

2021 Uniform Plumbing Code Part 1

Wisdom and Associates, Inc.

Chapter 1 - Administration

Conflicts Between Codes

- Where conflicts between codes occur, this code prevails
- Conflicts between this code, manufacturer, or referenced standards, most stringent applies (102.1)

Existing Installations

- Legal existing systems may be repaired and maintained
- Must have been correct at time of install
- No current hazard to life, health of property (102.2)

Maintenance

- Plumbing and drainage system shall be maintained
- Owner or owners agent responsible for maintenance
- Inspector can require a plumbing system be re-inspected (102.3)

Additions, Alterations, Renovations or Repairs

- Additions, alterations, renovations, or repairs to existing systems must meet current standards (102.4)

Required Inspections

1. Underground inspection of piping in trenches before backfill
2. Rough in prior to covering
3. Final inspection upon completion (105.2)

Chapter 2 - Definitions

- **Approved**—Acceptable to the authority having jurisdiction
- **Circuit Vent**—The vent that connect to a horizontal drainage branch and vents two traps to a maximum of eight traps connecting into a battery of fixtures
- **Combustible Material**—Material that is capable of being ignited
- **Dead Leg**—Potable water pipe which contains water that has no flow or does not circulate
- **Direct Vent Appliance**—All combustion air from outside, all flue gasses to outside
- **Emergency Floor Drain**—Serves to protect from damage from spills, leaks, backups
- **Expansion Tank**—Vessel used to protect potable water systems from excessive pressure
- **Group Wash Fixture**—Allows more than one person to use at a time. One or more drains & one or more faucets 20" rim space per fixture
- **Low Pressure Water Dispenser**—15 psi or less
- **Nonwater Urinal with Drain Cleansing Action**—Coveys waste without water for flushing, automatically drain cleanses
- **Point of Entry, Water Treatment Unit**—Water treatment for distribution system
- **Pre-fabricated Shower Enclosure**—Factory assembled, walls, drain, & door
- **Public Water System**— 15 service connections, 25 individuals daily for 60 days per year

Chapter 3 - General Regulations

Improper Location

- Plumbing equipment can't interfere with normal operation of doors, windows, other required facilities (308.1)

Workmanship

- Workmanship in accordance with *accepted engineering practices* and installation instructions
- Produces results sought by the code
- Safe and sanitary
- Meets sound limitations of the building code (309.0)

Dead Legs

- Method of flushing dead legs required (309.6)

Prohibited Fittings & Practices

- Following fitting can't be used for drainage:
- Double hub (unless vertical)
- Single or double tee branch
- Single or double tapped tee branch
- Side inlet quarter bend
- Running thread, hand or saddle used for drainage(310.1)
- No drainage or vent piping can be drilled or tapped to make a connection (drainage piping walls not thick enough for tapping) (310.2)

Protection of Piping

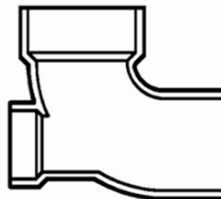
- Piping protected from damage
- Allowances for hot water pipe expansion (312.1)

Freezing Protection

- Pipes protected from freezing
- Attics, crawlspaces, exterior walls (312.6)

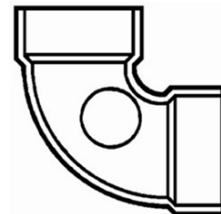


Plumbing equipment cannot interfere with other required facilities



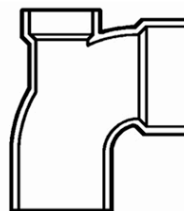
Hi-Head Inlet 1/4 Bend

Prohibited in drainage system. May be used in vent system



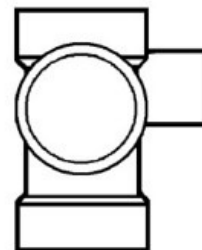
Side Inlet 1/4 Bend

May have single or double inlets
Prohibited in drainage system
May be used in vent system



Low-Heel Inlet 1/4 Bend

May be used for drainage but only with heel inlet facing upward

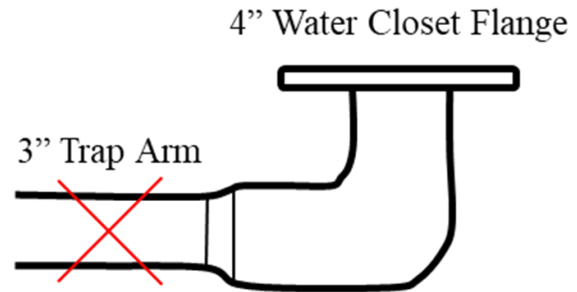


Sanitary Tee w/ Single or Double Side Inlet

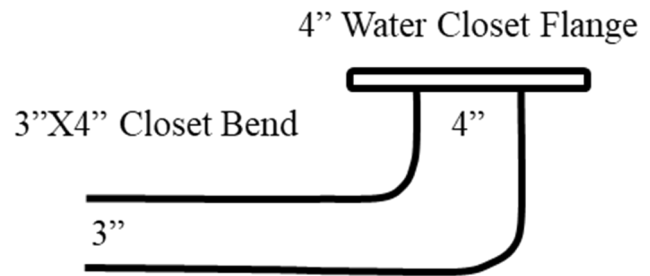
Side inlets must be in a drainage pattern for drainage use. Side inlet can be used as a vent.

Obstruction of Flow

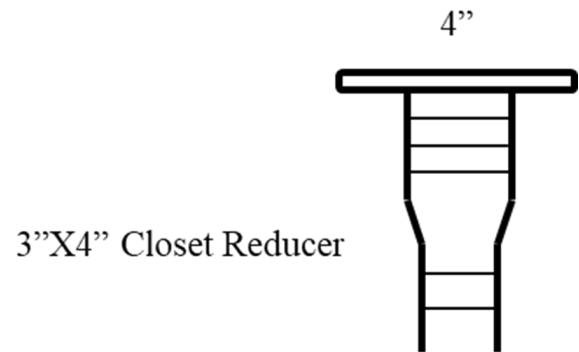
- Obstruction of flow not permitted
- 4X3 closet bend or closet reducer OK (310.5)



NOT PERMITTED



ALLOWED



ALLOWED

Fire Resistant Construction

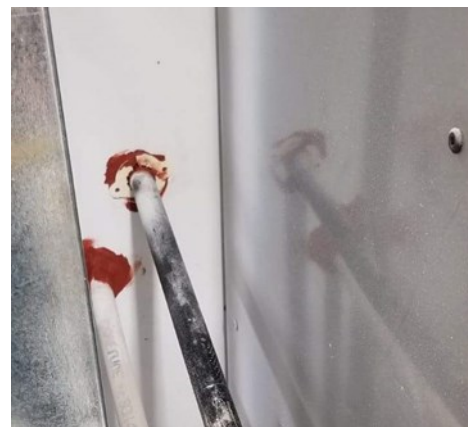
- Chapter 14
- Building Code (312.7)

Firewalls

- Annular space around piping passing through fire walls sealed in accordance with other codes (312.10.3)

Garages

- Ducts penetrating walls or ceilings separating the garage from the dwelling must be 26 ga. steel
- No openings into the garage
- Other penetrations (wires, pipes, ducts, etc.) protected as required (IRC R302.5.2-3)
- Resist passage of flame
- Does not have to meet ASTM E136 (single family dwellings)



Waterproofing Openings

- Watertight flashings where exiting the roof
- Exterior wall penetrations water tight (312.8)

Nail Plates

- Plastic or copper pipe protected within 1" of exposed framing edge
- Minimum 18 gauge plates
- Plates extend 1.5" beyond outside of piping (312.9)

Sleeves

- Piping through concrete or masonry walls or floors must be sleeved(312.10)

Structural Members

- Structural members cut, notched or bored in accordance with building code (312.11)

Cutting, Drilling, & Notching

- Dimensional lumber follow the code
- Engineered lumber follows manufacturer specifications (508.2)
- Holes cannot be closer than 2" apart
- Holes cannot be closet than 2" to a notch (R502.8.1)

Drilling and Notching, Top Plate

- Notch in exterior or load bearing walls exceeds 50% of top plate width
- 1.5" wide metal tie extending 6" beyond each side of notch (R602.6.1)

Drilling and Notching - Exterior & Bearing Walls

- Max notch 25% of stud width
- Max hole 40% of stud width
- Max hole 60% of stud width for no more than 2 studs in a row
- Holes must be more than 5/8" from stud edge
- Hole and notch cannot be in same cross-section (R602.6)

Drilling and Notching - Interior and Non-Bearing Walls

- Max notch 40% of stud width
- Max hole 60% of stud width
- Holes must be more than 5/8" from stud edge
- Hole and notch cannot be in same cross-section (R602.6)

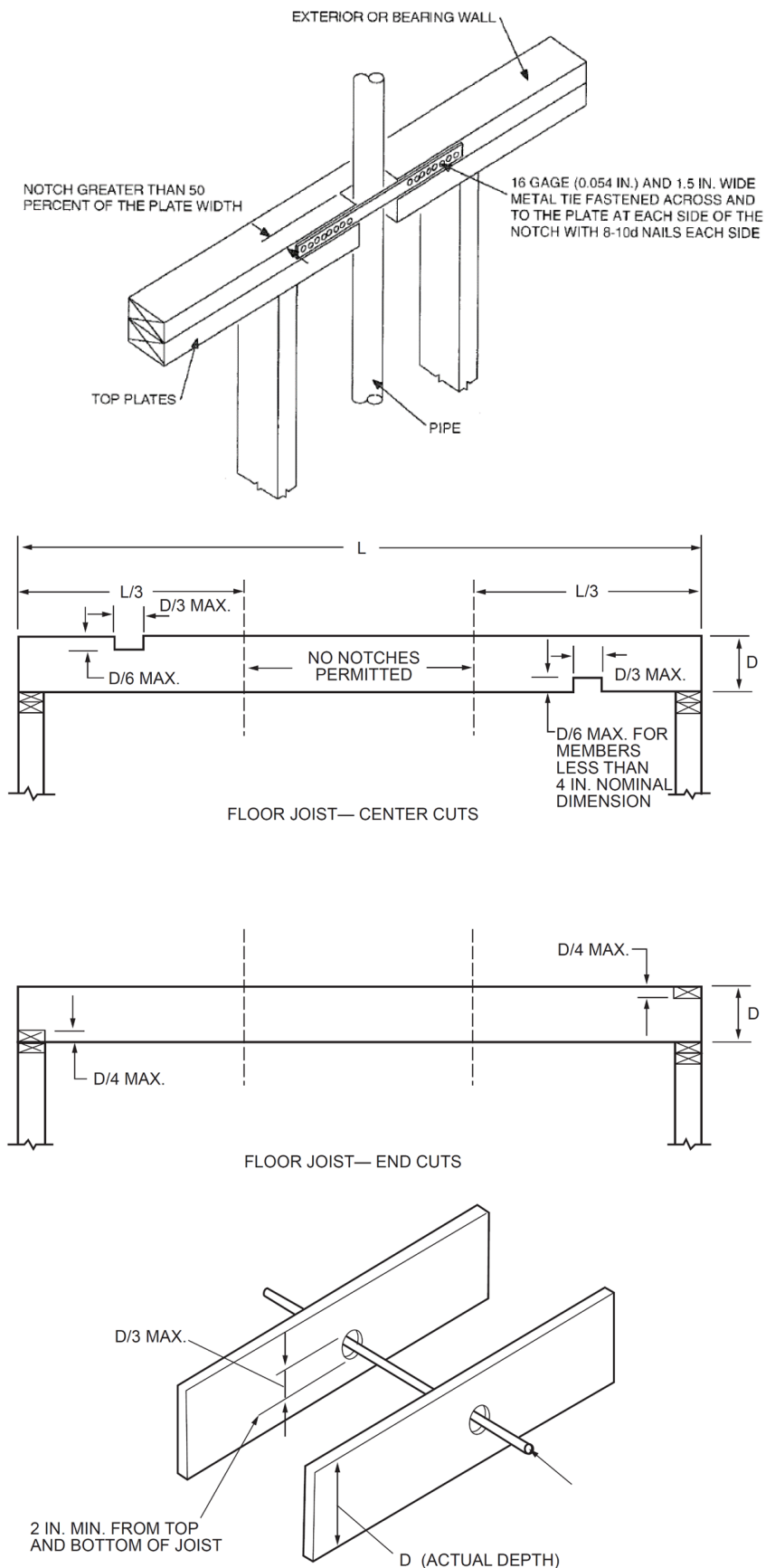
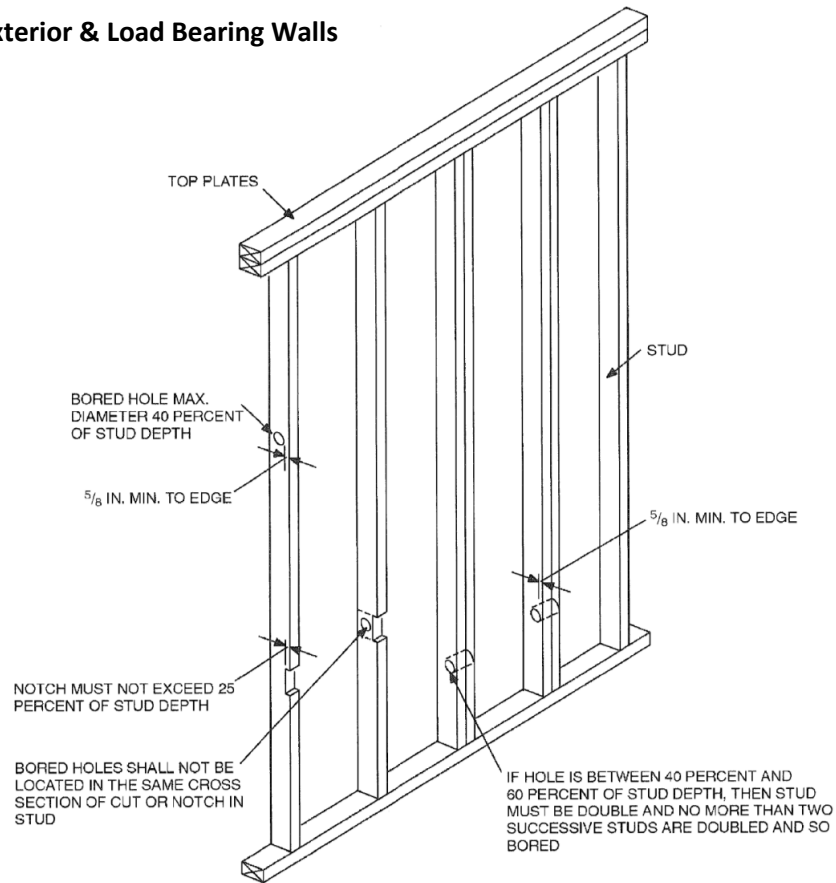
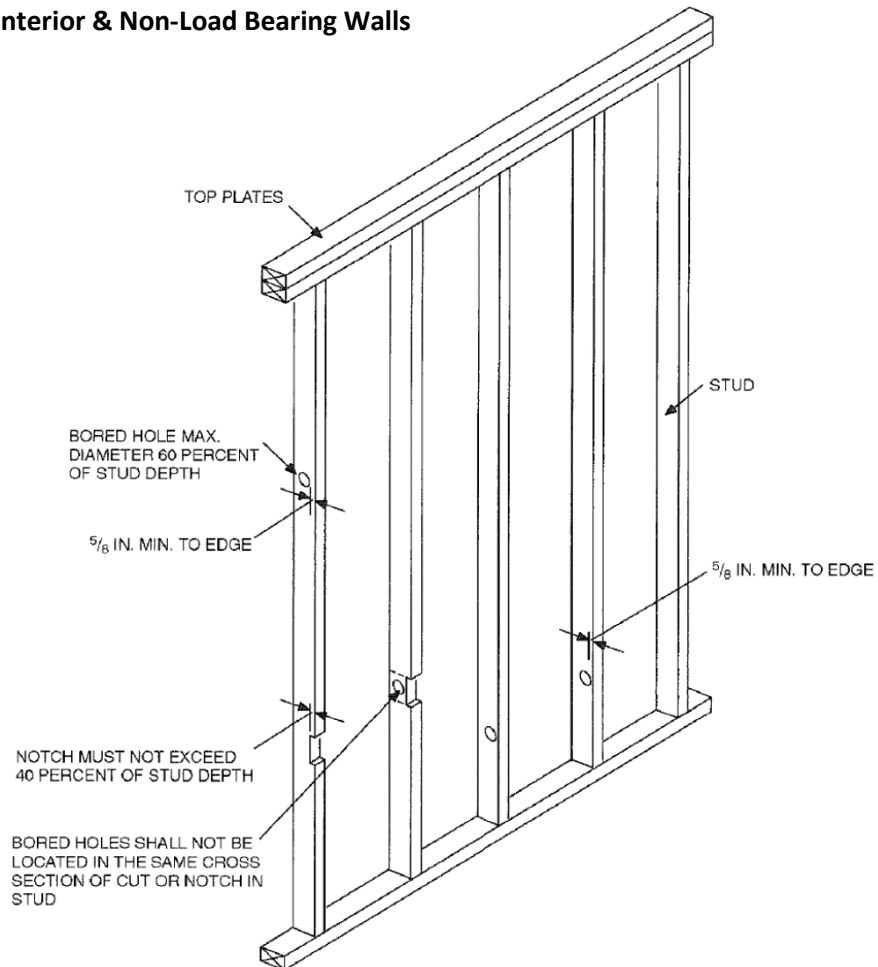


FIGURE R502.8
CUTTING, NOTCHING AND DRILLING

Exterior & Load Bearing Walls



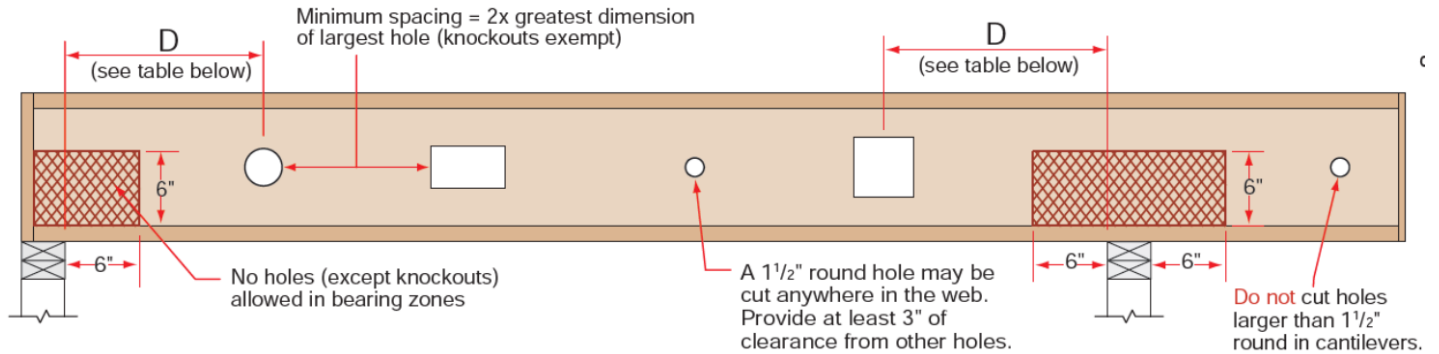
Interior & Non-Load Bearing Walls



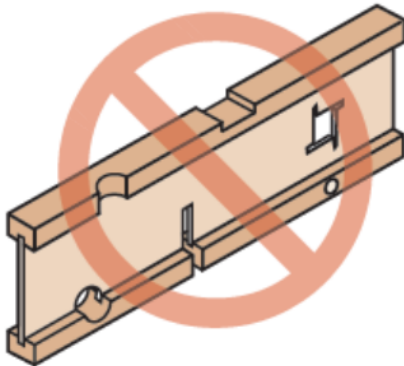
I Joist Cutting, Drilling, & Notching

- Follow manufacturer's specifications

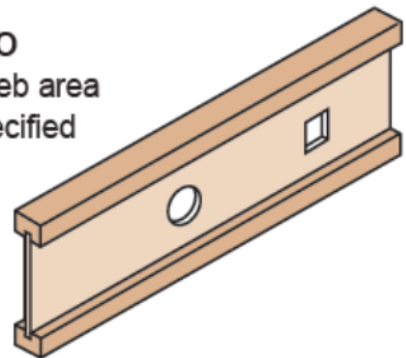
BCI® Joists are manufactured with 1½" round perforated knockouts in the web at approximately



DO NOT
cut or notch
flange



DO
cut in web area
as specified

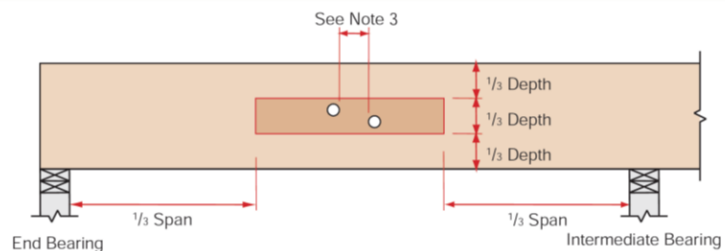


Allowable Holes in VERSA-LAM® Beams

Notes

- Square and rectangular holes are not permitted.
- Round holes may be drilled or cut with a hole saw anywhere within the shaded area of the beam.
- The horizontal distance between adjacent holes must be at least two times the size of the larger hole.
- Do not drill more than three access holes in any four foot long section of beam.
- The maximum round hole diameter permitted is:

Beam Depth	Max. Hole Diameter
5½"	¾"
7¼"	1"
9¼" and greater	2"



6. These limitations apply to holes drilled for plumbing or wiring access only. The size and location of holes drilled for fasteners are governed by the provisions of the *National Design Specification® for Wood Construction*.

7. Beams deflect under load. Size holes to provide clearance where required.

8. This hole chart is valid for beams supporting uniform load only. For beams supporting concentrated loads or for beams with larger holes, contact Boise Cascade EWP Engineering.

Minimum distance from support, listed in table below, is required for all holes greater than 1½"

MINIMUM DISTANCE (D) FROM ANY SUPPORT TO THE CENTERLINE OF THE HOLE																
Round Hole Diameter [in]			2	3	4	5	6	7	8	8 ⁷ / ₈	10	11	12	13	14	15
Rectangular Hole Side [in]			-	-	-	3	5	7	-	-	-	-	-	-	-	-
Any 9½" Joist	Span [ft]	8	1'-0"	1'-1"	1'-8"	2'-4"	2'-11"	3'-7"								
		12	1'-0"	1'-7"	2'-7"	3'-6"	4'-5"	5'-4"								
		16	1'-0"	2'-2"	3'-5"	4'-8"	5'-11"	7'-2"								
Round Hole Diameter [in]			2	3	4	5	6	7	8	8 ⁷ / ₈	10	11	12	13	14	15
Rectangular Hole Side [in]			-	-	-	2	3	5	7	8	-	-	-	-	-	-
Any 11 ⁷ / ₈ " Joist	Span [ft]	8	1'-0"	1'-1"	1'-6"	2'-0"	2'-5"	2'-11"	3'-5"	3'-10"						
		12	1'-0"	1'-7"	2'-3"	3'-0"	3'-8"	4'-5"	5'-1"	5'-9"						
		16	1'-2"	2'-1"	3'-0"	4'-0"	4'-11"	5'-10"	6'-10"	7'-8"						
		20	1'-5"	2'-7"	3'-10"	5'-0"	6'-2"	7'-4"	8'-6"	9'-7"						
Round Hole Diameter [in]			2	3	4	5	6	7	8	8 ⁷ / ₈	10	11	12	13	14	15
Rectangular Hole Side [in]			-	-	-	-	2	3	5	6	8	9	-	-	-	-
Any 14" Joist	Span [ft]	8	1'-0"	1'-1"	1'-2"	1'-2"	1'-6"	1'-11"	2'-4"	2'-9"	3'-3"	3'-8"				
		12	1'-0"	1'-1"	1'-2"	1'-7"	2'-3"	2'-11"	3'-6"	4'-1"	4'-10"	5'-6"				
		16	1'-0"	1'-1"	1'-3"	2'-2"	3'-0"	3'-10"	4'-9"	5'-6"	6'-6"	7'-4"				
		20	1'-0"	1'-1"	1'-7"	2'-8"	3'-9"	4'-10"	5'-11"	6'-10"	8'-1"	9'-2"				
		24	1'-0"	1'-1"	1'-11"	3'-3"	4'-6"	5'-10"	7'-1"	8'-3"	9'-9"	11'-0"				

For multiple holes, the amount of uncut web between holes must equal at least twice the diameter (or longest side) of the largest hole.

Holes may be positioned vertically anywhere in the web. The joist may be set with the 1½" knockout holes turned either up or down.

1½" round knockouts in the web may be removed by using a short piece of metal pipe and hammer.

Suspended Piping

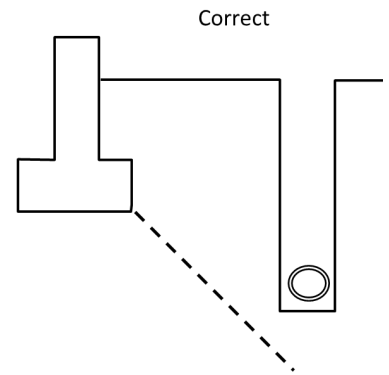
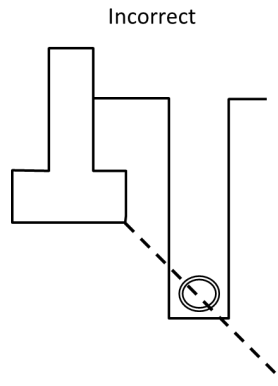
- Suspended piping supported in accordance with Table 313.3

Underground Installation

- Fully supported on a firm bed (313.5)

Trenches

- Piping cannot be buried parallel to the footing within the “cone of compression”
- Piping must be above 45° from the bottom exterior edges of the footing



Chapter 4 - Plumbing Fixtures and Fixture Fittings

Sanitation Requirements

- Minimum requirements:
- Water closet, lavatory, bathtub or shower
- Kitchen area with sink
- Plumbing fixtures (except toilets) provided with hot and cold water
- All fixtures connected to sewer (including floor drains) (R306)
- Toilets 30" minimum width, 24" in front
- Lavs 24" in front (402.5)
- Tub/shower surrounds non-absorbent
- Minimum 6 feet above the floor (R307.2)

Hot Water Temperature for Public Lavatories

- 120 max with temperature limiting device
- [Water heater control now permitted \(407.3\)](#)

Transient Public Lavatories

- Self closing or metering faucets installed on transient public lavatories
- Service stations, airports, restaurants, etc. (407.4)

Waste Outlet

- Lavatories minimum 1-1/4" tailpiece
- Approved stopper or strainer

Individual Shower Control Valves

- Each shower must have an individual control valve
- Water heater thermostat not acceptable as a control
- Not required on tub-only installs (no fall hazard)
- [Temperature limiting devices, water heater controls, temperature activated flow reduction now permitted \(408.3\)](#)

Shower Compartments

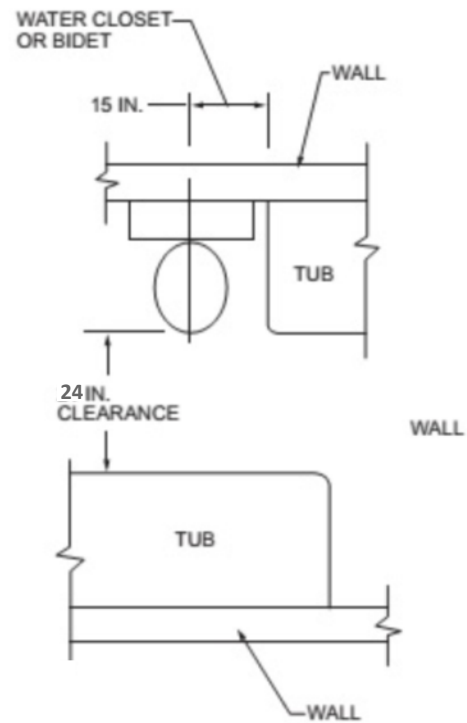
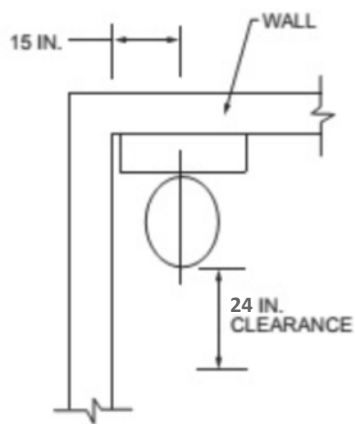
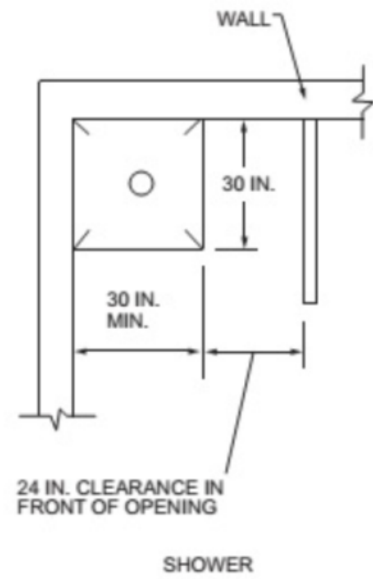
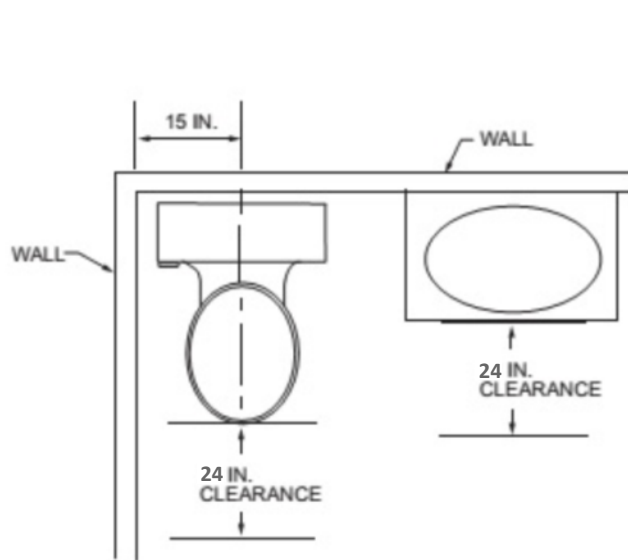
- Minimum 1024 square inches
- Minimum 30 inch circle
- Minimum 70 inches in height (408.6)

Installation and Access

- Whirlpool tubs must have removable panel for access
- Pump and piping self draining
- Suction fittings must comply with listed standards (409.6)



Whirlpool tub pump motors must be accessible and large enough for the removal of the motor at a later time. Exterior access is allowed if the panel is insulated to the same R-value as the surrounding exterior wall.



Water Closets

- Toilets maximum 1.6 GPF
- Dual flush toilets - average 1.6 GPF combined
- Flushometer 1.6 GPF max (411.2.1)

Nonwater Urinals

- Barrier liquid sealant
- 1 WSFU supply upstream on the same drain line for flow and rinsing
- Water line rough in for future retrofit to each urinal (412.1.1)

Nonwater Urinals with Drain Cleansing

- [Installed per manufacturers instructions \(412.1.2\)](#)

Low Pressure Water Dispenser

- [Installed per manufacturers instructions \(417.6\)](#)

Fixture Count

- Minimum fixtures required based on 50% male and 50% female
- If submitted documents show a different ratio, that ratio shall be used
- In occupancies of less than 50 people one toilet facility may be used (used to be 1500 square feet) (422.1)

Toilet Facilities

- Toilet facilities required on each floor
- Access to required toilet facilities cannot pass through employee areas
- Distance from required toilets to entry of shopping mall stores is 300 feet
- Distance from required toilets to entry of non-mall stores is 500 feet (422.4)



American Standard

Tofino Concealed Trapway 1-piece 1.1/1.6 GPF Dual Flush Elongated Toilet in White

★★★★☆ (36) [Write a Review](#) [Questions & Answers \(3\)](#)

Product Overview

This high-efficiency, ultra-low consumption model is WaterSense certified and uses 20% less water than standard toilets. The dual flush design provides the right flush at the right time. Its seamless 1-piece design with smooth-sided, cc... See Full Description

Dual flush toilets are allowed to have a flush rate in excess of 1.6 GPF, provided that the average of the greater and lesser flush rates is equal to or less than 1.6 GPF. In the example shown above the toilet has a lesser flush rate of 1.1 GPF and a greater flush rate of 1.6 GPF. The average flush rate is 1.35 GPF and this is the number used for code compliance.

Chapter 5 - Water Heaters

First Hour Rating

- Hot water available in the first hour of operation
- Based on bedrooms and bathrooms

Water Heater Requirements

- Water heaters may not be installed in bedrooms or bathrooms, unless:
 1. May be located in a closet within the bedroom or bathroom, if the closet is equipped with a listed gasketed self closing door assembly and supplied with combustion air
 2. Water heater is direct vent (504.1)

Self Closing Doors

- Self closing doors must latch each time the door is opened
- Hold-open mechanisms are not allowed (504.1.1)

Vents

- Water heaters shall be as close as possible to the chimney or vent, unless direct vent (504.2)

Pressure/Temperature Limiting Devices

- Over pressure protection required on all water heaters
- Over temperature protection required on all water heaters (504.4-5)

Temperature, Pressure, Vacuum Relief

- Installed according to manufacturer's specs
- No shutoff allowed between valve and discharge
- Capacity of discharge valve no less than input capacity of the water heater (504.6)

Oil Burning Water Heaters

- Storage type water heaters and hot water boilers must have a secondary over temperature device
- Oil fired water heaters follow NFPA 31 (505.2-3)

Table 501.1(2) - First Hour Rating

Number of Bathrooms	1 to 1.5			2 to 2.5				3 to 3.5			
Number of Bedrooms	1	2	3	2	3	4	5	3	4	5	6
First Hour Rating, Gallons	38	49	49	49	62	62	74	62	74	74	74

First hour rating found on the energy guide label
Solar water heaters must meet ratings shown in table



Capping, restricting, or otherwise impeding the flow or outlet of a pressure relief valve is expressly prohibited. Pressure relief valve discharge should be visible to alert occupant to a problem

Seismic Provisions

- Seismic categories C, D, E, and F require earthquake strapping
- Straps on upper and lower third of tank
- 4" above controls (507.2)

Ground Support

- Water heaters must rest on concrete or other approved base
- 3" above adjoining ground level (507.4)

Drainage Pan

- Must have drain pane where damage is possible from leakage
- 3/4" outlet
- 1-1/2" pan depth (507.5)



Even domestic hot water storage only tanks must be strapped in seismic areas as they provide a source of potable water in an emergency.

Installation in Garages

- Appliances in garages, appliances in spaces off of garage that are not part of the dwelling unit
- Burner must be elevated 18" off of the floor
- Appliances protected from vehicular impact
- Appliances in rooms in a garage where the only access is from outside are allowed to be installed on the floor (507.13)

Any gas appliance located in a residential garage or room open to the garage that is not a part of the living space is required to be elevated so the burner or burner ignition device is a minimum of 18" above the floor surface. In addition to being elevated off the floor gas appliances in garages must be protected from physical damage by a moving vehicle. When appliances are installed in a separate, enclosed space having access only from outside of the garage, the equipment may be installed at floor level, providing the required combustion air is taken from the exterior of the garage

Physical Damage

- Protected where physical damage may occur
- Barriers, elevated, out of vehicle path (507.13.1)

Access from Outside

- Only accessible through exterior
- Combustion air not from garage (507.13.2)

Protection of Outdoor Appliances

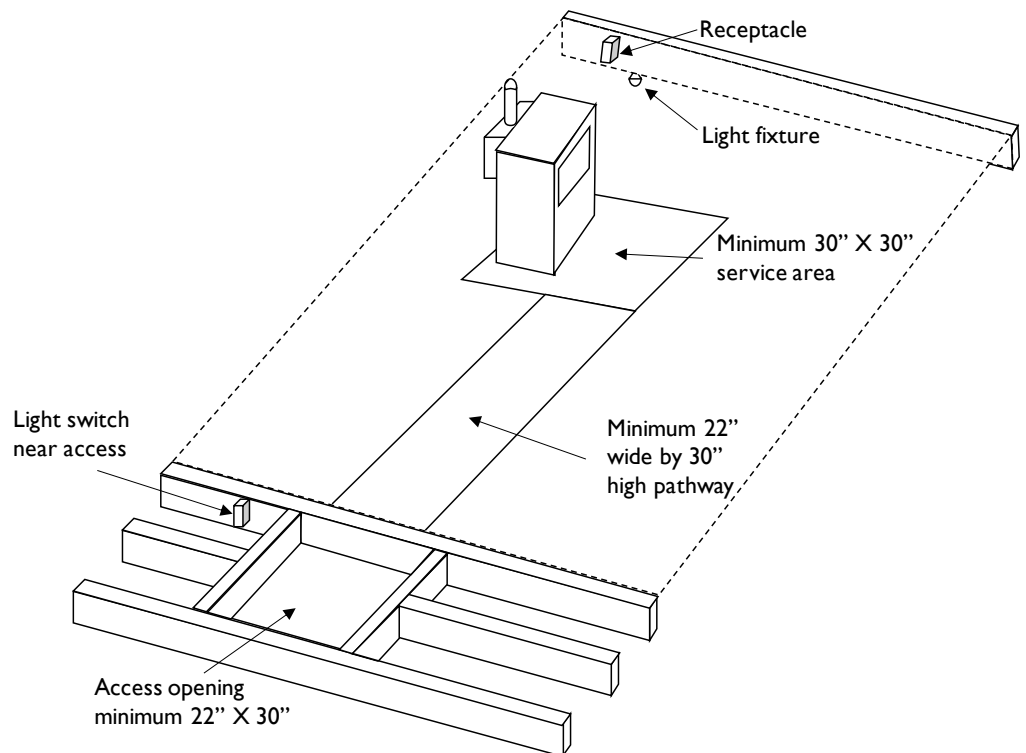
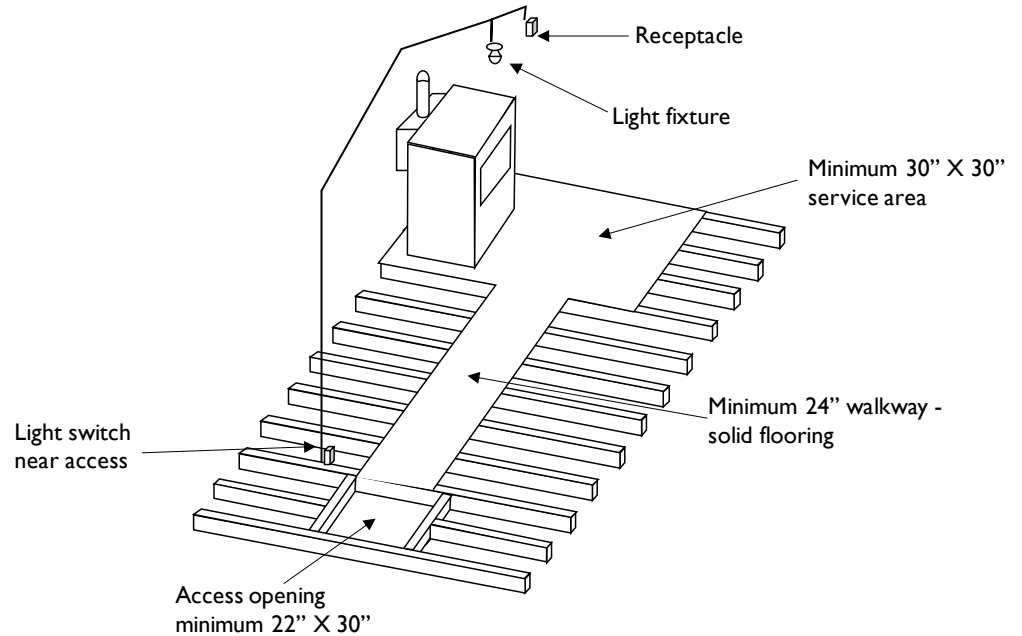
- Outdoor appliances must be protected from weather (507.25)

Accessibility for Service

- Appliance must be accessible
- Sufficient clearance for maintenance
- Attic passageways must be floored (507.26)

Appliance Access

- Access through an opening and passageway must be bigger than the largest appliance
- Minimum 22" by 30"
- Passageway height less than 6', maximum length of 20'
- Solid flooring, 24" in width minimum
- 30" by 30" work platform on the service side
- 120v receptacle and light at appliance, switch at entrance (508.4)

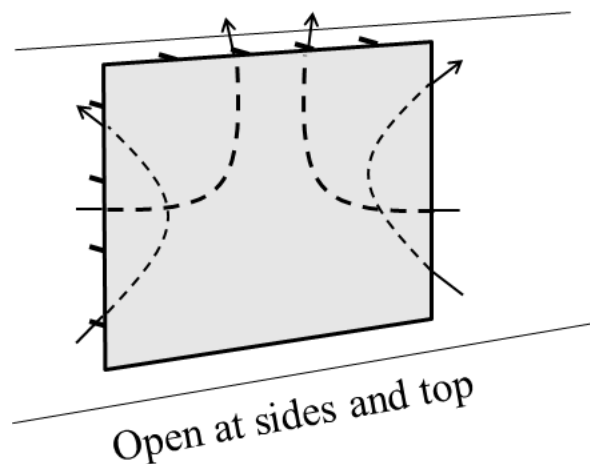
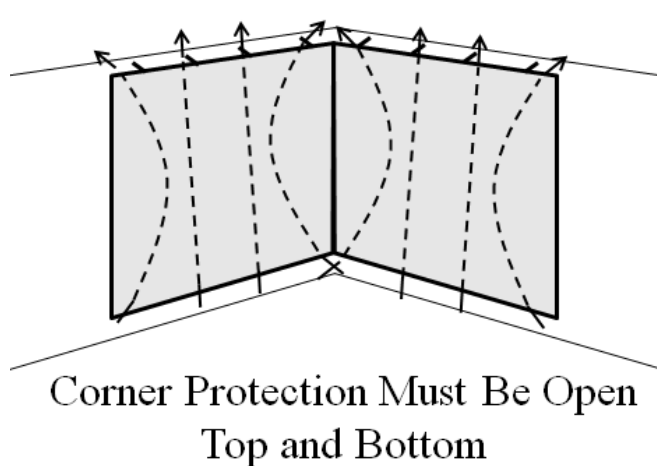
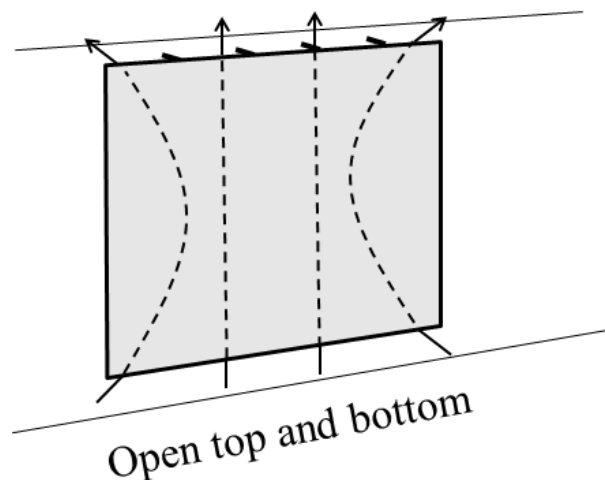
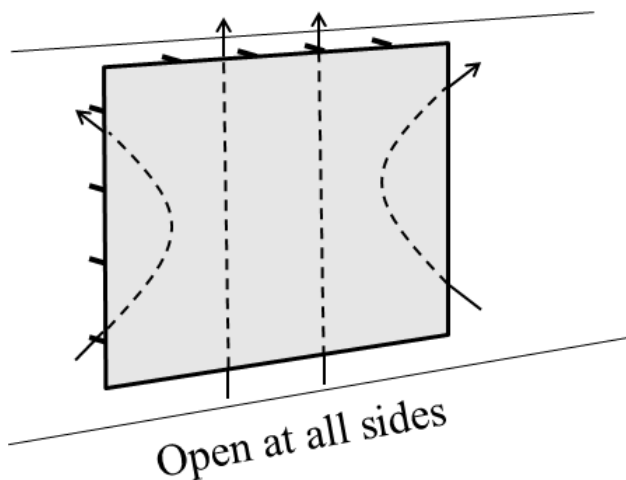
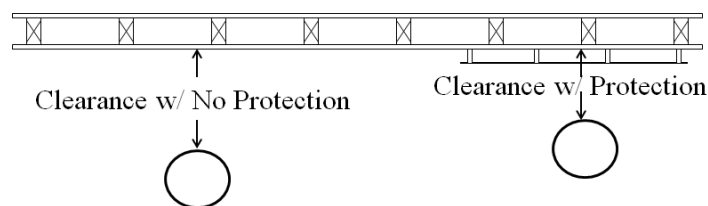
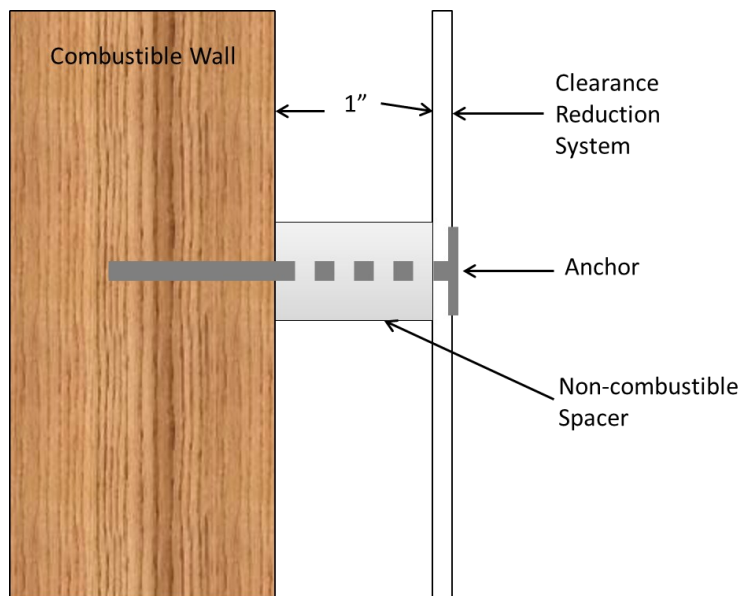


Reduction of Clearances

- Rules for reducing required clearances by means of heat shields

Reduction of Clearances

- Clearances shall be measured from the outer surface of the combustable material to the nearest point on the surface of the appliance, disregarding any intervening protection applied to the combustable material
- Spacers and ties shall be of noncombustible material. No spacer or tie shall be used directly opposite the appliance or connector
- There shall be at least 1 inch between clearance reduction systems and combustable walls and ceiling for reduction systems using ventilated air space
- There shall be at least 1 inch between the appliance and the protector



Fasteners

- Fasteners shall not penetrate the inner wall of double walled pipe (509.6.1)

Termination Requirements

- Gas vents smaller than 12" follow Table 509.6.2
- Must be at least 8 feet from vertical walls or other obstructions
- Gas vents over 12" must extend two feet through the roof and at least 2 feet above any obstructions within 10 feet (509.6.2)

Type B and L Vents

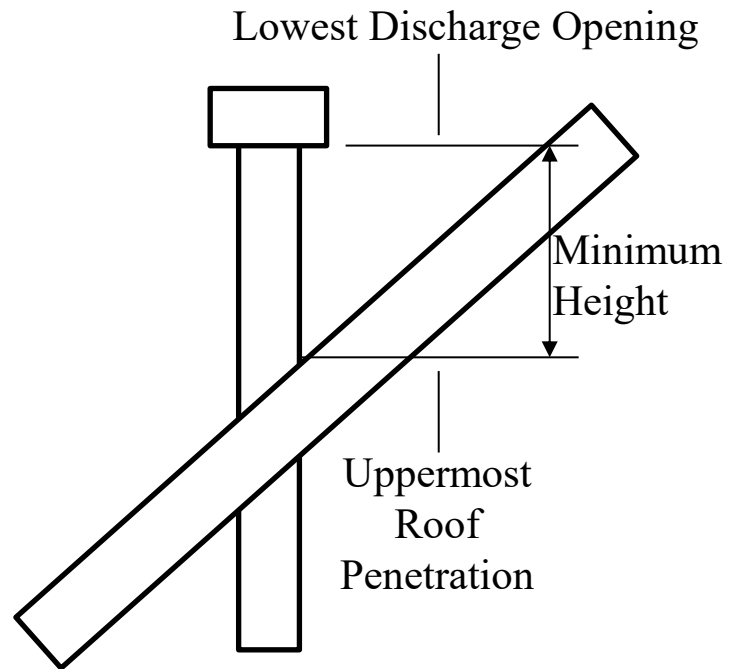
- Type B or L gas vents must extend 5 feet above highest connected draft hood or flue collar (509.6.2.1)
- (Type B suitable only for listed, draft-hood equipped, gas-fired appliances, including most domestic heating and hot water systems)
- (Type L vents are designed for venting approved oil-fired and natural-gas appliances that produce draft hood flue gasses that do not exceed a temperature of 570° F)

Type B-W Vents

- Type B-W gas vent shall terminate at least 12' above the bottom of the wall furnace (509.6.1.2)
- (Type B-W is oval type B used typically for wall furnaces)

Gas Vents

- Gas vent shall terminate at least 3 feet above a forced air inlet within 10 feet (509.6.1.6)



Gas Vent Terminations Locations for Listed Caps 12 Inches Or Less In Size, Not Less than 8 Feet From A Vertical Wall

Flat to 6/12	1.0
6/12 to 7/12	1.25
7/12 to 8/12	1.5
8/12 to 9/12	2.0
9/12 to 10/12	2.5
10/12 to 11/12	3.25
11/12 to 12/12	4.0
12/12 to 14/12	5.0
14/12 to 16/12	6.0
16/12 to 18/12	7.0
18/12 to 20/12	7.5
20/12 to 21/12	8.0

Mechanical Draft Venting Systems

- Mechanical draft vent systems must be at least 3 feet above any forced air inlet within 10 feet
- Must terminate 4 feet below, 4 feet horizontally from, or 1 foot above any openings into the building
- Must also be 12 inches above grade (24 inches in AK) (509.8.1)

Direct Vent Appliances

- Direct vent termination distance depends on appliance BTU/h input
- <10,000 BTU/h – 6 inches from openings
- 10,000 < 50,000 BTU/h 9 inches from openings
- >50,000 BTU/h to 150,000 BTU/h 12 inches from openings
- Above 150,000 BTU/h – manufacturer specs, no less than a mechanical draft system
- Must also be 12 inches above grade (24 inches in AK) (509.8.2)

Nuisance and Hazard

- Category II and IV appliances shall not discharge where a nuisance or hazard is created
- Same applies to I and III appliances where condensate is a problem
- Freezing condensate issues (509.8.3)

Condensation Drain

- Condensate shall be “collected and disposed” for all appliance types (509.9.1)
- This means in an approved receptor per Chapter 8



Exhaust too close to grade, subject to snow closure.