VERSION 4.3

Insulated Panel Council Australasia Ltd (IPCA)

CODE OF PRACTICE

004.3:2017

Incorporating IPCA Panel Certification Scheme

Insulated Panel Council Australasia Ltd

OTHER CODES OF PRACTICE AND RELATED DOCUMENTS

Ammonia Refrigeration Code of Practice 2010, Work Safe, Victoria

British Standard: Self-supporting double skin metal faced insulating panels (BS EN 14509) 2006, British Standards Group

Building Envelope Design Guide 2009, Wiss, Janney, Elstner Associates, Inc., Illinois USA

Code of Practice for Flammable Refrigerants 2013, Australian Institute of Refrigertion, Air Conditioning and Heating (AIRAH)

Coldstore Engineering in New Zealand 2009, Institution of Professional Engineers New Zealand (IPENZ)

Comprehensive Overview of Theories for Sandwich Panels, TNO Building and Construction Research

Condensation in Buildings 2014, Australian Building Codes Board (ABCB) Handbook Edition

Fire safety—Kitchen hood exhaust systems: Understanding and addressing the special force risks inherent in commercial kitchen ventilation systems, (Technical Bulletin) 2016, The Australian Institute of Refrigeration, Air Conditioning and Heating (AIRAH) *ICCA Building Technology Roadmap*, International Council of Chemical Associations (ICCA)

Installation Code for Metal Roofing and Wall Cladding (SAA HB-36/SA 4859) 1997, Standards Australia

National Construction Code 2014, Australian Building Codes Board (ABCB)

NZ Metal and Wall Cladding Code of Practice 2012, New Zealand Metal Roofing Manufacturers Inc.

Procurement of Construction Products, Australian Procurement and Construction Council

Project Team Integration Workbook 2014, Australian Construction Industry Forum (ACIF)/Australian Procurement and Construction Council

Quality Regulations for Sandwich Panels 2011, European Quality Assurance Association for Panels and Profiles (EPAQ)

Safety in welding and allied processes—Part 1: Fire precautions, (AS1674.1) 1997, Standards Australia

Temperature Controlled Environments, International Association of Cold Storage Contractors (IACSC)

Testing and Design of Fastenings for Sandwich Panels 2009, ECCS/CIB Joint Committee

Testing Rules for Panels and Profiles 2006, European Quality Assurance Association for Panels and Profiles (EPAQ)

The Case for Project Team Integration 2014, Australian Construction Industry Forum (ACIF)/Australian Procurement and Construction Council

CODE DISCLAIMER AND WARNING

It should be noted that the solutions in this voluntary Code of Practice cannot guarantee safety or outcomes for occupants, fire fighters, or owners of buildings, in the event of a fire, due to the unpredictable nature and behaviour of fire, and the many variables that affect fire behaviour, which are outside the control or influence of the recommendations of this CODE.

It is not the intention of Insulated Panel Council Australasia Ltd (IPCA) that this voluntary CODE be used as a guarantee of the products produced or workmanship of the members and final jurisdiction and responsibility for fire performance rests with the relevant authorities and Code Compliant Companies' manufacturers and installers.

The accuracy and reliability of the content and recommendations should be independently confirmed by the reader.

Failure to implement proper risk management may result in loss, damage or injury and this voluntary CODE does not claim to cover every precaution that is required to prevent the risk of fire in Insulated Panel Structures built in accordance with the CODE.

Insulated Panel Council Australasia Ltd (IPCA) will not accept liability for any result of acting on the content or recommendations of this publication or voluntary Industry Code System.

Insulated Panel Council Australasia Ltd (IPCA) has made every attempt to ensure the accuracy, completeness and suitability of the information presented in this CODE. Whilst every effort has been made to ensure accuracy, IPCA does not guarantee that the information is complete or correct, and no representation is made about the accuracy or completeness of the information and material, and the CODE should not be relied upon as a substitute for the exercise of independent judgment.

IPCA will not be liable in any way whatsoever (including for negligence) for any loss, damage (including incidental, special or consequential damages), costs or expenses suffered, arising out of, or in any way connected with the CODE to the extent permitted by law.

WHAT IS A CODE OF PRACTICE?

What is it? An approved Code of Practice gives practical guidance on how to comply with a general duty under an Act or a specific duty under the Regulations pertaining to that particular Act.

Compliance with the provisions in an approved Code of Practice (CODE), where relevant, may constitute compliance with the provisions of the Act or Regulations to which the CODE is giving practical guidance.

Generally, an approved Code of Practice contains various courses of action which are designed to achieve health and safety standards required to comply with the Act and Regulations. CODEs usually contain a number of options for meeting standards. The IPCA CODE has Proprietary Systems.

What is its legal status? The provisions in our CODE are voluntary and we have given binding undertakings that we will implement them.

That is, a person may choose to comply with the relevant provision of the Regulations in some other way, provided that the method used also fulfils the requirements of the Regulations. A person or company cannot be prosecuted simply for failing to comply with an approved Code of Practice if they have not committed to implementing the CODE.

However, in legal proceedings, failure to observe a relevant, approved Code of Practice can be used as evidence that a person or company has contravened or failed to comply with the provisions of Regulations. If a person has not adopted the method described in the CODE, it is up to that person to show that the legal requirement has been met by an alternative method.

Therefore, an approved Code of Practice should be followed, unless there is an alternative course of action that would also fulfil all the requirements of the Regulations.

Fit for purpose. Products and installation must comply with all relevant legislation. This not only includes or is limited to building, work health and safety, as well as consumer laws.

ACKNOWLEDGEMENTS

The development of this CODE has been a collaborative process and IPCA would like to acknowledge the contribution of the following individuals and organizations.

Firstly, the NSW Department of Emergency Services Minister, The Hon. Steve Whan MLC and his advisers, for arranging for us to work with NSW Fire Brigades. We would like to acknowledge the contribution of NSW Fire Brigades and in particular Superintendent Chris Jurgeit MIFireE Manager Fire Safety Unit and the AFAC Built Environment Committee for their review and contribution to the CODE to enable a consistent position to be developed nationally which would form the basis of AFAC advocacy in regulatory reforms.

We have appreciated encouragement from the NCC in this undertaking and they are being kept aware of the progress of this process.

The CODE has been developed in accordance with ACCC Guidelines for Industry Voluntary Codes of Practice, and we acknowledge the review the ACCC did of the draft document and their guidance and recommended improvements.

Last but not least, we thank our consultants and advisers and in particular John Clampett and Ross Hodge, John Clampett Consulting, the IPCA Directors, the Panel Group Members, and the Committee, for their support in the ongoing implementation of this process.

The commitment by the Owners and CEO's of the Member Companies who represent in excess of ninety percent of the Insulated Panel Industry in implementing this ongoing process across their Companies is pivotal to its ongoing success. This commitment to the CODE processes by all stakeholders in bringing about continuing improvements to Insulated Sandwich Panels, will result in reduction of financial loss to building owners and tenants, as well as their Insurers and improved safety which will benefit the whole community and it should be applauded.

The measures adopted in this CODE have been selected to directly address the issues put forward by the Fire Brigades regarding Insulated Sandwich Panel. The choice of measures was underpinned and validated by comprehensive research and repeated testing by independent laboratories.

Geoff Marsdon President IPCA,
Ron Lawson Chief Executive Officer IPCA.

Additional Support

We thank the AFAC for their continued support of this CODE.

We also thank the Australian Building Codes Board for allowing us to present this CODE at their conference as an example of Industry resolution of issues in line with COAG policy.

FM approvals have also indicated that they see the CODE measures that ensure an improved level of installation with audit and compliance requirements as a positive step forward.

SCOPE

It is important to note that this document addresses the concerns of fire fighters in relation to the performance of Insulated Sandwich Panel and Expanded Polystyrene Panel in a fire. The intention of this CODE is to deliver a better performing Panel System in a fire.

This CODE DOES NOT mitigate any requirements of the relevant building legislation. It is also not intended to be used in conjunction with a fire engineered alternative solution under the performance provisions of the Building Code of Australia.

As the CODE was developed to address fire fighter concerns pertaining to operational fire fighting, if any design application intends to use this CODE as part of a building approval submission, consultation with the Fire Brigade having jurisdiction should be undertaken.

The Members of IPCA manufacture a complete range of products and the principles of this CODE apply equally to Insulated Panels of all types.

The CODE's application to other Panel types has been included in this document, however its adaption to ISP and EPS-FR Panel has been deliberate in addressing prevalent incorrect perceptions about the comparative performance of Insulated Sandwich Panel.

VERSION 4.3

Insulated Panel Council Australasia Ltd (IPCA)

CODE OF PRACTICE

004.3:2017

Incorporating IPCA Panel Certification Scheme

SUMMARY OF IMPROVEMENTS TO ISP AND EPS PANEL SYSTEMS

The introduction of this Code of Practice for ISP including Expanded Polystyrene Fire Retardant Panel Systems establishes minimum standards and principles that include:

(a) Panels to be manufactured with fire retardant treatment to the EPS core, in accordance with AS1366.3 1992.

(b) All Panels to achieve Group 1 as per the National Construction Code (NCC) formerly Building Code of Australia (BCA) requirement in meeting AS/ISO 9705 or FM Class 1, with the additions noted in this CODE including perimeter suspension.

(c) An identification process to be used that will enable fire fighters to be aware of buildings, compartments or rooms, which have been constructed using ISP and EPS-FR Panel Systems, through the provision of labels on the doors leading into the said buildings, compartments or rooms identifying all Panel types.

(d) Strategic fire plans to be located at entrance to the site, the fire control room or other appropriate place.

(e) The relevant Fire Brigade to be sent a copy of the Certificate of Compliance/Exemption and annual lists of Certified Buildings by the Certification Body. This will also assist fire fighters to prepare appropriate Pre-Incident Planning and undertake site inspections.

(f) Evidence of the provisions of the appropriate Panels in areas of food processing at elevated temperatures and cooking equipment or similar heat generation equipment/processes.

(g) Appropriate Insulated Sandwich Panel and Expanded Polystyrene Panel joint design and fixing to be used to assist in addressing delamination and skin separation.

(h) Implementation of a Certification Scheme to ensure the design and installation of ISP and EPS-FR Panels Systems are in accordance with the principles and requirements of the CODE.

(i) An audit system established that verifies that the improvements and benefits are actually implemented as evidence of the commitment by IPCA to improving fire safety.

(j) The provision of post construction occupancy recommendations for better 'housekeeping' and emergency procedures that include:

  (i) Implementing a regular inspection and maintenance regime for each Code Compliant ISP and EPS-FR Panel System;

  (ii) Risk Management planning for the site with 'Safe Work' and 'Hot Work' permits;

  (iii) Emergency procedures planning; and

  (iv) Training to ensure experience, knowledge and standards remain relevant and applied.

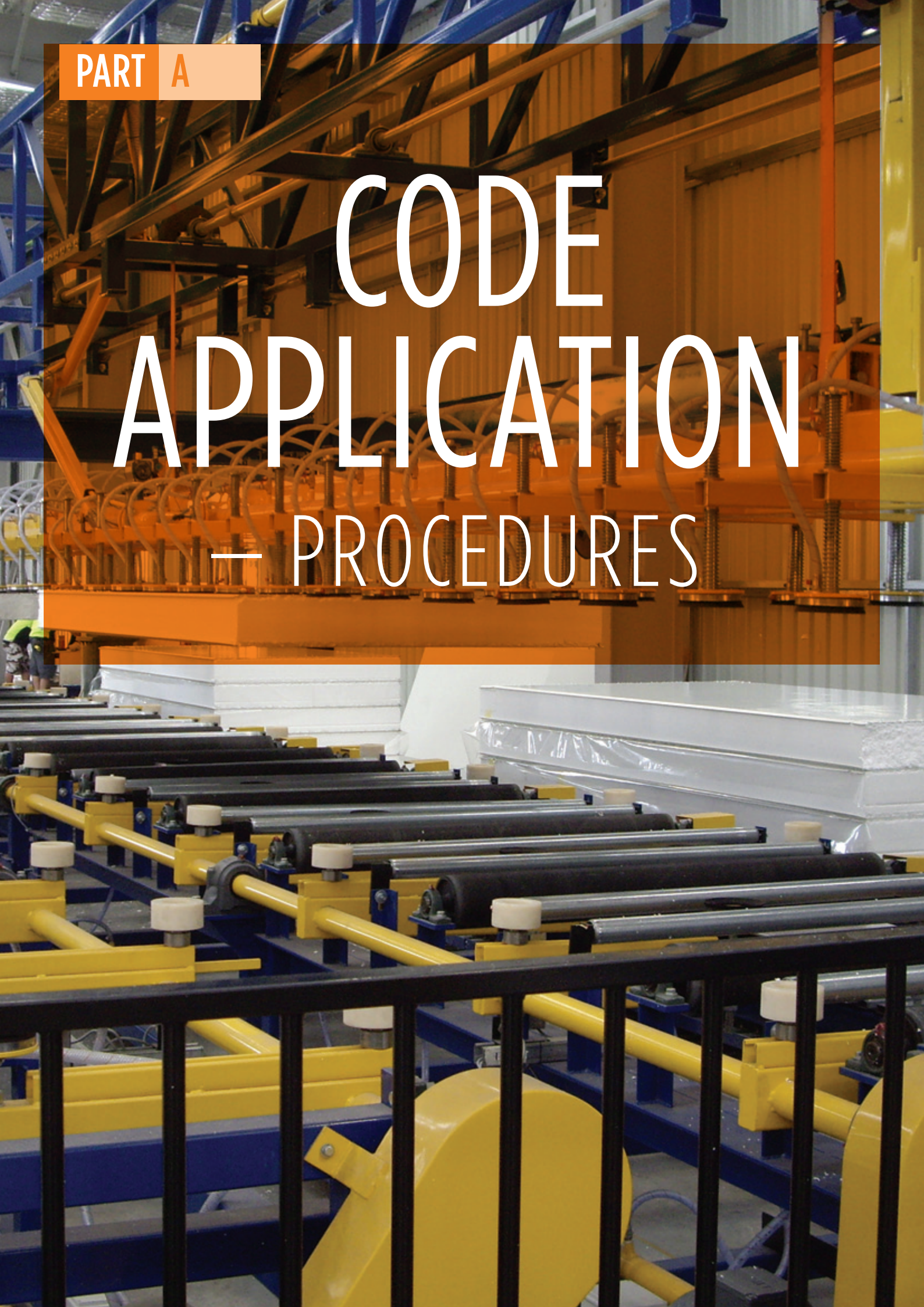
Insulated Panel Council Australasia Ltd (IPCA)

CODE OF PRACTICE

CONTENTS

CONTENTS

CONTENTS



PART A

CODE APPLICATION

– PROCEDURES

Insulated Panel Council Australasia Ltd

CODE APPLICATION — PROCEDURES

1. THE CODE OF PRACTICE

1.1 INTRODUCTION

IPCA 004.3–2017: This Code of Practice ('the CODE') has been introduced by the Insulated Panel Council Australasia Ltd (IPCA) and sets out the principles and standards for the design specification, manufacture, construction, maintenance and risk management for structures built using Expanded Polystyrene Fire Retardant Panel (ISP and EPS-FR Panel) Systems and all ISP types.

The CODE is set out in three parts, being:

A. Code Application

B. Code Specification

C. Panel Certification Scheme

The key objective of the CODE is to increase fire fighter confidence when undertaking their operational role. The industry has consulted with the Fire Brigades with this objective in mind.

To achieve Code Compliance, companies will need to meet the requirements of a Certification Scheme that will inspect and approve ISP and EPS-FR Panel System installations, and clearly label and certify these Code Compliant installations.

1.2 APPLICATION OF CODE

The CODE applies mainly to *NCC Class 7 and 8 Buildings* and to all rooms/compartments that are greater that 20m^2 and situated within a building, *other than NCC Class 1, 2, 4 or 10 Buildings* constructed with ISP and EPS-FR Panel Systems. The CODE can be applied for the construction of new buildings, as well as extensions, upgrading and refurbishment of existing buildings. The Committee is working with the original stakeholder to include other building classes.

2. OBJECTIVES OF THE CODE

2.1 OBJECTIVES

Compliance with the CODE will achieve a more fire stable structure and fire fighter confidence in ISP and EPS-FR Panel Systems, through:

(a) Establishing minimum principles and standards for:

(i) The design specification and approval of facilities incorporating such systems; and

(ii) The manufacture and installation of the ISP and EPS-FR Panel used in such systems.

(b) Promoting strategies to address the risk of fire, as well as the maintenance requirements and emergency planning procedures in facilities incorporating such systems.

(c) Providing a recognizable 'Code Branding Mark' that distinguishes ISP and EPS-FR Panel System constructions that are compliant with this CODE.

2.2 APPLICATION

This CODE will be applied by the IPCA Code Facilitator and Code Strategic Advisory and Review Committee (CSARC) to the registration of Code Compliant Companies, detailing, project approval, raw material specification, ISP and EPS-FR Panel manufacture, installation, labelling, certification, notification, audit and ongoing Risk Management and maintenance of ISP and EPS-FR Panel Systems for Code Compliant designed, specified, detailed, constructed and certified facilities, used in the classes of buildings noted above by Code Compliant Companies.

2.3 THE FOLLOWING DEFINITIONS APPLY SPECIFICALLY TO THIS CODE

Authority Having Jurisdiction: The authority, organisation or person for approving all or individual fields of work associated with Structures incorporating ISP and EPS-FR Panel.

The Board: The Board of Directors for Insulated Panel Council Australasia Ltd (IPCA).

Certification Scheme: The Certification Scheme associated with this CODE that inspects and approves completed ISP and EPS-FR Panel System installations and associated paperwork.

Code Compliant Company: A company that is a member of IPCA and has demonstrated a capacity to deliver a Code Compliant ISP and EPS-FR Panel System product or service in any or all designated fields of work covered by the CODE.

Code Branding Marks: Material developed by IPCA and licensed to Code Compliant Companies to use for labelling Code Compliant ISP and EPS-FR Panel System Structures and a separate Code Compliant Logo for self-promotion purposes by those companies.

Code Strategic Advisory and Review Committee (CSARC): The Committee appointed by the Board to oversee the reviewing, evaluating and administration of the CODE.

Customer: Client who has engaged a Code Compliant Company to construct an ISP and EPS-FR Panel System Structure.

Delamination: When the adhesive holding in place the outer metal skins of an Insulated Sandwich Panel and Expanded Polystyrene Panel System fails due to the heat of a fire and the skin 'peels away' exposing the ISP and EPS-FR core to the fire.

Design Specification: A design and specification detail for an ISP and EPS-FR Panel System structure to comply with the requirements of this CODE.

ISP and EPS-FR Panel System: A complete ISP and EPS-FR Panel installation including all the components for mounting, fixing, joining, edge capping and sealing walls and ceilings, also including doors and openings.

Expanded Polystyrene Panel: A Panel with a core of fire retardant expanded polystyrene and covered both sides by a non combustible steel skin.

Insulated Panel Council Australasia Ltd (IPCA): Peak Body representing the interests of the Insulated Sandwich Panel Industry in Australia and the Body responsible for implementing and administering this Code of Practice.

Insulated Sandwich Panel (ISP): Generic term for various types of Insulated Panel.

CODE APPLICATION — PROCEDURES

Maintenance: Inspection and maintenance regime to ensure the reliability, integrity, and performance of an ISP and EPS-FR Panel system post construction.

Manufacturer: A Code Compliant Company that manufactures and supplies ISP and EPS-FR Panel and associated installation components.

National Construction Code (NCC) formerly Building Code of Australia (BCA).

Perimeter Suspension: Inclusion of an approved suspension to the ends of each Panel to eliminate the Panel spanning from a wall.

Principal: A party inviting and receiving tenders for projects incorporating ISP and EPS-FR Panel Systems.

Risk Management: Planning to assist owners and/or managers of Code Compliant ISP and EPS-FR Panel Systems to mitigate post construction occupancy risk to properties.

3. APPLYING THE CODE – THE RULES

3.1 APPLICATION TO BECOME A CODE COMPLIANT COMPANY

To make an application to become a Code Compliant Company, the following is required:

(a) Be a current financial member of IPCA;

(b) Abide by the constitution of IPCA and Code of Conduct;

(c) Have made a successful application to achieve certification of an ISP and EPS-FR Panel System Structure as detailed in the requirements of Part B Code Specification and Part C Certification Scheme; and

(d) Have paid the required fees as outlined in Section 11.2 (Application Fees).

Part C outlines the application process and fees to apply for Certification to become Code Compliant. Annex C contains the forms and associated checklists to accompany an application submission for Certification to become a Code Compliant Company.

3.2 CODE COMPLIANT COMPANY EMPLOYEES AND CONTRACTORS

Code Compliant Companies shall ensure that employees and/or contractors who undertake work that impacts on the delivery of services relating to ISP and EPS-FR Panel System shall be educated in the provisions of this CODE and ensure all work they are responsible for is compliant with the CODE.

3.3 ADHERENCE TO APPLICABLE LEGISLATIVE OBLIGATIONS

To achieve Code Compliance, companies and their customers shall observe all legislative requirements including Building Regulation, Trade Practices and Consumer Affairs Legislation that pertains to the conduct of businesses both within the State(s) or Territory of operation and the Commonwealth of Australia.

3.4 ADMINISTRATION OF CONTRACTS

All Parties involved in the administration of contracts based on the delivery of Code Compliant ISP and EPS-FR Panel System related products and services, shall:

(a) Uphold all contractual obligations between the Code Compliant Company and the Customer to deliver a Code Compliant Service; and

(b) Ensure relevant documentation detailing Code Compliance is exchanged prior to finalization of each specific job, e.g. maintenance regime and risk management plan.

3.5 BEST PRACTICE RESPONSIBILITIES

Code Compliant Companies shall endeavour to operate with policies and procedures that support best practice principle in regards to:

(a) Being compliant with relevant Acts, Regulations and Standards;

(b) Appropriately qualified and trained staff and/or contractors;

(c) High level of work quality;

(d) Occupational health and safety;

(e) Sustainability;

(f) Minimizing environmental impacts;

(g) Customer service; and

(h) Timely completion of projects.

3.6 REFERENCING CODE

Compliance with this CODE may be a condition of tender. When Code Compliance is required, tender documentation provided by the Principal should contain the following or wording to this effect:

Companies tendering (for the nominated project) shall agree to comply with all the requirements of the Code of Practice IPCA 004.3:2017, as published by IPCA.

A company cannot make claim to being Code Compliant if it has not previously demonstrated compliance with the CODE or has not made an application to become a Code Compliant Company.

Whether compliance with the CODE is a condition for Tender or not, a Code Compliant Company may, where applicable, make reference to their Code Compliance in tender submissions.

3.7 CODE BREACHES

Where breaches of this CODE are formally reported, IPCA will undertake an investigation as noted in Section E (Compliance with the CODE) of this document. This investigation will take place regardless of other investigations that may be undertaken by Building Regulators, Insurers, Fire Services Authorities, or other Authorities with responsibility for investigating breaches of the Trade Practices Act.

CODE APPLICATION — PROCEDURES

3.8 BUSINESS INTEGRITY

The CODE requires Compliant Companies to act with integrity in regards to competitors and other stakeholder organisations by not making false or denigrating statements, or displaying unethical behaviour towards them.

3.9 DELIVERY OF SERVICES AND PRODUCTS FOR ISP AND EPS-FR PANEL SYSTEMS

From design to completed construction and ongoing maintenance, a Code Compliant Company is required to deliver a number of specific services and products to complete an ISP and EPS-FR Panel System Structure. This CODE will apply to all the fields of work relating to completion of a Code Compliant ISP and EPS-FR Panel System installation.

3.10 SPECIFICATION OF WORK COVERED BY THIS CODE

The rules of this CODE apply to new, existing and upgraded facilities and to the following fields of work covering ISP and EPS-FR Panel Structures:

(a) Detailing and Drawings;

(b) Panel Manufacturing;

(c) Panel Installation; and

(d) Post Construction Recommendations.

N.B. Part B Code Specifications of the CODE provides detailed information on the requirements applying to each of the fields of work. Code Compliant Companies are able to submit their proprietary systems for pre- or project -by -project approval.

3.11 CODE SPECIFICATION

Part B Code Specification of the CODE details specific provisions that need to be implemented for the stages of design drawings, manufacture and installation of the ISP and EPS-FR Panel Systems as well as recommendations for post construction Risk Management and maintenance of the building.

3.12 ISP AND EPS CERTIFICATION SCHEME – APPLICATION, INSPECTION AND APPROVAL

The Insulated Sandwich Panel and Expanded Polystyrene Panel Certification Scheme as outlined in Part C of the CODE is a key requisite step to a company achieving Code Compliance for each specific ISP and EPS-FR Panel System project. Part C of the CODE details the provisions for application, inspection and approval procedures to ensure the fields of work noted under Section 3.10., and detailed further in Part B Code Specification, meet the requirements of the Insulated Sandwich Panel and Expanded Polystyrene Panel Certification Scheme.

3.13 REGULATORY COMPLIANCE

This solution does not replace or mitigate National Construction Code (NCC) formerly Building Code of Australia (BCA) or any other relevant regulatory requirements. Should this CODE be used in conjunction with the Performance Provisions of the National Construction Code, then an appropriate fire engineering report to the satisfaction of the authority having jurisdiction is also required. Adherence to all or part of this CODE solution does not imply or infer in any way support or approval from any authority having jurisdiction.

3.14 ENVIRONMENTAL, CONSERVATION AND SUSTAINABLE MANAGEMENT PRACTICES

Code Compliant Companies shall:

(a) Promote and apply practices that encourage the sustainable use of resources and energy and reduce environmental impacts across all fields associated with ISP and EPS-FR Panel System construction;

(b) Abide by any applicable legislative requirements that manage and minimize environmental impacts; and

(c) Support initiatives that encourage the recycling or reuse of resources and minimise waste on ISP and EPS-FR Panel System Construction Projects such as the EPSA REPSA program.

3.15 EMPLOYMENT OF COMPETENT PERSONS

Where qualifications are necessary, Code Compliant Companies shall employ persons who are appropriately qualified to undertake the required tasks. Code Compliant Companies shall support ongoing training and provide supervision for staff and/or trainees who, while not requiring a formal qualification, need a level of technical competence to carry out their work tasks.

3.16 COMMERCIAL DISCORD

This CODE does not provide the scope to address matters of conflict that are of a commercial or competitive nature between Code Compliant Companies and/or Non Code Compliant Companies and/or Clients. The parties involved will be advised to seek independent advice on these types of matters.

3.17 USE OF CODE COMPLIANT PROMOTIONAL MATERIAL

Code Compliant Companies will be granted license to use specific IPCA promotional material including logos as an endorsement of providing Code Compliant ISP and EPS-FR Panel System products and services. There will also be an onsite 'Code Branding Mark' to identify ISP and EPS-FR Panel System Structures which have been inspected under the Code Certification scheme and have proven to be Code Compliant. This Code Compliance plate will be located at the Fire Indicator Panel (FIP).

Further reference to Promotion and Advertising Code Compliance can be found in Section 6. of Part A of this CODE document.

CODE APPLICATION — PROCEDURES

3.18 CEASING TO BE A SIGNATORY TO THE CODE

Code Compliant Companies can cease being a signatory to the CODE by:

(a) Not fulfilling the obligations for retaining Code Compliance as required under Section 7.1.; or

(b) Being found to have breached the CODE and having received a penalty as outlined in Section 5.5.

4. ADMINISTRATION OF THE CODE

4.1 CODE OF PRACTICE STRATEGIC ADVISORY AND REVIEW COMMITTEE

To supervise the administration of the CODE the IPCA Board will establish a Code Strategic Advisory and Review Committee (CSARC). There will be four members of CSARC appointed by the Board with representatives selected from:

(a) IPCA CEO;

(b) Code Facilitator;

(c) Member with Industry Technical Experience;

(d) Member representing Customer or Fire Services; or

(e) Member with Fire Safety Expertise.

4.2 ROLE OF CODE OF PRACTICE STRATEGIC ADVISORY AND REVIEW COMMITTEE

The key function of the Code Strategic Advisory and Review Committee (CSARC) is to review how the CODE is being implemented and administered. Key responsibilities of CSARC include:

(a) Ensure there is a review of the administration and effectiveness of the CODE, including Parts B and C undertaken at least every 12 months;

(b) Provide the IPCA Board with proposed draft amendments to the CODE, Certification Scheme and other relevant materials for consideration;

(c) Ensure there is a successful strategy in place to increase awareness of the CODE to all relevant stakeholders;

(d) Development and dissemination of educational material to ensure customers and other stakeholders are aware of the intent of the CODE and the requirements for Compliance; and

(e) Ensure there are effective procedures in place to respond to any reported and/or identified breaches of the CODE.

4.3 PROCEDURES

The procedures that CSARC ('the Committee') will operate in accordance with are:

(a) Members are appointed by the IPCA Board members for three year terms and are eligible for re-appointment for further terms;

(b) Any matter that comes under consideration by the Committee where there may be a conflict of interest or the likelihood of a conflict of interest by a member, that member must disclose that conflict of interest;

(c) To assist in deliberations with certain matters, the Committee may second one or several persons with relevant expertise to assist. Secondment of experts and the attendance of observers to meetings does not give them voting rights.

(d) Attendance at Committee meetings by IPCA Board members is allowed, though they do not have voting rights unless they are the nominated CSARC Member. Attendance at meetings as observers by Industry Members and/or interested parties requires the approval of the Committee;

(e) The IPCA Board must approve the attendance of a proxy on behalf of an appointed member;

(f) The Committee must meet at least four times per year or on a more frequent basis if the Chair identifies the need to do so; and

(g) Any decision made by the Committee must be supported unanimously or by the majority of members present.

4.4 INDEPENDENT REVIEW OF THE CODE

The IPCA Board will engage an independent entity to review and report on the relevance, effectiveness and administration of the CODE every three years. The independent entity will be chosen based on the criteria of having an understanding of building regulations and relevant Standards, fire safety and Risk Management, being able to evaluate technical reports and associated data.

An example of such an entity with these skills could be a person/body from the Insurance Industry.

CODE APPLICATION — PROCEDURES

5. COMPLIANCE WITH THE CODE

5.1 CODE COMPLIANCE MONITORING

It is the responsibility of Code Compliant Companies to ensure their compliance as a Code Compliant Company. Individual construction projects undertaken by Code Compliant Companies require the appropriate documentation associated with the Certification Scheme to be submitted for inspection and approval to authorize compliance. IPCA retains the right to conduct at anytime a compliance audit of a Code Compliant Company or of a construction project that has been previously inspected and approved under the Certification Scheme. An independent auditor may be appointed by IPCA to facilitate an audit.

5.2 IPCA INITIATED COMPLAINT

Where the IPCA Board believes there may be a breach of the CODE provisions, an investigation may be initiated without having received a written complaint.

5.3 REQUIREMENTS FOR REPORTING POTENTIAL BREACHES OF THE CODE

To respond to any suspected breaches of this CODE the following procedures must be followed for IPCA to initiate an investigation:

(a) A formal complaint must be made in writing to the CEO of IPCA providing an overview of the potential breaches or an overview of instances of non-compliance with the CODE;

(b) The Complainant cannot report breaches anonymously and must provide full contact details, i.e. name of Complainant, address, phone number and email; and

(c) Details of correspondence between the Complainant and the Code Compliant Company must be provided to the CEO of IPCA It is a pre-requisite to reporting a breach that there has been an attempt to resolve the matters by one or more of the parties involved.

All material received and/or generated from dealing with a complaint including documenting the resolution and any sanctions imposed will be recorded. This material can be used for monitoring Compliance with the CODE, reviewing the CODE and in preparing an Annual Report on the CODE's operation. Where such material is used publicly such as in an Annual Report the personal details of Members and/or Complainants involved in the reported breach shall be withheld.

5.4 PROCEDURES FOR INVESTIGATING POTENTIAL BREACHES OF THE CODE

Upon receiving a potential breach of the CODE in the format noted under Section 5.3., the IPCA CEO will undertake an initial investigation to confirm the validity of the complaint. If the validity of a complaint is sustained, the CEO will advise CSARC that a formal investigation is required and establish a file to record all matters connected to the reported breach. The CEO will then:

(a) Write to all parties that are associated with the reported breach outlining the nature of the complaint received and request formal responses in writing by a given date; and

(b) Prepare a briefing for CSARC within 28 days from commencing the investigation which will include copies of all documentation and CEO's notes held on file to that point in time.

Once CSARC has reviewed all the material provided by the CEO, a determination will be made as to whether more information is required or enough information has been provided to draw a conclusion to the investigation. CSARC will determine if a breach of the CODE has occurred once the Committee has reached a point where all relevant information has been tabled and considered.

All parties will be advised of the outcome of CSARC's investigation, including the IPCA Board.

5.5 PENALTIES FOR CODE BREACHES

Upon determination by CSARC that a breach has occurred, the matter of penalty will become the responsibility of the IPCA Board, which may consider one or a combination of several of the following options:

(a) Direct the Company to take remedial action to ensure Compliance with the CODE;

(b) Request a written undertaking from Company pledging future Code Compliance;

(c) Notify the Company of suspension from the CODE unless directions from the Board are followed through;

(d) Suspend the Company's licence to use IPCA CODE related materials, logos and promotion as a Code Compliant Company;

(e) Suspend membership to IPCA;

(f) The Board may also request an audit as noted in Section 5.1, to be satisfied the breach is a one off;

(g) Make a formal report to the appropriate Regulatory Authority; and

(h) Expel the Code Compliant Company from IPCA after repeated failure to comply with such directions.

CODE APPLICATION — PROCEDURES

5.6 APPEALING CSARC FINDING

The IPCA Board may accept to hear:

a) An appeal by the Code Compliant Company (Member) in response to the finding of CSARC that it was in breach of the CODE; or

b) An appeal by a Complainant in response to a decision by CSARC that no breach of the CODE has occurred.

A review of the decision made by the IPCA Board in response to an appeal they have adjudicated on, by either a Member or a Complainant may be heard by an independent referee appointed by IPCA Any costs associated with an independent review will be borne by the entity requesting the review.

6. PROMOTION AND ADVERTISING CODE COMPLIANCE

6.1 PROMOTION BY IPCA

IPCA will use a number of mediums to promote the benefits of both the CODE and engaging Code Compliant Companies to provide services and products within the ISP and EPS-FR Panel System Industry.

Promotion will also include general educational material explaining the CODE and why the ISP and EPS-FR Panel System Industry has identified the need to introduce it. This will be targeted at all identified stakeholder groups including but not limited to, building designers, engineers, insurers, fire services, building industry and selected industry peak bodies.

6.2 CODE COMPLIANT PROMOTIONAL MATERIAL

IPCA will make available specific materials that it will license Code Compliant Companies to use, identifying their work as being Code Compliant. These materials will include:

(a) Code of Practice Compliant Certificates including Member Panel Logo;

(b) Compliance Plate denoting ISP and EPS-FR Panel System installations that are Code Compliant and have been inspected and approved under Certification Scheme associated with the CODE;

(c) Labels denoting ISP and EPS-FR Panel System installations that are Code Compliant and have been inspected and approved under Certification Scheme associated with the CODE; and

(d) IPCA Code Compliant Member Company Logo for use on stationery, and promotional, advertising and signage material.

N.B. Refer to Annex B of this CODE: 'Labelling of Insulated Panels' for the application of labelling requirements for Code Compliant Structures.

7. REGISTER OF CODE COMPLIANT COMPANIES

7.1 RETAINING CODE COMPLIANCE

The following requirements must be met by Code Compliant Companies on an annual basis, to remain Code Compliant:

(a) Remain a financial member of IPCA;

(b) Provide a signed Code of Practice Declaration with return of annual membership renewal documentation; and

(c) Not to have been penalized for breaches of the CODE as per Section 5.5.(h).

7.2 REGISTER OF CODE COMPLIANT COMPANIES

An up-to-date register of Code Compliant Companies will be maintained by IPCA and Company contact details will be provided in response to enquiries from end users of ISP and EPS-FR Panel System structures.

7.3 IPCA WEBSITE

All Code Compliant Companies will be listed on the IPCA website, providing their contact details for potential customers.

7.4 UPDATING REGISTER

Whenever there is a cessation, for whatever reason, to the membership of a Company that has been Code Compliant, that Company shall be removed from the Register and the website listing.

7.5 ADVICE TO FIRE BRIGADES

The relevant Fire Brigades will be sent a Certificate of Compliance/ Exemption on completion of each Code Compliant Building by the Code Compliant Company.

CODE APPLICATION — PROCEDURES

8. REVIEW AND AMENDMENT OF CODE

8.1 CODE REVIEW

The responsibilities for reviewing, evaluating and administrating the CODE are delegated by the Board to CSARC. CSARC is required, when conducting a review to consult broadly with all groups that the CODE is likely to have an impact on. CSARC will forward recommendations from each review to the Board for its consideration.

8.2 CODE AMENDMENTS

It is the responsibility of the Board to amend the CODE whenever a requirement to do so is identified. In amending the CODE, the Board shall ensure that:

(a) All Code Compliant Companies are advised of the changes to the CODE and provided with an explanation detailing any impact an amendment may create; and

(b) All stakeholder groups that might be impacted by the CODE and any subsequent change to it are also to be made aware of the amendments.

8.3 ANNUAL REPORT

The CSARC shall prepare an Annual Report on the operation of the CODE, documenting relevant data and effectiveness. The CODE Annual Report will be made available on the IPCA website and copies will be forwarded to members and relevant stakeholders.

FOOTNOTE

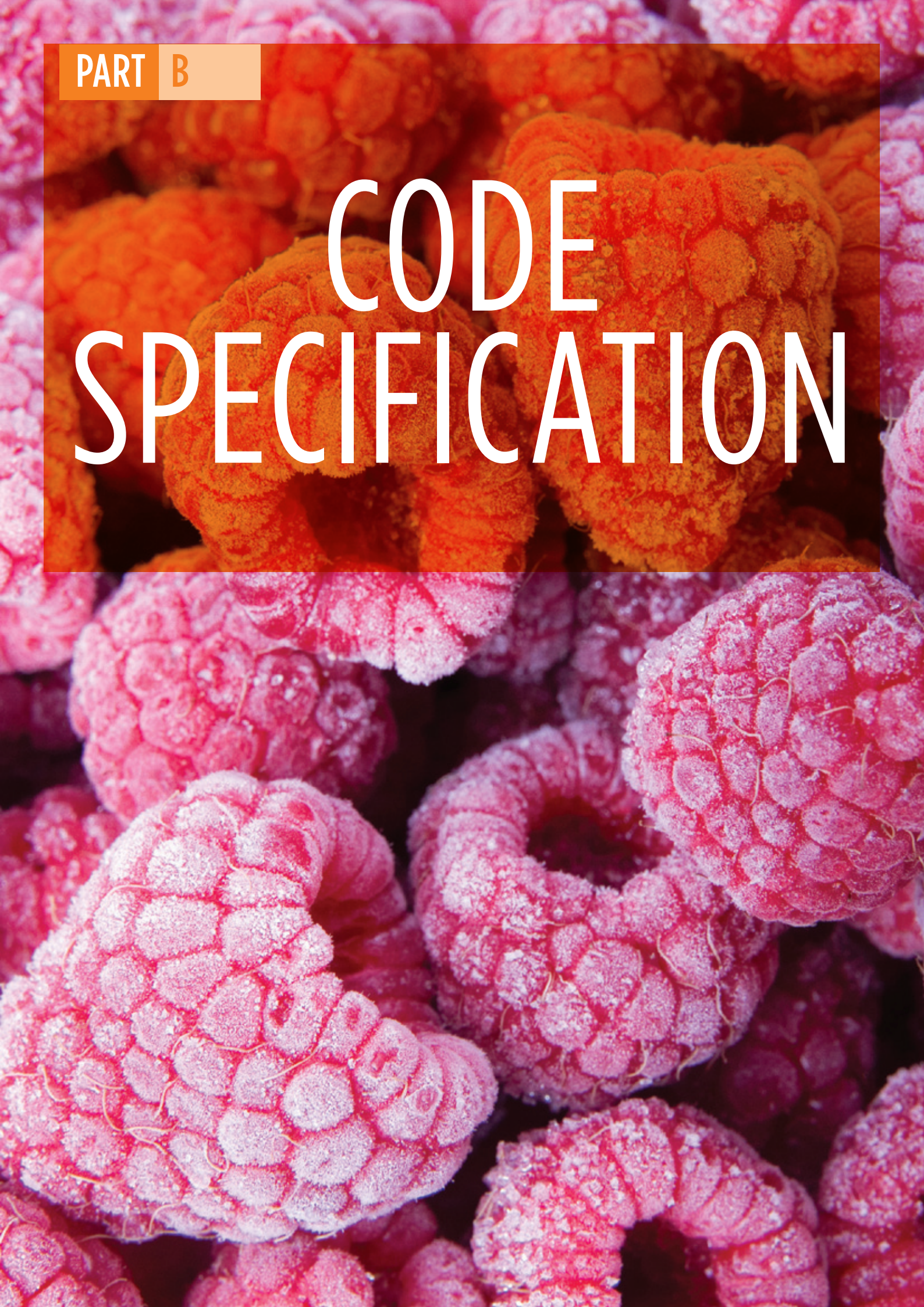
CONSULTATION

In preparing this Code of Practice and the Certification Scheme that provides the inspection and approval requirements for compliance with the CODE, IPCA has undertaken consultation with the following:

- Australasian Fire Authorities Council (AFAC);
- Fire Services;
- Australian Building Codes Board (ABCB);
- Australian Competition and Consumer Commission (ACCC);
- Society Fire Safety (SFS);
- BRANZ;
- Lumley Insurance; and
- Members of Insulated Panel Council Australasia Ltd (IPCA)

PART B

CODE SPECIFICATION



CODE SPECIFICATION

9. FIELDS OF WORK COVERED BY THE CERTIFICATION SCHEME

To achieve certification of an ISP and EPS-FR Panel System structure all of the following provisions need to be implemented. The following points list each of the key fields and examples of the specific criteria to be addressed in the application to achieve Code Compliance.

9.1 DESIGN DETAILING AND SPECIFICATION

The fundamental aim of the designer in preparing the design and specification of an ISP and EPS-FR Panel System Structure which meets the requirements of this Certification Scheme is to design a Panel System Structure with maximum structural integrity, thereby providing a more fire stable Panel System Structure in the event of a fire. A number of Systems are available to achieve this objective and Code Compliant Companies are encouraged to submit their proprietary solutions for approval.

9.1.1 NCC CLASS 7 AND 8 BUILDINGS

To meet the requirements of this section of the CODE — Part B Code Specification — the applicant is required to provide, with their Part C Certification Scheme application, details to be incorporated in the ISP and EPS-FR Panel System design.

These details can be submitted once and pre-approved then simply renewed in subsequent applications.

Detailed drawings could include:

(a) Cross Sectional Drawing;

(b) Chiller External Wall Detail;

(c) Wall to Insitu Floor;

(d) Partition Wall External Wall Base Detail;

(e) Wall to Wall Corner Details;

(f) Ceiling Connection Chiller to Freezer;

(g) Wall to Ceiling Joint Details;

(h) Wall to Ceiling with Hanging Fastener Detail;

(i) External Wall and Partition Detail;

(j) External Wall and Low Ceiling Details;

(k) Intermediate Ceiling Suspension Details;

(l) Intermediate Ceiling Suspension;

(m) Main Ceiling Suspension Detail;

(n) Chiller Intermediate Wall Fixing; and

(o) Chiller/Freezer Intermediate Wall Fixing Detail Freezer.

N.B. Annex A provides examples of Sectional Drawings of Jointing and Suspension Details required to comply with the CODE and meet the Certification requirements.

The applicant is also required to provide details of any other design specifications specific to the Insulated Sandwich Panel and Expanded Polystyrene Panel System for which the application for Certification for Code Compliance is being made.

Fit for purpose details are also required for provisions of the appropriate Panels in areas of food processing at elevated temperatures and cooking equipment or similar heat generating equipment/processes in as far as they are known and declared to the certified ISP and EPS-FR Panel Systems supplier and installer.

9.1.2 ROOMS/COMPARTMENTS THAT ARE NOT GREATER THAN 20M^2 AND NORMALLY SITUATED WITHIN A BUILDING OF OTHER CLASSES

To meet the requirements of this CODE for all rooms/compartments that are not greater than 20m^2 and situated within a building, the following criteria will apply:

- If the room consists of two or more compartments then the construction must be fully CODE compliant to this section or Section 9.1.1 depending on size.
- To be the AS9705 tested *Group Level* above the NCC requirement.
- A compliance plate to denote that it is for a room within a building other than a *NCC Class 7 and 8*.
- Spanning criteria — If the span is in excess of 3 metres then the system must be IPCA Code Compliant as for *NCC Class 7 and 8*.
- These rooms/compartments will still be subjected to auditing.
- Appropriate suppression system installed.
- Separation from cooking, heating and similar processes. If a fire rating is not already stipulated by a regulatory requirement, then 60 minute fire rated Panels are recommended in these areas.
- A one off fee of $550 will apply with no requirement for the payment of the fee per m^2.
- These shall be self-certified by the applicant and no desk top audit/review will be required.
- Companies to provide a list monthly of Code Compliant projects that they have undertaken that fit this criteria.
- Labelling to be the same as per CODE and the label will be placed at eye height adjacent to each entry to the room.
- Panel must be from a Code Compliant manufacturer.
- If required, all support/suspension and detailing systems to be fully Code Compliant as per Section 9.1.1.
- Annex C Post Construction Recommendations also apply.

CODE SPECIFICATION

9.2 PANEL MANUFACTURING/TYPE

The following is the criteria for the ISP and EPS-FR Panel System to meet to achieve the performance requirements of this Certification Scheme:

(i) Polystyrene

All polystyrene for insulation Panels and floor insulation shall be self extinguishing (FR) Expanded Polystyrene (EPS) foam in accordance with Australian Standard AS1366.3 1992 which is equivalent to the British Standard 3837-1986.

EPS shall be manufactured from 100% FR bead and shall be oven or other approved curing system cured after manufacture to ensure the resulting blocks are dry and residual pentane or other blowing agents have been removed.

The EPS shall be minimum 'SL' Grade with performance complying with AS1366.3 1992.

(ii) Steel Skins

Insulated Panel to be manufactured from steel skins thickness 0.4mm to 0.7mm manufactured (normally) with a Microban® or equivalent anti-bacterial paint technology – proven to inhibit the growth of surface bacteria that causes odours, food poisoning, allergies and staining. This product is HACCP endorsed. Typically Colorbond® Permagard™ white steel is used as supplied by BlueScope Steel or equivalent.

(iii) Insulated Panel

Insulated Panel to be manufactured in pre-painted galvanised steel skins bonded to both sides of a core of fire Retardant (FR) polystyrene foam by a two part heat polymerising adhesive.

The skins are to be bonded to the polystyrene core with a two part heat polymerising adhesive by means of a continuous laminating and roll forming process providing an interlocking tongue and groove style joint.

The surface of the insulated panels can be either smooth or standard style profiles.

(iv) Other Panel Types

Insulated Sandwich Panel (ISP) or other types will be accepted as an alternative:

(a) If they have Group 1 Certificate when tested to AS/ISO 9705; or

(b) Materials that do not have an AS/ISO 9705 Group 1 Certification will be exempt if they have an FM Approval 4880 Class 1 Classification and are installed to the FM requirements as well as all the Code Group 1 Plus measures applicable to EPS-FR Panels.

Confirmation is as tested AM 2015.

9.3 PANEL INSTALLATION

The 'onsite' installer of ISP and EPS-FR Panel Systems plays a key role in achieving the requirements of the Certification Scheme and the overall IPCA Code of Practice Compliance and therefore will need to be trained in the aspects of Panel construction and fixing.

ISP and EPS-FR Panel will be installed to Group 1 NCC AS/ISO 9705 C1.10 and require the following enhancements:

(a) Support

(i) Perimeter suspension to all ceilings — ceilings not to be supported by Panel walls.

(ii) No nylon fixings or suspensions to be used; minimum 10mm galvanised steel or stainless steel threaded steel rod with either wire and gripples, tested wire clamps or certified chain.

(iii) No aluminium rivets to be used, only steel or stainless steel fixings.

(iv) No aluminium extrusions to Panel junctions; all junctions to be steel of the equivalent thickness of the Panel skins minimum.

(b) Floor Insulation

(i) Floor insulation shall consist of a minimum of FR EPS.

(ii) The floor vapour proof membrane shall consist of one layer 0.250um thick heavy duty grade polythene film.

(iii) The polythene vapour proof membrane is to be sealed to the wall/floor; transitional vapour proof membrane sealed in a similar manner.

(iv) The insulation normally laid in two layers with all joints staggered by half a block width and length as appropriate.

(v) All concrete slabs and under floor ventilation (for freezers) are excluded from this specification. All base slabs for Panel erection should be level to +- 3mm in 3000mm.

XPS–FR Test Certificate to be supplied.

(c) Sealants

(i) All Panel work shall be fully sealed to create and maintain a complete vapour seal.

(ii) The vapour seal is to be applied on the warm side of the Panel work.

(iii) Sealants for Panel joints, floor vapour seal joints, etc. shall be non-setting mastic suitable for use in temperatures ranging from -30°C to +50°C. The mastic shall remain pliable and not crack, dry out or go brittle with age. The mastic shall be Selleys N Mastic non-drying sealant or approved equivalent.

(iv) Wall Panel slip joints and other joints shall be sealed with mastic liberally applied so that excess mastic is clearly visible on the Panel surface joint. Mastic is to be applied to the joint components before erection or making joint fast. Excess mastic shall be removed from the Panel surface at the completion of the project.

(v) Where specified for use, silicone sealant shall be neutral cure. Silicone sealant in food processing areas shall be mould resistant.

CODE SPECIFICATION

(vi) For waterproofing, polyurethane sealant or equivalent shall be used.

(d) Fixings

(i) All rivets used shall be blind, sealed steel encased rivets.

(ii) All rivets shall be 4mm diameter and at 300mm centres which shall be regarded as the minimum requirement or Class 3 steel screws at 300mm centres as required for Group 1.

(iii) Ceiling suspension and wall girt fixings to structural steelwork shall be by mushroom head bolt galvanised or stainless steel rod steel or stainless steel wire or certified chain fixings via a sleeved hole through the Panel, sealed with non setting mastic. Suspensions must comply with BRANZ Report FCR 9.

(e) Joints

(i) All joints will be designed and fabricated to ensure integrity of insulation and vapour seal. Joints will be capped and fixed with folded 0.4mm minimum thick steel flashings as necessary.

(ii) Wall Panels shall be seated on an Angle Channel or F Mould. The angle shall be fixed to the concrete structural slab by metal Dyna Bolt anchors or approved equivalent. The angle shall be placed on a 300mm wide transitional polythene vapour barrier (refer floor insulation).

(iii) A continuous bead of mastic shall be placed on the under-side of the angle prior to fixing to the concrete.

(iv) Prior to placing insulation Panels, mastic shall be applied liberally to the angle.

(v) The joint between vertical wall Panels shall be tongue and groove type joint. Mastic shall be applied liberally to the Panel joint when required prior to each Panel's erection.

(f) Thermal Cuts

(i) Adequate provision shall be made for expansion and contraction on the Panel skins by providing internal skin cuts in low temperature areas.

(ii) Thermal cuts shall be provided at required heights up the wall and shall be nominally 3mm wide and over flashed with matching Colorbond® and fixed as per (d).

(g) Relief Ports

(i) Adequate provision shall be made for pressure relief using double acting multi-valve pressure relief ports. All pressure relief ports will be fitted with heater cables.

(h) Heater cables

(i) Heater cables shall be low voltage or voltage regulated with suitable circuit breakers.

(i) Doors

(i) Insulated doors shall be manufactured with pre-fabricated Panel as for walls and ceiling, framed with heavy duty extruded aluminium extrusions, complete with labyrinth gasket, all necessary hardware and operating mechanisms. Door frames shall be fixed to walls without the use of additional steel framing. Door frames and architraves shall be aluminium and PVC extrusions with due consideration for thermal break across Panel thickness.

(ii) All doors to be fitted with safety escape instructions and release mechanisms.

9.4 EMERGENCY AND SAFETY MEASURES FOR REFRIGERATED AND COOLING CHAMBERS

A refrigerated or cooling chamber or similar, that is capable of accommodating a person, is to have safety measures to facilitate escape and for alerting people outside of such a space in an emergency. These measures would include:

(a) A door which is capable of being opened by hand from inside without a key;

(b) Internal lighting controlled only by a switch which is located adjacent to the entry doorway inside the chamber;

(c) An indicator lamp positioned outside the chamber, which is illuminated when the interior lighting required by (b) is switched on;

(d) An alarm that is:

(i) Located outside but controllable only from within the chamber; or

(ii) Able to achieve a sound pressure level outside the chamber of 90dB when measured 3m from the sounding device; and

(e) A door required by (a) in a refrigerated or cooling chamber must have a doorway with a clear width of not less than 600mm and clear height not less than 1.5m.

9.5 POST CONSTRUCTION RECOMMENDATIONS

Code Compliant Companies will be required to provide the new building Owner/Manager/Tenant (whoever is most applicable) with recommendations to be considered for the Risk Management planning of, and maintenance regime for the ISP and EPS-FR Panel Systems structure as well as emergency procedures planning.

The effective, efficient and safe performance of an ISP and EPS-FR Panel System structure post construction is critically dependent upon implementing rigorous 'housekeeping procedures' through:

(a) Regular inspection and maintenance regime for Panels; and

(b) Applying a Risk Management plan.

PANEL CERTIFICATION SCHEME

Regular Maintenance of ISP and EPS-FR Panel Systems

The nature of the industry and/or operational activities and the environmental (hot/cold) ambience of the building occupant may provide the potential for damaging contact with ceilings and walls of Panel Systems as well as doors and openings. A regular inspection regime incorporating procedures to ensure all defects are recorded and rectified is required for ISP and EPS-FR Panel Systems.

It is critical that the core of installed Panel must never be left exposed and rectification work to repair damaged Panels and/or exposed core must always be given a high priority.

Risk Management Planning

The nature of the industry and/or operational activities of the occupier may also create the potential for high fire risk conditions and the issue of 'Safe Work' permits and 'Hot Work' permits should be enforced. Cleanliness needs to be maintained, i.e. managing dust, waste build-up or general storage as well as managing all potential ignition sources associated with plant and equipment or high temperature activities.

Fires normally occur in the contents of the building or process machinery within the building and spread to components of the building such as Panel as the fire develops. Some of the main causes of ignition are:

(a) Arson;

(b) Poor Electrical Installation;

(c) Hot Working and Welding;

(d) Hot Cooking Processes and Associated Ductwork;

(e) Deep Fat Continuous Fryers;

(f) Ductwork Flues and Filters;

(g) Refrigerator Defrost Systems;

(h) Process Gases;

(i) Rubbish stored against Walls; and

(j) Battery Charging Areas.

Any Risk Management planning should consider all of the above recognised sources of ignition as well as any additional factors with each specific ISP and EPS-FR Panel System structure as well as the issuing of the special permits such as 'Hot Work' and 'Safe Work' Permits. The issuing of Hot and/or Safe Work Permits must apply to both staff and external contractors.

Emergency Procedures Planning

Recommendations will also be made to the new building Owner/Manager/Tenant (whoever most applicable) regarding the need to engage an organisation with experience in the development of emergency response procedures based on the Australian Standard AS90001 Emergency Control and procedures for buildings structures and workplaces. The procedures should also specifically address the types of emergencies that may arise from the industry and/or activities associated with the building occupation.

Suggested Guidelines

Appendix E provides suggested guidelines for both a regular inspection and maintenance regime to maintain the ISP and EPS-FR Panel Systems and for a Risk Management plan including examples of 'Safe Work' and 'Hot Work' Permits.

The CODE, while requiring these items to be provided to the building Owner and Occupier, does not claim that it identifies all possible risks or procedures that can and should be adopted to manage risk. The responsibility for managing these risks lies entirely with the Designers, Builders, Owners, Tenants and others associated with the building.

PART C

ISP AND EPS PANEL CERTIFICATION SCHEME

PANEL CERTIFICATION SCHEME

10. ISP AND EPS-FR CERTIFICATION SCHEME

10.1 INTRODUCTION

Insulated Panels are used in a range of buildings — predominately those that require temperature control but also some that operate at ambient or normal temperature. Expanded Polystyrene (EPS) core is the most common core for Insulated Panel Systems used for food factories, cold stores, freezer stores, pharmaceutical industries and other temperature controlled environments as well as high tech clean rooms.

Due to its relatively low cost, resistance to moisture, hygiene considerations, its light weight, all of which aid fast installation, demountability and reuse, and the emphasis now on energy efficiency and carbon footprint, EPS has become the dominant insulation core product used in Panel Systems.

The IPCA ISP and EPS-FR Panel Certificate Scheme ('the Certification Scheme') has been established to assess against specific criteria and certify that Expanded Polystyrene Fire Retardant (ISP and EPS-FR) Panel Structures meet the requirements of the CODE. Specifically the Certification Scheme provides the application, inspection and approval processes for making application to meet the Code Specification Criteria to gain Certification.

The Certification Scheme also applies to other ISP types, see 9.2 Panel Manufacturing/Type (page 21).

10.2 SCOPE OF THE IPCA ISP AND EPS PANEL CERTIFICATION SCHEME

To achieve the CODE objectives of a more fire stable structure and fire fighter confidence in ISP and EPS-FR Panel Systems, the Certification Scheme establishes the minimum standards and principles for the design, manufacture, installation, maintenance and Risk Management of structures constructed from ISP and EPS-FR Panel Systems. The Certification Scheme will ensure the Code Specification (Part B) requirements have been applied to deliver a Code Compliant ISP and EPS-FR Panel System Structure.

Each step in the detailing and construction process will require verification by the independent and transparent inspection and approval processes for a building to meet the requirements of this Certification Scheme. Documentation of post construction Risk Management planning and an ISP and EPS-FR Panel Systems maintenance regime of the completed building are also required.

10.3 APPLICATION OF CERTIFICATION SCHEME

For a building to achieve certification through this scheme the organisation responsible for the application for an ISP and EPS-FR Panel System Structure to be certified under the CODE, must be a Code Compliant Company. To achieve Code Compliance a Company must be a current member of IPCA and have successfully been assessed through the Certification Scheme as having met all the specification requirements to deliver a Code Compliant ISP and EPS-FR Panel Structure.

N.B. The exception to this condition would be a Company making an initial application for an ISP and EPS-FR Panel System project to be assessed as meeting the requirements of the Certification Scheme.

11. APPLYING FOR CERTIFICATION

See page 29 for a Flow Chart of the Certification Scheme process for Application, Inspection and Approval.

11.1 REQUIREMENTS TO MAKE APPLICATION FOR CERTIFICATION

Each of the fields of work outlined in Part B CODE Specification will need to be addressed, and all the required information provided for the Certification Application to be assessed. Checklists are provided at the end of Annex C of the CODE, denoting the specific details required from each field of work so that an ISP and EPS-FR Panel System Structure can be considered for certification. An application for Certification will only be considered when all the required documentation has been submitted and the relevant fees paid, i.e. certification for a building will not be granted in stages or in part.

Code Compliant Companies may pre-submit standard details for pre-approval to be referred to in their project by project applications.

11.2 APPLICATION FEES

The Application Fee is made up of two parts. There is a flat administration fee of $550 per application and then an amount based on the size of the structure being assessed for Certification. The second part of the application fee is based on $0.05 (cents) per square metre of the Panel in the building. For rooms/compartments not greater than than 20m^2 and situated within a building, there is only the requirement to pay the administration fee.

An additional fee may be charged if the application lacks all the required information/documentation or the applicant fails to respond appropriately in supplying all the additional material needed to undertake an assessment upon request to provide such.

All the required application documentation including the fees must be received before the application can be processed.

11.3 EXEMPTION

It is not intended to apply the CODE to all Insulated Sandwich Panel and Expanded Polystyrene Panel Structures and following is an example where Code Compliant Companies may request in writing for an installation to be exempt:

(i) Additions and alterations in existing non-Code Compliant Buildings where existing sections cannot be retro fitted to become Code Compliant.

All relaxations granted by IPCA will be provided in writing.

Where a Code Compliant Company is in doubt about requesting an exemption to the CODE, they should consult with the Code Facilitator who can seek further clarification by CSARC when necessary.

An application for exemption is to be submitted on the standard application form in Annex F. A one off fee of $550.00 per exemption applies.

11.4 RESPONSE TO CERTIFICATION APPLICATION

Within five working days of receiving a Certification Application for assessment the Scheme Facilitator will acknowledge to the Applicant

PANEL CERTIFICATION SCHEME

receipt of the application in writing by email or fax.

In the situation of the application being incomplete (lacking documentation and/or specific information) the Scheme Facilitator will within another five working days advise the applicant that their application is incomplete.

11.5 APPLICATION ASSESSMENT AND AUDIT

The process of assessment of an application for Certification will commence within 14 days of the Code Facilitator having received all of the required application and documentation material.

The assessment of an application for Certification will be:

(i) A desktop assessment of the application material by the Facilitator or an Independent Technical Consultant engaged by the Scheme's Facilitator; and/or

(ii) On a selected basis, an onsite audit of the ISP and EPS-FR Panel Structure by the Independent Technical Consultant or Code Facilitator to verify the application and documentation material is in accordance with the finished building.

The Facilitator or the Independent Technical Consultant may request additional information during the assessment process and/or make recommendations for further measures to be undertaken or any identified non compliant aspects of the ISP and EPS-FR Panel Structure be rectified before granting Certification. In the event of the Independent Technical Consultant advising of the requirement for additional measures, or that non-compliant aspects of the structure need to be rectified, the applicant must prove that the additional work has been undertaken and completed for Certification to be granted.

ISP and EPS-FR Panel Structures will be selected for onsite audits by the Scheme's Facilitator. ISP and EPS-FR Panel Structures that have previously been inspected and approved by desktop assessment may at sometime in the future be selected for random audits even after Certification of the building has been granted.

11.6 ISSUING A CERTIFICATE OF INSPECTION AND APPROVAL

Once the Independent Technical Consultant has advised the Code Facilitator that an application for Certification has been assessed as being compliant, framed Certificates of Certification Compliance will be issued for:

(i) The IPCA Member Company to retain for record and/or display purposes;

(ii) If required, the Owner/Manager/Tenant of the ISP and EPS-FR Panel Structure to retain for record and/or display purposes; and

(iii) At the direction of the Code Compliant Company, a copy for the Builder, Consultant and/or other appropriate stakeholders involved in the construction.

It is a condition of the CODE that a Certificate for Compliance Certification can only be issued under the signature of the Code Facilitator and cannot be produced or reproduced in any form. If a Code Compliant Member Company or an Owner/Manager of an ISP and EPS-FR Panel Structure requires an additional or replacement Certificate of Compliance they are required to make application to the Code Facilitator.

Original Certificates of Compliance issued by the Code Facilitator may be photocopied for record keeping purposes only.

11.7 CODE BRANDING – LABELLING AND LOGOS

Annex B provides examples of a Key Diagram, approved Compliance Plate and Labels that will be applied to a Certified ISP and EPS-FR Panel Structure, and the Logo that can be used by Code Compliant Companies. Labels will be provided for all Panel types.

Labels will be provided by the Code Facilitator once Certification has been obtained for the specific structure they are to be used on.

The Labels will provide an identification process that will assist fire fighters to identify buildings utilizing Code Compliant ISP and EPS-FR Panel Systems. This will be achieved through the provision of labels being placed on all doors leading into the compartments/rooms that have had ISP and EPS-FR Panel Systems used in their construction. The labels will denote that the Sandwich Panels used in this compartment/room meet the certification requirements. They shall be located at eye level or in an appropriate prominent position.

It is a condition of Code Compliance that only labels provided by the Code Facilitator can be used on ISP and EPS-FR Panel Structures that have been granted Certification and must not be transferred or used on any other installation whether it be Code Compliant or not. Replacement labels must be obtained from the Code Facilitator.

IPCA will also supply a logo for its members to use for promoting/advertising their organisations as Code Compliant Companies.

11.8 PANEL LABELLING REQUIREMENTS

Annex D provides examples of the approved labels to be used in Code Compliant Structures.

Surplus labels must be returned, noting the project that they were originally issued for.

Refer to Annex B of this CODE: 'Labelling of Insulated Panels' for the application of labelling requirements for Code Compliant Structures

11.9 APPLICATION OF CERTIFICATION SCHEME TO EXISTING BUILDINGS

Code Compliant Companies may apply for Certification of ISP and EPS-FR Panel Structures constructed prior to the CODE having been introduced. Application may also be made for existing buildings that are being extended or refurbished. All the assessment criteria required for the approval of a new building will be applied to ensure the performance of the structure is consistent with Part B Code Specifications of the CODE.

PANEL CERTIFICATION SCHEME

11.10 APPLICATION TO ROOMS/COMPARTMENTS NOT GREATER THAN 20M^2 AND SITUATED WITHIN A BUILDING

The recommended Code Compliance criteria for Panel used for rooms/compartments not greater than 20m^2 and situated within a building is to be found in Section 9.1.2 of the CODE.

11.11 APPEAL PROCEDURE

An applicant who has been unsuccessful with their application for Certification will have the right to an appeal. The appeal will be heard by the IPCA Board of Directors and the applicant will need to set out the basis of the appeal in writing. The applicant may also have to attend a meeting with the IPCA Board to personally address any queries they may have in investigating the appeal and/or the Code Facilitators' reasons for not issuing Certification Compliance.

The IPCA Board has the final say as to whether Certification is or is not granted.

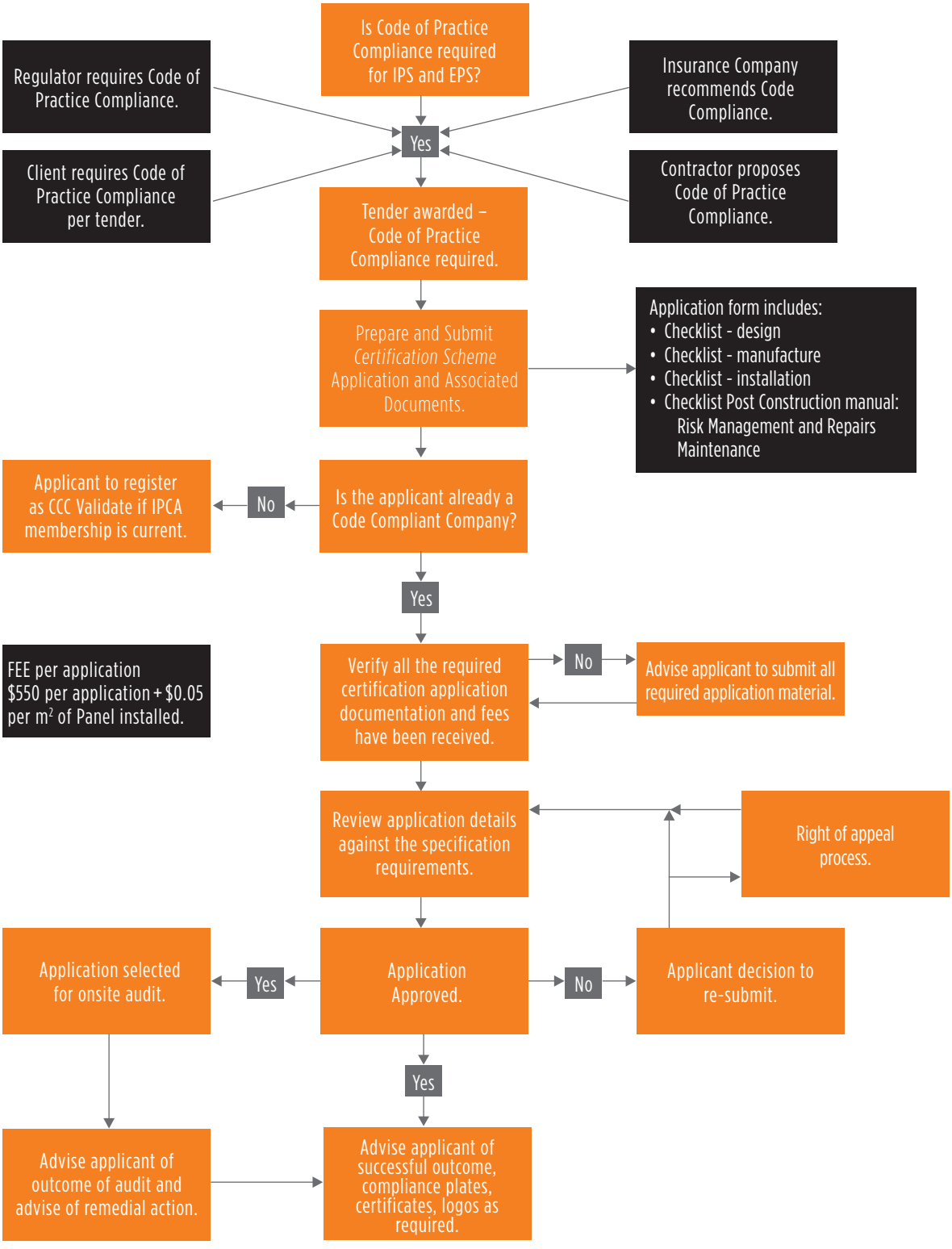
Certification will not be granted to any building that has outstanding matters of non-compliance that have not been resolved through the Code Facilitator.

Any Company that claims Certification before full Compliance has been granted by the Code Facilitator may have their Code Compliant Company status revoked.

PANEL CERTIFICATION SCHEME

12. APPLICATION FLOW CHART FOR CERTIFICATION

Panel Certification Scheme process for Application, Inspection and Approval.



Insulated Panel Council Australasia Ltd (IPCA)

CODE OF PRACTICE

ANNEX

CONTENTS | ANNEX

ANNEX A

SECTIONAL DRAWINGS OF JOINTING AND SUSPENSION DETAILS

CONTENTS

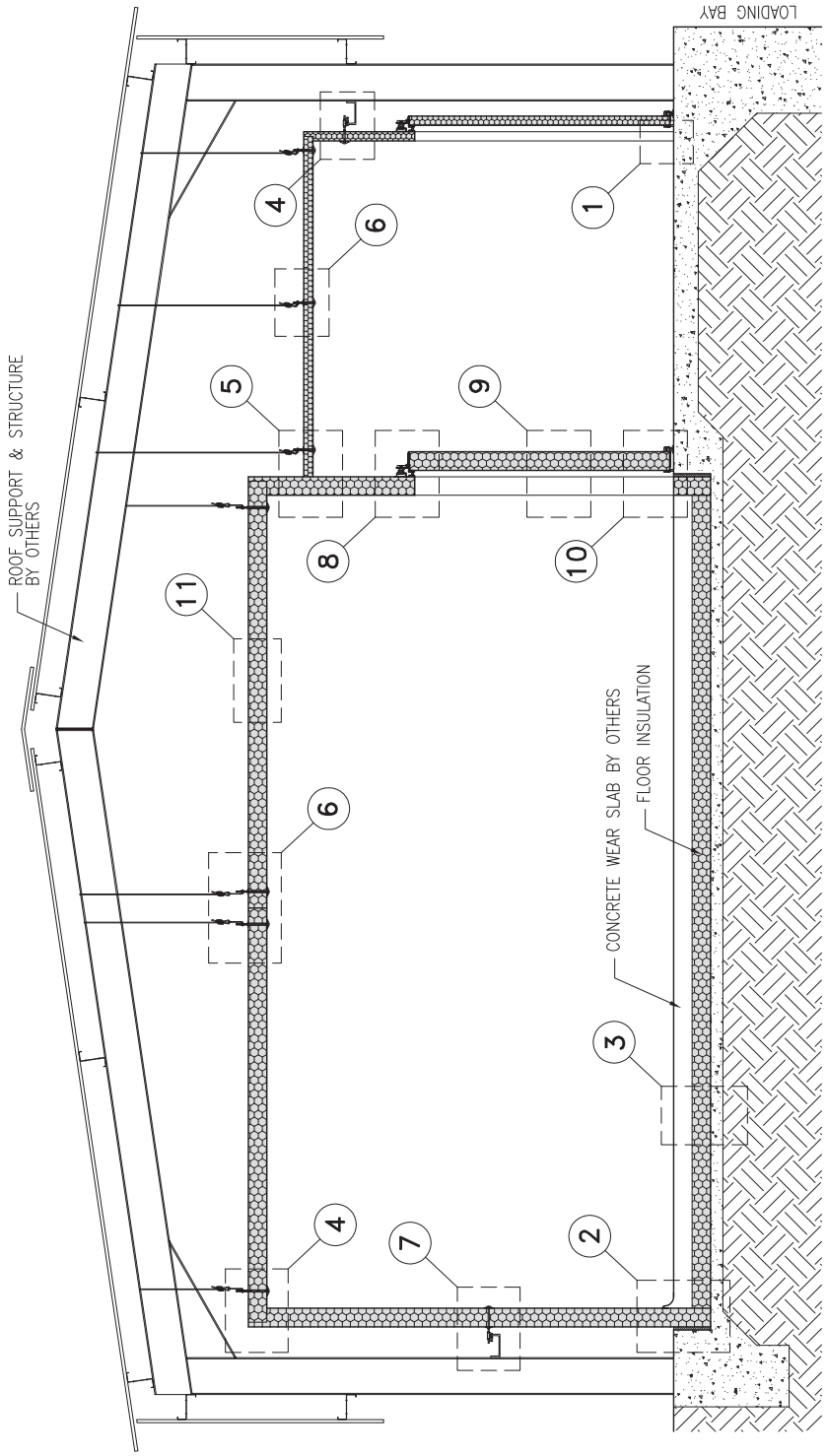
SECTIONAL DRAWINGS

Sectional Drawings of Jointing and Suspension Details

SECTIONAL DRAWINGS OF JOINTING AND SUSPENSION DETAILS

1. TYPICAL COLDROOM SECTIONAL DRAWING

IPCA CERTIFIED DATA SHEET – TYPICAL COLDROOM SECTION 2



TYPICAL COLDROOM SECTION

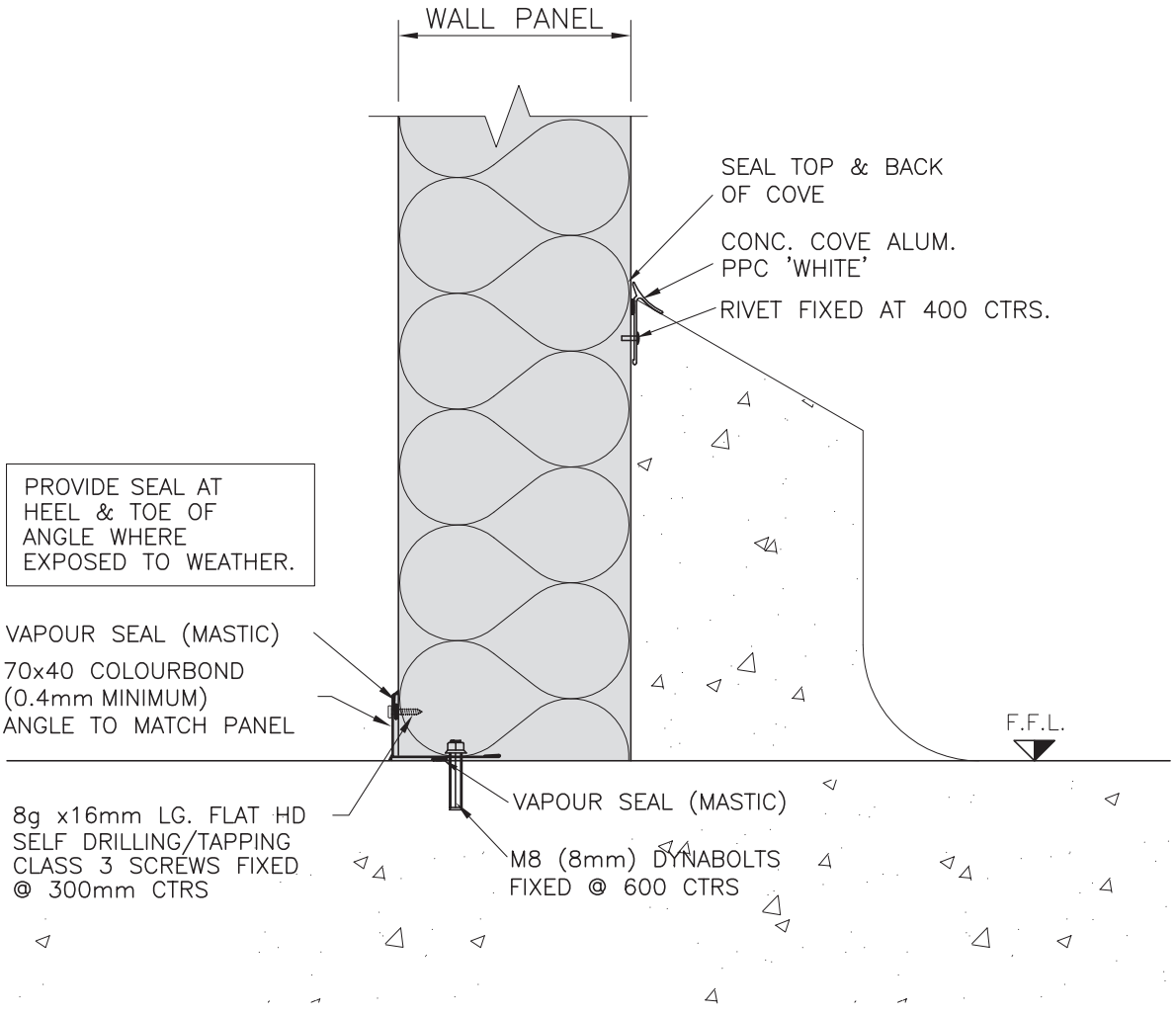
WORK BY OTHERS:

* REFRIGERATION & ELECTRICAL * CONCRETING & PLUMBING * BUILDING STRUCTURE, ROOF, VERMIN PROOFING

SECTIONAL DRAWINGS OF JOINTING AND SUSPENSION DETAILS

2. CHILLER EXTERNAL WALL BASE DETAIL

IPCA CERTIFIED DATA SHEET – TYPICAL COLDROOM SECTION 2

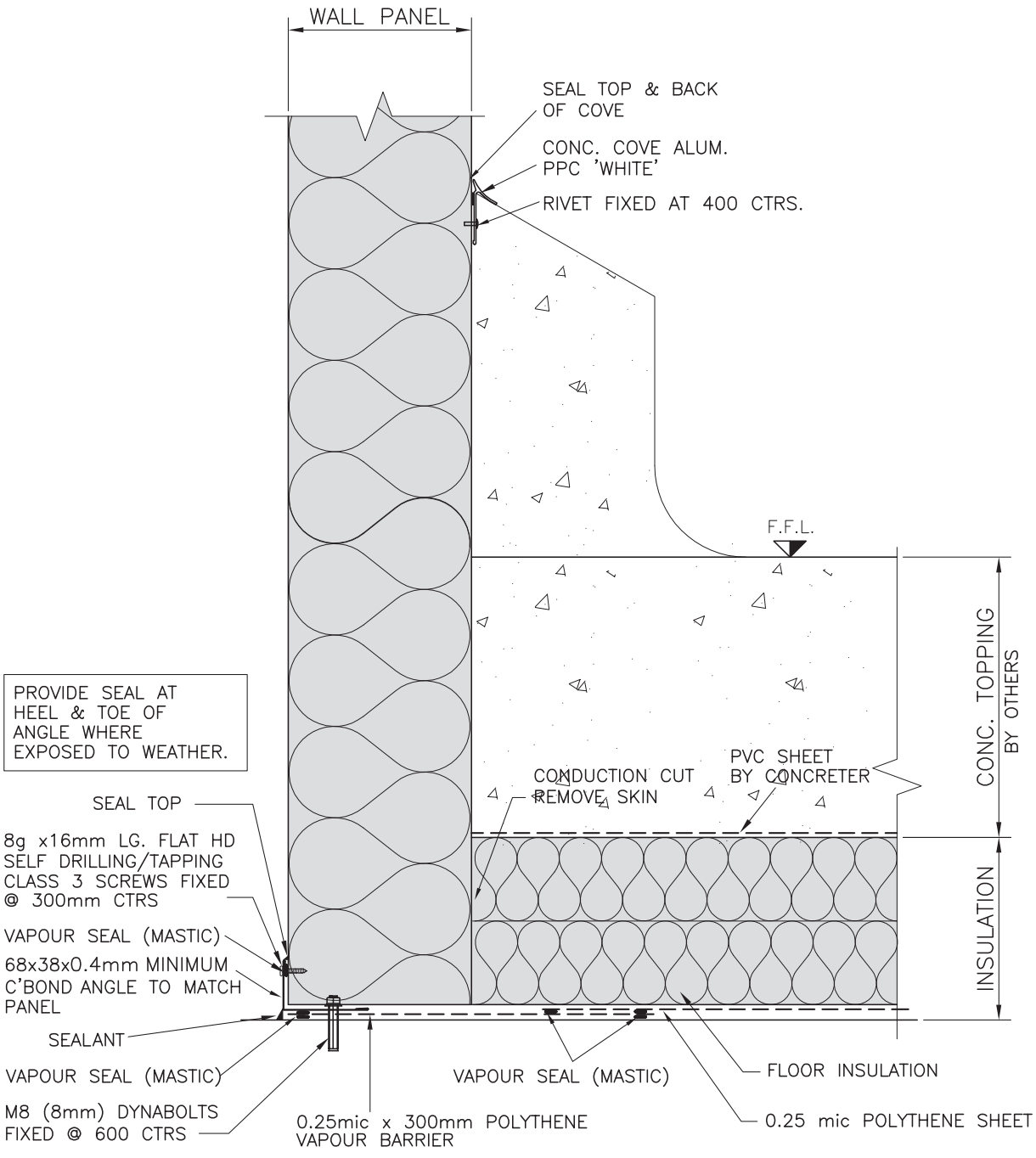


CHILLER EXT'L WALL BASE DETAIL

SECTIONAL DRAWINGS OF JOINTING AND SUSPENSION DETAILS

2.1 WALL TO IN SITU FLOOR

IPCA CERTIFIED DATA SHEET – TYPICAL COLDROOM SECTION 2



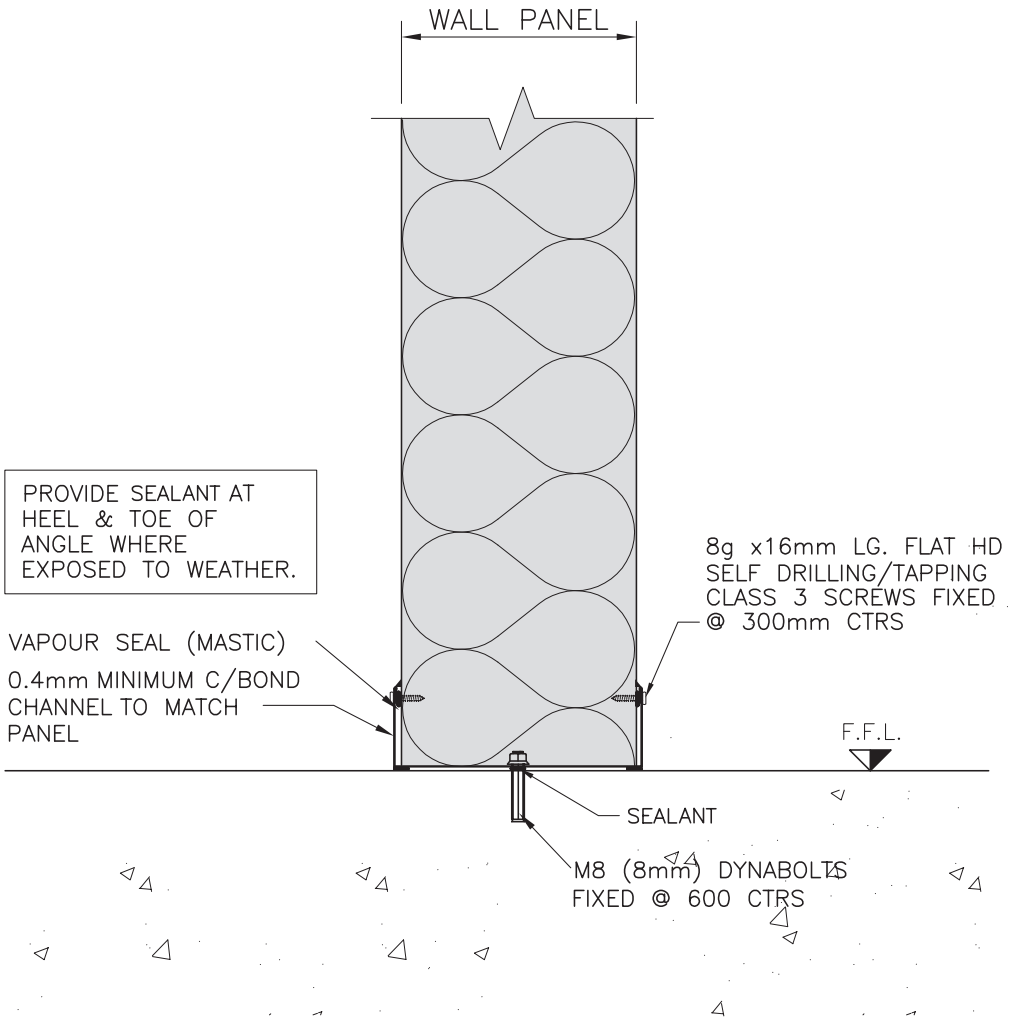
WALL TO INSITU FLOOR

FOR FREEZER FLOOR EXT'L WALLS ONLY

SECTIONAL DRAWINGS OF JOINTING AND SUSPENSION DETAILS

2.2 PARTITION WALL EXTERNAL WALL BASE DETAIL

IPCA CERTIFIED DATA SHEET – TYPICAL COLDROOM SECTION 2

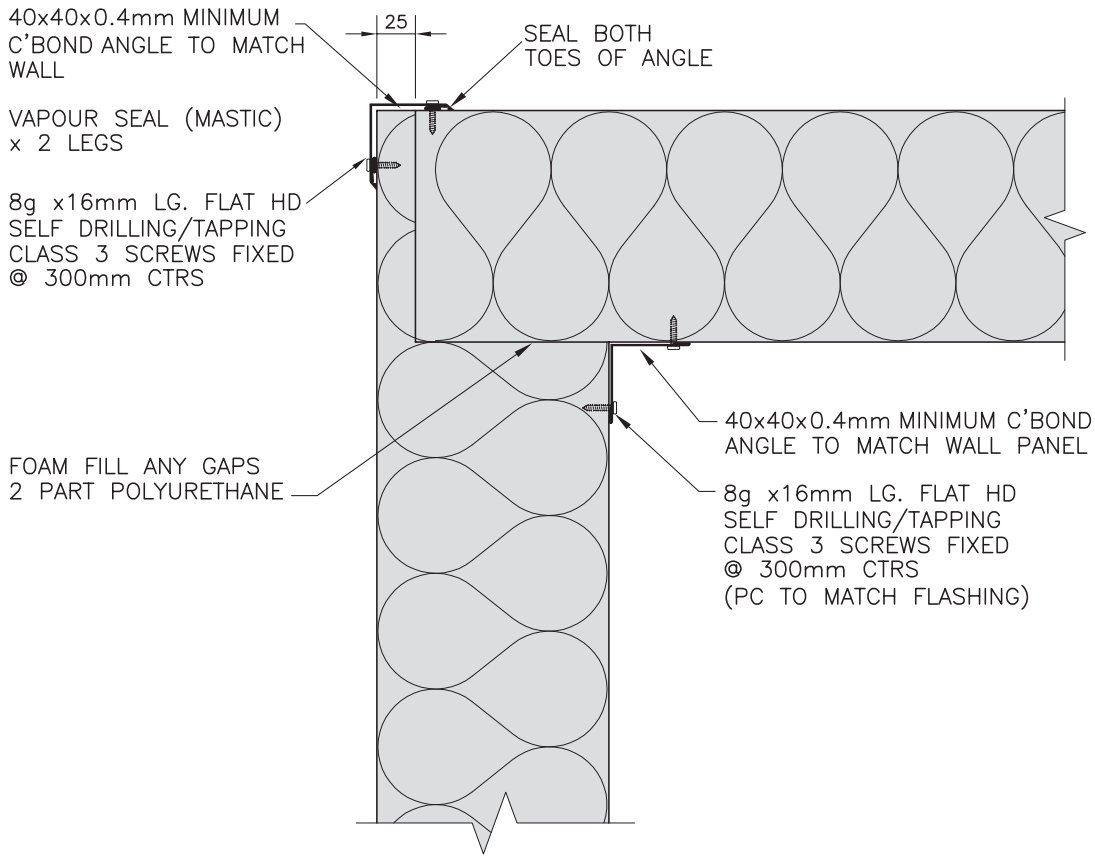


PARTITION WALL
EXT'L WALL BASE DETAIL

SECTIONAL DRAWINGS OF JOINTING AND SUSPENSION DETAILS

3. WALL TO WALL CORNER DETAIL

IPCA CERTIFIED DATA SHEET – TYPICAL COLDROOM SECTION 4



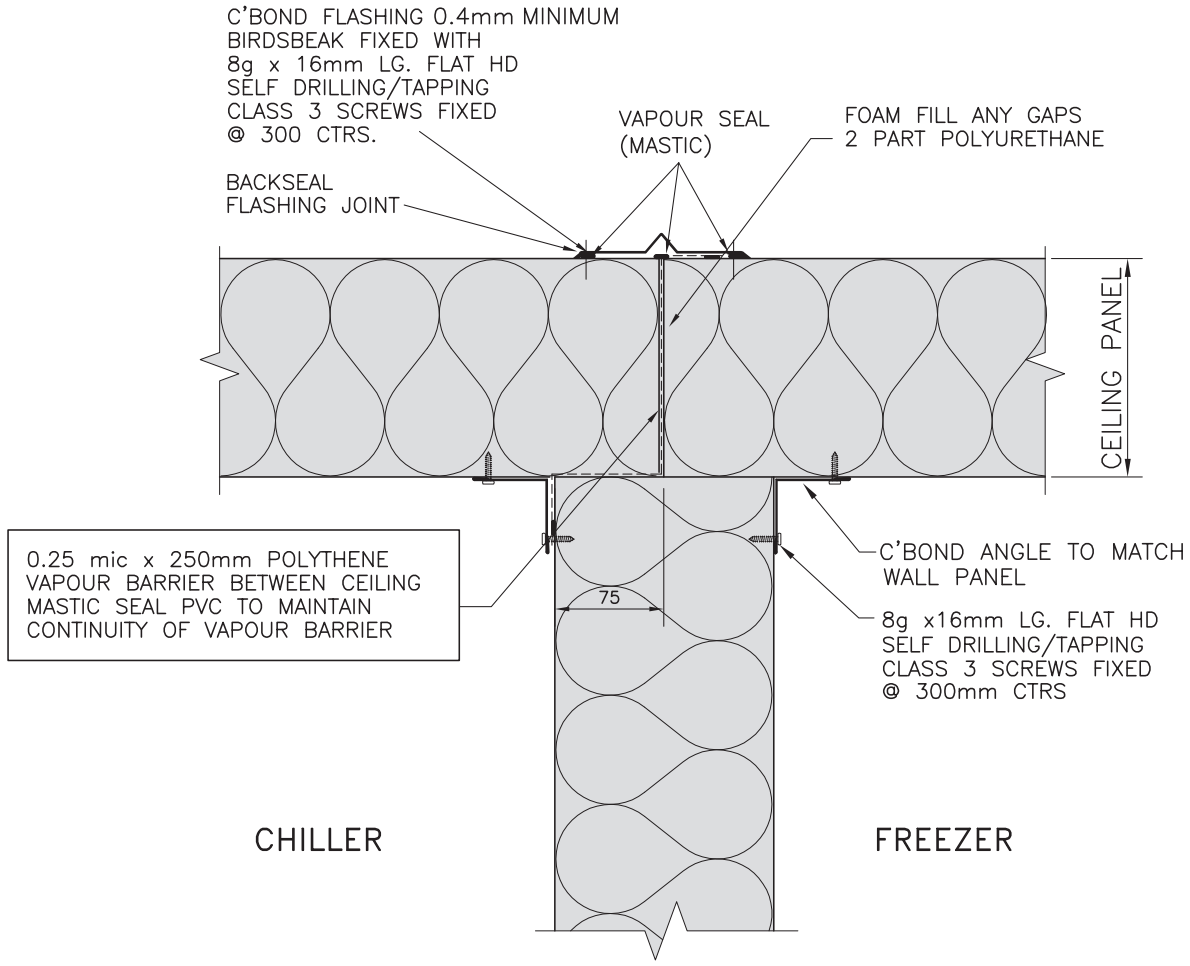
WALL TO WALL CORNER DETAIL

FOR FREEZER & CHILLER EXT'L WALLS

SECTIONAL DRAWINGS OF JOINTING AND SUSPENSION DETAILS

3.1 CEILING CONNECTION CHILLER TO FREEZER

IPCA CERTIFIED DATA SHEET – TYPICAL COLDROOM SECTION 4

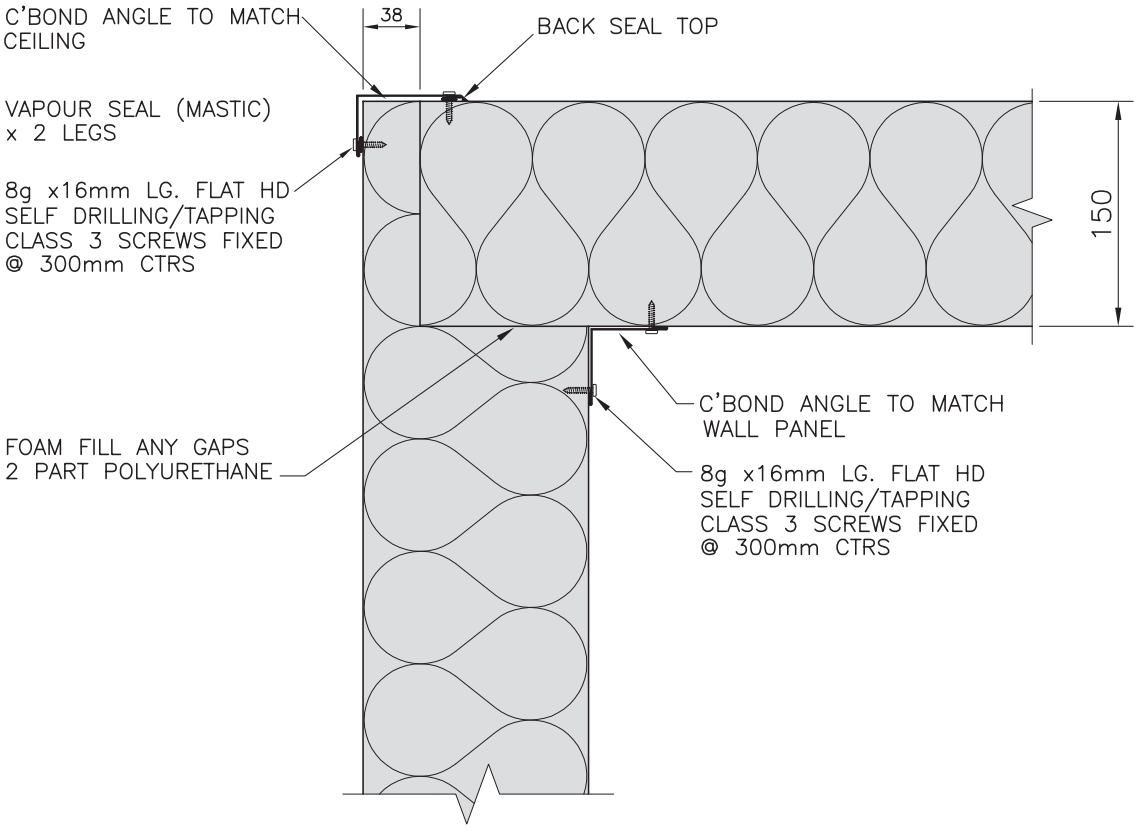


CEILING CONNECTION
CHILLER TO FREEZER

SECTIONAL DRAWINGS OF JOINTING AND SUSPENSION DETAILS

3.2 WALL TO CEILING JOINT DETAILS

IPCA CERTIFIED DATA SHEET – TYPICAL COLDROOM SECTION 4

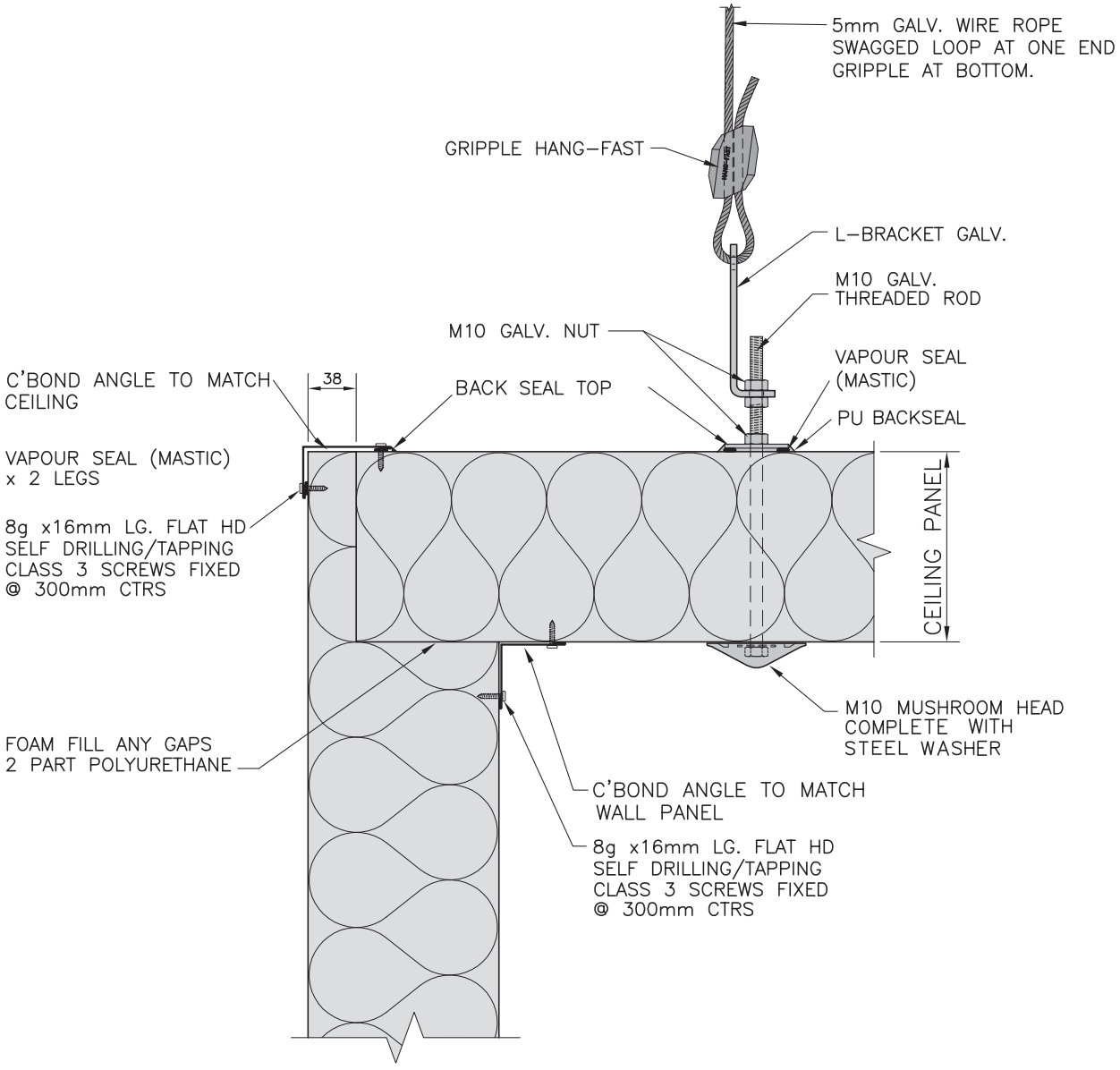


WALL TO CEILING DETAIL

SECTIONAL DRAWINGS OF JOINTING AND SUSPENSION DETAILS

3.3 WALL TO CEILING WITH HANGING FASTENER DETAIL

IPCA CERTIFIED DATA SHEET – TYPICAL COLDROOM SECTION 4

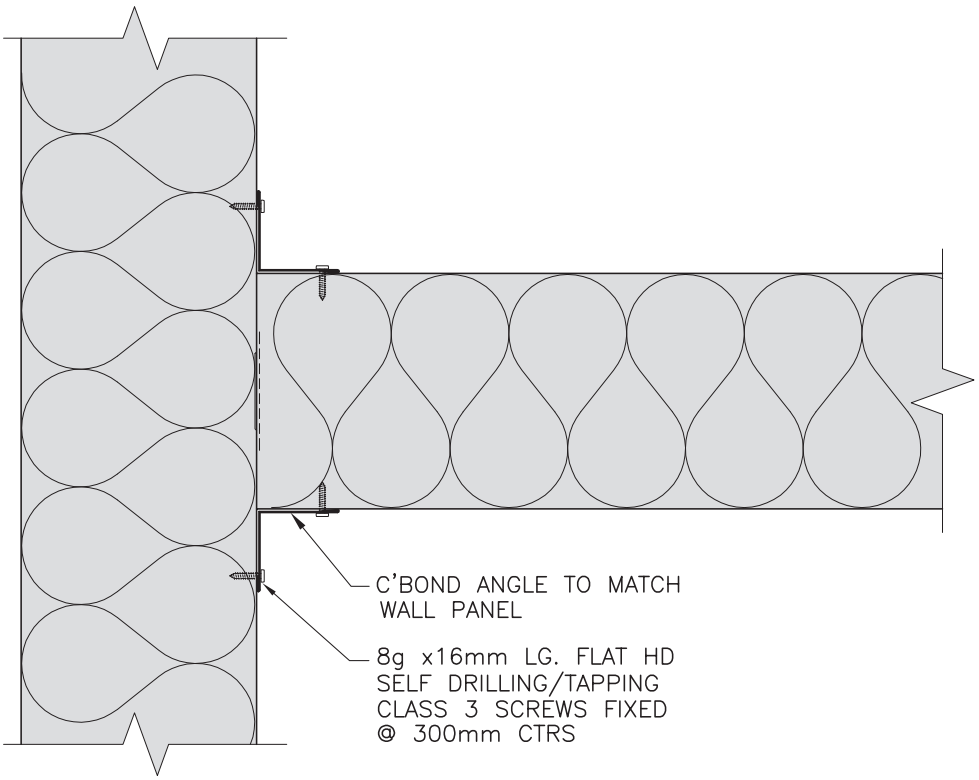


WALL TO CEILING DETAIL

SECTIONAL DRAWINGS OF JOINTING AND SUSPENSION DETAILS

4. EXTERNAL WALL AND PARTITION DETAIL

IPCA CERTIFIED DATA SHEET – TYPICAL COLDROOM SECTION 5



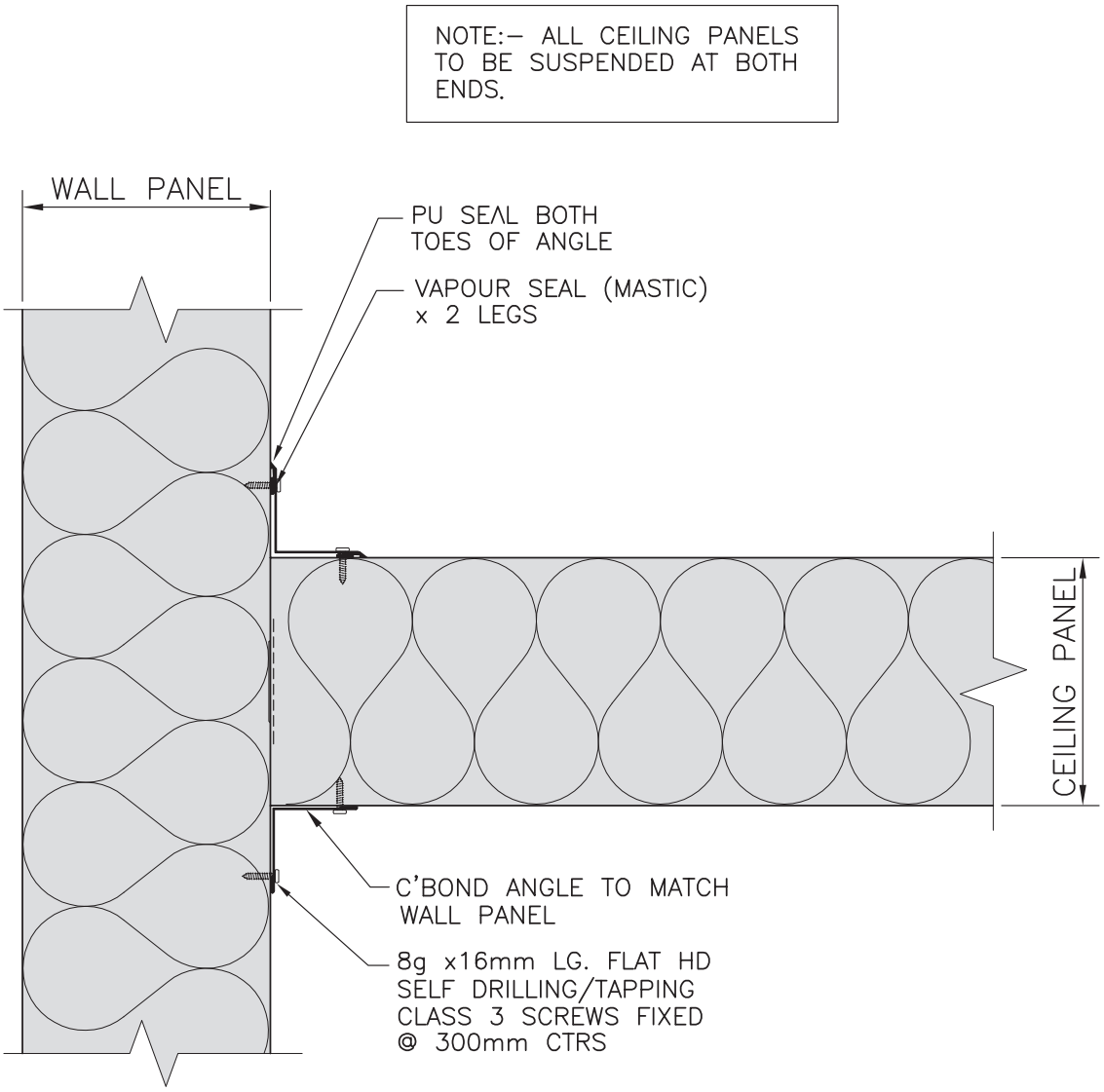
EXT'L WALL & PARTITION DETAIL

MASTIC VAPOUR SEAL ANGLE ON EXTERNAL FACE ONLY

SECTIONAL DRAWINGS OF JOINTING AND SUSPENSION DETAILS

4.1 EXTERNAL WALL TO LOW CEILING DETAIL

IPCA CERTIFIED DATA SHEET – TYPICAL COLDROOM SECTION 5

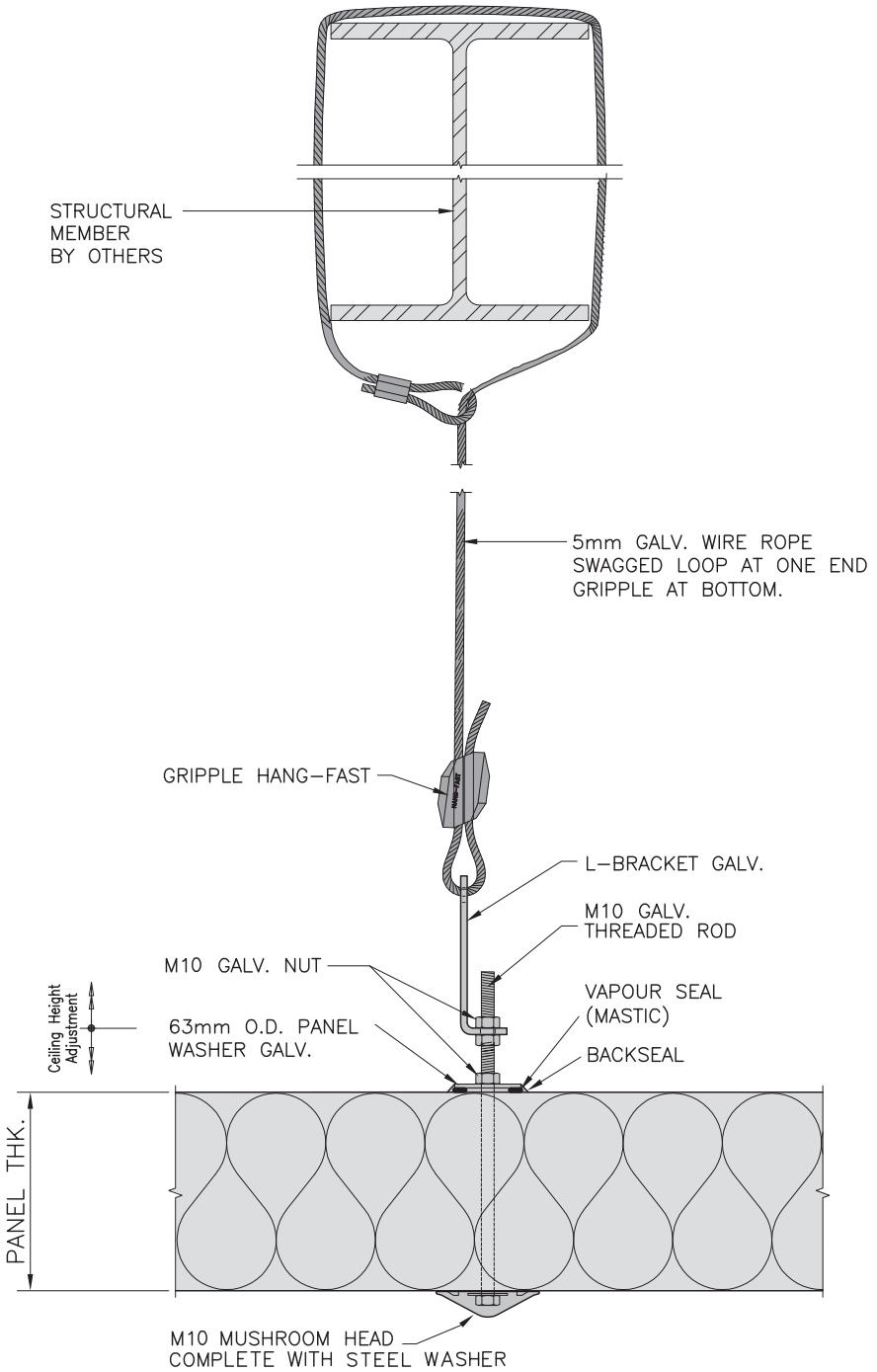


EXT'L WALL TO LOW CEILING DETAIL

SECTIONAL DRAWINGS OF JOINTING AND SUSPENSION DETAILS

5. INTERMEDIATE CEILING SUSPENSION DETAIL

IPCA CERTIFIED DATA SHEET – TYPICAL COLDROOM SECTION 6



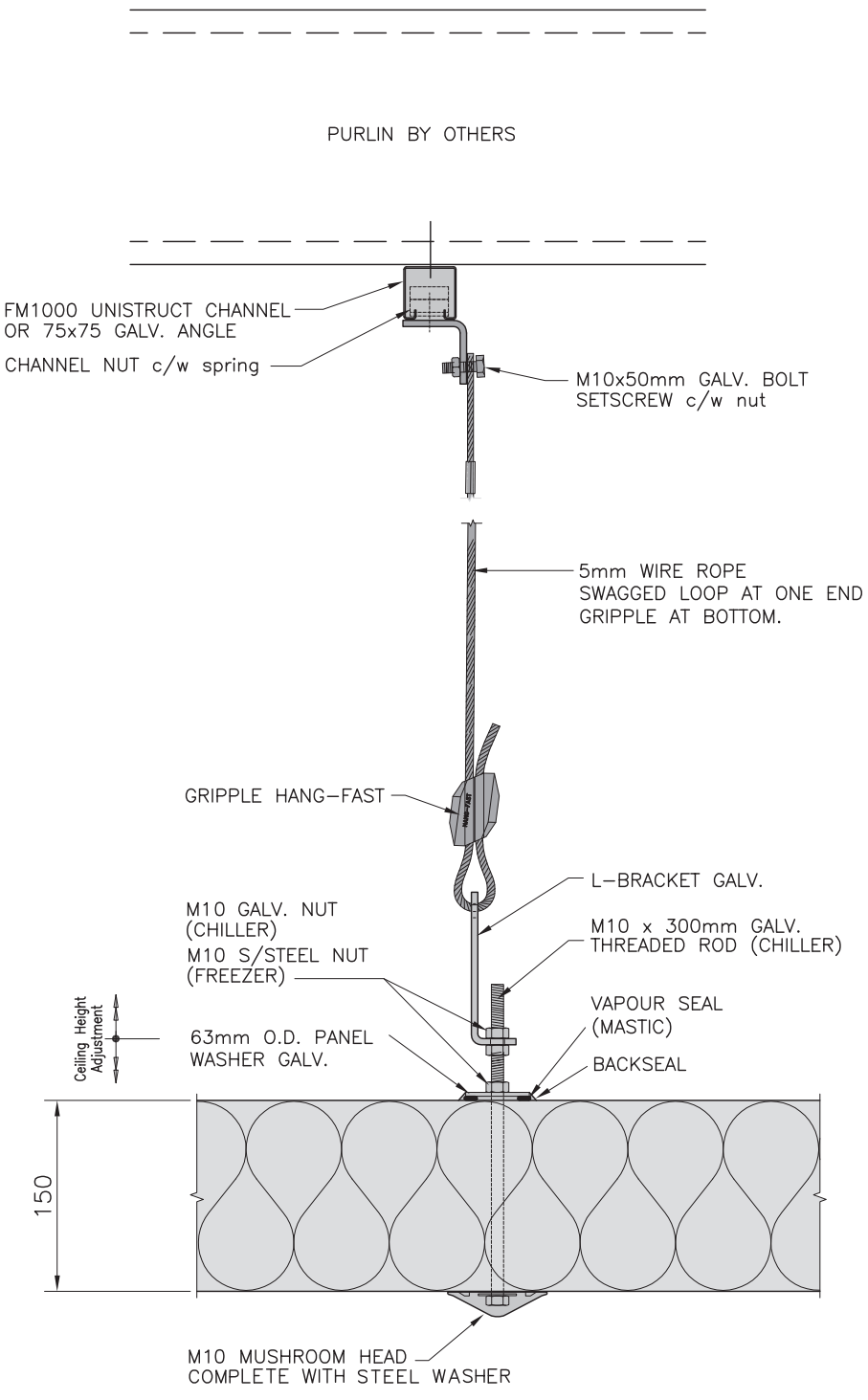
INTERMEDIATE CEILING SUSPENSION

N.B. THIS DETAIL ALSO USED TO END SUPPORT ALL CEILING PANELS

SECTIONAL DRAWINGS OF JOINTING AND SUSPENSION DETAILS

5.1 INTERMEDIATE CEILING SUSPENSION

IPCA CERTIFIED DATA SHEET – TYPICAL COLDROOM SECTION 6

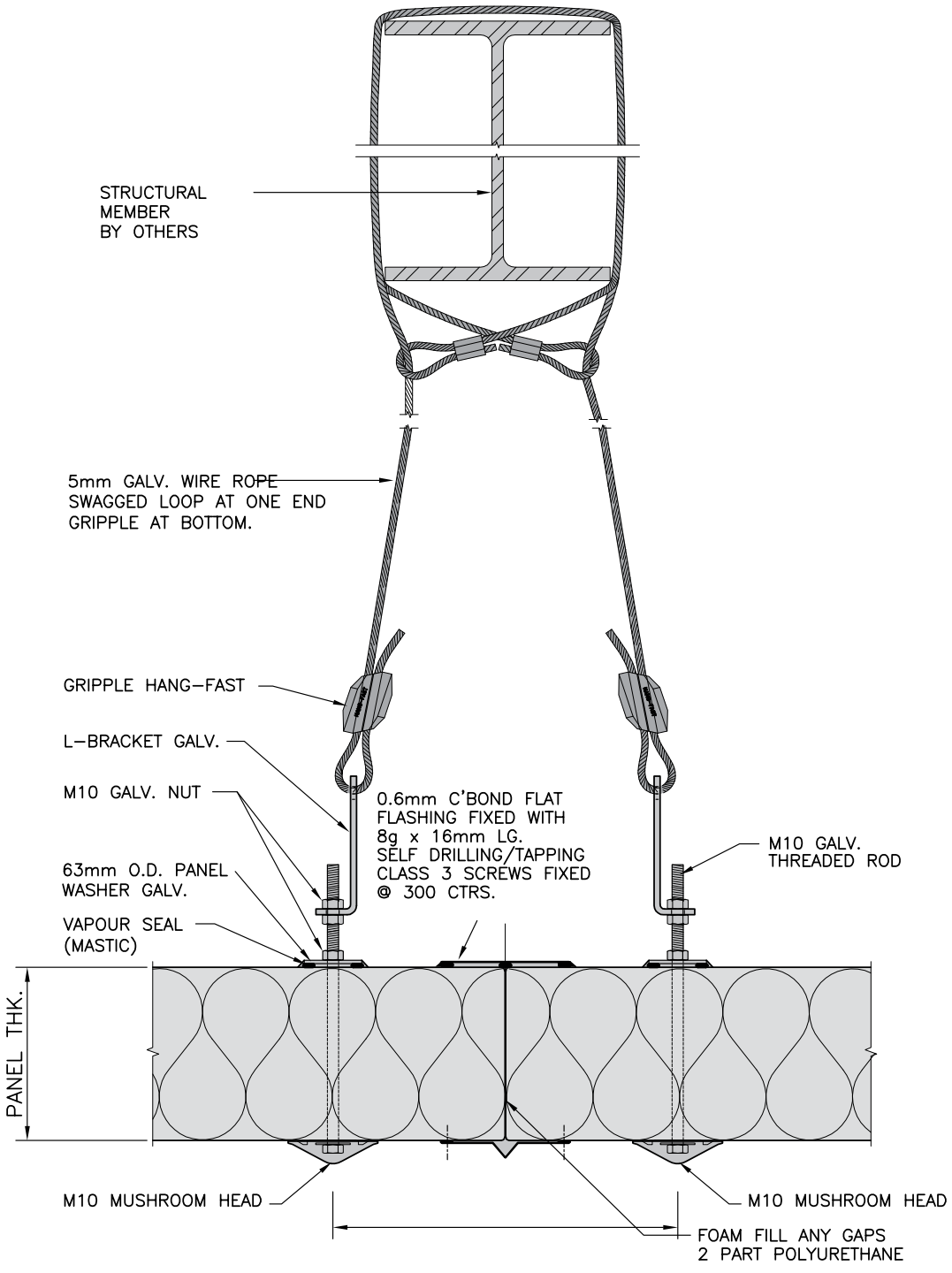


INTERMEDIATE CEILING SUSPENSION

SECTIONAL DRAWINGS OF JOINTING AND SUSPENSION DETAILS

5.2 MAIN CEILING SUSPENSION DETAIL

IPCA CERTIFIED DATA SHEET – TYPICAL COLDROOM SECTION 6

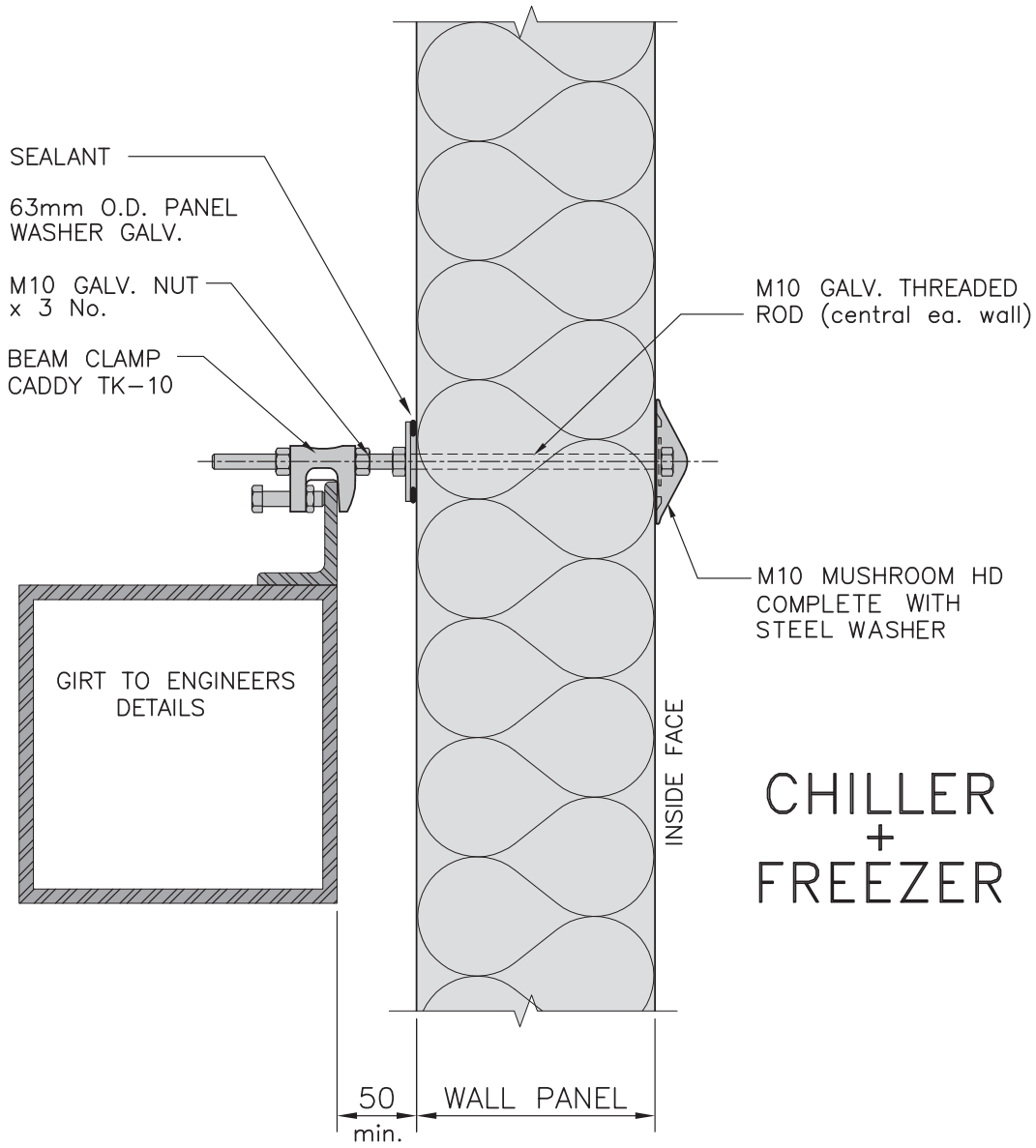


MAIN CEILING SUSPENSION

SECTIONAL DRAWINGS OF JOINTING AND SUSPENSION DETAILS

6. CHILLER INTERMEDIATE WALL FIXING

IPCA CERTIFIED DATA SHEET – TYPICAL COLDROOM SECTION 7

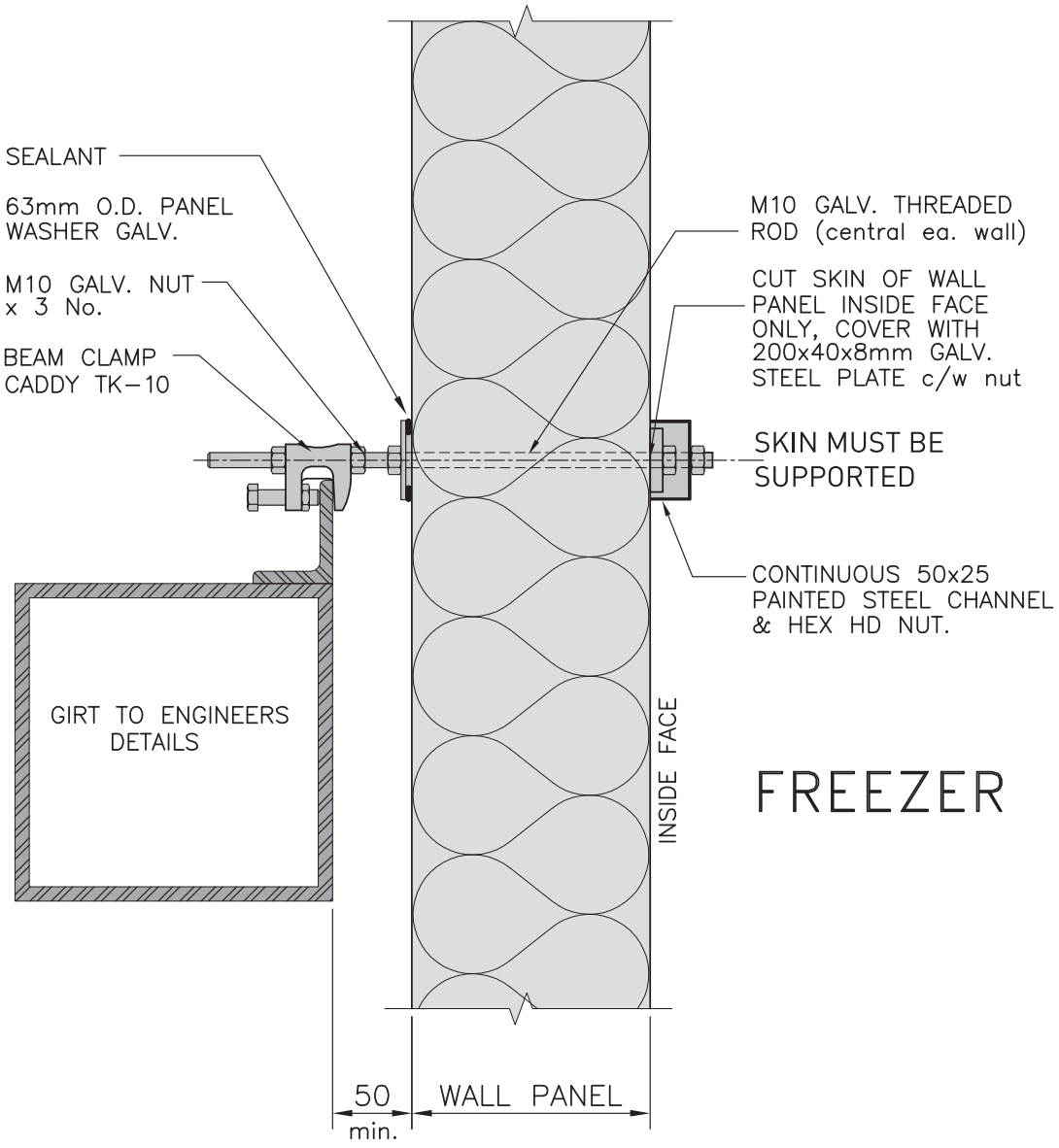


CHILLER INTERMEDIATE WALL FIXING

SECTIONAL DRAWINGS OF JOINTING AND SUSPENSION DETAILS

6.1 CHILLER INTERMEDIATE WALL FIXING / FREEZER INTERMEDIATE WALL FIXING DETAIL

IPCA CERTIFIED DATA SHEET – TYPICAL COLDROOM SECTION 7



FREEZER INTERMEDIATE WALL FIXING

ANNEX B

LABELLING OF INSULATED PANELS

CONTENTS

LABELLING OF INSULATED PANELS

LABELLING OF INSULATED PANELS

INTRODUCTION

Code of Practice Compliant structures will be identified with a labelling system. This system requires a key diagram, a numbered Compliance Plate and Insulated Panels to be labelled with labels that identify Panel core types which are provided by the Code Facilitator. The Panel labels will be located at all doorways in the Code Compliant Areas of the facility. The purpose of the labels is to assist fire fighters and other interested parties such as Insurance Assessors, Managers and Fire Wardens in understanding the type of Panel and the fixing systems utilized in the construction of the facility and their locations. This will enable pre-incident planning and assessment of the likely performance of the systems utilized in particular locations throughout the facility to be more accurate.

The CODE labelling system has the following three components:

1.0 KEY DIAGRAM

A key diagram no less than A3 in size and indicating the type of Panels used in the walls and ceilings or roof, shall be located at the Fire Indicator Panel (FIP) along with the Code Compliance Plate (see page 58).

2.0 PANEL LABELS

(a) Labels A5 in size will be placed on each side of the doors in a central easily read location at eye level indicating the type of Panel used in the construction of the room which you are entering. Labels are to be attached both externally and internally in the case of an entry into a room from outdoors.

(b) Labels will be UV resistant and suitable for wash down areas and will indicate:

(i) The type of Panel, the test method, result and whether it is Code Compliant. The label will include the core material type and the NCC Group Classification from C1.10a of the NCC i.e. Group 1, Group 1 + Plus Code Compliant Group 2 (for existing sections only) FRL ../../.. and the stability and construction methods.

(ii) Test details - AS/ISO 9705, AS 1530 PT 4.

(iii) Identification for the following Panel Core types (see from page 59 for examples of labels):
EPS
EPS-FR
XPS
PIR
MRF
SPS
LEAVING CODE COMPLIANT AREA

(c) In regards to the application of the labels, other important aspects of the labelling systems include:

(i) Only Code Compliant Companies can apply labels which can be obtained only from the Code Facilitator and will be strictly controlled.

(ii) Existing facilities or existing sections of facilities being extended can be made to be Code Compliant. In some circumstances, the facility can be retro fitted to become Code Compliant. The Panels used will have to be able to be traced and certified by a Code Compliant Manufacturer or the Panel tested to the satisfaction of the Code Facilitator and the Code Compliance Committee to prove that it is compliant.

(iii) The number of labels required will depend on the number of rooms, doors and the number of different Panel types used.

(iv) Alterations must be carried out by a Code Compliant Company and recorded on the diagram and labels affixed to maintain ongoing Code Compliance.

(v) In the event that the ceiling is of different Panel to the walls, a second label will be applied to the wall adjacent to the door indicating the type of Panel and its construction.

(vi) The label will include the Code Compliance Logo and contact details.

3.0 NUMBERED CODE COMPLIANCE PLATE

A numbered Code Compliance Plate will be fixed adjacent to the key diagram and will coincide with the Certificates (copies of the key diagram should be attached to the Certificate) and register, as well as the notice to the local fire services authorities (see page 58 for example).

BENEFITS OF CODE COMPLIANCE AND LABELLING

(a) Increases fire fighter confidence;

(b) Reminds Building Owners and Tenants to manage occupancy and process risks;

(c) Allows more accurate Risk Assessment;

(d) Reminds owners to maintain the construction level to keep the existing performance level and not inadvertantly alter the performance, during alterations and additions;

(e) Encourages more active fire fighting;

(f) Makes the building more insurable;

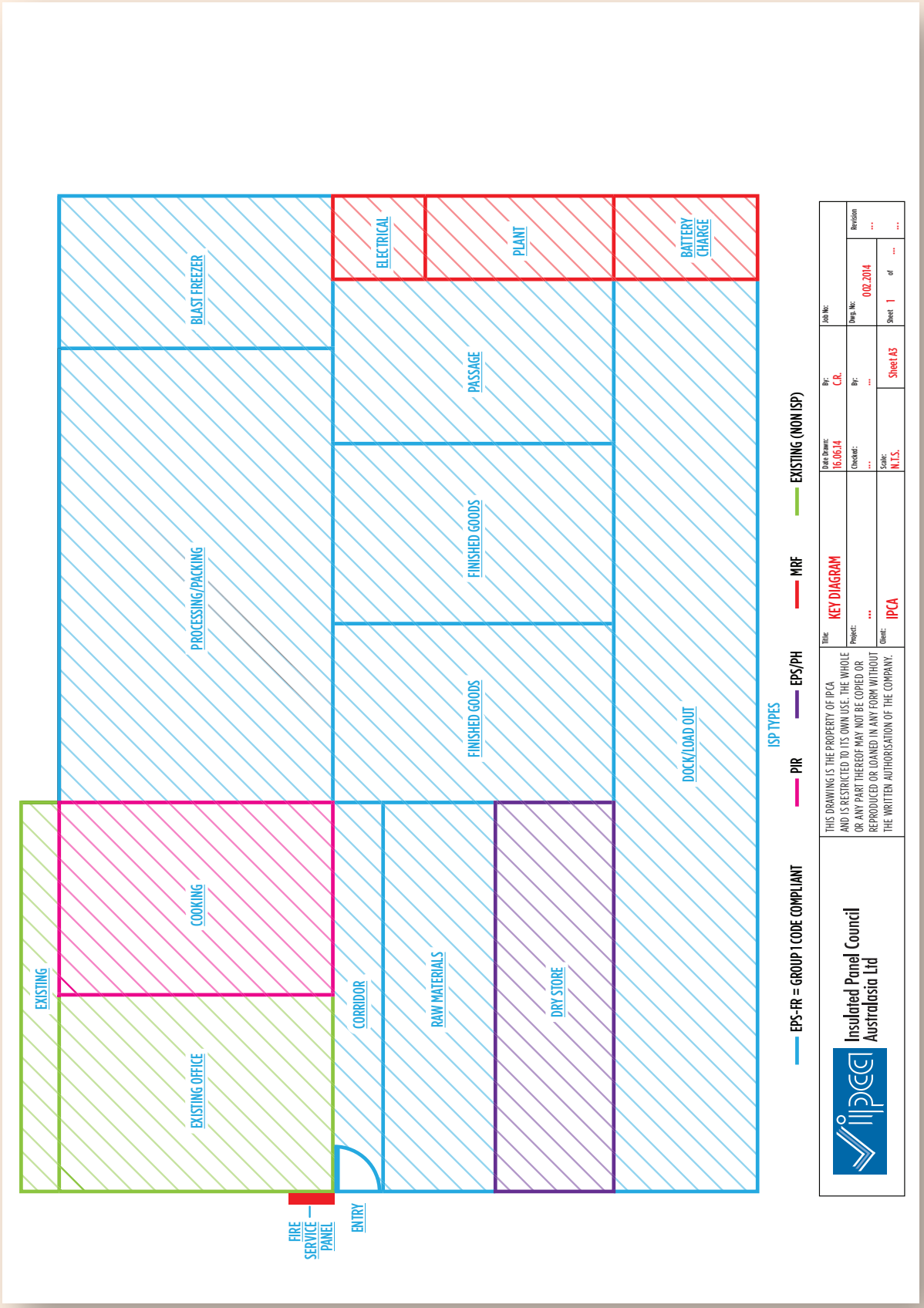
(g) Reduces losses;

(h) Presents a holistic plan to address the issues rather than a 'One Fix' solution; and

(i) Promotes a responsible collaboration between Regulators, Authorities, the Insulated Panel Industry, Insurance Companies and Insulated Panel facility users and owners.

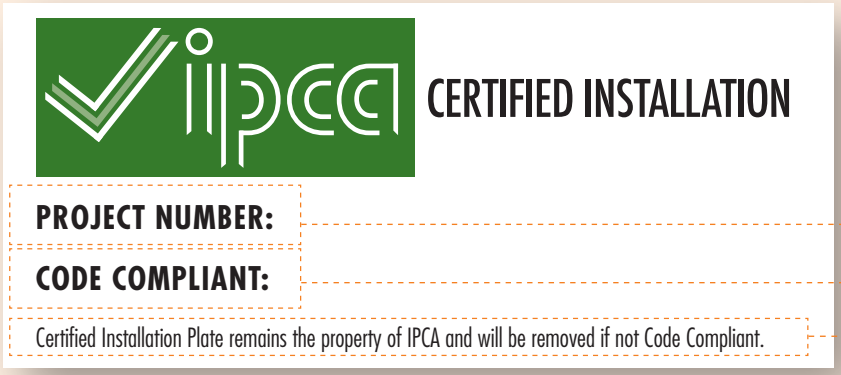
LABELLING OF INSULATED PANELS

1. EXAMPLE OF KEY DIAGRAM



LABELLING OF INSULATED PANELS

2.1 NUMBERED CODE COMPLIANCE PLATE — CLASS 7 AND 8



CODE COMPLIANT COMPANY'S OWN PROJECT NUMBER.

NUMBER ALLOCATED BY THE CODE FACILITATOR, WHICH WILL BE ON THE PLATE WHEN ISSUED.

QUALIFICATION STATEMENT.

2.2 NUMBERED CODE COMPLIANCE PLATE — OTHER CLASSES/SMALL ROOMS < 20m²

NUMBER ALLOCATED BY THE CODE FACILITATOR, WHICH WILL BE ON THE PLATE WHEN ISSUED.

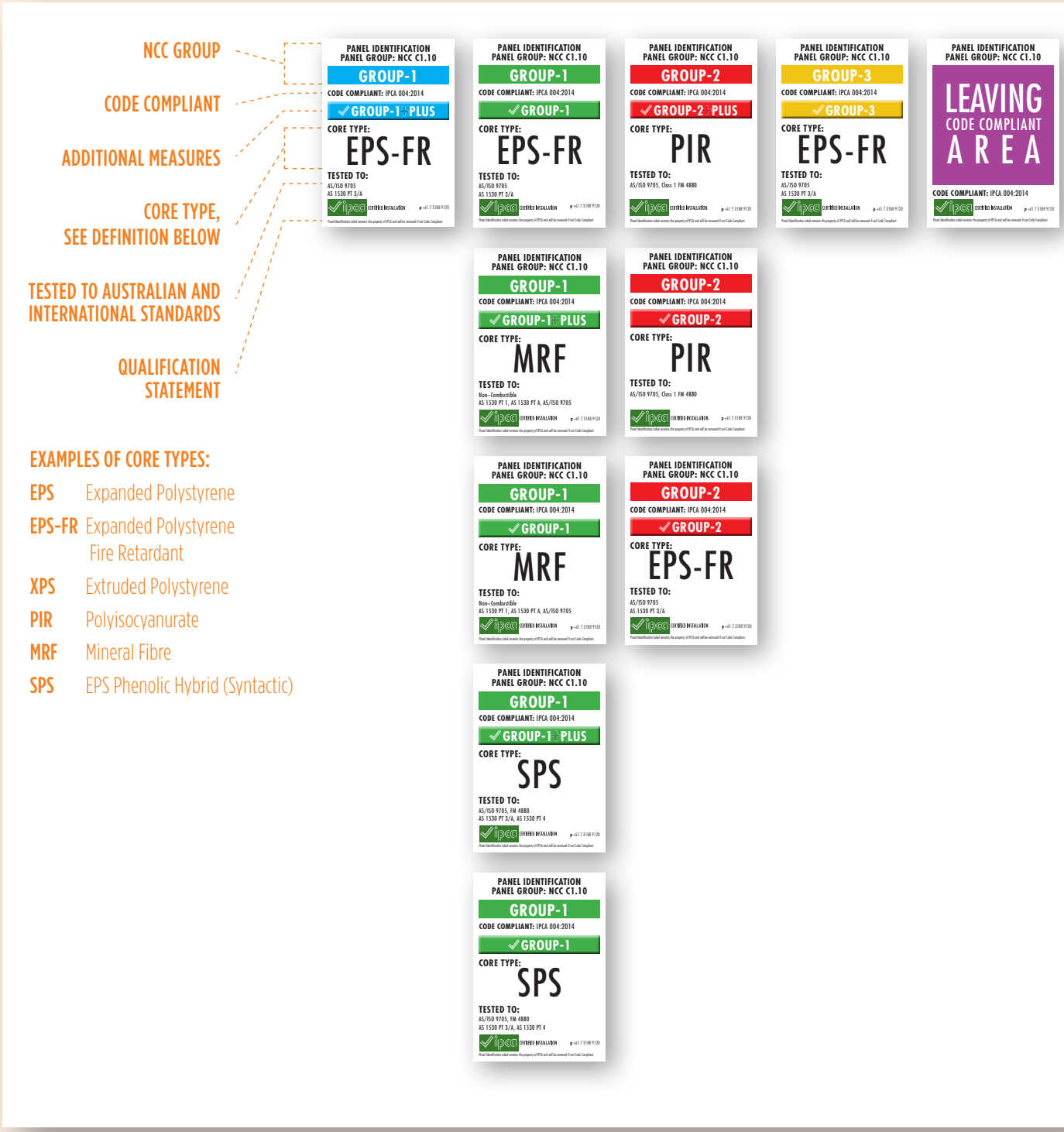
QUALIFICATION STATEMENT.

2.3 PROMOTIONAL LOGO

EXAMPLE OF PROMOTION LOGO.

LABELLING OF INSULATED PANELS

3. OVERVIEW OF CODE BRANDING LABELLING

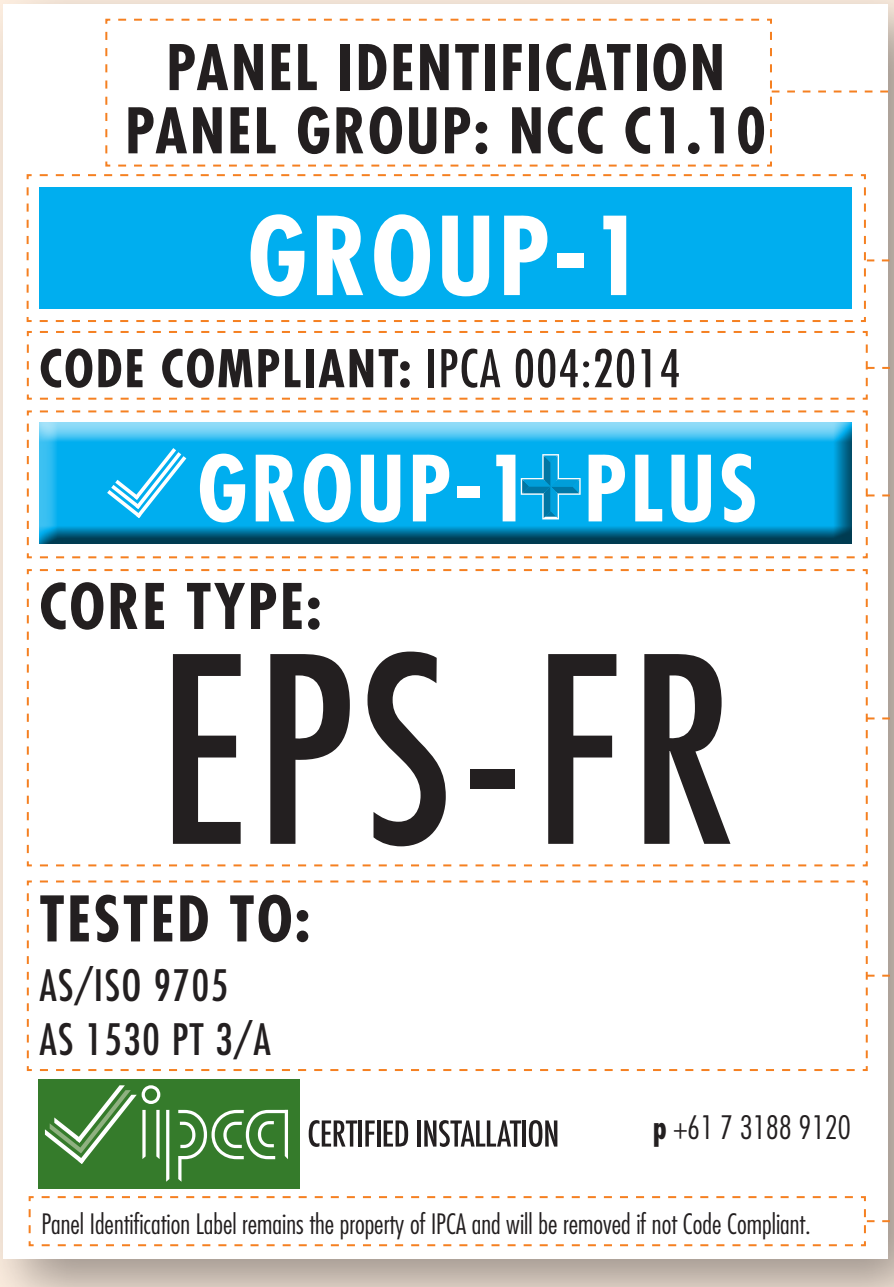


EXAMPLES OF CORE TYPES:

EPS	Expanded Polystyrene
EPS-FR	Expanded Polystyrene Fire Retardant
XPS	Extruded Polystyrene
PIR	Polyisocyanurate
MRF	Mineral Fibre
SPS	EPS Phenolic Hybrid (Syntactic)

LABELLING OF INSULATED PANELS

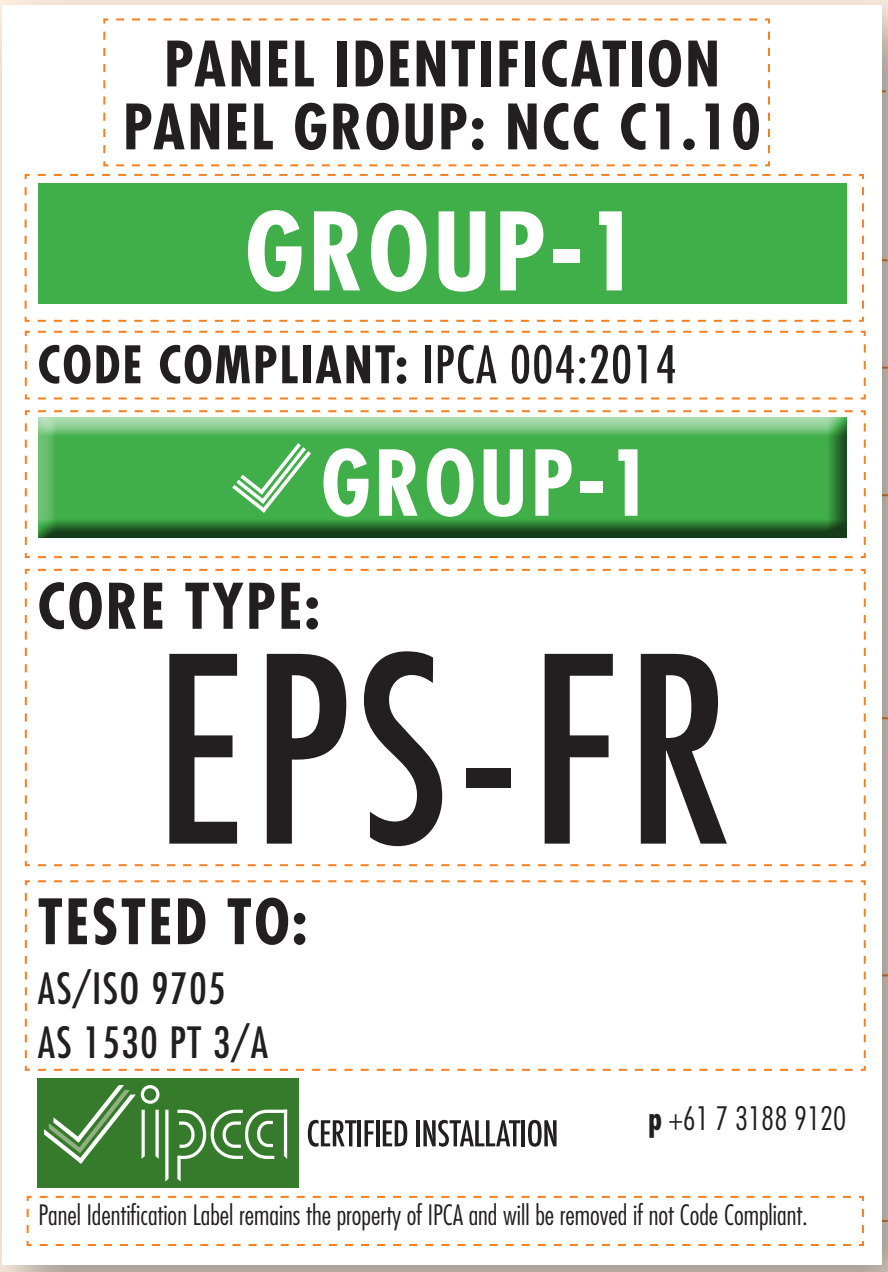
3.1 LABELLING FOR EPS-FR* (GROUP-1+PLUS) CORE TYPE



*Expanded Polystyrene Fire Retardant

LABELLING OF INSULATED PANELS

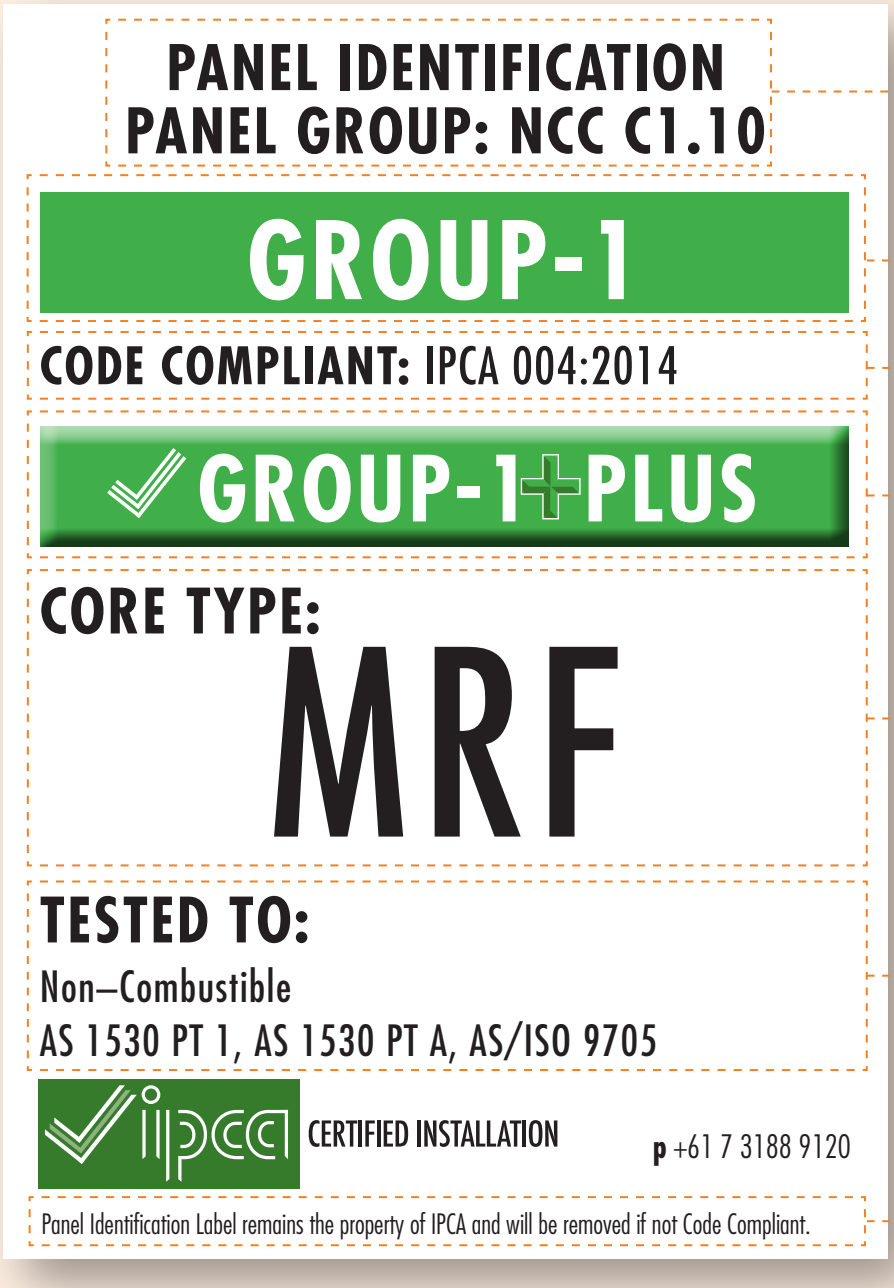
3.2 LABELLING FOR EPS-FR* (GROUP-1) CORE TYPE



*Expanded Polystyrene Fire Retardant

LABELLING OF INSULATED PANELS

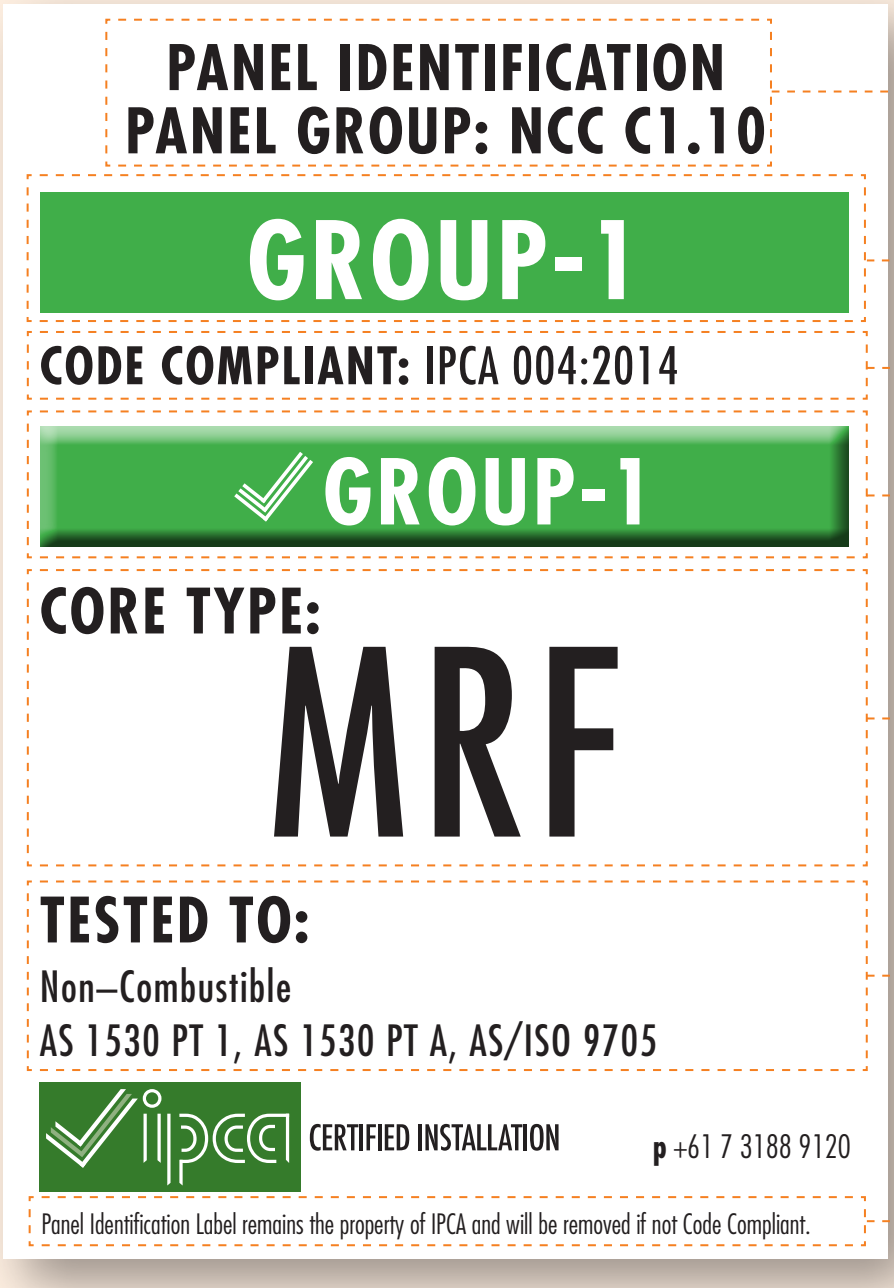
3.3 LABELLING FOR MRF* (GROUP-1+PLUS) CORE TYPE



*Mineral Fibre

LABELLING OF INSULATED PANELS

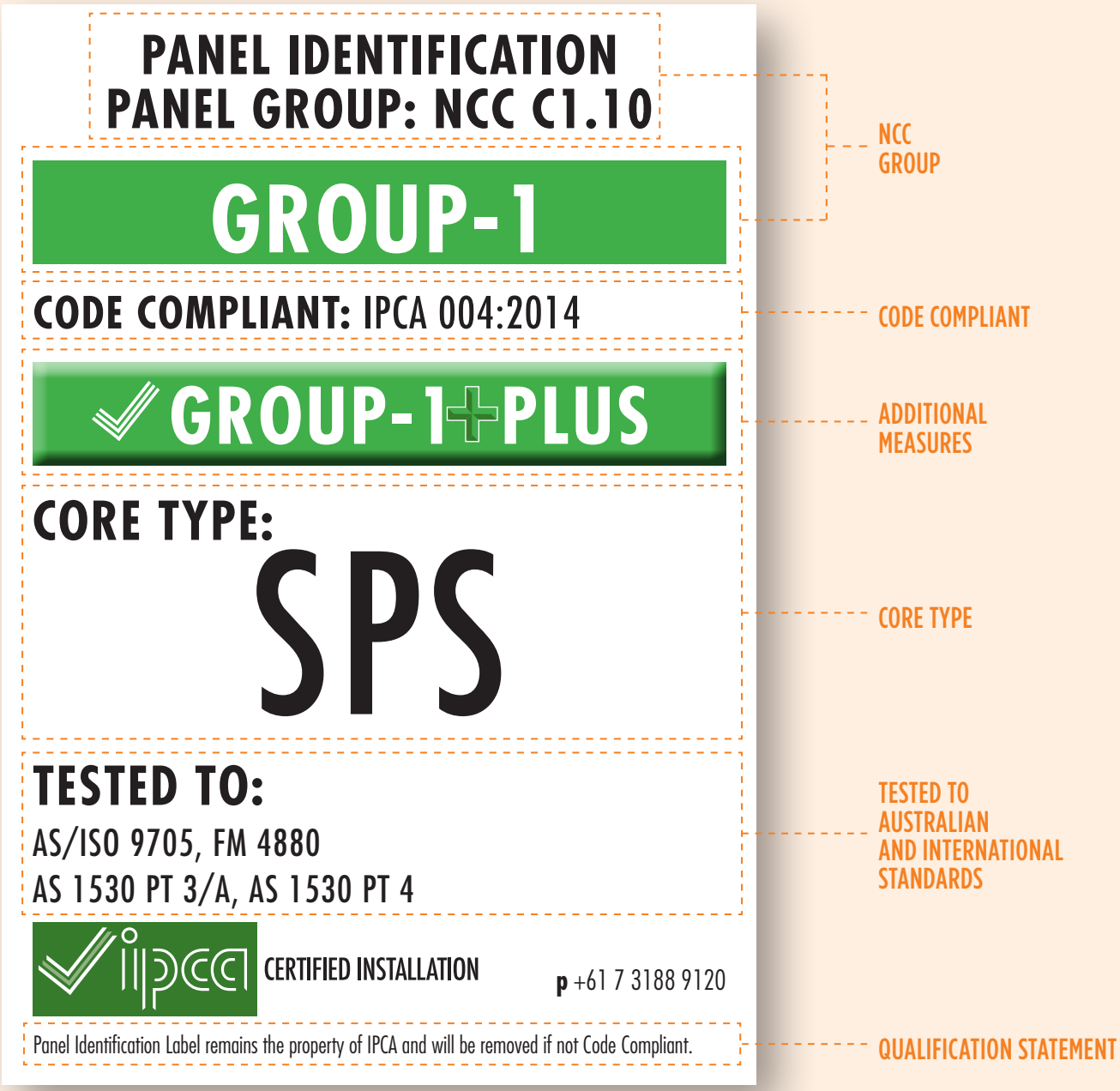
3.4 LABELLING FOR MRF* (GROUP-1) CORE TYPE



*Mineral Fibre

LABELLING OF INSULATED PANELS

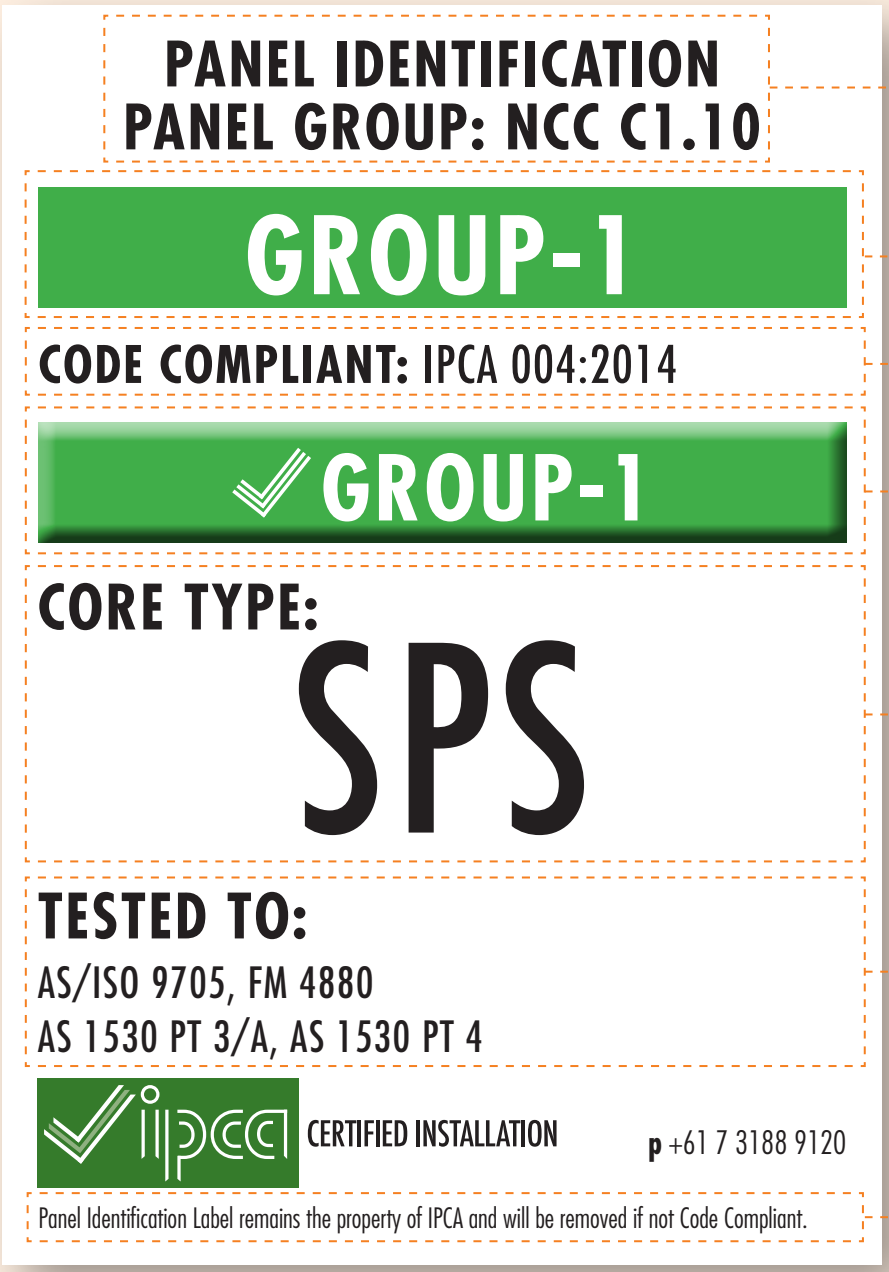
3.5 LABELLING FOR SPS* (GROUP-1+PLUS) CORE TYPE



* EPS Phenolic Hybrid Syntactic

LABELLING OF INSULATED PANELS

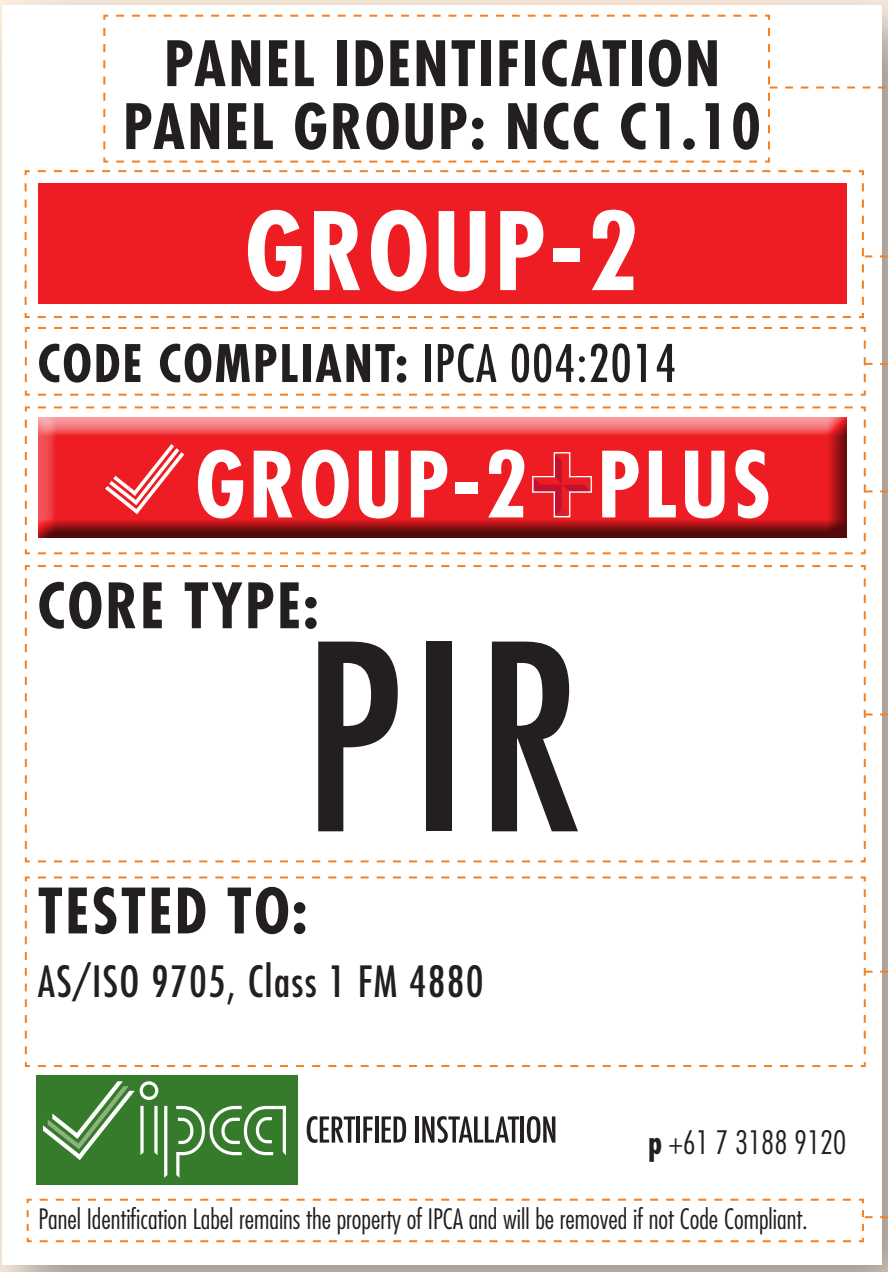
3.6 LABELLING FOR SPS* (GROUP-1) CORE TYPE



* EPS Phenolic Hybrid Syntactic

LABELLING OF INSULATED PANELS

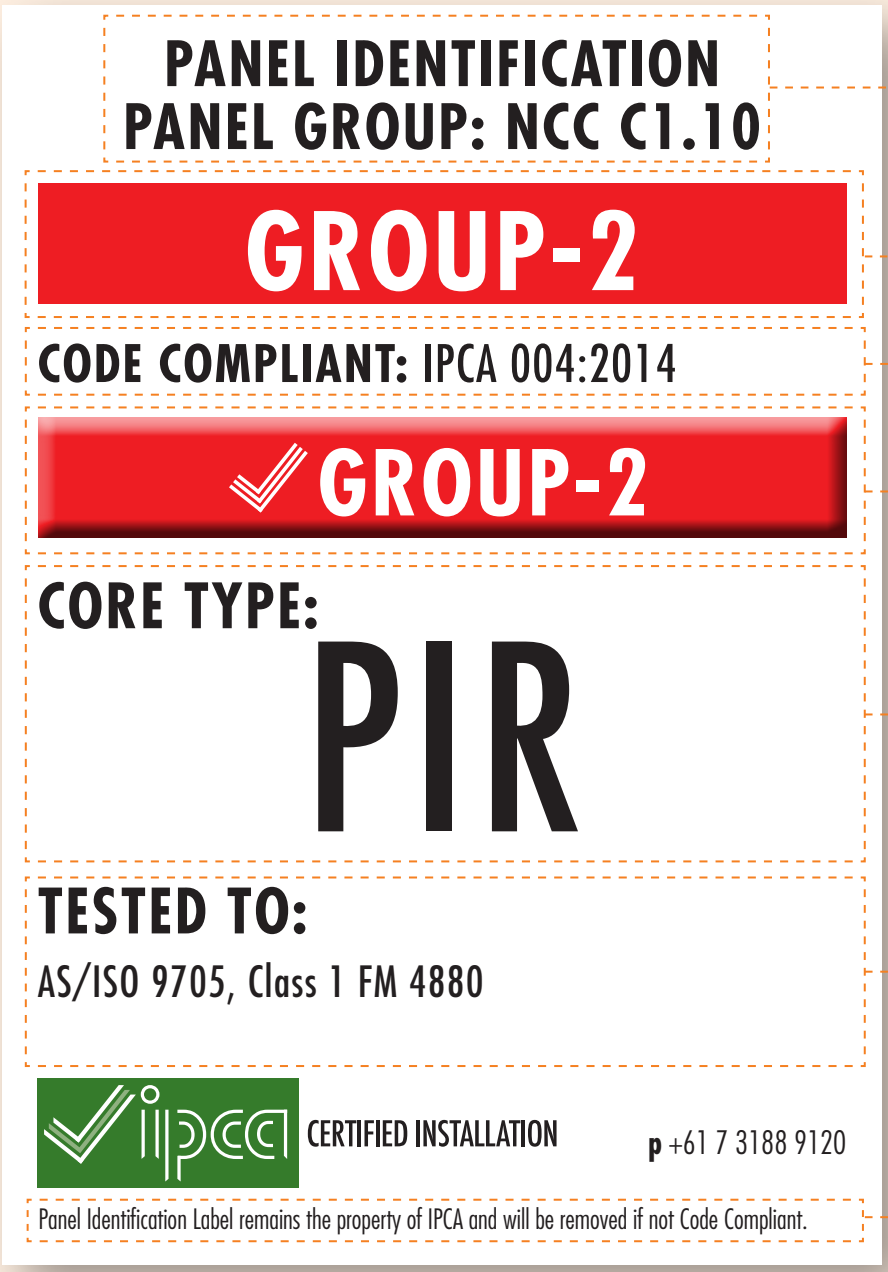
3.7 LABELLING FOR PIR* (GROUP-2+PLUS) CORE TYPE



* Polyisocyanurate

LABELLING OF INSULATED PANELS

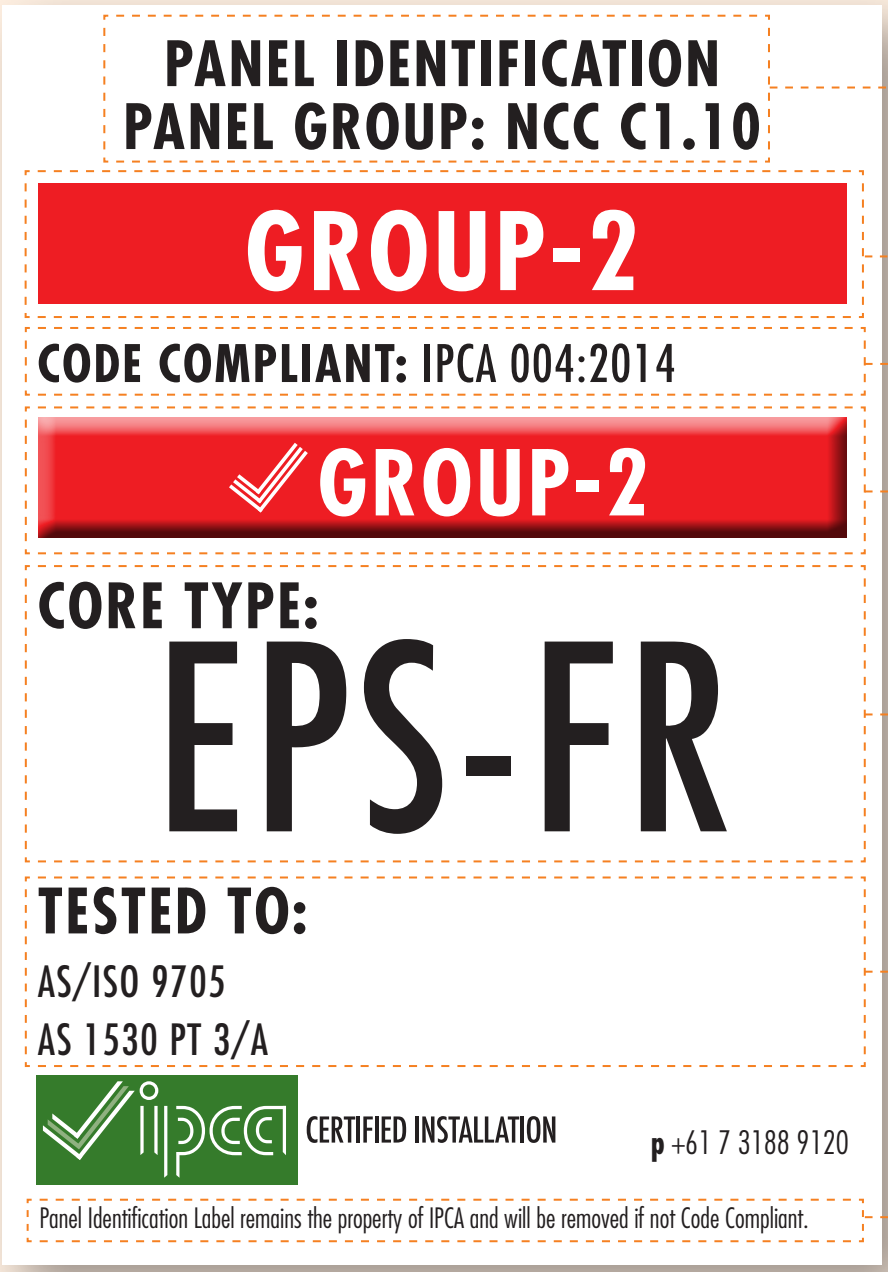
3.8 LABELLING FOR PIR* (GROUP-2) CORE TYPE



* Polyisocyanurate

LABELLING OF INSULATED PANELS

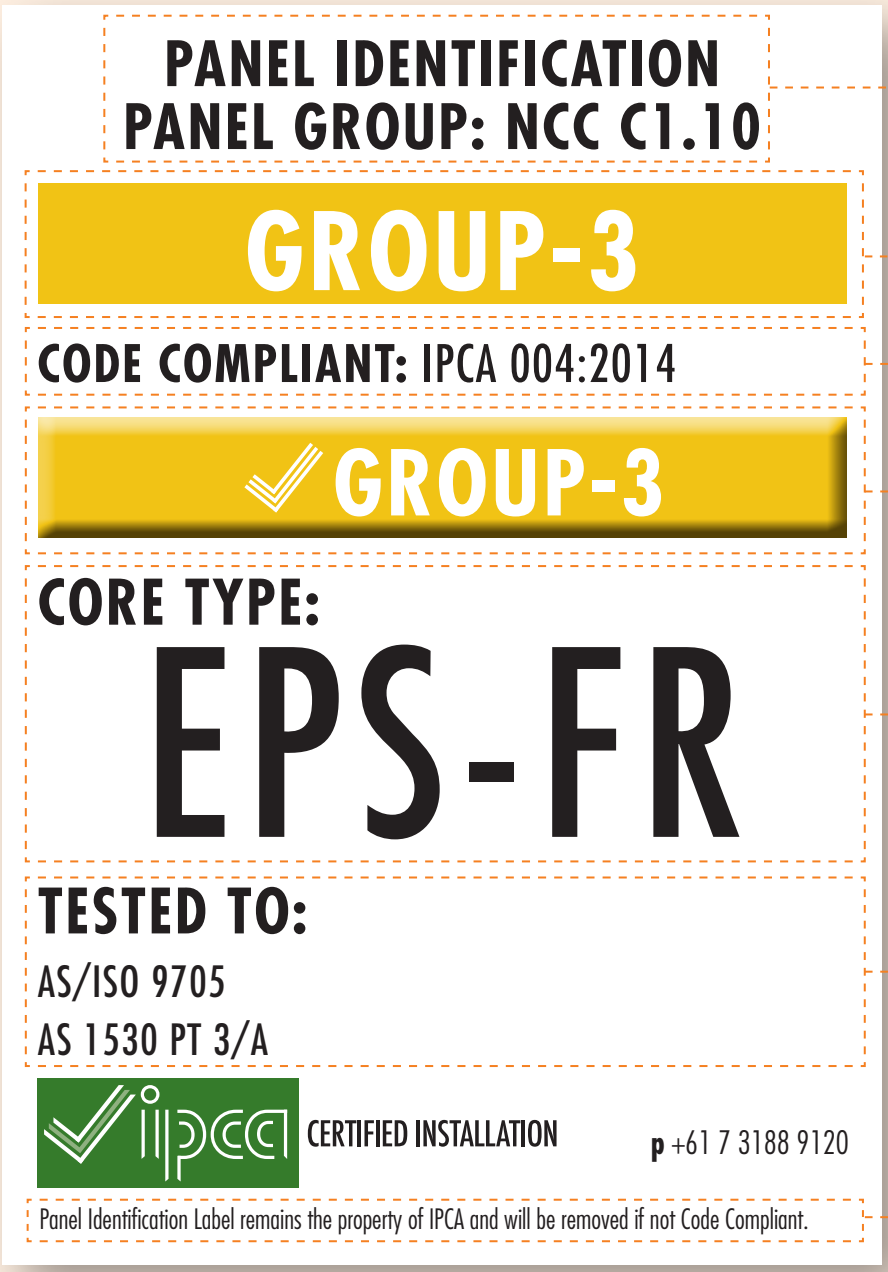
3.9 LABELLING FOR EPS-FR* (GROUP-2) CORE TYPE



*Expanded Polystyrene Fire Retardant

LABELLING OF INSULATED PANELS

3.10 LABELLING FOR EPS-FR* (GROUP-3) CORE TYPE



*Expanded Polystyrene Fire Retardant

LABELLING OF INSULATED PANELS

3.11 LABELLING FOR EXITING CODE COMPLIANT AREA

NCC GROUP

CODE COMPLIANT

QUALIFICATION STATEMENT

ANNEX C

POST CONSTRUCTION RECOMMENDATIONS

CONTENTS

POST CONSTRUCTION RECOMMENDATIONS

1. ISP AND EPS-FR PANEL SYSTEM INSPECTION AND MAINTENANCE MANAGEMENT

SCOPE

This procedure requires a regular inspection to be conducted of all areas containing ISP and EPS-FR Panel Systems to ensure that Panels are maintained in good condition, and exposure to potential fire ignition sources is minimised. Defects identified during these inspections must be recorded and an action plan completed to ensure these defects are rectified as a matter of urgency. A written record of these inspections and any rectification work must be kept on file for future reference.

IMPLEMENTING AN ISP AND EPS-FR PANEL SYSTEM MAINTENANCE INSPECTION PROCEDURE:

1. A nominated manager shall be appointed to coordinate the conducting of ISP Maintenance Inspections, and allocate appropriate staff to perform inspections.
2. Each site may be broken down into a number of smaller specific areas, to facilitate making these inspections easier to perform. Numbering each area on a master plan for all the Insulated Sandwich Panel and Expanded Polystyrene Panel Systems within the overall structure would ensure all Panel installed is included in the inspection and maintenance procedures.
3. Each area will be inspected at least every three months.
4. The performance of these inspections, and all identified defects, will be recorded on a Standardised Inspection Form (example on following pages).
5. An action plan will also be recorded on the Inspection Form, detailing all required remediation work, who will be responsible for performing each action, and the date the actions are completed.
6. A copy of the Inspection Form will be provided to all persons required to perform actions on the action plan, and the person conducting the original inspection will also inspect all work on the action plan after completion.
7. Completed Inspection Forms will be returned to the nominated manager for review, and to ensure all appropriate remediation work has been completed.
8. All completed ISP Maintenance Inspection Forms will be kept on file for a minimum of two years.

N.B. It is critical that the core of installed Panel never be left exposed, and rectification work to repair damaged Panels and/or exposed core must always be given a high priority.

Location (Area/Building/Floor) No: _____

_____

Name of Inspecting Officer: _____

Signature of Inspecting Officer: _____

Date of this Inspection: (DD/MM/YYYY) ☐☐ ☐☐ ☐☐☐☐

Date of Previous Inspection: (DD/MM/YYYY) ☐☐ ☐☐ ☐☐☐☐

N.B. To be included with approved Maintenance Management

POST CONSTRUCTION RECOMMENDATIONS

MAINTENANCE CHECKLIST FOR:

PANEL CEILINGS INSPECTION REQUIREMENT	PASS	FAIL
Vapour Seal: Inspect the ceiling and all the joints to make sure that a vapour barrier is maintained. Ice build up on the inside skin shows that there is a vapour seal leak. The vapour seal is on the outside or warmer side of the building.	☐	☐
Ceiling Levels: Check for excessive sagging of the ceiling Panels using a string line or a dumpy level. Excessive sagging may indicate that ice (additional weight) is building up inside the Panels. Immediate action is required as additional weight on ceiling Panels is a safety hazard.	☐	☐
Panel Joints: Check for any corrosion, ice, sweating and inadequate seal.	☐	☐
Ceiling Suspension: Check for corrosion, damage and excessive tightness. Suspension wire or chain should be firm not taut.	☐	☐
Panel Buckling: Check for Panel buckling (structural or thermal). Immediate action is required as buckling in Panels is a safety hazard.	☐	☐
Ceiling to Wall Intersection: Check the Panels, trims, rivets for any corrosion, ice, sweating and structural stress.	☐	☐
Ceiling Penetrations: Check to see if the penetration is properly sealed on the outside surface of the Panel. Check to make sure that there is no load being applied to the Panel.	☐	☐
Water Ponding: Check for water ponding on the ceiling Panels. This is caused by a water leak in the roof or from pipes. Water ponding on the Panels causes them to rust, so immediate action is required.	☐	☐
Safety Signs: Signs showing the safe loading on the ceiling Panels should be clear and visible at all access points to the ceiling.	☐	☐

PANEL WALLS INSPECTION REQUIREMENT	PASS	FAIL
Vapour Seal: Inspect the walls and all the joints to make sure that a vapour barrier is maintained. Ice build up on the inside skin shows that there is a vapour seal leak. Vapour seals are on the outside or warmer side of the Panel.	☐	☐
Wall Alignment: Check walls for straightness; discount the normal thermal bow due to the difference in the inside/outside temperature.	☐	☐
Panel Joints: Check for any corrosion, ice, sweating and inadequate seal.	☐	☐
Panel Corner Joints: Check the Panels, trims, rivets for any corrosion, ice, sweating, inadequate seal and structural stress.	☐	☐
Panel to Floor Joints: Check for corrosion, ice, sweating and inadequate seal.	☐	☐
Panel Expansion Joints: Check for corrosion, ice and sweating.	☐	☐
Wall Panel to Floor Coving: Check for corrosion, ice, sweating and inadequate seal.	☐	☐
Girt Fixings: Check for corrosion, ice, sweating and inadequate seal.	☐	☐
Panel Buckling: Check for Panel buckling (structural or thermal). Immediate action is required as buckling in Panels is a safety hazard.	☐	☐
Pressure Relief Ports: Check for corrosion, excess ice, sweating, inadequate seal and check that the relief port vanes open and close freely. Check that the heater cable for the relief port is operational. Check that there is not an excess of pressure occurring. Examples of insufficient pressure relief include: Difficulties in opening doors and a rush of air when the door is opened.	☐	☐

POST CONSTRUCTION RECOMMENDATIONS

DOORS INSPECTION REQUIREMENT	PASS	FAIL
Door and Door Frames: Check for corrosion and damage from collisions.	☐	☐
Heater Cables (where fitted): Check door and threshold heater cables are operating and are not damaged.	☐	☐
Door Rollers and Tracks: Check that the nylon wheels are running smoothly and freely and there is no wear. Check for corrosion and that the track is straight and there are adequate fixings.	☐	☐
Gaskets and Seals: Check that the seals are not damaged (ripped, torn, out of shape) and that there is an adequate seal and no sweating and no icing up.	☐	☐
N.B.: Gaskets may be cleaned with a mild solution of warm soapy water, and then flushed with water to remove all soap. Solvents should not be used to clean the gaskets and seals.	☐	☐
Safety Bells: Check for corrosion and that the bell is functioning properly.	☐	☐
Swing Doors: Check that the hinges, magnets and locking assembly are free from corrosion and are working properly.	☐	☐
Vertical Up Lift Doors: Check chains, sprockets, linkages, nylon wheels and tracks for corrosion and wear.	☐	☐
Vapour Barrier: Check that the vapour barrier is maintained on the outer skin of the doors. Check the Panels in the doors for damage, as damage can lead to ice and water building up inside the doors, reducing insulation efficiency and increasing weight (subsequently increasing wear of moving parts).	☐	☐

If any of the inspection requirements are marked as a fail, you must complete the Action Plan below.

Comments:

ACTION PLAN

REQUIRED ACTION	BY WHOM	TARGET DATE	COMPLETED DATE

A copy of this report must be provided to each person nominated in the action plan.
When actions are completed, these copies will be returned to the person conducting the inspection for sign off.

I have inspected the above work and to the best of my knowledge, it has been completed satisfactorily.

Inspecting Officer: _____ Print: _____ Signature: _____

Completed forms need to be returned to the Operations Manager for review and filing.

POST CONSTRUCTION RECOMMENDATIONS

2. RISK MANAGEMENT PLANNING

To ensure that the integrity of installed ISP and EPS-FR Panel Systems is maintained, rigorous risk management procedures need to be implemented and strictly followed. These procedures are aimed at preventing potential ignition sources coming in contact with Panels, or exposed inner core materials and ensuring that all normal operational activities as well as other work carried out in areas containing ISP and EPS-FR Panel Systems is controlled and performed in a safe manner.

RISK MANAGEMENT PLAN

The nature of the industry and/or operational activities of the occupier may also create the potential for high fire risk conditions and the issue of 'Safe Work' Permits and 'Hot Work' Permits should be enforced. Cleanliness, i.e. managing dust, waste build up or general storage as well as managing all potential ignition sources associated with plant and equipment or high temperature activities such as cooking, grinding, welding, etc, should all be included in Risk Management Planning along with the issuing of the special permits. Hot Work and Safe Work Permits need to apply to both staff and external contractors.

The following are some of the main causes of ignition that need to be considered in a Risk Management Plan:

(a) Arson;

(b) Poor Electrical Installation;

(c) Hot Working and Welding;

(d) Hot Cooking Processes and Associated Ductwork;

(e) Deep Fat Continuous Fryers;

(f) Ductwork Flues and Filters;

(g) Refrigerator Defrost Systems;

(h) Process Gases;

(i) Rubbish Stored against Walls; and

(j) Battery Charging Areas.

An example of a Risk Management Plan is on the following pages.

INSULATED SANDWICH PANEL 'SAFE WORK' PERMIT

The establishment of an Insulated Sandwich Panel 'Safe Work' Permit System is required to ensure that all work involving ISP and EPS-FR Panel is conducted in a safe manner. This procedure will also ensure that Panels are returned to a safe condition after completion of any work, particularly in regards to the correct sealing of all core materials. It is critical that this procedure be strictly enforced with both staff and external contractors who will be conducting work on or nearby any installed Panels.

An example of an ISP and EPS-FR Panel 'Safe Work' Permit form is attached.

HOT WORK PERMIT

The establishment of a Hot Work Permit System is required as a tool for controlling risks associated with Hot Work performed by staff or external contractors. Hot Work is defined as welding, thermal or oxygen cutting or heating, or other related heat-producing or spark-producing operations, such as grinding. Permitted activities should be strictly supervised and controlled to reduce the risk of fire.

An example of a 'Hot Work Permit' procedure and form are attached.

POST CONSTRUCTION RECOMMENDATIONS

INSULATED SANDWICH PANEL RISK MANAGEMENT INSPECTION

Location (Area/Building/Floor) No: _____

_____

Name of Inspecting Officer: _____

Signature of Inspecting Officer: _____

Date of this Inspection: (DD/MM/YYYY) ☐☐☐☐☐☐☐☐

Date of Previous Inspection: (DD/MM/YYYY) ☐☐☐☐☐☐☐☐

POST CONSTRUCTION RECOMMENDATIONS

LOCATION OF POTENTIAL IGNITION SOURCES	YES	NO
Are Forklift battery rechargers located within 5 metres of Panels?	☐	☐
Is any electrical equipment recess mounted in Panels?	☐	☐
Is any surface mounted electrical equipment less than IP54 Rated?	☐	☐
Has hot cooking equipment and associated ductwork been inspected and maintained?	☐	☐
Have deep fryers been inspected and maintained?	☐	☐
Are flammable gases stored safely?	☐	☐
Have ductwork flues and filters been maintained and cleaned?	☐	☐
Have refrigeration and defrost systems been inspected and maintained?	☐	☐
Is heat producing equipment, or any similar fire hazard, located within 5 metres of Panels?	☐	☐

If the answer to any of the above questions is YES, you must complete the action plan below.

Comments:

ACTION PLAN

REQUIRED ACTION	BY WHOM	TARGET DATE	COMPLETED DATE

A copy of this report must be provided to each person nominated in the action plan. When actions are completed, these copies will be returned to the person conducting the inspection for sign off.

I have inspected the above work and to the best of my knowledge, it has been completed satisfactorily.

Inspecting Officer (print name): _____

Signature: _____

Completed forms need to be returned to the Operations Manager for review and filing.

POST CONSTRUCTION RECOMMENDATIONS

ISP AND EPS-FR PANEL 'SAFE WORK' PERMIT

Location (Area/Building/Floor) No: _____

_____

Type of work to be performed? _____

_____

What equipment is to be used? _____

_____

PENETRATIONS	YES	NO	N/A
Will penetrations be made through Panels or Panel outer skins? How will these penetrations be made?	☐	☐	
Will services such as electric cables or pipes be placed through penetrations? Type of services being installed (e.g. electrical, cold water, hot water, steam, etc.)	☐	☐	
Has consideration been given to ways of avoiding these Panel penetrations? What materials will be used to firstly cap, and then seal these penetrations?	☐	☐	
Are all electrical cables to be enclosed in conduits?	☐	☐	☐
Are metal collars being installed in penetrations for single conduits?	☐	☐	☐
Are penetrations for cable trays being capped, and are the remaining holes fire stopped?	☐	☐	☐
Are the above capping and sealing materials currently available on site? (if NO, permit should not be issued until materials are ordered and received on site)	☐	☐	
If hot flues are being installed, are they double jacketed?	☐	☐	☐
Are electrical switches, or similar items, being directly mounted on Panels?	☐	☐	
If YES, are all these switches, or similar items, at least IP54 Rated?	☐	☐	

WORK SITE MANAGEMENT	YES	NO
Has the area's supervisor and staff been advised of the work to be done?	☐	☐
Is all installed fire detection and suppression equipment functioning correctly?	☐	☐
Is an extra staff member required to perform 'Safety Watch' whilst work is performed?	☐	☐
Is a suitable portable fire extinguisher located within 5 metres of the work area?	☐	☐

POST CONSTRUCTION RECOMMENDATIONS

PROMINENTLY DISPLAY THIS ISP AND EPS-FR PANEL SAFE WORK PERMIT IN THE AREA WHERE WORK IS BEING DONE

This permit is valid from:_____ am/pm on: (DD/MM/YYYY) ☐☐ ☐☐ ☐☐☐☐

to: _____ am/pm on: (DD/MM/YYYY) ☐☐ ☐☐ ☐☐☐☐

Name of employee/contractor performing the work: _____

Person in charge of work (print name):_____

Signature:_____

Permit returned/cancelled by (print name): _____

Signature:_____

COMPLETE THIS SECTION AFTER PROPOSED WORK IS COMPLETED	YES	NO
Have all joiner strips, end, top, bottom and corner capping been replaced?	☐	☐
Have all Panel penetrations been capped and sealed?	☐	☐
Has all Panel core material been capped and sealed? (no core material exposed)	☐	☐
Has all work equipment been removed from the area?	☐	☐
Have all surplus sections of Panel been removed and disposed of?	☐	☐
Is the work area clean and tidy?	☐	☐
Have any required Hot Work Permits been signed off?	☐	☐

The worksite has been inspected by me at the expiry/cancellation of this INSULATED SANDWICH PANEL SAFE WORK PERMIT and declared safe for normal operations to resume.

Inspecting Officer (print name):_____

Signature:_____

THIS COMPLETED SAFE WORK PERMIT MUST BE KEPT ON FILE FOR FUTURE REFERENCE.

POST CONSTRUCTION RECOMMENDATIONS

3. HOT WORK PERMIT PROCEDURE

SCOPE

The establishment of a 'Hot Work' Permit System is required as a tool for controlling risks associated with hot work performed by staff or external contractors. 'Hot Work' is defined as welding, thermal or oxygen cutting or heating, or other related heat-producing or spark-producing operations, such as drilling and grinding. When these operations are conducted in areas containing flammable or combustible material, the risk of fire is significantly increased. External contractors, who are not familiar with the premises, are especially at risk of performing work which may endanger the safety of your company and its assets. Every effort should therefore be made to inform contractors and staff of the risks involved in performing 'Hot Work' on site. Permitted activities should be strictly supervised and controlled to reduce the risk of fire.

IMPLEMENTING A 'HOT WORK' PERMIT PROCEDURE:

(a) A Responsible Officer shall be appointed to be responsible for the safe execution of 'Hot Work' on site, and shall have the authority to direct staff and external contractors in the performance of the 'Hot Work'.

(b) Before a 'Hot Work' Permit is issued, the site shall be thoroughly inspected and made safe by the Responsible Officer. Alternatively, cold methods of carrying out the work shall be adopted.

(c) When the Responsible Officer is satisfied that the 'Hot Work' may safely proceed, he shall issue a 'Hot Work' Permit (example attached) which must be held for inspection, at the work site.

(d) 'Hot Work' shall only be conducted during the period stated on the Hot Work Permit.

(e) Operators conducting 'Hot Work' in hazardous locations shall not work alone, and shall be provided with assistance as considered necessary by the Responsible Officer.

(f) A suitable portable fire extinguisher shall be located not more than 5 metres from the work site whilst the 'Hot Work' is carried out.

(g) A final inspection of the site will be conducted by the Responsible Officer, after the work has been completed, to ensure that the area is safe and no smouldering materials remain. The Responsible Officer will then sign off the 'Hot Work' Permit.

(h) All completed 'Hot Work' Permit Forms will be kept on file for a minimum of two years.

Further information on 'Hot Work' Permits, 'Hot Work' in hazardous areas, and preparation for 'Hot Work' on equipment which has contained flammable or explosive substances, is contained in Australian Standard AS 1674.1—1997 'Safety in welding and allied processes'.

POST CONSTRUCTION RECOMMENDATIONS

HOT WORK PERMIT

Location (Area/Building/Floor) No: _____

What Hot Work is covered by this permit? _____

What equipment is to be used? _____

COMPLETE THIS SECTION BEFORE PROPOSED WORK IS COMPLETED	YES	NO
Have drains, pits and depressions been checked, isolated and sealed?	☐	☐
Have combustible materials been removed from the work area or made safe?	☐	☐
Have tanks, valves, vents and pipelines been blanked off or effectively isolated?	☐	☐
Is ventilation adequate?	☐	☐
Are spark/flash screens in place?	☐	☐
Have leaks from valve/pump glands, flanges etc. been controlled?	☐	☐
Have pressure relief valves been vented to safe areas?	☐	☐
Has contaminated ground been covered?	☐	☐
Has fire equipment been checked and laid out?	☐	☐
Is a fire pump or Fire Brigade on standby?	☐	☐
Is a fire watch required (30 minutes after completion of work) and organised?	☐	☐
Is wind direction satisfactory for 'Hot Work' to be done?	☐	☐
Has product movement been stopped in the 'Hot Work' area?	☐	☐
Has site of 'Hot Work' been isolated/roped off?	☐	☐
Are all wall and floor openings sealed?	☐	☐
Is 'Hot Work' equipment in good repair?	☐	☐
Are combustibles on other side of wall moved away?	☐	☐
Is construction non-combustible and without combustible coverings?	☐	☐

POST CONSTRUCTION RECOMMENDATIONS

HOT WORK PERMIT PROCEDURE FORM

This permit is valid from: _____ am/pm on: (DD/MM/YYYY) ☐☐ ☐☐ ☐☐☐☐

to: _____ am/pm on: (DD/MM/YYYY) ☐☐ ☐☐ ☐☐☐☐

Name of employee/contractor performing the work: _____

Permit received by (print name): _____

Signature: _____

Person in charge of work (print name): _____

Signature: _____

Permit returned/cancelled by (print name): _____

Signature: _____

PROMINENTLY DISPLAY THIS HOTWORK PERMIT IN THE AREA WHERE WORK IS BEING DONE.

The worksite has been inspected by me at the expiry/cancellation of this HOT WORK PERMIT and declared SAFE for normal operations to resume.

Responsible Officer (print name): _____

Signature: _____

THIS COMPLETED HOT WORK PERMIT MUST BE KEPT ON FILE FOR FUTURE REFERENCE.

ANNEX D

CERTIFICATE OF COMPLIANCE

CONTENTS

CERTIFICATE OF COMPLIANCE

1. COMMITMENT DOCUMENT

MEMBERS

Manufacturing Member Companies as well as Associate Members are committed to the IPCA 004.3:2017 Industry Code of Practice (The CODE) incorporating the Panel Certification Scheme.

This CODE provides a framework to the Australian Insulated Panel Industry with practical, industry specific guidance, which will adapt and transform ISP and EPS-FR Sandwich Panels performance, thereby addressing fire behaviour issues and fire fighter confidence in structures utilizing ISP and EPS-FR Sandwich Panel Systems products.

The CODE addresses the challenges that were identified in consultation with the Fire Brigade and stakeholders by these stated objectives;
The Members using this CODE will:

(a) Sign a statement of commitment by the CEO or equivalent, publicly demonstrating their intention to integrate the CODE into their business.
(b) Participate in the Industry promotion of this CODE within their organizations and externally.
(c) Make application for approval as Code Compliant Companies, and make relevant applications for approval of work to be undertaken, in accordance with the CODE.
(d) Participate in the ongoing reviews of the CODE's operation to bring about further advancement of the CODE.

OBJECTIVES

Compliance with this CODE will achieve high standards in manufacturing and supply of ISP and EPS-FR Panel System products, and the subsequent installation, and post construction management and maintenance of ISP and EPS-FR Panel Systems. To achieve this, the CODE will:

(a) Promote best practice in the design specification and approval for facilities utilizing ISP and EPS-FR Panel Systems to achieve a more fire stable structure that will increase fire fighter confidence;
(b) Through a Certification Scheme, establish minimum acceptable benchmarks in the manufacture and installation of ISP and EPS-FR Panel Systems;
(c) Promote strategies that mitigate the risk of fire, and clarify maintenance requirements, in buildings that utilize ISP and EPS-FR Panel Systems;
(d) Promote the environmental and sustainability credentials of Code Compliant ISP and EPS-FR Panel System Installations; and
(e) Provide a recognizable 'Code Branding Mark' that distinguishes ISP and EPS-FR Panel System Constructions that are compliant with this CODE and a member logo specifically denoting Code Compliant Member Companies and approved installations.

Name
Company Title
Organisation
Signature Date (DD/MM/YYYY)

Name
Company Title
Organisation
Signature Date (DD/MM/YYYY)

Name
Company Title
Organisation
Signature Date (DD/MM/YYYY)

Name
Company Title
Organisation
Signature Date (DD/MM/YYYY)

Name
Company Title
Organisation
Signature Date (DD/MM/YYYY)

Name
Company Title
Organisation
Signature Date (DD/MM/YYYY)

CERTIFICATE OF COMPLIANCE

2. CERTIFICATE OF COMPLIANCE — EXAMPLE FOR NCC, CLASS 7 AND CLASS 8

CERTIFIED INSTALLATION

CERTIFICATE OF COMPLIANCE

CODE OF PRACTICE

Code of Practice Project Number:	XXXX
Code Compliant Company:	XXXX
Name of Business Occupant:	XXXX
Address Compliant Building:	XXXX
	XXXX
Date Certificate Issued:	00/00/0000
Certificate of Compliance - copy no.:	1/6

Code Facilitator IPCA

Owner Occupier or Facility Representative

Certificate of Compliance Requirements

This Certificate of Compliance is issued by the Insulated Panel Council Australasia Ltd (IPCA) in granting Code of Practice Compliance to the facility noted on this document. In signing this Certificate of Compliance, the property owner/business occupant agrees to maintain the facility, including any extensions or upgrades, in such a way that meets the requirements of the Code of Practice and to grant access to an IPCA Compliance Auditor upon request. This Certificate of Compliance is not transferable and IPCA reserves the right to cancel the Certificate and remove the Certified Installation Plate if there is evidence that the building is no longer Code Compliant.

Certificate subject to further terms & conditions, see reverse.

CERTIFICATE OF COMPLIANCE

2. CERTIFICATE OF COMPLIANCE — EXAMPLE FOR NCC, OTHER CLASSES

CERTIFIED INSTALLATION

CERTIFICATE OF COMPLIANCE

CODE OF PRACTICE

Code of Practice Project Number:	XXXX
Code Compliant Company:	XXXX
Name of Business Occupant:	XXXX
Address Compliant Building:	XXXX
	XXXX
Date Certificate Issued:	00/00/0000
Certificate of Compliance - copy no.:	1/6

Code Facilitator IPCA

Owner Occupier or Facility Representative

Certificate of Compliance Requirements

This Certificate of Compliance is issued by the Insulated Panel Council Australasia Ltd (IPCA) in granting Code of Practice Compliance to the facility noted on this document. In signing this Certificate of Compliance, the property owner/business occupant agrees to maintain the facility, including any extensions or upgrades, in such a way that meets the requirements of the Code of Practice and to grant access to an IPCA Compliance Auditor upon request. This Certificate of Compliance is not transferable and IPCA reserves the right to cancel the Certificate and remove the Certified Installation Plate if there is evidence that the building is no longer Code Compliant.

Certificate subject to further terms & conditions, see reverse.

CERTIFICATE OF COMPLIANCE

2.1 CODE OF PRACTICE PROJECT NUMBER LEGEND

The three sections of the Code of Practice Project Number (e.g.: "001-A-012017") on the Certificate assist in identifying important aspects for each Code Compliant facility, being:

(i) **First Part**

Project number (e.g. "001") denotes the IPCA sequential numbering of projects.

(ii) **Second Part**

Lettering denotes:
'A' = New Facility
'B' = Extension to Existing Facility
'C' = Refurbishment/Upgrade of an Existing Facility
'SR' = Small Room other than Classes 7 and 8

(iii) **Third Part**

Numbering denotes the month and year in which a project was granted compliance (e.g. "012017" = January, 2017).

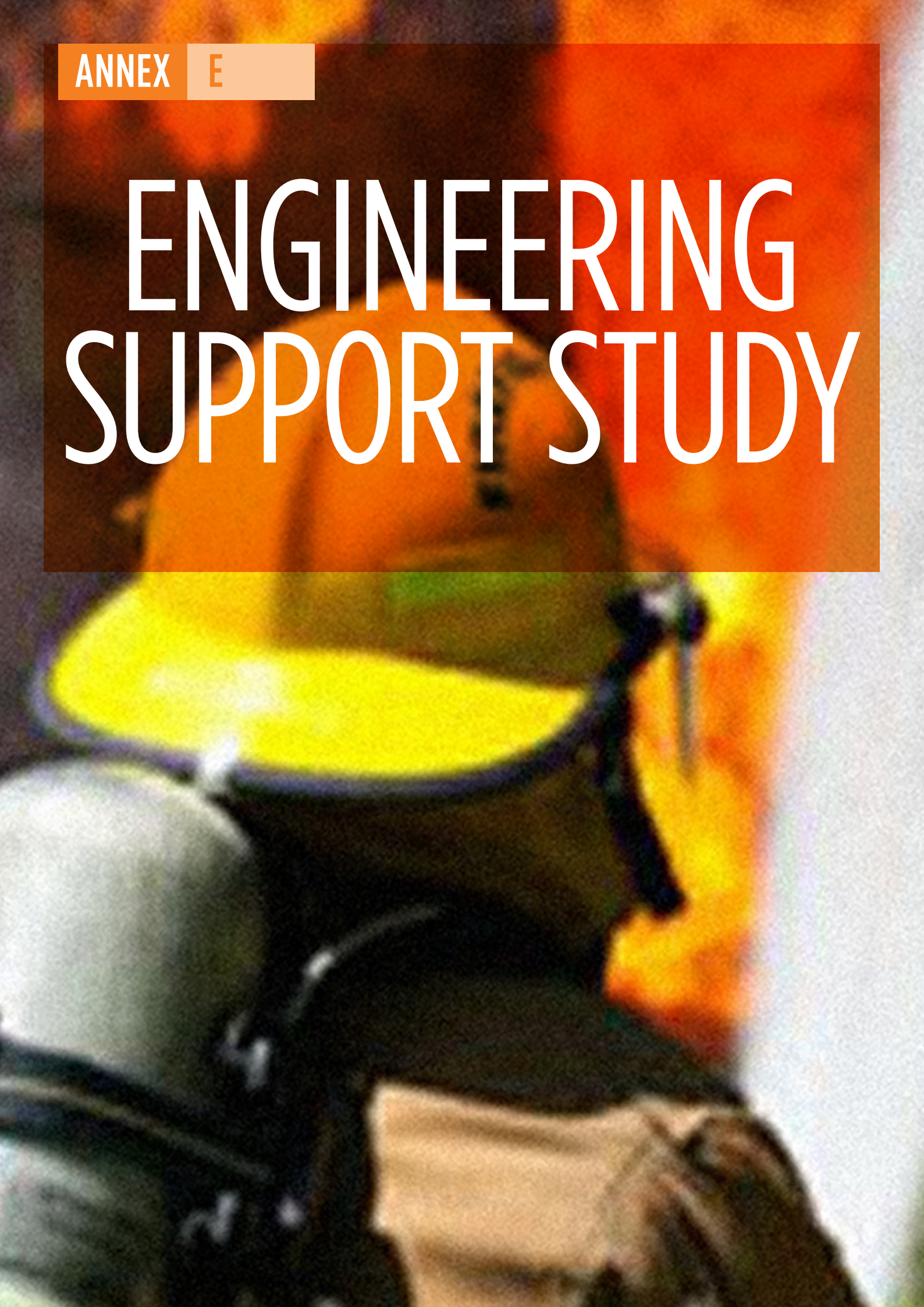
2.2 RECIPIENTS OF COPIES

The Certificate number (e.g. "Certificate No.: 1/6") represents the different recipients of a signed copy of the Certificate of Compliance (see explanation below):

(a.) IPCA Records.	Certificate No.: 1/6	To be returned by member to IPCA once signed by Owner Occupier or Facility Representative
(b.) IPCA Code Compliant Company.	Certificate No.: 2/6	Copy for Member records
(c.) Facility Owner/ Business Occupant.	Certificate No.: 3/6	Copy for Owner Occupier or Facility Representative
(d.) Fire Services.	Certificate No.: 4/6	To be delivered by member
(e.) Insurance Company.	Certificate No.: 5/6	To be supplied by owner
(f.) Designated Stakeholder.	Certificate No.: 6/6	Copy for Designer/Project Manager records, etc

ANNEX E

ENGINEERING SUPPORT STUDY



Insulated Panel Council Australasia Ltd

ENGINEERING SUPPORT STUDY

CONTENTS

ENGINEERING SUPPORT STUDY

> There are no good Panel cores nor any bad Panel cores, only badly selected cores or poorly designed Panels.
> Each application should be considered on its merit taking into account the complete design needs for the element and the characteristics of the various Panel cores.

Design, Construction, Specification and Fire Management of Insulated Envelopes for Temperature Controlled Environments, W.J. Bittles (Consultant editor), Technical Committee of IACSC (European Division), UK, 2008

1. EXECUTIVE SUMMARY

There has, for some time, been a debate in relation to the performance of Insulated Sandwich Panel in a fire. The debate has been mainly in relation to Expanded Polystyrene-Fire Retardant (EPS-FR) cored Insulated Sandwich Panel (ISP). Due to the '*marketing battle*' between manufacturers of different types of ISP cores, this matter has been given a great deal of focus.

As a consequence of this attention, the Insulated Panel Council of Australasia Ltd. (IPCA) undertook further study, testing and research work to test the validity of the traditional claim of the poor fire behaviour of EPS-FR cored ISPs.

The outcome of that work has raised many interesting findings that question the traditional view regarding poor fire behavior for all ISPs. These findings are discussed and a new question is put forward – *'Does the use of current, industry-approved EPS-FR ISP create the significant fire hazard that has been traditionally associated with this product?'*

Due to the very good thermal insulating properties and cost effectiveness of EPS-FR Panels, they are prevalent in the construction of cold stores and similar temperature controlled facilities.

An independent research project on the behaviour of EPS-FR Panels was conducted in 2003 by the Building Research Association of New Zealand (BRANZ), providing evidence which contradicts the argument that fire retardant EPS-FR Panels propagate fire and spread fire within the Panel cavity. This work is the most objective and forensic research undertaken on this subject found to date.

In a review of the case studies, many reports on Insulated Sandwich Panel fires fail to provide sufficient description of the construction details used and therefore it can be difficult to understand how representative or typical the construction was of either past practices or current day specifications and

ENGINEERING SUPPORT STUDY

assembly methods. It was also noted that many case studies were not accurate in the role that Panels played in the fires and the injuries and deaths. Some case studies cited were not even Insulated Sandwich Panel construction.

Statements about the performance of Metal Faced Insulated Panels are sometimes made by interested parties or manufacturers of particular core materials that only highlight the benefits of that aspect of their product and the disadvantages of a competing product (sometimes exaggerated) and in doing so, perpetuate selective and sometimes contradictory views of product performance in the literature. In some instances this has led to legal action by EPS companies obviously angry over some of these false claims, as has occurred in an Amsterdam court.

There is agreement that Insulated Sandwich Panel does not cause fires, are rarely the first items ignited and that a significant fire is required if the Panels are to be involved. There is also evidence from independent research organisations that the smoke from a burning EPS-FR core is no more toxic than smoke produced from burning cellulose materials.

Additional independent testing and research undertaken in the last ten years has shown that fire retardant EPS-FR ISPs is difficult to ignite, does not continue to propagate the fire when the ignition source is removed, and that the fire does not continue to burn within an ignited Panel and spread to other parts of the building.

Also recent innovations and improvements to industry practices have meant that the manufacture and installation of ISPs have improved over the years and had a significant impact upon the structural and behavioural performance of ISPs in fires. This has been enhanced by the introduction and implementation of an industry Code of Practice by IPCA.

This renewed debate has also opened up the question of the appropriateness of the testing methodologies used for compliance with building regulations regarding the use of ISPs.

This paper will also review the alternative testing methodologies in current use and those proposed. It was found that each regulatory jurisdiction '*champions*' its own testing methodology and that in Australia there does not appear to be any evidence, such as an increase in the incidence of fire or contradictory performance of tested materials in fires, to justify any change to the current testing to AS/ISO 9705.

Following concern from Fire Brigades, and after discussions with the Fire Brigades, IPCA has introduced a voluntary and industry administered Industry Code of Practice for Insulated Sandwich Panel to address the Fire Brigade concerns.

The IPCA Code of Practice, using the additional research and testing that has been undertaken, brings many improvements to the fire performance of all ISP including EPS-FR cored Insulated Sandwich Panels.

ENGINEERING SUPPORT STUDY

2. BACKGROUND

There have been '*marketing battles*' between manufacturers that have raised issues in relation to the fire performance of ISPs and in particular those with EPS-FR core. In short, the different manufacturers of the different core types have denigrated the fire performance of the alternate core types provided by competitors. All core type manufacturers have been guilty of this. Ironically, recent research of end users and approval authorities has shown that these '*marketing battles*' have been a blight on all types of Insulated Sandwich Panel, regardless of the core type. End users and approval authorities, probably tired of the claim and counter claim, no longer have the patience to review the detail and assess the contrary detail criticism, now just treat and view all Insulated Sandwich Panel as having poor fire performance.

This poor fire performance reputation has been in existence for at least 50 years. A positive aspect of these 'marketing battles' has been that past assumptions have been revisited and new work, both research and testing, has been undertaken. This has uncovered information that shows that this poor fire behavior may be exaggerated, wrongly diagnosed or not applicable to modern day fire retardant EPS and also other ISP products.

This paper examines the fire performance of Metal Faced Insulated Sandwich Panel with an Expanded Polystyrene-Fire Retardant core and identifies those factors which contribute to, or detract from, the fire performance. It also examines what construction changes or design features can be, and recently have been, included in the manufacture and use of EPS-FR Panel, to enhance its fire performance in Australia. The review included research papers, test reports, test protocols and case studies to identify the reasons contributing to past poor fire performance as well as identifying changes in construction and use that will improve its performance.

3. INSULATED SANDWICH PANELS (ISPs)

The most common cores used in Insulated Sandwich Panel construction are Expanded Polystyrene-Fire Retardant (EPS-FR), Polyurethane Foam (PUR), Polyisocyanurate Foam (PIR), Extruded Polystyrene (XPS) and Polystyrene Phenolic Hybrid Syntactic (SPS) and Mineral Wool (MRF) or Rock Fibre.

Insulated Sandwich Panel (ISP) have been used for commercial construction in Australia for the past 50 years. Insulated Sandwich Panel are made when three separate elements are *'sandwiched together'* to form one structure, see Figure 1. The combined properties of the high tensile and compressive strength of the outer steel skins and the high shear strength of the inner core lead to a building material which has a much longer spanning capacity and is lighter in weight than traditional building materials.

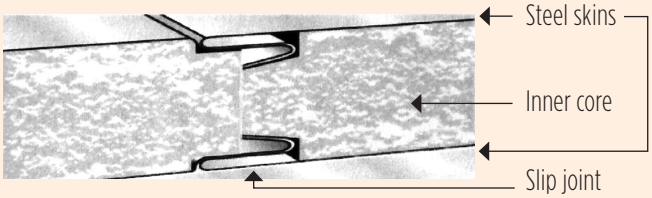


Figure 1 : Typical Insulated Sandwich Panel

EPS-FR is manufactured from styrene monomer, using a polymerisation process which produces translucent spherical beads of polystyrene, about the size of sago granules. During this process a low boiling point hydrocarbon, usually pentane gas, is added to the material to assist expansion during subsequent processing. The flame retardant predominately used for Expanded Polystyrene is hexabromocyclododecane (HBCD). HBCD is added during the polymerisation process and is retained within the polymer matrix.

4. ADVANTAGES OF USING EPS-FR ISP

- Significantly reduces the amount of energy used to keep buildings within a comfortable temperature range;
- Uses minimal adhesives and sealants, reducing potential volatile organic compounds;
- Light weight, low maintenance, recyclable and reusable;
- Uses the non ozone depleting insulants;
- Steel skins can be made with between 10%–30% recycled material;
- Reduces landfill over standard framed construction methods;
- Provides continuous insulation that reduces or eliminates thermal bridging;
- Provides a consistent level of insulation that is impervious to compression, water vapour, vermin and rot;
- Reduces air-leakage/infiltration rates; and
- Significantly shortens construction time.

The traditional criticism of EPS-FR Panel has been the historical behavior in fires. The most common criticisms of EPS-FR Panel in fire relate to the delaminating of the outer skins exposing the core, the structural stability of the Panel to stay in place and not collapse and the fire spreading within the Panel cavity.

One of the matters that did become evident with the review was that improvements and enhancements made to EPS-FR Panel over the years have not been communicated effectively to the relevant markets, approval authorities and industry. Improvements such as fire retardant EPS-FR, replacement of nylon fixings with steel fixings, steel used in lieu of aluminium etc. There have been numerous changes to EPS-FR Panel over the years to the point that the Panel, connections and fixing systems now used, do not reflect the Panel, connections and fixing systems that are cited in many of the fire case studies.

ENGINEERING SUPPORT STUDY

5. LITERATURE REVIEW

A disappointing finding of the literature review was that there was very little independent and objective research on the matter. Most of the information available is serving a marketing agenda and this has led to the propagation of inaccurate material often cited as fact. It was very difficult to find any publicly available material that gives a detailed objective analysis of the matter other than those cited below in latest research. The material is often incomplete, contradictory, based upon observation and not analysis. This was very much evident in the review of the fire case studies and their use.

This misinformation on the fire performance of EPS-FR Panel has even led to court action. In Amsterdam in 2011 a manufacturer of a Rock Fibre Panel was convicted of misleading and unacceptable comparative advertising. The lawsuit was filed by the Association of Stybenex EPS manufacturers. Stybenex took this legal action because the Rock Fibre Panel manufacturer claimed in its brochures, press releases and on its website, held that the use of Rock Wool insulation leads to a higher level of fire safety than if synthetic insulation (including EPS-FR) is used. The court directed the manufacturer to correct the information in the brochure and also to publish a rectification in magazines and on their website.[61]

The review of the literature showed that, as with nearly all materials when involved in a fire, and in that context, the cores made from EPS-FR, PIR and PUR are all combustible.[23,26,27] Mineral Wool systems with combustible adhesives used to adhere the metal facings to the core are therefore combustible to some extent (but produce small amounts of energy in fire) as is Rock Fibre, constituted with organic binders.[23,26,27] However, the performance of the Panel systems in fire and the extent to which the core contributes to fire spread, intensity and development, depends not only on the combustibility of the core but also on the behaviour of the Panel system as a whole and the degree and length of time for which the core is protected from the fire.[23, 28, 33, 58]

It is agreed that EPS-FR Panels do not start fires and they are rarely the item first ignited.[23,28] There is also agreement that the initiating fire needs to be sufficiently large before the Insulated Sandwich Panels have any impact upon the fire.[21,23,28]

Does the EPS-FR in an Insulated Sandwich Panel core significantly increase the fire size and burning rate, or is the amount of molten EPS-FR insignificant in comparison to the fire load and the size of the initiating fire? What needs to be considered, as it is agreed that it takes a significantly sized fire to involve the ISP, is whether there is already a large fire occurring that has its own impetus. A simple comparison of the fire load provided by the building contents to that of the core in the Insulated Sandwich Panel would show if the ISP is significantly adding to an to an already potentially significant contents fire.

Since EPS-FR will shrink and melt at fire temperatures causing Panels to lose strength and stability, it is considered to be at a disadvantage compared to materials that form a solid char. There have been many improvements to the fixings and support of ISPs in recent years to prevent early collapse of the EPS-FR Panel in a fire. This structural issue is also true for other Insulated Sandwich Panel types (not only those with EPS-FR core) since once the adhesive bond between the metal facing and the core material fails, the rigidity and strength of the Panel is lost.

Also, as EPS-FR will shrink and melt at fire temperatures, this is seen as a weakness of the EPS-FR cored ISPs, when in fact, it could be seen as strength in relation to fires. This aspect was recognized as far back as 1984 and could also explain the reason why, in the ISO 9705 room corridor test, PIR ISPs do not perform as well as EPS-FR ISPs — i.e. PIR ISPs flashover at an earlier time (although the time differences are not profound). The following is an extract from work undertaken at the National Research Council of Canada in the early 1980s[58]:

> *Influence on Growth of Fire*
>
> *Adding insulation to the walls and ceiling of a room may increase the rate at which a fire will grow. The insulation will retain heat from the fire in the room in the same way as heat from heating systems is conserved. This accumulation of heat may result in the flashover stage being reached much earlier than in a room with less insulation.*
>
> *Once a material, such as the lining in a room, is ignited, the temperature of the surface of the material will largely determine the speed of flame propagation. An increase in the rate at which surface temperature rises will result in more rapid flame propagation and production of flammable gases. For example, foam plastics in a fire will attain a surface temperature of 200°C in a few seconds whereas wood, under the same circumstances, requires 10 minutes to reach that temperature. The very rapid surface temperature rise of foam plastics is probably why some of them propagate flames so quickly — particularly thermosetting foam plastics. **Thermoplastic foam may melt before its temperature reaches a critical value. If that occurs, extremely fast propagation of fire is unlikely.***

As PUR and PIR do not shrink away from the flames, and stay in place when involved in fire, and assist with the structural stability of Panels, this may also, according to the above research, be responsible for a compartment fire reaching flashover faster. The above research also points out that thermoplastic foam (EPS-FR) may melt before a fire reaches it and will not be in place when the fire reaches that area and therefore its contribution to fuelling the fire would not be as significant.

ENGINEERING SUPPORT STUDY

6. FIRE RETARDANT EXPANDED POLYSTYRENE

Polystyrene is a thermoplastic manufactured from the polymerization of styrene in combination with a pentane blowing agent. The expanded product contains about 98% air. Polystyrene Foams soften and shrink at temperatures above 100°C, and melt when heated further.[29]

Fire retardant grades of EPS-FR are required to be used in the construction industry including EPS-FR core in Metal Faced Insulated Sandwich Panel. Flame retardancy is imparted by adding halogenated compounds (e.g. bromide agents) to the formulation. EPS-SE grade contains a small quantity of the fire retardant hexabromocyclododecane (HBCD). HBCD is highly efficient in this application so that very low levels are required to reach the desired flame retardancy. Typical HBCD levels in EPS are 0.7%. Babrauskas[53] reports the piloted ignition temperature of polystyrene without halogenated fire retardants as 360°C–370°C and with halogenated fire retardants as 430°C–445°C.

7. TOXICITY

The toxicity of Insulated Sandwich Panel is often poorly understood. Critics point to the thick black smoke from polystyrene that '*must be toxic*' while other reports state that smoke from EPS-FR is no more harmful than smoke from timber.[29,30,59] The large amount of particulate material produced when polystyrene pyrolyses is due to the aromatic styrene molecule in the polymer backbone providing a mechanism for particle formation.[30]

The smoke toxicity from burning polystyrene (alone) is mainly due to the CO produced with toxicity being comparable to that of polyurethane based on LC50 data for rats.[51] Combustion products from composite Metal Faced Insulated Sandwich Panel with EPS-FR core are similar to other organic materials i.e. generating CO, H_2O, C (soot), and CO_2 as well as traces of HBr (from the bromide fire retardant) and HCN (principally from the polyurethane-based adhesive used to adhere the metal skin to the polystyrene core).

The National Academy of Sciences in the USA studied potential health risks of flame retardants[54] and concluded that eight flame retardants (including HBCD) posed little or no health risk. However, more recently its persistence in the environment has been raised as a potential issue.[55] A main focus of the ISP industry at the moment is to find the replacement for HBCD as a fire retardant. There are many research development projects currently underway, including work by IPCA, and all signs are positive for a result in the near future.

It is undesirable for people to be exposed to any combustion products, and it is well known that carbon monoxide is a colourless, odourless and potentially lethal product of incomplete combustion.

The black colour of the smoke from burning polystyrene is indicative of the amount of unburned particulate material in the incomplete products of combustion. Similarly, the building contents contribute to the smoke produced as well. Fires in buildings with few external openings will not burn efficiently and will therefore produce more soot and particulate matter if there is insufficient air available to ensure complete combustion of the fuel. Cool stores by their very nature have few external openings and therefore fully developed fires in those buildings are likely to be strongly ventilation controlled and exhibit incomplete combustion.

Due to the chemistry of polystyrene, for a given mass of fuel, more than 10 times the amount of soot is produced compared to cellulosic/wood fuels under well-ventilated flaming conditions (as measured in laboratory tests). However, due to the low density of EPS-FR (the expanded product contains about 98% air) compared to cellulosic fuels, the total amount of soot produced for a given volume of fuel is similar, but is released over a shorter time period, therefore producing denser and darker smoke.

Therefore the main toxic hazards to occupants or fire fighters from combustion of EPS-FR Panel, as for other burning organic materials, is the asphyxiant effects of CO and oxygen depletion, as well as the irritant effects of exposure to smoke and the poor visibility through sooty smoke. All these effects are enhanced where fires are poorly ventilated as is often the case for cool store or any other similar buildings where there is poor ventilation causing incomplete combustion, **regardless of the material used for their construction.**

8. FIRE SPREAD WITHIN PANEL CAVITY

Of all of the issues in relation to the fire performance of EPS-FR ISPs, the subject of fire spreading within Panel with an EPS-FR Panel core is often raised as the major and most common concern. Research studies undertaken[6,21,33,60] based upon room fire tests have not observed this type of behaviour in the case of fire sources (i.e. gas burners up to 300 kW) that were used representing growing preflashover fires. These experiments show that the EPS-FR core material did not propagate the fire spread by self-sustaining combustion through the core void. The EPS-FR core of the Insulated Sandwich Panel melted and burned where the fire impinged on the Panel and stopped burning once the flame/heat source was removed. At a sufficient distance from the fire source, unaffected EPS-FR core remained (see figures 3 and 4).

The research project[33] undertaken by the Building Research Association of New Zealand (BRANZ) in 2003 specifically looked at the issue of the behavior of fire retardant EPS-FR Panel in fires. This research was an independent research project and was funded by the New Zealand Fire Service. One of the major findings was:

> *6.1.2 Cavity fire spread — The trials to investigate the phenomena of cavity spread between the metal skins of the*

ENGINEERING SUPPORT STUDY

PIP failed to produce any significant burning beyond the zone that was externally preheated by the flame from the burner. The experimental findings suggested little to be gained by incorporating non-combustible barriers within the core of the PIP. As a result, there are no recommendations to improve the fire performance of PIP in relation to the issue of cavity fire spread.

In 2010 the Insulated Panel Council of Australasia Ltd. (IPCA) commissioned BRANZ to repeat the tests to test the repeatability of the testing and the results and to verify that the results are consistent. That report[60] concluded:

The photographic evidence from the three replicate trials when directly compared to those from the original experimental trials, demonstrates comparable consistency in the amounts of EPS-FR that remained within the Panels after each test. The conclusions and recommendations from the original report (NSFSC 2004) are therefore considered to apply equally here and relevant sections from those conclusions and recommendations are copied below.

Figure 2: The experimental program was based on confirming work carried out by BRANZ in 2003 focussed on reviewing how to improve the performance of EPS-FR cored Panel in fire situations and firstly looked to review what actually happens when the EPS-FR core is directly exposed to flames, so a hole was cut in Panel, then a gas burner was placed up against the Panel.

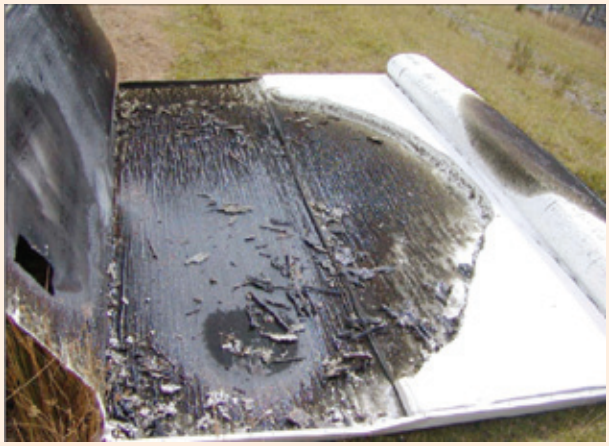


Figure 3: Result of 2003 tests at BRANZ – Note that there is no flame spread beyond where the flame has impinged.

Figure 4: This is the Panel after exposure to the fire flame. The Panel core EPS-FR melts and runs away but does not continue to burn once the source of the fire is taken away. This testing has been repeated at BRANZ 2010 and at the NSW Fire Bridage 2011 with similar outcomes.

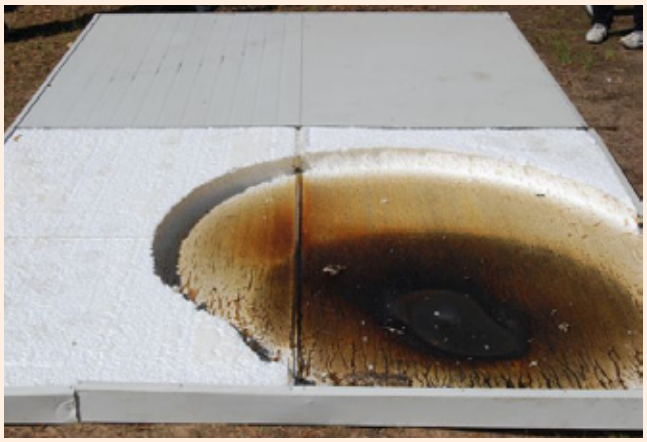


Figure 5: A demonstration burn at the NSW Fire Brigade facilities at Londonderry in 2011 replicating the BRANZ test results.

In the case where the building contents are progressively involved increasing the size and severity of the fire beyond that which applied in the experiments, it would be expected that more and more of

ENGINEERING SUPPORT STUDY

the Panel will also become affected as the fire spreads, with the core melting and pyrolysing in the affected regions impacted by the spreading fire. There has been no evidence in the independent tests[33,60] that the fire spreads within the core cavity, causing unseen fire spread to other parts of the building. It was noticed during the review of the available case studies that the phenomenon of the fire spread within the Panel was referred to, but there was no instance reported, for example, where incisions were made to Panel away from the fire where it was seen that the core cavity inside was burning.

So what is causing this apparent fire spread? The literature review of the case studies reveals that it is always assumed that the ISPs are the cause, and therefore no other work, research or reviews appears to be undertaken to consider any alternative reason for the fire spread. A reasonable alternative could be the fire load within the building resulting in the common method of fire spread caused by the release of the combustible gases from the building contents preheated by the radiant heat of the advancing fire and thus causing fire spread as it ignites. This is common in all interior fires of how the fire spreads regardless of the wall material.

If, as shown by the literature review and the results of independant testing, ISPs containing fire retardant EPS-FR core on their own do not start fires, also that it takes a significant fire to involve the Panel, then a reasonable assumption could be that the fire is already of a large size and will have its own momentum, regardless of the wall or ceiling lining.

One research point which needs to be explored is this: if the ISP metal wall linings for Panel that are ahead of the fire stay in place and therefore are not exposing the Panel core to the radiant heat from the advancing fire, what opportunity would there be for significant combustible gases to be produced from these remote Panels?

Another alternative for the fire spread sometimes put forward is this: if the integrity of the Panel connections and seams, and the bond between metal facings and the core are compromised in a fire, it is possible that any Panel core void could act as a conduit or flue for the combustion products to be transported to other parts of the building. This could potentially occur for all types of Insulated Sandwich Panel or any form of construction that has voids, such as stud walls etc. Also there is the theory that with the core melted the Panel has stored combustible gases that will feed the fire. From a review of the test reports and case studies there is no evidence that the Panel forms an airtight '*container*' to permit the '*storage*' of the combustible gases. One would assume the gases would dissipate through the Panel gaps as soon as they form. The behaviour of the Panel voids acting as conduits and flues has not been observed or documented in the literature, based on controlled experiments.

9. FIRE EXPERIENCE AND INCIDENTS

In Australia, and internationally, historically the majority of cool stores and food processing plants have used EPS-FR Insulated Sandwich Panel[23,31] due to desirable attributes such as good thermal properties, light weight, ease of construction and low cost.[26,34] It is therefore expected that most fires in cool stores and food processing plants would involve EPS-FR Insulated Sandwich Panel.[23,32] With a general growth in population, it is reasonable to expect there to be an increase in the number of these types of facilities.

It is also pointed out in the case studies that the common factor amongst these types of fires in cool stores and food processing plants is that all of the fires involved Insulated Sandwich Panel. Further to this observation, the case studies claim is that the Panel core is always a contributing factor to the fire. But another logical view could be that Panel is a common factor in these fires because the use of Insulated Sandwich Panel (particularly EPS-FR Panel) is the most common building material used in the construction of these premises, so would therefore feature in many of the fires.[27]

Whilst traditional non fire retardant EPS Panel that has been allowed to distort and collapse may contribute to a fire, in many cases, the contribution of the building contents to the fire is more important. This is demonstrated in fires such as that in Tamihere, New Zealand where large quantities of cheese fuelled a fire that followed an explosion killing a fire fighter. The facility was using a commercially available refrigerant, known as Hychill 50, which consists principally of propane. Although the building construction used EPS Panel, it was not implicated in contributing to the fatality by the investigations that followed.[42]

The Atherstone on Stour, UK fire, in which four fire fighters tragically died, was in a vegetable packing plant that reportedly also contained a PIR roof[56] and contained a high and substantial fire load. Although, by some reports, the deaths of the fire fighters have been attributed to the presence of EPS Panel, the review of the fire shows that the tragic deaths of the fire fighters was actually attributed to a flaw in the Fire Brigade operational procedures. Subsequent concerns were raised over possible breaches of health and safety laws by Senior Fire Officers while directing the firefighting operations[37,38,39,40,43] which sadly resulted in actions against the Senior Officers. Therefore, regardless of the type of construction or construction material, the tragic deaths would have occurred anyway.

It is important to note that these are primarily process facility fires that eventually involve the building construction. The fires would have occurred and spread regardless of the construction type.

A large fire at a meat processing facility in Greenacre, NSW, Australia in 2007[44,45] highlighted a number of issues concerning poor structural performance of EPS Panel (i.e. collapsing) as well as numerous other fire safety matters. A subsequent report recommended the need for

ENGINEERING SUPPORT STUDY

changes to the way EPS Panel was used and installed.

Although the building at Greenacre was largely of traditional construction (e.g. steel portal frame, brick walls, iron roof) there was extensive use of EPS Panel within the building envelope to subdivide the areas into processing, packaging and storage rooms. There were no vents or skylights in the roof. The internal ceiling Panels were suspended from the roof with metal cables, but nylon/plastic fastenings that connected the ceilings to the cables failed in the fire and allowed large sections of ceiling to collapse. Some of the Panels used aluminum facings that melted in the fire. Delamination of the metal facings occurred in some areas exposing the core material. (Delamination happens at 150°C–200°C when the adhesive fails and is independent of the core material.[33])

The building was also reportedly a labyrinth of interconnecting processing rooms, cold stores, passageways, hall ways, doors and corridors, built via a series of 'add-ons' over 36 years. Fire fighting access was severely obstructed due to the presence of numerous processing equipment, machines, work benches, trolleys, suspended ceiling racking, conveyor belts, stock and storage racking. A number of the characteristics of this building contributed to the poor fire performance of the Panel, and would not be present in new construction if currently recommended construction practices are followed. This report also highlighted the high fire load that was within the Greenacre building.

Regarding the Tip Top Bakery in NSW in Fairfield, NSW, Australia, the fire report starts by stressing the combustibility of the dough, flour and oil, and how this was the cause of the spread of the fire, yet the recommendations focus blame on the EPS cored Panels.[62]

Other more significant issues in this fire included:
1. Late call to Fire Services and their delayed arrival;
2. Failure of water supply; and
3. Human error.

The Sun Valley fire in a processing facility in Hereford, UK was an example where Insulated Sandwich Panel (including EPS, Mineral Wool and PUR) were supported on a metal grid suspended from the roof and held in place with polypropylene fixing pins that subsequently failed in the fire.[27] It is also an example of a practice that is no longer undertaken with new installations.

In reviewing case studies, the most common criticisms of Insulated Sandwich Panel performance have been failure of the Panel systems to stay in place and therefore falling on fire fighters and allowing fire spread within the building, fire spread within the Panel, the combustibility of the EPS core, poor ventilation of the smoke, poor way finding, and difficulties in Panel identification. These are addressed by the new Australian Code of Practice developed by the Insulated Panel Council of Australasia Ltd,[22] with the exception of way finding and smoke ventilation which are dependent on the overall building design rather than attributes of the Insulated Sandwich Panel.

Another significant issue highlighted by the review of the case studies is that care is required when interpreting past fire incidents where the construction did not remotely reflect current construction methods of Insulated Sandwich Panel. A case in point is the Worcester (MA) warehouse fire in which six fire fighters died.[41] This warehouse was not Building Code Compliant, had numerous deficiencies, had been derelict for many years and Insulated Sandwich Panel was not a part of any of the structure, that is, it was not Insulated Sandwich Panel construction in any shape or form.

However, case studies and past fire incidents similar to these, serve to remind that there may be a significant number of existing buildings incorporating EPS Panel construction methods that are no longer recommended.

Many of the case studies tend to involve food processing facilities where there are many potential ignition sources in the food processing areas. This should be regarded as a higher risk application.[23, 27, 28] The presence of EPS Panel alone is not the determining factor in that stand alone cool stores are also considered low risk. Hence risk management is considered important — selecting a suitable type of Insulated Sandwich Panel for the application/risk is more appropriate than banning products outright when they have many practical advantages for different applications.

Cool stores and cold stores by nature need to be air tight with minimal and specific ventilation requirements. While providing better ventilation will assist in way finding and dissipate smoke the thermal integrity of the enclosure needs to be maintained. The recent push towards better performing thermal requirements (such as the additional 6 star requirements in the Building Code of Australia) could lead to greater need and use of EPS Panel.

10. INSURANCE INTERESTS

Views and approaches between different insurance companies with respect to the use of Metal Faced Insulated Sandwich Panel construction also vary. Some focus upon fire safety management practices and do not significantly differentiate between the type of Panels and core material (EPS-FR, PUR or PIR) when determining premiums.[49] Others refuse to insure a building that has EPS Panel in its construction but do accept other types of Panel. Yet strangely there have been cited examples where the insurance company is happy with a significant amount of EPS material *'stored'* in the building, but refused to insure the premises due to EPS in the Insulated Sandwich Panel! From an insurance perspective it has been suggested that for typical uses of large insulated Panel buildings the value of the contents is often many times more than the value of the building[34] as was the case for a fire in a cold storage warehouse complex storing butter and cheese in Wisconsin, USA in 1991 where the losses exceeded US $100 million.

Insurers usually have different interests that include minimising the

ENGINEERING SUPPORT STUDY

potential financial losses in a fire, compared to the objectives of a building code. The National Construction Code is primarily concerned with life safety and neighbouring property protection, whilst Insurance Codes are concerned with owner property protection. EPS Panel may not be favoured from an insurance property protection aspect, but as a life safety issue it is not regarded as a significant concern for building occupants.[28] In many cases, given a sizable fire within the building, the damage done to the Metal Faced Insulated Sandwich Panel could be considerable. Regardless of the core material used (and whether or not it actually burns), once the metal facings start to delaminate when the adhesives fail (at 150°C–200°C), the loss of composite action between metal and core and overall Panel strength will dictate the need for the Panel to be replaced.

A review on the literature in relation to insurance issues produces many contradictory messages. Probably the most definitive insurance research undertaken was the report by BRE (Building Research Establishment Limited) for the ABI (Association of British Insurers).[23] Whilst the matter of the combustibility of ISPs is contentious in light of independent work refuting the fire spread capability of ISPs,[33] the ABI report does highlight many matters which find that in some circumstances using EPS ISPs, the risk is low, such as for standalone cool stores. The report also makes it clear that it requires a significant fire before the Panel is even involved. There is also a great emphasis on management procedures being the most important aspect of the fire safety and impacting on the risk.

Other material from insurance companies appears to be a regurgitation of assumptions on the behavior of ISPs in fires and there has been no apparent independent review of those assumptions, nor any evidence that these assumptions are based upon science or research.

The only insurance organization that has undertaken research and testing work in this area, FM Global, will approve and certify the use of IPSs, including EPS-FR cored Panel, if they meet a criteria and pass the required fire testing.

11. FIRE BRIGADE

Fire fighter safety is an important consideration. Most Fire Brigade operating procedures require site inspections and an onsite operational risk assessment of any fire. Fire Brigades in the UK have even been prosecuted under health and safety legislation for not providing enough information or appropriate training in the wake of some fires.[37,38,39,40]

It would be accurate to say that the Fire Brigade has concerns over many fire fighting risks and usually have operational procedures in place to minimize or mitigate the risk, such as for tilt up Panel, dangerous goods, electrical substations etc. It is a common policy of not entering a building to combat a fire if it is deemed unsafe to do so for many different reasons.

That is why, both in Australia and Europe, Insulated Sandwich Panel identification schemes have been put in place to enable fire fighters to possess the information so as to enable them to prepare suitable fire fighting operations.

12. FIRE TEST METHODS

12.1 INTRODUCTION

It is agreed by testing experts that it is more important that a test methodology be consistent and repeatable for all the products so that comparisons can be made between products and materials. It is the only practical way of benchmarking fire behaviour of materials and products. It is also generally agreed that the larger the scale of the test, the more realistic the results. But large scale makes testing too expensive and not viable in the market place. All accept that whilst real fire testing would be ideal, it is (a) too expensive and (b) impossible to provide consistent and accurate repeatability. There are just too many variables in real fires to enable accurate reproduction of fire behaviour.

There can be many reasons for changing a test methodology, such as new data required in relation to performance of a product or material, research develops a more cost effective test, regulation requiring a new test, to name a few. Fundamentally the first and most important question is this: is there evidence that the existing testing requirements are not meeting the objective of reducing and mitigating the impact and incidence of fire? In effect, has there been an increase in the number of fires that can be accurately attributed to existing testing provisions, as opposed to increased use of the material or product, change in fire load, change in makeup of material or use?

The cost to an industry due to any change of the testing methodology or requirements can be extremely expensive; the need for retooling, reengineering of process and assemblies, marketing material, specifications and the cost of retesting to the new methodology are examples. Often '*sunset clauses*' are used to negate the need to retest existing tested products. The problem with '*sunset clauses*' is that the market and approval authorities inevitably expect to see evidence of the new test being used. This often means that companies take the decision that it is simpler to retest everything again, rather than explain and debate the validity of a superseded (although compliant) test report.

So, as stated previously, to make the decision to change a testing methodology can cause serious economic hardship and before any decision is made, there should be evidence that there is a verifiable need. For example, with the National Construction Code which is a life safety code, the questions to ask are these: is there evidence that the risk to the occupants of the building has increased or the number of deaths or injuries have increased? What impact to the safety of building occupants, including fire fighters, would any change of the testing methodology have, however marginal?

In the area of testing for Insulated Sandwich Panel, there is a lot of discussion and disagreement over what is the most suitable testing

ENGINEERING SUPPORT STUDY

methodology for testing. The arena has quite a few stakeholders that have conflicting agendas, for example product manufacturers who do not want to undertake retesting, researchers who have developed *'better'* testing methodologies, testing laboratories that want to develop new markets, testing laboratories that cannot afford the capital for new apparatuses etc.

There are numerous testing methodologies in use at the moment in different parts of the world. Each testing methodology has its own *'champions'* that strongly defend its effectiveness and need not to be replaced. As there appears to be no significant differences in the fire incidents and performance of Insulated Sandwich Panel across the world, one could claim they are all correct!

What follows is a discussion of the various testing methodologies currently used for Insulated Sandwich Panel that are required by different jurisdictions.

12.2 AS 3837 / ISO 5660

It is well acknowledged in the literature that the cone calorimeter (AS 3837[20] or ISO 5660[19]) or other small-scale fire tests are not appropriate for characterising the hazard associated with Metal Faced Insulated Sandwich Panel.[12,13] This is because the fire performance of these Panels is dominated by the behaviour of the joints and connections and their effectiveness when exposed to fire. The Panel joints keep the metal skins in place to perform as a separating barrier preventing flame (and oxygen) from reaching the core. Therefore it is important that the '*system*' be tested along with the core material. This cannot be done in a cone calorimeter.

There is an overall principle with the cone calorimeter in that it was only developed and recommended for use for homogenous materials and not systems. The original intention was for it to be used for research purpose in determining heat release rates for different (homogenous) materials, and not for commercial or regulatory testing. It would not be considered suitable for any product that is an assembly or system to be tested with the cone calorimeter. This is relevant for different types of Insulated Sandwich Panel cores as well as any assembly — regardless of the material — in which the performance of fixings etc. relate to its performance in a fire.

The only circumstance where it may be possible to use the AS/NZS 3837 test to aid in classification of the life safety hazards of Insulated Sandwich Panel would be where the core material alone is tested without the metal facings, representing a worst case scenario. This may be acceptable in cases where the core materials have very limited combustibility, but for cores using a variety of foamed plastics (including EPS-FR) this approach would be too restrictive and overly conservative. It is therefore necessary to consider larger-scale fire tests for Metal Faced Insulated Sandwich Panel.

12.3 ISO 9705

ISO 9705[1] is a room fire test designed to evaluate the contribution to fire growth provided by a surface product using a specified ignition source. It comprises a test enclosure measuring 2.4m wide x 3.6m long x 2.4m high with an opening 2.0m high x 0.8m wide in one of the short walls. It is intended for lining materials to be fixed to a solid substrate provided by the walls and ceiling of the test facility in a representative manner to that used in the intended actual end-use. Lining materials are then exposed to a propane gas burner positioned on the floor in the corner of the room opposite to the opening. The gas burner is run at 100 kW for 10 minutes and the heat release rate from the burner and room linings is measured using the oxygen calorimetry method based on analysis of the combustion products leaving the enclosure. The size of the burner flame is representative of the peak burning rate of a fire in a large waste paper basket. If flashover (corresponding to HRR-1 MW) does not occur within 10 minutes then the burner output is increased to 300 kW for a further 10 minutes and the test continued.

Room lining materials are classified based on the time it takes for flashover to occur in the room fire test. Clearly the shorter the time to flashover the greater is the hazard associated with the lining. It should be noted however that the classification system is not part of the test standard but is separately specified by the authority having jurisdiction. In Australia, performance criteria for surface lining materials are given in Specification C1.10 of the National Construction Code.[2]

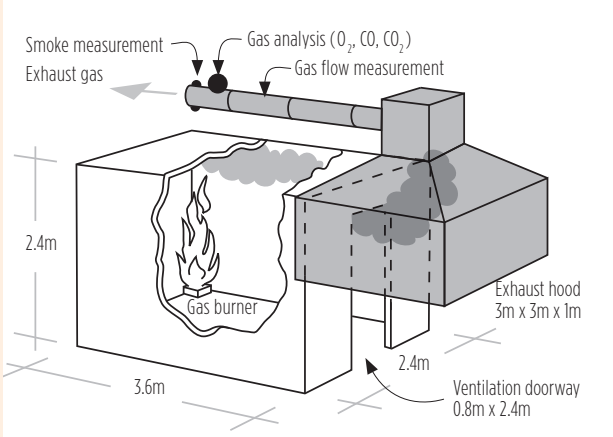


Figure 5: ISO 9705 Room Test (source[10])

ISO 9705 is considered to be a reference scenario for the purposes of the National Construction Code and also within the European system,[3,4] however within both jurisdictions room lining materials may also be classified on the basis of smaller scale test results e.g. cone calorimeter test[5] for Australia, and the Single Burning Item[4] (and other tests) in the case of Europe. These tests are of small or intermediate scale and therefore more convenient and less expensive to undertake compared to full-scale room testing. Correlations have been developed between the small-scale tests and the reference scenario. However, these smaller scale tests are not suitable for Metal Faced Insulated Sandwich Panel

ENGINEERING SUPPORT STUDY

specimens since they are unable to adequately evaluate the performance of fixings and joints. Van Hees and Johansson[10] and Axelsson and Van Hees[11] have found a very weak correlation between the Single Burning Item test and the ISO 9705 test for combustible cored Insulated Sandwich Panel. In Europe, including the United Kingdom, the reaction to fire classification of Metal Faced Insulated Sandwich Panel is based primarily on the intermediate scale Single Burning Item test even though it is unlikely to reflect the true hazard of the product.[9,13] The full scale testing of Insulated Sandwich Panel construction is currently driven by insurance companies and not by national building regulations.

The main reason for requiring combustible surface linings to demonstrate acceptable performance in these types of tests is to ensure that occupants have sufficient time to make a safe escape from the building. Fire fighters would also benefit indirectly if fewer fires led to flashover, or if fires developed at a slower rate, allowing them a higher likelihood of controlling the fire at an earlier stage.

With respect to the fire performance of Metal Faced Insulated Sandwich Panel, ISO 9705 is clearly relevant if the product is used as a surface lining material where the Panels are mechanically fixed to a solid wall and ceiling structure, however this is rarely the case. Rather Metal Faced Insulated Sandwich Panel structures will either normally be free-standing and self-supporting (often constructed within a larger weather-tight structure) or they are fixed to a separate supporting structure to enclose an external wall or ceiling. Ceiling Panels may be externally supported using suspension rods or cables and with bolted connections through the Panel.

While the ISO 9705 protocol is still relevant to Metal Faced Insulated Sandwich Panel there are minor practical difficulties in achieving a representative installation due to the physical confinement of the test enclosure preventing access to the rear of the Panel for construction purposes. While it is possible to construct a freestanding Metal Faced Insulated Sandwich Panel structure within the test room in a partially-representative fashion as demonstrated by Griffen et al,[6] compromises will generally be made resulting in some fixings being omitted from the rear face etc. The omission of some of these external fixings or flashings is likely to be detrimental rather than advantageous toward to the performance of the Panel in the test. There is also the potential for the substrate walls of the test enclosure to restrict access of air/oxygen to the rear face of the Panels. However the magnitude of these effects and their impact on the test result has not been well characterised and described in the published literature.

Another disadvantage of the ISO 9705 test is that the internal dimensions of the room will vary depending on the thickness of the Panel used. Since Insulated Sandwich Panel can be 250mm thick or more, this significantly reduces the room volume and changes (increases) the severity of the thermal exposure in the room — an undesirable trait when trying to compare the performance of different types and thickness of Panel. Although the advantage would be a more conservative outcome.

12.4 ISO 13784 PART 1

Further work has been undertaken to provide a testing methodology specifically for Metal Faced Insulated Sandwich Panel resulting in an alternative test method (and somewhat more complex and therefore expensive method) than ISO 9705, were developed and published as ISO 13784 Part 1[7] and Part 2.[8] These methods allow for the test room to be constructed from the Insulated Sandwich Panel, instead of being constructed inside a permanent test room enclosure and are applicable to both self-supporting and frame-supported Insulated Sandwich Panel systems.

It was also noted that there is very little published data for the performance of Insulated Sandwich Panel using the ISO 13784 Part 1 method in the literature and further work would need to be done to enable the performance to be verified before adoption as a regulatory testing methodology. The method has not been adopted by other countries for regulatory use, implying that the need is not there or the current testing methodology is considered suitable, although this may change with time, as more experience with the test method is gained.

ISO 13784 Part 1 (test method for small rooms) requires the test assembly to be same size as the ISO 9705 enclosure with combustion gases discharging directly from the opening into an exhaust hood as in the ISO 9705 test. Observations are made of any flaming from the external side of the room assembly. Alternatively, the test assembly can be constructed within a larger ventilated room, with all the combustion products collected and discharged into the exhaust hood for further analysis. In both cases, thermocouples are positioned on the external surface of each of the Panels and within their core, installed from the rear of the Panel in such a way that flame spread (if any) within the core can be monitored. The burner is placed on the floor in a corner opposite the wall with the doorway, or if there is a structural framework member such as a column directly in the corner, the burner is placed at the joint nearest the corner on the back wall.

The scope of ISO 13784 is more extensive than ISO 9705 with the reaction to fire performance of a Insulated Sandwich Panel assembly extended to also evaluate the potential for different kinds of flame spread. For example within the internal core, on the surface or through joints, through ignited combustible gases and falling debris or melting droplets. The following possible fire hazards can be assessed:

(a) The contribution of the system to fire development up to flashover;
(b) The development of smoke and fire gases inside the test room;
(c) The potential of an interior fire spreading to outside spaces or other compartments or adjacent buildings; and
(d) The possibility of collapse of the structure.

The first two hazards above are certainly relevant for safe occupant evacuation. The latter two hazards occur later and would be of interest to fire fighters and insurers.

ENGINEERING SUPPORT STUDY

Since the main benefit of using ISO 13784 Part 1 instead of ISO 9705 is, theoretically, to more closely ensure the Insulated Sandwich Panel is assembled in the same way it is constructed in practice, then at least the same performance criteria (time to flashover) as those given in Specification C1.10 of the National Construction Code should apply. It is important to ensure that the Panels are constructed in practice as they are in the test assemblies. Whether additional performance criteria beyond those needed for occupant life safety are necessary is a matter for the authority having jurisdiction to consider.

12.5 ISO 13784 PART 2

ISO 13784 Part 2[8] (test method for large rooms) requires the size of the test assembly to be 4.8m long x 4.8m wide x 4.0m high with an opening of 4.8m wide x 2.8m high in the front wall. The test facility could be located indoors or outdoors and measurement of the rate of heat release is not required.

Thermocouples on and within the panels are included as for Part 1. The burner output is 100 kW for 5 minutes, 300 kW for a further 5 minutes and 600 kW for the next 5 minutes. The burner is then turned off and observations made for a further 15 minutes. Observations may include: ignition of the specimen; spread of flame over surfaces — internal or external; openings, cracks, damage or gaps appearing in specimen; joints opening and flaming from joints; delamination, falling debris, flaming droplets; smoke or flames appearing outside room through joints; smoke intensity and colour (visual); any indications of flame spread through core of specimen (i.e. discoloration of the facing Panels); flames emerging through the doorway; flashover; and any collapse of the structure.

For both ISO 13784 Part 1 and Part 2, the test standards describe the procedures, measurements and observations that need to be made, but they do not specify acceptable performance or any pass/fail criteria. This must be done by the relevant authority having jurisdiction.

13. OTHER FULL SCALE FIRE TESTS USED BY THE INSURANCE INDUSTRY

13.1 LPS 1181

Some parts of the Insurance Industry have used full-scale fire testing for Insulated Sandwich Panel for many years as a means to reduce the potential losses in a fire. In the United Kingdom, BRE Certification uses the Loss Prevention Standard LPS 1181-1 [14] which is intended for cladding products for the external envelope of buildings. This stipulates the test, performance and installation/set-up requirements for composite cladding products including Insulated Sandwich Panel for compliance with the LPC Design Guide for the Fire Protection of Buildings.[16] It is appropriate for Insulated Sandwich Panel used for the external envelope of all types of industrial buildings. It involves constructing a room 10m long x 4.5m wide x 3m high, with a full width opening in one of the short walls with a height of 2.25m, and a second low level ventilation opening 1m x 1m located at floor level near the rear corner of the room. The fuel source is a timber crib of specified design with its base located 760mm above the floor and located at the rear of the compartment.

LPS 1181-1 has a number of detailed performance criteria that must be met in order for the product to be given a Grade EXT-A or Grade EXT-B classification. The test criteria include: no flashover at the ceiling; no sustained interior surface flaming beyond 1.5m from the perimeter of the crib; no flame spread at any location on the external surface of the test building; no fall of burning brands from the ceiling outside the vicinity of the crib fire area; limits on concealed burning and extent of damage within the core. The area of damage (e.g. charring or melting), outside the crib fire area may not exceed 5m^2 on the wall and 8m^2 on the ceiling in the case of Insulated Sandwich Panel.

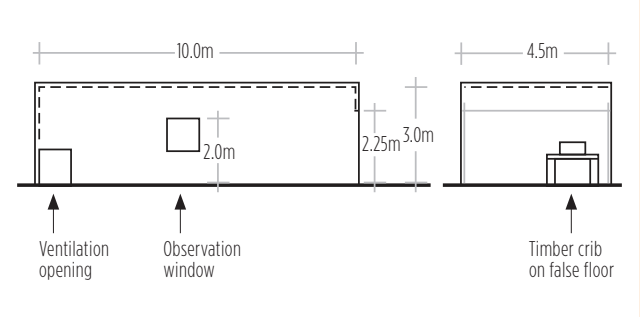


Figure 2: LPS 1181 Room Test (source[14])

Insulated Sandwich Panel installed as wall and ceiling lining systems internally within a building (i.e. systems that are not part of the external cladding), and which are self-supporting or supported externally, are covered by LPS 1181-2.[15] Part 2 requires the same construction and setup as Part 1 for the size of compartment and openings. As well as the wood crib fire source, provision is also made for a gas burner fire source however this is only required for products that also can provide a 60 minute fire resistance rating (INT-1 class). The INT-2 class is given to products with a 30 minute fire resistance rating and also meeting the LPS 1181-2 criteria. The INT-3 class applies to non-fire rated products meeting the LPS 1181-2 criteria. The criteria are much the same as used for LPS 1181-1 with the addition of requirement that no part of the test building collapse.

To achieve the higher INT-1 or INT-2 classifications, the Panels are required to achieve 60 minutes or 30 minutes fire resistance as described in LPS 1208.[17] The fire testing of the Panels is in accordance with BS 476 Part 22. To meet the insulation criterion[1] in this test, the Panel core must not melt at low temperatures otherwise heat transmission through the Panel will be too great. For this reason, Metal Faced Insulated Sandwich Panel with an EPS-FR core, could at best only achieve an INT-3 classification and this would require specific detailing of joints and connections — even then it is not clear if an EPS-FR cored Panel could meet the extent of damage criterion (due to melting of the core) in the LPS 1181 test.

ENGINEERING SUPPORT STUDY

13.2 FM 4880

FM 4880 is an approvals standard[18] giving the requirements for an Insulated Sandwich Panel wall or wall and roof/ceiling Panels for use where a Class 1 fire rating is needed by FM Approvals. FM Approvals represents the interest of the insurers in minimising the potential for significant financial losses in the event of fire. To obtain a Class 1 rating, a range of fire tests are required including small scale flammability characterisation tests using the Fire Propagation Apparatus as well as large scale 25ft or 50ft high corner tests and room testing (UBC 26-3, UBC 8-2 or ISO 9705). In the case of the ISO 9705 room test, the performance criteria include: an assembly shall

(a) Not support a self-propagating fire which extends to the outer extremities of the test area within 20 minutes as evidenced by flaming or materials damage (including charring of core materials);

(b) Not generate excessive smoke during the test period; and

(c) Sustain the applied load, if any, for the duration of the test period.

Interestingly, flashover or time to reach 1 MW is not given as the criteria, however criterion [1] could be interpreted to include a flashover event.

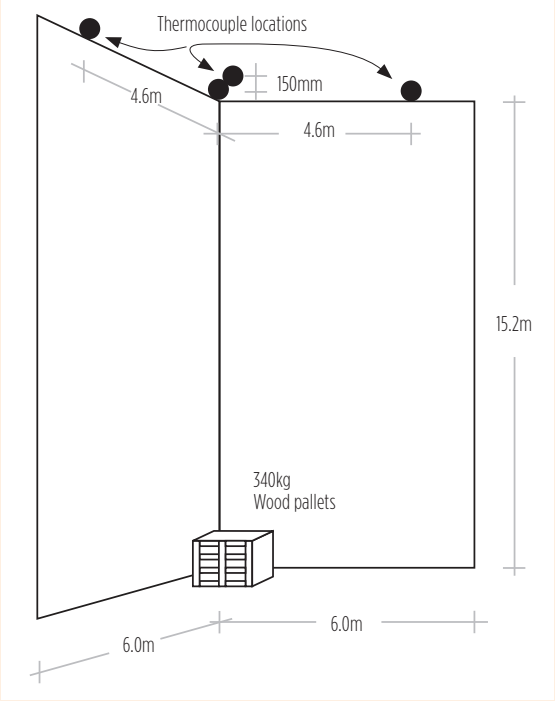


Figure 3 : 50ft Corner Test (source[18])

14. FULL SCALE ROOM FIRE TESTING OF METAL FACE INSULATED SANDWICH PANEL WITH AN EPS CORE

There are several research papers[10,6,21] in the literature that demonstrate the influence and importance of the fixings, connections and support systems used in the case of Metal Faced Insulated Sandwich Panel and specifically those constructed with EPS core materials.

In Australia, Griffen et al[6] carried out eight room fire tests on Metal Faced Insulated Sandwich Panels with EPS cores following the ISO 9705 protocols but ensuring representative fixings and connections as far as possible. One of the tests was for a freestanding assembly following ISO 13784 Part 1. Construction variables included Panel thickness (100mm–250mm thick), core material EPS grade (S or SL), rivets and channels/angles for joining Panels (aluminium or steel), steel skin thickness (0.4mm-0.6 mm). In some cases, the ceiling Panels were supported by the adjoining walls and riveted to angle strips (aluminium or steel); and in some cases steel mushroom through-bolts were used to externally support ceiling Panels. In six of the eight tests flashover was reached before the end of the test and the flashover times ranged from 415 to 1140 seconds. It was also noted that there was no evidence of fire spread within the Panels before flashover. In all tests there was some molten EPS material that leaked from the ceiling joins to form pools on the floor, but in the cases where flashover did not occur, there was less leakage of molten EPS from the ceiling.

The results of this series of room tests clearly indicated that:

- Thinner Panels perform better with longer time to flashover, than thicker Panels, due to less combustible core material available to contribute to the fire;
- Steel facings of thickness in the range 0.4mm to 0.6 mm did not make much difference;
- The use of steel rivets and angle trim to fix the Panels performed demonstrably better than aluminium rivets and angles — aluminium will melt at room fire temperatures while steel does not; and
- Maintaining the integrity of the longitudinal joins in the ceiling Panels with rivets and/or an external support system was very important for improving performance.

There was some evidence that the ISO 13784 Part 1 test may be a more severe test than ISO 9705 due to the greater mechanical stress on the structure leading to earlier failure of the connections. However, it was acknowledged only one ISO 13784 Part 1 test in a freestanding configuration was conducted and more were recommended.

In Sweden, Johansson and Van Hees[10] carried out room fire testing on 100 mm thick EPS (and other) Insulated Sandwich Panel in order to compare the ISO 9705 protocol to a similar but freestanding arrangement (as per ISO 13784 Part 1). Since the purpose of the testing was to explore the limits of the test method and not the performance characteristics of the assemblies tested, there was little detail available on the specific construction methods used for each assembly. However it was noted in the test observations that there was an aluminium channel in the burner corner and a ceiling support system was apparently used but the Panels were not fixed to it. Perhaps surprisingly the EPS Panel system performed better in the freestanding test with a longer time to flashover of 12 min 08 sec than it did in the ISO 9705 test (6 min 54 sec);

ENGINEERING SUPPORT STUDY

but there were apparently differences in the mounting of the specimen between the two test set-ups with better Panel connections used in the freestanding case. Notwithstanding this, the researchers concluded that for most products an earlier time to flashover is observed in the free-standing set-up (i.e. ISO 13784 Part 1 protocols).

In the United Kingdom, BRE[12] carried out comparative large scale fire tests on Metal Faced Insulated Sandwich Panel, not including EPS cores, using LPS 1181 with the Panels supported from an external frame and they confirmed that adequate levels of support are of vital importance, particularly for ceilings.

In New Zealand, BRANZ tested the performance of Metal Faced Insulated Sandwich Panel in room fire tests as part of a project concerned with use of foamed plastics in building construction.[21] Four tests were conducted using 100mm thick Panels with 0.6mm thick steel facings. Aluminium and steel angles and rivets were included amongst the specimens. The construction within the room was made to be freestanding as much as possible. Flashover was reached in three of the four tests with times ranging from 9 min 54 sec to 14 min 21 sec. The test specimen that did not reach flashover used both steel angles and rivets at the Panel joins, except for the floor channel at the bottom of the wall. NCC (formerly BCA) Group numbers from 1 to 3 were achieved depending on the particular joint specifications. These results are consistent with those obtained in Australia by Griffen et al,[6] and reinforce the influence that the connection detailing has on the fire performance of the Insulated Sandwich Panel.

Considering all these tests, it is very clear that the performance of Metal Faced Insulated Sandwich Panel is very dependent on the specific construction and support details used as well as the characteristics of the core materials. All Insulated Sandwich Panels, even with the same core material, do not perform the same when exposed to fire.

15. INSULATED PANEL COUNCIL OF AUSTRALASIA – CODE OF PRACTICE

In Australia, the Insulated Panel Council of Australasia Ltd. (IPCA) have developed a Code of Practice[22] for the use of EPS core Metal Faced Insulated Sandwich Panel in NCC (formerly BCA) Class 7 and 8 Buildings which incorporates construction specifications that reflect the findings of the previously discussed research,[6,21] as well as additional requirements relating to labelling and fire safety management practices. The Code of Practice includes detailed construction drawings that require the use of steel angles and screws for internal and external corner junctions, as well as an external ceiling suspension system using threaded steel rods inserted through the Panel. Importantly, no nylon fixings or suspensions are used; there are no aluminium rivets and no aluminium extrusions are used at the Panel junctions.

With a core material such as polystyrene, the key to improving the fire performance of the Metal Faced Insulated Sandwich Panel assembly as a whole is to:

(a) Keep the core material separated from contact with flame and air by keeping the metal facings in place using robust fixings that are able to withstand elevated temperatures (e.g. steel angles and rivets); and

(b) Provide external structural support for the ceiling Panels. Collapsing ceiling Panels are a hazard to fire fighters and are likely to expose the core material. A good support system should be designed to avoid sudden or unexpected failure of the ceiling system and exhibit a ductile and gradual failure mechanism, allowing fire fighters sufficient time to react and retreat if necessary.

Both of these requirements have been implemented in the new IPCA Code of Practice.[22]

Historical fire incidents in buildings constructed or incorporating EPS-FR Panel may not be representative of the expected behaviour of construction methods now being implemented (i.e. based upon the new Code of Practice[22]), since many of the past fire events would have involved Panel systems with aluminium fixings and ceiling support mechanisms with poor resistance to fire (e.g., nylon mushroom bolt etc). This also implies that many existing buildings that do not include currently recommended construction practices may be expected to perform poorly and could represent a risk to fire fighters. As existing buildings are modified or renovated, improved construction methods should be incorporated into the construction.

This is not to say that future construction would be completely without issues in the event of fire. When EPS-FR Panel are exposed to fully developed fire temperatures the core material will shrink and melt due to conduction through the metal facings, and the Panels will lose rigidity and strength. Inevitably in large fires fuelled by building contents it is likely that the damage caused to the building will be extensive and not repairable. This is also true of Panels using other core material following failure of the adhesive bond between the metal facing and the core material. This needs to be considered at the time of building design taking into account the size and use of the building, the nature and value of its contents, the installation of other fire safety systems as well as general risk and building management practices. Insulated Sandwich Panel are rarely the item first ignited. It is far more common for fires to start in higher risk areas such as cooking areas and spread due to poor housekeeping practices and lack of containment.[23] EPS-FR Panel are best used when fire resistance is not required and where the risk of ignition is low and good fire risk management practices are in place.

Thus the Code of Practice needs to be used in conjunction with good risk management practices, the judicious use of fire separating walls, ensuring good housekeeping, and general risk management such as having a hot work permit system in place and ensuring that the correct Panel is chosen, given the use of the building or room, as well as checking and controlling ignition sources with appropriate suppression systems.

ENGINEERING SUPPORT STUDY

16. DOES THE NCC NEED CHANGING?

Research in Australia[24] in the late 1990's by the Fire Code Reform Centre led to a change in the National Construction Code fire testing requirements and methods for evaluating the reaction to fire characteristics of surface lining materials used within buildings. These are described in NCC Specification C1.10 and they use the time to flashover in the ISO 9705 room fire test as the basis for classifying surface lining materials. The classifications apply depending on building use and mainly to ensure occupant life safety in the event of fire. It is also permitted to test surface linings to AS 3837 (cone calorimeter method) and use the results in an equation that predicts time to flashover in the ISO 9705 room test. This approach is best suited to relatively homogenous materials fixed to the walls and ceiling of a room. Since there was nothing that excluded its use for composite materials, it has been applied to Metal Faced Insulated Sandwich Panel as well. As discussed above, the use of small-scale tests such as AS 3837 are completely unsuitable for testing Metal Faced Insulated Sandwich Panel and therefore, in Australia, the room fire test ISO 9705 has been used instead.

In Europe, an intermediate scale Single Burning Item test [4] is used to classify Metal Faced Insulated Sandwich Panel for Building Code Compliance, although this is not supported by the scientific community.[9,12,13] For example, Cooke made the following statements:[13]

> *The SBI test is inappropriate to test Metal Faced Insulated Sandwich Panel as it cannot distinguish between Panels that will cause flashover in the reference scenario from those that will not.*
>
> *AD B should be amended to require the performance of Metal Faced Insulated Sandwich Panel containing combustible cores such as plastic foam to be determined in accordance with the ISO 9705 room reference test or ISO 13784-1.*

In the United Kingdom, BRE suggest that ISO/FDIS 13784-1 is the most appropriate test scenario for Metal Insulated Sandwich Panel. They say:[12]

> *Fire performance depends on the details of construction and there are a number of features of Insulated Sandwich Panel systems that are difficult to reproduce both in the intermediate scale SBI test and the ISO 9705 test.*
>
> *The reference scenario for lining products, the room corner test (ISO 9705), does not represent the scenario of a fire in a Insulated Sandwich Panel installation as many of these are free-standing and not used as linings in a room constructed from masonry. An appropriate scenario for these cases may be that used in ISO 13784-1 as it provides the smallest realistic size for construction, and therefore potentially the worst case in terms of propensity to flashover. It also incorporates the measurement of heat release rate, smoke production rate and fire spread performance through the Panels.*
>
> *The issues of sample buildability were also highlighted by Van Hees when comparing the fire performance of systems when installed within the ISO 9705 room and as freestanding or frame mounted systems. The view was expressed that due to the importance of the sample construction, only the free-standing or frame mounted systems could allow representative construction of the 'end use' conditions for these types of systems.*

As discussed previously, room fire testing of EPS Panel in Australia by Griffin et al[6] and in New Zealand by Collier[21] using ISO 9705 was able to successfully distinguish changes in fire performance due to factors such as Panel thickness, ceiling support conditions, use of aluminium or steel fixings (rivets and angles). This suggests that the test method is still appropriate for evaluating the contribution of the Panel to early fire growth, as for other common surface lining materials, provided that the Panels and connections are installed in a reasonably representative manner.

ISO 13784 Part 1 is yet to be embraced by regulators and Insurance Industries around the world. Furthermore, the test set-up requires that the appropriate facilities to run the test being somewhat more demanding than required for ISO 9705. The local availability of the test is a consideration; the cost of the test is likely to be similar or slightly more expensive than ISO 9705 but the installation is closer to the actual end use situation.

However, provided Insulated Sandwich Panel is installed within the ISO 9705 room in a manner representative of the intended end use (i.e. free-standing walls are not fixed to the test room wall, and the ceiling is externally supported or not as is required) then most of the disadvantages of using the ISO 9705 room for Insulated Sandwich Panel would if anything reduce the performance achieved. The smaller interior dimensions and omission of some fixings from the unexposed Panel junctions are more likely to result in a more severe fire. Where the ceiling is externally supported in the ISO 9705 room (simulated with fixings to the test room roof) then early collapse of the ceiling which could pull the walls inward is avoided provide the ceiling/wall connections are robust.

It is not clear whether the end result of using ISO 13784 Part 1 over ISO 9705 would materially change the NCC performance group achieved by various types of Insulated Sandwich Panel as there is only limited information in the literature comparing performance for an identical specimen. In the case of EPS-FR Panel (constructed as per the Code of Practice) there is a need for more data on the performance attained in the ISO 13784 Part 1 test in order to conclude whether there are real differences in the results achieved between the two test methods, and if so, are they substantial enough to warrant not permitting the continued use of ISO 9705 for Building Code Compliance.

ENGINEERING SUPPORT STUDY

17. CONCLUSIONS

The performance of EPS-FR Panel in fire can be improved by:

- **Supporting ceiling Panels with robust steel connections, avoiding nylon supports, and complying with BRANZ Report FCR 9; and**
- **Using steel rivets and corner trim instead of aluminium at corner junctions and Panel connections.**

Notwithstanding the above, the polystyrene core is deemed as a combustible material and is believed to have the potential to assist fire growth, if the measures to improve performance are not effective, due to poor workmanship for example.

Although suspending the ceiling Panels with metal cables etc. will be helpful in delaying collapse of the ceiling or at least helping to ensure the collapse mechanism is gradual rather than sudden, it may not be sufficient to prevent it.

There is no evidence that the failure of EPS-FR Panel construction occurs at a time by which occupant escape from the building is not accomplished. On the other hand, by the time fire fighters arrive at the scene, the fire size has grown considerably and, where poor performing construction methods have been used, EPS-FR Panel construction has the potential to make fire fighting difficult and possibly dangerous.

The fire performance of Metal Faced Insulated Sandwich Panel must be assessed using full-scale test methods. The ISO 9705 room fire test method is capable of differentiating between changes in the construction method associated with EPS-FR Panel construction, provided the Panel is installed within the room in a representative manner. Similarly the ISO 13784 room fire test method is also able to differentiate performance with the added advantage of allowing access to all sides of the specimen for construction and observation purposes. However some fire test laboratories may need to modify or extend their equipment in order to meet the ISO 13784 requirements. Both of these tests are intended to assess the potential contribution made by the test specimens to a developing fire, and may not necessarily be adequate for assessing conditions needed for fire fighting safety under fully developed fire conditions.

Property fire losses associated with smoke damaged contents may be considerable in both unsprinklered and sprinklered buildings constructed with Metal Faced Insulated Sandwich Panel, regardless of the type of core used.

There may be a significant number of existing buildings of Insulated Sandwich Panel construction that have used construction methods that are no longer recommended and which may perform poorly in fire and pose a risk to fire fighters.

IPCA recommends they be retro fitted to Code Compliance.

EPS-FR Panel construction is a functional and inexpensive construction method with many practical advantages, and many of the challenges when involved in fire and are addressed through improved construction methods and fire safety management practices. The Code of Practice developed by the Insulated Panel Council of Australasia Ltd. addresses many of these construction methods and fire behavior concerns and is strongly recommended to be applied to all future construction involving Insulated Sandwich Panel regardless of the core material used.

ENGINEERING SUPPORT STUDY

18. REFERENCES

1. ISO 9705:1993(E), Fire Tests – Full-scale room tests for surface products, Switzerland: International Standards Organization.
2. Australian Building Codes Board. National Construction Code Specification C.1.10. ABCB, Canberra, Australia.
3. European Commission (CEN). 2006. EN 14509. Self-supporting double skin metal faced insulating panels – Factory made products – Specifications.
4. European Commission (CEN). 2002. EN 13823. Reaction to fire tests for building products – Building products excluding floorings exposed to the thermal attack by a single burning item.
5. Standards Australia. 1998. AS/NZS 3837:1998 Method of Test for Heat and Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter. Standards Australia.
6. Griffen, G.J. Bicknell, A.D. Bradbury, G.P. and White, N. 2006. Effect of Construction Method on the Fire Behaviour of Sandwich Panels with Expanded Polystyrene Cores in Room Fire Tests. Journal of Fire Sciences Volume 24, p275–293.
7. ISO 13874.1:2002. Reaction to fire test of sandwich panel building systems – Part 1: Test method for small rooms, International Organization for Standardization, Geneva.
8. ISO 13874.2:2002. Reaction to fire test of sandwich panel building systems – Part 2: Test method for large rooms, International Organization for Standardization, Geneva.
9. Messerschmidt B. 2007. The capabilities and limitations of the single burning item test. Proceedings Fire & Building Safety in the Single European Market.
10. Johansson P. and Van Hees P. 2001. Development of a Test Procedure for Sandwich Panels using ISO 9705 Philosophy. Nordtest project nr 1432-99. SP Rapport 2000:26, SP Swedish National Testing and Research Institute, Fire Technology, Boras.
11. Axelsson J. and Van Hees P. 2004. New data for sandwich panels on the correlation between the SBI test method and the room corner reference scenario, Fire and Materials.
12. BRE. 2003. Final Report for Sector Group C – Sandwich Panels. Report on Experimental Programme and Recommendations. Report No. 210725.
13. Cooke, G. Metal faced sandwich panels with plastic foam cores – a challenge to fire safety. Fire Safety Engineering. Feb 2009.
14. Loss Prevention Standard LPS 1181: Part 1. Series of Fire Growth Tests for LPCB Approval and Listing of Construction Product Systems Part One: Requirements and Tests for Built-up Cladding and Sandwich Panel Systems for Use as the External Envelope of Buildings. BRE Certification 2005. United Kingdom.
15. Loss Prevention Certification Board. Loss Prevention Standard LPS 1181: Part 2. Series of Fire Growth Tests for LPCB Approval and Listing of Construction Product Systems Part One: Requirements and Tests for Built-up Cladding and Sandwich Panel Systems for Use as Internal Constructions in Buildings. BRE Global Ltd 2005. United Kingdom.
16. LPC Design Guide for the Fire Protection of Buildings: 2000: Fire Protection Association.
17. LPS 1208. 2005. LPCB Fire resistance requirements for elements of construction used to provide compartmentation. BRE Global Ltd.
18. FM Global 4880. 2005. Approval Standard for Class 1 Fire Rating of Wall or Wall and Roof/Ceiling Panels, Interior Finish Materials or Coatings, and Exterior Wall Systems. FM Approvals.
19. ISO 5660-1: 2002. Reaction-to-fire tests — Heat release, smoke production and mass loss rate — Part 1: Heat release rate (cone calorimeter method). International Organization for Standardization, Geneva.
20. AS/NZS 3837:1998. Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter. Standards Australia / Standards New Zealand.
21. Collier P.C.R. 2005. Flame Barriers for Foamed Plastics. Study Report No. 44. BRANZ Ltd. Porirua City.
22. Insulated Panel Council of Australasia Ltd – Code of Practice Version 4.2 – 2012.
23. BRE. 2003. Technical Briefing: Fire Performance of Sandwich Panel Systems. ABI Technical Bulletin on 'Fire Performance of Sandwich Panels'. Updated in 2008.
24. Fire Code Reform Centre. 1998. Fire Performance of Wall and Ceiling Lining Materials. CRC Project 2 – Stage A, Fire Performance of Materials, Project Report FCRC – PR 98-02, Fire Code Reform Research Program. Sydney, Australia.
25. Property and Business Fire Protection – Insulated Panels Kingspan Insulated Panels P/L marketing publication – April 2007
26. Dr Gordon M E Cooke. 2000. Sandwich panels for external cladding – Fire safety issues and implication for the risk assessment process. Report commissioned by Eurisol – UK Mineral Wool Association.
27. International Fire Consultants. Sun Valley Fire – Revisited. Report undertaken for the British Plastics Federation.
28. Morgan, P. and Shipp, M.P. 1999. Firefighting options for fires involving sandwich panels. Home Office Fire Research and Development Group, UK.
29. BASF Aktiengesellschaft (BASF). 2001. Technical Information Styropor® 129 – Fire characteristics of Styropor foams. BASF, Ludwigshafen.
30. Hertzberg, T. et al. 2003. Particles and isocyanates from fires – SP Report 2003:05, SP Swedish National Testing and Research Institute.
31. Kingspan – Fire Statistic – http://www.kingspan.info/Fire-Statistic-1323.html
32. Richard Oliver International. Insulated Sandwich Panels – The risks and insurance concerns. Report prepared by Richard Oliver International, Sydney NSW.
33. Collier, P.C.R. and Baker, G.B. 2004. Improving the Fire Performance of Polystyrene Insulated Panel in New Zealand – BRANZ April 2004 – New Zealand Fire Service Commission Report.
34. IPENZ. Coolstore Engineering in New Zealand. 2009. IPENZ Engineers New Zealand. Practice Note 15.
35. Fire violations kill twenty-five in chicken plant – Emergency Response and Research Institute Report 1991.
36. United States Fire Administration. Chicken Processing Plant Fires Hamlet, North Carolina, and North Little Rock, Arkansas. Technical Report Series.
37. Dalton, Alan J. 1998. Safety, health and environmental hazards at the workplace. Page 30 Published by Cassell.
38. HSE finds fire service at fault over firefighter deaths. Press report. http://www.guardian.co.uk/uk/2008/jan/16/firefighters.haroonsiddique
39. HSE Statement On Improvement Notice Served To Warwickshire Fire Service After Death Of Four Fire Fighters, UK. Press report. http://www.medicalnewstoday.com/articles/94429.php
40. Fire service bosses arrested over warehouse blaze that killed four. Press report. http://www.timesonline.co.uk/tol/news/uk/article7039387.ece
41. US Department of Homeland Security – U.S Fire administration/Technical Report Series – Abandoned Cold Storage Warehouse Multi-Firefighter Fatality Fire – Worcester, Massachusetts- USFA-TR-134/ December 1999.
42. New Zealand Fire Service. 2008. Paula Beever et al. Enquiry into the Explosion and Fire at IcepakCoolstores, Tamahere 5th April 2008, New Zealand Fire Service.
43. Atherstone on Stour fire investigation. Warwickshire County Council Audit and Standards Committee – 11 May 2010. Press Report May 2010.
44. New South Wales Fire Brigade. Performance of Expanded Polystyrene Foam Insulated Sandwich Panel Structures Under Fire Conditions. NSWFB Fire Operations Journal No. 3.
45. New South Wales Fire Brigade. Case Study #1 Greenacre Twelfth Alarm Meat processing Plant Fire. NSWFB Fire Operations Journal No. 3.
46. Building Research Association of New Zealand (BRANZ). FM4371 Report. Ad hoc testing to evaluate the phenomenon of fire spread within polystyrene Insulated Panels. May 2010.
47. Harrington, J. 2006. Lessons Learned from Understanding Warehouse Fires. Fire Protection Engineering. http://www.fpemag.com/archives/article.asp?issue_id=35&i=193
48. http://www.theage.com.au/national/firefighter-injured-in-factory-blaze-fgc9.html
49. Presentation by Lumley Insurance at EPS Code of Practice industry launch May 27 2010, Sydney.
50. Nelligan, R,J. 2006. Guidelines for the use of expanded foam polystyrene panel systems in industrial buildings so as to minimise the risk of fire. Fire Engineering Research Report 06/1. Department of Civil Engineering, University of Canterbury, Christchurch, New Zealand.
51. HeikkiSavolainen, Nicolas Kirchner: Toxicological Mechanisms Of Fire Smoke. The Internet Journal of Rescue and Disaster Medicine. 1998. Volume 1 Number 1. http://www.ispub.com/ostia/index.php?xmlFilePath=journals/ijrdm/vol1n1/smoke.xml
52. BASF Technical Information 38187, Ludwigshafen, Germany. February 1995. http://www.geosyscorp.com/Documents/BASF/BASF181.pdf
53. Babrauskas, V. 2003. Ignition Handbook. Chapter 7 Table 34. Fire Science Publishers. USA.
54. National Academy of Sciences. 2000. Toxicological Risk of Fire Retardant Chemicals. National Academies Press. Washington DC.
55. European Chemical Agency (ECHA). 2008. Member State Committee Support Document for Identification of Hexabromocyclododecane and All Major Diastereoisomers Identified as a Substance of Very High Concern. SVHC Support Document.
56. Fire chiefs seek tighter regs on panels after fatal blaze. Media Report. http://www.cnplus.co.uk/news/fire-chiefs-seek-tighter-regs-on-panels-after-fatal-blaze/226351.article
57. NFPA Summary Fire Investigation Report. Cold Storage Warehouse Fire Madison, Wisconsin May 3, 1991.
58. Lie T.T. - Effects of Insulation on Fire Safety. National Research Council of Canada. Division of Building Research. Canadian Building Digest 218.August 1981.
59. Sumi K., Tsuchiya Y. – Toxic Gases and Vapours Produced at Fires. National Research Council of Canada. Division of Building Research. Canadian Building Digest 144. December 1971.
60. Building Research Association of New Zealand – FM 2489, Adhoc Testing to Evaluate the Phenomenon of Fire Spread Within Polystyrene Insulated Panels. May 2010.
61. http://www.stybenex.nl/default.aspx
62. New South Wales Post Incident Summary Report, June 2002 – Tip Top Bakery Fire.

ENGINEERING SUPPORT STUDY

19. ABBREVIATONS AND TERMS

ABI Association of British Insurers

BCA Building Code of Australia, now NCC

BRANZ Building Research Association of New Zealand

BRE Building Research Establishment Limited

CODE Code of Practice Version 4.2

Cone Calorimeter
Device used to study the fire behavior of small samples of various materials in condensed phase

EPS Expanded Polystyrene

EPS-FR Expanded Polystyrene-Fire Retardant

Flashover
Near-simultaneous ignition of most of the directly exposed combustible material in an enclosed area.

FM Global
Insurance company that can determine risk and premiums by engineering analysis as opposed to historically based actuarial calculations

HBCD Hexabromocyclododecane

IPCA Insulated Panel Council of Australasia Ltd.

IPS Insulated Panel System

ISP Insulated Sandwich Panel

Mineral Wool
Generally used to refer solely to synthetic materials including fibreglass, ceramic fibres and stone wool

MFP Metal Fascia Panel

MRF Mineral Wool

NCC National Construction Code

PIP Polystyrene Insulated Panels

PIR Polyisocyanurate Foam

PUR Polyurethane Foam

Rock Fibre
Basalt or 'slag' that is spun into bundles of single filament fibres

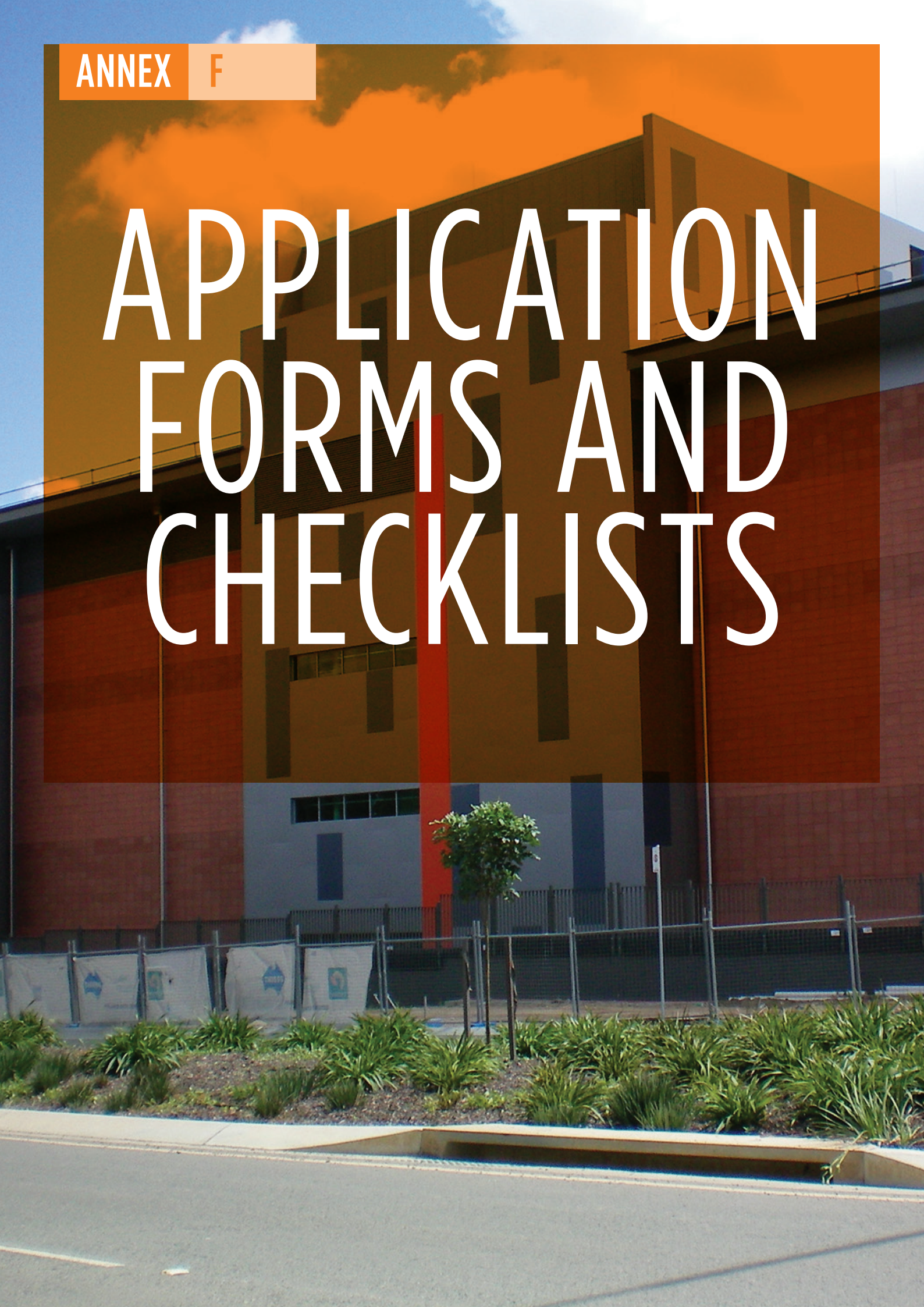
SPS Phenolic Hybrid Syntactic

SIP Structural Insulated Panel

XPS Extruded Polystyrene

ANNEX F

APPLICATION FORMS AND CHECKLISTS



CONTENTS

Insulated Panel Council Australasia Ltd

APPLICATION FORM

IPCA ISP and EPS-FR Panel Certification Scheme

COMMITMENT REGISTER CODE COMPLIANT COMPANY SIGNATORIES

The signing of this Commitment Register by the organisation below demonstrates and records their commitment in having become compliant with the IPCA 004.3:2017 Industry Code of Practice, incorporating the Panel Certification Scheme.

This CODE provides a framework to the Australian Insulated Panel Industry through practical, industry specific guidance, which will adapt and transform ISP and EPS Sandwich Panels performance, thereby addressing fire performance issues and fire fighter confidence in facilities constructed in accordance with the Code Specification and Certification requirements. To demonstrate their commitment to the CODE, Code Compliant IPCA members will:

(i) By the signing of this statement of commitment by the CEO or equivalent, publicly demonstrate their intention to integrate the CODE into their business.

(ii) Participate in the Industry promotion of the CODE within their organizations and externally.

(iii) Make application for approval as Code Compliant Companies and make relevant applications for approval of work to be undertaken, in accordance with the CODE.

(iv) Participate in the ongoing reviews of the CODE's operation to bring about further advancement through the review processes established by the CODE.

CODE OBJECTIVES

The Code of Practice objectives were formulated in addressing the challenges that were identified in consultation with the Fire Brigade and stakeholders. The stated objectives of the CODE are:

Compliance with the CODE will achieve a more fire stable structure and fire fighter confidence in Insulated Sandwich Panel and Expanded Polystyrene Panel Systems, through:

(a) Establishing minimum principles and standards for:

(i) The design, specification and approval of facilities incorporating such systems; and

(ii) The manufacture and installation of the ISP and EPS-FR Panel used in such systems.

(b) Promoting strategies to address the risk of fire as well as the maintenance requirements and emergency planning procedures in facilities incorporating such systems; and

(c) Providing a recognizable 'Code Branding Mark' that distinguishes ISP and EPS-FR Panel System Constructions which are compliant with this CODE.

ORGANISATION SIGNING COMMITMENT REGISTER:

Name of Organisation Signing Register: _____

Title of Executive Signing on behalf of Organisation: _____

Name and Signature: _____

(Print Name) (Signature)

Date: (DD/MM/YYYY) ☐☐ ☐☐ ☐☐☐☐

Office Use Only:
Commitment Certificate No:
COP File No:

Insulated Panel Council Australasia Ltd

APPLICATION FORM

IPCA ISP and EPS-FR Panel Certification Scheme

NAME AND CONTACT DETAILS FOR PERSON/COMPANY MAKING APPLICATION:

Title: _____ Given Name: _____ Surname: _____

Company Name: _____

Mailing Address: _____

Suburb: _____ State: _____ Postcode: _____

Phone: (____) _____ Mobile: _____ Fax: (____) _____

Email: _____

IPCA Membership Name: _____

Type of structure of ISP and EPS-FR Panel Project for which Certification is being sought (Please tick one box)**:**

New Building ☐ **Building Extension** ☐ **Building Refurbishment** ☐ **Small Room** ☐ **Exemption Request** ☐

Name of Business and location of Project: _____

_____

Address: _____

Suburb: _____ State: _____ Postcode: _____

Name of ISP and EPS-FR Panel Manufacturer: _____ Panel type: _____

Name of EPS Bead Supplier: _____

Name of Designer: _____

Name of Design Engineer: _____

Name of EPS Manufacturer: _____

DECLARATION

I sincerely declare that the information and documentation provided in this application is a true and accurate record of the completed ISP and EPS-FR Panel System for which Certification under the IPCA Code of Practice is being sought.

Signature _____

Dated (DD/MM/YYYY) ☐☐ ☐☐ ☐☐☐☐

FORM FIELDS

Each section of this Application Form needs to be completed and all the required evidence documentation sent as an attachment. Only when all the required documentation has been received will the Certification Assessment process commence.

Send this form, all the specification documentation as per the checklists, and the Application Fee to:

IPCA
Code of Practice Application
Suite 5 Level 1, The Exchange
88 Brandl Street,
Eight Mile Plains QLD 4113

CHECKLIST EVIDENCE REQUIREMENTS

Please ensure you read the requirements of each of the following checklists and provide the information as specified.

Insulated Panel Council Australasia Ltd

APPLICATION FORM

IPCA ISP and EPS-FR Panel Certification Scheme

DESIGN, DETAILING AND SPECIFICATION

CHECKLIST	YES	NO	N/A
PANEL SYSTEMS DESIGN DRAWINGS: As pre-approved	☐	☐	
Cross Sectional Drawing.	☐	☐	☐
Fixings of External Walls to Base.	☐	☐	☐
Fixings of External Wall to Insitu Floor.	☐	☐	☐
Load out Area – External Wall Base Details.	☐	☐	☐
Wall to Wall Corner Details.	☐	☐	☐
Ceiling Connection Chiller to Freezer.	☐	☐	☐
Wall to Ceiling with Hanging Fastener Details.	☐	☐	☐
External Wall and Low Ceiling Details.	☐	☐	☐
Intermediate Ceiling Suspension Details.	☐	☐	☐
Main Ceiling Suspension Details.	☐	☐	☐
Chiller Freezer Intermediate Wall Fixing Detail.	☐	☐	☐

OTHER DETAILS REQUIRED

Key Diagram (required) of floor plan/s detailing locations for each Panel type. Attatched. ☐

Number of doors: ☐☐☐

Quantity and types of labels to be fitted externally: EPS+ ☐ EPS ☐ PIR+ ☐ PIR ☐ XPS ☐ MRF ☐ LEAVING AREA ☐

Total square metres of Panel to be installed (Fee calculated based on this). ☐☐☐☐ Total metres ^{2}

Existing Panel Certification number if an extension: No.: ☐☐☐☐☐☐☐☐

Please provide details of any additional information in regards to design, detailing and specification:

DOCUMENTARY EVIDENCE

Check that you have provided the above information with your application in regards to design detail.

Insulated Panel Council Australasia Ltd

APPLICATION FORM

IPCA ISP and EPS-FR Panel Certification Scheme

PANEL MANUFACTURE/TYPE

CHECKLIST	YES	NO	N/A
(FR) EPS Foam in accordance with AS1366.3-1992.	☐	☐	☐
Manufactured from 100% FR Bead.	☐	☐	☐
Microban® or equivalent anti-bacterial paint technology.	☐	☐	☐
Steel skins bonded to EPS core with two-part heat polymerising adhesive (All Panels).	☐	☐	☐
Constructed from continuous laminating roll forming process providing interlocking tongue and groove style joints.	☐	☐	☐
Panel surface either smooth or standard style profiles.	☐	☐	☐
Other Panel types as per **Section 9.2** Panel Manufacturing/Type (see page 21).	☐	☐	☐
Alternative Approved Class 1 FM 4880 Panel	☐	☐	☐
Other Group 1 Panel (Certificate required).	☐	☐	☐

Panel type (please tick): Approved PIR ☐ Approved SPS ☐ EPS-FR ☐ MRF ☐

Please provide details of any additional information in regards to Panel Manufacturing/Type:

DOCUMENTARY EVIDENCE

Check that you have provided the above information with your application in regards to confirming Panel Manufacturing/Type Used.

Insulated Panel Council Australasia Ltd

APPLICATION FORM

IPCA ISP and EPS-FR Panel Certification Scheme

PANEL INSTALLATION

CHECKLIST	YES	NO	N/A
Support:			
Perimeter suspension to all ceilings (ends of Panel not supported by wall Panels) required.	☐	☐	☐
Minimum 10mm galvanised or stainless steel rods with either wire and gripples or certified chain.	☐	☐	☐
All steel junctions equivalent thickness to skins (no aluminium extrusions).	☐	☐	☐
Floor Insulation:			
FR EPS in two layers of equal thickness.	☐	☐	☐
One layer of heavy duty polythene film vapour proof membrane 0.250um thickness.	☐	☐	☐
Other XPS-FR	☐	☐	☐
Sealants:			
Vapour seal on 'warm' side of Panel work.	☐	☐	☐
Non-setting mastic for -30°C to +50°C temperature range.	☐	☐	☐
Mastic applied as per **Section 9.3(c)** of CODE.	☐	☐	☐
White and mould resistant silicone in food processing areas.	☐	☐	☐
Fixings:			
All blind, sealed steel encased 4mm rivets.	☐	☐	☐
Class 3 steel screws.	☐	☐	☐
Rivets and/or screws at 300mm centres.	☐	☐	☐
Ceiling suspension and wall girt fixings as per **Section 9.3(d)**.	☐	☐	☐
Joints:			
All joints designed and fabricated as per **Section 9.3(e)**.	☐	☐	☐
Thermal Cuts:			
Provision has been made for expansion and contraction of Panel skins.	☐	☐	☐

DOCUMENTARY EVIDENCE

Check that you have provided the above information with your application in regards to Panel Installation.

Insulated Panel Council Australasia Ltd

APPLICATION FORM

IPCA ISP and EPS-FR Panel Certification Scheme Application

PANEL INSTALLATION

CHECKLIST (CONTINUED)	YES	NO	N/A
Relief Ports:			
Provision for pressure relief using double acting multi-valve relief ports.	☐	☐	☐
Pressure relief ports fitted with heater cables.	☐	☐	☐
Heater Cables:			
Heater cables are low voltage.	☐	☐	☐
or			
Heater cables are voltage regulated with a suitable circuit breaker.	☐	☐	☐
Doors:			
All doors are manufactured and installed as per Section 9.3(i) of the CODE.	☐	☐	☐
All doors fitted with safety escape instructions and release mechanisms.	☐	☐	☐
Penetrations:			
All penetrations are capped and sealed to maintain the level of resistance specified for the group number and BCA C.1.10.	☐	☐	☐
Service Penetrations:			
All service penetrations are sealed with a non-combustible intumescent sealant with a minimum FRL of not less than 30 minutes.	☐	☐	☐
Work Method Statement (SWMS):			
Work Method Statement has been produced and submitted for approval.	☐	☐	

Please provide details of any additional information in regards to Panel installation:

DOCUMENTARY EVIDENCE

Check that you have provided the above information with your application in regards to Panel Installation.

Insulated Panel Council Australasia Ltd

APPLICATION FORM

IPCA ISP and EPS-FR Panel Certification Scheme Application

POST CONSTRUCTION RECOMMENDATIONS

CHECKLIST

Inspection and Maintenance Regime:

Has ☐ / Will ☐ the Building Owner/Occupier been/be given documentation with recommendations for ISP and EPS-FR Panel Systems inspection and maintenance procedures?

Has ☐ / Will ☐ owner sign Certificate of Compliance?

Risk Management Planning and Special Work Permits: (Include pages 76 – 83.)

Has ☐ / Will ☐ the Building Owner/Occupier been/be provided with recommendations for housekeeping procedures for:

Risk Management Planning ☐

Issuing Safe Work Permits ☐

Issuing Hot Work Permits ☐

Fire Service:

Has ☐ / Will ☐ the local Fire Service been/be given Certificate of Compliance?

Labels:

Have ☐ / Will ☐ labels and Compliance Plate been/be attached at FIP or entry?

DOCUMENTARY EVIDENCE

Evidence is required to show that Post Construction recommendations have been provided to either the Building Owner, Manager or Tenant, regarding the implementation of an appropriate Risk Management Plan and a maintenance regime for the ISP and EPS-FR Panel System post construction.

Insulated Panel Council Australasia Ltd

phone: +61 7 3188 9120
email: admin@insulatedpanelcouncil.org
web: www.insulatedpanelcouncil.org

Suite 5 Level 1, The Exchange
88 Brandl Street,
Eight Mile Plains QLD 4133

PANEL
CERTIFICATION SCHEME