratings

- Part number: VTYIK1
- Material for transition: Expanded polystyrene, Grade 54 (building material)
- Material for dual outdoor port: White polypropylene
- Contamination rate: 3.2% between stale air to outdoors and fresh air from outdoors

Submitted by:	Date:	Project:
Quantity:	Model number:	Remarks:
		Location:
		Architect:
		Engineer:
		Contractor:



Broan-NuTone LLC, 926 West State Street, Hartford, WI 53027 (1-877-862-7626)

VTYIK1d180118

Bibliography: See original proposal.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. See original proposal.

RM31-18

IRC: M1601.1.1

Proposed Change as Submitted

Proponent: David Bixby, Air Conditioning Contractors of America (ACCA), representing Air Conditioning Contractors of America (bixster1953@yahoo.com)

2018 International Residential Code

Revise as follows

M1601.1.1 Above-ground duct systems. Above-ground *duct systems* shall conform to the following:

1. *Equipment* connected to *duct systems* shall be designed to limit discharge air temperature to not greater than 250°F (121°C).
2. Factory-made ducts shall be listed and labeled in accordance with UL 181 and installed in accordance with the manufacturer's instructions.
3. Fibrous glass duct construction shall conform to the *SMACNA Fibrous Glass Duct Construction Standards* or *NAIMA Fibrous Glass Duct Construction Standards*.
4. Field-fabricated and shop-fabricated metal and flexible duct constructions shall conform to the *SMACNA HVAC Duct Construction Standards—Metal and Flexible* except as allowed by Table M1601.1.1. Galvanized steel shall conform to ASTM A653.
5. The use of gypsum products to construct return air ducts or plenums is permitted, provided that the air temperature does not exceed 125°F (52°C) and exposed surfaces are not subject to condensation.
6. *Duct systems* shall be constructed of materials having a flame spread index of not greater than 200.
7. Stud wall cavities and the spaces between solid floor joists to be used as air plenums shall comply with the following conditions:
 - 7.1. These cavities or spaces shall not be used as a plenum for supply air.
 - 7.2. These cavities or spaces shall not be part of a required fire-resistance-rated assembly.
 - 7.3. Stud wall cavities shall not convey air from more than one floor level.
 - 7.4. Stud wall cavities and joist-space plenums shall be isolated from adjacent concealed spaces by tight-fitting fireblocking in accordance with Section R602.8.
 - 7.5. Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air plenums.
8. Volume dampers, equipment and other means of supply, return and exhaust air adjustment used in system balancing shall be provided with access.
9. Zoned duct systems shall be designed and installed in accordance with ACCA Manual Zr.

Reason: Currently there is no coverage in the residential code to address the design of zoned duct systems. ACCA Manual Zr provides procedures for designing zoned comfort systems for single family detached homes, duplex and triplex homes, row houses, town houses, and large multi-family structures that are compatible with ACCA Manual J procedures for residential load calculations. In addition, use of Manual Zr will avoid the potential for an improperly designed zoned duct system to adversely impact the safe operation and durability of the heating/cooling equipment. For code officials, Manual Zr has three normative sections to determine clear compliance. Manual Zr is also a consensus-based ANSI standard.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
No cost impacts.

Analysis: A review of the standard proposed for inclusion in the code, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

RM31-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: ACCA Manual D already refers to Manual Zr. The standard is not yet published. The committee did not review the final version of the draft standard. (Vote 10-0)

Assembly Action:

None

RM31-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Patrick McLaughlin, Self, representing Air-Conditioning, Heating & Refrigeration Institute (pmclaugma@aol.com); David Bixby (david.bixby@acca.org); Eric Brodsky (ebrodskype@gmail.com); John Brown (jbrown@ewccontrols.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Residential Code

M1601.1.1 Above-ground duct systems. Above-ground *duct systems* shall conform to the following:

1. *Equipment* connected to *duct systems* shall be designed to limit discharge air temperature to not greater than ~~250°F~~ 250 F (121°C).
2. Factory-made ducts shall be listed and labeled in accordance with UL 181 and installed in accordance with the ~~manufacturer's~~ manufacturer's instructions.
3. Fibrous glass duct construction shall conform to the SMACNA *Fibrous Glass Duct Construction Standards* or NAIMA *Fibrous Glass Duct Construction Standards*.
4. Field-fabricated and shop-fabricated metal and flexible duct constructions shall conform to the SMACNA HVAC *Duct Construction Standards— Metal and Flexible* except as allowed by Table M1601.1.1. Galvanized steel shall conform to ASTM A653.
5. The use of gypsum products to construct return air ducts or plenums is permitted, provided that the air temperature does not exceed ~~125°F~~ 125 F (52°C) and exposed surfaces are not subject to condensation.
6. *Duct systems* shall be constructed of materials having a flame spread index of not greater than 200.
7. Stud wall cavities and the spaces between solid floor joists to be used as air plenums shall comply with the following conditions:
 - 7.1. These cavities or spaces shall not be used as a plenum for supply air.
 - 7.2. These cavities or spaces shall not be part of a required fire-resistance-rated assembly.
 - 7.3. Stud wall cavities shall not convey air from more than one floor level.
 - 7.4. Stud wall cavities and joist-space plenums shall be isolated from adjacent concealed spaces by tight-fitting fireblocking in accordance with Section R602.8.
 - 7.5. Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air plenums.
8. Volume dampers, equipment and other means of supply, return and exhaust air adjustment used in system balancing shall be provided with access.
9. Zoned duct systems shall be designed and installed in accordance with the equipment manufacturer's instructions and ACCA Manual Zr ~~Zr~~ or in accordance with the equipment manufacturer's instructions and other approved methods.

Commenter's Reason: MCLAUGHLIN: RM31 was disapproved at the Committee Action Hearings primarily because the standard was not submitted as the ANSI approved published version at the time. The ANSI approved and published version has been submitted and is the exact same standard that was before the committee. The Air Conditioning, Heating & Refrigeration Institute member companies, who manufacture the effected equipment participated in the development of the standard with the Air Conditioning Contractors Association and strongly feel that ACCA Manual Zr will provide installers with necessary design guidance that will improve the installation of the systems. ACCA has modified the original submittal to clarify that manufactures instructions are also included as they are in the current code. Please approve this public comment

BIXBY: ACCA's public comment provides the final published ANSI/ACCA 11 Manual Zr - 2018: Residential HVAC System Zoning. The final published version is identical to the draft submitted in our original proposal. ACCA Manual Zr specifies procedures for designing zoned duct systems which are not contained in ACCA Manual D for single duct systems. Therefore, it is imperative that Manual Zr be specified by the IRC to avoid the potential for an improperly designed zoned duct system which could adversely impact the safe operation and durability of the heating/cooling equipment. In addition, ACCA requests that the proposal be further modified as underlined below.

9. Zoned duct systems shall be designed and installed in accordance with ACCA Manual Zr and the manufacturer's instructions or by other approved methods.

BRODSKY:

There is no coverage in the residential code to address the design of zoned duct systems. ACCA Manual Zr and the manufacturers instructions provides procedures for designing zoned comfort systems for residential homes, and structures that are compatible with ACCA Manual J procedures for residential load calculations. Use of Manual Zr will avoid the potential for an improperly designed zoned duct system that can adversely impact energy usage, occupant comfort as well as the operation of heating/cooling equipment. An National Association of Homebuilders (NAHB) study demonstrated that a proper zoning strategy could have over a 25% energy savings compared to a non-zoned home, as well as improved homeowner comfort. Manual Zr is a ANSI standard with normative sections that offer information written with clear code compliance

BROWN:

Manual Zr provides Code Officials and the AHJ, the means to determine whether a residential zone system was installed at a level of competency, that will avoid efficiency losses, equipment failures and most importantly, litigation.

Manual Zr employs a scientifically sound and defensible design methodology, for all currently manufactured types of HVAC Zone Systems.

AHRI member Zoning Manufacturers fully embrace ACCA Manual Zr. Using physics, Manual Zr levels the playing field and effectively homogenizes the zone manufacturer's design guidance.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

MCLAUGHLIN/BRODSKY: However, properly designed zoned duct systems will have long term cost benefit.

BIXBY: This code change will not affect the cost of a zoned comfort system as it represents a nationally-recognized minimum requirement for proper design and installation per manufacturer's instructions.

BROWN: The net effect of the public comment and code change proposal will decrease the cost of construction.

The cost impact of this decision is positive when compared to the current negative cost due to the lack of standardized design guidance.

RM31-18

RM39-18

IRC: Table TABLE M2105.4, Table TABLE M2105.5, NSF

Proposed Change as Submitted

Proponent: Jeremy Brown, representing NSF International (brown@nsf.org)

2018 International Residential Code

Revise as follows

**TABLE M2105.4
GROUND-SOURCE LOOP PIPE**

MATERIAL	STANDARD
Chlorinated polyvinyl chloride (CPVC)	ASTM D2846; ASTM F437; ASTM F438; ASTM F439; ASTM F441; ASTM F442; CSA B137.6
Cross-linked polyethylene (PEX)	ASTM F876; CSA B137.5
High-density polyethylene (HDPE)	ASTM D2737; ASTM D3035; ASTM F714; AWWA C901; CSA B137.1; CSA C448; NSF 358-1
Polyethylene/aluminum/polyethylene (PE-AL-PE) pressure pipe	ASTM F1282; AWWA C 903; CSA B137.9
Polypropylene (PP-R)	ASTM F2389; CSA B137.11, NSF 358-2
Polyvinyl chloride (PVC)	ASTM D1785; ASTM D2241; CSA 137.3
Raised temperature polyethylene (PE-RT)	ASTM F2623; ASTM F2769, CSA B137.18, <u>NSF358-4</u>

**TABLE M2105.5
GROUND-SOURCE LOOP PIPE FITTINGS**

PIPE MATERIAL	STANDARD
Chlorinated polyvinyl chloride (CPVC)	ASTM D2846; ASTM F437; ASTM F438; ASTM F439; ASTM F1970; CSA B137.6
Cross-linked polyethylene (PEX)	ASTM F877; ASTM F1807; ASTM F1960; ASTM F2080; ASTM F2159; ASTM F2434; CSA B137.5
High-density polyethylene (HDPE)	ASTM D2683; ASTM D3261; ASTM F1055; CSA B137.1; CSA C448; NSF 358-1
Polyethylene/aluminum/polyethylene (PE-AL-PE)	ASTM F1282; ASTM F2434; CSA B137.9
Polypropylene (PP-R)	ASTM F2389; CSA B137.11; NSF 358-2
Polyvinyl chloride (PVC)	ASTM D2464; ASTM D2466; ASTM D2467; ASTM F1970, CSA B137.2; CSA B137.3
Raised temperature polyethylene (PE-RT)	ASTM D2683; ASTM D3261; ASTM F1055; ASTM F1807; ASTM F2098; ASTM F2159; ASTM F2735; ASTM F2769; CSA B137.1; CSA B137.18, <u>NSF 358-4</u>

Add new standard(s) follows



NSF International
789 N. Dixboro Road P.O. Box 130140

NSF 358-4-2017:

Polyethylene of raised temperature (PE-RT) pipe and fittings for water-based ground-source (geothermal) heat pump systems

Reason: At the proposal deadline, NSF 358-4 was still a draft standard, but it is expected to be published prior to the public hearing. The balloted draft standard will be submitted with the proposal. Anyone may receive a complimentary copy of this draft standard for the purpose of reviewing this proposal by emailing brown@nsf.org.

These tables contain the acceptable materials for geothermal ground loop pipe and fittings. PE-RT piping and associated fittings are already accepted materials with referenced standards. NSF 358-4 is a proposed ANSI standard written specifically to contain requirements for PE-RT geothermal piping and fittings. Companion standards NSF 358-1 (PE) and NSF 358-3(PP) are already approved in this table. NSF 358-4 addresses performance pressure testing, long term strength, chemical resistance, constant tensile load joint testing, suitability for burial and marking specific to geothermal PE-RT piping systems.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Providing an additional option is cost neutral.

Analysis: A review of the standard proposed for inclusion in the code, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

RM39-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposed standard is not yet published. (Vote 10-0)

Assembly Action:

None

RM39-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jeremy Brown, representing NSF International (brown@nsf.org) requests As Submitted.

Commenter's Reason: NSF 358-4 was rejected by the committee because the standard was not completed at the time of this proposal's submittal. No one spoke against this standard. A draft standard was submitted to the committee at the time of proposal. The standard is complete without any changes from the draft submitted to the committee.

A copy of the standard may be viewed at http://www.nsf.org/newsroom_pdf/NSF_358-4-2018-watermarked.pdf. There is no controversy around this standard. It is the 4th in a suite of NSF Standards covering geothermal pipe and fittings. NSF 358-1 (Polyethylene) and NSF 358-2 (Polypropylene) are already referenced in Tables M2105.4 and Table M2105.5. NSF 358-3 (Crosslinked Polyethylene) was approved as submitted by the committee in P40.

NSF 358-4 Polyethylene of raised temperature (PE-RT) pipe and fittings for water-based ground-source (geothermal) heat pump systems should be added to provide an additional option to the code for this material.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This standard provide an another option for compliance and so is therefore cost neutral.

RM39-18

PSD1-18

IPSDC: 101.2, 101.3, 107.2, 107.2.1, 107.2.2, 1 (New), 304, 304.1, 304.1.1, 304.2, 304.3, 304.4, 304.5, 304.6, 504.5, 802.1, 802.4, 802.5, 802.10, 805.3, 805.6, Chapter 11, 1101.1, 1101.2, 1202.4, Chapter 14

Proposed Change as Submitted

Proponent: Dennis Hallahan, Infiltrator Water Technologies, representing National Onsite Wastewater Recycling Association (dhallahan@infiltratorwater.com)

2018 International Private Sewage Disposal Code

Revise as follows

[A] 101.2 Scope. Septic tank and effluent absorption systems or other treatment tank and effluent disposal systems shall be permitted where a public sewer is not available to the property served. ~~Unless specifically approved, the private sewage disposal system of each building shall be entirely separate from and independent of any other building.~~ The use of a common system or a system on a parcel other than the parcel where the structure is located shall be subject to the full requirements of this code as for systems serving public buildings.

[A] 101.3 Public sewer connection. Where public sewers become available to the premises served, the use of the *private sewage disposal system* shall be discontinued within that period of time required by law, but such period shall not exceed one year. The building sewer shall be disconnected from the *private sewage disposal system* and connected to the public sewer.

Exception: Where approved by the code official for such reasons as excessive cost or project difficulty, or where the existing system does not pose a health threat or is code compliant, then connection to the public sewer shall not be required.

[A] 107.2 Special inspections. Special inspections of alternative ~~engineered~~ design *private sewage disposal systems* shall be conducted in accordance with Sections 107.2.1 and 107.2.2.

[A] 107.2.1 Periodic inspection. The registered design professional or designated inspector shall periodically inspect and observe the alternative ~~engineered~~ design to determine that the installation is in accordance with the approved plans. Discrepancies shall be brought to the immediate attention of the *private sewage disposal system* contractor for correction. Records shall be kept of all inspections.

[A] 107.2.2 Written report. The registered design professional shall submit a final report in writing to the code official upon completion of the installation, certifying that the alternative ~~engineered~~ design conforms to the approved construction documents. A notice of approval for the *private sewage disposal system* shall not be issued until a written certification has been submitted.

SECTION 304 ALTERNATIVE ENGINEERED DESIGN

304.1 Alternative engineered design. The design, documentation, inspection, testing and approval of an alternative ~~engineered~~ design *private sewage disposal system* shall comply with Sections 304.1.1 through 304.6.

304.1.1 Design criteria. An alternative ~~engineered~~ design shall conform to the intent of the provisions of this code and shall provide an equivalent level of quality, strength, effectiveness, fire resistance, durability and safety. Material, equipment or components shall be designed and installed in accordance with the manufacturer's instructions.

304.2 Submittal. The registered design professional shall indicate on the permit application that the *private sewage disposal system* is an alternative ~~engineered~~ design. The permit and permanent permit records shall indicate that an alternative ~~engineered~~ design was part of the approved installation.

304.3 Technical data. The registered design professional shall submit sufficient technical data to substantiate the proposed alternative ~~engineered~~ design and to prove that the performance meets the intent of this code.

304.4 Construction documents. The registered design professional shall submit to the code official two complete sets of signed and sealed construction documents for the alternative ~~engineered~~ design.

304.5 Design approval. Where the code official determines that the alternative ~~engineered~~ design conforms to the intent of this code, the *private sewage disposal system* shall be approved. If the alternative ~~engineered~~ design is not approved, the code official shall notify the registered design professional in writing, stating the reasons therefor.

304.6 Inspection and test. The alternative ~~engineered~~ design shall be inspected in accordance with the requirements of Section 107.

Add new text as follows

504.5 Thermoplastic Tanks. Thermoplastic tanks shall conform to IAPMO Z1000, IAPMO IGC 262-2013 or CSA B66-16.

Revise as follows

504.5 6 Manholes. Manhole ~~collars and extensions shall be of the same material as the tank.~~ Manhole covers shall be of concrete, steel, cast iron, thermoplastic or other approved material.

802.1 General. Septic tanks shall be fabricated or constructed of welded steel, monolithic concrete, fiberglass, thermoplastic or an approved material. Tanks shall be water tight and fabricated to constitute an individual structure, and shall be designed and constructed to withstand anticipated loads. The design of prefabricated septic tanks shall be approved. Plans for site-constructed concrete tanks shall be approved prior to construction.

805.3 Construction. Holding tanks shall be constructed of welded steel, monolithic concrete, glass-fiber-reinforced polyester, thermoplastic or other approved materials.

802.4 Manholes. Each compartment of a tank shall be provided with not fewer than one manhole opening located over the inlet or outlet opening, and such opening shall be not less than 24 inches (610 mm) square or 24 inches (610 mm) in diameter. Where the inlet compartment of a septic tank exceeds 12 feet (3658 mm) in length, an additional manhole shall be provided over the baffle wall. Manholes shall terminate not greater than 6 inches (152 mm) below the ground surface. ~~Manholes shall be of the same material as the tank. Steel tanks shall have not less than a 2-inch (51 mm) collar for the manhole extensions permanently welded to the tank. The manhole extension on fiberglass tanks shall be of the same material as the tank and an integral part of the tank. The collar shall be not less than 2 inches (51 mm) high.~~

802.5 Manhole covers. Manhole risers shall be provided with a fitted, water-tight cover of concrete, steel, cast iron, thermoplastic or other approved material capable of withstanding all anticipated loads. Manhole covers terminating above grade shall have an approved locking device.

805.6 Manholes. Each tank shall be provided with either a manhole not less than 24 inches (610 mm) square or with a manhole having a 24-inch (610 mm) inside diameter extending not less than 4 inches (102 mm) above ground. Finished grade shall be sloped away from the manhole to divert surface water from the manhole. Each manhole cover shall have an effective locking device or tamper resistant screw fastener. Service ports in manhole covers shall be not less than 8 inches (203 mm) in diameter and shall be 4 inches (102 mm) above finished grade level. The service port shall have an effective locking cover or a brass cleanout plug.

802.10 Manhole riser joints. Joints on concrete risers and manhole covers shall be tongue-and-groove or shiplap type and sealed water tight using neat cement, mortar or bituminous compound. Joints on steel risers shall be welded or flanged and bolted and water tight. Steel manhole extensions shall be bituminous coated both inside and outside. Methods of attaching fiberglass and thermoplastic risers shall be water tight and approved.

CHAPTER **11 RESIDENTIAL-ADVANCED WASTE-WATER TREATMENT SYSTEMS**

1101.1 Scope. The provisions of this chapter shall govern ~~residential-advanced wastewater treatment~~ systems.

1101.2 Residential-Advanced waste-water treatment systems. The regulations for materials, design, construction and performance shall comply with NSF 40, NSF 245 or NSF 350, as applicable.

1202.4 Other inspections. In addition to the required inspection prior to backfilling, the code official shall conduct any other inspections deemed necessary to determine compliance with this code. Including inspections to verify adequate ongoing performance of the system as required.

Add new standard(s) follows

NSF/ANSI 245 - 2013:

Wastewater Treatment Systems - Nitrogen Reduction
NSF/ANSI 350-2014:

Onsite Residential and Commercial Water-Reuse Treatment Systems

B66-16:

Design, material, and manufacturing requirements for prefabricated septic tanks and sewage holding tanks

IAPMO IAPMO/ANSI Z1000-2013 Prefabricated Septic Tanks

IAPMO IAPMO IGC 262-2013 Corrugated Thermoplastic Tanks

Reason: 101.1 Cluster system designs are very common, can serve more than one building, and allow additional solutions to protect public health.

101.3 A private sewage treatment system can provide wastewater treatment similar to a public sewer.

107.2, 107.2.1, 304, 304.1, 304.1.1, 304.2, 304.3, 304.4, 304.5, 304.6:

In the 2015 International Private Sewage Disposal Code, the phrase Alternative Engineered Design is stated 16 times, including the table of contents and the index, therefore there are additional locations to remove this term. The Code does not define an "Alternative Engineered Design", nor does it provide guidance as to what constitutes an Alternative Engineered Design. Many states, provinces, and international programs allow registered sanitarians or environmental specialists to design sewage treatment systems, hence NOWRA requests that the term "engineered" be removed from this section and others.

New Section 504.5 Thermoplastic tanks are approved by all 50 states and provinces and are common internationally.

504.5 (this section number should be moved up to 504.6) Thermoplastic collars and extensions are approved by all 50 states. It is common practice to have materials differing than the tank. For example, thermoplastic extensions are cast into concrete tanks.

802.1 Thermoplastic tanks are approved by all 50 states and provinces and are common internationally.

802.4 Thermoplastic collars and manhole extensions are approved by all 50 states and provinces. It is common practice to have materials differing than the tank.

802.5, 802.10, & 805.3 Thermoplastic materials have been in use for many years and are approved in all states and provinces.

805.6 Tamper resistant screws are standard practice are approved in many state and provincial codes.

11 The title is proposed to change to Advanced Waste-Water Treatment Systems because this is the most common industry term. The term "Residential" is removed because the facilities served can be residential or commercial.

1101.1 Change consistent with Section 11 above.

1101.2 The term Residential is removed to be consistent with Section 11 above. Available new standards are NSF 245 and NSF 350 to address nutrient removal and reuse.

1202.4 As the decentralized wastewater industry progresses, many states, provinces, and counties require operational permits for private sewage treatment systems, both conventional and/or advanced waste-water treatment systems.

Cost Impact: The code change proposal will decrease the cost of construction

101.1 By allowing other solutions to be considered the cost may be lowered.

101.3 The private sewage treatment system option may have a lower cost.

107.2, 107.2.1, 304, 304.1, 304.1.1, 304.2, 304.3, 304.4, 304.5, & 304.6:

Allowing other certified professionals to design systems will increase choices and may lower costs.

New Section 504.5 The inclusion of Thermoplastic tanks will increase choices and may offer cost savings in materials and labor.

504.5 The inclusion of thermoplastic collars and extensions will increase choices and may offer cost savings.

802.1 The inclusion of thermoplastic materials will increase choices and may offer cost savings.

802.4 The inclusion of thermoplastic materials will increase choices and may offer cost savings.

802.5 The inclusion of thermoplastic materials will increase choices and may offer cost savings.

802.10 The inclusion of thermoplastic materials will increase choices and may offer cost savings.

805.3 The inclusion of thermoplastic materials will increase choices and may offer cost savings.

805.6 The inclusion of tamper resistant screws will increase choices and may offer cost savings.

11 The code change proposal will have no impact on the cost of construction.

1101.1 The code change proposal will have no impact on the cost of construction.

1101.2 For the jurisdictions that require treatment in accordance with these standards, the code change proposal will have no impact on the cost of construction.

1202.4 For the jurisdictions that require operational permits, the code change proposal will have no impact on the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, NSF 245-2013, IAPMO Z1000-2013, IAPMO IGC 262-2013 and CSA B66-16 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018. The referenced standard, NSF 350-2014, is currently referenced in other 2018 I-codes.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Evaluation of site and system by an arbitrary person seems too open. Removal of "engineered" is inappropriate as these systems require engineering input. (Vote:13-1)

Assembly Action:

None

PSD1-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Pennie Feehan, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (pmgcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Private Sewage Disposal Code

101.3 Public sewer connection. Where public sewers become available to the premises served, the use of the *private sewage disposal system* shall be discontinued within that period of time required by law, but such period shall not exceed one year. The building sewer shall be disconnected from the *private sewage disposal system* and connected to the public sewer.

~~**Exception:** Where approved by the code official for such reasons as excessive cost or project difficulty, or where the existing system does not pose a health threat or is code compliant, then connection to the public sewer shall not be required. Existing private sewage disposal systems in accordance with Section 102.4.~~

304.1 Alternative ~~engineered~~ design. The design, documentation, inspection, testing and approval of an alternative design *private sewage disposal system* shall comply with Sections 304.1.1 through 304.6.

802.5 Manhole covers. Manhole risers shall be provided with a fitted, water-tight cover of concrete, steel, cast iron, thermoplastic or other approved material capable of withstanding all anticipated loads. Manhole covers terminating above grade shall have an approved locking ~~device~~ device or tamper resistant screw fasteners.

1202.4 Other inspections. In addition to the required inspection prior to backfilling, the code official shall conduct any other inspections deemed necessary to determine compliance with this code. ~~including code. Such inspections to verify adequate ongoing performance of the system as required shall verify that the installation will perform in a safe and sanitary condition.~~

Commenter's Reason: The National Onsite Wastewater Recycling Association (NOWRA) is the largest organization within the United States dedicated to educating and representing members within the onsite and decentralized wastewater treatment industry. Their members include educators, regulators, engineers, contractors, manufacturers, suppliers, service providers, and other parties.

The original proposal is the result of NOWRA members working together to advise regulatory bodies of issues hindering the acceptance of decentralized advanced wastewater treatment systems. These systems can provide optimal wastewater management for homes, businesses and industrial centers where water recycling is encouraged or necessary to reduce the demand on municipal potable water systems and wastewater treatment infrastructures. Because many locations in North America are already restricting potable water use because of the lack of raw water supplies caused by climate changes, population growth, or the exorbitant cost of treatment of poor quality raw water; decentralized, onsite advanced wastewater treatment systems offer one solution to these problems.

Technical Support for the Public Comment

The following are the committee's two reasons for disapproval and the remedy provided for each in this public comment:

Section 101.3 : "Evaluation of site and system by an arbitrary person seems too open". It is agreed that cost can be a subjective assessment. Accordingly it has been removed in the exception and replaced by a reference to Section 102.4 which explicitly permits existing installations to remain in service provided they are properly maintained. Section 102.4

reads as follows:

102.4 Existing installations. *Private sewage disposal systems* lawfully in existence at the time of the adoption of this code shall be permitted to have their use and maintenance continued if the use, maintenance or repair is in accordance with the original design and no hazard to life, health or property is created by the system.

This is and should be the key consideration - does the existing private sewage disposal system perform in a safe and sanitary condition? If it does, the code allows it to remain operational. Further, Section 102.5 Maintenance requires both existing and new systems to be maintained in proper operating condition and empowers the code official to require reinspection at any time.

Sections 107 and 304: "Removal of "engineered" is inappropriate as these systems require engineering input." The removal of term "engineered" is not an indication that a responsible design professional is not involved in alternative designs. Section 304.2 specifically requires that a "registered design professional" perform these designs. The Chapter 2 definition of "registered design professional" does not require the "registered design professional" to be an engineer. There are other types of design professionals who are registered or licensed to practice their respective design profession. Many states, provinces, and international programs allow registered or licensed sanitarians or environmental specialists to design sewage treatment systems. Becoming registered or licensed requires significant education and training to satisfy the statutory requirements of the entities that issue such registrations and licenses. Removal of term "engineered" is simply to avoid misunderstandings about who the registered design professional can be. The deletion of the term "engineered" in the title to Section 304.1 was overlooked in the original proposal and has been corrected in this public comment.

Two additional changes are included in this public comment, Sections 802.5 and 1202.4.

Section 802.5: The revision to Section 802.5 provides an alternative to manhole cover locking devices and was actually a modification that was suggested by the floor, ruled in order by the Chair and testified upon at the hearing. There was no opposition to this modification at the hearing.

Section 1202.4: The change is intended to clarify the proposed additional sentence, resulting in an inspection which ensures a safe and sanitary installation.

The remainder of the original proposal is retained unchanged. It was noted at the CAH that the proposal includes requirements that are appropriate for "Advanced Waste Water Treatment Systems" by virtue of the addition of the noted additional NSF standards.

This public comment is submitted by the ICC PMGCAC. CAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 and 2018 the PMGCAC has held one face-to-face meeting and 11 conference call meetings which included members of the committee as well as any interested party to discuss and debate the proposed changes and public comments. Related documentation and reports are posted on the PMGCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/pmg-code-action-committee-pmgcac/>.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. The proposal along with this public comment offers alternative methods for providing for wastewater disposal for building. Options offer designers a choice of the most cost effective method for solving construction challenges.

PSD1-18

PSD3-18

IPSDC: 802.1

Proposed Change as Submitted

Proponent: William Hall, Portland Cement Association, representing Alliance For Concrete Codes and Standards (jhall@cement.org); Eric Carleton, National Precast Concrete Association, representing National Precast Concrete Association (ecarleton@precast.org); Stephen Szoke, representing American Concrete Institute (steve.szoke@concrete.org)

2018 International Private Sewage Disposal Code

Revise as follows

802.1 General. Septic tanks shall be fabricated or constructed of welded steel, monolithic concrete, fiberglass or an approved material. Tanks shall be water tight and fabricated to constitute an individual structure, and shall be designed and constructed to withstand anticipated ~~loads.~~ hydraulic and structural loads including soil, hydrostatic, flotation and traffic when conditions exist. When required by the code official, the design of septic tanks shall be by a registered professional engineer within the state or province of the septic tank installation. The design of prefabricated septic tanks shall be approved. Plans for site-constructed concrete tanks shall be approved prior to construction.

Reason: Section 802.1 General. The current language ignores clarifying that the critical components of septic tank design is both hydraulic for correct sizing and structural for continued function of the tank without failure. The listing of specific loads is for the benefit of the reviewer to be aware that each site is unique and requires the designer to be aware and acknowledge those variable conditions have been analyzed.

Section 802.4 Manholes. The reasoning to strike the existing sentence is the same as describe in section 504.5, the existing language requires the use of the same materials for the extension sections (risers) as that of the lid and tank. Current septic tank fabrication methods have successfully fabricated hybrid systems which utilize precast concrete for the tank chamber for the attributes it possesses and other materials for the risers which are directly cast into the flattop lid to make a watertight seal.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Provides clarification

PSD3-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: It is too specific to require a register professional engineer from the specific state of province to design the tank. (Vote:11-3)

Assembly Action:

None

PSD3-18

Individual Consideration Agenda

Public Comment 1:

Proponent: William Hall, Portland Cement Association, representing Alliance for Concrete Codes and Standards (jhall@cement.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Private Sewage Disposal Code

802.1 General. Septic tanks shall be fabricated or constructed of welded steel, monolithic concrete, fiberglass or an approved material. Tanks shall be water tight and fabricated to constitute an individual structure, and shall be designed and constructed to withstand anticipated hydraulic and structural loads including soil, hydrostatic, flotation and traffic when conditions exist. When required by the code official, the design of septic tanks shall be by a registered professional engineer ~~within the state or province of the septic tank installation~~. The design of prefabricated septic tanks shall be approved. Plans for site-constructed concrete tanks shall be approved prior to construction.

Commenter's Reason: Section 802.1 General. The current language ignores clarifying that the critical components of septic tank design are both hydraulic loading for correct sizing and structural for continued tank function without failure. The listing of specific loads is for the benefit of the reviewer to be aware that each site is unique and requires the designer of record to be aware and acknowledge those variable conditions have been analyzed. The committee did not like the proposed language dealing with design professional. While the engineer should be aware of local soil properties, the committee felt it should not be limited to engineers within the state or province.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The public comment only clarifies responsibility and does not affect materials or labor costs of construction.

PSD3-18

P1-18 Part II

IRC: R202

Proposed Change as Submitted

Proponent: Pennie L Feehan, Pennie L. Feehan Consulting, representing Copper Development Association
(penniefeehan@me.com)

2018 International Residential Code

Add new definition as follows

COPPER ALLOY. A homogeneous mixture of not less than two metals where not less than 50% of the finished metal is copper.

Reason:

It is important to understand that copper tube is an almost pure copper alloy, composed of 99.9% Cu + Ag combined with no greater than 0.04% P. Whereas, a copper alloy is a mixture of at least two metals in which copper is the primary component comprising no less than 50% and is combined with other elements to create different copper alloys.

Therefore, brass, bronze, red brass, etc. are all forms of Copper Alloy.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This code change proposal will not increase or decrease the cost of construction.

P1-18 Part II

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: No definitions for materials are in the code now, so this is unneeded text. (Vote: 7-0)

Assembly Action:

None

P1-18 Part II

Individual Consideration Agenda

Public Comment 1:

Proponent: Pennie L Feehan, representing Copper Development Association (penniefeehan@me.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Residential Code

COPPER ALLOY. ~~A homogeneous mixture of not less than two metals where not less than 50% of the finished metal~~ metal alloy where the principal component is copper.

Commenter's Reason: This is a simpler definition which was approved in IPC.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This definition simply clarifies what is already required by the code and therefore, does not impact the cost of materials.

P1-18 Part II

P1-18 Part III

IMC: 202 (New)

Proposed Change as Submitted

Proponent: Pennie L Feehan, Pennie L. Feehan Consulting, representing Copper Development Association (penniefeehan@me.com)

2018 International Mechanical Code

Add new definition as follows

COPPER ALLOY. A homogeneous mixture of not less than two metals where not less than 50% of the finished metal is copper.

Reason:

It is important to understand that copper tube is an almost pure copper alloy, composed of 99.9% Cu + Ag combined with no greater than 0.04% P. Whereas, a copper alloy is a mixture of at least two metals in which copper is the primary component comprising no less than 50% and is combined with other elements to create different copper alloys. Therefore, brass, bronze, red brass, etc. are all forms of Copper Alloy.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This code change proposal will not increase or decrease the cost of construction.

P1-18 Part III

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This is the only material definition for Chapter two and the code doesn't need definitions for every material addressed in the code. (Vote:11-0)

Assembly Action:

None

P1-18 Part III

Individual Consideration Agenda

Public Comment 1:

Proponent: Pennie L Feehan, representing Copper Development Association (penniefeehan@me.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Mechanical Code

COPPER ALLOY. ~~A homogeneous mixture of not less than two metals where not less than 50% of the finished metal metal alloy where the principal component is copper.~~

Commenter's Reason: This definition is similar to definitions found on the internet and was approved by the IPC.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This definition simply clarifies what is already required by the code and therefore, does not impact the cost of materials.

P1-18 Part III

P1-18 Part IV

IFGC: 202 (New)

Proposed Change as Submitted

Proponent: Pennie L Feehan, Pennie L. Feehan Consulting, representing Copper Development Association
(penniefeehan@me.com)

2018 International Fuel Gas Code

Add new definition as follows

COPPER ALLOY. A homogeneous mixture of not less than two metals where not less than 50% of the finished metal is copper.

Reason: It is important to understand that copper tube is an almost pure copper alloy, composed of 99.9% Cu + Ag combined with no greater than 0.04% P. Whereas, a copper alloy is a mixture of at least two metals in which copper is the primary component comprising no less than 50% and is combined with other elements to create different copper alloys. Therefore, brass, bronze, red brass, etc. are all forms of Copper Alloy.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This code change proposal will not increase or decrease the cost of construction.

P1-18 Part IV

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Aligns with the ISPSC. Approval was based on the proponent's published reason statement. (Vote: 11-0)

Assembly Action:

None

P1-18 Part IV

Individual Consideration Agenda

Public Comment 1:

Proponent: Pennie L Feehan, representing Copper Development Association (penniefeehan@me.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Fuel Gas Code

COPPER ALLOY. ~~A homogeneous mixture of not less than two metals where not less than 50% of the finished metal metal alloy where the principal component is copper.~~

Commenter's Reason: This definition is similar to definitions found on the internet and was approved by the IPC.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This definition simply clarifies what is already required by the code and therefore, does not impact the cost of materials.

P1-18 Part IV

P1-18 Part V

ISPSC: 202 (New)

Proposed Change as Submitted

Proponent: Pennie L Feehan, Pennie L. Feehan Consulting, representing Copper Development Association (penniefeehan@me.com)

2018 International Swimming Pool and Spa Code

Add new definition as follows

COPPER ALLOY. A homogeneous mixture of not less than two metals where not less than 50% of the finished metal is copper.

Reason:

It is important to understand that copper tube is an almost pure copper alloy, composed of 99.9% Cu + Ag combined with no greater than 0.04% P. Whereas, a copper alloy is a mixture of at least two metals in which copper is the primary component comprising no less than 50% and is combined with other elements to create different copper alloys. Therefore, brass, bronze, red brass, etc. are all forms of Copper Alloy.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This code change proposal will not increase or decrease the cost of construction.

P1-18 Part V

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: A copper alloy complying with this definition can be used in many locations. (Vote: 12-0)

Assembly Action:

None

P1-18 Part V

Individual Consideration Agenda

Public Comment 1:

Proponent: Pennie L Feehan, representing Copper Development Association (penniefeehan@me.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Swimming Pool and Spa Code

COPPER ALLOY. ~~A homogeneous mixture of not less than two metals where not less than 50% of the finished metal metal alloy where the principal component is copper.~~

Commenter's Reason: This definition is similar to definitions found on the internet and was approved by the IPC.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This definition simply clarifies what is already required by the code and therefore, does not impact the cost of materials.

P1-18 Part V

P1-18 Part VI

IPSDC: 202 (New)

Proposed Change as Submitted

Proponent: Pennie L Feehan, representing Copper Development Association (penniefeehan@me.com)

2018 International Private Sewage Disposal Code

Add new definition as follows

COPPER ALLOY. A homogeneous mixture of not less than two metals where not less than 50% of the finished metal is copper.

Reason: See Part I

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is just a definition for clarification.

P1-18 Part VI

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: A copper content as low as 50 percent is not an appropriate value for all applications covered by this code. (Vote:11-2)

Assembly Action:

None

P1-18 Part VI

Individual Consideration Agenda

Public Comment 1:

Proponent: Pennie L Feehan, representing Copper Development Association (penniefeehan@me.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Private Sewage Disposal Code

COPPER ALLOY. ~~A homogeneous mixture of not less than two metals where not less than 50% of the finished metal metal alloy where the principal component is copper.~~

Commenter's Reason: This definition is similar to definitions found on the internet and was approved by the IPC.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This definition simply clarifies what is already required by the code and therefore, does not impact the cost of materials.

P1-18 Part VI

P1-18 Part I

IPC: 202 (New)

Proposed Change as Submitted

Proponent: Pennie L Feehan, Pennie L. Feehan Consulting, representing Copper Development Association (penniefeehan@me.com)

THIS IS A 6 PART CODE CHANGE PROPOSAL. PARTS I and VI WILL BE HEARD BY THE IPC-IPSDC COMMITTEE. PART II WILL BE HEARD BY THE IRC-PLUMBING COMMITTEE. PART III WILL BE HEARD BY THE IMC COMMITTEE. PART IV WILL BE HEARD BY THE IFGC COMMITTEE. PART V WILL BE HEARD BY THE ISPSC COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

2018 International Plumbing Code

Add new definition as follows

COPPER ALLOY. A homogeneous mixture of not less than two metals where not less than 50% of the finished metal is copper.

Reason: It is important to understand that copper tube is an almost pure copper alloy, composed of 99.9% Cu + Ag combined with no greater than 0.04% P. Whereas, a copper alloy is a mixture of at least two metals in which copper is the primary component comprising no less than 50% and is combined with other elements to create different copper alloys. Therefore, brass, bronze, red brass, etc. are all forms of Copper Alloy.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This code change proposal will not increase or decrease the cost of construction.

P1-18 Part I

Public Hearing Results

Committee Action:

As Modified

Committee Modification: COPPER ALLOY. A metal alloy where the principle component ~~homogeneous mixture of not less than two metals where not less than 50% of the finished metal~~ is copper.

Committee Reason: For the Modification: A less prescriptive copper requirement allows for a wider range of materials. For the Proposal: The term is used in various locations of the code and needs to be defined. (Vote:12-2)

Assembly Action:

None

P1-18 Part I

P13-18

IPC: TABLE 403.1 (IBC: [P] TABLE 2902.1)

Proposed Change as Submitted

Proponent: Don Davies, Salt Lake City Corporation, representing Utah Chapter of International Code Council (don.davies@slcgov.com)

2018 International Plumbing Code

Revise as follows

**TABLE 403.1
MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES^a (See Sections 403.1.1 and 403.2)**

NO.	CLASSIFICATION	DESCRIPTION	WATER CLOSETS (URINALS: SEE SECTION 424.2)		LAVATORIES		BATHTUBS/ SHOWERS	DRINKING FOUNTAIN (SEE SECTION 410)	OTHER
			MALE	FEMALE	MALE	FEMALE			
1	Assembly	Theaters and other buildings for the performing arts and motion pictures ^d	1 per 125	1 per 65	1 per 200		—	1 per 500	1 service sink
		Nightclubs, bars, taverns, dance halls and buildings for similar purposes ^d	1 per 40	1 per 40	1 per 75		—	1 per 500	1 service sink
		Restaurants, banquet halls and food courts ^d	1 per 75	1 per 75	1 per 200		—	1 per 500	1 service sink
		Gaming areas	1 per 100 for the first 400 and 1 per 250 for the remainder exceeding 400	1 per 50 for the first 400 and 1 per 150 for the remainder exceeding 400	1 per 250 for the first 750 and 1 per 500 for the remainder exceeding 750		—	1 per 1,000	1 service sink
		Auditoriums without permanent seating, art galleries, exhibition halls, museums, lecture halls, libraries, arcades and gymnasiums ^d	1 per 125	1 per 65	1 per 200		—	1 per 500	1 service sink
		Passenger terminals and transportation facilities ^d	1 per 500	1 per 500	1 per 750		—	1 per 1,000	1 service sink
		Places of worship and other religious services ^d	1 per 150	1 per 75	1 per 200		—	1 per 1,000	1 service sink

		Coliseums, arenas, skating rinks, pools and tennis courts for indoor sporting events and activities	1 per 75 for the first 1,500 and 1 per 120 for the remainder exceeding 1,500	1 per 40 for the first 1,520 and 1 per 60 for the remainder exceeding 1,520	1 per 200	1 per 150	—	1 per 1,000	1 service sink
		Stadiums, amusement parks, bleachers and grandstands for outdoor sporting events and activities ^f	1 per 75 for the first 1,500 and 1 per 120 for the remainder exceeding 1,500	1 per 40 for the first 1,520 and 1 per 60 for the remainder exceeding 1,520	1 per 200	1 per 150	—	1 per 1,000	1 service sink
2	Business	Buildings for the transaction of business, professional services, other services involving merchandise, office buildings, banks, light industrial and similar uses	1 per 25 for the first 50 and 1 per 50 for the remainder exceeding 50	1 per 40 for the first 80 and 1 per 80 for the remainder exceeding 80	—	—	—	1 per 100	1 service sink ^e
3	Educational	Educational facilities	1 per 50	1 per 50	—	—	—	1 per 100	1 service sink
4	Factory and industrial	Structures in which occupants are engaged in work fabricating, assembly or processing of products or materials	1 per 100	1 per 100	—	—	—	1 per 400	1 service sink
5	Institutional	Custodial care facilities	1 per 10	1 per 10	1 per 8	—	—	1 per 100	1 service sink
		Medical care recipients in hospitals and nursing homes	1 per room ^c	1 per room ^c	1 per 15	—	—	1 per 100	1 service sink per floor
		Employees in hospitals and nursing homes ^b	1 per 25	1 per 35	—	—	—	1 per 100	—
		Visitors in hospitals and nursing homes	1 per 75	1 per 100	—	—	—	1 per 500	—
		Prisons ^b	1 per cell	1 per cell	1 per 15	—	—	1 per 100	1 service sink
		Reformatories, detention centers, and correctional centers ^b	1 per 15	1 per 15	1 per 15	—	—	1 per 100	1 service sink

		Employees in reformatories, detention centers and correctional centers ^b	1 per 25	1 per 35	—	1 per 100	—
		Adult day care and child day care	1 per 15	1 per 15	1	1 per 100	1 service sink
6	Mercantile	Retail stores, service stations, shops, salesrooms, markets and shopping centers	1 per 500	1 per 750	—	1 per 1,000	1 service sink ^e
7	Residential	Hotels, motels, boarding houses (transient)	1 per sleeping unit	1 per sleeping unit	1 per sleeping unit	—	1 service sink
		<u>Hostels (transient)</u>	<u>1 per 10</u>	<u>1 per 10</u>	<u>1 per 8</u>	<u>1 per 100</u>	<u>1 service sink</u>
		Dormitories, fraternities, sororities and boarding houses (not transient)	1 per 10	1 per 10	1 per 8	1 per 100	1 service sink
		Apartment house	1 per dwelling unit	1 per dwelling unit	1 per dwelling unit	—	1 kitchen sink per dwelling unit; 1 automatic clothes washer connection per 20 dwelling units
		Congregate living facilities with 16 or fewer persons	1 per 10	1 per 10	1 per 8	1 per 100	1 service sink
		One- and two-family dwellings and lodging houses with five or fewer guestrooms	1 per dwelling unit	1 per dwelling unit	1 per dwelling unit	—	1 kitchen sink per dwelling unit; 1 automatic clothes washer connection per dwelling unit
7	Residential	Congregate living facilities with 16 or fewer persons	1 per 10	1 per 10	1 per 8	1 per 100	1 service sink
8	Storage	Structures for the storage of goods, warehouses, storehouse and freight depots. Low and Moderate Hazard.	1 per 100	1 per 100	—	1 per 1,000	1 service sink

Reason: Hostels are not addressed in the code and they are unique in that they operate like a hotel/motel for transient stay as an R-1 occupancy but the restrooms facilities provided resemble the requirements for R-2 boarding houses where

restroom facilities are shared as opposed to hotels and motels where each sleep unit must be provided with its own water closet, lavatory and tub or shower. This creates a problem when applying the provisions of I.B.C. Table 2902.1. The resolution would be to create another R-1 occupancy designation with a description of Hostels and place the requirements for plumbing fixtures from R-2 boarding houses into that classification. A precedent has already been established with two R-2 classifications one for boarding houses and another for apartments which have different requirements. Arbitrarily placing hostels in an R-2 occupancy group would also subject that use to the more restrictive accessibility requirements of I.B.C. Section 1106.2.2.1. While hostels are not that common in the U.S. they are quite common elsewhere in the world and the I.B.C. is an international code so this issue should be addressed.

Cost Impact: The code change proposal will decrease the cost of construction

As the code is written, the hostel would be required to be classified as an R-1 occupancy and would be required to have restrooms in each sleeping room. With the proposed change, the hostel classification would still remain an R-1 occupancy but the number of restrooms would decrease.

Analysis: Duplicated text in the IBC is not shown for brevity.

P13-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Coverage for hostels needs to begin by the IBC identifying the group classification that they fall under. (Vote:13-1)

Assembly Action:

None

P13-18

Individual Consideration Agenda

Public Comment 1:

Proponent: William Warlick, representing Salt Lake City Building Services (william.warlick@slcgov.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

HOSTEL. Lodging facility for transient stay providing shared bathing and restroom facilities and where community cooking facilities may or may not be provided on site.

310.2 Residential Group R-1. Residential Group R-1 occupancies containing *sleeping units* where the occupants are primarily *transient* in nature, including:

- Boarding houses (transient) with more than 10 occupants*
- Congregate living facilities (transient) with more than 10 occupants*
- Hostels
- Hotels (transient)*
- Motels (transient)*

310.3 Residential Group R-2. Residential Group R-2 occupancies containing *sleeping units* or more than two *dwelling units* where the occupants are primarily permanent in nature, including:

- Apartment houses
- Congregate living facilities (nontransient) with more than 16 occupants*

- Boarding houses (nontransient)*
- Convents
- Dormitories*
- Fraternities and sororities
- Monasteries

- Hostels
- Hotels (nontransient)
- Live/work units*
- Motels (nontransient)
- Vacation timeshare properties

Commenter's Reason: As requested by the Committee, we propose a definition for *hostel* in the IBC Chapter 2 and add the defined term to Group R1 and R2 descriptions.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This public comment only clarifies the what the proposal intends to regulate. As indicated in the proposal, the cost of construction will decrease because fewer toilet facilities will be required.

P13-18

P14-18

IPC: 403.1.1

Proposed Change as Submitted

Proponent: Josephine Ortega, representing University of California

2018 International Plumbing Code

Revise as follows

403.1.1 Fixture calculations. To determine the occupant load of each sex, the total occupant load shall be divided in half. To determine the required number of fixtures, the fixture ratio or ratios for each fixture type shall be applied to the occupant load of each sex in accordance with Table 403.1. Fractional numbers resulting from applying the fixture ratios of Table 403.1 shall be rounded up to the next whole number. For calculations involving multiple *occupancies*, such fractional numbers for each *occupancy* shall first be summed and then rounded up to the next whole number.

Exception-Exceptions:

1. The total occupant load shall not be required to be divided in half where *approved* statistical data indicates a distribution of the sexes of other than 50 percent of each sex.
2. Where multi-user facilities are designed to serve all genders, the minimum fixture count shall be calculated 100%, based on total occupant load. In such multi-user user facilities, each fixture type shall be in accordance with ICC A117.1 and each urinal that is provided shall be located in a stall.

Reason: This proposal will permit designers to design gender specific facilities using either the men or women category. The proposal will also bridge the gap of designing for facilities that elect to install all-inclusive bathroom/restrooms.

1. See attached

Bibliography: [Title of book] [Report/Document #] [Author] [Year published] [Page #]
[Link to website for additional information]

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal will permit designers to design gender specific facilities using either the men or women category. The proposal will also bridge the gap of designing for facilities that elect to install all-inclusive bathroom/restrooms.

1. See attached

[Title of book] [Report/Document #] [Author] [Year published] [Page #]

[Link to website for additional information]

P14-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The Committee agreed with the published reason statement. (Vote:10-4)

Assembly Action:

None

P14-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Bryan Romney, representing selfrequests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

403.1.1 Fixture calculations. To determine the occupant load of each sex, the total occupant load shall be divided in half. To determine the required number of fixtures, the fixture ratio or ratios for each fixture type shall be applied to the occupant load of each sex in accordance with Table 403.1. Fractional numbers resulting from applying the fixture ratios of Table 403.1 shall be rounded up to the next whole number. For calculations involving multiple *occupancies*, such fractional numbers for each *occupancy* shall first be summed and then rounded up to the next whole number.

Exceptions:

1. The total occupant load shall not be required to be divided in half where *approved* statistical data indicates a distribution of the sexes of other than 50 percent of each sex.
2. Where adopted by local, state or federal law in the jurisdiction to allow multi-user facilities ~~are~~ designed to serve all genders, the minimum fixture count shall be calculated 100%, based on total occupant load. In such multi-user user facilities, each fixture type shall be in accordance with ICC A117.1 and each urinal that is provided shall be located in a stall.

Commenter's Reason: Approve as modified by this Public Comment.

The IBC and IPC and other legacy codes have for many years prescribed the requirements for multi-stall toilet facilities for male and female. The expectation of separate facilities for male and female has long been accepted by the public and code officials as a point of law and even civil rights. Recent changes to this expectation have prompted this proposed code change which could be adopted in the IPC and ultimately in the IBC for All-Inclusive multi-stall toilet facilities. However, this issue is not a building or plumbing code issue, it is more appropriately a civil rights issue which should be decided in the judicial system, public referendum, state law, ordinance, or whatever mechanism is recognized by the jurisdiction to establish legal and defensible and constitutional law. The language of this proposed code change does not stipulate whether action by the code official to allow Exception #2 is legal and constitutional which honors the civil rights of all people. The proposed code change would put at risk the actions by the jurisdiction, permit applicant and potentially those involved in the design and construction of an all-inclusive toilet facility without first having been vetted by the public and deemed law for the city, county, state or other jurisdictional areas governed by the IBC and IPC.

For example, if an all-inclusive toilet facility was constructed and a segment of the public decided that this facility was a violation of privacy and was an act of discrimination of their civil rights and legal action ensued, without the due process of law to vet this type of facility as legal and adopted by law, this all-inclusive toilet facility and the actions by those who approved and built it would be at risk of legal action. Other potential objections which could prompt such legal challenges are those people who question the impact of all-inclusive toilet facilities on children (Group E Occupancies) for age groups kindergarten through the 12th grade, the lack of privacy in the sink area, sanitation of the water closets in the stalls used by both men and women, or the action by jurisdictions to require all-inclusive toilet rooms in places of worship or other public buildings. There is no language in this proposed code change which restricts a jurisdiction from required compliance to Exception #2 at will for all or certain occupancies.

Additionally, the proponent in the Reason statement includes bathrooms in addition to restrooms. It is unclear as to the intent of the proponent to include bathrooms. There are no proposed code changes for all-inclusive bathrooms. If there is a proposed code change for bathrooms to be designed as all-inclusive facilities, then the same reasons as described above apply and must be considered for modifications as proposed by this Public Comment.

It is of vital importance that this proposed code change be modified by this public comment in order to protect all people's civil rights and avoid legal action. This proposed code change is not an exception which belongs in the IPC and IBC alone, but rather an action which should be determined by the due process of the law. Provide a safe and defensible position for the jurisdiction, the code official, the permit applicant, the design professionals, the contractors and others by approving this Public Comment.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The cost impact shown in the original proposed code change is not accurate. The cost impact by the proposed code change is significantly more when compared to the cost of a typical toilet room. The proposed All-Inclusive Toilet Room would require the construction of separate stalls for water closets and urinals. This construction would require floor to ceiling walls and doors which will need finishes which are durable and waterproof in accordance with IBC section 1210.2.2. The partition construction of each stall would be a custom installation as compared to a manufactured metal compartment system currently used. The door for each stall would need to be a type of door and frame which has acoustic features not required currently. The individual stalls proposed for All-Inclusive Toilet Rooms will require individual HVAC systems and Individual Lighting systems. These requirements under the current code requirements are significantly less when compared to potential design solutions for the All-Inclusive toilet room proposal. Without further assessment of the cost impact, disapproval of this proposed change should be reason enough for disapproval.

Public Comment 2:

Proponent: Jason Phelps, representing Self (jason.phelps@hillsboro-oregon.gov) requests Disapprove.

Commenter's Reason: This proposal is intended to allow men and women to share the same restroom, but it does not address the separate facilities code sections at all. This adds confusion to the code and this proposal should not be approved. Also, approval of P15-18 makes this proposal obsolete.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction. Disapproval of this proposal will not cause the code to require anything more or less than it does now.

Public Comment 3:

Proponent: Bryan Romney, University of Utah, representing self requests Disapprove.

Commenter's Reason: Move to Disapprove

The IBC and IPC and other legacy codes have for many years prescribed the requirements for multi-stall toilet facilities for male and female. The expectation of separate facilities for male and female has long been accepted by the public and code officials as a point of law and even civil rights. Recent changes to this expectation have prompted this proposed code change which could be adopted in the IPC and ultimately in the IBC for All-Inclusive multi-stall toilet facilities. However, this issue is not a building or plumbing code issue, it is more appropriately a civil rights issue which should be decided in the judicial system, public referendum, state law, ordinance, or whatever mechanism is recognized by the jurisdiction to establish legal and defensible and constitutional law. The language of this proposed code change does not stipulate whether action by the code official to allow Exception #2 is legal and constitutional which honors the civil rights of all people. The proposed code change would put at risk the actions by the jurisdiction, permit applicant and potentially those involved in the design and construction of an all-inclusive toilet facility without first having been vetted by the public and deemed law for the city, county, state or other jurisdictional areas governed by the IBC and IPC.

For example, if an all-inclusive toilet facility was constructed and a segment of the public decided that this facility was a violation of privacy and was an act of discrimination of their civil rights and legal action ensued, without the due process of law to vet this type of facility as legal and adopted as law, this all-inclusive toilet facility and the actions by those who approved and built it would be at risk of legal action. Other potential objections which could prompt such legal challenges are those persons who question the impact of all-inclusive toilet facilities on children (Group E Occupancies) for age groups kindergarten through the 12th grade, the lack of privacy in the sink area, sanitation of the water closets in the stalls used by both men and women, or the action by jurisdictions to require all-inclusive toilet rooms in places of worship or other public buildings. There is no language in this proposed code change which restricts a jurisdiction from required compliance to Exception #2 at will for all or certain occupancies.

Additionally, the proponent in the Reason statement includes bathrooms in addition to restrooms. It is unclear as to the intent of the proponent to include bathrooms. There are no proposed code changes for all-inclusive bathrooms. If there is a proposed code change for bathrooms to be designed as all-inclusive facilities, then the same reasons as described above apply and must be considered for disapproval.

Disapproval is requested.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction

The cost impact shown in the original proposed code change is not accurate. The cost impact by the proposed code change is significantly more when compared to the cost of a typical toilet room. The proposed All-Inclusive Toilet Room would require the construction of separate stalls for water closets and urinals. This construction would require floor to ceiling walls and doors which will need finishes which are durable and waterproof in accordance with IBC section 1210.2.2. The partition construction of each stall would be a custom installation as compared to a manufactured metal compartment system currently used. The door for each stall would need to be a type of door and frame which has acoustic features not required currently. The individual stalls proposed for All-Inclusive Toilet Rooms will require individual HVAC systems and Individual Lighting systems. These requirements under the current code requirements are significantly less when compared to potential design solutions for the All-Inclusive toilet room proposal. Without further assessment of the cost impact, disapproval of this proposed change should be reason enough for disapproval.

P14-18

P15-18

IPC: 403.1.1 (IBC [P] 2902.1.1), 403.1.2 (IBC [P] 2902.1.2), 403.2 (IBC [P] 2902.2)

Proposed Change as Submitted

Proponent: David Collins, representing The American Institute of Architects (dcollins@preview-group.com)

2018 International Plumbing Code

Revise as follows

403.1.1 Fixture calculations. To determine the occupant load of each sex, the total occupant load shall be divided in half. To determine the required number of fixtures, the fixture ratio or ratios for each fixture type shall be applied to the occupant load of each sex in accordance with Table 403.1. Fractional numbers resulting from applying the fixture ratios of Table 403.1 shall be rounded up to the next whole number. For calculations involving multiple *occupancies*, such fractional numbers for each *occupancy* shall first be summed and then rounded up to the next whole number.

Exception-Exceptions:

1. The total occupant load shall not be required to be divided in half where *approved* statistical data indicates a distribution of the sexes of other than 50 percent of each sex.
2. Distribution of the sexes is not required where single-user water closets and bathing room fixtures are provided in accordance with Section 403.1.2.

403.1.2 Single-user toilet ~~facility~~ and bathing room fixtures. The plumbing fixtures located in single-user toilet ~~facilities~~ and bathing rooms, including family or assisted-use toilet and bathing rooms that are required by Section 1109.2.1 of the International Building Code, shall contribute toward the total number of required plumbing fixtures for a building or tenant space. Single-user toilet ~~facilities~~ and bathing rooms, and family or assisted-use toilet rooms and bathing rooms shall be identified for use by either sex.

The total number of fixtures shall be permitted to be based on the required number of separate facilities or based on the aggregate of any combination of single-user or separate facilities.

403.2 Separate facilities. Where plumbing fixtures are required, separate facilities shall be provided for each sex.

Exceptions:

1. Separate facilities shall not be required for dwelling units and sleeping units.
2. Separate facilities shall not be required in structures or tenant spaces with a total occupant load, including both employees and customers, of 15 or fewer.
3. Separate facilities shall not be required in mercantile *occupancies* in which the maximum occupant load is 100 or fewer.
4. Separate facilities shall not be required in business occupancies in which the maximum occupant load is 25 or fewer.
5. Separate facilities shall not be required to be designated by sex where single-user toilets rooms are provided in accordance with Section 403.1.2.
6. Separate facilities shall not be required where rooms having both water closets and lavatory fixtures are designed for use by both sexes and privacy for water closets are installed in accordance with Section 405.3.4.

Reason: As part of the changes to the 2018 code provisions were added to allow single user toileting features to be counted toward the total number of fixtures required despite their designation by sex or family. This change is proposed to clarify how toilet rooms that are configured in such a manner to allow use by either sex can also be used. Many communities have been asking to use these provisions in advance of full adoption of the 2018 codes because of their need to address significant issues of gender and equality for access.

The codes only require the installation of family or assisted-use facilities in a limited number of occupancies. With this change the codes will allow the design of facilities that are available to those needing assistance by other assistants that are of an opposite gender without causing any discomfort by anyone.

Cost Impact: The code change proposal will decrease the cost of construction

This change would reduce the cost of construction because the duplication of areas used for single sex facilities can be eliminated saving unneeded floor area.

Analysis: Duplicated text in the International Building Code is not shown for brevity.

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 6. Separate facilities shall not be required where rooms having both water closets and lavatory fixtures are designed for use by both sexes and privacy for water closets are installed in accordance with Section 405.3.4. Urinals shall be located in an area visually separated from the remainder of the facility or each urinal that is provided shall be located in a stall.

Committee Reason: For the Modification: For multi-user, both sex toilet facilities, urinals need to have similar visual separation.

For the Proposal: The Committee agreed with the published reason statement. (Vote:11-3)

Assembly Action:

None

P15-18

Individual Consideration Agenda

Public Comment 1:

Proponent: James Colgate, representing National Center for Transgender Equality (james.colgate@bryancave.com) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Plumbing Code

403.2 Separate facilities. Where plumbing fixtures are required, separate facilities shall be provided for each sex.

Exceptions:

1. Separate facilities shall not be required for dwelling units and sleeping units.
2. Separate facilities shall not be required in structures or tenant spaces with a total occupant load, including both employees and customers, of 15 or fewer.
3. Separate facilities shall not be required in mercantile *occupancies* in which the maximum occupant load is 100 or fewer.
4. Separate facilities shall not be required in business occupancies in which the maximum occupant load is 25 or fewer.
5. Separate facilities shall not be required to be designated by sex where single-user toilets rooms are provided in accordance with Section 403.1.2.
6. Separate facilities shall not be required where rooms having both water closets and lavatory fixtures are designed for use by ~~both sexes~~ all persons and privacy for water closets are installed in accordance with Section 405.3.4. ~~Urinals~~ Urinals shall be located in an area ~~visually~~ physically separated from the remainder of the facility by a door or each urinal that is provided shall be located in a stall.

Commenter's Reason: The 2018 code provisions were modified to allow single user toilets to be counted toward the total number of fixtures required. This change clarifies that such single user toilets shall not be required to be designated by sex.

Further this change seeks to eliminate the requirement that separate facilities are required in grouped toilet facilities and to permit an alternative design option. Private establishments in the United States and many establishments throughout Europe already offer gender neutral facilities, which have proven to be useful, effective and economical. This change would address issues of gender and equality and will address the issue of a person or child needing assistance by a person of a different gender.

Lastly, the provision on urinals addresses restrooms that may be converted to this newly permitted design or newly built facilities that provide urinals. This change ensures that urinals are kept separate from the facility at large to prevent causing any discomfort to persons using such facilities.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This change would effectively decrease the cost of construction by eliminating the duplication of space needed for separate facilities. The number of fixtures required would remain the same, but waiting time would be reduced by allowing any person to use any available facility.

Public Comment 2:

Proponent: Jason Phelps, representing Self (jason.phelps@hillsboro-oregon.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

403.2 Separate facilities. Where plumbing fixtures are required, separate facilities shall be provided for each sex.

Exceptions:

1. Separate facilities shall not be required for dwelling units and sleeping units.
2. Separate facilities shall not be required in structures or tenant spaces with a total occupant load, including both employees and customers, of 15 or fewer.
3. Separate facilities shall not be required in mercantile *occupancies* in which the maximum occupant load is 100 or fewer.
4. Separate facilities shall not be required in business occupancies in which the maximum occupant load is 25 or fewer.
5. Separate facilities shall not be required to be designated by sex where single-user toilets rooms are provided in accordance with Section 403.1.2.
6. Separate facilities shall not be required where rooms having both water closets and lavatory fixtures are designed for use by both sexes and privacy for water closets and urinals are installed is provided in accordance with Section 405.3.4. ~~6. Urinals shall be located in an area visually separated from the remainder of the facility or each urinal that is provided shall be located in a stall.~~

405.3.6 Privacy, multi-user either sex toilet rooms. Where rooms having multiple water closets or urinals are designed for use by either sex, such rooms shall comply with all of the following:

1. Each water closet and each urinal shall be located in a compartment having floor-to-ceiling walls or partitions. The compartment door shall comply with all of the following:
 - 1.1. The door height shall be not less than 6 feet, 8 inches.
 - 1.2. The head jamb and side jambs of the door frame shall have continuous stop mouldings that prevent viewing of the compartment interior when the door is closed.
 - 1.3. The door locking hardware shall provide an exterior indication that the door is secured from the inside of the compartment.
2. Each compartment shall be provided with exhaust ventilation.

The required number of lavatories shall be permitted to be located within water closet or urinal compartments provided that both of the following apply:

1. Not more than one required lavatory is located in a compartment.
2. Not more than ½ of the required number of lavatories are located in compartments.

Commenter's Reason: This original proposal sends the user to section 405.3.4 for privacy requirements. This proposal also allows men and women to share the restroom. This has never been approved for restrooms with multiple water closets.

Section 405.3.4 states that water closets shall occupy a separate compartment to ensure privacy . This language is too ambiguous and unclear. Without a definition for privacy , additional provisions are needed to add clarity.

This public comment will add the necessary privacy and safety that is needed for a proposal like this to be approved. Attached are several photos showing very typical gaps of up to 1 inch around doors and near walls as well as privacy concerns above and below the partition walls.

Also attached is a design guide approved by the City of Portland that addresses this very scenario.









TOPIC: Separate Facilities - OSSC/29/#2

CODE: Oregon Structural Specialty Code: 2014 Edition

REVISED: December 29, 2016 [Paul L. Scarlett], Director

REFERENCE: Oregon Structural Specialty Code – Chapter 29

SUBJECT: Requirements for Separate Facilities for Plumbing Systems

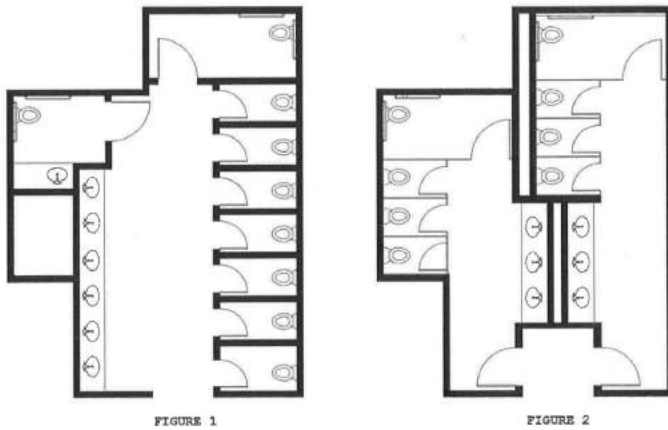
QUESTION: What constitutes a separate facility for each sex where plumbing fixtures are required?

RESPONSE: The Oregon Structural Special Code (OSSC) Section 2902.2 states that where plumbing fixtures are required, separate facilities shall be provided for each sex. However, "separate facilities" are not defined by the OSSC. The Bureau of Development Services (BDS) has determined that facilities meeting the following requirements may be considered separate facilities for the purposes of this code section. See Figure 1.

- A. **Full Height Walls and Doors.** Each water closet must be enclosed by a 6'-8" minimum door that fills the door frame, and floor to ceiling partitions or walls;
- B. **Overlapping Jambs.** Each water closet must have a doorjamb that overlaps the door in the closed position;
- C. **Occupied Indicators.** Each water closet must have locking hardware that functions with an indicator showing whether it is occupied or vacant;
- D. **Ventilation.** Each water closet must have separate ventilation;
- E. **Lavatories.** The lavatory(s) may be located within the water closet or outside of the water closets in a cluster setting; and
- F. **Other Requirements.** All other code requirements, including but not limited to, minimum number of fixtures required, accessibility, family or assisted-use facilities, and signage must be met.

Facilities where the aggregate of water closets and lavatories are located in separate rooms for each sex may also be considered separate facilities for the purpose of this code section. See Figure 2.

Other alternatives may be reviewed and considered on a case-by-case basis through the BDS administrative appeals process.



New September 16, 2016
Revised December 29, 2016

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. This public comment will add the necessary privacy and safety provisions for this proposal to be approved.

Public Comment 3:

Proponent: Bruce Pitts, representing Self (bhpbhp@yahoo.com) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Plumbing Code

403.2 Separate facilities. Where plumbing fixtures are required, separate facilities shall be provided for each sex.

Exceptions:

1. Separate facilities shall not be required for dwelling units and sleeping units.
2. Separate facilities shall not be required in structures or tenant spaces with a total occupant load, including both employees and customers, of 15 or fewer.
3. Separate facilities shall not be required in mercantile *occupancies* in which the maximum occupant load is 100 or fewer.
4. Separate facilities shall not be required in business occupancies in which the maximum occupant load is 25 or fewer.
5. Separate facilities shall not be required to be designated by sex where single-user toilets rooms are provided in accordance with Section 403.1.2.
6. Separate facilities shall not be required ~~where rooms having both~~ for water closets located in floor-to-ceiling compartments, with solid, full-height, lockable doors and occupied indicators identified for use by all genders. Any interior compartment door undercuts shall not exceed 0.5 inch (13 mm). lavatory fixtures are designed for use by both sexes and privacy for water closets are installed in accordance with Section 405.3.4. In all gender toilet rooms containing water closets, lavatories and urinals, urinals that are provided shall be located in an area visually separated from the remainder of the facility, or each urinal that is provided shall be identified and located in a stall compartment by these provisions.

Commenter's Reason: Referencing IPC Section 405.3.4 for privacy could result in partial-height compartments found in separate-sex facilities. All gender facilities solve state bathroom bills, provide potty parity, accommodate opposite-sex parent-caregivers and reduce floor area. Minimum compartment door undercuts are important for privacy and sound attenuation. A door as narrow as 22 inches wide with a 0.5 inch undercut satisfies a 0.08 in wg pressure drop and a 1.5 loss coefficient at maximum 70 CFM exhaust per IMC Table 403.3.1.1. Example of a 22 inch door undercut height = $(70 \text{ CFM}/4005) \times (1.5/.08)^{.5} = 0.078$ square feet x 144 square inches/square feet = 10.9 square inches/22 inch wide door = 0.49 inch high door undercut height, round up to 0.5 inch. Wider doors at this undercut would have even better pressure drop and loss coefficients.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction

One all-gender facility instead of two separate-sex facilities reduces floor area.

Public Comment 4:

Proponent: Bryan Romney, representing selfrequests As Modified by This Public Comment.

Further modify as follows:

Commenter's Reason: Approve as modified by this Public Comment.

The IBC and IPC and other legacy codes have for many years prescribed the requirements for multi-stall toilet facilities for male and female. The expectation of separate facilities for male and female has long been accepted by the public and code officials as a point of law and even civil rights. Recent changes to this expectation have prompted this proposed code change which could be adopted in the IPC and ultimately in the IBC for All-Inclusive multi-stall toilet facilities. However, this issue is not a building or plumbing code issue, it is more appropriately a civil rights issue which should be decided in the judicial system, public referendum, state law, ordinance, or whatever mechanism is recognized by the jurisdiction to establish legal and defensible and constitutional law. The language of this proposed code change does not stipulate whether action by the code official to allow Exception #2 is legal and constitutional which honors the civil rights of all people. The proposed code change would put at risk the actions by the jurisdiction, permit applicant and potentially those involved in the design and construction of an all-inclusive toilet facility without first having been vetted by the public and deemed law for the city, county, state or other jurisdictional areas governed by the IBC and IPC.

For example, if an all-inclusive toilet facility was constructed and a segment of the public decided that this facility was a violation of privacy and was an act of discrimination of their civil rights and legal action ensued, without the due process of law to vet this type of facility as legal and adopted as law, this all-inclusive toilet facility and the actions by those who approved and built it would be at risk of legal action. Other potential objections which could prompt such legal challenges are those who question the impact of all-inclusive toilet facilities on children (Group E Occupancies) for age groups kindergarten through the 12th grade, the lack of privacy in the sink area, sanitation of the water closets in the stalls used by both men and women, or the action by jurisdictions to require all-inclusive toilet rooms in places of worship or other public buildings. There is no language in this proposed code change which restricts a jurisdiction from required compliance to Exception #2 at will for all or certain occupancies.

Additionally, the proponent in the Reason statement does not include reasons for all-inclusive bathrooms or restrooms. It is unclear as to the intent of the proponent to not include the reasons. There are no proposed code changes for all-inclusive bathrooms only toilet facilities. If there is a proposed code change for bathrooms to be designed as all-inclusive facilities, then the same reasons as described above apply and must be considered for disapproval.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The cost impact shown in the original proposed code change is not accurate. The cost impact by the proposed code change is significantly more when compared to the cost of a typical toilet room. The proposed All-Inclusive Toilet Room would require the construction of separate stalls for water closets and urinals. This construction would require floor to ceiling walls and doors which will need finishes which are durable and waterproof in accordance with IBC section 1210.2.2. The partition construction of each stall would be a custom installation as compared to a manufactured metal compartment system currently used. The door for each stall would need to be a type of door and frame which has acoustic features not required currently. The individual stalls proposed for All-Inclusive Toilet Rooms will require individual HVAC systems and Individual Lighting systems. These requirements under the current code requirements are significantly less when compared to potential design solutions for the All-Inclusive toilet room proposal. Without further assessment of the cost impact, it is unknown the potential cost impact to these types of projects.

Public Comment 5:

Proponent: Jason Phelps, representing Self (jason.phelps@hillsboro-oregon.gov) requests Disapprove.

Commenter's Reason: This proposal allows men and women to share a restroom with multiple stalls without any additional privacy requirements. This will create a very unsafe and uncomfortable environment, especially for women and children.

I think gender neutral restrooms are great and should be limited to single user restrooms only. We do not need men to have access to the women's restroom and I think that has been demonstrated in the few cases this has been tried already.

Also, this practice is not currently being done widespread in Europe as so easily claimed by the proponent. Lastly, I was at the code hearings and I can tell you the committee was not prepared to vote on this issue. One committee member even asked staff why this was not in the IBC general committee.

I urge your disapproval on this issue.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction.

Disapproval of this proposal will not cause the code to require anything more or less than it does now.

Public Comment 6:

Proponent: Bryan Romney, representing self requests Disapprove.

Commenter's Reason: Move to Disapprove

The IBC and IPC and other legacy codes have for many years prescribed the requirements for multi-stall toilet facilities for male and female. The expectation of separate facilities for male and female has long been accepted by the public and code officials as a point of law and even civil rights. Recent changes to this expectation have prompted this proposed code change which could be adopted in the IPC and ultimately in the IBC for All-Inclusive multi-stall toilet facilities.

However, this issue is not a building or plumbing code issue, it is more appropriately a civil rights issue which should be decided in the judicial system, public referendum, state law, ordinance, or whatever mechanism is recognized by the jurisdiction to establish legal and defensible and constitutional law. The language of this proposed code change does not stipulate whether action by the code official to allow Exception #2 is legal and constitutional which honors the civil rights of all people. The proposed code change would put at risk the actions by the jurisdiction, permit applicant and potentially those involved in the design and construction of an all-inclusive toilet facility without first having been vetted by the public and deemed law for the city, county, state or other jurisdictional areas governed by the IBC and IPC.

For example, if an all-inclusive toilet facility was constructed and a segment of the public decided that this facility was a violation of privacy and was an act of discrimination of their civil rights and legal action ensued, without the due process of law to vet this type of facility as legal and adopted as law, this all-inclusive toilet facility and the actions by those who approved and built it would be at risk of legal action. Other potential objections which could prompt such legal challenges are those who question the impact of all-inclusive toilet facilities on children (Group E Occupancies) for age groups kindergarten through the 12th grade, the lack of privacy in the sink area, sanitation of the water closets in the stalls used by both men and women, or the action by jurisdictions to require all-inclusive toilet rooms in places of worship or other public buildings. There is no language in this proposed code change which restricts a jurisdiction from required compliance to Exception #2 at will for all or certain occupancies.

Additionally, the proponent in the Reason statement does not include reasons for all-inclusive bathrooms or restrooms. It is unclear as to the intent of the proponent to not include the reasons. There are no proposed code changes for all-inclusive bathrooms only toilet facilities. If there is a proposed code change for bathrooms to be designed as all-inclusive facilities, then the same reasons as described above apply and must be considered for disapproval.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction.

The cost impact shown in the original proposed code change is not accurate. The cost impact by the proposed code change is significantly more when compared to the cost of a typical toilet room. The proposed All-Inclusive Toilet Room would require the construction of separate stalls for water closets and urinals. This construction would require floor to ceiling walls and doors which will need finishes which are durable and waterproof in accordance with IBC section 1210.2.2. The partition construction of each stall would be a custom installation as compared to a manufactured metal compartment system currently used. The door for each stall would need to be a type of door and frame which has acoustic features not required currently. The individual stalls proposed for All-Inclusive Toilet Rooms will require individual HVAC systems and Individual Lighting systems. These requirements under the current code requirements are significantly less when compared to potential design solutions for the All-Inclusive toilet room proposal. Without further assessment of the cost impact, disapproval of this proposed change should be reason enough for disapproval.

P15-18

P17-18

IPC: 403.2 (IBC [P]2902.2)

Proposed Change as Submitted

Proponent: James P. Colgate, Esq., RA, CFM, Bryan Cave LLP, representing National Center for Transgender Equality (James.Colgate@bryancave.com); David Collins, representing The American Institute of Architects (dcollins@preview-group.com)

2018 International Plumbing Code

Revise as follows

403.2 Separate facilities. Where plumbing fixtures are required, separate facilities shall be provided for each sex.

Exceptions:

1. Separate facilities shall not be required for dwelling units and sleeping units.
2. Separate facilities shall not be required in structures or tenant spaces with a total occupant load, including both employees and customers, of 15 or fewer.
3. Separate facilities shall not be required in mercantile *occupancies* in which the maximum occupant load is 100 or fewer.
4. Separate facilities shall not be required in business occupancies in which the maximum occupant load is 25 or fewer.
5. Separate facilities shall not be required where all water closet compartments are provided with partitions, including the doors thereto, that extend to the floor and to the ceiling.

Reason: Colleges across the United States, private businesses, membership clubs, and many establishments throughout Europe have adopted an alternative design for bathroom and toilet facilities that removes the requirement that such facilities be designated for use by a specific sex. This design has proven to be useful, effective, and economical. NCTE's proposal would give designers the option of group toilet rooms regardless of sex, as long as each stall has partitions on all four sides that extend to the floor. Partitions ensure that the user's privacy is maintained. This proposal is advantageous because the partitions remove the embarrassment that many people face in a shared restroom facility. Additionally, group toilet facilities promote shorter wait times for the restroom and waste less space on a general bathroom waiting area.

This proposal also shares many of the benefits the Membership intended when they adopted P40-15, Public Comment 2. Specifically, grouped toilet facilities mitigate the anxiety transgender individuals experience when they are required to use the bathroom that does not match their identity. Allowing designers to construct gender-neutral toilet facilities will save proprietors time, money, and space without having to construct two identical bathrooms for each sex.

It should be noted that this proposal does not trigger compliance with Exception 2 of Section 1109.2 of the *International Building Code*, which requires that 50% of single-user toilet or bathing rooms clustered in a single location be accessible. Section 1109.2.1.2 of the *International Building Code* defines "toilet room" to include a water closet and a lavatory. Under NCTE's proposed design scheme, the partitioned stalls need not contain sinks or wash basins, and would therefore be treated as ordinary toilet compartments and subject to the 5% rule of Section 1109.2.2 of the *International Building Code*.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The same numbers of fixtures are still required and waiting time will be reduced by allowing any sex to use the available toilet stalls. Further, the general waiting area and space required for two facilities will not be necessary in places with this design option. While that may save a small cost, an additional cost may be expended to create partitions on all four sides that extend to the floor.

Analysis: Duplicated text in the International Building Code is not shown for brevity.

P17-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The Committee preferred P16-18 for handling the topic. (Vote:14-0)

Assembly Action:

None

P17-18

Individual Consideration Agenda

Public Comment 1:

Proponent: James Colgate, representing National Center for Transgender Equality (james.colgate@bryancave.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

403.2 Separate facilities. Where plumbing fixtures are required, separate facilities shall be provided for each sex.

Exceptions:

1. Separate facilities shall not be required for dwelling units and sleeping units.
2. Separate facilities shall not be required in structures or tenant spaces with a total occupant load, including both employees and customers, of 15 or fewer.
3. Separate facilities shall not be required in mercantile *occupancies* in which the maximum occupant load is 100 or fewer.
4. Separate facilities shall not be required in business occupancies in which the maximum occupant load is 25 or fewer.
5. Separate facilities shall not be required where all water closet compartments are provided with partitions, including the doors thereto, that extend to the floor and to the ceiling, with no gaps between the doors and partitions. Urinals shall be located in a room separated from the remainder of the facility or each urinal that is provided shall be located in a compartment equivalent to those required for water closets.

Commenter's Reason: This change seeks to eliminate the requirement that separate facilities are required in grouped toilet facilities and to permit an alternative design option. Colleges across the United States, private businesses, membership clubs and many establishments throughout Europe already offer this design, which has proven to be useful, effective and economical. This change would address issues of gender and equality and will address the issue of a person or child needing assistance by a person of a different gender.

Further, this provision addresses privacy concerns that may result from the implementation of gender neutral restrooms. By requiring stalls that are entirely enclosed, each user will experience complete privacy in a gender neutral facility. Further, this provision ensures that urinals are kept private from the remainder of the gender neutral facility, such that anyone not using a urinal would not be exposed to any discomfort.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This change would likely not affect the cost of construction. While cost is decreased by eliminating the duplication of space needed for separate facilities, cost is increased because of the requirement to build larger doors and possibly require separate lighting and ventilation in such stalls. The number of fixtures required would remain the same and waiting time would be reduced by allowing any person to use any available facility.

Public Comment 2:

Proponent: Bryan Romney, representing selfrequests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

403.2 Separate facilities. Where plumbing fixtures are required, separate facilities shall be provided for each sex.

Exceptions:

1. Separate facilities shall not be required for dwelling units and sleeping units.
2. Separate facilities shall not be required in structures or tenant spaces with a total occupant load, including both employees and customers, of 15 or fewer.
3. Separate facilities shall not be required in mercantile *occupancies* in which the maximum occupant load is 100 or fewer.
4. Separate facilities shall not be required in business occupancies in which the maximum occupant load is 25 or fewer.
5. ~~Separate~~ Where adopted by local, state or federal law in the jurisdiction to allow multi-user facilities designed to serve all genders, separate facilities shall not be required where all water closet compartments are provided with partitions, including the doors thereto, that extend to the floor and to the ceiling.

Commenter's Reason: Approved as modified by this Public Comment.

The IBC and IPC and other legacy codes have for many years prescribed the requirements for multi-stall toilet facilities for male and female. The expectation of separate facilities for male and female has long been accepted by the public and code officials as a point of law and even civil rights. Recent changes to this expectation have prompted this proposed code change which could be adopted in the IPC and ultimately in the IBC for All-Inclusive multi-stall toilet facilities. However, this issue is not a building or plumbing code issue, it is more appropriately a civil rights issue which should be decided in the judicial system, public referendum, state law, ordinance, or whatever mechanism is recognized by the jurisdiction to establish legal and defensible and constitutional law. The language of this proposed code change does not stipulate whether action by the code official to allow Exception #5 is legal and constitutional which honors the civil rights of all people. The proposed code change would put at risk the actions by the jurisdiction, permit applicant and potentially those involved in the design and construction of an all-inclusive toilet facility without first having been vetted by the public and deemed law for the city, county, state or other jurisdictional areas governed by the IBC and IPC.

For example, if an all-inclusive toilet facility was constructed and a segment of the public decided that this facility was a violation of privacy and was an act of discrimination of their civil rights and legal action ensued, without the due process of law to vet this type of facility as legal and adopted as law, this all-inclusive toilet facility and the actions by those who approved and built it would be at risk of legal action. Other potential objections which could prompt such legal challenges are those who question the impact of all-inclusive toilet facilities on children (Group E Occupancies) for age groups kindergarten through the 12th grade, the lack of privacy in the sink area, sanitation of the water closets in the stalls used by both men and women, or the action by jurisdictions to require all-inclusive toilet rooms in places of worship or other public buildings. There is no language in this proposed code change which restricts a jurisdiction from required compliance to Exception #5 at will for all or certain occupancies.

Additionally, the proponent in the Reason statement includes bathrooms in addition to restrooms. It is unclear as to the intent of the proponent to include bathrooms. There are no proposed code changes for all-inclusive bathrooms. If there is a proposed code change for bathrooms to be designed as all-inclusive facilities, then the same reasons as described above apply and must be considered for modification.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The cost impact shown in the original proposed code change is not accurate. The cost impact by the proposed code change is significantly more when compared to the cost of a typical toilet room. The proposed All-Inclusive Toilet Room would require the construction of separate stalls for water closets and urinals. This construction would require floor to ceiling walls and doors which will need finishes which are durable and waterproof in accordance with IBC section 1210.2.2. The partition construction of each stall would be a custom installation as compared to a manufactured metal compartment system currently used. The door for each stall would need to be a type of door and frame which has acoustic features not required currently. The individual stalls proposed for All-Inclusive Toilet Rooms will require individual HVAC systems and Individual Lighting systems. These requirements under the current code requirements are significantly less when compared to potential design solutions for the All-Inclusive toilet room proposal. Without further assessment of the cost impact, it is unknown the potential cost impact to these types of projects.

Public Comment 3:

Proponent: Joel Sanders, Joel Sanders Architect, representing Stalled! (jsanders@joelsandersarchitect.com) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Plumbing Code

403.2 Separate facilities. Where plumbing fixtures are required, separate facilities shall be provided for each sex.

Exceptions:

1. Separate facilities shall not be required for dwelling units and sleeping units.
2. Separate facilities shall not be required in structures or tenant spaces with a total occupant load, including both employees and customers, of 15 or fewer.
3. Separate facilities shall not be required in mercantile *occupancies* in which the maximum occupant load is 100 or fewer.
4. Separate facilities shall not be required in business occupancies in which the maximum occupant load is 25 or fewer.
5. Separate facilities shall not be required where all water closet compartments are provided with partitions, including the doors thereto, that extend to not greater than 4 inches above the floor and to not less than the ceiling-7 feet above the floor.

Commenter's Reason: While the 2018 code provisions were modified to allow single user toilets to be counted toward the total number of fixtures required, this change seeks to eliminate the requirement that separate facilities are required in grouped toilet facilities and to permit an alternative design option.

Private establishments in the United States and many establishments throughout Europe already offer gender neutral facilities, which have proven to be useful, effective and economical. This change has a number of advantages. Transgender and gender non-conforming people who do not identify with their gender assigned at birth will not have to choose between two options—men's room and women's room -- that don't align with their identities. By consolidating a greater number of people in one rather than two rooms, there are more eyes to monitor, reducing risk of violence. Most important, gender neutral facilities meet not only the needs of the trans community, but they also accommodate the needs of a wide range of differently embodied subjects of varying ages, genders, and disabilities. For example, it facilitates caregiving between people of different gender expressions. Now a father can accompany his young daughter, or a woman can take her elderly male friend to the restroom.

This change to the code provision seeks to eliminate typical sex-segregated facilities characterized by stalls whose revealing gaps, at floor, ceiling and doors compromise visual privacy. We recommend implementing stalls that extend no more than 4 inches from the floor with a height of at least 7 feet to achieve this privacy.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This change would likely not affect the cost of construction. Cost is decreased by eliminating the duplication of space needed for separate facilities. While fully-enclosed floor-to-ceiling partitions for stalls are preferable, they are slightly more expensive to build because each stall could require individual lighting and ventilation. Therefore, we propose the more economical approach of stall doors with small gaps at floor and ceiling that ensure complete visual privacy, without impacting mechanical and lighting requirements. This will keep costs to a minimum because then easy-to-install, mass-produced partitions can be used, allowing the stalls to continue to share lighting and ventilation. The number of fixtures required would remain the same and waiting time would be reduced by allowing any person to use any available facility.

Public Comment 4:

Proponent: Bryan Romney, representing selfrequests Disapprove.

Commenter's Reason: The IBC and IPC and other legacy codes have for many years prescribed the requirements for multi-stall toilet facilities for male and female. The expectation of separate facilities for male and female has long been accepted by the public and code officials as a point of law and even civil rights. Recent changes to this expectation have prompted this proposed code change which could be adopted in the IPC and ultimately in the IBC for All-Inclusive multi-stall toilet facilities. However, this issue is not a building or plumbing code issue, it is more appropriately a civil rights issue which should be decided in the judicial system, public referendum, state law, ordinance, or whatever mechanism is recognized by the jurisdiction to establish legal and defensible and constitutional law. The language of this proposed code change does not stipulate whether action by the code official to allow Exception #2 is legal and constitutional which honors the civil rights of all people. The proposed code change would put at risk the actions by the jurisdiction, permit applicant and potentially those involved in the design and construction of an all-inclusive toilet facility without first having been vetted by the public and deemed law for the city, county, state or other jurisdictional areas governed by the IBC and IPC. For example, if an all-inclusive toilet facility was constructed and a segment of the public decided that this facility was a violation of privacy and was an act of discrimination of their civil rights and legal action ensued, without the due process of law to vet this type of facility as legal and adopted as law, this all-inclusive toilet facility and the actions by those who approved and built it would be at risk of legal action. Other potential objections which could prompt such legal challenges are those who question the impact of all-inclusive toilet facilities on children (Group E Occupancies) for age groups kindergarten through the 12th grade, the lack of privacy in the sink area, sanitation of the water closets in the stalls used

by both men and women, or the action by jurisdictions to require all-inclusive toilet rooms in places of worship or other public buildings. There is no language in this proposed code change which restricts a jurisdiction from required compliance to Exception #2 at will for all or certain occupancies.

Additionally, the proponent in the Reason statement does not include reasons for all-inclusive bathrooms or restrooms. It is unclear as to the intent of the proponent to not include the reasons. There are no proposed code changes for all-inclusive bathrooms only toilet facilities. If there is a proposed code change for bathrooms to be designed as all-inclusive facilities, then the same reasons as described above apply and must be considered for disapproval.

The proponent's original proposal was disapproved by Committee action. However, there are multiple Public Comments to allow this proposal to be heard in the Public Hearings. This proposal and its other Public Comments must be disapproved for the reasons stated above.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The cost impact shown in the original proposed code change is not accurate. The cost impact by the proposed code change is significantly more when compared to the cost of a typical toilet room. The proposed All-Inclusive Toilet Room would require the construction of separate stalls for water closets and urinals. This construction would require floor to ceiling walls and doors which will need finishes which are durable and waterproof in accordance with IBC section 1210.2.2. The partition construction of each stall would be a custom installation as compared to a manufactured metal compartment system currently used. The door for each stall would need to be a type of door and frame which has acoustic features not required currently. The individual stalls proposed for All-Inclusive Toilet Rooms will require individual HVAC systems and Individual Lighting systems. These requirements under the current code requirements are significantly less when compared to potential design solutions for the All-Inclusive toilet room proposal. Without further assessment of the cost impact, disapproval of this proposed change should be reason enough for disapproval.

P17-18

P22-18 Part I

IBC: 1109.2.1.7

Proposed Change as Submitted

Proponent: Jason Phelps, representing Self (jason.phelps@hillsboro-oregon.gov)

THIS IS A TWO PART CODE CHANGE. BOTH PARTS OF THIS CODE CHANGE WILL BE HEARD BY THE PLUMBING CODE DEVELOPMENT COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

2018 International Building Code

Revise as follows

1109.2.1.7 Privacy. Doors to family or assisted-use toilet and bathing rooms shall be securable from within the room and be provided with an "occupied" indicator.

Reason: This code change proposal will alleviate privacy and safety concerns by requiring the occupied indicator for single user restrooms. Without an occupied indicator, the only way for someone to see if the room is in use is to turn the handle. This causes safety and privacy concerns for the user. This can cause severe discomfort, even fear, for children or people who have suffered trauma. This proposal will proactively provide increased comfort and safety for everyone.

Cost Impact: The code change proposal will increase the cost of construction. Adding the occupied indicator to the already required privacy lock increases the cost of the hardware by no more than a few dollars per door.

P22-18 Part I

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Users will no longer be alarmed by "handle jiggling" by those on the outside checking to see if the door is locked. (Vote:8-6)

Assembly Action:

None

P22-18 Part I

Individual Consideration Agenda

Public Comment 1:

Proponent: Jason Phelps, representing Self (jason.phelps@hillsboro-oregon.gov) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Building Code

1109.2.1.7 Privacy. Doors to family or assisted-use toilet and bathing rooms shall be securable from within the room and be provided with an "occupied" indicator. For Group I-1, I-2, and Group B ambulatory care facilities, the type of means for unlocking such doors from the outside of the room shall be the responsibility of the facility designer.

Commenter's Reason: A concern was brought up by the National Association of Healthcare Facilities during the committee action hearings regarding the privacy lock for single user toilet rooms. The privacy lock has always been required, this code proposal simply adds the occupied indicator and was approved by the committee. This public comment adds an exception for healthcare facilities. I have inspected several hospitals and they are currently being built this way. They have a pull chain near the water closet for emergencies and they have a privacy lock with occupied indicator that is openable by staff in case of emergency. This language is meant to clarify the code to match current building practices.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction as stated in the code proposal, the occupied indicator will increase the cost of construction by a few dollars per door.

P22-18 Part I

P22-18 Part II

IPC: 403.3.7; IBC: 2902.3.7

Proposed Change as Submitted

Proponent: Jason Phelps, representing Self (jason.phelps@hillsboro-oregon.gov)

2018 International Plumbing Code

Add new text as follows

403.3.7 Privacy. Doors to single-user toilet and bathing rooms and family or assisted-use toilet and bathing rooms shall be securable from within the room and be provided with an "occupied" indicator.

2018 International Building Code

2902.3.7 Privacy. Doors to single-user toilet and bathing rooms and family or assisted-use toilet and bathing rooms shall be securable from within the room and be provided with an "occupied" indicator.

Reason: This code change proposal will alleviate privacy and safety concerns by requiring the occupied indicator for single user restrooms. Without an occupied indicator, the only way for someone to see if the room is in use is to turn the handle. This causes safety and privacy concerns for the user. This can cause severe discomfort, even fear, for children or people who have suffered trauma. This proposal will proactively provide increased comfort and safety for everyone.

Cost Impact: The code change proposal will increase the cost of construction. Adding the occupied indicator to the already required privacy lock increases the cost of the hardware by no more than a few dollars per door.

P22-18 Part II

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This would result in a risk to life in healthcare facilities and is an unnecessary increase in the cost of construction. (Vote:8-6)

Assembly Action:

None

P22-18 Part II

Individual Consideration Agenda

Public Comment 1:

Proponent: Jason Phelps, representing Self (jason.phelps@hillsboro-oregon.gov) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Plumbing Code

403.3.7 Privacy. Doors to single-user toilet and bathing rooms and family or assisted-use toilet and bathing rooms shall be securable from within the room and be provided with an "occupied" indicator. For Group I-1, I-2, and Group B ambulatory care facilities, the type of means for unlocking such doors from the outside of the room shall be the responsibility of the facility designer.

2018 International Building Code

2902.3.7 Privacy. Doors to single-user toilet and bathing rooms and family or assisted-use toilet and bathing rooms shall be securable from within the room and be provided with an "occupied" indicator.

Exception: Group I-1, I-2, and Group B ambulatory care facilities are permitted to have a lock that is operable by staff in case of an emergency.

Commenter's Reason: This exception is meant to clarify the code to match current building practices. A concern was brought up by the National Association of Healthcare Facilities during the committee action hearings regarding the privacy lock for single user toilet rooms. The privacy lock has always been required, this code proposal simply adds the occupied indicator and was approved by the committee. This public comment adds an exception for healthcare facilities. I have inspected several hospitals and they are currently being built this way. They have a pull chain near the water closet for emergencies and they have a privacy lock with occupied indicator that is operable by staff in case of emergency. This language is meant to clarify the code to match current building practices.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction as stated in the code proposal adding the occupied indicator will increase the cost by a few dollars per door.

Public Comment 2:

Proponent: John Williams, representing Healthcare Committee (ahc@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

403.3.7 Privacy. ~~Doors~~ Where doors to single-user toilet and room, bathing rooms and family or assisted-use toilet and bathing rooms shall be ~~are~~ securable from within the ~~room and be provided with an "occupied" indicator~~ toilet and bathing room the locking devices shall include an occupied indicator.

Exception: Locking devices shall not be required to have occupied indicators on doors for toilet rooms or bathing room in the following locations:

1. Within individual dwelling or sleeping units.
2. Within a private office.

2018 International Building Code

2902.3.7 Privacy. ~~Doors~~ Where doors to single-user toilet ~~and room,~~ bathing rooms and family or assisted-use toilet and bathing rooms shall be are securable from within the room ~~and be provided with an "occupied" indicator.~~ toilet and bathing room the locking devices shall include an occupied indicator.

Exception: Locking devices shall not be required to have occupied indicators on doors for toilet rooms or bathing room in the following locations:

1. Within individual dwelling or sleeping units.
2. Within a private office.

Commenter's Reason: IBC Section 1209.3.1 Exception 1 requires a lock only on single occupant toilet rooms utilized by the public or employees - therefore, our assumption is that single occupant toilet rooms within apartments, hotel rooms, within private offices, or within a hospital room are not required to have a lock. The original proponent stated that his concerns were for a privacy indicator so that you did not have to knock on the door to see if these rooms are occupied. The revised text would only require the indicator if the door was equipped with a lock. The exception would allow for bathrooms that choose to have locks, such as within a hotel room, to not have to have privacy indicators. This modification will also address the hospital and nursing home concern that bathrooms within a dwelling or sleeping unit (i.e. patient sleeping rooms) are not required to be locked. Within a private office exception will address private bathrooms within doctor's offices.

This public comment is submitted by the ICC Committee on Healthcare (CHC). The CHC was established by the ICC Board to evaluate and assess contemporary code issues relating to healthcare facilities. This is a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. In 2017 and 2018 the CHC held 2 open meetings and numerous conference calls, *which included members of the committees as well as any interested parties, to discuss and debate the proposed changes.* Information on the CHC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CHC effort can be downloaded from the CHC website at: <https://www.iccsafe.org/codes-tech-support/cs/icc-committee-on-healthcare/>.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. However, the modification will limit this requirement to where someone provides a lock on a public bathroom.

P23-18

IPC: 403.6

Proposed Change as Submitted

Proponent: Eirene Knott, BRR Architecture, representing Metropolitan Kansas City Chapter of the ICC
(Eirene.Knott@brrarch.com)

2018 International Plumbing Code

Add new text as follows

403.6 Service sink location. Service sinks shall not be required to be located in individual tenant spaces in a covered mall provided that service sinks are located within a distance of travel of 300 feet (91 m) of the most remote location in the tenant space and not more than one story above or below the tenant space. Service sinks shall be located on an accessible route.

Reason: There were at least two attempts in the 2015/2016/2017 code development cycle to reduce or remove the requirement of a service sink. One proposal was to not require a service sink where the occupant load was 30 or less. The committee felt that raising the occupant threshold and applying that load across the board would result with some occupancies not having a sink but would need the sink for other regulations such as health code requirements. The other proposed code changes came from the PMG CAC adding a new section for service sinks allowing for a service sink to be located in a central core of a building. The committee disapproved that code change because it called for a minimum outlet drain of 3 inches in diameter. The committee felt the 3-inch requirement was overkill and felt the proposed code change also superseded the requirements of Table 403.1.

Despite attempts during the public comment phase where both proposal were approved, both were disapproved in the final action process. Based on the action at the public comment phase, there is an understanding that some small tenant spaces, especially those within a mall, do not need to have the service sink in a readily accessible location. Since both drinking fountains and public toilets are allowed to be within 300 feet of a tenant space in a mall, the same travel distance seems reasonable for access to a service sink. I have opted to have this change apply only to tenants within a covered mall as in some parts of the country it may not be practical for tenants in an outdoor mall to push a mop bucket 300 feet in the snow.

For a small tenant that may not meet footnote e to Table 403.1, the addition of a service sink can take up much needed tenant space, let alone add an additional cost that can negatively impact the tenant space overall. Most small tenants do not need a service sink but knowing that one would be available to them, just like a public restroom and drinking fountain are available within the same travel distances, would provide a sense of security.

Cost Impact: The code change proposal will decrease the cost of construction. This may reduce the cost of construction as each individual tenant would not be required to provide a service sink, reducing the cost of materials needed.

P23-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Transporting water for 300 feet in a mop bucket is going to create a slip hazard. The proposal needs expanded to include the requirement that the tenants have access to the service sink. (Vote:12-2)

Assembly Action:

None

P23-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Eirene Knott, representing Metropolitan Kansas City Chapter of the ICC (eirene.knott@brrarch.com) requests As Submitted.

Commenter's Reason: The committee disapproved this code change citing that transporting water for 300 feet in a mop bucket will create a slip hazard and that tenants need to have access to the service sink. As the code is currently written, small tenants in mall locations would be required to provide a mop sink when the occupant load for a retail store exceeds 15, per Table 403.1, footnote e . Using the square footage for a retail space of 60 square feet per person, that amounts to tenant spaces which are greater than 900 square feet. However, this small tenant space would not be required to provide toilet facilities as Section 403.3.4 allows for tenant spaces in a mall to be within 300 feet of required toilet facilities. There are often times in a retail setting where getting to the toilet facility can be an emergency yet malls are allowed to have up to 300 feet of travel to get to a toilet facility for both employees and the general public.

Why should a tenant space, which can provide toilet facilities within 300 feet, be required to provide a service sink if one is provided within a reasonable distance to the tenant space? If an employee has 300 feet in which to travel to go to the bathroom, that same distance seems reasonable for an employee to be able to access a service sink rather than provide a plumbing fixture that will seldom, if ever, get used.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This may reduce the cost of construction as each individual tenant would not be required to provide a service sink, reducing the cost of materials needed.

P23-18

P24-18

IPC: 404.1, 404.2, 404.3

Proposed Change as Submitted

Proponent: Dawn Anderson, representing self (gonedawning@yahoo.com); Dan Buuck, representing National Association of Home Builders (dbuuck@nahb.org); David Collins, representing the American Institute of Architects (dcollins@preview-group.com); Marsha Mazz, representing U.S. Access Board (mazz@Access-Board.gov); Dominic Marinelli, representing United Spinal Association (DMarinelli@accessibility-services.com)

2018 International Plumbing Code

Revise as follows

404.1 Where required. Accessible plumbing facilities and fixtures shall be provided in accordance with the International Building Code and ICC A117.1.

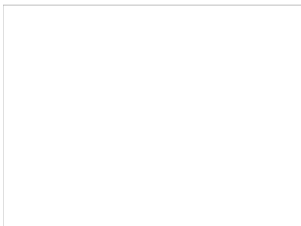
Delete without substitution

~~**404.2 Accessible fixture requirements.** Accessible plumbing fixtures shall be installed with the clearances, heights, spacings and arrangements in accordance with ICC A117.1.~~

~~**404.3 Exposed pipes and surfaces.** Water supply and drain pipes under accessible lavatories and sinks shall be covered or otherwise configured to protect against contact. Pipe coverings shall comply with ASME A112.18.9.~~

Reason: Section 404.2 and 404.3 were added by P42-12. They should be removed for multiple reasons. The reference to IBC would also get a reference to ICC A117.1 in Section 1101.2, however, if there is a concern that this may be missed by plumbing inspectors, the reference can be added in Section 404.1.

In Section 404.2, the laundry list is incomplete on what is required in the A117.1 for accessible plumbing fixtures. Since standards are only referenced to the extent the code sends you there (Section 102.8), this could be misinterpreted as intending to limit requirements that would be applicable in the standard. The requirement for pipe protection is a technical requirement for accessible lavatories, address in A117.1 Section 606.6, so it should not be repeated here. The ASME A112.18.9 standard addresses the requirements for heat transfer, not cold, therefore it only addresses half the issue associated with water, and not all the issues associated with accidental contact. The test for hot water is substantially hotter than tempered water which is required for public lavatories. Also, if the pipes are protected from contact by some type of shield as indicated in the photo, there is no exception for compliance with the standard, even if there is no contact with the pipes. If ASME A112.18.9 should be referenced, this standard should be reviewed through the ICC A117.1 process for technical issues associated with accessibility requirements. It does not belong in the IPC.



Cost Impact: The code change proposal will not increase or decrease the cost of construction. The proposal will eliminate possible conflicts between the IPC and ICC A117.1.

P24-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 404.1 Where required. Accessible plumbing facilities and fixtures shall be provided in accordance with Chapter 11 of the International Building Code and ICC A117.1.

404.2 Accessible fixture requirements. Accessible plumbing fixtures shall be installed in accordance with ICC A117.1.

404.3 Exposed pipes and surfaces. Water supply and drain pipes under accessible lavatories and sinks shall be covered or otherwise configured to protect against contact. Pipe coverings shall comply with ASME A112.18.9.

Committee Reason: For the Modification: Reference standard ASME A112.18.9 needs to be retained for the pipe coverings. The reference to standard A117.1 needs to be retained to point to the information needed for installation. For the Proposal: The Committee agreed with the published reason statement. (Vote:13-0)

Assembly Action:

None

P24-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Dawn Anderson, representing self (gonedawning@yahoo.com); Dan Buuck, representing National Association of Home Builders (dbuuck@nahb.org); David Collins, representing the American Institute of Architects (dcollins@preview-group.com); Dominic Marinelli, representing United Spinal Association (DMarinelli@accessibility-services.com) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Plumbing Code

~~**404.3 Exposed pipes and surfaces.** Water supply and drain pipes under accessible lavatories and sinks shall be covered or otherwise configured to protect against contact. Pipe coverings shall comply with ASME A112.18.9.~~

Commenter's Reason: Section 404.3 should be deleted. The requirement for pipe protection under the accessible lavatory or sink is already stated in ICC A117.1 Section 606.6. ICC A117.1 Section 606.6 also states that there shall be no sharp or abrasive surfaces under the lavatory or sink, so only part of the requirement is in this section. The standard referenced in Section 404.3, ASME A112.18.9, should be deleted. During the testimony it was stated that this standard was proposed to the ICC A117.1 and that they were told that standards are not in ICC A117.1. This is not the case - see Section ICC A117.1 Section 105.2 for a list of standards referenced. The ICC A117.1 committee rejected this standard because the standard only requires testing for hot water. It does not address the issue of accidental contact for sharp edges where someone moving under the sink could suffer cuts or bruises - even though that is stated in the purpose of the standard.

From a technical perspective, the test for hot water is substantially hotter than tempered water which is required for public lavatories - specifically 104 degrees Fahrenheit for 5 hours. What is the justification for this? Also, if the pipes are protected from contact by some type of shield, there is no exception for compliance with the standard, even if there is no possible contact with the pipes. The name of this standard is "Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixture", so this standard is not applicable for shielded locations. See the picture in the original proposal for an example.

Also, P25-18 proposed an additional standard ASTM C1822. The reason statement said the new standard covers all of ASME A112.18.9, so therefore this standard would also be redundant. This group does have a public comment to P25 asking for disapproval.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposal is only clarification that will eliminate potential conflicts between the IPC and ICC A117.1.

P25-18

IPC: 404.3, Chapter 15

Proposed Change as Submitted

Proponent: Howard Ahern, representing Plumberex Speciality Products

2018 International Plumbing Code

Revise as follows

404.3 Exposed pipes and surfaces. Water supply and drain pipes under accessible lavatories and sinks shall be covered or otherwise configured to protect against contact. Pipe coverings shall comply with ASME A112.18.9 or ASTM C1822.

Add new standard(s) follows

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box
C700
West Conshohocken PA 19428-2959
US

C1822-2015:

Standard Specification for Insulating Covers on Accessible Lavatory Piping

Reason: There is a new standard that has been developed specifically for insulating covers over water supply pipes and drain piping under accessible lavatories. The new standard is titled: ASTM C1822-2015 Standard Specification for Insulating covers on Accessible Lavatory Piping. The Standard was developed by the C16.40 Thermal Insulation Systems committee. The new standard covers all of ASME A112.18.9 requirements but is a more comprehensive standard than ASME A112.18.9 and has additional language covering requirements related to restrictions on cable tie fasteners associated with a Federal lawsuit.

This code modification allows both the ASME A112 18.9 standard and would also allow ASTM C1822 compliance. designers are able to comply with either standard. Both standards are needed for these products allowing compliance with either standard will help contractors and inspectors with compliance and identification, while also allowing greater compliance with Department of Justice 2010 Americans with Disability Act standard for Assessable Design Standard 606.5 and ANSI Standard A117.1.

Bibliography: Howard Ahern representing Plumberex Speciality Products.
Member ASME A112. 18.9 standard

Chairman ASTM C1822 Standard Committee

Cost Impact: The code change proposal will not increase or decrease the cost of construction
no cost increase would be associated with this modification

Analysis: A review of the standard proposed for inclusion in the code, ASTM C1822-2015, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P25-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The Committee agreed with the published reason statement. (Vote:14-0)

Assembly Action:

None

P25-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Dawn Anderson, representing self (gonedawning@yahoo.com); Dan Buuck, representing National Association of Home Builders (dbuuck@nahb.org); David Collins, representing the American Institute of Architects (dcollins@preview-group.com); Dominic Marinelli, representing United Spinal Association (DMarinelli@accessibility-services.com)requests Disapprove.

Commenter's Reason: Similar to ASME A122.18.9 address in P24-18, this new standard requires testing at 140 degrees Fahrenheit for 5 hours. What is the 'accessibility' justification for this temperature or this amount of time?

It is not clear what federal lawsuit the reason statement is talking about, but the only requirement is that the insulating cover shall not be "attached by cable tie fasteners, adhesive or adhesive tape" (Section 10.7) This standard also includes requirements for surface burning characteristics (12.1) and rate of burning (12.4). What is the 'accessibility' justification for these requirements? The reason statement says compliance with this standard will not increase cost. Is that based on the code already requires compliance with ASME A112.18.9? While the standard is not considered proprietary, how many products on the market can meet these requirements?

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. The original proposal said adding this additional standard would not be a cost increase. Meeting this additional standard will be a cost increase. Disapproval of this additional standard will remove that increase.

P25-18

P27-18

IPC: 405.3.1

Proposed Change as Submitted

Proponent: Daniel Gleiberman, SLOAN, representing SLOAN (dangleib@gmail.com)

2018 International Plumbing Code

Revise as follows

405.3.1 Water closets, urinals, lavatories and bidets. A water closet, urinal, lavatory or bidet shall not be set closer than 15 inches (381 mm) from its center to any side wall, partition, vanity or other obstruction. ~~Where~~ For water closets, urinals, or bidets, where partitions or other obstructions do not separate adjacent fixtures, fixtures shall not be set closer than 30 inches (762 mm) center to center between adjacent fixtures. There shall be not less than a 21-inch (533 mm) clearance in front of a water closet, urinal, lavatory or bidet to any wall, fixture or door. Water closet compartments shall be not less than 30 inches (762 mm) in width and not less than 60 inches (1524 mm) in depth for floor-mounted water closets and not less than 30 inches (762 mm) in width and 56 inches (1422 mm) in depth for wall-hung water closets.

Exception: An accessible children's water closet shall be set not closer than 12 inches (305 mm) from its center to the required partition or to the wall on one side.

Reason: This code section is a subsection of Section 405 entitled "Installation of Fixtures". This code change proposal clarifies that lavatories must be installed to meet the 15 inch separation from the center of the fixture to any obstruction.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The change clarifies the current code requirement

P27-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The language is not clear as to what is trying to be accomplished. (Vote:13-0)

Assembly Action:

None

P27-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Bradley Corporation (jbenigneer@aol.com); Daniel Gleiberman (dangleib@gmail.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

405.3.1 Water closets, urinals, lavatories and bidets. A water closet, urinal, lavatory or bidet shall not be set closer than 15 inches (381 mm) from its center to any side wall, partition, vanity or other obstruction. ~~For water closets, urinals, or bidets, where~~ Where partitions or other obstructions do not separate adjacent fixtures, ~~water closets, urinals, or bidets, the fixtures shall not be set closer than 30 inches (762 mm) center to center between adjacent fixtures or adjacent water closets, urinals, or bidets.~~ There shall be not less than a 21-inch (533 mm) clearance in front of a water closet, urinal, lavatory or bidet to any wall, fixture or door. Water closet compartments shall be not less than 30 inches (762 mm) in width and not less than 60 inches (1524 mm) in depth for floor-mounted water closets and not less than 30 inches (762 mm) in width and 56 inches (1422 mm) in depth for wall-hung water closets.

Exception:

An accessible children's water closet shall be set not closer than 12 inches (305 mm) from its center to the required partition or to the wall on one side.

Commenter's Reason: I made a commitment to the Plumbing Code Committee that I would correct the proposal and bring it back as a Public Comment. The proponent has good intentions, but the wording was confusing. The sentences being modified was only intended to apply to water closets, bidets, and urinals. The modified text identifies that the requirements only apply to these three fixtures.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This is an editorial clean up of the code change. There is no cost of construction associated with the change.

P27-18

P29-18

IPC: 405.3.6

Proposed Change as Submitted

Proponent: Gary Schenk, City of SeaTac, WA, representing Washington Association of Building Officials (gschenk@ci.seatac.wa.us); Gary Lampella, City of Seatac WA, representing Washington Association of Building Officials TDC (garyl@nwcodeprofessionals.com)

2018 International Plumbing Code

Add new text as follows

405.3.6 Privacy. Public restrooms shall be visually screened from outside entry or exit doors to ensure user privacy within the restroom. This provision shall also apply where mirrors would compromise personal privacy.

Exception: Visual screening shall not be required for single-occupant toilet rooms with lockable doors.

Reason: Although this section currently has provisions for sidewall or partition privacy within the restrooms, it does not address privacy from viewing the user at the fixture from outside the restroom. It also addresses the placement of mirror reflection viewing from the outside.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This is a minor design consideration. It can be addressed at the design stage.

P29-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The Committee agreed with the published reason statement. (Vote:7-6)

Assembly Action:

Disapproved

P29-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Assembly Action requests Disapprove.

Commenter's Reason: This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action. The assembly action for Disapprove was successful by a vote of 60.7% (68) to 39.3% (44) by eligible members online during the period of May 9 - May 23, 2018.

Staff Analysis: Proposal G132-18 was heard by the IPC committee along with P29-18. Proposal G132 modifies the language in IBC Section [P]1209.3 to result in the same requirements that P29-18 is requiring. This public comment was created as a result of a successful floor motion for D. Approval of P29-18 will duplicate, in the IPC, the requirements that will be successfully added (by the consent agenda vote) to the IBC

P29-18

P35-18

IPC: 408.3, Chapter 15

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Bradley Corporation (JBEngineer@aol.com)

2018 International Plumbing Code

Revise as follows

408.3 Bidet water temperature. The discharge water temperature from a bidet fitting shall be limited to not greater than 110°F (43°C). ~~The water temperature shall be regulated by a water temperature heater conforming to ASSE 1084 or by a limiting device conforming to either ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3.~~

Add new standard(s) follows

ASSE

ASSE International
18927 Hickory Creek Drive, Suite
220
Mokena IL 60448

1084-2018:

Performance Requirements for Water Heaters used as Temperature Limiting Devices

Reason: A new standard, ASSE 1084, was developed for water heaters that limit the temperature of hot water similar to an ASSE1070 valve. The standard is comparable to ASSE 10710/ASME A112.1070/CSA B125.7. The water heater cannot produce a temperature of hot water exceeding 120° F. The water heater must be capable of shutting off the supply of hot water when the temperature exceeds the set limit. These water heaters may be installed in the close proximity of the fixtures they serve.

Cost Impact: The code change proposal will decrease the cost of construction. This option may lower the cost of an installation.

Analysis: A review of the standard proposed for inclusion in the code, ASSE 1084 2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P35-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposed standard is not yet complete. (Vote:14-0)

Assembly Action:

None

P35-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Bradley Corporation (JBEngineer@aol.com) requests As Submitted.

Commenter's Reason: At the first hearing, the draft of ASSE 1084 was not submitted on time, nor was the standard complete. The standard has now been completed, hence the change should be approved as submitted.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The result of this change is options for the code user. As such, there is no construction cost impact.

Staff Analysis: In accordance with Section 3.6.3.1 of ICC Council Policy 28, the new referenced standard ASSE 1084-2018 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

Public Comment 2:

Proponent: Conrad Jahrling, representing ASSE International (conrad.jahrling@asse-plumbing.org) requests As Submitted.

Commenter's Reason: As of July 16th, 2018
Status of ASSE 1084-2018: Currently finishing working group discussions. The performance of the device is designed to conform similarly to ASSE 1070 / ASME A112.1070 / CSA B125.70, except with only a cold water inlet. Projected date of completion is Oct 15th.

The ASSE standards development process after standards have completed the open working group is outlined as:

- Ballot the ASSE PSC consensus body for 21 days.
- Resolve comments between commenters, staff, and PSC chair.
- Send to public comment with ANSI for 45-day review. Resolve comments between commenters, staff, and PSC chair.
- Submit to ANSI for review and approval.
- Publish.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
There are alternative devices being proposed to the currently described methods in the text.

Staff Analysis: In accordance with Section 3.6.3.1 of ICC Council Policy 28, the new referenced standard ASSE 1084-2018 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

P35-18

P38-18 Part I

IBC: 202, 1109.5, 2902.7 (New)

Proposed Change as Submitted

Proponent: Jenifer Gilliland, City of Seattle, Washington, representing City of Seattle, Washington
(jenifer.gilliland@seattle.gov)

THIS IS A 2 PART CODE CHANGE. PART I AND PART II WILL BE HEARD BY THE PLUMBING CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

2018 International Building Code

Add new definition as follows

WATER DISPENSER. A plumbing fixture that is manually controlled by the user for the purpose of dispensing potable drinking water into a receptacle such as a cup, glass or bottle. Such fixture is connected to the potable water distribution system of the premises. This definition includes a freestanding apparatus for the same purpose that is not connected to the potable water distribution system and that is supplied with potable water from a container, bottle or reservoir.

Revise as follows

1109.5 ~~Drinking~~ High and low drinking fountains. Where drinking fountains are provided on an exterior site, on a floor or within a secured area, the drinking fountains shall be provided in accordance with Sections 1109.5.1 and 1109.5.2.

1109.5.1 Minimum number. Not fewer than two drinking fountains shall be provided. One drinking fountain shall comply with the requirements for people who use a wheelchair and one drinking fountain shall comply with the requirements for standing persons.

Exceptions:

1. A single drinking fountain with two separate spouts that complies with the requirements for people who use a wheelchair and standing persons shall be permitted to be substituted for two separate drinking fountains.
2. Where drinking fountains are primarily for children's use, drinking fountains for people using wheelchairs shall be permitted to comply with the children's provisions in ICC A117.1 and drinking fountains for standing children shall be permitted to provide the spout at 30 inches (762 mm) minimum above the floor.

1109.5.2 More than the minimum number. Where more than the minimum number of drinking fountains specified in Section 1109.5.1 is provided, 50 percent of the total number of drinking fountains provided shall comply with the requirements for persons who use a wheelchair and 50 percent of the total number of drinking fountains provided shall comply with the requirements for standing persons.

Exceptions:

1. Where 50 percent of the drinking fountains yields a fraction, 50 percent shall be permitted to be rounded up or down, provided that the total number of drinking fountains complying with this section equals 100 percent of the drinking fountains.
2. Where drinking fountains are primarily for children's use, drinking fountains for people using wheelchairs shall be permitted to comply with the children's provisions in ICC A117.1 and drinking fountains for standing children shall be permitted to provide the spout at 30 inches (762 mm) minimum above the floor.

[P] 2902.6 Small occupancies. Drinking fountains shall not be required for an occupant load of 15 or fewer.

Add new text as follows

2902.7 Substitution. Where restaurants provide drinking water in a container free of charge, drinking fountains shall not be required in those restaurants. In other occupancies where more than two drinking fountains are required, water dispensers shall be permitted to be substituted for not more than 50 percent of the required number of drinking fountains.

Reason: Reason for proposal 1:

It is important for both the building official and the plumbing inspector to fully understand the requirements for drinking fountains including when they can be eliminated, switched out, and when high/low drinking fountains are required. Currently, only a portion of the information is available in the IPC and IBC.

The IPC does not have language addressing two important points needed for accessible drinking fountains:

- 1) The IPC doesn't include the requirements found in the IBC that are based on where the fountain is being provided - per floor, per secure area, or outside.
- 2) The IPC doesn't address high/low requirements for three or more drinking fountains.

This proposal adds the relevant sections currently found in IBC to IPC. The changes to the language are editorial for coordination only.

There also appears to be a conflict between the IPC allowing half of the drinking fountains to be switched out starting at two drinking fountains, and the accessibility requirement requiring at least two. Adding "two or more" to the IPC Section 410.4 will eliminate that conflict. This information should be repeated in IBC Chapter 29 along with the information that small occupancies do not have to have drinking fountains.

Reason for proposal 2:

A freestanding apparatus should not be substituted for a drinking fountain. There is nothing to stop a building owner from discontinuing the service or removing the equipment.

Having access to drinking fountains where someone can get water or access to a water dispenser where someone can use their own cup or bottle is important for occupant's health as well as helping our environment by reducing the number of plastic bottles going into the landfill. By eliminating the option to substitute a non-plumbed free standing apparatus containing a reservoir for a drinking fountain, we will also be saving the energy it would have taken to deliver the jugs or containers of water to supply the apparatus.

The water dispenser, which in many installations would be a water bottle filling station, could be plumbed as a separate fixture, combined with the traditional high-low drinking fountain in new equipment, or attached after-the-fact to existing drinking fountains.

Bibliography: [1] (Deirdre Hanners, Grand Canyon National Park's Environmental Specialist)
https://www.nps.gov/grca/playourvisit/refilling_stations.htm

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Cost for proposal 1 -

This is a coordination/clarification of existing requirements in the IBC and the IPC.

Cost for proposal 2 -

Where this option is chosen, a permanent fixture would need to be installed instead of allowing for a portable system. However, there are a variety of options to choose from so the cost to the building owner should be about the same.

Staff Note: In Part I, the intent is for the text in the IPC for the definition of water dispenser and Section 410.4 to be copied verbatim into the IBC as a new definition and new Section 2902.7. The Code Correlation Committee will decide, prior to publication of the codes, whether a scoping designation will be applied to this new definition and new section in the IBC. The title change of IBC Section 1109.5 is only editorial.

P38-18 Part I

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The Committee agreed with the published reason statement. (Vote:14-0)

Assembly Action:

None

P38-18 Part I

Individual Consideration Agenda

Public Comment 1:

Proponent: James Kendzel, representing American Supply Association (jkendzel@asa.net) requests As Modified by This Public Comment.

Modify as follows:

2018 International Building Code

DRINKING FOUNTAIN A plumbing fixture that is connected to the potable water distribution system and the drainage system. The fixture allows the user to obtain a drink directly from a stream of flowing water without the use of any accessories.

Commenter's Reason: The proposed modification is to add the definition of "drinking fountain" from the IPC into the IBC along with the definition for "water dispenser" which is being added to the IBC based on the current proposal. Both terms are used in the current language of the IBC and proposed new text to be added to the IBC in the proposal. The change does not alter the intent of the original proposal but provides a consistency in definition and assurance that the full intent of the IPC language, including applicable definitions, are incorporated into the IBC.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

No cost impact since there is no substantive change to the proposal being suggested but rather an incorporation of applicable definitions already existing in the IPC to ensure consistency.

P38-18 Part I

P38-18 Part II

IPC: 410.3 (New), [BE]410.3, 410.3.2(New), 410.4

Proposed Change as Submitted

Proponent: Jenifer Gilliland, City of Seattle, Washington, representing City of Seattle, Washington (jenifer.gilliland@seattle.gov)

2018 International Plumbing Code

SECTION 202 GENERAL DEFINITIONS

WATER DISPENSER. A plumbing fixture that is manually controlled by the user for the purpose of dispensing potable drinking water into a receptacle such as a cup, glass or bottle. Such fixture is connected to the potable water distribution system of the premises. This definition includes a freestanding apparatus for the same purpose that is not connected to the potable water distribution system and that is supplied with potable water from a container, bottle or reservoir.

SECTION 410 DRINKING FOUNTAINS

410.2 Small occupancies. Drinking fountains shall not be required for an occupant load of 15 or fewer.

Add new text as follows

410.3 High and low drinking fountains. Where drinking fountains are provided on an exterior site, on a floor or within a secured area, the drinking fountains shall be provided in accordance with Sections 410.3.1 and 410.3.2.

Revise as follows

~~**[BE] 410.3 410.3.1 High and low drinking fountains - Minimum number.** Where drinking fountains are required, not fewer than two drinking fountains shall be provided. One drinking fountain shall comply with the requirements for people who use a wheelchair and one drinking fountain shall comply with the requirements for standing persons.~~

Exceptions:

1. A single drinking fountain with two separate spouts that complies with the requirements for people who use a wheelchair and standing persons shall be permitted to be substituted for two separate drinking fountains.
2. Where drinking fountains are primarily for children's use, the drinking fountains for people using wheelchairs shall be permitted to comply with the children's provisions in ICC A117.1 and drinking fountains for standing children shall be permitted to provide the spout at 30 inches (762 mm) minimum above the floor.

Add new text as follows

410.3.2 More than the minimum number. Where more than the minimum number of drinking fountains specified in Section 1109.5.1 is provided, 50 percent of the total number of drinking fountains provided shall comply with the requirements for persons who use a wheelchair and 50 percent of the total number of drinking fountains provided shall comply with the requirements for standing persons.

Exceptions:

1. Where 50 percent of the drinking fountains yields a fraction, 50 percent shall be permitted to be rounded up or down, provided that the total number of drinking fountains complying with this section equals 100 percent of the drinking fountains.

2. Where drinking fountains are primarily for children's use, drinking fountains for people using wheelchairs shall be permitted to comply with the children's provisions in ICC A117.1 and drinking fountains for standing children shall be permitted to provide the spout at 30 inches (762 mm) minimum above the floor.

Revise as follows

410.4 Substitution. Where restaurants provide drinking water in a container free of charge, drinking fountains shall not

be required in those restaurants. In other occupancies where more than two drinking fountains are required, *water dispensers* shall be permitted to be substituted for not more than 50 percent of the required number of drinking fountains.

Reason: Reason for proposal 1:

It is important for both the building official and the plumbing inspector to fully understand the requirements for drinking fountains including when they can be eliminated, switched out, and when high/low drinking fountains are required. Currently, only a portion of the information is available in the IPC and IBC.

The IPC does not have language addressing two important points needed for accessible drinking fountains:

1) The IPC doesn't include the requirements found in the IBC that are based on where the fountain is being provided - per floor, per secure area, or outside.

2) The IPC doesn't address high/low requirements for three or more drinking fountains.

This proposal adds the relevant sections currently found in IBC to IPC. The changes to the language are editorial for coordination only.

There also appears to be a conflict between the IPC allowing half of the drinking fountains to be switched out starting at two drinking fountains, and the accessibility requirement requiring at least two. Adding "two or more" to the IPC Section 410.4 will eliminate that conflict. This information should be repeated in IBC Chapter 29 along with the information that small occupancies do not have to have drinking fountains.

Reason for proposal 2:

A freestanding apparatus should not be substituted for a drinking fountain. There is nothing to stop a building owner from discontinuing the service or removing the equipment.

Having access to drinking fountains where someone can get water or access to a water dispenser where someone can use their own cup or bottle is important for occupant's health as well as helping our environment by reducing the number of plastic bottles going into the landfill. By eliminating the option to substitute a non-plumbed free standing apparatus containing a reservoir for a drinking fountain, we will also be saving the energy it would have taken to deliver the jugs or containers of water to supply the apparatus.

The water dispenser, which in many installations would be a water bottle filling station, could be plumbed as a separate fixture, combined with the traditional high-low drinking fountain in new equipment, or attached after-the-fact to existing drinking fountains.

Bibliography: [1] (Deirdre Hanners, Grand Canyon National Park's Environmental Specialist)
https://www.nps.gov/grca/planyourvisit/refilling_stations.htm

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Cost for proposal 1 -

This is a coordination/clarification of existing requirements in the IBC and the IPC.

Cost for proposal 2 -

Where this option is chosen, a permanent fixture would need to be installed instead of allowing for a portable system. However, there are a variety of options to choose from so the cost to the building owner should be about the same.

Staff note: In Part 2, the intent is for the text in the IBC Section 1109.5, 1109.5.1 and 1109.5.2 to be copied verbatim into the IPC as Sections 410.3, 410.3.1 and 410.3.2 . A [BE] is shown in front of the text to indicate this, however, code committee scoping will be officially determined at a later date. There is a revision to IPC Section 410.4.

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The Committee agreed with the published reason statement. (Vote:14-0)

Assembly Action:

None

P38-18 Part II

P42-18

IPC: 411.3, Chapter 15

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Bradley Corporation (JBEngineer@aol.com)

2018 International Plumbing Code

Revise as follows

411.3 Water supply. Where hot and cold water is supplied to an emergency shower or eyewash station, the temperature of the water supply shall only be controlled by a temperature actuated mixing valve complying with ASSE 1071. Where water is supplied directly to an emergency shower or eyewash station from a water heater, the water heater shall comply with ASSE 1085.

Add new standard(s) follows

ASSE

ASSE International
18927 Hickory Creek Drive, Suite
220
Mokena IL 60448

1085-2018:

Performance Requirements for Water Heaters for Emergency Equipment

Reason: A new standard, ASSE 1085, was developed for water heaters specifically designed for emergency fixtures. The standard is comparable to the valve standard, ASSE 1071. The water heater cannot produce a temperature of hot water exceeding 100° F. The water heater produces water within a minute at the tepid temperature range required for emergency fixtures. These water heaters are typically installed within the close proximity of the emergency fixture. This is an alternative methods for meeting the high flow rates for emergency showers without the need for adding to the hot water demand of the plumbing within the building.

Cost Impact: The code change proposal will decrease the cost of construction. The availability of more options to achieve code compliance usually results in lower construction costs.

Analysis: A review of the standard proposed for inclusion in the code, ASSE 1085-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P42-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: These water heating units are already being successfully used in the indicated application. The standard is necessary to control the manufacturing of these units. (Vote:8-6)

Assembly Action:

None

P42-18

Individual Consideration Agenda

Public Comment 1:

Proponent: CP28 Administration.

Commenter's Reason: The administration of ICC Council Policy 28 (CP28) is not taking a position on this code change. This public comment is being submitted to bring a procedural requirement to the attention of the ICC voting membership. In accordance with Section 3.6.3.1.1 of ICC Council Policy 28 (partially reproduced below), the new referenced standard ASSE 1085-2018 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

(CP28) 3.6.3.1.1 Proposed New Standards. In order for a new standard to be considered for reference by the Code, such standard shall be submitted in at least a consensus draft form in accordance with Section 3.4. If the proposed new standard is not submitted in at least consensus draft form, the code change proposal shall be considered incomplete and shall not be processed. The code change proposal shall be considered at the Committee Action Hearing by the applicable code development committee responsible for the corresponding proposed changes to the code text. If the committee action at the Committee Action Hearing is either As Submitted or As Modified and the standard is not completed, the code change proposal shall automatically be placed on the Public Comment Agenda with the recommendation stating that in order for the public comment to be considered, the new standard shall be completed and readily available prior to the Public Comment Hearing

P42-18

P45-18 Part I

IPC: 412.3, 412.4, Chapter 15

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Bradley Corporation (JBEngineer@aol.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IPC COMMITTEE. PART II WILL BE HEARD BY THE IRC-PLUMBING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

2018 International Plumbing Code

Revise as follows

412.3 Individual shower valves. Individual shower and tub-shower combination valves shall be balanced-pressure, thermostatic or combination balanced-pressure/thermostatic valves that conform to the requirements of ASSE 1016/ASME A112.1016/CSA B125.16 or ASME A112.18.1/CSA B125.1 and shall be installed at the point of use. Shower and tub-shower combination valves required by this section shall be equipped with a means to limit the maximum setting of the valve to 120°F (49°C), which shall be field adjusted. ~~In-line thermostatic valves shall not be utilized for compliance with this section.~~ The means for regulating the maximum temperature shall be by one of following:

1. A field adjustment and setting of the maximum temperature limit means of the shower or tub-shower combination valve in accordance with the manufacturer's instructions.
2. A limiting device conforming to either ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3.
3. A thermostatic mixing valve conforming to ASSE 1017.
4. A water heater conforming to ASSE 1082.
5. A water heater conforming to ASSE 1084.
6. A temperature actuated flow reduction device conforming to ASSE 1062.

412.4 Multiple (gang) showers. Multiple (gang) showers supplied with a single-tempered water supply pipe shall have the water supply for such showers controlled by an *approved* automatic temperature control mixing valve that conforms to ASSE 1069 or CSA B125.3, or each shower head shall be individually controlled by a balanced-pressure, thermostatic or combination balanced-pressure/thermostatic valve that conforms to ~~ASSE 1016/ASME A112.1016/CSA B125.16 or ASME A112.18.1/CSA B125.1 and is installed at the point of use. Such valves shall be equipped with a means to limit the maximum setting of the valve to 120°F (49°C), which shall be field adjusted in accordance with the manufacturers' instructions.~~ complies with Section 412.3.

Add new standard(s) follows

ASSE

ASSE International
18927 Hickory Creek Drive, Suite
220
Mokena IL 60448

1082-18:

Performance Requirements for Water Heaters used as Temperature Control Devices for Hot Water Distribution Systems

1084-2018:

Performance Requirements for Water Heaters used as Temperature Limiting Devices

Reason: The scald prevention requirements for a shower valve are by the requirement for a balanced-pressure, thermostatic or combination balanced-pressure/thermostatic valves. The high temperature limit was originally added to protect children that play hot and cold while taking a shower. This was extended to protecting people who inadvertently turn up the temperature of the shower valve.

The current code only stipulates the setting of the limit stop on the fixture fitting or shower valve, however, other viable means are available for setting the maximum temperature. The other viable means are often superior to setting the limit stop on the fixture fitting.

When the limit stop is adjusted, it is based on the temperature setting of the water heater and the cold water temperature. If the cold water temperature drops, which happens in some areas during the winter months, the setting

temperature drops. If the water heater is increased in temperature, the setting temperature rises. This phenomena does not occur when other means are used to regulate the high temperature.

Section 412.7 already permits the use of a TARF complying with ASSE 1062 for controlling the water temperature discharging from a faucet. Hence, the identification of the standard in this section complements the requirements in Section 412.7.

A thermostatic mixing valve is an effective method of regulating the maximum temperature. The temperature is maintained within a few degrees depending on the flow rate. Scalding temperatures are in excess of this temperature. Other viable means of maintaining the water temperature to a maximum of 120° F are water heater meeting one of the two new standards.

The two new standard for water heaters are ASSE 1082 and ASSE 1084. These water heaters are equivalent to ASSE 1017 and ASSE 1070 respectively. As such, they have the capability of providing an equivalent level of performance as the corresponding mixing valve.

For Section 412.4, there is no need to repeat all of the requirements in Section 412.3. If an individual shower valve is installed in gang showers, the requirements of Section 412.3 automatically apply. The revision merely emphasizes this requirement.

The changes to the Residential Code will make the requirements consistent with the Plumbing Code.

Cost Impact: The code change proposal will decrease the cost of construction. Other options, which may be a lower cost, will be available for setting the maximum temperature.

Analysis: A review of the standards proposed for inclusion in the code, ASSE 1084-2018 and ASSE1082-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P45-18 Part I

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Devices complying with ASSE 1017 and ASSE 1062 do not have the capability to protect against thermal shock. (Vote:11-3)

Assembly Action:

None

P45-18 Part I

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Bradley Corporation (JBEngineer@aol.com) requests As Submitted.

Commenter's Reason: There was confusion regarding the application of the standards specified. Thermal shock protection is provided by the ASSE 1016/ASME A112.1016/CSA B125.16 shower valve. The remaining items merely are used to set the upper temperature limit. Section 412.7 already permits the use of an ASSE 1062 device for upper temperature limit protection. Hence, the Committee statement was inaccurate. The ASSE 1017 device is also only setting the upper temperature limit. That is permitted by the current code. If the maximum water temperature out of the shower valve is less than 120 degrees F, there is no adjustment necessary. The limitation of the hot water temperature is the ASSE 1017 valve.

It must be noted that NEITHER ASSE 1070/ASME A112.1070/CSA B125.70, ASSE 1017, ASSE 1082, ASSE 1084, nor ASSE 1062 are providing thermal shock or scald protection. These devices and water heater are providing upper temperature limits in a shower. There is no change to the protection required by an ASSE 1016/ASME A112.1016/CSA B125.16 shower valve.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This change presents options to the code user. As such, there is no impact to the cost of construction.

Staff Analysis: In accordance with Section 3.6.3.1 of ICC Council Policy 28, the new referenced standards ASSE 1082-2018 and ASSE 1085-2018 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

P45-18 Part I

P45-18 Part II

IRC: P2708.4, Chapter 44

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Bradley Corporation (JBEngineer@aol.com)

2018 International Residential Code

Revise as follows

P2708.4 Shower control valves. Individual shower and tub/shower combination valves shall be equipped with control valves of the pressure-balance, thermostatic-mixing or combination pressure-balance/thermostatic-mixing valve types with a high limit stop in accordance with ASSE 1016/ASME A112.1016/CSA B125.16. ~~The high limit stop A means shall be set provided to limit the water temperature to not greater than 120°F (49°C). In-line thermostatic valves shall not be used for compliance with this section.~~ The means for regulating the maximum temperature shall be by one of the following:

1. A field adjustment and setting of the maximum temperature limit means of the shower or tub-shower combination valve in accordance with the manufacturer's instructions.
2. A limiting device conforming to either ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3.
3. A thermostatic mixing valve conforming to ASSE 1017.
4. A water heater conforming to ASSE 1082.
5. A water heater conforming to ASSE 1084.
6. A temperature actuated flow reduction device conforming to ASSE 1062.

Add new standard(s) follows

ASSE

ASSE International
18927 Hickory Creek Drive, Suite
220
Mokena IL 60448

1082-2018:

Performance Requirements for Water Heaters Used as Temperature Control Devices for Hot Water Distribution Systems.

1084-2018:

Performance Requirements for Water Heaters used as Temperature Limiting Devices

Reason: The scald prevention requirements for a shower valve are by the requirement for a balanced-pressure, thermostatic or combination balanced-pressure/thermostatic valves. The high temperature limit was originally added to protect children that play hot and cold while taking a shower. This was extended to protecting people who inadvertently turn up the temperature of the shower valve.

The current code only stipulates the setting of the limit stop on the fixture fitting or shower valve, however, other viable means are available for setting the maximum temperature. The other viable means are often superior to setting the limit stop on the fixture fitting.

When the limit stop is adjusted, it is based on the temperature setting of the water heater and the cold water temperature. If the cold water temperature drops, which happens in some areas during the winter months, the setting temperature drops. If the water heater is increased in temperature, the setting temperature rises. This phenomena does not occur when other means are used to regulate the high temperature.

Section 412.7 already permits the use of a TARF complying with ASSE 1062 for controlling the water temperature discharging from a faucet. Hence, the identification of the standard in this section complements the requirements in Section 412.7.

A thermostatic mixing valve is an effective method of regulating the maximum temperature. The temperature is maintained within a few degrees depending on the flow rate. Scalding temperatures are in excess of this temperature. Other viable means of maintaining the water temperature to a maximum of 120° F are water heater meeting one of the two new standards.

The two new standard for water heaters are ASSE 1082 and ASSE 1084. These water heaters are equivalent to ASSE 1017 and ASSE 1070 respectively. As such, they have the capability of providing an equivalent level of performance as the corresponding mixing valve.

For Section 412.4, there is no need to repeat all of the requirements in Section 412.3. If an individual shower valve is installed in gang showers, the requirements of Section 412.3 automatically apply. The revision merely emphasizes this requirement.

The changes to the Residential Code will make the requirements consistent with the Plumbing Code.

Cost Impact: The code change proposal will decrease the cost of construction. Other options, which may be a lower cost, will be available for setting the maximum temperature.

Analysis: A review of the standard proposed for inclusion in the code, ASSE 1082-2018 and ASSE 1084-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: ASSE 1082 is not yet completed. (Vote:10-0)

Assembly Action:

None

P45-18 Part II

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Bradley Corporation (JBEngineer@aol.com) requests As Submitted.

Commenter's Reason: At the first hearing, ASSE 1082 was not completed. The standard has been finalized. Based on the original supporting statement, the change should be accepted.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This change presents options to the code user. As such, there is no impact to the cost of construction.

Staff Analysis: In accordance with Section 3.6.3.1 of ICC Council Policy 28, the new referenced standards ASSE 1082-2018 and ASSE 1085-2018 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

P45-18 Part II

P46-18 Part II

IRC: P2708.4

Proposed Change as Submitted

Proponent: Pennie Feehan, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (PMGCAC@iccsafe.org)

2018 International Residential Code

Revise as follows

P2708.4 Shower control valves. Individual shower and tub/shower combination valves shall be equipped with control valves of the pressure-balance, thermostatic-mixing or combination pressure-balance/thermostatic-mixing valve types with a high limit stop in accordance with ASSE 1016/ASME A112.1016/CSA B125.16. Shower control valves shall be rated for the flow rate of the installed showerhead. The high limit stop shall be set to limit the water temperature to not greater than 120°F (49°C). In-line thermostatic valves shall not be used for compliance with this section.

Reason: The thermal protection afforded by shower valves can be compromised if the flow rate of the showerhead is less than the flow rate for which the protective components of the valve have been designed. The proposed text is consistent with similar requirements found in ASSE 1016/ASME A112.1016/CSA B125.16 and ASME A112.18.1/CSA B125.1. As manufacturers continue to innovate with more water- and energy-efficient showerheads, this proposal is needed to ensure that new buildings built to the code will safely accommodate the showerheads selected by the designer or builder. Note that this language does not require that the showerhead itself have a flow rate of less than 2.5 gpm, but simply that the flow rating of the shower valve matches the flow rate of the installed showerhead to provide the scald and thermal shock protection required by the recognized standard when the valve model is tested. Note that the 2012 Uniform Plumbing Code, Section 408.3, contains a similar requirement for 'matching' the valve and showerhead flow rates as follows:

"Showers and tub-shower combinations shall be provided with individual control valves of the pressure balance, thermostatic, or combination pressure balance/thermostatic mixing valve type that provide scald and thermal shock protection for the rated flow of the installed showerhead."

The IPC and IRC should be no less protective of health and safety than the UPC.

This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). The PMG CAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance the International Codes or portions thereof that were under the purview of the PMG CAC. In 2017 the PMG CAC held one face-to-face meeting and 11 conference call meetings. Numerous interested parties attended the committee meetings and offered their input.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Adoption of this proposal will have no effect on the cost of construction, because it calls for the installation of showerheads and shower mixing valves that are compatible, rather than calling for the installation of a particular showerhead or shower control valve that might carry a cost premium. Care in specification and installation is required, not a special product or special installation technique. As noted above, the proposal does not require that the showerhead itself have a flow rate of less than 2.5 gpm, and compliance can be achieved with minimally compliant valves and showerheads. If an architect or builder chooses to install a more efficient showerhead with a lower flow rate, there are control valves available at moderate price points that can accommodate the builder's decision.

P46-18 Part II

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: In residential settings, for a variety of reasons, the builder-supplied original showerheads are often replaced by the building occupants soon after initial occupancy of the building. Knowing this fact, the proposed requirement doesn't effectively provide for any real added level of safety after these types of buildings are occupied. (Vote:5-4)

Assembly Action:

None

P46-18 Part II

Individual Consideration Agenda

Public Comment 1:

Proponent: Pennie Feehan, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (pmgcac@iccsafe.org)requests As Submitted.

Commenter's Reason: The committee felt that there was no benefit in this safety requirement because the occupants would likely replace the originally installed showerhead. While that may be true, this can be said about any safety provision in the entire code. Homeowners can always undo, tamper with or eliminate any safety device or installation and that is completely out of the control of the code official and the builder. The builder makes sure that the properly rated shower head and control valve combination is installed and the code official inspects for such. The installation is safe when the owners move into the house. What happens to the shower head after that is beyond the control of the builder and code official. It is important for the code to state the proposed safety requirement for the initial installation, but is also important to advise those that change the controls and shower heads in the future. If the homeowner created a hazard by changing the original shower head, and an injury resulted, the code would be stating that the what the home owner did was a violation, thereby relieving the builder of liability.

The proposed text is necessary for safeguarding public health and safety, and is consistent with similar requirements found in industry standards (ASSE 1016/ASME A112.1016/CSA B125.16 and ASME A112.18.1/CSA B125.1). Furthermore, manufacturers are already marking control valve packaging to indicate the rated flow rate of the showerhead to be used and showerhead packaging to indicate the rated flow rate of the control valve to be used. Therefore, the requirement is enforceable.

This public comment is submitted by the ICC PMGCAC. CAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 and 2018 the PMGCAC has held one face-to-face meeting and 11 conference call meetings which included members of the committee as well as any interested party to discuss and debate the proposed changes and public comments. Related documentation and reports are posted on the PMGCAC website at: <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/pmg-code-action-committee-pmgcac/>.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Adoption of this proposal will have no effect on the cost of construction, because it calls for the installation of showerheads and shower mixing valves that are compatible, rather than calling for the installation of a particular showerhead or shower control valve that might carry a cost premium. Care in specification and installation is required, not a special product or special installation technique. As noted above, the proposal does not require that the showerhead itself have a flow rate of less than 2.5 gpm, and compliance can be achieved with minimally compliant valves and showerheads. If an architect or builder chooses to install a more efficient showerhead with a lower flow rate, there are control valves available at moderate price points that can accommodate the builder's decision.

Public Comment 2:

Proponent: Ed Osann, representing Natural Resources Defense Council (eosann@nrdc.org)requests As Submitted.

Commenter's Reason: The IRC-Plumbing Committee erred by turning down this proposal even as the IPC Committee approved the same language. The proposal was offered by the PMG CAC to ensure that showers would be safely operated in the as-built condition, by ensuring that the rated flow of a shower mixing valve is adequate to provide thermal protection at the flow rate of the showerhead being installed. The IRC-Plumbing Committee strayed into speculation about after-occupancy changes in showerheads. But occupants can make many, many changes to a building in future years that might render it less safe or even unsafe, and yet the codes covering new construction and major renovation seek to

make new buildings as safe as reasonably possible. This provision addresses the need for a newly installed shower to operate safely. The fact that other steps may be needed to better inform consumers about shower safety does not negate in any way the value and purpose of this proposal as submitted -- as was concluded by the IPC Committee looking at the same proposal.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Adoption of this proposal will have no effect on the cost of construction, because it calls for the installation of showerheads and shower mixing valves that are compatible, rather than calling for the installation of a particular showerhead or shower control valve that might carry a cost premium. Care in specification and installation is required, not a special product or special installation technique.

P46-18 Part II

P46-18 Part I

IPC: 412.3, 412.4

Proposed Change as Submitted

Proponent: Pennie Feehan, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (PMGCAC@iccsafe.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IPC COMMITTEE. PART II WILL BE HEARD BY THE IRC-PLUMBING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

2018 International Plumbing Code

Revise as follows

412.3 Individual shower valves. Individual shower and tubshower combination valves shall be balanced-pressure, thermostatic or combination balanced-pressure/thermostatic valves that conform to the requirements of ASSE 1016/ASME A112.1016/CSA B125.16 or ASME A112.18.1/CSA B125.1 and shall be installed at the point of use. Shower control valves shall be rated for the flow rate of the installed showerhead. Shower and tub-shower combination valves required by this section shall be equipped with a means to limit the maximum setting of the valve to 120°F (49°C), which shall be field adjusted in accordance with the manufacturer's instructions. In-line thermostatic valves shall not be utilized for compliance with this section.

412.4 Multiple (gang) showers. Multiple (gang) showers supplied with a single-tempered water supply pipe shall have the water supply for such showers controlled by an *approved* automatic temperature control mixing valve that conforms to ASSE 1069 or CSA B125.3, or each shower head shall be individually controlled by a balanced-pressure, thermostatic or combination balanced-pressure/thermostatic valve that conforms to ASSE 1016/ASME A112.1016/CSA B125.16 or ASME A112.18.1/CSA B125.1 and is installed at the point of use. Where a showerhead is individually controlled, shower control valves shall be rated for the flow rate of the installed showerhead. Such valves shall be equipped with a means to limit the maximum setting of the valve to 120°F (49°C), which shall be field adjusted in accordance with the manufacturers' instructions.

Reason: The thermal protection afforded by shower valves can be compromised if the flow rate of the showerhead is less than the flow rate for which the protective components of the valve have been designed. The proposed text is consistent with similar requirements found in ASSE 1016/ASME A112.1016/CSA B125.16 and ASME A112.18.1/CSA B125.1. As manufacturers continue to innovate with more water- and energy-efficient showerheads, this proposal is needed to ensure that new buildings built to the code will safely accommodate the showerheads selected by the designer or builder. Note that this language does not require that the showerhead itself have a flow rate of less than 2.5 gpm, but simply that the flow rating of the shower valve matches the flow rate of the installed showerhead to provide the scald and thermal shock protection required by the recognized standard when the valve model is tested. Note that the 2012 Uniform Plumbing Code, Section 408.3, contains a similar requirement for 'matching' the valve and showerhead flow rates as follows:

"Showers and tub-shower combinations shall be provided with individual control valves of the pressure balance, thermostatic, or combination pressure balance/thermostatic mixing valve type that provide scald and thermal shock protection for the rated flow of the installed showerhead."

The IPC and IRC should be no less protective of health and safety than the UPC.

This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). The PMG CAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance the International Codes or portions thereof that were under the purview of the PMG CAC. In 2017 the PMG CAC held one face-to-face meeting and 11 conference call meetings. Numerous interested parties attended the committee meetings and offered their input.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Adoption of this proposal will have no effect on the cost of construction, because it calls for the installation of showerheads and shower mixing valves that are compatible, rather than calling for the installation of a particular showerhead or shower control valve that might carry a cost premium. Care in specification and installation is required, not a special product or special installation technique. As noted above, the proposal does not require that the showerhead

itself have a flow rate of less than 2.5 gpm, and compliance can be achieved with minimally compliant valves and showerheads. If an architect or builder chooses to install a more efficient showerhead with a lower flow rate, there are control valves available at moderate price points that can accommodate the builder's decision.

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: Showerhead and shower valve flow rates are already being coordinated when new shower valves are installed. (Vote:9-5)

Assembly Action:

None

P46-18 Part I

P48-18 Part I

IPC: 412.5, Chapter 15

Proposed Change as Submitted

Proponent: Misty Guard, representing Bradley Corporation (Misty.Guard@bradleycorp.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IPC COMMITTEE. PART II WILL BE HEARD BY THE IRC-PLUMBING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

2018 International Plumbing Code

Revise as follows

412.5 Bathtub and whirlpool bathtub valves. The *hot water* supplied to bathtubs and whirlpool bathtubs shall be limited to not greater than 120°F (49°C) by a water-temperature limiting device that conforms to ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3 or by a water heater complying with ASSE 1082 or ASSE 1084, except where such protection is otherwise provided by a combination tub/shower valve in accordance with Section 412.3.

Add new standard(s) follows

ASSE

ASSE International
18927 Hickory Creek Drive, Suite
220
Mokena IL 60448

1084-2018:

Performance Requirements for Water Heaters used as Temperature Limiting Devices

1082-2018:

Performance Requirements for Water Heaters Used as Temperature Control Devices for Hot Water Distribution Systems.

Reason: There are two new standards for water heaters, ASSE 1082 and ASSE 1084. These water heaters are equivalent to ASSE 1017 and ASSE 1070 respectively. As such, they have the capability of providing an equivalent level of performance as the currently listed water-temperature limiting device.

Water heaters complying with either one of these standards can provide tempered water within a range of a few degrees depending on the flow rate. The temperature range is similar to the allowable temperature range for an ASSE 1070/ASME A112.1070/CSA B125.70 device. The two new standard for water heaters are ASSE 1082 and ASSE 1084. These water heaters are equivalent to ASSE 1017 and ASSE 1070 respectively. As such, they have the capability of providing an equivalent level of performance as the corresponding mixing valve.

Bibliography: 1082-2017 Performance Requirements for Water Heaters used as Temperature Control Devices for Hot Water Distribution Systems 412.5
1084-2017 Performance Requirements for Water Heaters used as Temperature Limiting Devices 412.5

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The code change proposal will not increase or decrease the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, ASSE 1084-2018 and ASSE1082-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P48-18 Part I

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: These devices are already being successfully used. Including a standard in the code will make these devices safer. (Vote:8-7, Chair voted)

Assembly Action:

None

P48-18 Part I

Individual Consideration Agenda

Public Comment 1:

Proponent: CP28 Administration.

Commenter's Reason: The administration of ICC Council Policy 28 (CP28) is not taking a position on this code change. This public comment is being submitted to bring a procedural requirement to the attention of the ICC voting membership. In accordance with Section 3.6.3.1.1 of ICC Council Policy 28 (partially reproduced below), the new referenced standards ASSE 1082-2018 and ASSE 1084-2018 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

(CP28) 3.6.3.1.1 Proposed New Standards. In order for a new standard to be considered for reference by the Code, such standard shall be submitted in at least a consensus draft form in accordance with Section 3.4. If the proposed new standard is not submitted in at least consensus draft form, the code change proposal shall be considered incomplete and shall not be processed. The code change proposal shall be considered at the Committee Action Hearing by the applicable code development committee responsible for the corresponding proposed changes to the code text. If the committee action at the Committee Action Hearing is either As Submitted or As Modified and the standard is not completed, the code change proposal shall automatically be placed on the Public Comment Agenda with the recommendation stating that in order for the public comment to be considered, the new standard shall be completed and readily available prior to the Public Comment Hearing

P48-18 Part I

P48-18 Part II

IRC: P2713.3, Chapter 44

Proposed Change as Submitted

Proponent: Misty Guard, representing Bradley Corporation (Misty.Guard@bradleycorp.com)

2018 International Residential Code

Revise as follows

P2713.3 Bathtub and whirlpool bathtub valves. Hot water supplied to bathtubs and whirlpool bathtubs shall be limited to a temperature of not greater than 120°F (49°C) by a water-temperature limiting device that conforms to ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3 or by a water heater complying with ASSE 1082 or ASSE 1084, except where such protection is otherwise provided by a combination tub/shower valve in accordance with Section P2708.4.

Add new standard(s) follows

ASSE

ASSE International
18927 Hickory Creek Drive, Suite
220
Mokena IL 60448

1084-2018:

Performance Requirements for Water Heaters used as Temperature Limiting Devices

1082-2018:

Performance Requirements for Water Heaters Used as Temperature Control Devices for Hot Water Distribution Systems.

Reason: There are two new standards for water heaters, ASSE 1082 and ASSE 1084. These water heaters are equivalent to ASSE 1017 and ASSE 1070 respectively. As such, they have the capability of providing an equivalent level of performance as the currently listed water-temperature limiting device.

Water heaters complying with either one of these standards can provide tempered water within a range of a few degrees depending on the flow rate. The temperature range is similar to the allowable temperature range for an ASSE 1070/ASME A112.1070/CSA B125.70 device. The two new standard for water heaters are ASSE 1082 and ASSE 1084. These water heaters are equivalent to ASSE 1017 and ASSE 1070 respectively. As such, they have the capability of providing an equivalent level of performance as the corresponding mixing valve.

Bibliography: 1082-2017 Performance Requirements for Water Heaters used as Temperature Control Devices for Hot Water Distribution Systems P2713.3
1084-2017 Performance Requirements for Water Heaters used as Temperature Limiting Devices P2713.3

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The code change proposal will not increase or decrease the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, ASSE 1084-2018 and ASSE1082-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P48-18 Part II

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: ASSE 1082 is not yet completed. ASSE 1084 was submitted only in draft form. (Vote:10-0)

Assembly Action:

None

P48-18 Part II

P50-18 Part I

IPC: 412.5, Chapter 15

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Bradley Corporation (JBEngineer@aol.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IPC COMMITTEE. PART II WILL BE HEARD BY THE IRC-PLUMBING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

2018 International Plumbing Code

Revise as follows

412.5 Bathtub and whirlpool bathtub valves. The hot water supplied to bathtubs and whirlpool bathtubs shall be limited to not greater than 120°F (49°C) ~~by a The water temperature limiting device that conforms~~ temperature shall be regulated by one of the following:

1. A limiting device conforming to ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3,
2. A thermostatic mixing valve conforming to ASSE 1017.
3. A water heater conforming to ASSE 1082.
4. A water heater conforming to ASSE 1084.

Exception: ~~except~~ Water temperature regulation by one of the items indicated in this section shall not be required where such regulation is ~~Where such protection is otherwise provided by a combination tub/shower valve in accordance with Section 412.3.~~

Add new standard(s) follows

ASSE

ASSE International
18927 Hickory Creek Drive, Suite
220
Mokena IL 60448

1084-2018:

Performance Requirements for Water Heaters used as Temperature Limiting Devices

1082-2018:

Performance Requirements for Water Heaters Used as Temperature Control Devices for Hot Water Distribution Systems.

Reason: The requirement for regulating the maximum temperature of water for bathtubs and whirlpool bathtub is a scald prevention requirement. The current code allows the use of a device complying with ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3. This change identifies other viable methods of controlling the temperature of the hot water. e identification of the standard in this section complements the requirements in Section 412.7.

A thermostatic mixing valve is an effective method of regulating the maximum temperature. The temperature is maintained within a few degrees depending on the flow rate. Scalding temperatures are in excess of this temperature. Other viable means of maintaining the water temperature to a maximum of 120° F are water heater meeting one of the two new standards.

The two new standard for water heaters are ASSE 1082 and ASSE 1084. These water heaters are equivalent to ASSE 1017 and ASSE 1070 respectively. As such, they have the capability of providing an equivalent level of performance as the corresponding mixing valve.

The change to the Residential Code will make the requirements consistent with the Plumbing Code.

Cost Impact: The code change proposal will decrease the cost of construction. The options may result in lower costs.

Analysis: A review of the standards proposed for inclusion in the code, ASSE 1084-2018 and ASSE1082-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: It is known that ASSE 1017 valves have a problem with temperature creep. The ASSE 1082 standard does not address the potential for temperature creep. (Vote:10-4)

Assembly Action:

None

P50-18 Part I

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Bradley Corporation (JBEngineer@aol.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

412.5 Bathtub and whirlpool bathtub valves. The *hot water* supplied to bathtubs and whirlpool bathtubs shall be limited to not greater than ~~±20°F~~ 120 F (49°C/49 C) The water temperature shall be regulated by one of the following:

1. A limiting device conforming to ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3,
2. A ~~thermostatic mixing valve conforming to ASSE 1017.~~
- ~~3. A water heater conforming to ASSE 1082.~~
- ~~4.3.~~ A water heater conforming to ASSE 1084.

Exception: Water temperature regulation by one of the items indicated in this section shall not be required where such regulation is provided by a combination tub/shower valve in accordance with Section 412.3.

Commenter's Reason: I pointed out during the first hearing that ASSE 1017 should have been deleted in a modification. Also, during the first hearing, ASSE 1084 had not been completed. The standards are now available.

The Committee statement mentions that ASSE 1082 provides no protection against creep. As I testified, a water heater being controlled for outlet temperature cannot have creep. The creep that occurs in an ASSE 1017 valve is related to improper adjustment of a recirculating system. Even with a recirculating system, a water heater cannot have creep. The outlet temperature is always within the allowable range of the set point.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This change provides an option to the code users. As such, there is no impact to the cost of construction.

Staff Analysis: In accordance with Section 3.6.3.1 of ICC Council Policy 28, the new referenced standards ASSE 1082-2018 and ASSE 1084-2018 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

P50-18 Part I

P50-18 Part II

IRC: P2713.3, Chapter 44

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Bradley Corporation (JBEngineer@aol.com)

2018 International Residential Code

Revise as follows

P2713.3 Bathtub and whirlpool bathtub valves. *Hot water* supplied to bathtubs and whirlpool bathtubs shall be limited to not greater than 120°F (49°C) ~~by a The water temperature limiting device that conforms temperature shall be regulated by one of the following:~~

1. A limiting device conforming to ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3.
2. A thermostatic mixing valve conforming to ASSE 1017.
3. A water heater conforming to ASSE 1082.

4. A water heater conforming to ASSE 1084.

Exception: ~~except~~ Water temperature regulation by one of the items indicated in this section shall not be required where such regulation is ~~where such protection is otherwise~~ provided by a combination tub/shower valve in accordance with Section P2708.4.

Add new standard(s) follows

ASSE

ASSE International
18927 Hickory Creek Drive, Suite
220
Mokena IL 60448

1082-2018:

Performance Requirements for Water Heaters used as Temperature Control Devices for Hot Water Distribution Systems

1084-2018:

Performance Requirements for Water Heaters used as Temperature Limiting Devices

Reason: The requirement for regulating the maximum temperature of water for bathtubs and whirlpool bathtub is a scald prevention requirement. The current code allows the use of a device complying with ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3. This change identifies other viable methods of controlling the temperature of the hot water. e identification of the standard in this section complements the requirements in Section 412.7.

A thermostatic mixing valve is an effective method of regulating the maximum temperature. The temperature is maintained within a few degrees depending on the flow rate. Scalding temperatures are in excess of this temperature. Other viable means of maintaining the water temperature to a maximum of 120° F are water heater meeting one of the two new standards.

The two new standard for water heaters are ASSE 1082 and ASSE 1084. These water heaters are equivalent to ASSE 1017 and ASSE 1070 respectively. As such, they have the capability of providing an equivalent level of performance as the corresponding mixing valve.

The change to the Residential Code will make the requirements consistent with the Plumbing Code.

Cost Impact: The code change proposal will decrease the cost of construction
The options may result in lower costs.

P50-18 Part II

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: ASSE 1082 is not yet completed. (Vote:10-0)

Assembly Action:

None

P50-18 Part II

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Bradley Corporation (JBEngineer@aol.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Residential Code

P2713.3 Bathtub and whirlpool bathtub valves. Hot water supplied to bathtubs and whirlpool bathtubs shall be limited to not greater than ~~120°F~~ 120 F (49°C) The water temperature shall be regulated by one of the following:

1. A limiting device conforming to ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3.
2. A ~~thermostatic mixing valve conforming to ASSE 1017.~~
- ~~3. A water heater conforming to ASSE 1082.~~
- ~~4.3.~~ A water heater conforming to ASSE 1084.

Exception: Water temperature regulation by one of the items indicated in this section shall not be required where such regulation is provided by a combination tub/shower valve in accordance with Section P2708.4.

Commenter's Reason: During the first hearing, I indicated that ASSE 1082 was not yet complete. The standard has been finalized. Also during the first hearing, I indicated that based on the input I received that ASSE 1017 should be deleted. The modification deletes reference to ASSE 1017.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This change provides an option to the code users. As such, there is no impact to the cost of construction.

Staff Analysis: In accordance with Section 3.6.3.1 of ICC Council Policy 28, the new referenced standards ASSE 1082-2018 and ASSE 1084-2018 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

P50-18 Part II

P51-18

IPC: 412.10, Chapter 15

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Bradley Corporation (JBEngineer@aol.com)

2018 International Plumbing Code

Revise as follows

412.10 Head shampoo sink faucets. Head shampoo sink faucets shall be supplied with hot water that is limited to not more than 120°F (49°C) ~~by a water temperature limiting device that conforms to ASSE 1070/ASME A112.1070/CSA B125.70.~~ Each faucet shall have integral check valves to prevent crossover flow between the hot and cold water supply connections. The means for regulating the maximum temperature shall be one of the following:

1. A limiting device conforming to ASSE 1070/ASME A112.1070/CSA B125.70.
2. A thermostatic mixing valve conforming to ASSE 1017.
3. A water heater conforming to ASSE 1082.
4. A water heater conforming to ASSE 1084.
5. A temperature actuated flow reduction device conforming to ASSE 1062.

Add new standard(s) follows

ASSE

ASSE International
18927 Hickory Creek Drive, Suite
220
Mokena IL 60448

1084-2018:

Performance Requirements for Water Heaters used as Temperature Limiting Devices

1082-2018:

Performance Requirements for Water Heaters Used as Temperature Control Devices for Hot Water Distribution Systems.

Reason: The scald prevention requirements for head shampoo sink faucets is similar to the upper limit requirement for shower valves. There other viable means are available for setting the maximum temperature besides a device complying with ASSE 1070/ASME A112.1070/CSA B125.70. The other viable means of meeting the high temperature limit. Section 412.7 already permits the use of a TARF complying with ASSE 1062 for controlling the water temperature discharging from a faucet. Hence, the identification of the standard in this section complements the requirements in Section 412.7.

A thermostatic mixing valve is an effective method of regulating the maximum temperature. The temperature is maintained within a few degrees depending on the flow rate. Scalding temperatures are in excess of this temperature. Other viable means of maintaining the water temperature to a maximum of 120° F are water heater meeting one of the two new standards.

The two new standard for water heaters are ASSE 1082 and ASSE 1084. These water heaters are equivalent to ASSE 1017 and ASSE 1070 respectively. As such, they have the capability of providing an equivalent level of performance as the corresponding mixing valve.

Cost Impact: The code change proposal will decrease the cost of construction. The available options could result in lower costs.

Analysis: A review of the standards proposed for inclusion in the code, ASSE 1084-2018 and ASSE1082-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P51-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 412.10 Head shampoo sink faucets. Head shampoo sink faucets shall be supplied with hot water that is limited to not more than 120°F (49°C) . Each faucet shall have integral check valves to prevent crossover flow between the hot and cold water supply connections. The means for regulating the maximum temperature shall be one of the following:

1. A limiting device conforming to ASSE 1070/ASME A112.1070/CSA B125.70.

~~2. A thermostatic mixing valve conforming to ASSE 1017.~~

~~3. 2.~~ A water heater conforming to ASSE 1082.

~~4. A water heater conforming to ASSE 1084.~~

~~5. 3.~~ A temperature actuated flow reduction device conforming to ASSE 1062.

Committee Reason: For the Modification: ASSE 1084 is not yet completed and ASSE 1017 is not appropriate for the application.

For the Proposal: The Committee agreed with the published reason statement. (Vote:10-4)

Assembly Action:

None

P51-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Conrad Jahrling, representing ASSE International (conrad.jahrling@asse-plumbing.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

412.10 Head shampoo sink faucets. Head shampoo sink faucets shall be supplied with hot water that is limited to not more than ~~120°F~~ 120 F (49°C) . Each faucet shall have integral check valves to prevent crossover flow between the hot and cold water supply connections. The means for regulating the maximum temperature shall be one of the following:

1. A limiting device conforming to ASSE 1070/ASME A112.1070/CSA B125.70.
2. A water heater conforming to ASSE ~~1082~~ 1084.
3. A temperature actuated flow reduction device conforming to ASSE 1062.

Commenter's Reason: A device that conforms with ASSE 1084 has the same temperature control output tolerances and requirements as a device that conforms with ASSE 1070 / ASME A112.1070 / CSA B125.70. The difference between the two is that an ASSE 1084 device adds heat to the system and only requires a cold water supply inlet. ASSE 1084 devices include electrical heater safety controls that are specific to point-of-use applications, whereas ASSE 1082 devices do not as they are for distribution.

As of July 16th, 2018:

ASSE 1082-2018 will be in public review until Sept 11. The performance of the device is designed to conform similarly to ASSE 1017, except with only a cold water inlet. Projected date of completion is Oct 15th.

ASSE 1084-2018 is currently finishing working group discussions. The performance of the device is designed to conform similarly to ASSE 1070 / ASME A112.1070 / CSA B125.70, except with only a cold water inlet. Projected date of completion is Oct 15th.

The ASSE standards development process after standards have completed the open working group is outlined as:

Ballot the ASSE PSC consensus body for 21 days.
Resolve comments between commenters, staff, and PSC chair.
Send to public comment with ANSI for 45-day review. Resolve comments between commenters, staff, and PSC chair.
Submit to ANSI for review and approval.
Publish.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

These devices are alternatives to current code-required methods. There is not a cost impact for including alternative methods in the code.

Staff Analysis: In accordance with Section 3.6.3.1 of ICC Council Policy 28, the new referenced standards ASSE 1082-2018 and ASSE 1084-2018 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

Public Comment 2:

Proponent: CP28 Administration.

Commenter's Reason: The administration of ICC Council Policy 28 (CP28) is not taking a position on this code change. This public comment is being submitted to bring a procedural requirement to the attention of the ICC voting membership. In accordance with Section 3.6.3.1.1 of ICC Council Policy 28 (partially reproduced below), the new referenced standards ASSE 1082-2018 and ASSE 1084-2018 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

(CP28) 3.6.3.1.1 Proposed New Standards. In order for a new standard to be considered for reference by the Code, such standard shall be submitted in at least a consensus draft form in accordance with Section 3.4. If the proposed new standard is not submitted in at least consensus draft form, the code change proposal shall be considered incomplete and shall not be processed. The code change proposal shall be considered at the Committee Action Hearing by the applicable code development committee responsible for the corresponding proposed changes to the code text. If the committee action at the Committee Action Hearing is either As Submitted or As Modified and the standard is not completed, the code change proposal shall automatically be placed on the Public Comment Agenda with the recommendation stating that in order for the public comment to be considered, the new standard shall be completed and readily available prior to the Public Comment Hearing

P51-18

P53-18

IPC: 413.5

Proposed Change as Submitted

Proponent: James Richardson Jr, representing City of Columbus Ohio (jarichardson@columbus.gov); Robert Schutz, representing City of Columbus, OH (RJSchutz@columbus.gov)

2018 International Plumbing Code

Add new text as follows

413.5 Floor slope to floor and trench drains. The floor surface in the area or room served by a floor or trench drain shall have a slope to such drains at not less than one-fourth unit vertical in 12 units horizontal (2-percent slope).

Reason: This is long overdue. Everyone has seen this issue at some point in their life. There is some emergency situation and although there is an emergency floor drain/trench drain in the room or area, some water remains on the surface (sometimes several inches) due to the fact there is no real requirement for the area to have slope to the drain. In many cases the highest point in the room or area is actually the inlet to the floor drain/trench drain. It does seem odd that it is covered in great detail when we look at the requirements for a shower liner, however, a floor surface somehow doesn't matter. What many have failed to realize by overlooking this issue is that even though the floor drain/trench drain may be located in a concrete floor (with or without floor covering of some type), there are other portions of the building that can be greatly impacted. For instance, the walls that make up the room. Some assume these would be CMU units, but construction would allow for many other materials. If the walls were metal studs with drywall for instance, the metal studs could be subjected to deterioration from rust caused by the water that remained at the base of the wall because the surface was not sloped correctly. The drywall often becomes a breeding ground for mold as well.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. There should not be a cost impact related to this proposal.

P53-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This requirement might not apply in some applications. The slope could result in an excessive amount of fall in the floor surface. The topic of this proposal (sloping floors towards floor drains) would be better suited to be proposed and evaluated for inclusion into the IBC. (Vote:13-0)

Assembly Action:

None

P53-18

Individual Consideration Agenda

Public Comment 1:

Proponent: James Richardson Jr, representing City of Columbus (jarichardson@columbus.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

413.5 Floor slope to floor and trench drains. The floor surface in the area or room served by a floor or trench drain shall have a slope to such drains ~~at not less than one-fourth unit vertical in 12 units horizontal (2-percent slope),~~ with a minimum acceptable height difference between the highest point in the horizontal floor surface and the inlet to the fixture of 1/4 inch.

Commenter's Reason: Proponents reason statement.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
There will be no realized cost impact as this change only requires the prepared surface under the concrete to be sloped accordingly.

P53-18

P60-18

IPC: 419.5, Chapter 15

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Bradley Corporation (JBEngineer@aol.com)

2018 International Plumbing Code

Revise as follows

419.5 Tempered water for public hand-washing facilities. *Tempered water* shall be delivered from lavatories and group wash fixtures located in public toilet facilities provided for customers, patrons and visitors. ~~Tempered~~ The tempered water shall be delivered through an approved water temperature limiting device that conforms to controlled by one of the following:

1. A temperature limiting device conforming to either ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3.
2. A thermostatic mixing valve conforming to ASSE 1017.
3. A water heater conforming to ASSE 1082.
4. A water heater conforming to ASSE 1084.
5. A temperature actuated flow reduction device conforming to ASSE 1062.

Add new standard(s) follows

ASSE

ASSE International
18927 Hickory Creek Drive, Suite
220
Mokena IL 60448

1084-2018:

Performance Requirements for Water Heaters used as Temperature Limiting Devices

1082-2018:

Performance Requirements for Water Heaters Used as Temperature Control Devices for Hot Water Distribution Systems.

Reason: The requirements for public lavatories is out of date based on the changes made to the standard. Previously, ASSE 1070 was considered a thermostatic mixing valve standard with safety features. The standard was revised to be a safety standard without performance requirements for thermostatic mixing. Some valves are adjustable, while others are not.

The requirement for tempered water for public lavatories is a comfort requirement as well as a scald prevention requirement. However, comfort overrides the safety requirement since tempered water is limited to a maximum temperature of 110° F. Scalding temperatures are in excess of this temperature. Other viable means of tempering water to 110° F or less are an ASSE 1017 valve or a water heater meeting one of the two new standards.

The two new standard for water heaters are ASSE 1082 and ASSE 1084. These water heaters are equivalent to ASSE 1017 and ASSE 1070 respectively. As such, they have the capability of providing an equivalent level of performance as the corresponding mixing valve.

The last device listed is a TARF complying with ASSE 1062. Section 412.7 already permits the use of these devices for controlling the water temperature discharging from a faucet. Hence, the identification of the standard in this section complements the requirements in Section 412.7.

Cost Impact: The code change proposal will decrease the cost of construction
The options may result in a lower installation cost.

Analysis: A review of the standards proposed for inclusion in the code, ASSE 1084-2018 and ASSE1082-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P60-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The Committee prefers the language of P61-18. The ASSE 1017 valve is incorrect for the application. (Vote:14-0)

Assembly Action:

None

P60-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting,, representing Bradley Corporation (jbenigneer@aol.com)requests As Submitted.

Commenter's Reason: The Committee stated that they preferred P61-18, yet they rejected P61-18. For hand washing, any of the identified methods can provide comfortable water temperatures. Hand washing upper temperature was intended for comfort and easy adjustment of water temperature, not scald protection. The origins of the requirement are related to ICC A117.1 for handicapped lavatories. This requirement was expanded to all public lavatories. After the development of ASSE 1070 that standard was added to this section. However, there is no justification for such a mandate when other viable options are available. While an ASSE 1070 device works fine, there are other methods available. This change identifies all of the acceptable means of regulating hot water temperature.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. By adding options, the cost of construction will be lowered since other valves and devices are less expensive.

Staff Analysis: In accordance with Section 3.6.3.1 of ICC Council Policy 28, the new referenced standards ASSE 1082-2018 and ASSE 1084-2018 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

P60-18

P64-18

IPC: 421.5.2

Proposed Change as Submitted

Proponent: James Richardson Jr, representing City of Columbus Ohio (jarichardson@columbus.gov); Robert Schutz, representing City of Columbus, OH (RJSchutz@columbus.gov)

2018 International Plumbing Code

Revise as follows

421.5.2 Shower ~~lining~~ linings. Floors under shower compartments, except where prefabricated receptors have been provided, shall be lined and made water tight utilizing material complying with Sections 421.5.2.1 through 421.5.2.6. Such liners shall turn up on all sides not less than 2 inches (51 mm) above the finished threshold level. Liners shall be recessed and fastened to an *approved* backing so as not to occupy the space required for wall covering, and shall not be nailed or perforated at any point less than 1 inch (25 mm) above the finished threshold. Liners shall be pitched one-fourth unit vertical in 12 units horizontal (2-percent slope) and shall be sloped toward the fixture drains and be securely fastened to the waste outlet at the seepage entrance, making a water-tight joint between the liner and the outlet. For showers that are designed with a zero height threshold, a trench drain shall be provided that runs 2 inches beyond the full width of the shower compartment opening on both sides. The trench drain shall have a flashing clamp and the shower liner material shall be securely fastened to the waste outlet at the seepage entrance, making a water-tight joint between the liner and the outlet. The shower liner shall also be required to extend 2 inches above the floor level and 1 inch beyond the edges of the trench drain. If for some reason the trench drain cannot be accommodated, the entire room the shower is located in shall be considered part of the shower compartment and provided with a liner for the entire floor surface.

The completed liner shall be tested in accordance with Section 312.9.

Exceptions:

1. Floor surfaces under shower heads provided for rinsing laid directly on the ground are not required to comply with this section.
2. Where a sheet-applied, load-bearing, bonded, waterproof membrane is installed as the shower lining, the membrane shall not be required to be recessed.

Reason: The plumbing code has not yet dealt with site built zero height threshold showers. These continue to be a problem for jurisdictions since the code provides no direction or parameters for how these should be constructed. We have seen installations end up causing substantial damage to a structure due to water migration between the floor covering and the sub floor. This proposal provides two possibilities which should result in adequate protection for the structure.

Bibliography: See "Reason Statement"

Cost Impact: The code change proposal will increase the cost of construction. This will result in an increase in the cost of construction, but will also provide adequate protection for the structure to prevent hidden damage.

P64-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The slope could be in excess of what ADA limitations are for shower floors. There are other methods that can be used to achieve the same result. Requiring this one method is too restrictive. (Vote:12-1)

Assembly Action:

None

P64-18

Individual Consideration Agenda

Public Comment 1:

Proponent: James Richardson Jr, City of Columbus, representing City of Columbus Ohio (jarichardson@columbus.gov)requests As Submitted.

Commenter's Reason: This is an issue that needs addressed in the plumbing code. We have observed property after property that suffered significant damage because there is a lack of direction regarding the construction of a "barrier - free" or "zero-threshold" site built shower. Water always seeks its' own level and in doing so migrates horizontally. Often there is damage to not only the subfloor, but also to the base of the wall and the vertical studs.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The increase in the cost of construction will be offset by the savings realized from preventing the damage in the first place.

P64-18

P65-18

IPC: 423.3, Chapter 15

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Bradley Corporation (JBEngineer@aol.com)

2018 International Plumbing Code

Revise as follows

423.3 Footbaths and pedicure baths. The water supplied to specialty plumbing fixtures, such as pedicure chairs having an integral foot bathtub and footbaths, shall be limited to not greater than 120°F (49°C) ~~by a~~. The water - temperature limiting device that conforms - temperature shall be regulated by one of the following:

1. A limiting device conforming to ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3.
2. A thermostatic mixing valve conforming to ASSE 1017.
3. A water heater conforming to ASSE 1082.
4. A water heater conforming to ASSE 1084.
5. A temperature actuated flow reduction device conforming to ASSE 1062.

Add new standard(s) follows

ASSE

ASSE International
18927 Hickory Creek Drive, Suite
220
Mokena IL 60448

1082-2018:

Water Heaters Used as Temperature Control Devices for Hot Water Distribution Systems.

1084-2018:

Performance Requirements for Water Heaters used as Temperature Limiting Devices

Reason: The requirement for regulating the maximum temperature of water for pedicure chairs having an integral foot bathtub, footbaths, and head shampoo sinks is a scald prevention requirement. The current code allows the use of a device complying with ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3.

Section 412.7 already permits the use of a TARF complying with ASSE 1062 for controlling the water temperature discharging from a faucet. Hence, the identification of the standard in this section complements the requirements in Section 412.7.

A thermostatic mixing valve is an effective method of regulating the maximum temperature. The temperature is maintained within a few degrees depending on the flow rate. Scalding temperatures are in excess of this temperature. Other viable means of maintaining the water temperature to a maximum of 120° F are water heater meeting one of the two new standards.

The two new standard for water heaters are ASSE 1082 and ASSE 1084. These water heaters are equivalent to ASSE 1017 and ASSE 1070 respectively. As such, they have the capability of providing an equivalent level of performance as the corresponding mixing valve.

Cost Impact: The code change proposal will decrease the cost of construction
The options may reduce the cost of an installation.

Analysis: A review of the standard proposed for inclusion in the code, ASSE 1082-2018 and ASSE 1084-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P65-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: There appears to be too many concerns of testifiers about the differences between ASSE 1017 and ASSE 1082 "devices". ASSE 1017 valves are not acceptable for point-of-use applications. The ASSE 1084 standard is not yet completed. (Vote:12-2)

Assembly Action:

None

P65-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, representing Self (jbenigneer@aol.com)requests As Submitted.

Commenter's Reason: Footbaths and pedicure baths are administered under the control of an attendant. The temperature is not adjusted by the person whose feet are being bathed. The upper temperature limit is not for anti-scald as implied. The upper temperature limit is to provide a means of warming the bath, at the same time, not having scalding water spray on the bather. Any one of the device listed can provide upper temperature limit on the hot water.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction This will present an option to the user. The valves being added as options cost less to purchase.

Staff Analysis: In accordance with Section 3.6.3.1 of ICC Council Policy 28, the new referenced standards ASSE 1082-2018 and ASSE 1084-2018 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

P65-18

P66-18

IPC: 423.3, Chapter 15

Proposed Change as Submitted

Proponent: Misty Guard, representing Bradley Corporation (Misty.Guard@bradleycorp.com)

2018 International Plumbing Code

Revise as follows

423.3 Footbaths and pedicure baths. The water supplied to specialty plumbing fixtures, such as pedicure chairs having an integral foot bathtub and footbaths, shall be limited to not greater than 120°F (49°C) by a water-temperature-limiting device that conforms to ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3 or from a water heater complying with ASSE 1082 or ASSE 1084.

Add new standard(s) follows

ASSE

ASSE International
18927 Hickory Creek Drive, Suite
220
Mokena IL 60448

1084-2018:

Performance Requirements for Water Heaters used as Temperature Limiting Devices

1082-2018:

Performance Requirements for Water Heaters Used as Temperature Control Devices for Hot Water Distribution Systems.

Reason: There are two new standards for water heaters, ASSE 1082 and ASSE 1084. These water heaters are equivalent to ASSE 1017 and ASSE 1070 respectively. As such, they have the capability of providing an equivalent level of performance as the currently listed water-temperature limiting device.

Water heaters complying with either one of these standards can provide tempered water within a range of a few degrees depending on the flow rate. The temperature range is similar to the allowable temperature range for an ASSE 1070/ASME A112.1070/CSA B125.70 device.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The code change proposal will not increase or decrease the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, ASSE 1084-2018 and ASSE1082-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P66-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 423.3 Footbaths and pedicure baths. The water supplied to specialty plumbing fixtures, such as pedicure chairs having an integral foot bathtub and footbaths, shall be limited to not greater than 120°F (49°C) by a water-temperature-limiting device that conforms to ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3 or from a water heater complying with ASSE 1082 ~~or ASSE 1084~~.

Committee Reason: For the Modification: The ASSE 1084 standard is not yet completed.
For the Proposal: Devices that comply with the requirements of ASSE 1082 are being successfully used. The Committee approved a previous proposal for these devices to be used for head shampoo sinks. (Vote:10-4)

Assembly Action:

None

P66-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Conrad Jahrling, representing ASSE International (conrad.jahrling@asse-plumbing.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

423.3 Footbaths and pedicure baths. The water supplied to specialty plumbing fixtures, such as pedicure chairs having an integral foot bathtub and footbaths, shall be limited to not greater than 120 F (49 C) by a water-temperature-limiting device that conforms to ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3 or from a water heater complying with ASSE ~~1082~~1084.

Commenter's Reason: This is a misapplication of ASSE 1082. The purpose of a device that conforms with ASSE 1082 is to supply hot or tempered water at a controlled output temperature for distribution. The tolerances for control are the same as the tolerances described in ASSE 1017 for mixing valves. Similarly, a device conforming to ASSE 1017 would not be appropriate in this application.

Conversely, a water heater that conforms to ASSE 1084 would be appropriate.

As of July 16th, 2018:

ASSE 1082-2018 will be in public review until Sept 11. The performance of the device is designed to conform similarly to ASSE 1017, except with only a cold water inlet. Projected date of completion is Oct 15th.

ASSE 1084-2018 is currently finishing working group discussions. The performance of the device is designed to conform similarly to ASSE 1070 / ASME A112.1070 / CSA B125.70, except with only a cold water inlet. Projected date of completion is Oct 15th.

The ASSE standards development process after standards have completed the open working group is outlined as:

- Ballot the ASSE PSC consensus body for 21 days.
- Resolve comments between commenters, staff, and PSC chair.
- Send to public comment with ANSI for 45-day review. Resolve comments between commenters, staff, and PSC chair.
- Submit to ANSI for review and approval.
- Publish.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

These devices are alternatives to current code-required methods. There is not a cost impact for including alternative methods in the code.

Staff Analysis: In accordance with Section 3.6.3.1 of ICC Council Policy 28, the new referenced standards ASSE 1082-

2018 and ASSE 1084-2018 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

Public Comment 2:

Proponent: CP28 Administration.

Commenter's Reason: The administration of ICC Council Policy 28 (CP28) is not taking a position on this code change. This public comment is being submitted to bring a procedural requirement to the attention of the ICC voting membership. In accordance with Section 3.6.3.1.1 of ICC Council Policy 28 (partially reproduced below), the new referenced standards ASSE 1082-2018 and ASSE 1084-2018 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

(CP28) 3.6.3.1.1 Proposed New Standards. In order for a new standard to be considered for reference by the Code, such standard shall be submitted in at least a consensus draft form in accordance with Section 3.4. If the proposed new standard is not submitted in at least consensus draft form, the code change proposal shall be considered incomplete and shall not be processed. The code change proposal shall be considered at the Committee Action Hearing by the applicable code development committee responsible for the corresponding proposed changes to the code text. If the committee action at the Committee Action Hearing is either As Submitted or As Modified and the standard is not completed, the code change proposal shall automatically be placed on the Public Comment Agenda with the recommendation stating that in order for the public comment to be considered, the new standard shall be completed and readily available prior to the Public Comment Hearing

P66-18

P70-18

IPC: 501.2

Proposed Change as Submitted

Proponent: Ronald George, representing Self (Ron@Plumb-TechLLC.com)

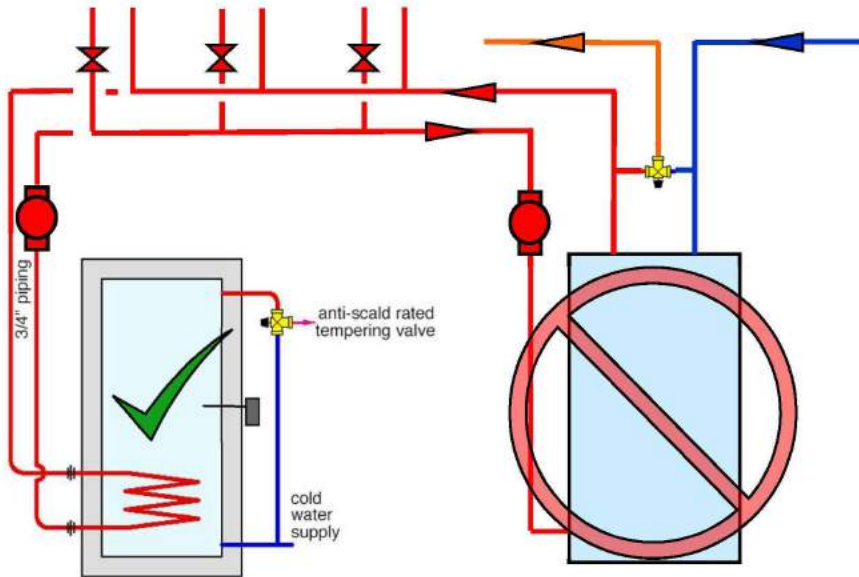
2018 International Plumbing Code

Revise as follows

501.2 Water heater as space heater. Where a combination potable water heating and space heating system requires water for space heating at temperatures greater than 140°F (60°C), a master thermostatic mixing valve complying with ASSE 1017 shall be provided to limit the water supplied to the potable *hot water* distribution system to a temperature of 140°F (60°C) or less. ~~The potability of the water~~ water for the space heating system shall be maintained throughout the system, separated from the potable water system by use of a double wall heat exchanger.

Reason: This code change still allows a single heating appliance to provide both the heating and domestic hot water for a building, however it requires a heat exchanger to separate the two fluid systems. This is because heating hot water systems can sit idle for up to 8 or 9 months per year in southern climates. This causes the water to sit stagnate for many months when the thermostat does not call for heat. This stagnant period is when bacteria grows in a biofilm to very high numbers until the thermostat calls for heat. Then the bacteria is pumped into the water heater where it is transmitted to people from showers and other aerosolizing fixtures. The potential for Legionellosis or Legionnaires' disease is very high. The control valve or zone circulating pump remains off and allows water treatment chemicals to dissipate and bacteria can growth to very high levels in an uncirculated heating circuit. In systems where they cycle the zone valve or circulating pump, it wastes energy and overheats the spaces during summer months. There are other issues that are outlined below.

Combined systems require someone very familiar with how both systems are supposed to operate to properly operate and maintain the system. Proper maintenance of the system can be a comfort or Legionella bacteria growth issue when the temperatures are low and a serious safety and scald issue when temperatures are high. A combined system is a hybrid system that utilizes a boiler or boilers to heat water for heating the building environment and it uses boiler water to heat the domestic hot water for bathing, washing and cleaning uses. There are two applications for these combined systems. One application is heating the building environment with heating hot water which generally needs to be at a very high temperature around 180F to 210F without using oversized heating coils. The other application is for bathing, showering and domestic hot water uses which generally use a lower temperature around 85F to 120F. If the water gets too hot, there are scalding dangers, so proper controls (thermostatic mixing valves) are very important for these types of systems. I have been investigating scald incidents with combined systems since the mid-1990s and I have seen a significant number of these combined systems involved in scald litigation cases because these systems are generally not designed, installed, operated or maintained properly. The following is a list of problems or pitfalls that I have found over the years that are related to combined heating hot water and domestic hot water systems.



A combination Boiler/Water heater should be configured as shown on the left to keep from having domestic hot water sitting stagnant in heating coils and a heating circuit for months during non-heating months. The Boiler/Water heater on the right creates a large dead leg which contributes to Legionella Bacteria growth during non-heating season months. The first call for heat in the fall doses the hot water tank with a high concentration of bacteria from the dead leg.

Codes: There is very little code language on Combines heating hot water and domestic hot water systems. There are only two plumbing code sections in the model codes that mention these combined systems and they give important, but often overlooked requirements. One section calls for the piping and components in a combined system to be approved for use in potable water systems. The other code section calls for a thermostatic mixing valve if the system temperature exceeds 140 degrees Fahrenheit.

There are many more issues that need to be addressed to have a safe and properly designed system. If you can avoid these pitfalls you will have a much safer system:

Pitfall Number 1: Open System vs Closed System “Open systems” are systems with domestic hot water flowing from the city water supply through the heating hot water system components such as pumps, control valves and heating coils. Open systems introduce a lot of oxygen and minerals into the heating coil of the boiler and can cause corrosion and scale build-up issues on heating surfaces. Open systems often have scale build-up on the boiler heating surfaces in hard water areas. High Flue gas temperatures are a sign of scale build-up which minimizes heat transfer into the water and therefore the flue temperatures rise. “Closed Systems” are systems with a double wall heat exchanger separating the fluid of the heating hot water system and the domestic hot water. The boiler loop can be chemically treated and mineral build-up on heating surfaces is minimized. Closed loop systems generally require a double wall heat exchanger when boiler chemicals are used. Open systems provide a significant challenge because the fluid in the system must be potable water and it is difficult to circulate domestic hot water through many hydronic components without having scale, corrosion, build-up of air pockets and oxidation problems. Most hydronic systems have pumps, valves, coils and components that are not approved for drinking water service. Closed systems allow the heating hot water to be chemically treated to prevent corrosion and scale build-up on heating surfaces. Closed hydronic heating systems are the preferred type of combined systems because it eliminates a lot of opportunities for systems problems. There are water heaters with hot water coils in the tank that can be used for this application or a plate and frame or shell and tube heat exchanger can be used for this application. Open systems often see corrosion problems in the components that are not compatible for domestic water systems.

Pitfall Number 2: System Operating Temperatures The next challenge is with the system operating temperatures. Heating hot water systems are generally designed to operate between 180 degrees Fahrenheit and 210 degrees Fahrenheit. Domestic hot water systems are designed to operate between 85 degrees Fahrenheit for the lowest temperature of tempered water to 140 degrees Fahrenheit the highest hot water temperature for kitchens or laundries. “Tempered Water” is water having a temperature range between 85°F (29°C) and 110°F (43°C). “Hot Water” is water at a temperature greater than or equal to 110°F (43°C) and generally domestic hot water for bathing and showering is limited to a maximum of 120 degrees Fahrenheit in code language related to showers and bathtub facilities. Domestic hot water for dishwashing and laundries can be higher. Generally, domestic hot water systems operate at a maximum of 140 degrees Fahrenheit and heating hot water Systems operate best around 190 to 200 degrees Fahrenheit. If the

combined-open heating hot water system is set to 120 degrees F the building will be cold in winter months because there will not be enough heat coming out of the heating units. If the system temperature is set to a higher temperature to satisfy the heating coils or baseboard heater requirements then there is a significant scald risk on the domestic hot water side of the system unless thermostatic mixing valves are used to limit hot water temperatures.

Pitfall Number 3 - Not including all of the required components in the combined systems A combined system has many components that are required for it to operate properly. If all of the components are not installed in the proper location, then the system will experience problems. These components include but are not limited to: The boiler, and expansion tank, isolation valves, unions, dielectric waterways, circulating pumps, air eliminators or air vents, control valves, relief valves, balancing valves, heating coils, fin tube radiators, thermostats, pressure gauges, temperature gauges, flushing connections, plumbing fixtures, drains, etc. All of these components must work in concert and be designed to work together as a system. If any one or several of the components are not installed, or if they are undersized, adjusted or installed improperly the problems and safety issues can occur.

Pitfall Number 4 - Seasonal Pumping and Pump Sizing In large centrally piped systems, when the winter heating season occurs all of the components in a combined heating hot water and domestic hot water system will require a simultaneous peak demand in the morning when it is showering time. So the circulating pump must be sized for the simultaneous peak heating and showering loads. During the winter months, it does not make sense to circulate a large quantity of water, so often I see a smaller circulating pump that is piped around the large circulating pump so it can be used in the winter months when the large circulators are not needed for building heating. This creates a large dead leg in the hot water piping where Legionellae bacteria can grow when the heating hot water pumps are shut down.

Pitfall Number 5 - Dead legs During the summer months the fan coil units and branches to baseboard heating units are shut off with a solenoid valve or the circulating pump on these branches does not run all summer long. It is not unusual for heating system to sit idle for over six months in southern climates. When the first call for heating is made there is usually a slug of brackish and foul tasting water that is high in debris, metals and bacteria content. Combined systems are by design creating very large dead legs which is a plumbing code violation in many plumbing codes. Controls on combined systems need to incorporate a periodic flushing of the zones by operating the solenoid valves and circulators on each zone on at least a bi-weekly basis if not more often. Chlorine dissipates in the domestic water over time and when heated. So dead legs are more susceptible to bacteria growth. In combined systems where a significant portion of the system is used seasonally for heating and the remainder of the system is being used year round for domestic hot water, combined systems are open systems that are susceptible to bacteria growth in stagnant sections of heating coil piping. Heating coils in the summer season are an area with huge potential for bacterial amplification when hydronic systems are coupled with domestic hot water systems and there is no physical barrier or heat exchanger to separate the fluids between the two systems.

Pitfall Number 6 - Peak load problems - Space heating and Shower loads simultaneously The early morning is the generally coldest time of day and it is also when guests at a hotel or an apartment building or condominium take their morning showers. Equipment, piping, pumps and valves must be sized to handle this simultaneous peak load. If the heating coils, pipe and pump equipment is not sized big enough the temperature of the space will drop and the shower water temperature will drop to an uncomfortable temperature. Either condition is likely to result in call and complaints about water temperatures or space temperatures being too low.

Pitfall Number 7 - Sizing Sizing problems can arise when engineers, owners or contractors try to be thrifty and save a few bucks by rounding down on their peak load calculations and downsizing pumps, piping, valves or coils. When this happens, you can bet the maintenance department phone will be ringing off the hook with complaints of spaces being too cold or not enough hot water for a shower during cold weather conditions. The maintenance men usually do what comes natural when they receive a call of not enough heat, they go to the boiler and turn the temperature up. When someone is scalded they always claim they never touched the thermostat. Turning up the temperature will not cause problems for the heating coils, but it does significantly increase the risk of scalding if the maintenance man does not go around and re-adjust all of the maximum temperature limit stops in the showers and tub/shower valves. If the shower has an old two-handle or single handle non-compensating type shower valve that cannot compensate for changes in incoming temperature or pressure, then the risk of scalding is even greater. The best solution is to have a Thermostatic mixing valve on the hot water supply to the bathing and washing fixtures to limit the hot water to a safe temperature. If the hot water and heating water piping are still separated, and the system uses one boiler then a temperature actuated master thermostatic mixing valve conforming to ASSE 1017 or the appropriate CSA B-125 mixing valve can be located at the water heater to lower the hot water to a safe delivery temperature. If the combined system utilizes the same piping for heating hot water and domestic hot water then, a temperature limiting valve conforming to ASSE 1070 should be used in-line to mix cold water with hot water to provide a safe temperature of hot water for bathing or showering fixtures locally.

Pitfall Number 8 - Maintenance The main problem with a combined system is the system includes components and controls for two different mechanical trade disciplines. Often if there is a service call on one of these systems, the service technician may only be familiar with one system or the other. If the system was designed with a specific operating temperature it is not uncommon for a service tech familiar with only one system to set the temperature of the system to what he is accustomed to setting the temperature to. There are also many components in the system that

one trade or the other may be unfamiliar with. For example in one case the owner called an HVAC technician to work on his combined system. The HVAC technician was used to setting hydronic system for building heating at 190 to 200 degrees Fahrenheit. The technician set the temperature to 190 degrees and later a woman was scalded when she got in her shower. The HVAC technician did not know about he needed to reset the maximum temperature limit stop on all of the ASSE 1016 shower valves when he readjusted the boiler set point temperature. There are maintenance technicians that are trained and fully capable of working on combined systems, but they would need to have the design drawings, design operating temperatures and sequence of operations in order to properly maintain the system.

Pitfall Number 9 – Cast Iron Boiler on an Open System I have seen Cast iron boilers used on an open combined heating hot water and domestic hot water system. Cast iron boilers do not perform well with open systems because of the large quantities of water that introduces oxygen and minerals which cause rust stains, oxidation and fouling of the heating surfaces. This mistake does not take long to find because of the rust stains that appear in the sinks, bathtubs & showers. Cast iron boiler can work nicely, but they must have a separate closed loop of boiler water that is treated with corrosion inhibitors and other boiler chemicals as needed. The boiler water can then be piped to a coil in a hot water tank or to a heat exchanger to provide domestic hot water.

Pitfall Number 10 - No Hot Water Tank with Copper Fin Tube Boilers I have seen installation where someone thought they could save a few bucks by eliminating the storage tank and using the heating hot water main as the storage tank. This does not work in motels, hotels, apartment buildings and condos with large peak loads. In facilities like these there needs to be a stored volume of water ready for use in a dump load such as a morning shower period. Copper fin-tube boilers can only raise the temperature of the water 20 - 40 degrees Fahrenheit as the water flows through the boiler. If the water flows too slow, through the boiler, it will scale up and if the water flows too fast (in excess of five feet per second) the copper will erode away. These types of boilers work fine, the just need to have a storage tank for plumbing applications with a dump load. In heating applications the BTU input is matched to the heating load calculations and the system works fine. In a large domestic hot water or a combined heating hot water/domestic hot water system, copper fin-tube boilers should have an adjacent storage tank in order to work properly. If there is no storage tank, the system temperatures will drop off drastically during peak winter showering and building heating periods. The usual result is the maintenance personnel turn up the temperature and higher temperatures increase the risk of scalding.

Pitfall Number 11 - No Thermal Expansion Tank/Proper Thermal Expansion Tank Materials All heating hot water system and domestic hot water systems must have a thermal expansion tank. The thermal expansion tank should be sized for a system start-up from ambient to hot. Another problem I have encountered with these combined systems is usage of a hydronic expansion tank on a combined system. If the same water flows through the coils and to the plumbing fixtures, the system must have a thermal expansion tank rated for use in a potable water system. If the system has one boiler and two separate piping systems with a heat exchanger each piping system should have a thermal expansion tank.

Pitfall Number 12 - Scalding Injuries & Deaths Many designers, contractors and owners forget there are lives at stake when they design and build the combined heating hot water and domestic hot water systems. People have been scalded to death and people have been seriously injured when the systems are not designed, installed or maintained properly. This is more than just a savings on first-cost of an installation, it is a system that warrants serious attention because the public's safety is at stake. A properly sized and located thermostatic mixing valve conforming to ASSE 1017 or ASSE 1070 should be located in the combined system in accordance with the scoping requirements for each type of valve to prevent scalding. At shower locations an ASSE 1016 valve should be used and it should be properly set by the installer and/or the maintenance personnel to limit the maximum outlet temperature to 120 F or less.

Pitfall Number 13 - Litigation Combined systems are susceptible to problems. Problems can lead to injuries and injuries can lead to litigation. If an open combined heating hot water and domestic hot water system cannot be properly maintained for the entire life of the system, don't design it, don't install it or don't request that it be installed because problems will arise. Combined systems require an extensive amount of work and oversight by a person with knowledge of both the heating water requirements and domestic hot water requirements to make sure the system works properly and to make sure someone does not get injured. You must document everything when working on a combined system because when someone gets injured, everyone will be named in the lawsuit.

Pitfall Number 14 – Code Requirements for Thermostatic Mixing Valves The 2009 International Plumbing Code has the following Language dealing with combined systems: 501.2 Water heater as space heater. Where a combination potable water heating and space heating system requires water for space heating at temperatures higher than 140°F (60°C), a master thermostatic mixing valve complying with ASSE 1017 shall be provided to limit the water supplied to the potable hot water distribution system to a temperature of 140°F (60°C) or less. The potability of the water shall be maintained throughout the system. The above code language limits the domestic hot water system to 140 degrees Fahrenheit, and in other code sections the temperature for showers and tub/shower combination units is limited to 120 degrees Fahrenheit. The 2009 International Plumbing code also has the following language addressing maximum water temperatures for instantaneous water heaters: 501.6 Water temperature control in piping from tankless heaters. The temperature of water from tankless water heaters shall be a maximum of 140°F (60°C) when intended for domestic uses. This provision shall not supersede the requirement for protective shower valves in accordance with Section 424.3.

Pitfall Number 15 - Engineered System vs Value Engineered systems I have seen where a value engineering option was offered by a contractor to combine the domestic hot water system with the heating hot water system. This was not a value to the owner and it was not engineered. During the evaluation process the owner decided to allow the contractor to combine the systems without the contractor providing engineered drawings. This decision gave the contractor the ability to use whatever he wanted to use since there were no engineered drawings. The owner got a system that did not work, and had black brackish water flushed out of the dead legs every fall when the heating system was turned on and the stagnant water was circulated through the domestic water piping. I submitted a report almost 200 pages long documenting the many problems in that system.

Pitfall Number 16 - Pipe Materials I have seen where a pipe material cost cutting option that was labeled as a value engineering option was given by a contractor. The option was accepted and the contractor simply eliminated the domestic hot water system and changed the hydronic system from black steel to galvanized steel piping. This was in a condominium building that had about 500 condos that sold in the neighborhood of 1 million dollars each. The galvanized pipe started to rust significantly within two years of service and rust stains were significant in all fixtures. The seasonal dead legs from the heating coils allowed rust barnacles to form until the first call for heat. When the flow in these dead leg branches would resume on the first call for heat in the fall it would flush rust, debris and iron oxide and stagnant water into the strainers of the control valves and into the domestic water system. Galvanized steel pipe should never be used on a domestic hot water system because domestic hot water in an open system connected to the city water main introduces a large quantity of oxygenated water into the system and causes rust. Oxygenated water will cause significant corrosion in ferrous metals such as black steel and galvanized pipe. All components of a combined system should be copper or another code approved non-ferrous material for domestic hot water service if they are in contact with the city water supply. Another thing I often see is iron valves installed in these combined systems. This is usually the result of a heating contractor installing or performing maintenance on the combined system and it is usually the result of the contractor not being familiar with the requirements in the code for all components to be all bronze and/or approved for domestic water use.

Pitfall Number 17 - Pumps When sizing pumps for a combined system there should be two separate systems. The closed system should have large circulating pumps designed for the heating hot water flows. The open system should have small circulator pumps to maintain hot water to the farthest fixture. It is also a good idea to split the load into two and use two smaller pumps to allow for some redundancy and allow for one pump to be maintained while the other is in service. It's a good idea to do this with the boilers also to provide some redundancy. The hydronic system should be a closed loop that can use large ductile iron bodied pumps. The domestic water system is an open system and should have an all bronze circulator. I have seen combined systems where it was an open system with large ductile iron pumps in the main piping before the boilers to provide an adequate flow of heating hot water in the winter months. Then because they did not want to run the large pumps just to maintain the domestic hot water temperature at the end of the system, a small bronze circulator was installed on a branch off of the main with check valves to prevent short circuiting the flow through the larger pumps. The problem with an open system is when the large pumps are shut down for sometimes over 6 months the pumps, and all hydronic circuits to heating coils and baseboard heaters become dead legs in the piping system. Dead legs are places where bacteria like Legionellae can grow and thrive. This is why there should be a separate closed piping circuit for the heating hot water system piping.

Pitfall Number 18 - Corrosion Ferrous piping in a domestic hot water system is not advisable. Although galvanized pipe is allowed by code for domestic hot water systems, it should never be used in a domestic hot water system if you intend for the building systems to last more than a couple of years. Hot water tends to accelerate corrosion in galvanized piping systems. All domestic hot water piping should be copper or another approved non-ferrous material. Another problem with combined systems is the use of large cast iron and ductile iron hydronic heating circulating pumps that are installed in combined systems that were not approved for domestic water systems. I have seen galvanized steel pipes and even black steel pipe nipples used in domestic hot water systems. When the systems were first turned on in the fall large slugs of iron oxide laden water is forced into the domestic hot water distribution system. This generally results in sinks and bathtubs filled with black and orange rusty looking water until the entire system get flushed out significantly. The ferrous materials in the combined system typically lead to other problems with plugged strainers on control valves and other components. The iron oxide can also provide a surface for bacteria to grow.

Pitfall Number 19 - Corrosion inhibitors and other boiler water treatment chemicals I visited one building on the east coast where the combined system consisted of 8 inch galvanized water pipes. The galvanized pipes were corroding to the point where the hot water was very cloudy and orange. The building maintenance personnel chose to add an injection pump to inject chemicals into the domestic water main entering the building to raise the PH of the water and to intentionally build up a layer of scale inside the piping to minimize the amount of corrosion in the galvanized piping. The problem was the scale also formed on the heating surfaces and in the control valves causing them to fail. Upon inspection of the barrel of chemicals being injected into the water supply there were warning labels that stated the materials were toxic to humans. I reported this to the building owner to correct the situation immediately. This was another case of a heating contractor working on a plumbing system and not being familiar with plumbing code requirements. The solution he came up with would be a possible option for a hydronic system, but in a domestic water system that was a code violation and a health and safety issue.

Pitfall Number 20 - Loss of Both Systems When There is a Problem Another problem with combined systems is when there is a problem with a combined system that causes the system to shut down, both the domestic hot water system and the heating hot water system is out of service. If it is a boiler problem or another major problem the entire building could be without both systems for a long period of time. Combined system should have separate piping loops and redundant equipment to allow for some usage if one system or the other requires service.

Pitfall Number 21 - Legionellae Bacteria A research report in 1988 authored by Al Steele who was the president of the ASPE Research foundation at the time recommended storing domestic hot water between 135 degrees Fahrenheit and 140 degrees Fahrenheit to kill Legionellae bacteria and utilizing a thermostatic mixing valve to mix the hot water down to a safe delivery temperature below 120 degrees Fahrenheit to minimize scalding. The higher storage temperature around 140 degrees Fahrenheit was suggested because it is above the temperatures where Legionella bacteria can survive and multiply. With a storage temperature of 140 degrees Fahrenheit the Legionellae bacteria will die within 32 minutes.

Table -1 Legionellae Bacteria Growth and Disinfection Temperature Chart.

158 F and above F (70 C +): Legionellae Bacteria Disinfection range.

At 151 Degrees F (66 Degrees C): Legionellae die within 2 minutes.

At 140 Degrees F (60 Degrees C): Legionellae die within 32 minutes.

At 135 Degrees F (57.5 Degrees C) Legionellae die within 2 hours.

At 131 Degrees F (55 Degrees C): Legionellae die within 5 to 6 hours.

Above 122 Degrees F (50 Degrees C): They can survive but do not multiply.

95 to 115 Degrees F (35 to 46 Degrees C): Ideal Legionellae Bacteria growth range.

68 to 122 Degrees F (20 to 50 Degrees C): Legionellae Bacteria growth range.

Below 68 Degrees F (20 Degrees C): Legionellae can survive but are dormant.

The Legionellae bacteria cannot survive water temperatures above 131 degrees Fahrenheit (55 Degrees C) for more than five or six hours. The bacteria die instantly at temperatures above 158 degrees F (70 degrees C). General protection against the bacteria can be achieved by designing an operating water temperature of at least 140 degrees F (60 degrees C) or higher. As temperatures increase, so does the risk of scalding.

For system water temperatures below 140 Degrees F (60 Degrees C) special provisions are necessary to allow for cleaning and chemical treatment procedures for addressing the Legionellae Bacteria in the Domestic Hot Water System. Given a storage temperature of 140 degrees Fahrenheit that should be high enough to protect the water heater from the bacteria, but in open systems with Legionellae bacteria in the municipal water supply, it would continually re-seed the potable hot water system with high dosages of potentially Legionellae bacteria infested water. This is another reason why combined systems should have a closed loop for the heating hot water system.

Pitfall Number 22 - Leakage of Boiler Water. When boiler water is at a higher temperature than 140 degrees Fahrenheit, (180 to 210 degrees Fahrenheit) and it is allowed to leak through a faulty zone valve or solenoid valve if there is debris in the line or if the boiler water is allowed to flow by gravity circulation through a circulating pump that is de-energized, there is the potential for overheating the domestic hot water. In these cases a system can have a thermostat set to de-energize the circulating pumps or close the solenoid valve and if they leak, the domestic hot water can rise above the set point to a temperature close to the boiler water temperature. A thermostat that controls a solenoid valve or circulating pumps on the water heater should never be used to control the temperature in a domestic hot water system because thermostats allow too much of a temperature variation from when it senses the water to turn on or off the pump or solenoid valve and there is potential for leakage and temperature creep. The best way to address this is to provide a thermostatic mixing valve that conforms to ASSE 1017 on the domestic hot water line coming from the hot water tank to provide a safe hot water distribution temperature. If you are considering a combined system, avoiding these pitfalls listed above should help keep your building warm and the occupants in a safe temperature of hot water. If you don't avoid these pitfalls you could find yourself in hot water. Another option would be to keep life simple and keep the systems separate. Then you will not have to worry about someone coming along later and messing up your system design with system modifications or poor maintenance that can create scalding issues then steer clear of combined heating hot water and domestic hot water systems and you will steer clear of potential litigation also.

Cost Impact: The code change proposal will increase the cost of construction This will cause an increase in equipment costs.

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The Committee agreed with the published reason statement. (Vote:7-6)

Assembly Action:

Disapproved

P70-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Self (JBEngineer@aol.com) requests Disapprove.

Commenter's Reason: There is a lack of understanding of the operation of these system by the proponent. Thousands of water heaters have been used as the heating source for an air handling unit. The proponent alleges bacteria growth, yet there is no data provided identifying any system with bacteria growth. The proponent also claims energy waste. Again, this shows a lack of understanding as to how these systems work. If a viable system is going to be prohibited by the code, there should be proper technical justification to support such a drastic change, not supposition.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Systems that currently comply with the code are viable and economical. Disapproval of this proposal will allow for these economical heating systems to continue to be installed without an increase or decrease in cost caused by a change in the code requirements.

Public Comment 2:

Proponent: DONALD SURRENA, NATIONAL ASSOCIATION OF HOME BUILDERS, representing National Association of Home Builders (dsurrena@nahb.org) requests Disapprove.

Commenter's Reason: This proposal indicates water in piping will sit stagnant for 6 to 8 months. This is an incorrect statement. The water heating and space heating unit is a dual function appliance. It draws water whenever hot water is used in any of the fixtures in the dwelling, there is no part of the piping system that sits dormant. This proposal will only succeed in increasing the complexity of the heating unit and further increase the cost of construction.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
Providing a double wall heat exchanger will add to the cost of construction.

Public Comment 3:

Proponent: Assembly Action requests Disapprove.

Commenter's Reason: This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action. The assembly action for Disapprove was successful by a vote of 75.5% (77) to 24.5% (25) by eligible members online during the period of May 9 - May 23, 2018.

P70-18

P79-18 Part I

IPC: 604.3, TABLE 604.3

Proposed Change as Submitted

Proponent: DONALD SURRENA, National Association of Home Builders, representing National Association of Home Builders (dsurrena@nahb.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IPC COMMITTEE. PART II WILL BE HEARD BY THE IRC-PLUMBING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

2018 International Plumbing Code

Revise as follows

604.3 Water distribution system design criteria. The water distribution system shall be designed, and pipe sizes shall be selected such that under conditions of sized for peak demand, the capacities at the fixture supply pipe outlets shall be not less than using the values shown in Table 604.3. The minimum flow rate and flow pressure provided to fixtures and appliances not listed in Table 604.3 shall be in accordance with the manufacturer's installation instructions.

TABLE 604.3
FLOW RATES AND PRESSURES FOR DESIGNING WATER DISTRIBUTION SYSTEM DESIGN CRITERIA
REQUIRED CAPACITY AT FIXTURE SUPPLY PIPE OUTLET SYSTEMS

FIXTURE SUPPLY OUTLET SERVING	FLOW RATE^a (gpm)	FLOW PRESSURE (psi)
Bathtub, balanced-pressure, thermostatic or combination balanced-pressure/thermostatic mixing valve	4	20
Bidet, thermostatic mixing valve	2	20
Combination fixture	4	8
Dishwasher, residential	2.75	8
Drinking fountain	0.75	8
Laundry tray	4	8
Lavatory, private	0.8	8
Lavatory, private, mixing valve	0.8	8
Lavatory, public	0.4	8
Shower	2.5	8
Shower, balanced-pressure, thermostatic or combination balanced-pressure/thermostatic mixing valve	2.5 ^b	20
Sillcock, hose bibb	5	8
Sink, residential	1.75	8
Sink, service	3	8
Urinal, valve	12	25
Water closet, blow out, flushometer valve	25	45
Water closet, flushometer tank	1.6	20
Water closet, siphonic, flushometer valve	25	35
Water closet, tank, close coupled	3	20
Water closet, tank, one piece	6	20

For SI: 1 pound per square inch = 6.895 kPa, 1 gallon per minute = 3.785 L/m.

- a. For additional requirements for flow rates and quantities, see Section 604.4.
- b. Where the shower mixing valve manufacturer indicates a lower flow rating for the mixing valve, the lower value shall be applied.

Reason: The section and the table were intended to be used to set design capacities for the domestic water systems,

not for field testing. With the emphasis on low flow fixtures and lower flow rating for mixing valves these numbers are causing confusion and misinterpretation in the field. Looking at the table what would be the health or safety reason for a bathtub to be required to flow at 4 gpm at 20 psi, or a water closet at 6 gpm at 20 psi or even 3 gpm at 20 psi as the table states? Balanced mixing valves are shown as 2.5 gpm at 20 psi or even lower if the manufacturer indicates. How does the inspector regulate the psi from 20 to 8 depending on the fixture being measured? These are all design specifications and not volumes to be measured at the fixture at differing psi.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This is a clarification change that will not impact the cost of construction.

P79-18 Part I

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: There doesn't appear to be a legitimate reason for this proposal. The section language already indicates that the table is for design purposes. (Vote:13-1)

Assembly Action:

None

P79-18 Part I

Individual Consideration Agenda

Public Comment 1:

Proponent: DONALD SURRENA, NATIONAL ASSOCIATION OF HOME BUILDERS, representing National Association of Home Builders (dsurrena@nahb.org) requests As Submitted.

Commenter's Reason: This proposal was approved by the IRC committee 8 in favor and 2 opposed. This is a clarification of a table and text to indicate the requirements are design criteria and not inspection criteria.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This is a clarification for the use of the values in the table. There is no cost impact for clarifications of the code.

P79-18 Part I

P79-18 Part II

IRC: P2903.1, Table TABLE P2903.1

Proposed Change as Submitted

Proponent: DONALD SURRENA, National Association of Home Builders, representing National Association of Home Builders (dsurrena@nahb.org)

2018 International Residential Code

Revise as follows

P2903.1 Water supply system design criteria. The water service and water distribution systems shall be designed and pipe sizes shall be selected such that under conditions of sized for peak demand, the capacities at the point of outlet discharge shall be not less than using values shown in Table P2903.1.

TABLE P2903.1
REQUIRED CAPACITIES AT POINT OF OUTLET DISCHARGE FLOW RATE AND PRESSURES FOR DESIGNING PIPING SYSTEMS

FIXTURE SUPPLY OUTLET SERVING	FLOW RATE (gpm)	FLOW PRESSURE (psi)
Bathtub, balanced-pressure, thermostatic or combination balanced-pressure/thermostatic mixing valve	4	20
Bidet, thermostatic mixing valve	2	20
Dishwasher	2.75	8
Laundry tray	4	8
Lavatory	0.8	8
Shower, balanced-pressure, thermostatic or combination balanced-pressure/thermostatic mixing valve	2.5 ^a	20
Sillcock, hose bibb	5	8
Sink	1.75	8
Water closet, flushometer tank	1.6	20
Water closet, tank, close coupled	3	20
Water closet, tank, one-piece	6	20

For SI: 1 pound per square inch = 6.895 kPa, 1 gallon per minute = 3.785 L/m.

- a. Where the shower mixing valve manufacturer indicates a lower flow rating for the mixing valve, the lower value shall be applied.

Reason: The section and the table were intended to be used to set design capacities for the domestic water systems, not for field testing. With the emphasis on low flow fixtures and lower flow rating for mixing valves these numbers are causing confusion and misinterpretation in the field. Looking at the table what would be the health or safety reason for a bathtub to be required to flow at 4 gpm at 20 psi, or a water closet at 6 gpm at 20 psi or even 3 gpm at 20 psi as the table states? Balanced mixing valves are shown as 2.5 gpm at 20 psi or even lower if the manufacturer indicates. How does the inspector regulate the psi from 20 to 8 depending on the fixture being measured? These are all design specifications and not volumes to be measured at the fixture at differing psi.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This is a clarification to existing language and will not impact the cost of construction.

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This is a needed clarification because these pressures and flows cannot be "inspected". This table is only intended to be used for calculation and pipe sizing purposes. (Vote:8-2)

Assembly Action:

None

P79-18 Part II

P82-18 Part I

IPC: Table TABLE 604.4

Proposed Change as Submitted

Proponent: Anthony Floyd, City of Scottsdale, representing City of Scottsdale (afloyd@scottsdaleaz.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IPC COMMITTEE. PART II WILL BE HEARD BY THE IRC-PLUMBING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

2018 International Plumbing Code

Revise as follows

**TABLE 604.4
MAXIMUM FLOW RATES AND CONSUMPTION FOR PLUMBING FIXTURES AND FIXTURE FITTINGS**

PLUMBING FIXTURE OR FIXTURE FITTING	MAXIMUM FLOW RATE OR QUANTITY^b
Lavatory, private	2.2 gpm at 60 psi
Lavatory, public (metering)	0.25 gallon per metering cycle
Lavatory, public (other than metering)	0.5 gpm at 60 psi
Shower head ^{a,c}	2.5 gpm at 80 psi
Sink faucet	2.2 gpm at 60 psi
Urinal	1.0 gallon per flushing cycle
Water closet	1.6 gallons per flushing cycle

For SI: 1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

- a. A hand-held shower spray is a shower head.
- b. Consumption tolerances shall be determined from referenced standards.
- c. Where a shower compartment is served by multiple shower heads, the concurrent discharge of all shower heads controlled by a single valve shall not exceed the maximum flow rate.

Reason: This code change limits the combined shower head flow rate to 2.5 gpm where multiple heads are installed unless the shower is designed to allow only one shower head to operate at a time. Multiple shower heads were not common when EAct was enacted 25 years ago to limit the flow rate of shower heads. Since then, shower compartments have trended towards multiple shower heads and body sprays.

This code change ensures that where a shower compartment is served by multiple shower heads, the maximum flow rate is 1) controlled by a single valve for each shower head, 2) designed to allow only one shower head to be in operation at a time or 3) controlled by a single valve for the combined flow rate of multiple heads not exceeding the maximum flow rate.

Shower compartments with multiple showering stations are typically provided with a separate valve for each shower head. Shared shower compartments with separate valve controls are common features and meet the intent of this code change.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. There is no cost impact.

P82-18 Part I

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This is a CalGreen requirement that should not be a minimum for everywhere else. (Vote:14-0)

Assembly Action:

None

P82-18 Part I

Individual Consideration Agenda

Public Comment 1:

Proponent: Anthony Floyd, representing City of Scottsdale (afloyd@scottsdaleaz.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

**TABLE 604.4
MAXIMUM FLOW RATES AND CONSUMPTION FOR PLUMBING FIXTURES AND FIXTURE FITTINGS**

PLUMBING FIXTURE OR FIXTURE FITTING	MAXIMUM FLOW RATE OR QUANTITY^b
Lavatory, private	2.2 gpm at 60 psi
Lavatory, public (metering)	0.25 gallon per metering cycle
Lavatory, public (other than metering)	0.5 gpm at 60 psi
Shower head ^{a,c}	2.5 gpm at 80 psi
Sink faucet	2.2 gpm at 60 psi
Urinal	1.0 gallon per flushing cycle
Water closet	1.6 gallons per flushing cycle

For SI:

1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

- a. A hand-held shower spray is a shower head.
- b. Consumption tolerances shall be determined from referenced standards.
- c. Where a shower compartment is served by multiple shower heads, ~~the concurrent discharge of all shower heads controlled by a single each shower control valve shall not exceed the maximum flow rate~~ operate not more than two shower heads or other outlets at any given time.

Commenter's Reason: This modification recognizes shower compartments with multiple shower heads or other shower outlets such as rain heads and body sprays that are not currently addressed in the code. Unlike the CalGreen standard (as referenced by the committee), this modification will allow up to two shower outlets controlled by a single control valve with a higher combined flow rate.

In addition, the shower head flow rate limit remains at 2.5 gpm, not the 2.0 gpm that's in CalGreen. Kohler, Delta, American Standard, Toto and other shower valve product manufacturers have diverter control valves readily available on the market. This modification provides a reasonable limitation on the total volume of water in showers with multiple shower heads and/or other shower outlets that is in line with the Energy Policy Act (1992) for water conservation.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The code change is based on the shower compartment design and number of installed shower heads. It does not require any additional fixtures or valves to be installed.

Public Comment 2:

Proponent: David Collins, representing International Code Council Sustainability, energy and high performance Code Action Committee (sehpcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

**TABLE 604.4
MAXIMUM FLOW RATES AND CONSUMPTION FOR PLUMBING FIXTURES AND FIXTURE FITTINGS**

PLUMBING FIXTURE OR FIXTURE FITTING	MAXIMUM FLOW RATE OR QUANTITY ^b
Lavatory, private	2.2 gpm at 60 psi
Lavatory, public (metering)	0.25 gallon per metering cycle
Lavatory, public (other than metering)	0.5 gpm at 60 psi
Shower head ^{a,c}	2.5 gpm at 80 psi
Sink faucet	2.2 gpm at 60 psi
Urinal	1.0 gallon per flushing cycle
Water closet	1.6 gallons per flushing cycle

For SI: 1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

- a. A hand-held shower spray or body spray is a shower head .
- b. Consumption tolerances shall be determined from referenced standards.
- c. Where a shower compartment is served by multiple shower heads, ~~the concurrent discharge of all shower heads controlled by a single~~ each shower control valve shall ~~not exceed the maximum flow rate~~ operate not more than two shower heads.

Commenter's Reason: This modification recognizes shower compartments with multiple shower heads or other shower outlets such as rain heads and body sprays that are not currently addressed in the code. Unlike the CalGreen standard (as referenced by the committee), this modification will allow up to two shower outlets controlled by a single control valve with a higher combined flow rate.

In addition, the shower head flow rate limit remains at 2.5 gpm, not the 2.0 gpm that's in CalGreen. Kohler, Delta, American Standard, Toto and other shower valve product manufacturers have diverter control valves readily available on the market. This modification provides a reasonable limitation on the total volume of water in showers with multiple shower heads and/or other shower outlets that is in line with the Energy Policy Act (1992) for water conservation.

This public comment was submitted by the ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors in July of 2011 to pursue opportunities and to improve and enhance assigned International Codes or portions thereof. Each year the SEHPCAC has historically held 3 open face-to-face meetings and numerous Working Group meetings, conference calls and webinars. These meetings, conference calls and webinars are public and are convened to facilitate discussion and debate of proposed changes and public comments to the codes by members of the committee, as well as interested parties.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The code change is based on the shower compartment design and number of installed shower heads. It does not require any additional fixtures or valves to be installed.

P82-18 Part I

P82-18 Part II

IRC: Table TABLE P2903.2

Proposed Change as Submitted

Proponent: Anthony Floyd, City of Scottsdale, representing City of Scottsdale (afloyd@scottsdaleaz.gov)

2018 International Residential Code

Revise as follows

**TABLE P2903.2
MAXIMUM FLOW RATES AND CONSUMPTION FOR PLUMBING FIXTURES AND FIXTURE FITTINGS^b**

PLUMBING FIXTURE OR FIXTURE FITTING	MAXIMUM FLOW RATE OR QUANTITY
Lavatory faucet	2.2 gpm at 60 psi
Shower head ^{a,c}	2.5 gpm at 80 psi
Sink faucet	2.2 gpm at 60 psi
Water closet	1.6 gallons per flushing cycle

For SI: 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

- a. A handheld shower spray shall be considered to be a shower head.
- b. Consumption tolerances shall be determined from referenced standards.
- c. Where a shower compartment is served by multiple shower heads, the concurrent discharge of all shower heads controlled by a single valve shall not exceed the maximum flow rate.

Reason: This code change limits the combined shower head flow rate to 2.5 gpm where multiple heads are installed unless the shower is designed to allow only one shower head to operate at a time. Multiple shower heads were not common when EAct was enacted 25 years ago to limit the flow rate of shower heads. As houses and bathrooms have increased in size, many shower compartments have expanded to include multiple shower heads and body sprays.

This code change ensures that where a shower compartment is served by multiple shower heads, the maximum flow rate is 1) controlled by a single valve for each shower head, 2) designed to allow only one shower head to be in operation at a time or 3) controlled by a single valve for the combined flow rate of multiple heads not exceeding the maximum flow rate.

Shower compartments with multiple showering stations are typically provided with a separate valve for each shower head. Shared shower compartments with separate valve controls are common features and meet the intent of this code change.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. There is no cost impact.

P82-18 Part II

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This requirement would limit the design possibilities for buildings and shower system manufacturers. (Vote:9-1)

Assembly Action:

None

P82-18 Part II

Individual Consideration Agenda

Public Comment 1:

Proponent: Anthony Floyd, representing City of Scottsdale (afloyd@scottsdaleaz.gov) requests As Modified by This Public Comment.

Modify as follows:

2018 International Residential Code

**TABLE P2903.2
MAXIMUM FLOW RATES AND CONSUMPTION FOR PLUMBING FIXTURES AND FIXTURE FITTINGS^b**

PLUMBING FIXTURE OR FIXTURE FITTING	MAXIMUM FLOW RATE OR QUANTITY
Lavatory faucet	2.2 gpm at 60 psi
Shower head ^{a,c}	2.5 gpm at 80 psi
Sink faucet	2.2 gpm at 60 psi
Water closet	1.6 gallons per flushing cycle

For SI:

1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

- a. A handheld shower spray shall be considered to be a shower head.
- b. Consumption tolerances shall be determined from referenced standards.
- c. Where a shower compartment is served by multiple shower heads, ~~the concurrent discharge of all shower heads controlled by a single each shower control valve shall not exceed the maximum flow rate~~ operate not more than two shower heads or other outlets at any given time.

Commenter's Reason: This modification recognizes shower compartments with multiple shower heads or other shower outlets such as rain heads and body sprays that are not currently addressed in the code. Unlike the CalGreen standard (as referenced by the committee), this modification will allow up to two shower outlets controlled by a single control valve with a higher combined flow rate. This modification will not limit the design possibilities for buildings and shower system manufacturers as stated by the committee.

In addition, the shower head flow rate limit remains at 2.5 gpm, not the 2.0 gpm that's in CalGreen. Kohler, Delta, American Standard, Toto and other shower valve product manufacturers have diverter control valves readily available on the market. This modification provides a reasonable limitation on the total volume of water in showers with multiple shower heads and/or other shower outlets that is in line with the Energy Policy Act (1992) for water conservation.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The code change is based on the shower compartment design and number of installed shower heads. It does not require any additional fixtures or valves to be installed.

Public Comment 2:

Proponent: David Collins, representing International Code Council Sustainability, energy and high performance Code Action Committee (sehpcac@iccsafe.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Residential Code

**TABLE P2903.2
MAXIMUM FLOW RATES AND CONSUMPTION FOR PLUMBING FIXTURES AND FIXTURE FITTINGS^b**

PLUMBING FIXTURE OR FIXTURE FITTING	MAXIMUM FLOW RATE OR QUANTITY
Lavatory faucet	2.2 gpm at 60 psi
Shower head ^{a,c}	2.5 gpm at 80 psi
Sink faucet	2.2 gpm at 60 psi
Water closet	1.6 gallons per flushing cycle

For SI: 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

- a. A handheld shower spray or body spray shall be considered to be a shower head.
- b. Consumption tolerances shall be determined from referenced standards.
- c. Where a shower compartment is served by multiple shower heads, ~~the concurrent discharge of all shower heads controlled by a single~~ each shower control valve shall ~~not exceed the maximum flow rate~~ operate not more than two shower heads.

Commenter's Reason: This modification recognizes shower compartments with multiple shower heads or other shower outlets such as rain heads and body sprays that are not currently addressed in the code. Unlike the CalGreen standard (as referenced by the committee), this modification will allow up to two shower outlets controlled by a single control valve with a higher combined flow rate. This modification will not limit the design possibilities for buildings and shower system manufacturers as stated by the committee.

In addition, the shower head flow rate limit remains at 2.5 gpm, not the 2.0 gpm that's in CalGreen. Kohler, Delta, American Standard, Toto and other shower valve product manufacturers have diverter control valves readily available on the market. This modification provides a reasonable limitation on the total volume of water in showers with multiple shower heads and/or other shower outlets that is in line with the Energy Policy Act (1992) for water conservation.

This public comment was submitted by the ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors in July of 2011 to pursue opportunities and to improve and enhance assigned International Codes or portions thereof. Each year the SEHPCAC has historically held 3 open face-to-face meetings and numerous Working Group meetings, conference calls and webinars. These meetings, conference calls and webinars are public and are convened to facilitate discussion and debate of proposed changes and public comments to the codes by members of the committee, as well as interested parties.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The code change is based on the shower compartment design and number of installed shower heads. It does not require any additional fixtures or valves to be installed.

P82-18 Part II

P91-18

IPC: 606.1

Proposed Change as Submitted

Proponent: Guy McMann, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO)
(gmcmann@jeffco.us)

2018 International Plumbing Code

Revise as follows

606.1 Location of full-open valves. Full-open valves shall be installed in the following locations:

1. On the building water service pipe from the public water supply near the curb.
2. On the water distribution supply pipe at the entrance into the structure.
 - 2.1 In multiple tenant buildings, where a common water supply piping system is installed to supply other than one and two family dwellings, a main shutoff valve shall be provided for each tenant.
3. On the discharge side of every water meter.
4. On the base of every water riser pipe in occupancies other than multiple-family residential occupancies that are two stories or less in height and in one- and two-family residential occupancies.
5. On the top of every water down-feed pipe in occupancies other than one- and two-family residential occupancies.
6. On the entrance to every water supply pipe to a dwelling unit, except where supplying a single fixture equipped with individual stops.
7. On the water supply pipe to a gravity or pressurized water tank.
8. On the water supply pipe to every water heater.

Reason: It is a needless inconvenience to have to shut down an entire building when tenants need to work on their own water piping or in the case of emergencies. For the minimal cost of a valve, it makes sense to isolate tenant spaces just as what is done for gas piping. Opening the system causes air in pipes in other units that they might not be aware of and possibly causing a water hammer situation that can have a negative effect on the piping.

Cost Impact: The code change proposal will increase the cost of construction
The increase will be the cost of the valve and the labor to install it.

P91-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: The Committee agreed with the published reason statement. (Vote:10-4)

Assembly Action:

None

P91-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, representing Self (jbengineer@aol.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

606.1 Location of full-open valves. Full-open valves shall be installed in the following locations:

1. On the building water service pipe from the public water supply near the curb.
2. On the water distribution supply pipe at the entrance into the structure.
 - 2.1. In multiple tenant buildings, where a common water supply piping system is installed to supply other than one and two family dwellings, a main shutoff valve shall be provided for each tenant except where each fixture is equipped with individual stops.
3. On the discharge side of every water meter.
4. On the base of every water riser pipe in occupancies other than multiple-family residential occupancies that are two stories or less in height and in one- and two-family residential occupancies.
5. On the top of every water down-feed pipe in occupancies other than one- and two-family residential occupancies.
6. On the entrance to every water supply pipe to a dwelling unit, except where supplying a single fixture equipped with individual stops
7. On the water supply pipe to a gravity or pressurized water tank.
8. On the water supply pipe to every water heater.

Commenter's Reason: For high rise plumbing systems, piping design goes from horizontal to vertical. (This actually occurs for building 4 stories and taller.) In vertical piping arrangements, multiple risers can serve a single tenant space. There is not a single pipe that serves all of the fixtures in that tenant space. This change would, in effect, prohibit a common piping design which is highly efficient and economical. Each fixture has a shut off valve in this piping arrangement. Hence, the except adds a requirement for individual stops. The code already requires a shut off valve at the top of each downfeed or the bottom of each riser. This will provide the control for shutting off the water in a high rise building.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This change will allow vertical piping arrangements to be installed in tall buildings. This is a less expensive means of installing the water piping. If the modification is not accepted, vertical piping installation would not be permitted.

Public Comment 2:

Proponent: Jeffrey Hugo, representing National Fire Sprinkler Association (hugo@nfsa.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

606.1 Location of full-open valves. Full-open valves shall be installed in the following locations:

1. On the building water service pipe from the public water supply near the curb.
2. On the water distribution supply pipe at the entrance into the structure.
- 2.1 In multiple tenant buildings, where a common domestic water supply piping system is installed to supply other than one and two family dwellings, a main shutoff valve shall be provided for each tenant.
3. On the discharge side of every water meter.
4. On the base of every water riser pipe in occupancies other than multiple-family residential occupancies that are two stories or less in height and in one- and two-family residential occupancies.
5. On the top of every water down-feed pipe in occupancies other than one- and two-family residential occupancies.
6. On the entrance to every water supply pipe to a dwelling unit, except where supplying a single fixture equipped with individual stops.
7. On the water supply pipe to a gravity or pressurized water tank.
8. On the water supply pipe to every water heater.

Commenter's Reason: While the IPC is strictly for plumbing systems there could be an interpretation to valve automatic sprinkler systems for individual units. An application of the IPC with the current wording could apply to every unit on every floor and goes far beyond the installation standards (NFPA 13 and NFPA 13R). Including the word domestic clarifies the valve is only for the plumbing system.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This clarification would eliminate excessive valves, electric supervision and maintenance costs for individual valves of automatic sprinkler systems in each unit.

P91-18

P94-18

IPC: 607.1

Proposed Change as Submitted

Proponent: Duane Jonlin, representing City of Seattle (duane.jonlin@seattle.gov)

2018 International Plumbing Code

Revise as follows

607.1 Where required. In residential *occupancies*, *hot water* shall be supplied to plumbing fixtures and equipment utilized for bathing, washing, culinary purposes, cleansing, laundry or building maintenance. In nonresidential *occupancies*, *hot water* shall be supplied for culinary purposes, cleansing, laundry or building maintenance purposes. In nonresidential *occupancies*, *hot water* or *tempered water* shall be supplied for bathing and washing purposes.

Exception: Where the water serving public lavatories that are not served by separate hot and cold water pipes is not heated, or is heated with a water heating system that is not capable of heating the water to a temperature above 80° F, this section shall not apply.

Reason: Use of 120-degree water for handwashing *increases* the risk of disease transmission, as well as wasting energy and increasing the cost and complexity of construction. Room temperature water provides equal handwashing hygiene, while not supporting the growth of legionella. This proposal makes hot water *optional* for lavatories, and provides significant cost savings: the hot water piping, circulation pumps, pipe insulation, tempering valves, mixing valves and numerous other components would become unnecessary, and little if any water heating would be required. Operational savings and risk reduction persist for the life of the building, with dramatically decreased energy, maintenance, and equipment replacement costs, and no growth of legionella.

Owners can still provide hot water for handwashing, but this proposal allows those concerned with cost, safety and disease control to opt out if they so choose.

Bibliography: Show Me the Science - How to Wash Your Hands, Centers for Disease Control and Prevention (2017), page 1, www.cdc.gov/handwashing/show-me-the-science-handwashing.html

The environmental cost of misinformation: why the recommendation to use elevated temperatures for handwashing is problematic, International Journal of Consumer Studies, Carrico, Amanda R., et al. (2013) page 2.

Cool Water as Effective as Hot for Removing Germs During Handwashing, Infection Control Today (2017) page 1

Water temperature as a factor in handwashing efficacy, Food Service Technology, Michaels, B, et al, (2002) pages 139-149

Cost Impact: The code change proposal will decrease the cost of construction
This proposal makes hot water for lavatories *optional*.

For those who choose to provide hot water for lavatories, there is no cost change.

For those who choose *not* to provide hot water for lavatories, there are significant cost savings in materials, labor and space usage, due to the elimination of an entire system serving those lavatories. In addition, operational savings for energy, maintenance and equipment replacement are dramatically reduced and in some cases eliminated for the building's water heating and distribution system.

P94-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The Committee is not against the concept however, the language in the exception is not clear and could conflict with Section 419.5. (Vote:14-0)

Assembly Action:

As Submitted

P94-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Duane Jonlin, representing City of Seattle (duane.jonlin@seattle.gov); Jenifer Gilliland, representing City of Seattle, Washington requests As Modified by This Public Comment.

Replace as follows:

2018 International Plumbing Code

419.5 Tempered water for public hand-washing facilities. *Tempered water* shall be delivered from lavatories and group wash fixtures located in public toilet facilities provided for customers, patrons and visitors. *Tempered water* shall be delivered through an *approved* water-temperature limiting device that conforms to ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3.

Exception: Where the water serving public lavatories that are not served by separate hot and cold water pipes is not heated, or is heated with a water heating system that is not capable of heating the water to a temperature above 80 degrees F, this section shall not apply to those public lavatories.

607.1 Where required. In residential *occupancies*, *hot water* shall be supplied to plumbing fixtures and equipment utilized for bathing, washing, culinary purposes, cleansing, laundry or building maintenance. In nonresidential *occupancies*, *hot water* shall be supplied for culinary purposes, cleansing, laundry or building maintenance purposes. In nonresidential *occupancies*, *hot water* or *tempered water* shall be supplied for bathing and washing purposes.

Exception: Where the water serving public lavatories that are not served by separate hot and code water pipes is not heated, or is heated with a water heating system that is not capable of heating the water to a temperature above 80 degrees F, this section shall not apply to those public lavatories.

Commenter's Reason: The goal of the proposed code change is to make hot water, as defined by the International Plumbing Code, *optional* for public lavatories. Adoption of P94 will result in several benefits for the building owner as well as the public including reductions in construction cost, disease transmission risk, and energy consumption. In its review of the proposal, the Plumbing Code Committee stated that it was "not against the concept. However, the language in the exception is not clear and could conflict with Section 419.5." To address this concern, the wording of the changes to IPC 714.2 exception in the original proposal also being added to Section IPC 419.5. This should eliminate concerns about the alignment of these sections.

Bibliography: Please see sources in original proposal.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. The cost reductions will include reductions in the size of water heating and pumping equipment, length and diameter of hot water piping, pipe insulation, and mixing valves. In addition, there will be reductions in space requirements, both in equipment rooms and in wall/ceiling cavities.

P94-18

P96-18

IPC: 607.1.1, 607.1.2, Chapter 15

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Bradley Corporation (JBEngineer@aol.com)

2018 International Plumbing Code

Revise as follows

607.1.1 Temperature limiting means. A thermostat control for a water heater shall ~~not only~~ serve as the temperature limiting means for the purposes of complying with the requirements of this code for maximum allowable *hot* or *tempered water* delivery temperature at fixtures where the water heater complies with ASSE 1082, ASSE 1084, or ASSE 1085.

607.1.2 Tempered water temperature control. Tempered water shall be ~~supplied through a water temperature controlled by one the following:~~

1. A limiting device that conforms conforming to ASSE 1070/ASME A112.1070/CSA B125.70 and shall limit the tempered water to not greater than set to a maximum of 110°F (43°C).
2. A thermostatic mixing valve conforming to ASSE 1017.
3. A water heater conforming to ASSE 1082.
4. A water heater conforming to ASSE 1084.

This provision shall not supersede the requirement for protective shower valves in accordance with Section 412.3.

Add new standard(s) follows

ASSE

ASSE International
18927 Hickory Creek Drive, Suite
220
Mokena IL 60448

1085-2018:

Performance Requirements for Water Heaters for Emergency Equipment

1084-2018:

Performance Requirements for Water Heaters used as Temperature Limiting Devices

1082-2018:

Performance Requirements for Water Heaters Used as Temperature Control Devices for Hot Water Distribution Systems.

Reason: The restriction on the use of the water heater thermostat for regulating water temperature is based on standard water heaters. There are three new water heater standards that regulate the outlet temperature of the water heater. Hence, it is appropriate to use reference these standards as the only water heaters in which the water heater thermostat can be used to regulate the upper temperature limit.

Tempered water is a comfort requirement, as well as, a scald prevention requirement. However, comfort overrides the safety requirement since tempered water is limited to a maximum temperature of 110° F. Scalding temperatures are in excess of this temperature. Other viable means of controlling tempered water to 110° F or less are available in addition to a limiting device that complies with ASSE 1070/ASME A112.1070/CSA B125.70. The most common means of controlling tempered water is with a thermostatic mixing valve that complies with ASSE 1017.

A thermostatic mixing valve is an effective method of regulating the maximum temperature. The temperature is maintained within a few degrees depending on the flow rate. Scalding temperatures are in excess of this temperature. Other viable means of maintaining the water temperature to a maximum of 110° F are water heater meeting one of the three new water heater standards.

The three new standard for water heaters are ASSE 1082, ASSE 1084, and ASSE 1085. These water heaters are equivalent to ASSE 1017, ASSE 1070, and ASSE 1071 respectively. As such, they have the capability of providing an equivalent level of performance as the corresponding mixing valve. While a water heater complying with ASSE 1071 is designed to supply tepid water for emergency fixtures, the tepid temperature range can also meet the tempered temperature range. Hence, an ASSE 1085 water heater is also a viable option.

Cost Impact: The code change proposal will decrease the cost of construction. The options may lower the cost of installation.

Analysis: A review of the standards proposed for inclusion in the code, ASSE 1085-2018, ASSE 1084-2018 and ASSE1082-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P96-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 607.1.1 Temperature limiting means. A thermostat control for a water heater shall only serve as the temperature limiting means for the purposes of complying with the requirements of this code for maximum allowable hot or tempered water delivery temperature at fixtures where the water heater complies with ASSE 1082, ~~ASSE 1084~~, or ASSE 1085.

Committee Reason: For the Modification: The ASSE 1084 standard is not yet completed.
For the Proposal: The Committee agreed with the published reason statement. (Vote:10-4)

Assembly Action:

Disapproved

P96-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Conrad Jahrling, representing ASSE International (conrad.jahrling@asse-plumbing.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

607.1.1 Temperature limiting means. A thermostat control for a water heater shall only serve as the temperature limiting means for the purposes of complying with the requirements of this code for maximum allowable *hot or tempered water* delivery temperature at fixtures where the water heater complies with ASSE 1082, ~~or ASSE 1085~~.

607.1.2 Tempered water temperature control. Tempered water shall be controlled by one the following:

1. A limiting device conforming to ASSE 1070/ASME A112.1070/CSA B125.70 set to a maximum of 110 F (43 C).
- ~~2. A thermostatic mixing valve conforming to ASSE 1017.~~
- ~~3. A water heater conforming to ASSE 1082.~~
- 4.2. A water heater conforming to ASSE 1084.

This provision shall not supersede the requirement for protective shower valves in accordance with Section 412.3.

Commenter's Reason: *With regard to 607.1.1*

Only devices that conform to ASSE 1082 are appropriate for this application for water distribution. Water heaters conforming to ASSE 1084 only supply tempered water to point-of-use devices and fittings, similar to water temperature limiting devices conforming to ASSE 1070 / ASME A112.1070 / CSA B125.70. Water heaters conforming to ASSE 1085 only supply emergency fixtures that conform to ISEA Z358.1.

With regard to 607.1.2

Devices that conform to either ASSE 1017 or ASSE 1082 are not for controlling water temperature by the end user, which is the scope of this section. It is only appropriate to use a device that conforms to ASSE 1084 or ASSE 1070 / ASME A112.1070 / CSA B125.70.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

These are alternative devices being proposed to the currently required methods in the code. Alternatives in the code do not cause a cost impact.

Staff Analysis: In accordance with Section 3.6.3.1 of ICC Council Policy 28, the new referenced standards ASSE 1082-2018, ASSE 1084-2018 and ASSE 1085-2018 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

Public Comment 2:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Bradley Corporation

(JBEngineer@aol.com)requests As Submitted.

Commenter's Reason: At the time of the hearing, ASSE 1084 was not completed. The standard is now available.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposal will accept the original code change. The cost impact is the same as state in the original change.

Staff Analysis: In accordance with Section 3.6.3.1 of ICC Council Policy 28, the new referenced standards ASSE 1082-2018, ASSE 1084-2018 and ASSE 1085-2018 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

Public Comment 3:

Proponent: Assembly Actionrequests Disapprove.

Commenter's Reason: This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action. The assembly action for Disapprove was successful by a vote of 58.3% (60) to 41.7% (43) by eligible members online during the period of May 9 - May 23, 2018.

Public Comment 4:

Proponent: CP28 Administration.

Commenter's Reason: The administration of ICC Council Policy 28 (CP28) is not taking a position on this code change. This public comment is being submitted to bring a procedural requirement to the attention of the ICC voting membership. In accordance with Section 3.6.3.1.1 of ICC Council Policy 28 (partially reproduced below), the new referenced standards ASSE 1082-2018, ASSE 1084-2018 and ASSE 1085-2018 must be completed and readily available prior to the Public Comment Hearing in order for this public comment to be considered.

(CP28) 3.6.3.1.1 Proposed New Standards. In order for a new standard to be considered for reference by the Code, such standard shall be submitted in at least a consensus draft form in accordance with Section 3.4. If the proposed new standard is not submitted in at least consensus draft form, the code change proposal shall be considered incomplete and shall not be processed. The code change proposal shall be considered at the Committee Action Hearing by the applicable code development committee responsible for the corresponding proposed changes to the code text. If the committee action at the Committee Action Hearing is either As Submitted or As Modified and the standard is not completed, the code change proposal shall automatically be placed on the Public Comment Agenda with the recommendation stating that in order for the public comment to be considered, the new standard shall be completed and readily available prior to the Public Comment Hearing

Bibliography: Lorem ipsum dolor amit.

P99-18

IPC: 609.2

Proposed Change as Submitted

Proponent: Guy McMann, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO)
(gmcman@jeffco.us)

2018 International Plumbing Code

Revise as follows

609.2 Water service. Hospitals shall have two water service pipes installed in such a manner so as to minimize the potential for an interruption of the supply of water in the event of a water main or water service pipe failure. Each water service pipe shall enter the building independently and shall be sized in accordance with Section 603.1.

Reason: This Section lacks some specificity and doesn't provide much guidance. The intent is to eliminate the possibility of water service interruption. There needs to be a separation distance for the two water lines that designers can employ based the the situation. No specific number has been submitted as each situation will require analysis by the designers

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is editorial in nature and isnt requiring anything in addition to whats already required.

P99-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This is already taken care of by the definition of water service pipe. (Vote:13-0)

Assembly Action:

None

P99-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Guy McMann, Jefferson County Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmmann@jeffco.us) requests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

609.2 Water service. Hospitals shall have two water service pipes installed in such a manner so as to minimize the potential for an interruption of the supply of water in the event of a water main or water service pipe failure. Each water service pipe shall enter the building ~~independently and separately~~ and shall be sized in accordance with Section 603.1.

Commenter's Reason: The committee didn't care for the word "independently" and preferred the word "separately" instead.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This is editorial and will not increase cost.

P99-18

P104-18

IPC: 702.6, TABLE 702.6 (New), 901.3, 902.1.1 (New), Chapter 15

Proposed Change as Submitted

Proponent: Brian Helms, Charlotte Pipe and Foundry, Plastics Division, representing Charlotte Pipe and Foundry (brian.helms@charlottepipe.com)

2018 International Plumbing Code

Revise as follows

702.6 Chemical waste drainage system. A chemical waste drainage system, including its vent system, shall be completely ~~separated independent~~ from the ~~any~~ sanitary drainage system. The pipes and fittings of a chemical waste drainage system shall conform to any of the applicable standards indicated in Table 702.6. The pipe and fitting material shall be recommended by the manufacturers of the pipe and fittings for the temperatures, types and concentrations of chemicals that the system is designed for. The drainage in a chemical waste drainage system shall be treated in accordance with Section 803.2 before discharging to the a sanitary drainage system. ~~Separate drainage systems for chemical wastes and vent pipes shall be of an approved material that is resistant to corrosion and degradation for the concentrations of chemicals involved.~~

Add new text as follows

**TABLE 702.6
CHEMICAL DRAINAGE SYSTEM PIPE AND FITTINGS**

<u>MATERIAL</u>	<u>STANDARD</u>
<u>Chlorinated polyvinyl chloride (CPVC)</u>	<u>ASTM F2618</u>
<u>High silicon iron</u>	<u>ASTM A518/A518M</u>
<u>Polypropylene (PP)</u>	<u>ASTM F1412</u>
<u>Polyvinylidene flouride (PVDF)</u>	<u>ASTM F1673</u>
<u>Chemical-resistance glass</u>	<u>ASTM C1053</u>
<u>Stainless steel drainage systems</u>	<u>ASME A112.3.1</u>

Revise as follows

901.3 Chemical waste ~~vent systems, drainage system venting.~~ The vent system for a chemical waste drainage system shall be independent of the ~~sanitary vent system and shall terminate separately~~ any vent system for a sanitary drainage system. The termination of a vent system for a chemical waste drainage system shall be through the roof to the outdoors or to an air admittance valve that complies with ASSE 1049. Air admittance valves for chemical waste drainage systems shall be constructed of materials ~~approved~~ in accordance with Section 702.6 and shall be tested for chemical resistance in accordance with ASTM F1412.

Add new text as follows

902.1.1 Chemical waste drainage system vents. The pipe and fitting materials for the vent system of a chemical waste drainage system shall be in accordance with Section 702.6. The methods utilized for construction and installation of such venting system shall be in accordance with the pipe and fitting manufacturers' instructions.

Add new standard(s) follows

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box
C700
West Conshohocken PA 19428-2959

F2618-15:

Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Fittings for Chemical Waste Drainage Systems

C1053-00 (2015):

Standard Specification for Borosilicate Glass Pipe and Fittings for Drain, Waste, and Vent (DWV)

Applications

A518/A518M -99 (2012):

Standard Specification for Corrosion-Resistant High-Silicon Iron Castings

Reason: Corrosive and laboratory waste drainage is very different from other applications such as food handling and sterilization included in this chapter. Since the code provides direction on system design in section 803.2, it should also provide direction on allowable materials for these applications. This code change proposal includes all materials either currently manufactured or available in the market that are manufactured to standards specifically for corrosive or laboratory waste drainage applications.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This code change proposal will not increase or decrease the cost of construction because it is intended to clarify allowable third party certified products appropriate for corrosive or laboratory waste applications.

Analysis: A review of the standard proposed for inclusion in the code, ASTM F2618-15, ASTM C1053-00 (2015), and ASTM A518/A518M -99 (2012) with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P104-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This is too broad of approach. It is not enforceable. (Vote:12-1)

Assembly Action:

None

P104-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Brian Helms, representing Charlotte Pipe and Foundry (brian.helms@charlottepipe.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

**TABLE 702.6
CHEMICAL DRAINAGE SYSTEM PIPE AND FITTINGS**

Portions of table not shown remain unchanged.

MATERIAL	STANDARD
Stainless steel drainage systems	ASME A112.3.1

702.6 Chemical waste drainage system. A chemical waste drainage system, including its vent system, shall be completely independent from any sanitary drainage system. The pipes and fittings of a chemical waste drainage system shall conform to any of the to the applicable standards indicated in Table 702.6. ~~The pipe and fitting material shall be recommended by the manufacturers of the pipe and fittings for the temperatures, types and concentrations of chemicals that the system is designed for.~~ The drainage in a chemical waste drainage system shall be treated in accordance with Section 803.2 before discharging to a sanitary drainage system.

902.1.1 Chemical waste drainage system vents. The pipe and fitting materials for the vent system of a chemical waste drainage system shall be in accordance with Section 702.6. ~~The methods utilized for construction and installation of such venting system shall be in accordance with the pipe and fitting manufacturers' instructions.~~ 702.6.

Commenter's Reason: This comment clarifies the language from the original proposal and removes Stainless Steel from the proposed table.

Chemical waste drainage is very different from sanitary drainage applications included in Chapter 7. Chemical waste applications require pipe and fitting systems that are specifically designed to convey waste that may be harmful to other piping materials as well as the health and safety of the public. The code currently provides direction on allowable materials for sanitary drainage systems in tables 702.1, 702.2, 702.3 and 702.4 but is not as specific regarding chemical waste in 702.6.

Since the code requires chemical waste systems to be completely separated from the sanitary system in section 702.6 and provides direction on system design in section 803.2, it should also include a table to provide direction on allowable materials for these applications. Currently, section 702.6 requires an "approved" material, which by definition in Chapter 2, means that the material should be "acceptable to the code official." The removal of this statement and the addition of the proposed table will eliminate any confusion regarding appropriate materials for chemical waste drainage applications.

Materials used for vents in these systems should exhibit the same physical characteristics regarding temperature and chemical resistance and therefore should be held to the same requirements.

This code change proposal includes all materials either currently manufactured or available in the market that are manufactured to standards specifically for corrosive or laboratory waste drainage applications.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of

construction

This code change proposal will not increase or decrease the cost of construction because it is intended to clarify allowable third party certified products appropriate for chemical waste drainage applications.

P104-18

P108-18

IPC: Table 702.4, 705.10.4 (New), Chapter 15

Proposed Change as Submitted

Proponent: Brian Conner, representing Charlotte Pipe and Foundry (bconner@charlottepipe.com)

2018 International Plumbing Code

Add new text as follows

705.10.4 Push-fit joints. Push-fit joints shall conform to ASME A112.4.4 and shall be installed in accordance with the manufacturer's instructions.

Revise as follows

**TABLE 702.4
PIPE FITTINGS**

MATERIAL	STANDARD
Acrylonitrile butadiene styrene (ABS) plastic pipe in IPS diameters	ASTM D2661; ASTM F628; CSA B181.1
Acrylonitrile butadiene styrene (ABS) plastic pipe in sewer and drain diameters	ASTM D2751
Cast iron	ASME B16.4; ASME B16.12; ASTM A74; ASTM A888; CISPI 301
Copper or copper alloy	ASME B16.15; ASME B16.18; ASME B16.22; ASME B16.23; ASME B16.26; ASME B16.29
Glass	ASTM C1053
Gray iron and ductile iron	AWWA C110/A21.10
Polyethylene	ASTM D2683
Polyolefin	ASTM F1412; CSA B181.3
Polyvinyl chloride (PVC) plastic in IPS diameters	ASTM D2665; ASTM F1866; <u>ASME A112.4.4</u>
Polyvinyl chloride (PVC) plastic pipe in sewer and drain diameters	ASTM D3034
Polyvinyl chloride (PVC) plastic pipe with a 3.25-inch O.D.	ASTM D2949
Polyvinylidene fluoride (PVDF) plastic pipe	ASTM F1673; CSA B181.3
Stainless steel drainage systems, Types 304 and 316L	ASME A112.3.1
Steel	ASME B16.9; ASME B16.11; ASME B16.28
Vitrified clay	ASTM C700

For SI: 1 inch = 25.4 mm.

Add new standard(s) follows

ASME

American Society of Mechanical
Engineers
Two Park Avenue
New York NY 10016-5990

A112.4.4-2017:

Plastic Push Fit Drain, Waste, and Vent (DWV) Fittings

Reason: Adding this section along with the consensus standard for Push-fit DWV fittings will give code officials direction on inspecting push-fit fitting installations and installers direction on installing push-fit fittings. Adding this section is consistent with "push-fit joints" sections in chapter 6.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Adding this section to the code will not increase or decrease the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, ASME A112.4.4-2017, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P108-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 705.10.4 Push-fit joints. Push-fit joints DWV fittings shall be listed and labeled shall conform to ASME A112.4.4 and shall be installed in accordance with the manufacturer's instructions.

Committee Reason: For the Modification: Clarifies that the standard is for the fittings and not the joint.
For the Proposal: Consistency with action on P105-18. (Vote:14-0)

Assembly Action:

None

P108-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Self (JBEngineer@aol.com) requests As Submitted.

Commenter's Reason: Listing and labeling is already required by Section 303.4. There is no need to duplicate the requirement for listing and labeling. The proper reference to the standard is in the original code change.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This change is editorial in nature. As such, there is no impact to the cost of construction.

P108-18

P109-18 Part II

IRC: P3003.9.4 (New), TABLE P3002.3, Chapter 44

Proposed Change as Submitted

Proponent: Angel Guzman Rodriguez, ASME, representing The American Society of Mechanical Engineers (ASME)

2018 International Residential Code

Add new text as follows

P3003.9.4 Push-fit joints. Push-fit joints shall conform to ASME A112.4.4 and shall be installed in accordance with the manufacturer's instructions.

Revise as follows

**TABLE P3002.3
PIPE FITTINGS**

PIPE MATERIAL	FITTING STANDARD
Acrylonitrile butadiene styrene (ABS) plastic pipe in IPS diameters	ASTM D2661; ASTM D3311; ASTM F628; CSA B181.1
Acrylonitrile butadiene styrene (ABS) plastic pipe in sewer and drain diameters	ASTM D2751
Cast-iron	ASME B16.4; ASME B16.12; ASTM A74; ASTM A888; CISPI 301
Copper or copper alloy	ASME B16.15; ASME B16.18; ASME B16.22; ASME B16.23; ASME B16.26; ASME B16.29
Gray iron and ductile iron	AWWA C110/A21.10
Polyethylene	ASTM D2683
Polyolefin	ASTM F1412; CSA B181.3
Polyvinyl chloride (PVC) plastic in IPS diameters	ASTM D2665; ASTM D3311; ASTM F1866; <u>ASME A112.4.4</u>
Polyvinyl chloride (PVC) plastic pipe in sewer and drain diameters	ASTM D3034
Polyvinyl chloride (PVC) plastic pipe with a 3.25 inch O.D.	ASTM D2949
PVC fabricated fittings	ASTM F1866
Stainless steel drainage systems, Types 304 and 316L	ASME A112.3.1
Vitrified clay	ASTM C700

For SI: 1 inch = 25.4 mm.

Add new standard(s) follows

ASME

American Society of Mechanical
Engineers
Two Park Avenue
New York NY 10016-5990

A112.4.4-2017:

Plastic Push Fit Drain, Waste, and Vent (DWV) Fittings

Reason: A new standard has been published for push fit fittings to be used in DWV applications. Fittings are to be used with ABS or PVC pipe only in non-pressure applications.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Zero cost

A review of the standard proposed for inclusion in the code, ASME A112.4.4-2017, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

Public Hearing Results

Committee Action:

As Modified

Committee Modification: P3003.9.4 Push-fit joints. Push-fit DWV fittings joints shall conform be listed and labeled to ASME A112.4.4 and shall be installed in accordance with the manufacturer's instructions.

Committee Reason: For the Modification: Consistency with modifications made on P106-18 Part II.
For the Proposal: Consistency with action on P106-18 Part II. (Vote:10-0)

Assembly Action:

None

P109-18 Part II

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Self (JBEngineer@aol.com) requests As Submitted.

Commenter's Reason: Listing and labeling is already required by Section 2609.4. There is no need to duplicate the requirement for listing and labeling. The proper reference to the standard is in the original code change.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
The change is editorial. As such, there is no impact to the cost of construction.

P109-18 Part II

P109-18 Part I

IPC: TABLE 702.4, 705.10.4 (New), Chapter 15

Proposed Change as Submitted

Proponent: Angel Guzman Rodriguez, ASME, representing The American Society of Mechanical Engineers (ASME)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IPC COMMITTEE. PART II WILL BE HEARD BY THE IRC-PLUMBING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

2018 International Plumbing Code

Add new text as follows

705.10.4 Push-fit joints. Push-fit joints shall conform to ASME A112.4.4 and shall be installed in accordance with the manufacturer's instructions.

Revise as follows

**TABLE 702.4
PIPE FITTINGS**

	MATERIAL	STANDARD
	Acrylonitrile butadiene styrene (ABS) plastic pipe in IPS diameters	ASTM D2661; ASTM F628; CSA B181.1
	Acrylonitrile butadiene styrene (ABS) plastic pipe in sewer and drain diameters	ASTM D2751
	Cast iron	ASME B16.4; ASME B16.12; ASTM A74; ASTM A888; CISPI 301
	Copper or copper alloy	ASME B16.15; ASME B16.18; ASME B16.22; ASME B16.23; ASME B16.26; ASME B16.29
	Glass	ASTM C1053
	Gray iron and ductile iron	AWWA C110/A21.10
	Polyethylene	ASTM D2683
	Polyolefin	ASTM F1412; CSA B181.3
	Polyvinyl chloride (PVC) plastic in IPS diameters	ASTM D2665; ASTM F1866; <u>ASME A112.4.4</u>
	Polyvinyl chloride (PVC) plastic pipe in sewer and drain diameters	ASTM D3034
	Polyvinyl chloride (PVC) plastic pipe with a 3.25-inch O.D.	ASTM D2949
	Polyvinylidene fluoride (PVDF) plastic pipe	ASTM F1673; CSA B181.3
	Stainless steel drainage systems, Types 304 and 316L	ASME A112.3.1
	Steel	ASME B16.9; ASME B16.11; ASME B16.28
	Vitrified clay	ASTM C700

For SI: 1 inch = 25.4 mm.

Add new standard(s) follows

A112.4.4-2017:

Plastic Push Fit Drain, Waste, and Vent (DWV) Fittings

Reason: A new standard has been published for push fit fittings to be used in DWV applications. Fittings are to be used with ABS or PVC pipe only in non-pressure applications.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Zero Cost

Analysis: A review of the standard proposed for inclusion in the code, ASME A112.4.4-2017, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P109-18 Part I

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The Committee already addressed this topic in P108-18. (Vote:14-0)

Assembly Action:

None

P109-18 Part I

P116-18

IPC: 717 (New), 717.1 (New), Chapter 15

Proposed Change as Submitted

Proponent: Sidney Cavanaugh, representing LMK Technologies (sidneycavanaugh@yahoo.com)

2018 International Plumbing Code

Add new text as follows

717 BUILDING SEWER AND SEWER SERVICE LATERAL REHABILITATION

717.1 Building sewer and sewer service lateral rehabilitation. Any rehabilitation of building sewer piping and sewer service lateral piping shall be in accordance with ASTM F2599. Any rehabilitation of building sewer and sewer service lateral pipe and its connection to the main sewer pipe shall be in accordance with F2561. All rehabilitation of building sewer piping and sewer service laterals shall include the use of hydrophilic rings or gaskets meeting ASTM F3240 to assure water tightness and elimination of ground water penetration.

Add new standard(s) follows

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box
C700
West Conshohocken PA 19428-2959

F2599-16:

Standard Practice for The Sectional Repair of Damaged Pipe By Means of An Inverted Cured-In-Place Liner

F2561-17:

Standard Practice for Rehabilitation of a Sewer Service Lateral and Its Connection to the Main Using a One Piece Main and Lateral Cured-in-Place Liner

F3240-17:

Standard Practice for Installation of Seamless Molded Hydrophilic Gaskets (SMHG) for Long-Term Watertightness of Cured-in-Place Rehabilitation of Main and Lateral Pipelines

Reason: To add necessary requirements for rehabilitation of building sewers and sewer service laterals that are currently missing from IPC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction but in most cases it would decrease cost since there is no need of digging up and replacing existing piping

Analysis: A review of the standard proposed for inclusion in the code, ASTM F2599-16, ASTM F2561-17, ASTM F3240-17, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P116-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 717.1 Building sewer and sewer service lateral rehabilitation. ~~Any Cured-in-place~~ rehabilitation of building sewer piping and sewer service lateral piping shall be in accordance with ASTM F2599. ~~Any Cured-in-place~~ rehabilitation of building sewer and sewer service lateral pipe and its connection to the main sewer pipe shall be in accordance with F2561. All ~~cured-in-place~~ rehabilitation of building sewer piping and sewer service laterals shall include the use of hydrophilic rings or gaskets meeting ASTM F3240 to assure water tightness and elimination of ground water penetration.

Committee Reason: For the Modification: Clarification is necessary to to indicate that the process is only for cured-in-place rehabilitation.

For the Proposal: The Committee agreed with the published reason statement. (Vote:14-0)

Assembly Action:

None

P116-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Joanne Carroll, Subtegit Group Inc., representing National Association of Sewer Service Companies (jcarroll@subtegit.com) requests Disapprove.

Commenter's Reason: Disapprove the code change. The proposed text is written to exclude valid materials and processes in place of proprietary materials and processes. Also, the proposed addition of ASTM standards require these proprietary materials and processes.

The proposed code change requires the use of hydrophilic seals or gaskets to provide a watertight seal. However, most cured-in-place-pipe technologies do not use hydrophilic seals or gaskets but rather use epoxy and other methods to make a watertight seal. Mandating the use of gaskets eliminates most of the current technology that has been used for decades. There was no technical justification provided to eliminate the use of current methods in favor of this technology.

The proposal P116-18 includes patented or otherwise exclusive supplier, material and practices including proposed reference ASTM Standards F2599, F2561 and F3240. In accordance with ASTM Regulations, *when an approved standard requires the use of a patented material, product, or apparatus, the standard shall include a footnote requesting interested parties to submit information regarding the identification of alternatives to the patented items.* Patent reference is shown on the first page of each of the proposed reference ASTM Standards further supporting this Public Comment to Disapprove the addition of ASTM Standards F2599, F2561 and F3240, and the proposal which required these Standards. In addition, CP#28-05 Code Development, Section 3.6.2.5, states that "The standard shall not have the effect of requiring proprietary materials."

Bibliography: ASTM (2017), "Regulations Governing ASTM Technical Committees, Section 15 Patents in Standards", ASTM International, 2017

ICC (2017), "CP#28-05 Code Development", International Code Council, 2017

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. The net effect of the public comment and disapproval of the code change proposal will decrease the cost of construction by providing more options for products which meet the Code; and, by not limiting these products only to patented materials and practices.

Public Comment 2:

Proponent: Carl Marc-Aurele, representing Formadrain Inc. (carl@formadrain.com) requests Disapprove.

Commenter's Reason: This proposal restricts technologies that could be used to successfully achieve building sewer rehabilitation to the submitter's own products.

ASTM F2599 describes a methodology that inverts a liner inside a pipe. Even after modification, the wording "Cured-in-place rehabilitation [...] shall be in accordance with ASTM F2599" prevents the use of pulled-in-place technologies and future invention as well. The inclusion of ASTM F2599 without the inclusion of ASTM F1216, F1743 and many other rehabilitation related standards is misleading and uninclusive.

ASTM F2561, ASTM F2599 and ASTM F3240 all include the use of "hydrophilic rings" as the sole acceptable sealing method for liners. The hydrophilic seals are proprietary patented technology from the submitter and they are not the only way of achieving proper sealing at the ends of liners, as other technologies and resins (such as epoxy versus polyester) are successfully certified NSF14 and pass the leakage test on a quarterly basis and achieve the necessary water tightness without the use of these proprietary seals.

I am pro-rehabilitation of building sewers, but this proposal is product driven and not results driven. I therefore disapprove of the code change proposal and strongly recommend the committee revises its position accordingly.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

It depends on the point of view:

Comparing CIPP with conventional dig-and-replace, using CIPP in building sewers will most of the time decrease the cost of construction.

Comparing LMK's own CIPP with other CIPP technologies, the hydrophilic seals being a patented and proprietary technology, the restriction to use them in every situation (even when not necessary with the CIPP system used) will have other CIPP manufacturers forced to add an unnecessary proprietary part to their already working systems to comply with the IPC and therefore increase the cost of construction.

Public Comment 3:

Proponent: Abraham I. Murra, Self, representing Trelleborg Pipe Seals Lelystad B.V. requests Disapprove.

Commenter's Reason: ASTM F2561, ASTM F2599, and ASTM F3240 are proprietary standards that cover products protected by patents, as stated in the first pages of each of the standards (see note below). Referencing those standards in the code would exclude alternative technologies and violate the ANSI patent policy. It is not possible to comply with any one of the standards referenced without infringing patent rights; therefore, it would become necessary to pay royalties and request licenses from the owner of the patents, effectively granting the patent holder control of the marketplace and restricting it. There are no technical reasons justifying the restrictions in the proposal, as there are several other technologies that can and have been successfully used in the rehabilitation of pipes. Therefore, I request that the proposal be disapproved.

Note: F2561-16, Standard Practice for Rehabilitation of a Sewer Service Lateral and Its Connection to the Main Using a One Piece Main and Lateral Cured-in-Place Liner states: "*The rehabilitation of a sewer service lateral and its connection to the main using a one-piece main and lateral cured-in-place liner is covered by patents (LMK Enterprises, Inc. 1779 Chessie Lane, Ottawa, IL 61350). Interested parties are invited to submit information regarding the identification of acceptable alternatives to this patented item to the Committee on Standards, ASTM Headquarters...*"

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction. This public comment will **prevent** the cost of construction from increasing.

The contrary, that is, accepting code change proposal # P116-18 will **increase** the cost of construction, because it would become necessary to pay royalties and request licenses from the owner of the patents, effectively granting the patent holder control of the marketplace and restricting it.

P116-18

P120-18

IPC: 1002.1

Proposed Change as Submitted

Proponent: James Richardson Jr, representing City of Columbus Ohio (jarichardson@columbus.gov); Robert Schutz, representing City of Columbus, OH (RJSchutz@columbus.gov)

2018 International Plumbing Code

Revise as follows

1002.1 Fixture traps. Each plumbing fixture shall be separately trapped by a liquid-seal trap, except as otherwise permitted by this code. The vertical distance from the fixture outlet to the trap weir shall not exceed 24 inches (610 mm), and the horizontal distance shall not exceed 30 inches (610 mm) measured from the centerline of the fixture outlet to the centerline of the inlet of the trap. The height of a clothes washer standpipe above a trap shall conform to Section 802.3.3. A fixture shall not be double trapped.

Exceptions:

1. This section shall not apply to fixtures with integral traps.
2. A combination plumbing fixture is permitted to be installed on one trap, provided that one compartment is not more than 6 inches (152 mm) deeper than the other compartment and the waste outlets are not more than 30 inches (762 mm) apart.
3. ~~A grease interceptor intended to serve as a fixture trap in accordance with the manufacturer's installation instructions shall be permitted to serve as the trap for a single fixture or a combination sink of not more than three compartments where the vertical distance from the fixture outlet to the inlet of the interceptor does not exceed 30 inches (762 mm) and the developed length of the waste pipe from the most upstream fixture outlet to the inlet of the interceptor does not exceed 60 inches (1524 mm).~~
- 4.3. Floor drains in multilevel parking structures that discharge to a building storm sewer shall not be required to be individually trapped. Where floor drains in multilevel parking structures are required to discharge to a combined *building sewer* system, the floor drains shall not be required to be individually trapped provided that they are connected to a main trap in accordance with Section 1103.1.

Reason: This is an error in the code that has been present since the change was made to section 802.1.7 requiring that utensil/pot/pan sinks to be indirectly connected. Previously a direct connection was also permissible, which promulgated exception # 3. Since a direct connection is no longer permissible for these type of sinks, exception # 3 would be in direct violation of 802.1.7

Bibliography: 2018 International Plumbing Code
PUB. - 08/31/2017

802.1.7 Food utensils, dishes, pots and pans sinks.

Sinks, in other than dwelling units, used for the washing, rinsing or sanitizing of utensils, dishes, pots, pans or service ware used in the preparation, serving or eating of food **shall discharge indirectly through an air gap or an air break to the drainage system.**

1002.1 Fixture traps.

Each plumbing fixture shall be separately trapped by a liquid-seal trap, except as otherwise permitted by this code. The vertical distance from the fixture outlet to the trap weir shall not exceed 24 inches (610 mm), and the horizontal distance shall not exceed 30 inches (610 mm) measured from the centerline of the fixture outlet to the centerline of the inlet of the trap. The height of a clothes washer standpipe above a trap shall conform to Section 802.3.3. A fixture shall not be double trapped.

Exceptions:

1. 1. This section shall not apply to fixtures with integral traps.
2. 2. A combination plumbing fixture is permitted to be installed on one trap, provided that one compartment is not more than 6 inches (152 mm) deeper than the other compartment and the waste outlets are not more than 30 inches (762 mm) apart.
3. **3. A grease interceptor intended to serve as a fixture trap in accordance with the manufacturer's installation instructions shall be permitted to serve as the trap for a single fixture or a combination sink of not more than three compartments where the vertical distance from the fixture outlet to the inlet of the interceptor does not exceed 30 inches (762 mm) and the developed length of the waste pipe from the most upstream fixture outlet to the inlet of the interceptor does not exceed 60 inches (1524 mm).**
4. 4. Floor drains in multilevel parking structures that discharge to a building storm sewer shall not be required to be individually trapped. Where floor drains in multilevel parking structures are required to discharge to a combined building sewer system, the floor drains shall not be required to be individually trapped provided that they are connected to a main trap in accordance with Section 1103.1.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. There will be no cost impact due to the fact that the requirement is already in chapter 8 for an indirect connection.

P120-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: 1002.1 Fixture traps. Each plumbing fixture shall be separately trapped by a liquid-seal trap, except as otherwise permitted by this code. The vertical distance from the fixture outlet to the trap weir shall not exceed 24 inches (610 mm), and the horizontal distance shall not exceed 30 inches (610 mm) measured from the centerline of the fixture outlet to the centerline of the inlet of the trap. The height of a clothes washer standpipe above a trap shall conform to Section 802.3.3. A fixture shall not be double trapped.

Exceptions:

1. This section shall not apply to fixtures with integral traps.
2. A combination plumbing fixture is permitted to be installed on one trap, provided that one compartment is not more than 6 inches (152 mm) deeper than the other compartment and the waste outlets are not more than 30 inches (762 mm) apart.
3. Floor drains in multilevel parking structures that discharge to a building storm sewers shall not be required to be individually trapped. Where floor drains in multilevel parking structures are required to discharge to a combined building sewer system, the floor drains shall not be required to be individually trapped provided that they are connected to a main trap in accordance with Section 1103.1.

4. Where a hydromechanical grease interceptor serves a food utensil, dishes, pots and pans sink, in accordance with the manufacturer's installation instructions. The branch drain serving the interceptor shall be provided with an emergency floor drain down stream of the interceptor connection, and the branch shall serve only the emergency floor drain and the interceptor. Where the interceptor serves combination sink of not more than three compartments where the vertical distance from the fixture outlet to the inlet of the interceptor does not exceed 30 inches (762 mm) and the developed length of the waste pipe from the most upstream fixture outlet to the inlet of the interceptor does not exceed 60 inches (1524 mm). The food utensil, dishes, pots and pans sink shall be required to connect directly with the interceptor.

Committee Reason: For the Modification: An emergency floor drain would relieve the pressure on the fixture drain to prevent backup into sink should the drain system back up.

For the Proposal: The Committee agreed with the published reason statement. (Vote:13-1)

Assembly Action:

None

P120-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Max Weiss, representing Plumbing and Drainage Institute (mweiss@pdionline.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

1002.1 Fixture traps. Each plumbing fixture shall be separately trapped by a liquid-seal trap, except as otherwise permitted by this code. The vertical distance from the fixture outlet to the trap weir shall not exceed 24 inches (610 mm), and the horizontal distance shall not exceed 30 inches (610 mm) measured from the centerline of the fixture outlet to the centerline of the inlet of the trap. The height of a clothes washer standpipe above a trap shall conform to Section 802.3.3. A fixture shall not be double trapped.

Exceptions:

1. This section shall not apply to fixtures with integral traps.
2. A combination plumbing fixture is permitted to be installed on one trap, provided that one compartment is not more than 6 inches (152 mm) deeper than the other compartment and the waste outlets are not more than 30 inches (762 mm) apart.
3. Floor drains in multilevel parking structures that discharge to a building storm sewer shall not be required to be individually trapped. Where floor drains in multilevel parking structures are required to discharge to a combined *building sewer* system, the floor drains shall not be required to be individually trapped provided that they are connected to a main trap in accordance with Section 1103.1.
4. Where a hydromechanical grease interceptor serves a food utensil, dishes, pots and pans sink, in accordance with the manufacturer's installation instructions. The branch drain serving the interceptor shall be provided with an emergency floor drain and trap downstream of the interceptor connection, and the branch shall serve only the emergency floor drain and the interceptor. Where the interceptor serves combination sink of not more than three compartments where the vertical distance from the fixture outlet to the inlet of the interceptor does not exceed 30 inches (762 mm) and the developed length of the waste pipe from the most upstream fixture outlet to the inlet of the interceptor does not exceed 60 inches (1524 mm). The food utensil, dishes, pots and pans sink shall be required to connect directly with the interceptor.

Commenter's Reason: Language implies hydromechanical interceptor has integral water seal (trap). It does not. Therefore adding the words, "and trap" clarifies that a trap is necessary on the branch line.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. A required emergency floor drain and trap will add cost.

P120-18

P121-18

IPC: 1002.4.1.1

Proposed Change as Submitted

Proponent: Ed Osann, representing Natural Resources Defense Council (eosann@nrdc.org)

2018 International Plumbing Code

Revise as follows

1002.4.1.1 Potable water-supplied trap seal primer valve. A potable water-supplied trap seal primer valve shall supply water to the trap. Water-supplied trap seal primer valves shall conform to ASSE 1018-, and shall be of the type that uses not more than 30 gallons per year per trap. The discharge pipe from the trap seal primer valve shall connect to the trap above the trap seal on the inlet side of the trap.

Reason: A water-supplied trap seal primer that is unrestricted can discharge 300 to 500 gallons a year to a trap. By comparison, a 2-inch trap, for example, actually requires less than 1/2 gallon per year to maintain the trap seal. Trap seal primer valves that limit the amount of water discharged to 8 gallons per year have been on the market for several years. The maximum of 30 gallons of discharge per year in this proposal is contained in both the 2015 *International Green Construction Code* (IgCC) and the 2015 IAPMO *Green Plumbing and Mechanical Code Supplement*. It is time to bring this common-sense requirement into the IPC to prevent an unnecessary waste of drinking water.

Bibliography: 2015 *International Green Construction Code*, International Code Council, 2015, sec. 702.8.2. 2015 *Green Plumbing and Mechanical Code Supplement*, International Association of Plumbing and Mechanical Officials, 2015, sec. 415.1.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This code change proposal applies to only one of four available compliance paths where trap seal protection is required, and thus will not increase the cost of construction.

P121-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Trap sizes vary and the minimal volume might not be enough for larger traps in some locations. (Vote:12-1)

Assembly Action:

As Submitted

P121-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Ed Osann, representing Natural Resources Defense Council (eosann@nrdc.org) ; Julius Ballanco, representing Self (jbenigneer@aol.com) requests As Submitted.

Commenter's Reason: The committee's concerns about the inadequacy of 30 gallons of water per year to maintain a trap seal are misplaced. The purpose of a trap primer is not to flush the trap, but simply to maintain the seal. Traps evaporate from their surface area, and even a large trap can be maintained with far less than 30 gallons. At an evaporation rate of 12 inches per year, which is generous for indoor ambient conditions, even a 6-inch trap would require less than 6 gallons. 30 gallons a year is more than adequate for this purpose, regardless of trap size or location. Discharges of more than 30 gallons per year are clearly excessive, and at the scale of a large building, multiplied in a community with many large buildings, can add up to significant waste of treated drinking water. This proposal only applies to primer valves using potable water to maintain the trap seal.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This code change proposal applies to only one of four available compliance paths where trap seal protection is required, and thus will not increase the cost of construction.

P121-18

P123-18

IPC: 1003.3.2

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing InSinkErator (JBENGINEER@aol.com)

2018 International Plumbing Code

Revise as follows

1003.3.2 Food waste disposers restriction. A food waste disposer shall not discharge to a grease interceptor.

Exception: A two or three compartment sink that is required to discharge to a grease interceptor shall be permitted to have a food waste disposer provided that the disposer rating is not greater than 1.0 horsepower.

Reason: The commercial food handling industry has requested that small food waste disposers be permitted on two or three compartment sinks to handle the incidental food waste that accumulates in the wash sink after cleaning. The food waste disposer would not be the typical commercial food waste disposer unit handling all of the food waste from the establishment. It would only account for a small portion of food waste remaining during the washing operation.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This would allow an optional installation.

P123-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This could create too much opportunity for too many solids to carry over to the interceptor. (Vote:13-1)

Assembly Action:

None

P123-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing InSinkErator (JBEngineer@aol.com)requests As Submitted.

Commenter's Reason: I proposed the original code change that restricts the discharge of food waste disposer through a grease interceptor. It was pointed out to me after the change was approved that food handling establishments like to install a small food waste disposer on the wash sinks to collect any food particles that make it past the scraping of the dishes or pots and pans. At the end of the wash cycle, the disposer reduces the size of the particle.

If a disposer is not installed, it is feared that large food particle can pass into the grease interceptor. This would be more detrimental than the smaller particle passing through a disposer. By keeping the size of the disposer to 1 hp or less, a food handling establishment is not going to use the disposer as a primary means of disposing of food particles.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This provides an option to the code users. There is no impact to the cost of construction.

Public Comment 2:

Proponent: Max Weiss, representing Plumbing and Drainage Institute (mweiss@pdionline.org)requests Disapprove.

Commenter's Reason: Food waste disposers should not discharge to interceptors. Solids accumulation will modify internal fluid mechanics and interfere with proper function of the interceptor.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Approval of this public comment will nullify the proposal therefore costs of construction will not change.

P123-18

P124-18

IPC: 1003.3.2.1

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing InSinkErator (JBENGINEER@aol.com)

2018 International Plumbing Code

Add new text as follows

1003.3.2.1 Existing installations. For existing installations where the food waste disposer discharges through the grease interceptor, the grease interceptor shall be properly sized to include the discharge from the food waste disposer. The sizing of the grease interceptor shall be based on the continuous flow from the food waste disposer.

Reason: The code was revised to add the prohibition for the discharge of food waste disposers through grease interceptors. However, there are many existing installations where the food waste disposer discharges through the grease interceptor. When the grease interceptor is replaced, the sizing must include the increase load from the food waste disposer.

It is common practice to have the food waste disposer operating in a food handling establishment. When connected to a grease interceptor, this can add a greater load than normal dishwashing sinks. This additional load must be considered when sizing the replacement grease interceptor. The time interval between cleaning of the grease interceptor must also be considered.

In a recently published paper, "A critical review of fat, oil, and grease (FOG) in sewer collection systems: Challenges and control," the importance of properly sizing and maintaining a grease interceptor was identified as a means of reducing the problems of FOG build up in public sewer systems. This proposed change will provide guidance in the proper sizing when an existing system has a food waste disposer discharging to a grease interceptor. This will reduce the contributions of FOG to the public sewer system.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This addresses existing installations and has no impact on the cost.

P124-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Sizing is already covered by the code and by local departments. (Vote:13-1)

Assembly Action:

None

P124-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing InSinkErator (JBEngineer@aol.com)requests As Submitted.

Commenter's Reason: There are a number of installations of grease interceptors that precede the code requirement prohibiting a food waste disposer to discharge through a grease interceptor. There needs to be a sizing requirement in place for the installation of replacement grease interceptors. The code should not rely on the local official to understand the need to size the grease interceptor for the load including the existing food waste disposer.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This provides a means of properly sizing a replacement grease interceptor.

Public Comment 2:

Proponent: Max Weiss, representing Plumbing and Drainage Institute (mweiss@pdionline.org)requests Disapprove.

Commenter's Reason: Food waste disposers should not discharge to an interceptor. Solids accumulation will modify internal fluid mechanics and interfere with proper function. Interceptor sizing is dealt with elsewhere in the code.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Disapproving the proposal will not change the code and thus, will have no impact on the cost of construction.

P124-18

P125-18

IPC: 1106.2, 1106.2.1, Table TABLE 1106.2.1, 1106.2.1.1, 1106.2.1.2, 1106.2.2, 1106.2.2.1

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Self (JBEngineer@aol.com)

2018 International Plumbing Code

Revise as follows

1106.2 Size of storm drain piping. ~~Storm drain pipe sizing.~~ Vertical and horizontal ~~The storm drain drainage piping shall be sized based on the flow rate through the roof drain. The flow rate in storm drain piping shall not exceed that specified in Table 1106.2 in accordance with Section 1106.2.1 or Section 1106.2.2.~~

Add new text as follows

1106.2.1 Roof drainage. The rainwater drainage flow rate from the roof surface shall be determined based on the rainfall rate of a 60 minute storm with a 100 year return period and the area of the roof being drained in accordance with Table 1106.2.1.

**TABLE 1106.2.1
ROOF AREA DRAINAGE FLOW RATE**

Roof Drainage Area (sq. ft.)	Drainage Flow Rate (gpm)					
	Based on Rainfall Rates (in/hr)					
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
<u>500</u>	<u>5</u>	<u>10</u>	<u>16</u>	<u>21</u>	<u>26</u>	<u>31</u>
<u>1000</u>	<u>10</u>	<u>21</u>	<u>31</u>	<u>42</u>	<u>52</u>	<u>62</u>
<u>1500</u>	<u>16</u>	<u>31</u>	<u>47</u>	<u>62</u>	<u>78</u>	<u>94</u>
<u>2000</u>	<u>21</u>	<u>42</u>	<u>62</u>	<u>83</u>	<u>104</u>	<u>125</u>
<u>2500</u>	<u>26</u>	<u>52</u>	<u>78</u>	<u>104</u>	<u>130</u>	<u>156</u>
<u>3000</u>	<u>31</u>	<u>62</u>	<u>94</u>	<u>125</u>	<u>156</u>	<u>187</u>
<u>3500</u>	<u>36</u>	<u>73</u>	<u>109</u>	<u>145</u>	<u>182</u>	<u>218</u>
<u>4000</u>	<u>42</u>	<u>83</u>	<u>125</u>	<u>166</u>	<u>208</u>	<u>249</u>
<u>4500</u>	<u>47</u>	<u>94</u>	<u>140</u>	<u>187</u>	<u>234</u>	<u>281</u>
<u>5000</u>	<u>52</u>	<u>104</u>	<u>156</u>	<u>208</u>	<u>260</u>	<u>312</u>
<u>5500</u>	<u>57</u>	<u>114</u>	<u>171</u>	<u>229</u>	<u>286</u>	<u>343</u>
<u>6000</u>	<u>62</u>	<u>125</u>	<u>187</u>	<u>249</u>	<u>312</u>	<u>374</u>
<u>6500</u>	<u>68</u>	<u>135</u>	<u>203</u>	<u>270</u>	<u>338</u>	<u>405</u>
<u>7000</u>	<u>73</u>	<u>145</u>	<u>218</u>	<u>291</u>	<u>364</u>	<u>436</u>
<u>7500</u>	<u>78</u>	<u>156</u>	<u>234</u>	<u>312</u>	<u>390</u>	<u>468</u>
<u>8000</u>	<u>83</u>	<u>166</u>	<u>249</u>	<u>332</u>	<u>416</u>	<u>499</u>
<u>9000</u>	<u>94</u>	<u>187</u>	<u>281</u>	<u>374</u>	<u>468</u>	<u>561</u>
<u>10000</u>	<u>104</u>	<u>208</u>	<u>312</u>	<u>416</u>	<u>519</u>	<u>623</u>
<u>11000</u>	<u>114</u>	<u>229</u>	<u>343</u>	<u>457</u>	<u>571</u>	<u>686</u>
<u>12000</u>	<u>125</u>	<u>249</u>	<u>374</u>	<u>499</u>	<u>623</u>	<u>748</u>

1106.2.1.1 Roof drain. The flow rate used for sizing the roof drainage system shall be not less than the roof drain manufacturer's published flow rate based on a head height of 4 inches (102 mm) of water ponding. Storm drainage piping shall be sized in accordance with Table 1106.2.

1106.2.1.2 Secondary roof drainage. The opening for the secondary roof drainage shall be not less than 2 inches (51 mm) and not more than 5 inches (76 mm) above the bottom opening of the primary roof drain.

1106.2.2 Engineered Roof Drain Flow Rate. Vertical and horizontal storm drain piping shall be sized based on the flow rate through the roof drain. The flow rate used for sizing the storm drainage piping shall be based on the maximum anticipated ponding at the roof drain based on a rainfall rate of a 60 minute storm with a 100 year return period and a 5 minute storm with a 10 year return period. The flow rate used for sizing the storm drainage piping system shall be the manufacturer's published flow rate for the roof drain based on the established maximum anticipated water ponding height. The storm drainage piping shall be sized in accordance with Table 1106.2.

1106.2.2.1 Secondary roof drainage. The discharge through the secondary roof drain shall not be considered when establishing the maximum height of ponding at the primary roof drain. The opening for the secondary roof drainage shall be not less than 2 inches (51 mm) above the bottom opening of the primary roof drain.

Reason: The code was revised a few cycles ago to reflect the research published by the ASPE Research Foundation. ASPE RF and IAPMO cosponsored research on the performance of roof drains in storm drainage systems. There has been a number of requests for a fast sizing method that does not require engineering calculations. The change adds such a fast, cook-book method of sizing the storm drainage piping system. The ASPE RF research report states the problem associated with a storm drainage system is the improper sizing of the storm drainage pipe. The old sizing method did not account for the high quality of the roof drain. The research report is included with the submittal and can be downloaded at no cost at www.aspe.org.

The code change identifies two methods for sizing the storm drainage system. The first sizing method listed in Section 1106.2.1 Roof Drainage, is the quick sizing method. When using this method, the storm drain pipe may be sized large than the engineered sizing method. The quick method will not result in smaller diameter pipe for the storm drainage system.

These requirements respond to the request by inspectors, contractors, and engineers. The first sizing method identified was developed to provide a cookbook method of sizing rather than conducting a full engineering design analysis. The sizing of the storm drainage system still relies on the values published by the roof drain manufacturers. This data identifies the flow rate based on head height through the roof drain.

Because the method takes a cookbook approach, the secondary roof drainage must be considered. For that reason, secondary roof drainage is required to be between 2 inch and 5 inches above the primary roof drainage. This is calculated into the flow rate sizing values in Table 1106.2.1. It will assure that the system will not exceed the ponding height determined in flow calculations.

The second method, identified as Section 1106.2.2 Engineered Roof Drain Flow Rate, is the current sizing method required by the code. One change has been added to the engineered sizing method. The engineered sizing will require the evaluation of the roof drainage system for a microburst, which is a 5-minute storm with a 10-year return period. While a 100-year storm may appear to be the most drastic storm for sizing a system, a microburst can overpower the storm drainage piping resulting in failure of the piping system. The microburst will typically not have a significant impact on the roof loading compared to a 100-year storm of 60-minute duration. The ASPE RF research report recommends the evaluation of both a 100-year storm of 60 minutes duration and a 10-year storm of 5-minute duration.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This provides an option for sizing the storm drainage system.

P125-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This proposal needs more coordination with the roofing contractor groups to develop a public comment that refines this proposal. (Vote:9-5)

Assembly Action:

None

P125-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Max Weiss, representing Plumbing and Drainage Institute (mweiss@pdionline.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Plumbing Code

1106.2.1.1 Roof drain. The flow rate used for sizing the roof drainage system shall be ~~not less than the roof drain manufacturer's published flow rate~~ based on a head height of 4 inches (102 mm) of water ponding. Storm drainage piping shall be sized in accordance with Table 1106.2.

1106.2.1.2 Secondary roof drainage. The opening for the secondary roof drainage shall be not less than 2 inches (51 mm) and not more than ~~5-4~~ inches (~~76-101~~ mm) above the bottom opening of the primary roof drain.

1106.2.2 Engineered Roof Drain Drainage Flow Rate. ~~Vertical and horizontal storm drain piping shall be sized based on the flow rate through the roof drain. The flow rate used for sizing the storm drainage piping shall be based on the maximum anticipated ponding at the roof drain based on a rainfall rate of a 60 minute storm with a 100 year return period and a 5 minute storm with a 10 year return period . The flow rate used for sizing the storm drainage piping system shall be the manufacturer's published flow rate for the roof drain based on the established maximum anticipated water ponding height. The storm drainage piping shall be sized and~~ in accordance with Table 1106.2.

Commenter's Reason: The roof drain fixture should not be used to control drainage rate. Stack configuration is the greatest single variable affecting flow rate. 4" ponding limitation, roof area, rainfall rate determine drainage system requirement in gpm. Roof drain fixture simply has to be capable of that flow at that head.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The public comment modifications adjusts the proposal to reflect what is common practice in the industry today. Therefore, the proposal as modified will not impact the cost of labor or materials.

Public Comment 2:

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Self (JBEngineer@aol.com) requests As Submitted.

Commenter's Reason: The reason given for the rejection was that the proposal needs to be coordinated with the roofing contractors. The concern with the contractors is the roof load based on the design. While the roofing contractors thought the roof load should be addressed in this proposal, it is unnecessary. Roof loading is already addressed in Section 1101.7. There is no need to duplicate the requirements from that section in this proposal.

The main purpose of this proposal is to add a simplified method of designing the storm drainage system. That is what is provided in the additional design method. While it results in oversizing of the drainage piping, the system will perform without failure. A simplified design option has been requested by code officials, engineers, contractors, and staff.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

This change provides an alternative method for sizing the roof drainage system. Alternatives have no cost impact.

Public Comment 3:

Proponent: Max Weiss, representing Plumbing and Drainage Institute (mweiss@pdionline.org) requests Disapprove.

Commenter's Reason: This proposal and related sections require further development.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of this proposal results in the current code not changing. Therefore, the net effect on costs is zero.

P125-18

P126-18

IPC: 1102.6, Chapter 15

Proposed Change as Submitted

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing Froet Industries (JBEngineer@aol.com)

2018 International Plumbing Code

Revise as follows

1102.6 Roof Drains. Roof drains shall conform to ASME A112.6.4 or ASME A112.3.1. Roof drains, other than siphonic roof drains, shall be tested and rated in accordance with ASME A112.6.4 or ASPE/IAPMO Z1034.

Add new standard(s) follows

ASPE

American Society of Plumbing
Engineers
6400 Shafer Ct., Suite 350
Rosemont IL 60018-4914

ASPE/IAPMO 21034-2015:

Test Method for Evaluating Roof Drain Performance

Reason: ASPE/IAPMO Z1034 is the consensus standard for testing and rating roof drains for their flow rate at different ponding heights. The current code requires the manufacturer to publish their flow rates. The flow rates are determined by testing to either of the two standards referenced.

Siphonic roof drains are rated differential with the system designed in accordance with ASPE 45 and the roof drain tested in accordance with ASME A112.6.9.

The testing requirements in the standard are consistent with the results published in the ASPE Research Foundation Roof Drainage Research Report. There are third party laboratories currently testing and certifying roof drains to the ASPE/IAPMO Z1034 standard.

Cost Impact: The code change proposal will increase the cost of construction. There is a cost associated with the testing of roof drains.

Analysis: A review of the standard proposed for inclusion in the code, ASPE/IAPMO 21034-2015, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P126-18

Public Hearing Results

Committee Action:

As Submitted

Committee Reason: This will answer some questions about roof drains and storm drain system piping requirements in the code. (Vote:14-0)

Assembly Action:

None

P126-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Max Weiss, representing Plumbing and Drainage Institute (mweiss@pdionline.org) requests Disapprove.

Commenter's Reason: Drainage systems must be sized in accordance with anticipated load and provision for air. Roof drain fixtures must be sized in accordance with drainage system design capacity. Wording in proposal was obtuse and intra-contradictory.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

Disapproval of a proposal will not change the code therefore, the costs of construction will not be impacted.

P126-18

P131-18 Part I

IPC: 1301.1.1 (New), Chapter 15

Proposed Change as Submitted

Proponent: Dave Cantrell, representing The Joint CSA/ICC Rainwater System Design and Installation Consensus Committee (dave.cantrell.codes@gmail.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IPC COMMITTEE. PART II WILL BE HEARD BY THE IRC-PLUMBING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

2018 International Plumbing Code

Add new text as follows

1301.1.1 Alternate compliance path. Systems for nonpotable uses that comply with CSA B805/ICC 805 are deemed to comply with this chapter.

Add new standard(s) follows

CSA

CSA Group
8501 East Pleasant Valley Road
Cleveland OH 44131-5516

CSA B805-18/ICC 805-2018:

Rainwater Harvesting Systems

Reason: This proposal adds the CSA B805/ICC 805 Standard as an alternate compliance path for rainwater to be used in nonpotable applications. The Canadian Standards Association and the International Code Council jointly formed the Rainwater System Design and Installation Consensus Committee (IS-RCSDI) in order to create a Rainwater Harvesting Standard for use in North America. Nonpotable rainwater harvesting systems that conform to this Standard will comply with Chapter 13, thus providing a far more comprehensive guidance document as an alternate compliance path. While this new Standard addresses rainwater for potable use and stormwater for nonpotable use, neither of which are addressed in Chapter 13, including this Standard in Chapter 14 would not mandate such uses. However, it will provide code officials with the guidance needed for reviewing and inspecting these types of water reuse systems that are becoming more common with ever-increasing water conservation measures.

Here are some necessary provisions that the committee felt obligated to include in this Standard:

1. This Standard addresses roof surface rainwater and stormwater being used as source water. It addresses rainwater intended for use in nonpotable applications as well as potable applications.

2. Recognizing that the risk to public health increases with the number of persons using a rainwater harvesting system, this Standard provides different methods for protecting water based on the influent water quality, the system, and the application. Stormwater runoff is expected to have a higher likelihood of contamination as a result of its flowing overland. Therefore, this Standard specifies additional treatment process requirements for stormwater runoff and does not cover its use for potable water applications.

3. In order to ensure the consideration of the wide range of variables associated with each site, location, design, and application, this Standard requires that a water safety plan be developed for all rainwater harvesting systems. The water safety plan considers the specific challenges and risks presented by the site and associated impact on source water quality, operation of system components, and the risk associated with the end use.

4. Applications for harvested rainwater are separated into four end use tiers that consider the exposure potential through ingestion, inhalation, and skin contact. It further separates these tiers into two groups, one for single-family residential and one for multifamily, commercial and public facilities.

5. This Standard specifies minimum performance criteria for each end use tier in consideration of the health risk and identifies possible treatment process options to meet the specified performance criteria.

6. Based on the expected source water quality, this Standard establishes suitable water quality parameters that are used to substantiate that the treatment process is operating as intended to produce safe water for the specified end use.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The proposed alternate compliance path is an option provided to the user, not a requirement. Therefore, no added cost is mandated to the user of the code.

Analysis: A review of the standard proposed for inclusion in the code, CSA 805-17/ICC 805-2017, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P131-18 Part I

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Consistency with action on P131 Part II. (Vote:13-1)

Assembly Action:

As Submitted

Staff Analysis: P131-18 Part II, an identical proposal to this proposal, was heard by the IRC-PM Committee. The reason for disapproval was "An alternative compliance path to use this standard instead of the code is available through Section R104.11 (alternative methods.)"

P131-18 Part I

Individual Consideration Agenda

Public Comment 1:

Proponent: Pennie Feehan, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (pmgac@iccsafe.org); Dave Cantrell (dave.cantrell.codes@gmail.com); Paul Gulletson (paul.gulletson@csagroup.org) requests As Modified by This Public Comment.

Replace as follows:

2018 International Plumbing Code

1301.1 ~~Scope-General.~~ The provisions of Chapter 13 shall govern the materials, design, construction and installation of systems for the collection, storage, treatment and distribution of nonpotable water. For nonpotable rainwater systems, the provisions of CSA B805/ICC 805 shall be an alternative for regulating the materials, design, construction and installation of systems for rainwater collection, storage, treatment and distribution of nonpotable water. The use and application of nonpotable water shall comply with laws, rules and ordinances applicable in the jurisdiction.

CSA

CSA Group
8501 East Pleasant Valley Road
Cleveland OH 44131-5516

CSA B805-18/ICC 805-18:

Rainwater Harvesting Systems

Commenter's Reason: The committee reason for disapproval was that alternative compliance paths are already allowed in Chapter one, Section 105.2. While this is true, Section 105.2 offers no guidance as to what a viable alternative path should be. Providing a specified alternative compliance path gives the code official and the designer a tangible source of design specifications. The committee also thought that a standard for rainwater systems is not appropriately located in Chapter 13, however, Chapter 13 is the only chapter that addresses non-traditional water systems and Chapter 13 includes Section 1303, which covers nonpotable rainwater systems. Based on the committee's reason, the code would never need to specify any alternative compliance requirements, and would always burden the code official with making an equivalency determination with no guidance from the code. The proposed standard, CSA B805/ICC 805 was jointly developed by ICC and the Canadian Standards Association. The committee offered no technical justification for not including the proposed standard in the code.

This public comment is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). The PMG CAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance the International Codes or portions thereof that were under the purview of the PMG CAC. In 2017 the PMG CAC held one face-to-face meeting and 11 conference call meetings. Numerous interested parties attended the committee meetings and offered their input.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposed language only provides for an option to the user. Because this is not a requirement, there is no added or decreased cost of construction caused by this option being placed on the code.

P131-18 Part I

P131-18 Part II

IRC: P2912.1.1 (New), Chapter 44

Proposed Change as Submitted

Proponent: Dave Cantrell, representing The Joint CSA/ICC Rainwater System Design and Installation Consensus Committee (dave.cantrell.codes@gmail.com)

2018 International Residential Code

Add new text as follows

P2912.1.1 Alternate compliance path. Systems for nonpotable uses that comply with CSA B805/ICC 805 are deemed to comply with Section P2912.

Add new standard(s) follows

CSA

CSA Group
8501 East Pleasant Valley Road
Cleveland OH 44131-5516

CSA B805-18/ICC 805-2018:

Rainwater Harvesting Systems

Reason: This proposal adds the CSA B805/ICC 805 Standard as an alternate compliance path for rainwater to be used in nonpotable applications. The Canadian Standards Association and the International Code Council jointly formed the Rainwater System Design and Installation Consensus Committee (IS-RCSDI) in order to create a Rainwater Harvesting Standard for use in North America, one that will provide further guidance for rainwater to serve both potable and nonpotable uses. Nonpotable rainwater harvesting systems that conform to this Standard will comply with Section P2912, thus providing a far more comprehensive guidance document as an alternate compliance path. While this new Standard addresses rainwater for potable use and stormwater for nonpotable use, neither of which are addressed in Section P2912, including this Standard in Chapter 44 would not mandate such uses. However, it will provide code officials with the guidance needed for reviewing and inspecting these types of water reuse systems that are becoming more common with ever-increasing water conservation measures.

Here are some necessary provisions that the committee felt obligated to include in this Standard:

1. This Standard addresses roof surface rainwater and stormwater being used as source water. It addresses rainwater intended for use in nonpotable applications as well as potable applications.
2. Recognizing that the risk to public health increases with the number of persons using a rainwater harvesting system, this Standard provides different methods for protecting water based on the influent water quality, the system, and the application. Stormwater runoff is expected to have a higher likelihood of contamination as a result of its flowing overland. Therefore, this Standard specifies additional treatment process requirements for stormwater runoff and does not cover its use for potable water applications.
3. In order to ensure the consideration of the wide range of variables associated with each site, location, design, and application, this Standard requires that a water safety plan be developed for all rainwater harvesting systems. The water safety plan considers the specific challenges and risks presented by the site and associated impact on source water quality, operation of system components, and the risk associated with the end use.
4. Applications for harvested rainwater are separated into four end use tiers that consider the exposure potential through ingestion, inhalation, and skin contact. It further separates these tiers into two groups, one for single-family residential and one for multifamily, commercial and public facilities.
5. This Standard specifies minimum performance criteria for each end use tier in consideration of the health risk and identifies possible treatment process options to meet the specified performance criteria.
6. Based on the expected source water quality, this Standard establishes suitable water quality parameters that are used to substantiate that the treatment process is operating as intended to produce safe water for the specified end use.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The proposed alternate compliance path is an option provided to the user, not a requirement. Therefore, not added cost

is mandated to the user of the code.

Analysis: A review of the standard proposed for inclusion in the code, CSA B805-18/ICC 805-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P131-18 Part II

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Alternative compliance paths are already provided for under Section R104.11 (Vote:10-10)

Assembly Action:

None

P131-18 Part II

Individual Consideration Agenda

Public Comment 1:

Proponent: Pennie Feehan, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (pmgcac@iccsafe.org); Dave Cantrell (dave.cantrell.codes@gmail.com); Paul Gulletson (paul.gulletson@csagroup.org)requests As Modified by This Public Comment.

Replace as follows:

2018 International Residential Code

P2912.1 General. The provisions of this section shall govern the construction, installation, *alteration*, and repair of rainwater collection and conveyance systems for the collection, storage, treatment and distribution of rainwater for nonpotable applications ~~as permitted by~~. For nonpotable rainwater systems, the provisions of CSA B805/ICC 805 shall be an alternative for regulating the materials, design, construction and installation of systems for rainwater collection, storage, treatment and distribution of nonpotable water. The use and application of nonpotable water shall comply with laws, rules and ordinances applicable in the jurisdiction.

CSA

CSA Group
8501 East Pleasant Valley Road
Cleveland OH 44131-5516

CSA B805-18/ICC 805-18:

Rainwater Harvesting Systems

Commenter's Reason: The committee reason for disapproval was that alternative compliance paths are already allowed in Chapter one, Section R104.11. While this is true, Section R104.11 offers no guidance as to what a viable alternative path should be. Providing a specified alternative compliance path gives the code official and the designer a tangible source of design specifications. The committee also thought that a standard for rainwater systems is not appropriately located in Section P2912, however, P2912 is the only section that addresses non-traditional water systems, which includes nonpotable rainwater systems. Based on the committee's reason, the code would never need to specify any alternative compliance requirements, and would always burden the code official with making an equivalency determination with no guidance from the code. The proposed standard, CSA B805/ICC 805 was jointly developed by ICC and the Canadian Standards Association. The committee offered no technical justification for not including the proposed standard in the code.

This public comment is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). The PMG CAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance the International Codes or portions thereof that were under the purview of the PMG CAC. In 2017 the PMG CAC held one face-to-face meeting and 11 conference call meetings. Numerous interested parties attended the committee meetings and offered their input.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposed language only provides for an option to the user. Because this is not a requirement, there is no added or decreased cost of construction caused by this option being placed on the code.

P131-18 Part II

P132-18 Part I

IPC: 1301.1.1 (New), Chapter 15

Proposed Change as Submitted

Proponent: Dave Cantrell, representing The Joint CSA/ICC Rainwater System Design and Installation Consensus Committee (dave.cantrell.codes@gmail.com)

2018 International Plumbing Code

Add new text as follows

1301.1.1 Alternate compliance path. Systems designed for potable uses shall comply with CSA B805/ICC 805.

Add new standard(s) follows

CSA

CSA Group
8501 East Pleasant Valley Road
Cleveland OH 44131-5516

CSA B805-18/ICC 805-2018:

Rainwater Harvesting Systems

Reason: This proposal adds the CSA B805/ICC 805 Standard as an alternate compliance path for rainwater to be used in both potable and nonpotable applications. The Canadian Standards Association and the International Code Council jointly formed the Rainwater System Design and Installation Consensus Committee (IS-RCSDI) in order to create a Rainwater Harvesting Standard for use in North America, one that will provide further guidance for rainwater to serve both potable and nonpotable uses.

Chapter 13 does not address rainwater for potable use, nor does it contain provisions for the use of stormwater for nonpotable use. This Standard provides code officials the guidance needed for reviewing and inspecting these types of water reuse systems that are becoming more common with ever-increasing water conservation measures. For this reason this Standard should be referenced in Chapter 14. It should further be noted that nonpotable rainwater harvesting systems that conform to this Standard will comply with Chapter 13, thus providing a far more comprehensive guidance document as an alternate compliance path.

Here are some necessary provisions that the committee felt obligated to include in this Standard:

1. This Standard addresses roof surface rainwater and stormwater being used as source water. It addresses rainwater intended for use in nonpotable applications as well as potable applications.

2. Recognizing that the risk to public health increases with the number of persons using a rainwater harvesting system, this Standard provides different methods for protecting water based on the influent water quality, the system, and the application. Stormwater runoff is expected to have a higher likelihood of contamination as a result of its flowing overland. Therefore, this Standard specifies additional treatment process requirements for stormwater runoff and does not cover its use for potable water applications.

3. In order to ensure the consideration of the wide range of variables associated with each site, location, design, and application, this Standard requires that a water safety plan be developed for all rainwater harvesting systems. The water safety plan considers the specific challenges and risks presented by the site and associated impact on source water quality, operation of system components, and the risk associated with the end use.

4. Applications for harvested rainwater are separated into four end use tiers that consider the exposure potential through ingestion, inhalation, and skin contact. It further separates these tiers into two groups, one for single-family residential and one for multifamily, commercial and public facilities.

5. This Standard specifies minimum performance criteria for each end use tier in consideration of the health risk and identifies possible treatment process options to meet the specified performance criteria.

6. Based on the expected source water quality, this Standard establishes suitable water quality parameters that are used to substantiate that the treatment process is operating as intended to produce safe water for the specified end use.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The proposed alternate compliance path is an option provided to the user, not a requirement. Therefore, not added cost

is mandated to the user of the code.

Analysis: A review of the standard proposed for inclusion in the code, CSA 805-18/ICC 805-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P132-18 Part I

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Consistency with action on P131 Part I. Also, Chapter 13 is for nonpotable water systems and this standard involves potable water. (Vote:13-1)

Assembly Action:

As Submitted

P132-18 Part I

Individual Consideration Agenda

Public Comment 1:

Proponent: Pennie Feehan, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (pmgcac@iccsafe.org); Paul Gulletson (paul.gulletson@csagroup.org); Dave Cantrell (dave.cantrell.codes@gmail.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Plumbing Code

602.3 ~~Individual~~ Alternative potable water supply-supplies. Where a potable public water supply is not available, potable water from one or more of the following individual sources of potable water supply shall be utilized:

1. An individual water supply in accordance with Sections 602.3.1 through 602.3.5.1.
2. A rainwater harvesting system in compliance with CSA B805/ICC 805.

CSA

CSA Group
8501 East Pleasant Valley Road
Cleveland OH 44131-5516

CSA B805-18/ICC 805-18:

Rainwater Harvesting

Commenter's Reason: The committee thought that a standard for potable rainwater systems is not appropriately located in Chapter 13. Therefore, this public comment places this potable water alternative source in Section 602 where other potable water systems are regulated.

Another committee reason for disapproval was that alternative compliance paths are already allowed in Chapter one, Section 105.2. While this is true, Section 105.2 offers no guidance as to what a viable alternative path should be. Providing a specified alternative compliance path gives the code official and the designer a tangible source of design specifications. Based on the committee's reason, the code would never need to specify any alternative compliance requirements, and would always burden the code official with making an equivalency determination with no guidance from the code. The proposed standard, CSA B805/ICC 805 was jointly developed by ICC and the Canadian Standards Association.

The committee offered no technical justification for not including the proposed standard in the code.

This public comment is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). The PMG CAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance the International Codes or portions thereof that were under the purview of the PMG CAC. In 2017 the PMG CAC held one face-to-face meeting and 11 conference call meetings. Numerous interested parties attended the committee meetings and offered their input.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposed language only provides for an option to the user. Because this is not a requirement, there is no added or decreased cost of construction caused by this option being placed on the code.

P132-18 Part I

P132-18 Part II

IRC: P2912.1.1 (New), Chapter 44

Proposed Change as Submitted

Proponent: Dave Cantrell, representing The Joint CSA/ICC Rainwater System Design and Installation Consensus Committee (dave.cantrell.codes@gmail.com)

2018 International Residential Code

Add new text as follows

P2912.1.1 Alternate compliance path. Systems designed for potable uses shall comply with CSA B805/ICC 805.

Add new standard(s) follows

CSA

CSA Group
8501 East Pleasant Valley Road
Cleveland OH 44131-5516

CSA B805-18/ICC 805-18:

Rainwater Harvesting Systems

Reason: This proposal adds the CSA B805/ICC 805 Standard as an alternate compliance path for rainwater to be used in both potable and nonpotable applications. The Canadian Standards Association and the International Code Council jointly formed the Rainwater System Design and Installation Consensus Committee (IS-RCSDI) in order to create a Rainwater Harvesting Standard for use in North America, one that will provide further guidance for rainwater to serve both potable and nonpotable uses.

Section P2912 does not address rainwater for potable use, nor does it contain provisions for the use of stormwater for nonpotable use. This Standard provides code officials the guidance needed for reviewing and inspecting these types of water reuse systems that are becoming more common with ever-increasing water conservation measures. For this reason this Standard should be referenced in Chapter 44. It should further be noted that nonpotable rainwater harvesting systems that conform to this Standard will comply with Section P2912, thus providing a far more comprehensive guidance document as an alternate compliance path.

Here are some necessary provisions that the committee felt obligated to include in this Standard:

1. This Standard addresses roof surface rainwater and stormwater being used as source water. It addresses rainwater intended for use in nonpotable applications as well as potable applications.

2. Recognizing that the risk to public health increases with the number of persons using a rainwater harvesting system, this Standard provides different methods for protecting water based on the influent water quality, the system, and the application. Stormwater runoff is expected to have a higher likelihood of contamination as a result of its flowing overland. Therefore, this Standard specifies additional treatment process requirements for stormwater runoff and does not cover its use for potable water applications.

3. In order to ensure the consideration of the wide range of variables associated with each site, location, design, and application, this Standard requires that a water safety plan be developed for all rainwater harvesting systems. The water safety plan considers the specific challenges and risks presented by the site and associated impact on source water quality, operation of system components, and the risk associated with the end use.

4. Applications for harvested rainwater are separated into four end use tiers that consider the exposure potential through ingestion, inhalation, and skin contact. It further separates these tiers into two groups, one for single-family residential and one for multifamily, commercial and public facilities.

5. This Standard specifies minimum performance criteria for each end use tier in consideration of the health risk and identifies possible treatment process options to meet the specified performance criteria.

6. Based on the expected source water quality, this Standard establishes suitable water quality parameters that are used to substantiate that the treatment process is operating as intended to produce safe water for the specified end use.

Cost Impact: The code change proposal will not increase or decrease the cost of construction

The proposed alternate compliance path is an option provided to the user, not a requirement. Therefore, not added cost

is mandated to the user of the code.

Analysis: A review of the standard proposed for inclusion in the code, CSA B805-18/ICC 805-2018, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

P132-18 Part II

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Alternative compliance paths are already provided for under Section R104.11 (Vote:10-10)

Assembly Action:

None

P132-18 Part II

Individual Consideration Agenda

Public Comment 1:

Proponent: Pennie Feehan, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (pmgcac@iccsafe.org); Dave Cantrell (dave.cantrell.codes@gmail.com); Paul Gulletson (paul.gulletson@csagroup.org)requests As Modified by This Public Comment.

Replace as follows:

2018 International Residential Code

P2602.1 General. The water-distribution system of any building or premises where plumbing fixtures are installed shall be connected to a public water supply. Where a public water-supply system is not available, or connection to the supply is not feasible, potable water from one or more of the following an individual water supply shall be provided.:

1. An individual water supply in accordance with this section.
2. A rainwater harvesting system in compliance with CSA B805/ICC 805.

Individual water supplies shall be constructed and installed in accordance with the applicable state and local laws. Where such laws do not address the requirements set forth in NGWA-01, individual water supplies shall comply with NGWA-01 for those requirements not addressed by state and local laws.

Sanitary drainage piping from plumbing fixtures in buildings and sanitary drainage piping systems from premises shall be connected to a public sewer. Where a public sewer is not available, the sanitary drainage piping and systems shall be connected to a private sewage disposal system in compliance with state or local requirements. Where state or local requirements do not exist for private sewage disposal systems, the sanitary drainage piping and systems shall be connected to an approved private sewage disposal system that is in accordance with the International Private Sewage Disposal Code .

Exception: Sanitary drainage piping and systems that convey only the discharge from bathtubs, showers, lavatories, clothes washers and laundry trays shall not be required to connect to a public sewer or to a private sewage disposal system provided that the piping or systems are connected to a system in accordance with Section P2910 or P2911.

CSA

CSA Group
8501 East Pleasant Valley Road
Cleveland OH 44131-5516

CSA B805-18/ICC 805-18:

Rainwater Harvesting Systems

Commenter's Reason: The committee thought that a standard for potable rainwater systems is not appropriately located in Section P2912. Therefore, this public comment places this potable water alternative source in Section P2602.1 where other potable water systems are regulated.

Another committee reason for disapproval was that alternative compliance paths are already allowed in Chapter one, Section 104.11. While this is true, Section 104.11 offers no guidance as to what a viable alternative path should be. Providing a specified alternative compliance path gives the code official and the designer a tangible source of design specifications. Based on the committee's reason, the code would never need to specify any alternative compliance

requirements, and would always burden the code official with making an equivalency determination with no guidance from the code. The proposed standard, CSA B805/ICC 805 was jointly developed by ICC and the Canadian Standards Association.

The committee offered no technical justification for not including the proposed standard in the code.

This public comment is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). The PMG CAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance the International Codes or portions thereof that were under the purview of the PMG CAC. In 2017 the PMG CAC held one face-to-face meeting and 11 conference call meetings. Numerous interested parties attended the committee meetings and offered their input.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The proposed language only provides for an option to the user. Because this is not a requirement, there is no added or decreased cost of construction caused by this option being placed on the code.

Public Comment 1:

Proponent: Craig Conner, representing self (craig.conner@mac.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Residential Code

P2913 POTABLE RAINWATER COLLECTION AND DISTRIBUTION SYSTEMS

P2913.1 General. This section shall apply to detached single-family dwellings that use rainwater as potable water. Potable rainwater systems shall meet the requirements of Sections P2913.2 through P2913.9, P2906, and Section 2912.

P2913.2 Roof materials. The following roof materials shall be prohibited for roofs that collect rainwater: shingles with fire retardant, copper, and materials that contain asbestos. Materials that contain lead, including but not limited to flashings and roof jacks, shall be prohibited.

P2913.3 Cross connection. Potable water supplies shall be protected against cross connection with rainwater as specified in P2902.1.

P2913.4 Disinfection. Disinfection shall be provided by at least one of the following:

1. Ultraviolet (UV) light providing at least 40 mJ/cm² at 254 nm for the highest water flow rate. A UV sensor with visible alarm, audible alarm, or water shutoff shall be triggered when the UV light is below the minimum at the sensor. In addition filtration no greater than 5 µm shall be located upstream of the UV light or
2. filtration no greater than 0.2 µm , or
3. other approved disinfection

P2913.5 Non-contaminating materials. Materials and systems that collect, convey, pump, or store rainwater for potable rainwater systems shall comply with NSF 53, NSF 61 or equivalent.

P2913.6 Water quality. The quality of the water at the point of use shall be verified in accordance with the requirements of the jurisdiction.

P2913.7 Sunlight. The rainwater storage shall not admit sunlight.

P2913.8 Pipe color. Potable rainwater pipe shall not be required to be purple post disinfection.

Commenter's Reason: Chapter 29 does not currently address rainwater for potable use. Proposals P131 and P132 proposed a new standard on rainwater use, but was disapproved by the committees in four separate votes. Section P2911 of the IRC already covers non-potable rainwater. This proposal adds requirements specific to potable rainwater. This proposal applies only to single-family residences.

The requirements in this proposal are simple.

-- The existing Section 2906 on Materials, Joints and Connections is required. The requirements for non-potable rainwater already in Section 2912 are also required for potable rainwater; debris excluder, roof washer, gutters, inspections, manuals, etc. (P2913.1)

--Roof materials that are not suitable for potable rainwater collection are prohibited (P2913.2).

--Cross connection that would allow rainwater to flow back into other water supply systems is prohibited (P2913.3).

--Disinfection to address biological contaminants is required, with UV light being by far the most common; however microfiltration and other options are allowed (P2913.4).

--Potable rainwater systems have components upstream of the potable water that must not contaminate the incoming water. The cited standards (NSF 53 on Drinking Water Treatment Units and NSF 61 on Drinking Water System Components) are already used in Chapter 29. (P2912.5) The Safe Drinking Water Act is a Federal Law that requires much lower levels of lead in plumbing products.

--Water quality is required to meet the quality requirements of the jurisdictions using language similar to the existing code (P2912.6).

--Sunlight in the rainwater tank would allow algae to grow, so it is prohibited (P2913.7).

--Purple pipe would not be required after disinfection because post-disinfection these pipes carry only potable water (P2912.8).

This proposal replaces the rainwater standard originally proposed. Even if the new rainwater standard were only an option, the proposed rainwater standard would need to be understandable to code enforcement staff. A few examples from the standard originally proposed- there are multiple uses of "should" and "guidance" instead of "shall" or mandatory language. For example in Section 5..1.1 item #1 says "Where water is used for public drinking water supplies, the authority having jurisdiction should be consulted for specific regulatory requirements for water quality." The word "should" is inappropriate. Requirements for the authority having jurisdiction are not optional. Also, the required "Water Safety Plan" is poorly defined and mostly discussed in non-mandatory sections. For example, Annex D on the Water Safety Plan is "informative".

Code requirements for rainwater need to be usable. Please approve this replacement proposal.

Doug Pushard and Darrel McMaster contributed greatly to this public comment.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. Construction of rainwater collection and storage will add cost. The added cost will be strongly dependent on the size of the system. Use of rainwater systems will likely reduce the costs of operating the home.

RP3-18

IRC: P2705.1, P2708.6, P2713.4, SECTION P2726, P2726.1, P2726.2, P2726.2.1, P2726.2.2, P2726.3, P2726.4, P2726.4.1, P2726.4.2, P2726.4.3, P2726.5, P2726.6

Proposed Change as Submitted

Proponent: Jake Pauls, representing Jake Pauls Consulting Services (bldguse@aol.com)

2018 International Residential Code

Revise as follows

P2705.1 General. The installation of fixtures shall conform to the following:

1. Floor-outlet or floor-mounted fixtures shall be secured to the drainage connection and to the floor, where so designed, by screws, bolts, washers, nuts and similar fasteners of copper, copper alloy or other corrosion-resistant material.
2. Wall-hung fixtures shall be rigidly supported so that strain is not transmitted to the plumbing system.
3. Where fixtures come in contact with walls and floors, the contact area shall be water tight.
4. Plumbing fixtures shall be usable including safety of users of showers, bathtubs and bathtub-shower combinations in accordance with R301.1, R306, R307, R308, R311, R320, P2701, P2708, P2713, and P2726.
5. Water closets, lavatories and bidets. A water closet, lavatory or bidet shall not be set closer than 15 inches (381 mm) from its center to any side wall, partition or vanity or closer than 30 inches (762 mm) center-to-center between adjacent fixtures. There shall be a clearance of not less than 21 inches (533 mm) in front of a water closet, lavatory or bidet to any wall, fixture or door.
6. The location of piping, fixtures or equipment shall not interfere with the operation of windows or doors.
7. In flood hazard areas as established by Table R301.2(1), plumbing fixtures shall be located or installed in accordance with Section R322.1.6.
8. Integral fixture-fitting mounting surfaces on manufactured plumbing fixtures or plumbing fixtures constructed on site, shall meet the design requirements of ASME A112.19.2/CSA B45.1 or ASME A112.19.3/CSA B45.4.

Add new text as follows

P2708.6 Grab Bars and Stanchions for Showers and Bathtub-Shower Combinations. Showers and bathtub-shower combinations shall provide stanchions or similar vertically-oriented, handholds typically not attached to walls, and grab bars in accordance with P2726.

P2713.4 Grab Bars and Stanchions for Bathtubs and Bathtub-Shower Combinations. Bathtubs and bathtub-shower combinations shall provide grab bars or stanchions in accordance with P2726.

SECTION P2726 GRAB BARS FOR BATHTUBS AND SHOWERS.

P2726.1 General. Grab Bars and Stanchions for Bathtubs, Bathtub-Shower Combinations, and Showers. Bathtubs, bathtub-shower combinations, and showers not required to be accessible shall be provided with grab bars or stanchions complying with P2726.1 through P2726.6. Dimensions specified are to the centerline of the grab bar or stanchion.

P2726.2 Grab Bars or Stanchions for Bathtubs and Bathtub-Showers. Grab bars or stanchions complying with P2726.2.1 and P2726.2.2 shall be provided at bathtubs and bathtub-shower combinations.

P2726.2.1 Vertical Grab bar or Stanchion. A vertical grab bar or stanchion shall be provided and shall comply with the following criteria.

1. Approach. The grab bar or stanchion shall be located so that it is usable without any obstruction. An unobstructed clear floor space 21 inches (533 mm) wide minimum and 21 inches (533 mm) deep minimum, measured from the outer side of the bathtub, shall be provided and shall be located within 12 inches (305 mm) of the grab bar or stanchion.
2. Length. The grab bar or stanchion shall be 36 inches (914 mm) long minimum.
3. Position. The grab bar or stanchion shall be positioned in accordance with the following criteria:
 - 3.1. The lower end of the grab bar or stanchion shall be 24 inches (610 mm) minimum and 27 inches maximum above the finished floor.
 - 3.2. Grab bars located inside a combination bathtub-shower compartment shall have their centerline 6 inches (152 mm) minimum, measured horizontally, to the shower curtain rod and 8 inches (200 mm) maximum, measured horizontally from the outer side of the bathtub.
 - 3.3. Grab bars and stanchions shall be permitted within 6 inches (152 mm) outside of the outer side of the bathtub complying with P2726.2.1.1

P2726.2.2 Horizontal Grab Bar. A 24-inch (610 mm) long minimum grab bar shall be provided on the long, non-entry side of bathtubs and bathtub-shower combinations. The grab bar shall be installed in a horizontal position and shall be centered, plus or minus two inches, along the length of the tub. The horizontal grab bar shall be located 8 inches (205 mm) minimum and 10 inches (255 mm) maximum above the tub rim.

Exception: A diagonal grab bar or, with 24 inches (610 mm) minimum length is permitted if installed with its higher end 12 inches (305mm) maximum from the control wall. The higher end of the grab bar shall be 25 inches (635 mm) minimum and 27 inches (685 mm) maximum above the tub rim. The lower end shall be located 8 inches (205 mm) minimum and 10 inches (255 mm) maximum above the tub rim.

P2726.3 Vertical Grab Bar or Stanchion for Showers. A vertical grab bar or stanchion shall be provided for showers. The vertical grab bar or stanchion shall be located either interior to or outside the shower compartment, within 3 inches (76 mm) of the compartment access and egress opening. The grab bar or stanchion shall be 24 inches (610 mm) long minimum with its lower end 39 inches (991 mm) maximum above the finished floor.

P2726.4 Other Details. Grab bars and stanchions shall comply with P2726.4

P2726.4.1 Cross Section. Grab bars and stanchions shall be circular in cross section having an outside diameter of 1.25 inches (32 mm) minimum and 2 inches (51 mm) maximum.

P2726.4.2 Spacing. The space between the grab bar or stanchion and adjacent surfaces plus water controls shall be 1.5 inches (32 mm) minimum.

P2726.4.3 Surface Hazards. Grab bars, stanchions and adjacent surfaces shall be free of sharp or abrasive elements. Edges shall be rounded with a minimum radius of 0.25 inch (6 mm).

P2726.5 Structural Characteristics. Allowable stresses shall not be exceeded for materials used when a vertical or horizontal force of 250 pounds (1112 N) is applied an any point on the grab bar, stanchion, fasteners, mounting device or supporting structure. Grab bars and stanchions shall not rotate within their fittings.

P2726.6 Design and Installation for Water. Grab bars, stanchions, fasteners, mounting device or supporting structure shall be designed and installed in accordance with P2701.1, with suitable materials, to withstand effects of water, including corrosion and other deterioration through their service life.

Reason:

“Reason Statement” or Justification for Grab Bars and Stanchions

for Bathtubs, Bathtub-Shower Combinations and Showers

Complying with New Requirements in IRC, especially Section P2726

Proposed by Jake Pauls, BArch, CPE, HonDSc

Introduction

Points of Control. Grab bars, handrails and stanchions are important building components providing—in combination with our hands and our feet—what are called (in ergonomics) “points of control” to maintain balance and aid in ambulation and other movement activities that are crucial to utilizing means of egress for safety generally (in both normal and emergency conditions) and which pose dangers of injurious falls, the leading source of injuries in most countries, including the USA.

A brief digression to explain “stanchions.” You see them routinely on transportation vehicles such as subway trains and city buses. They are the **vertical** assemblies of graspable tubing that are fixed between ceilings, horizontal handrails just above head height, seats, floors, etc. usually located between seating and passageways or aisles. The term, stanchions is used in ADA requirements for transportation vehicles and for this context Wikipedia has the following description: “On board most buses and trams/subways, vertical supports to provide stability when passengers are standing. They are located throughout most city buses and are connected to seats, floor, roof, etc.” This term is used in contexts similar to those for the “poles” referred to in NFPA’s recent adoption of new requirements for grab bars or poles for new bathtubs, bathtub-shower combinations and showers.

Examples of Points of Control in Specific Contexts. The starred, central cell of Table 1. shows the equity, with points of control—**shown in bold italics**—achieved with now-proposed grab bars, handrails and stanchions being required, in Section 1003, in the same way that handrails are required for stairs in the rest of the IBC.

Table 1. Minimum Number of Points of Control Provided with New (★) or Currently Imposed Rules or Practices

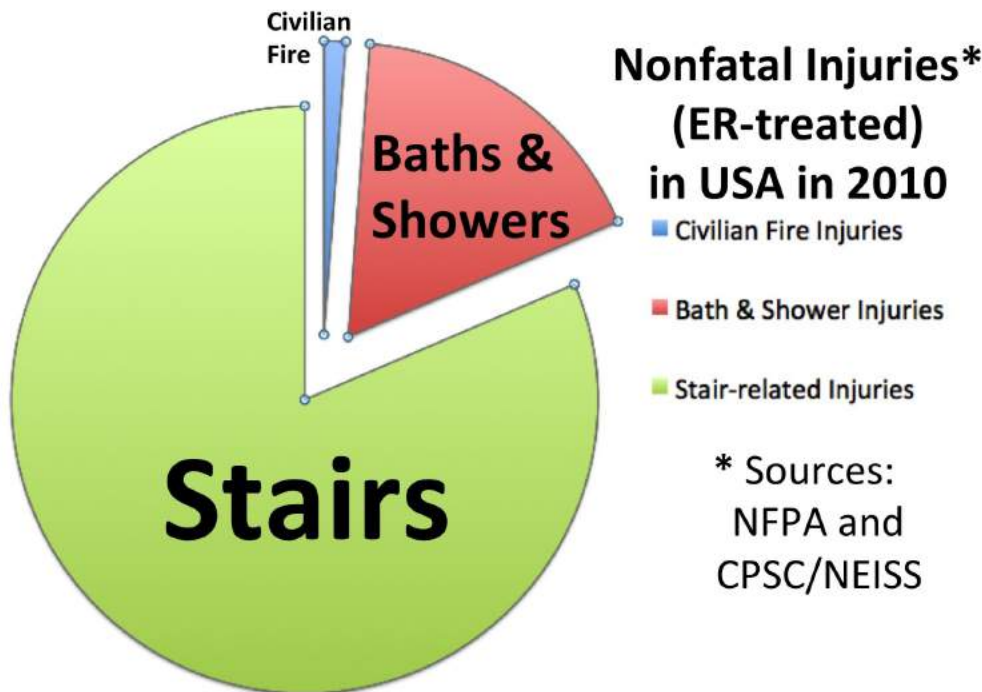
Number of Points of Control Via Hands or Feet	≤1	1	2	3	3-4
Standard walker for older adult with altered gait.					✓
Occupational settings with risk of worker falls from heights. Also, stairs where users can use two handrails simultaneously, one on each side.				✓	
Stairs where users have only a single handrail. <i>Grab bar(s) usable for bathtub/shower entry/egress.</i>			✓ ★		
Bathtubs/showers with slip resistant underfoot surfaces when wet.		✓			
Bathtubs/showers without slip resistant underfoot surfaces when wet, the common condition currently.	✓				

The Problems To Be Solved with A New Requirement for Grab bars, handrails and stanchions. The central and most important point of this code change proposal is to respond to the relatively high risk of injurious falls when entering and exiting bathing/showering facilities, *in all new settings where they occur*. Such risks exceed those for stairs on an exposure-adjusted basis. That is, the time during which one is stepping into or out of a bathtub or shower is more risky than a similar stepping behavior on a stair. The former result in about 25 percent of the injuries as do falls on stairs. This is based on about 300,000 US hospital emergency room visits per year for bathtubs and showers versus about 1.2 million US hospital emergency room visits per year for stairs, using comparably serious injury data for 2010 (discussed by Lawrence, *et al.*, 2015 in the journal *Injury Prevention*). The societal cost of these injuries, plus about two and a half times additional, medically treated injuries, was (for 2010) about 20 billion dollars for US bathtubs and showers and about 93 billion dollars for US stairs with the greatest risk for both being in homes, where bathing/showering is a near daily activity for most people in the US (Lawrence, *et al*, 2015). (See also the annex to this justification for details of injuries documented by the US Consumer Product Safety Commission, CPSC.)

Table 1 depicts the current inequity as well as the increased equity that will be achieved when bathtubs and showers are subject to the same principle about availability of points of control (usable by ones hands or feet) that are crucial to our stability in utilizing those portions of the means of egress that entail elevation differences, changes of slope, and changes in slip resistance. The current—at best—one point of control provided with typical bathtubs and showers (i.e., one foot in a stable placement on a slip-resistant surface) would be augmented by one point of control available reliably to one hand. This achieves equity of safety with stairs where we can count on one foot planted on a tread and one hand on a handrail. For some situations, involving bathtubs used for immersion bathing (with occupants seated or lying on the bottom of the tub) two points of control, utilizing grab bars, handrails or stanchions—one for each hand—are needed for this equity and, more practically, to accomplish the relatively difficult stand-to-sit and sit-to-stand transfers within the tub.

Size of the Problem with Bathtubs and Showers Compared to Other Large Problems. Figure 1, a pie chart, shows the approximate scales of the nonfatal injury problem for three dangers to building occupants. In the US, the traditional danger of fire-related injuries is far smaller than that from bathing/showering and even smaller in relation to stair-related injuries. Right now, in the I-Codes, the segment for bathing/showering is not addressed while many, many pages of the I-Codes deal with fire-related injury prevention. Again, the proposal for grab bars and other points of control to be provided equitably, will provide a major improvement to injury prevention that, heretofore, has been largely ignored in code development and in practice except in some hotel properties where no more than half of the grab bars, handrails or stanchions to be required under the new proposal are provided for bathtubs.

Figure 1. Comparing three dangers resulting in injuries in buildings



There is an inverse relationship between these epidemiological insights and the extent of coverage of the great dangers of stairs and baths/showers in building codes and housing codes plus leading healthy homes literature.

International Codes, Scientific/Technical/Policy/Managerial Perspectives

Precedent Set by NFPA Codes. The foregoing is the philosophical and epidemiological foundation for the proposed addition of requirements for grab bars, handrails and stanchions in Section 1003 of the IBC and, in future or elsewhere, in the I-Codes generally. There is also the precedent taken in NFPA 101 and NFPA 5000 in their 2018 editions where grab bars (alternatively poles which are given the more-technical name “stanchions” in this IBC proposal) were proposed and almost completely adopted (with the exception of health care, discussed below) for new bathtubs and showers in buildings regulated by these codes. The new requirements were mostly noncontroversial and it is hoped that the same will be true with the proposals now submitted to the I-Codes. The justification for the new requirements far outweigh the opposition to them as the ergonomic, biomechanics, epidemiological, etiological and economic aspects have been carefully considered and addressed to the satisfaction of many people who know building codes and safety standards well and whose votes on the many committees considering the issue attest to the multiple justifications for this new feature of building codes and safety standards.

Parallel Code Development Activity in Canada. A proposal, comparable to what NFPA has adopted, is being addressed by a Grab Bar Task Group for the National Building Code of Canada and, when its next cycle commences, will also be proposed for action by the ICC A117 Committee for a new section, on mainstreamed grab bar, handrail and stanchion features for the A117.1 standard. Leaders in the standards and codes field, conversant with the value of grab bars, handrails and stanchions have been discussing such mainstreaming since early 2016, at an international meeting of experts on bathing/showering safety held in Toronto and partly available for study in a free streaming video that is available with several other streaming videos addressing points of control, grab bars, cost-benefit issues, etc., that are all listed in the Bibliography provided with this proposal. So a lot of the groundwork has been laid and different perspectives have been elicited and discussed.

Survey of Existing Facilities. Centered on hotels, health care facilities**, airport airline club shower facilities*, and homes, the proponent for this code change has been conducting a personal, opportunity-based survey of bathing/showering facilities worldwide, including the following countries where his work on building use and safety has taken him in recent years or his work is followed by other professionals, including public health authorities.

- Canada**
- USA* **

- UK*
- Sweden**
- Finland
- Netherlands
- Italy
- Singapore*
- Australia**
- New Zealand
- Japan

The survey is documented in many hours of video and thousands of photographs plus many measurements, in residential occupancies, of three-, four-, five-piece bathrooms ranging in size from a few square meters (20 square feet) to spaces big enough to park an automobile, occasionally with tubs and showers almost that big. Generally, the more compact the bathroom, the easier it is to provide the needed points of control—and with very substantial cost savings.

Hotels Surveyed. They were operated by Marriott, Sheraton, Intercontinental, Holiday Inn, Best Western, Hyatt, Hilton in almost of the countries listed above. In some of them, meetings were held with hotel managers and those responsible for risk management.

Detailed Justifications for Specific New Sections in IRC

P2705.1 already has the heart of the proposal in its item 4, “Plumbing fixtures shall be usable.” The proposal simply fleshes this out with sufficient detail to implement this objective.

P2708. The new text, for the Section for Showers, clarifies, for Showers, that stanchions (sometimes termed “poles,” as in NFPA’s requirements) are equivalent to required grab bars of the conventional sort. It directs IRC users to a new P2726 for requirements.

P2713. 4. The new text, for the section on Bathtubs, directs users to a new P2726 for requirements.

P2726.1. This new text introduces the detailed requirements and clarifies that dimensions (taken at right angles to the grab bar or stanchion) are to the centerline of the device.

P2726.2. These detailed requirements, here for vertical points of control, are based on research findings and recommendations described below and are roughly similar to what NFPA adopted for the 2018 edition of NFPA 101 and NFPA 5000. They are also being considered currently for the National Building Code of Canada.

In these detailed requirements for the vertical points of control, the first things is to establish where within the plan of the bathroom, they will adequately serve users. This is based on Section R307 of the IRC which, along with Figure R307.1, sets the required minimum 21-inch (533 mm) clearances in front of fixtures (toilet, lavatory and tub), the areas through which bathers need to move reasonably unobstructed to access the tub and to exit the tub. The required points of control have to be within 12 inches (905 mm), measured horizontally, of these clear areas.

The dimensions shown here, plus the general superiority of vertical grab bars for ambulatory transfers, are based on extensive Canadian research over the last two decades as well as a meeting of US and Canadian experts in early 2016 that is partially available—for its presentations of Principle Investigators—on free streaming video (with links also provided in the Bibliography). An example of a vertical pole that is recognized as at least equivalent to the conventional vertical grab bar is shown in Figure 2, above, along with relevant discussion that supports the superiority of a properly installed stanchion which can be more easily positioned where the tub is most likely to be accessed. These dimensions are generally similar to what NFPA adopted for its 2018 editions of NFPA 101 and NFPA 5000. They are stated slightly

differently in the IBC proposal to take better account of bathtubs that do not have walls on one to three sides. As in the NFPA-adopted requirements, P2726.2.1.3(2) addresses the often-missed issue of a wall-mounted conventional, vertical grab bar interfering with the shower curtain getting a good seal on the end wall.

Figure 2. Demonstration set up of both conventional grab bars (nominally meeting the length and location criteria of proposed IRC requirements and a stanchion plus a horizontally-fixed section—like a handrail—of the same tubing used for the stanchion (both completely meeting the length, location and structural strength requirements of proposed IRC requirements (which are consistent with IBC, ICC A117.1 and NFPA requirements)



Besides aesthetic advantages, the stanchion and the full-tub-length bars /tubing are clearly superior in placement flexibility—as they do not require walls for attachment—and better performance for a wider range of users and uses including here, especially for the stanchion, serving a use that is not addressed in P2726 for stand-to-sit and sit-to-stand transfers for toilet users that might be a bonus benefit used more frequently than would be uses related to bathing and showering. This is especially the case in small, residential-use bathrooms such as serving hotel guest rooms, where (for space and plumbing efficiency reasons) often have bathtubs and toilets in close proximity. This is addressed further in the Cost Impact section of the justification.

Note that the straight tubing based stanchion and the horizontal bar/tubing are not held by mere compression fit; they are held by adhesive that is permanent and waterproof. The lower part of the stanchion was tested at sustained loads of 300 pounds of horizontal, shearing force without any indication of failure. Its fixing plate shear area exceeds the shear area of conventional grab bar screws by a factor of six and unlike the case for conventional grab bar screws there is no issue with water intrusion and corrosion as well as deterioration of the structural backing for the screws. (See the section below describing field observations of serious deterioration of conventional grab bars fixing details that are often not designed for water intrusion.) Here it should be noted that automobiles, today, utilize high-performance adhesives where, in the past, screws were the norm but these, and the necessary perforations in parts, performed poorly from a corrosion perspective. Water pumps as well as body panels and headlamp plus taillight assemblies are examples of how modern automobiles are built with waterproof, automotive-grade adhesives. Examples of greater use of modern adhesives are also found increasingly in building construction.

Here it must be emphasized that grab bars and stanchions have to be structurally installed; some of the products available in the marketplace, e.g., suction-cup grab bars—that have a temporary and precarious adhesion to smooth tiles—and compression-fit (via a jackscrew mechanism) temporary transfer poles do not meet the structural requirements imposed in the proposed new requirements, the same structural performance requirements applied—withstanding loads of 250 pounds—currently applicable to conventional grab bars in the IBC. In Figure 2, below, the photograph shows a demonstration bathtub-shower combination with a redundant set of both conventional (vertical and diagonal) grab bars and (vertical and horizontal, straight lengths of tubing fixed at their ends)—they easily meet the 250-pound structural load criterion.

P2726.2.2 Horizontal Grab Bar. As with the vertical grab bar, described above (for P2726.2.1), the dimensions and need for this second grab bar are based on Canadian research identified in the Bibliography and is addressed in the video of the presentation by Dr. Nancy Edwards, Principal Investigator of the early Canadian work which also addressed the option of a diagonal grab bar provided via the exception to 2726.2. Note that the base requirement covers installations where the bathtub is not enclosed on one or more sides with a wall. Such horizontal grab bars are intended for use by persons using the tub for immersion bathing which requires stand-to-sit and sit-to-stand transfers that utilize a horizontal or diagonal grab bar (and might also utilize a vertical grab bar or pole addressed by 27.2.1). 2726.2.2 permits horizontal handrails, which could be the same tubing used for the stanchion, to be used in a horizontal orientation. These could be longer (e.g., full tub length) than conventional, horizontal grab bars which need a parallel wall for support, unlike the horizontal tubing fixed between end walls only.

P2726.2.3. Vertical Grab Bar or Stanchion for Showers. Because of the variety of dedicated showers, especially in plan shape and size, this requirement is stated in a relatively flexible fashion relying more on a performance approach than specific dimensions, other than the minimum length and lower end position that takes into account various statures of users as well as the possibility there might be a seat in the shower. The inclusion of a stanchion takes into account the structural differences between bathtubs and free-standing showers; the latter would be good candidates for a stanchion positioned between the ceiling and the floor just outside the shower entrance.

2726.4. Other Details. Generally the requirements referenced here are based mostly on current requirements of ICC A117.1-2017 and with a new provision that addresses often-seen issues of water damage to conventional grab bars that range from the cosmetic to the catastrophic.

27.26.4.1 Cross Section. This is the same as ICC A117.1-2017 without an exception for noncircular sections which are rarely seen within bathrooms.

P2726.4.2. Spacing. This is based on a simplified version of ICC A117.1-2017.

P2726.4.3. Surface Hazards. This expands on a requirement, P2701.1.

P2726.5. Structural Characteristics. This is based on current requirements of ICC A117.1

2726.6. Design and Installation for Water. This last section is new and it addresses a serious problem with a non-trivial number of grab bars that have been seen in hotels, especially in the USA and Canada. Many are not designed, installed and maintained to address deterioration and corrosion problems with conventional, wall-mounted grab bars due to easy water intrusion and entrapment between conventional grab bar mounting plates and the covers fastened over them. Often, when water is entrapped here, there is no way for it to drain out, particularly from the lower portion of the enclosed space.

Problems Found in the Field with Conventional Grab Bars

Here follows some detail on what has been observed in the field on two large problems addressed in 2726.6 as well as in 2726.2.1.3(2).

During the course of his opportunity-based survey of grab bars provided for bathrooms in hotel guest rooms the proponent of this code change has found two problems with many installations.

The first, affecting over 50 percent of the surveyed bathtub-shower combinations, comes from placement of vertical grab bars underneath—and within a few inches horizontally of the end bracket for shower curtains. This makes sealing the shower curtain against the end wall of the bathtub-shower combination very difficult so that the danger of water getting outside the bathtub, on the adjacent floor is heightened unreasonably and needlessly. The proposed section

1003.8.2.1.3(3) addresses this problem as follows: “If attached to a wall, a grab bar or handrail shall be located inside the bathtub or combination bathtub-shower compartment and shall be no closer than 6 inches (152 mm), measured horizontally to the shower curtain rod.”

A much more worrying problem is found with a smaller percentage of conventional, wall-mounted grab bar installations, specifically grab bars which have cover plates over the screw plate onto which the tube of the grab bar is welded. There is invariably a space between the hole in the cover plate through which the tubing (grasped) portion of the grab bar passes and the tubing itself. Water can easily enter here and get trapped by the cover plate thus creating a pool of water and debris (hair, shampoo residue, etc.) from the showering process.

Aside from the hygiene problem here, there is a greatly heightened risk of two structural problems. One is water intrusion into the wall, around the fixing screws—typically two or three for each end of the grab bar, causing deterioration of the backing material so the screws become loose enough to be extractable with ones fingers. The second problem is equally worrisome especially as the quality of the steel used in (off-shore) grab bars is relatively poor in terms of corrosion of the screws and, less often, the mounting plates. The worst case seen recently had the heads of all the screws holding a grab bar so corroded that their heads were completely deteriorated and the grab bar could be pulled away from the walls with little force by one hand—clearly far, far less than the stipulated load of 250 pounds that codes in the US stipulate for structural strength.

The proponent has many photographs of these problems as well as a few videos showing how loose the grab bars have become due to corrosion as well as backing deterioration from water. One such photograph is provided in Figure 3, below; it is not the worst situation seen in the field.

Figure 3. Corrosion behind grab bar cover plate



Clearly such examples need to be addressed in several ways including stronger inspection by authorities and improved management of facilities. Improved design and manufacture of conventional grab bars would help too but, until that occurs, this proposal offers the stanchion options as well as mounting locations that keep the important “points of control” in relatively dry locations, for example at the exterior of a shower enclosure, but still near enough to the entrance to be usable from both outside and inside the enclosure. Proposed Section 2726.2.3 contains the provision, for the grab bar or stanchion to be located either interior to or outside of the shower compartment. . . .

Annexes

Annex 1: Representative sample of narratives of actual bathtub/shower-related injuries that led to US hospital emergency department visits, and for about one in ten of such visits led to hospital admission, **Annex 2,** (plus an additional 30 percent who went directly to hospital admission without an ED visit) in 2010. These are collected and published by the US Consumer Product Safety Commission (CPSC) National Electronic Injury Surveillance System (NEISS) and many more can be downloaded from the CPSC/NEISS Web site, <https://www.cpsc.gov/Research--Statistics/NEISS-Injury-Data>. Accessed January 8, 2018.

Annex 1: US CPSC NEISS: First 112 Sample Narratives (of 6,946 cases) for Product Code 0611 Injuries in 2010 - ER released w/wo treatment

(Product Code 611 covers bathtubs or showers including fixtures or accessories; excluding enclosures, faucets, spigots and towel racks)

41 YOM FRACTURED A RIB BY SLIPPING IN THE BATHTUB & FALLING AGAINST THE TOILET AT HOME.

53 YOF SUSTAINED A CONTUSION OF A SHIN BY BUMPING IT WHILE SHOWERING AT HOME.

18 YOF SPRAINED HER LOWER BACK BY FALLING IN THE SHOWER AT SCHOOL.

02 YOF SUSTAINED A LACERATION OF THE CHIN BY FALLING IN THE BATHTUB AT HOME.

18 YOF SUSTAINED A HEAD INJURY BY FALLING IN A SHOWER AT HOME.

80 YOM DISLOCATED A HIP BY LIFTING LEG IN SHOWER.

86 YOF SUSTAINED A LACERATION OF THE SCALP BY TRIPPING ON A RUG IN THE SHOWER AT HOME.

71 YOF SUSTAINED A HEAD INJURY BY FALLING FROM TOILET AGAINST THE BATHTUB AT HOME.

68 YOF SPRAINED AN ANKLE BY FALLING IN A SHOWER.

47 YOF FRACTURED A KNEE BY FALLING IN THE SHOWER AT HOME.

02 YOF SUSTAINED A LACERATION OF THE CHIN BY FALLING IN THE BATHTUB.

22 YOM SPRAINED A FOOT WHILE STEPPING OUT OF A SHOWER AT JAIL.

23 YOF SUSTAINED A CONTUSION OF A FOOT BY TRIPPING ON A RUG & STRIKING AGAINST A TUB AT HOME.

40 YOM SUSTAINED A LACERATION OF THE NOSE FROM BEING STRUCK BY THE SHOWER HEAD IN THE SHOWER AT HOME.

21 MOM RUPTURED AN EAR DRUM WITH A COTTON-TIPPED SWAB WHILE BATHING IN TUB AT HOME.

48 YOF SUSTAINED A CONTUSION OF THE NECK BY FALLING IN THE BATHTUB AT HOME.

04 YOF SLIPPED IN BATHTUB FELL AND INJURED FACE DX/ FACIAL LAC L KNEE STR

10 YOF FELL OUT OF SHOWER AND INJURED L KNEE. HAS ABRASION TO KNEE ALSO

80 YOF FELL IN SHOWER AT HOME HIT HEAD. DX/ HEAD INJURY

94 YOM SLIPPED AND FELL IN SHOWER AND HIT FACE ON FLOOR. DX/ FACIAL FX

55 YOM SLL LEG HEMATOMA

72 YOF CAUGHT FOOT IN TUB, INJURING LOWER LEG. NOW HAS HEMATOMA AND INCREASING PAIN.

22 YOF AT HOME FAINTED WHILE IN SHOWER AND FELL CUTTING FOREHEAD.

26 YOF SLIPPED AND FELL IN TUB DX: KNEE STRAIN

90 YOF GETTING OUT OF SHOWER WITH WALKER SLIPPED ON THE FLOOR AND HIT HEAD DX/ SCALP ABRASION

30 YOM SLIPPED AND FELL INTO TUB DX: CONTUSION TO BACK

51 YOF SLIPPED IN TUB AND HIT HEAD DX/ SCALP LAC

60 YOF SLIPPED AND FELL IN TUB DX: CONTUSION TO COCCYX

44 YOM FELL AND HIT ABDOMEN ON BATHTUB AT HOME. DX/ ABDOMINAL CONTUSION

04 YOM WITH CUT TO FACE FELL IN TUB DX: LACERATION TO FACE

51 YOF AT HOME FELL AT 5PM WHEN LOST BALANCE AND HIT L SIDE OF RIBS ON BATHTUB.

33 YOF SLIPPED AND FELL IN TUB DX: HEAD LACERATION

23 MOM FELL IN BATHTUB AT HOME AND HIT CHIN CAUSING LACERATION.

62 YOM WITH BACK PAIN FELL INTO TUB DX; CONTUSION TO LOWER BACK

63 YOF FELL INTO BATHTUB / NO INJURIES OR COMPLAINTS

54 YOM SLIPPED AND FELL IN TUB DX: RIB FRACTURE

02 YOM SLIPPED IN TUB AT HOME AND INJURED FACE DX/ CHIN LAC

25 YOF WITH CHEST PAIN AFTER FALL INTO TUB DX: CONTUSION TO CHEST

84 YOM FELL OUT OF SHOWER ON TO THE FLOOR AT HOME HIT HEAD DX/ HEAD INJURY

85 YOF SLIPPED AND FELL IN TUB AND HIT HEAD AT HOME DX/ HEAD INJURY

06 YOM AT HM WAS TAKING A BATH & SWIMMING IN TUB WHEN HE STRUCK HIS HEAD AGAINST FAUCET CAUSING HEAD LACERATION.

28 YOM AT HOME FELL IN SHOWER. WAS RESPONSIVE PER EMS.

26 YOF SLIPPED / FELL IN THE SHOWER DX: R EAR LAC. / HEAD & R SHOULDER CONTUSION

36 YOF THIS AM SLIPPED WHILE TRYING TO GET OUT OF BATHTUB AND LANDED ON BUTTOCKS.

28 YOF RIPPED FINGER NAIL OFF WHEN SLIPPED IN THE SHOWER AND THE NAIL BENT BACKWARDS.

26 YOF INJURED KNEE STEPPING OUT OF SHOWER DX/ RIGHT KNEE SPRAIN

50 YOM FELL IN BATHTUB AND HIT CHEST DX/ RIB FX

83 YOM CUT SCROTUM FELL IN TUB DX: LACERATION TO SCROTUM

71 YOF FELL OUT OF BATHTUB AT HOME AND HIT HEAD ON THE FLOOR DX/ HEAD INJURY

89 YOF FELL IN TUB HITTING HEAD DX: CLOSED HEAD INJURY

69 YOF WAS IN SHOWER AND FELL BACKWARDS STRIKING HER BACK.

08 YOF AT HOME LACERATED FACE ABOVE R ORBITAL. HIT HER HEAD ON SOAP DISH WHILE SHOWERING. NO LOC.

40 YOM SLIPPED AND FELL IN SHOWER AND INJURED CHEST. DX/ RIB FX

17 YOF FELL IN TUB HURT NECK DX: NECK STRAIN

23 YOM INJURED LOWER BACK BENDING OVER IN SHOWER AT HOME DX/ LUMBAR STRAIN

83 YOF FELL IN THE TUB AT ASSISTED LIVING AND INJURED SHOULDER DX/ RT SHOULDER CONTUSION

02 YOM HIT FACE ON BATHTUB AT HOME DX/ FACIAL LAC

74 YOM FELL AND HIT HEAD IN TUB DX: CONTUSION TO HEAD

85 YOF SLIPPED AND FELL GETTING OUT OF TUB DX: CONTUSION TO HIP

58 YOF SLIPPED AND FELL INTO TUB HIT HEAD DX: CLOSED HEAD INJURY

13 MOM AT HOME FELL IN BATHTUB AND HIT FOREHEAD AND MOUTH.

06 YOM SLIPPED IN BATHTUB AND HIT HEAD DX/ HEAD CONTUSION

78 YOM SLIPPED AND FELL IN TUB DX: LACERATION TO HEAD

08 YOM SLIPPED IN TUB TWISTED ANKLE DX: ANKLE STRAIN

51 YOF HIT HEAD ON SOAP DISH IN SHOWER 2 TIMES THIS WEEK HAS HEADACHE DX/ CONCUSSION

51 YOF SLIPPED IN SHOWER AND INJURED KNEE AT HOME DX/ RIGHT KNEE CONTUSION

83 YOM SLIPPED AND FELL IN THE SHOWER LAST NIGHT AND INJURED BACK DX/ BACK PAIN

31 YOM HIT EYE WITH TOWEL WHILE GETTING OUT OF THE SHOWER AT HOME DX/ RIGHT EYE CORNEAL ABRASION

24 YOF FELL GETTING OUT OF SHOWER HIT HEAD DX/ SCALP LAC

48 YOF SLIPPED IN SHOWER HIT HEAD + LOC DX/ HEAD INJURY

11 YOM SLIPPED IN SHOWER AND INJURED LEG. DX/ LEFT LEG CONTUSION

30 YOF SLIPPED AND FELL INTO TUB DX: CONTUSION TO HIP

18 MOM FELL IN TUB DX: LACERATION TO FACE

46 YOF SLIPPED AND FELL IN TUB DX: CONTUSION TO LOWER BACK

30 YOM CUT HAND ON BROKEN SOAP DISH AT HOME. DX// RIGHT HAND LAC

70 YOF SLIPPED AND FELL IN TUB DX: CONTUSION TO CHEST

31 YOM CUT THUMB ON SHOWER DRAIN THIS AM.

62 YOF SLIPPED IN THE SHOWER AND FELL ON THE FLOOR AT HOME DX/ LEFT WRIST SPRAIN

67 YOM FELL GETTING OUT OF SHOWER HIT HEAD ON TUB AT HOME DX/ SCALP CONTUSION

45 YOF PASSED OUT IN SHOWER AT GROUP HOME HIT HEAD. DX/ HEAD INJURY

04 YOF FELL IN BATHTUB AND HIT MOUTH DX/ LIP LAC

43 YOM SLIPPED IN BATHTUB AND INJURED KNEE DX/ LEFT KNEE CONTUSION

15 YOM TAKING SHOWER AND SHOWER DOOR SHATTERED AND PT FEET WERE CUT WITH THE GLASS AT HOME DX/ BILAT FOOT LAC

73 YOF AT 9AM TODAY WAS GETTING OUT OF TUB AND SLIPPED AND BUMPED L RIBS ON THE TUB. C/O RIB PAIN.

87 YOF BENT DOWN TO PUT SCALE AWAY FELL AND HIT INTO TUB AT HOME DX/ LEFT HIP CONTUSION22 YOM FELL IN TUB AT HOME AND INJURED CHEST DX/ RIB FX

40 YOF SLIPPED GETTING OUT OF BATHTUB AND INJURED LOWER BACK DX/ LOW BACK PAIN

34 YOM FELL AND HIT TUB DX: SHOULDER STRAIN

70 YOF SLIPPED FELL HIT CHEST ON SIDE OF TUB DX: CONTUSION TO CHEST

89 YOF SLIPPED AND FELL IN THE SHOWER LAST NIGHT AT NURSING HOME INJURED CHEST DX/ CHEST CONTUSION

44 YOM FELL IN TUB AND HIT CHEST DX.CHEST CONTUSION

36 YOF SLIPPED AND FELL IN TUB DX: LACERATION TO FACE

56 YOM CUT WRIST ON BROKEN SHOWER KNOB AT HOME DX/ LEFT WRIST LAC

88 YOF FELL AT HOME IN SHOWER AND HIT HEAD ON TUB DX/ SCALP CONTUSION

51 YOM SLIPPED AND FELL IN TUB DX: NECK STRAIN

23 YOM FELL IN BATH TUB AND INJURED CHEST DX/ CHEST CONTUSION

59 YOM FELL IN SHOWER AND INJURED SHOULDER DX/ LEFT SHOULDER FX

46 YOM HAD FALL HIT TUB DX: CONTUSION TO FACE

78 YOF FELL AT HOME AND HIT FACE ON BATHTUB DX/ FACIAL CONTUSION

29YOF WITH BACK PAIN AFTER FALL IN TUB DX: LOW BACK STRAIN

31 YOF FELL GETTING OUT OF TUB AT HOME INJURED FLANK DX/ FLANK CONTUSION

72 YOF AT HOME FELL WHEN SLIPPED ON URINE IN BATHROOM AND HIT HEAD ON SIDE OF BATH TUB.

19 YOF SLIPPED AND FELL INTO TUB DX: CONTUSION TO LOWER BACK

08 YOM FELL IN THE SHOWER AT HOME AND HIT EAR DX/ LEFT EAR LAC

62 YOM SLIPPED / FELL IN THE SHOWER. DX: RIB CONTUSION

09 YOF FELL IN TUB AND HIT LIP. DX/ LIP LAC

56 YOF WITH SHOULDER PAIN AFTER USING BATHBRUSH IN SHOWER DX: SHOULDER STRAIN

75 YOF AT HOME FELL OFF HASSOCK APPROX 30 MIN AGO HITTING HEAD AND L ARM ON BATHTUB. DENIES LOC.

62 YOF SLIPPED IN TUB HITTING FOOT DX: CONTUSION TO FOOT

04 YOM SLIPPED IN THE BATHTUB AND HIT CHIN DX/ CHIN LAC

34 YOM FELL IN THE SHOWER AT HOME INJURED BACK DX/ BACK SPRAIN

25 YOF + ETOH BAL 313 FELL IN SHOWER AND HIT HEAD DX/ HEAD CONTUSION

Annex 2: US CPSC NEISS: First 48 Sample Narratives (of 630 cases) for Product Code 0611 Injuries in 2010 - ER treated & Then Admitted to Hospital

(Product Code 611 covers bathtubs or showers including fixtures or accessories; excluding enclosures, faucets, spigots and towel racks)

89 YOF GETTING OUT OF THE SHOWER THE NEXT THING SHE KNEW SHE WAS ON THE FLOOR WITH HEAD AND SHOULDER INJURY; SHOULDER AND HEAD CONTUSION

69 YOM WAS WASHING HIMSELF IN SHOWER, FELL ONTO BLUNT PART OF BATHTUB, IMMEDIATELY HAD PAIN & TROUBLE BREATHING. DX - MULTIPLE RIB FXS

56 YOF SLIPPED IN THE SHOWER AND FELL FORWARD HITTING HER FACE & INJURING HER RT ARM- DX- MECHANICAL FALL W/ FRACTURE RT SHOULDER

78 YOF FAMILY FOUND HER ON THE FLOOR BETWEEN TOILET AND BATHTUB, SHE STATED SHE PASSED OUT WHEN SHE WAS IN SHOWER; SHOULDER INJURY

47 YOM HAD A WET SHEETROCK FALL ON HEAD WHILE IN SHOWER, +LOC, WAS CONFUSED. DX - BLUNT HEAD TRAUMA W/BRIEF LOC

62 YOM HAD A SYNCOPAL TODAY AT HOME IN THE SHOWER INJURING EYE AREA- DX- LACERATION TO FACE(EYE)

78 YOF PRESENT TO ER FROM HOME WHEN SHE WAS TAKING A BATH AND COLLAPSED - DX- CARDIAC ARREST, RESUSCITAED

43 YOM PRESENT TO ER AFTER HE WAS IN THE BATHTUB AND SLIP AND FELL GETTING OUT HITTING HEAD ON FLOOR- DX- BLUNT HEAD TRAUMA

81 YOM PRESENT TO ER AFTER A FALL IN THE SHOWER AT HOME TODAY INJURING THE HEAD AREA- DX- BLUNT HEAD TRAUMA

41 YOM FELL OUT OF SHOWER AT ASSISTED LIVING HOME YESTERDAY ONTO RT SIDE C/O RT HIP & RT LEG PAIN. DX - RT HIP FRACTURE

80 YOF TRYING TO GET OUT OF BATHTUB ACCIDENTLY FELL INJURED LOWER BACK; BACK CONTUSION AND AMBULATORY DYSFUNCTION

92 YOM PRESENT TO ER AFTER A FALL IN BATHTUB THIS MORNING INJURING RT HIP-DX- FRACTURE RT LOWER TRUNK (HIP)

88 YOF PRESENT TO ER AFTER A FAL IN BATH TUB AT SNF INJURING LT HIP- DX - FRACTURE LT LOWER TRUNK (HIP)

88 YOF WAS GETTING OUT OF SHOWER, FELT DIZZY & FELL STRIKING BACK OF HEAD ON FLOOR INJURING LT ARM. DX - SKIN TEAR LACERATION

88 YOF GETTING OUT OF BATHTUB THIS MORNING FELL TRIED TO BRACE HERSELF INJURED SHOULDER; SHOULDER FRACTURE

71 YOF WAS FOUND DOWN BY SON IN BATHTUB AT HOME, HAS INJURY TO LT EYE & FOREHEAD, IS REPETITIVE. DX - BLUNT HEAD TRAUMA, +ETOH

86 YOF LOST BALANCE WHEN SHE TURNED AROUND & FELL INTO BATHTUB C/O LOW BACK PAIN. DX - LOW BACK PAIN, POSS FX VS CONTUSION

80 YOF HUSBAND DID NOT WANT HER SMOKING IN HOUSE, WENT TO BATHROOM STOOD ON THE TOILET, OPENED WINDOW, SLIPPED BETWN TOILET/TUB; PELVIC FX

44 YOF FELL IN SHOWER TODAY SUSTAINING HEAD INJURY. DX - SCALP LACERATION

37 YOF SUSTAINED A MECHANICAL FALL IN SHOWER ONTO RT UPPER EXTREMITY, C/O RT SHOULDER PAIN. DX - RT DISTAL CLAVICLE FX

37 YOM HAD A GROUND LEVEL FALL IN BATHROOM STRIKING LOWER BACK ON BATHTUB. DX - SPINAL CONTUSION

84 YOF HAD SYNCOPAL EPISODE IN SHOWER AND FELL. DX: L 10TH RIB FX, INABILITY TO AMBULATE.

87 YOF FELL IN SHOWER. DX: RHABDOMYOLYSIS.

93 YOF FELL IN SHOWER AT ASSISTED LIVING. DX: L DISTAL HUMERUS FX.

79 YOM FELL IN SHOWER. DX: A FIB W/RAPID VENTRICULAR RESP, SYNCOPE, SDH, SAH, ELEVATED INR.

84 YOF FELL WHILE GETTING OUT OF BATHTUB SUSTAINING A FRACTURE TO HER LUMBAR SPINE

90 YOF SLIPPED IN BATHTUB AND GRAZED HEAD ON SHELF AT ASSISTED LIVING. DX: R KNEE STRAIN W/POSS INTERNAL DERANGEMENT, CLOSED HEAD INJURY.

82 YOF WITH NO INJ FROM FALL IN TUB

85 YOM WITH NO IN, FELL IN BATHTUB, ADMITTED FOR OTHER REASONS

52 YOM W/ALS FELL AND BECAME STUCK BETWEEN TOILET AND TUB. DX: RHABDOMYOLYSIS STATUS POST FALL, NASAL FX.

95 YOF FELL IN SHOWER SUSTAINING CHEST CONTUSION

71 YOF SLIPPED AND FELL IN SHOWER. DX: SYNCOPE, LARGE HEAD LAC, COAGULOPATHY, HYPOKALEMIA, LONT QT, ALCO

79 YOF FELL IN SHOWER SUSTAINING A FRACTURED KNEE

87 YOF WITH RIB FRACTURE FROM FALL IN TUB

79 YOM WITH LOWER BACK STRAIN FROM FALL IN SHOWER

81 YOF TURNED IN SHOWER AND FELL SUSTAINING A FRACTURED HIP

97 YOF FELL IN THE SHOWER AT NURSING HOME. DX: TRAUMATIC SDH, AGGITATION.

70 YOF FELL IN SHOWER AT HOME AND WAS UNABLE TO GET UP, SUSTAINED CHI, BACK CONTUSIONS

88 YOF FELL AGAINST BATHTUB AND WALL AT ASSISTED LIVING. DX: BACK/SHOUL PX, SYNCOPE, STAGE I THORACIC DECUBITUS ULCER, MULT OLD THORACIC FX'S.

88 YOF SLIPPED ON WET FLOOR GETTING OUT OF SHOWER AT NURSING HOME. DX: BACK CONT, PNEUMONIA, HYPOXEMIA, PLEURAL EFFUSION.

41YOF WITH NO INJURIES FROM FALL IN SHOWER, WAS ADMITTED

83 YOM FELL IN THE SHOWER. DX: TRAUMATIC ICH, FACIAL LAC, CONCUSSION W/O LOC, RENAL FAILURE.

94 YOM FELL GETTING OUT OF THE SHOWER AND HIT HEAD SUSTAINING A LACERATION

79 YOM FELL ON SIDE OF BATHTUB. DX: SYNCOPE, CHEST WALL CONT.

55 YOM SLIPPED AND FELL IN BATHTUB. DX: R HEMOTHORAX/PNEUMOTHORAX, MULT R RIB FX'S.

86 YOF FELL BACKWARDS INTO BATHTUB & HIT HEAD AT HOME DX: LACERATION TO SCALP/ ACUTE DEHYDRATED

95 YOF TRIPPED OVER THROW RUG WHILE GETTING INTO SHOWER AT HOME DX; AVULSION TO FACE/ MALIGNANT HYPERTENSION

53 YOF SLIPPED IN SHOWER AND FELL HITTING HIP ON TOILET AT HOME DX: STRAINED RIGHT HIP/ UNCONTROLABLE DIABETES

Bibliography: Bibliography

Approximately 50 internationally-produced scientific and technical references, on bathing/showering safety, were compiled by the proponent, in 2016, for an American Public Health Association (APHA) draft policy highlighting, especially two Canadian research studies that also are addressed in video presentations by Principal Investigators (Dr. Nancy Edwards, Dr. Alison Novak) for the research and posted, for free streaming viewing at, <https://vimeo.com/164239941> Accessed January 8, 2018. Additional videos covering technical aspects of bathing and showering safety (including cost impact and benefit issues*) are found at the following links (all of which are available, with descriptions, at www.bldguse.com, the proponent's Professional Practice Website, Accessed January 8, 2018.).

- <https://vimeo.com/237294479>
- <https://vimeo.com/239276202> *
- <https://vimeo.com/197742277>
- <https://vimeo.com/193507768>
- <https://vimeo.com/173883358>
- <https://vimeo.com/175101448> *
- <https://vimeo.com/117572176>

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Cost Impact: The code change proposal will increase the cost of construction

Cost Impact

The code change proposal will increase the cost of residential construction, but that increased cost pales in comparison to the benefits of enhanced usability and reduction of fall injuries, the majority of which occur in residential settings, especially homes.

The additional material in the form of conventional grab bars or poles plus their fixings is about 50 dollars per grab bar or pole (using *retail* prices for the components confirmed as recently as 2017) and with a conventional three-fixture bathroom with a bathtub there would be a need for two such grab bars or poles or one of each. Labor to install these would be about one hour for each. Thus an overall, installed cost is on the order of \$200 per bathroom. The service life would be on the order of two or more decades.

Against this added cost of an installed single grab bar or two per bathroom there are the ongoing benefits of enhanced normal (non-injury) uses which, for a typical US household for a 20-year period, for example, number about 7,000 per person or on the order of 20,000 per household. Those enhanced uses, with grab bars, have an economic value that is larger than the benefit of averted injuries from falls.

Currently without grab bars, our bathtubs and showers are the site of injuries serious enough to require professional medical attention at a rate, annually (using 2010 data) of about 1 million per 110 billion uses or about one in 110,000 uses. Every one of those non-injury uses has a value. By comparison, for stairs this ratio is about one professionally treated fall injury for every million flight uses in home settings and one such injury for every ten million flight uses in public settings where, under the IBC and more-detailed inspection procedures, stairs are nearly one order of magnitude safer than those nominally constructed under the IRC. See the video presentation by Jake Pauls to the April 2017 meeting, “The Impact of Building Codes and Standards in Public Health and Safety,” held in Melbourne, Australia, in connection with the 15th World Congress on Public Health. The streaming video containing this presentation, which includes the “Injury Pyramids” used for the above stair safety calculation, is available freely at <https://vimeo.com/239276202> (as listed in the first part of the Bibliography accompanying this proposal) accessed Jan 8, 2018.

The injuries-averted benefit, over twenty years, has a value, in 2010 dollars, about 6.5 times greater than the installation cost, based on the very reasonable assumption that half the falls are averted with the specified grab bars or poles. For the vertical poles that also enhance and make safer the use of toilets that, being adjacent to a bathtub, can serve stand-to-sit and sit-to-stand transfers for toileting, this benefit increases by about 35 percent to nearly 9 times greater than the installation cost. These projections are based on the injury economic data provided by the 2015 paper in the respected journal, *Injury Prevention*, by Lawrence, Spicer and Miller (see Bibliography for details).

The bottom line is that the benefits of both enhanced normal uses, in the tens of thousands per household over a 20-year period, combined with the benefit of averted injuries, is on the order of at least 20 or more times the cost of providing the grab bars, especially if they take the form of vertical poles serving bathtub-shower combination users as well as toilet users in a three-piece bathroom provision that is very common in homes and hotels, for

example. For hotels, while the lavatory sink(s) may be in a separate space, the toilet and bathtub-shower combination are usually close together so that a single pole can serve transfers for both. Thus the cost impact of grab bar or pole installations is very small in relation to the benefits and that cost of installation is very small in relation to the overall price of a dwelling unit or hotel guest room for example.

RP3-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Although this is a legitimate concern, to require these in every home is overkill. Stanchions might interfere with shower doors, clearances at water closets and other fixtures. Although this proposal is focused for areas in and around bathing fixtures, this topic is more aligned to be placed in building part of the code (Chapter 3). Perhaps the first step towards a future possible requirement for these bars is to require blocking to be installed for proper attachment of the indicated bar arrangements. Requirements for bar mounting blocking in manufactured plumbing fixtures (such as fiberglass shower and bathtub enclosures) needs to be addressed in the product standards for those products such as CSA B45.5/IAPMO Z124. (Vote:10-0)

Assembly Action:

None

RP3-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jake Pauls, representing Jake Pauls Consulting Services (bldguse@aol.com) requests As Modified by This Public Comment.

Modify as follows:

2018 International Residential Code

P2705.1 General. The installation of fixtures shall conform to the following:

1. Floor-outlet or floor-mounted fixtures shall be secured to the drainage connection and to the floor, where so designed, by screws, bolts, washers, nuts and similar fasteners of copper, copper alloy or other corrosion-resistant material.
2. Wall-hung fixtures shall be rigidly supported so that strain is not transmitted to the plumbing system.
3. Where fixtures come in contact with walls and floors, the contact area shall be water tight.
4. Plumbing fixtures shall be usable ~~including safety of users~~. Usability of showers, bathtubs and bathtub-shower combinations shall include safety of access to, bathing plus showering in accordance with R301.1, R306, R307, R308, R311, R320, P2701, P2708, P2713, and P2726, and egress from the facility achieved with provision of grab bars and stanchions in accordance with either R307 or the International Building Code, 2021, Section 1209.
5. Water closets, lavatories and bidets. A water closet, lavatory or bidet shall not be set closer than 15 inches (381 mm) from its center to any side wall, partition or vanity or closer than 30 inches (762 mm) center-to-center between adjacent fixtures. There shall be a clearance of not less than 21 inches (533 mm) in front of a water closet, lavatory or bidet to any wall, fixture or door.
6. The location of piping, fixtures or equipment shall not interfere with the operation of windows or doors.
7. In flood hazard areas as established by Table R301.2(1), plumbing fixtures shall be located or installed in accordance with Section R322.1.6.
8. Integral fixture-fitting mounting surfaces on manufactured plumbing fixtures or plumbing fixtures constructed on site, shall meet the design requirements of ASME A112.19.2/CSA B45.1 or ASME A112.19.3/CSA B45.4.

P2708.6 Grab Bars and Stanchions for Showers and Bathtub-Shower Combinations. Showers and bathtub-shower combinations shall ~~provide stanchions or similar vertically oriented, handholds typically not attached to walls, and grab bars in accordance with P2726~~ be provided with grab bars and stanchions in accordance with either R307 or the International Building Code, 2021, Section 1209.

P2713.4 Grab Bars and Stanchions for Bathtubs and Bathtub-Shower Combinations. Bathtubs and bathtub-shower combinations shall ~~provide~~ be provided with grab bars or stanchions in accordance with ~~P2726~~ grab bars and stanchions in accordance with either R307 or the International Building Code, 2021, Section 1209.

Commenter's Reason: (1) While there was much that was confusing, if not also mistaken, in the Columbus hearing of the IRC-P Committee, I have tried to apply what was constructively suggested by way of a fix to my proposal. That is to work toward a change that might only be fully implemented in 2019 in the Group B process. This will build upon technical requirements, first proposed for, a new Section 2726, to be proposed for Chapter 3, Planning, of the IRC.

(2) While building toward action in the Group B process in 2019, I am also building on what can be done in Group A during 2018. This relies on a separate public comment I have submitted for the addition of new requirements for bath/shower safety within Section 1209 of the IBC which refers, for scoping, to Chapter 29 which includes some bathroom scoping, requiring one bathtub or shower, for each one and two-family dwelling (Table 2902.1). Thus, within IBC Section 1209, Toilet and Bathroom requirements, I have submitted a public comment to relocate what was originally proposed for the Egress Chapter to Chapter 12 with some revisions based on the Egress Committee's comments in Columbus. This takes care of bath/shower safety in all contexts, i.e., including IBC buildings. Based on what was done in an earlier adoption, by NFPA 101 and NFPA 5000, 2018 editions, I provide exceptions for certain occupancies in Institutional Groups I-2 and I-3.

(3) For the IRC plumbing chapter, I have greatly simplified the originally proposed requirements in RP3-18, based on comments from the IRC Plumbing Committee as well as comments from the IBC Egress Committee to recognize what can be done in Group A deliberations this year and what remains to be done in Group B deliberations next year. Thus requirements in both the IBC and the IRC are referenced in the public comment on RP3-18, my original proposal.

(4) Turning to a point-by-point response to the IRC hearing commenters and Committee members, the Committee Reason statement for disapproval of RP3-18 was very disappointing with the boldly inappropriate statement (from industry testimony) that "to require these (grab bars and stanchions) in every home is overkill." It is disappointing not just because an uninformed and factually incorrect statement was repeated; it reflects badly on ICC and its "safety" mission statement implied in its Web URL.

(5) To claim that the modest proposal to seek some kind of equity with what is nominally required—without great protest from industry—was "overkill" is akin to the automobile industry and its regulators to claim that it is overkill for every automobile to have functioning brakes and steering systems — as if drivers were supposed to have the ability to drive safely lacking such basic prevention and mitigation systems not only provided in a basic fashion but with all the improvements made in recent decades with these automotive systems we have all come to take for granted; they function well and reliably.

(6) The ridiculous comment about "overkill" is far more apt when describing the toll of injuries—another topic that both audience testifiers and at least one committee member revealed major misconceptions. In my proposal substantiation I provided the annual toll, for the year 2010, of one million medically treated injuries that year for bath and shower-related injuries in the US. (See the section of the justification under the heading, "**The Problems To Be Solved with A New Requirement for Grab bars, handrails and stanchions.**" The annual societal injury cost of these injuries came to tens of billions of dollars for the US, again, for the year 2010. In the same section, I also noted that the risk per unit of time for exposure to the most dangerous aspects of showering and bathing—the transfers into and out of the facilities—exceeded the risk of stair-related fall injuries for comparable units of exposure—a few steps on a stair.

(7) Turning to something also noted in the Committee Reason statement but discussed very confusingly in the testimony and Committee remarks, we agree somewhat that Chapter 27 of the IRC is not the best place to have the detailed requirements for grab bars and stanchions needed to bring bathtubs and showers into parity with home stairs (for four or more steps in a flight) to have at least one handrail—and a inferior one at that due to the industry demands for oversized, hard-to-grip railings in homes. It was a strategic move on my part, as the proponent, to use the opportunity, in Group A hearings to open the debate about grab bars, etc. At least that offered an opportunity for some of the misinformation, within the committees and others, to come out to be corrected while there was time to get set up for Group B hearings in 2019.

(8) However, even here the inconsistency in arguments pose a problem. For example, it is inconsistent and very unhelpful for one of the acknowledged leaders among plumbing professionals to argue both that I needed to collaborate with the plumbing industry—who this leader claimed had been working on slipping and grab bar issues for decades—but also to be told that the plumbing section of the IRC, Chapter 27, was the wrong place to deal with grab bars, etc. They claimed it should be left to other professionals to work this into Chapter 3 of the IRC dealing with spatial planning. How can this be? And how can I be blamed, as I was for not working with the plumbing industry standards committees—as if I, with 15 committee memberships already in the US alone, was delinquent for not working closely with the plumbing industry that has done a dreadful job with providing slip-resistant bathtubs and shower pans, let alone doing nothing about grab bars, etc., despite reportedly working on these matters intensively for decades?

(9) Those industry professionals knew months before the hearings that I had submitted proposal RP3-18 but they did nothing to contact me. They knew, or should have known, from my proposal justification available early in 2018, that I had produced several videos that dealt authoritatively and effectively with issues of slipping in industry-provided slippery bathtubs and showers and I have championed both conventional and unconventional points of control for baths and showers based on extensive research evidence. Why did they not contact me before, or even after the hearings in Columbus about the committee meetings that I, according to them, should be attending to meet with industry authorities? Moreover, why was I accused of not working with ICC/ANSI A117 about grab bars when I brought key leaders of that Committee together to discuss points of control and bath/shower slipping issues a few years ago in my role as the longest serving individual member of A117?

(10) Turning to other aspects of the hearing as reflected in the Committee Reason for disapproval, BLOCKING was noted as the "first step towards a future possible requirement for these bars." This statement makes as much sense as providing all new cars with brake drums and brake fluid connections with the engine but not providing the brake pedal and connection to the power braking and ABS system in the engine compartment. Alternatively provide power steering but no steering wheel. Of course blocking alone is an nonsensical, ineffective way to stop falls in baths and showers as if we are to be comforted by the hidden blocking somewhere behind the tile surface of the bath/shower enclosure. Notably, blocking requirements for walls are ineffective if, as is increasingly the case, there are no walls around the bathtub or the shower walls are flimsy plastic where any post-installation holes in the enclosure destroy the water protection provided to the surrounding structure. Blocking alone has never saved anyone from a loss of balance becoming a serious fall. Experts on bath/shower-related falls agree there is nothing as effective as universal provision of grab bars or equivalent devices **before** a bath or shower is first used.

(11) Finally, it is without any evidence of a major problem for someone to claim that "stanchions might interfere with shower doors, clearances at water closets and other fixtures." I have had a stanchion installed in my 5 by 7-foot bathroom for a long time, mounted above the middle of the access-side, tub wall. It has never interfered with other bathroom functions. I have also stayed in many hotel guest rooms worldwide (averaging over 100 hotel nights annually) where, increasingly, hotels are replacing bathtubs with dedicated showers (with and without doors) in their predominantly glass, full-length or half-length panels. In no case I have examined would a functionally placed stanchion interfere with a door or with access to/from the shower or to/from the water closet that is very commonly placed adjacent to the shower. I have shot photos of almost all of these guest room bathrooms. Some mock up a stanchion doing double duty for shower access/egress as well as toilet use which for 75-year knees like mine poses increasing difficulty and danger without the vertically oriented stanchion within easy and effective reach.

(12) I am looking for some intelligence from those returning to this topic in Richmond and in hearings next year when the proposal for grab bars to be addressed in IRC Section 307 comes up. In the interim, if not for Richmond, please read the lengthy justification, with its many, many scientific references before we once again address this critically important public health issue. Also please view the free streaming videos at my Web site to see how to solve the slipping problems not only within bathtubs and showers but on the adjacent bathroom floor. It turns out the the most important thing plumbers deal with—water—is not your enemy when bathing and showering; it can indeed be your friend and a much more reliable one at that than were the statements of professionals who testified in Columbus on RP3-18.

(13) **Postscript about Reason Statement.** I am leaving my original proposal Reason Statement untouched from what was submitted in January. This means that "poles" are still referred to in some places where, now, the preferred standard term is "stanchions," for which a definition has been proposed for NFPA codes, as follows: "A fixed, generally upright bar or pole used as a support when grasped by a hand." Stanchions have a long history in transportation vehicles, dating back likely earlier than conventional grab bars.

Bibliography: The originally submitted Bibliography provided with my proposal is still effective for this comment.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction. The cost impact provided with the original proposal stands for this public comment as there was no criticism from testifiers or the Committee about this in the original proposal.

RP3-18

RP10-18

IRC: P2905.3

Proposed Change as Submitted

Proponent: Anthony Floyd, City of Scottsdale, representing City of Scottsdale (afloyd@scottsdaleaz.gov)

2018 International Residential Code

Add new text as follows

P2905.3 Hot water supply to fixtures. The developed length of hot water piping, from the source of hot water to the fixtures that require hot water, shall not exceed 50 feet (15 240 mm). Water heaters and recirculating system piping shall be considered to be sources of hot or tempered water.

Reason: This change adds a new section to limit the hot water supply line length from the source of hot water to the fixtures that require hot or tempered water. This provision is replicated from existing IPC Section 607.2. Hot water supply lines greater than 50 feet waste water (proportional to pipe size) while occupants wait for hot water to reach fixtures for bathing, washing and culinary purposes. Even though hot water supply lines are insulated, the hot water remaining in the lines between demand periods cools down. Limiting the length and consequent volume of heated water in the supply lines reduce the amount of wasted water and occupant waiting time.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. Cost is based on proximity of hot water source to point of use.

RP10-18

Public Hearing Results

Committee Action:

As Modified

Committee Modification: P2905.3 Hot water supply to fixtures. The developed length of hot water piping, from the source of hot water to the fixtures that require hot water, shall not exceed ~~50~~ 100 feet (~~15-240 mm~~). Water heaters and recirculating system piping shall be considered to be sources of hot or tempered water.

Committee Reason: For the Modification: 100 feet is a more feasible threshold than 50 feet.
For the Proposal: Sustainability goals are important. The code needs to provide clear direction that the fixtures cannot be too far away from the hot water source. (Vote:6-4)

Assembly Action:

None

RP10-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Anthony Floyd, City of Scottsdale, representing City of Scottsdale (afloyd@scottsdaleaz.gov) requests As Modified by This Public Comment.

Further modify as follows:

2018 International Residential Code

P2905.3 Hot water supply to fixtures. The developed length of hot water piping, from the source of hot water to the fixtures that require hot water, shall not exceed 75 ~~100~~ feet . Water heaters and recirculating system piping shall be considered to be sources of hot water.

Commenter's Reason: The 100 foot maximum length approved by the committee is twice the maximum length of 50 feet that exists in the IPC for commercial buildings. This modification reduces the maximum length to 75 feet as a reasonable limit for the average size single family home of 2600 square feet.
This change provides a simplified approach to reducing water that is wasted while waiting for hot water, conserve energy and provide convenience for homeowners. The modification provides clear direction for designers and builders in considering the location of the hot water source with respect to plumbing fixtures.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
Cost is based on the floor plan layout and proximity of hot water source to point of use.

Public Comment 2:

Proponent: DONALD SURRENA, NATIONAL ASSOCIATION OF HOME BUILDERS, representing National Association of Home Builders (dsurrena@nahb.org) requests Disapprove.

Commenter's Reason: Modification was 100 feet, but from where? This will be a compliance problem for inspection and plan review. There is no guidance for how to measure or exactly what to measure. Is it 100 ft. for each branch or is it cumulative 100 ft. for all branches?

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction
This will only complicate the inspection and plan review, which may increase the departmental cost of review and inspection.

RP10-18

RP13-18

IRC: P3110, P3110.1, P3110.2, P3110.2.1, P3110.3, P3110.3.1, P3110.3.2, P3110.3.3

Proposed Change as Submitted

Proponent: Jane Malone, American Association of Radon Scientists and Technologists, representing American Association of Radon Scientists and Technologists, National Policy Director

2018 International Residential Code

Add new text as follows

SECTION P3110 SOIL GAS VENT PIPING

P3110.1 Scope. The provisions of this section shall govern the materials, construction, and installation of soil gas vent pipe and connectors.

P3110.2 Soil gas vent pipe. A gas-tight pipe of 3-inch [76 mm] nominal size or larger shall be extended from below the slab or crawl space through the interior of the building and exit the roof. The pipe shall be centered in a cylindrical space which is located in the attic below the roof, is not adjacent to an eave or wall, and has a vertical height of not less than 48 inches [122 cm] and diameter of not less than 21 inches [53 cm]. Materials used shall comply with Section P3002.

P3110.2.1 Soil gas vent pipe termination. The vent pipe shall terminate vertically upward not less than 12 inches [305 mm] above the roof in a location not less than 10 feet [3048 mm] away from any window, air intake, or other opening into the conditioned spaces of the building that is less than 2 feet [610 mm] below the exhaust point. The vent pipe shall terminate not less than 10 feet [3048 mm] from window or other opening in adjoining or adjacent buildings.

P3110.3 Soil gas vent pipe connector. A tee fitting or equivalent method shall be installed to secure the soil gas vent pipe to the perforated piping or geotextile matting from which soil gas is collected.

P3110.3.1 Crawl spaces. In a building with a crawl space, a soil gas vent pipe connector shall be installed with not less than 10 feet [3048 mm] of perforated pipe or geotextile matting connected to each of the two horizontal openings of the connector. The connector and pipe or geotextile matting shall be located below a soil gas membrane complying with ASTM Class A, B, or C.

P3110.3.2 Slab-on-grade and basements. In buildings with a basement or slab-on-grade, a soil gas vent pipe connector of 4-inch [102 mm] nominal diameter shall be installed with not less than 4 feet [1219 mm] of perforated pipe or geotextile matting connected to each of the two horizontal openings of the connector.

P3110.3.3 Drain tile systems. Where an interior drain tile system is present, the two horizontal openings of the soil gas vent pipe connector shall be connected to the drain tile system.

Reason: Chapter 31 governs the piping, tubing and fittings for vents in one- and two-family dwellings. Soil gas vents are commonly installed by plumbers yet there is no information about soil gas vents in Chapter 31 or elsewhere in the plumbing sections of the IRC. Sections 401 through 701 of *ANSI AARST CCAH-2013, Reducing Radon in New Construction of One and Two Family Dwellings* describe the pipe-related (and other) requirements for soil gas vents. This proposed code change concisely adds the standard's requirements for such vents, which will ensure that plumbers have the correct information within the IRC plumbing chapter on vents. This change does not add a requirement to provide a soil gas vent but rather delivers the specification for how to provide one when a building project requires one.

Bibliography: [ANSI AARST CCAH-2013, Reducing Radon in New Construction of One and Two Family Dwellings] [AARST Consortium on Radon Standards] [2013] [<http://aarst-nrpp.com/wp/america-national-radon-standards/>]

Cost Impact: The code change proposal will not increase or decrease the cost of construction. The provisions are not required for every home. They only apply to homes where the builder or buyer includes soil gas vent pipe.

RP13-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This doesn't belong in the plumbing chapters because it is not plumbing. These requirements would increase the cost of construction. (Vote:10-0)

Assembly Action:

None

RP13-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Jane Malone, representing American Association of Radon Scientists and Technologists, American Lung Association, Cancer Survivors Against Radon (CanSAR), Citizens for Radioactive Radon Reduction, National Center for Healthy Housing (jmalone@aarst.org) requests As Modified by This Public Comment.

Modify as follows:

2018 International Residential Code

SECTION P3110 SOIL GAS VENT PIPING

P3110.1 Scope. ~~The provisions of this section shall govern the materials, construction, and installation of soil gas vent pipe and connectors shall be in accordance with the requirements of Sections P3110.2 through P3110.3.3.~~

P3110.2 Soil gas vent pipe. A gas-tight pipe of 3-inch [76 mm] nominal size or larger shall be extended from below the slab or crawl space through the interior of the building and exit the roof. ~~The, with a slope not less than 1/8 inch per foot (10 mm/m). In the attic, the pipe shall be centered in a cylindrical space which is located in the attic below the roof, is not adjacent to an eave or wall, and that~~ has a vertical height of not less than ~~48-36~~ inches [122-91 cm] and diameter of not less than 21 inches [53 cm]. Materials used shall comply with Section P3002.1(1).

P3110.2.1 Soil gas vent pipe termination. The vent pipe shall terminate vertically upward not less than 12 inches [305 mm] above the roof in a location not less than 10 feet [3048 mm] away from any window, air intake, or other opening into the conditioned spaces of the building that is less than 2 feet [610 mm] below the exhaust point. The vent pipe shall terminate not less than 10 feet [3048 mm] from any window or other opening in adjoining or adjacent buildings.

P3110.3 Soil gas vent pipe connector. A tee fitting or equivalent method shall be installed to secure the soil gas vent pipe to the vertical opening and to the perforated piping or geotextile matting from which soil gas is collected.

P3110.3.1 Crawl spaces. In a building with a crawl space, a soil gas vent pipe connector shall be installed with not less than 10 feet [3048 mm] of perforated pipe or geotextile matting connected to each of the two horizontal openings of the connector. The connector and perforated pipe or geotextile matting shall be located below a soil gas membrane ~~complying with ASTM Class A, B, or C.~~ constructed of polyethylene sheeting not less than 10 mil in thickness.

Commenter's Reason: This code change proposal as modified by public comment will help to ensure oversight by code officials and reduce problems caused by incorrectly installed radon pipe.

Vents are the subject of Chapter 31 of the IRC, yet there is no information about soil gas vents in Chapter 31 (or elsewhere in the plumbing sections of the IRC or elsewhere in the body of the IRC). The proposed code change would supply the standard requirements for such vents, in the same code section as other vents, to help ensure that code officials have the correct information in jurisdictions where radon features are being installed yet Appendix F is not in effect.

Under the proposed P3110.1 Scope, the comment amends the original proposal to clarify that the language that follows only applies where a radon system is installed voluntarily: "The installation of soil gas pipe shall be in accordance with" the subsequent requirements. The height of the attic space in proposed P31110.2 is corrected from 48 inches to 36 inches. The comment also fixes editorial issues and adds pipe slope, and replaces an incomplete ASTM reference with more general language.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction

The proposed new code section will increase the cost of construction where soil gas vent piping is provided. The additional cost would be \$39-70 for materials (10-20 feet of 4" perforated pipe or matting (\$10-20), 10-36 feet of 3" piping (\$14-35) and one tee fitting (\$15)) and a minimal labor cost component to install the pipe.

Public Comment 2:

Proponent: Michael Cudahy, representing self (mikec@cmservices.com) requests As Submitted.

Commenter's Reason: Having some information in the residential code on these life safety radon venting systems is a good inclusion, and we see no technical justification for rejection. It does no harm to the code, it improves awareness.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

If a radon system is required or not is not determined by this code language. Therefore, it will not alter costs of construction.

RP13-18

RP16-18

IRC: Appendix U (New)

Proposed Change as Submitted

Proponent: Ed Osann, representing Natural Resources Defense Council (eosann@nrdc.org)

2018 International Residential Code

Add new text as follows

AU101.1 Scope. This appendix shall apply to:

1. New buildings.
2. Additions to existing buildings.
3. Alterations to existing buildings.

SECTION AU102 DEFINITIONS

AU102.1 General. The following words and terms, for purposes of this appendix, shall have the meanings shown herein. Chapter 2 shall be referred to for general definitions.

Add new definition as follows

AUTOMATIC. Self-acting, operating by its own mechanism when actuated by some impersonal influence, such as a change in current strength, pressure, temperature, or mechanical configuration.

AUTOMATIC IRRIGATION CONTROLLER. A timing device used to remotely control valves that operate an irrigation system.

REGENERATION. The maintenance process that restores a medium in a system so that it can continue to perform its water treatment function.

RUNOFF. Water that is not absorbed by the soil or landscape to which it is applied and flows from the landscape area.

SUBMETER. A meter installed subordinate to a utility service meter.

WATER SOFTENER. A pressurized water treatment device in which hard water is passed through a bed of cation exchange media (either inorganic or synthetic organic) for the purpose of exchanging calcium and magnesium ions for sodium or potassium ions, thus producing a softened water that is more desirable for laundering, bathing, and dishwashing.

AU103 PLUMBING FIXTURES AND FIXTURE FITTINGS

AU103.1 Maximum flow and water consumption. The maximum water consumption flow rates and quantities for plumbing fixtures and fittings shall be in accordance with Table AU103.1.

**TABLE AU103.1
MAXIMUM FLOW RATES AND CONSUMPTION FOR PLUMBING FIXTURES AND FIXTURE FITTINGS^b**

PLUMBING FIXTURE OR FIXTURE FITTING	MAXIMUM FLOW RATE OR QUANTITY
Lavatory faucet	1.5 gpm at 60 psi
Shower head ^a	2.0 gpm at 80 psi
Sink faucet ^c	1.8 gpm at 60 psi
Water closet	1.28 gallons per flushing cycle

For SI: 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa

- a. A handheld shower spray shall be considered to be a shower head.
- b. Consumption tolerances shall be determined from referenced standards.
- c. Kitchen faucets shall be permitted to have a temporary increase in flow to not exceed 2.2 gpm provided that upon either the user's physical release of the increased flow activation mechanism or the user's closure of the faucet valve, the faucet reverts to the flow indicated in the table.

AU104 WATER SOFTENERS AND TREATMENT DEVICES

AU104.1 Water softeners. Water softeners shall be listed and labeled in accordance with NSF 44 and shall comply with Sections AU104.1.1 through AU104.1.3.

AU104.1.1 Demand-initiated regeneration. Water softeners shall be equipped with demand-initiated regeneration control systems. Such control systems shall automatically initiate the regeneration cycle after determining the depletion, or impending depletion, of softening capacity.

AU104.1.2 Water consumption. Water softeners shall have a maximum water consumption during regeneration of 4 gallons per 1,000 grains of hardness removed as measured in accordance with NSF 44.

AU104.1.3 Salt efficiency. Water softeners shall have a rated salt efficiency of not less than 4,000 grains of total hardness exchange per pound of salt, based on sodium chloride equivalency.

AU104.2 Reverse osmosis water treatment systems. Point-of-use reverse osmosis systems shall be equipped with an automatic shutoff valve that prevents the production of reject water when there is no demand for treated water.

AU105 AUTOMATIC IRRIGATION SYSTEMS

AU105.1 Automatic irrigation controllers. Where installed as part of a permanent landscape irrigation system, irrigation controllers shall regulate irrigation based on weather, climatological, or soil moisture status data. The controller shall have an integrated or separate sensor to suspend irrigation events during rainfall.

AU105.2 Misdirection and runoff prohibited. Automatic irrigation systems shall not direct water onto building exterior surfaces, foundations, exterior paved surfaces, or adjoining lots. Systems shall not generate runoff.

AU105.3 Landscape water measurement. A submeter shall be installed to separately record the volume of all water supplied to an outdoor landscape with an irrigated area of 5,000 square feet or greater served by an automatic irrigation system.

Exception: Where a utility service meter is installed to record the volume of all water supplied to the landscape through a service connection dedicated to irrigation.

Reason: This proposal adds a short, voluntary appendix to the IRC containing requirements that will enhance the water efficiency of dwellings subject to the code. The language of this appendix is NOT mandatory unless, and to the extent, specifically referenced in the adopting ordinance or regulation of the jurisdiction. The purpose of the proposal is to offer enhanced water efficiency provisions applicable to one- and two-family homes in code language for consideration by jurisdictions using the IRC. The ICC offers enhanced or "stretch code" provisions for large buildings in the International Green Construction Code (IgCC), but the IgCC does NOT apply to low-rise residential buildings. The ICC also offers "green" building standards for residential buildings of all sizes in ICC 700, the *National*

Green Building Standard. However, ICC 700 is a points-based rating system, NOT code language, and the practices in its chapter on water efficiency are not mandatory. This new appendix will fill this gap, allowing jurisdictions that customarily use the IRC the opportunity to consider enhanced water efficiency requirements in familiar code format.

The proposal is intentionally brief, focusing on three areas of water consumption where enhanced performance criteria are well-known, and that together are responsible for the great majority of single-family residential water use in nearly all jurisdictions -- plumbing products, water softening, and landscape irrigation.

* Plumbing products: Requirements are based on performance levels established by the US EPA *WaterSense* Program for water closets, lavatory faucets, and showerheads, and by the 2016 California Green Building Standards Code (CalGreen) for kitchen faucets. These provisions are all found in IgCC 2015 as well, in Table 702.1, applicable to residential occupancies covered by that code.

* Water softeners and treatment devices: These requirements for water use and salt efficiency (an important consideration for maintaining water quality and the ability to beneficially recycle municipal wastewater) were all included in section 704 of IgCC 2015, and are adopted here for applicability to the one- and two-family homes covered by the IRC. Water consumption during regeneration and salt efficiency are considered "elective performance claims" under NSF 44, and must be verified by test procedures laid out in section 711 of that standard. The requirements for demand-initiated regeneration and salt efficiency have been mandatory requirements for all residential water softeners installed in California since 2002.

* Automatic irrigation systems: These requirements are also drawn from the IgCC, where landscape metering requirements are specified in section 701.2.1 and other irrigation system requirements are laid out in section 404.1.2. Although the IgCC requires separate metering for irrigated landscapes of all sizes, a less stringent requirement may be appropriate for single-family residences. This proposal limits the metering requirement to residential landscapes of 5,000 square feet or more, the threshold of applicability for landscape metering contained in the California Code of Regulations, Title 23, Chapter 2.7, also known as the Model Water Efficient Landscape Ordinance (MWELO). MWELO also requires that irrigation controllers in all newly permitted landscape installations in California be either weather-based or soil moisture sensor-based, as required in this proposal. Note that the requirements of section AU105 are only applicable to permanent irrigation systems with automatic controls, and have no applicability to hose-end sprinklers.

Terms that are not otherwise defined in the IRC are included in a definitions section of the appendix. The definitions have been drawn variously from the IgCC, MWELO, the IAPMO Green Plumbing and Mechanical Code Supplement, and NSF 330.

It should be noted that when considering this voluntary appendix, adopting jurisdictions are free to adopt the appendix in its entirety, but may adopt any individual provision of their choosing that they find most relevant to local conditions and most practical for enforcement. Each element of the proposal stands on its own. The scope of the proposal has also been drafted in such a way as to highlight its applicability to project types (new buildings, additions to buildings, and alterations) and allow adopting jurisdictions full latitude to narrow the scope in that regard should they so choose.

Each successive year brings new evidence of the impacts of our changing climate, and significant among these impacts are greater extremes and frequency of both droughts and floods. The hydrological record of the last 100 years has become less useful as a predictor of water supply reliability. Few can doubt that efficient water use will become even more important in the decades ahead than it is today. Residential water use typically constitutes 60 to 65% of all publicly supplied drinking water, and the majority of residential use is found in single-family homes. For all these reasons, the IRC would be made more valuable to jurisdictions throughout the country if it included enhanced water efficiency criteria in clear code language for voluntary adoption.

Bibliography:

American Water Works Association/Raftelis Financial Consultants Inc., *2016 Water and Wastewater Rate Survey*

ICC-ES Water Efficient Plumbing Fixtures -- <http://www.icc-es.org/News/Articles/High-efficiencyPlumbingFixtures.pdf>

Plumbing Manufacturers International, Water Efficiency Overview -- www.safeplumbing.org/water-efficiency

National Association of Homebuilders, ICC/ASHRAE 700-2015, *National Green Building Standard*

NSF International, NSF/ANSI 44-2016, *Residential Cation Exchange Water Softeners*

NSF International, NSF/ANSI 330-2015, Glossary of Drinking Water Treatment Unit Terminology

International Association of Plumbing and Mechanical Officials, *2015 Green Plumbing & Mechanical Code Supplement*

California Department of Water Resources, *Model Water Efficient Landscape Ordinance*, California Code of Regulations, Title 23, Chapter 2.7, www.water.ca.gov/wateruseefficiency/landscapeordinance/docs/Title_23_extract_-_Official_CCR_pages.pdf

California Energy Commission, "Staff Analysis of Water Efficiency Standards for Showerheads," Docket Number 15-AARR-05, p. 13, August 7, 2015, http://docketpublic.energy.ca.gov/PublicDocuments/15-AAER-05/TN205654_20150807T151426_Staff_Analysis_Of_Water_Efficiency_Standards_For_Showerheads.pdf

California Energy Commission, "Staff Analysis of Lavatory Faucet Appliance Standards," Docket Number 15-AAER-05, July 24, 2015, http://docketpublic.energy.ca.gov/PublicDocuments/15-AAER-05/TN205513_20150724T152718_Staff_Analysis_of_Lavatory_Faucet_Appliance_Standards.pdf

California Legislative Information, California Health and Safety Code, §§ 116775-116795

US Environmental Protection Agency, *WaterSense* Program, www.epa.gov/watersense/technical-specifications

Cost Impact: The code change proposal will not increase or decrease the cost of construction

The proposal offers enhanced water efficiency specifications for voluntary adoption by jurisdictions using the IRC. As such, there is no general impact on users of the IRC.

The content of this voluntary appendix establishes enhanced efficiency criteria for plumbing products, water softeners, and certain landscape irrigation equipment.

Regarding plumbing products, products are widely available from multiple manufacturers. Based on US EPA *WaterSense* product listings, as of September 2017 there are over 3,100 models of tank-type toilets, over 15,000 models of lavatory faucets, and nearly 6,000 models of showerheads that meet the criteria in this proposal. Although prices for plumbing products vary widely, based on considerations of style, color, and trim, there is no price premium attached to higher water use efficiency *per se*. See, for example, the staff reports of the California Energy Commission on standards for lavatory faucets and showerheads that found no price premium for products performing at the level proposed in this voluntary appendix.

Regarding water softeners, costs vary widely, but much of this difference is due to capacity, rather than efficiency of performance. The key criteria in this proposal have been statewide requirements for residential water softeners in California since 2002. As such, compliant products are widely available from multiple manufacturers. By way of illustration, as of this writing, the least expensive residential cation exchange water softener now available from Lowes fully complies with all criteria in this proposal (http://pdf.lowes.com/installationguides/090259891214_install.pdf), as does the least expensive cation exchange water softener available from Home Depot (<https://www.homedepot.com/b/Kitchen-Water-Filters-Water-Softeners/N-5yc1vZaq3y/Ntk-semanticsearch/Ntt-water+softener?NCNI-5>).

Regarding irrigation controllers, prices also vary widely, with a major driver being the number of zones controlled by the controller. Some 800 models of irrigation controllers have been certified to the *WaterSense* specification for weather-based irrigation controllers, so supply and choice of compliant products are ample. Smart controllers are now required for all newly permitted landscape installations in California, ensuring continued competitive interest in this product area. The prevailing price differential between a timer-based controller and a smart controller meeting the criteria of this proposal has been around \$100. But several products are on the market that cut this differential in half, and at least one weather-based irrigation controller is now on the market at a price comparable to a timer-based controller.

When products meet enhanced criteria for water efficiency, costs are typically recouped by savings on water and/or sewer charges over the life of the product. According to the *2016 Water and Wastewater Rate Survey*, over the last decade, water charges have annually increased by 5.34 % and wastewater charges have annually increased by 5.98 %, far exceeding the annual inflation rate of 2.07 % for that period. These trends are expected to continue, underscoring the cost-effectiveness of installation of water-efficient products.

RP16-18

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Even though this would be an "above code" appendix, there is concern that if a jurisdiction adopts, there could be drainage (sewer) problems with lesser flows being discharged. Discussions about lowering flow rates in the body of the code raised similar concerns. (Vote:6-4)

Assembly Action:

None

RP16-18

Individual Consideration Agenda

Public Comment 1:

Proponent: Craig Conner, representing self (craig.conner@mac.com) requests As Modified by This Public Comment.

Replace as follows:

2018 International Residential Code

APPENDIX U Water Efficiency

AU101.1

Maximum flow and water consumption.

The maximum water consumption flow rates and quantities for plumbing fixtures and fitting shall be in accordance with Table AU101.1.

TABLE U101.1
MAXIMUM FLOW RATES AND CONSUMPTION FOR PLUMBING FIXTURES AND FIXTURE FITTINGS

<u>PLUMBING FIXTURE OR FIXTURE FITTING</u>	<u>MAXIMUM FLOW RATE OR QUANTITY</u>
<u>Lavatory faucet</u>	<u>1.5 gpm at 60 psi</u>
<u>Shower head^a</u>	<u>2.0 gpm at 80 psi</u>
<u>Sink faucet^c</u>	<u>1.8 gpm at 60 psi</u>
<u>Water closet</u>	<u>1.28 gallons per flushing cycle</u>

For SI: 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa

a. A handheld shower spray shall be considered to be a shower head.

b. Consumption tolerances shall be determined from referenced standards.

c. Kitchen faucets shall be permitted to have a temporary increase in flow to not exceed 2.2 gpm provided that upon either the user s physical release of the increased flow activation mechanism or the user's closure of the faucet valve, the faucet reverts to the flow indicated in the table

Commenter's Reason: The faucet flow rate, shower head flow rate, and water closet flush volumes in the table are broadly available with no incremental cost. This is a good option for any jurisdiction that has water availability issues, or water treatment volume issues. Using efficient fixtures and fittings is far less expensive than building new facilities or otherwise trying to supply water for new construction.

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

These fixtures and fittings are broadly available as a no cost option, therefore this change will not increase or decrease the cost of a new home.

For municipalities with water supply shortages, water pumping volume limitations or water treatment volumes issues this may limit their future costs. In addition water supply, water pumping and wastewater treatment are usually the largest municipal energy costs. This change may help moderate those costs.

Public Comment 2:

Proponent: Ed Osann, representing Natural Resources Defense Council (eosann@nrdc.org) requests As Submitted.

Commenter's Reason: State and local code officials would be better served if this proposal is adopted as submitted. The proposal consists of a brief voluntary appendix containing several water efficiency measures in code language, specifically for plumbing products, water softeners, and certain landscape irrigation equipment. Each of these measures has been previously approved by the ICC voting membership in the adoption of successive editions of the International Green Construction Code. However, the IgCC is applicable to large building projects, not the one- and two-family homes covered by the IRC. IAPMO offers a compendium of above-code water efficiency measures for voluntary code adoption applicable to single-family construction, but there is no parallel in the ICC family of codes. Thus this proposal fills a gap, for the benefit of state and local jurisdictions that customarily use the IRC. The technical committee offered no explanation for maintaining the availability of voluntary water efficiency code language for large projects covered by the IgCC, but their recommended denial of publication of similar voluntary provisions in the IRC.

In its reason statement, the committee speculated about drainage flows in sanitary collection systems, which is a utility-specific issue that jurisdictions considering adoption of the appendix can consider through local review and public comment. The provisions in the appendix are well known for reducing unnecessary or excessive water use. The US Geological Survey recently reported that residential water use in the US was 82 gallons per capita per day in 2015. The proposals in the appendix relating to plumbing fixtures could, on average, reduce per capita indoor water use by about 8 to 10 gallons per day, leaving ample discharges for sanitary collection and transport of waste. Nevertheless, as a voluntary appendix, state and local officials are free to adopt any portion of the appendix, alone or in combination. Some jurisdictions may choose to adopt only the landscape irrigation efficiency measures, which have no impact on sanitary collection systems at all. They should have that opportunity, by approval of the proposal as submitted.

Bibliography: Dieter, et al, *Estimated Use of Water in the United States in 2015*, Circular 1441, US Geological Survey, June 2018, p. 22..

Cost Impact: The net effect of the public comment and code change proposal will not increase or decrease the cost of construction

The code change proposal will not increase or decrease the cost of construction. The proposal offers enhanced water efficiency specifications for voluntary adoption by jurisdictions using the IRC. As such, there is no general impact on users of the IRC.

RP16-18