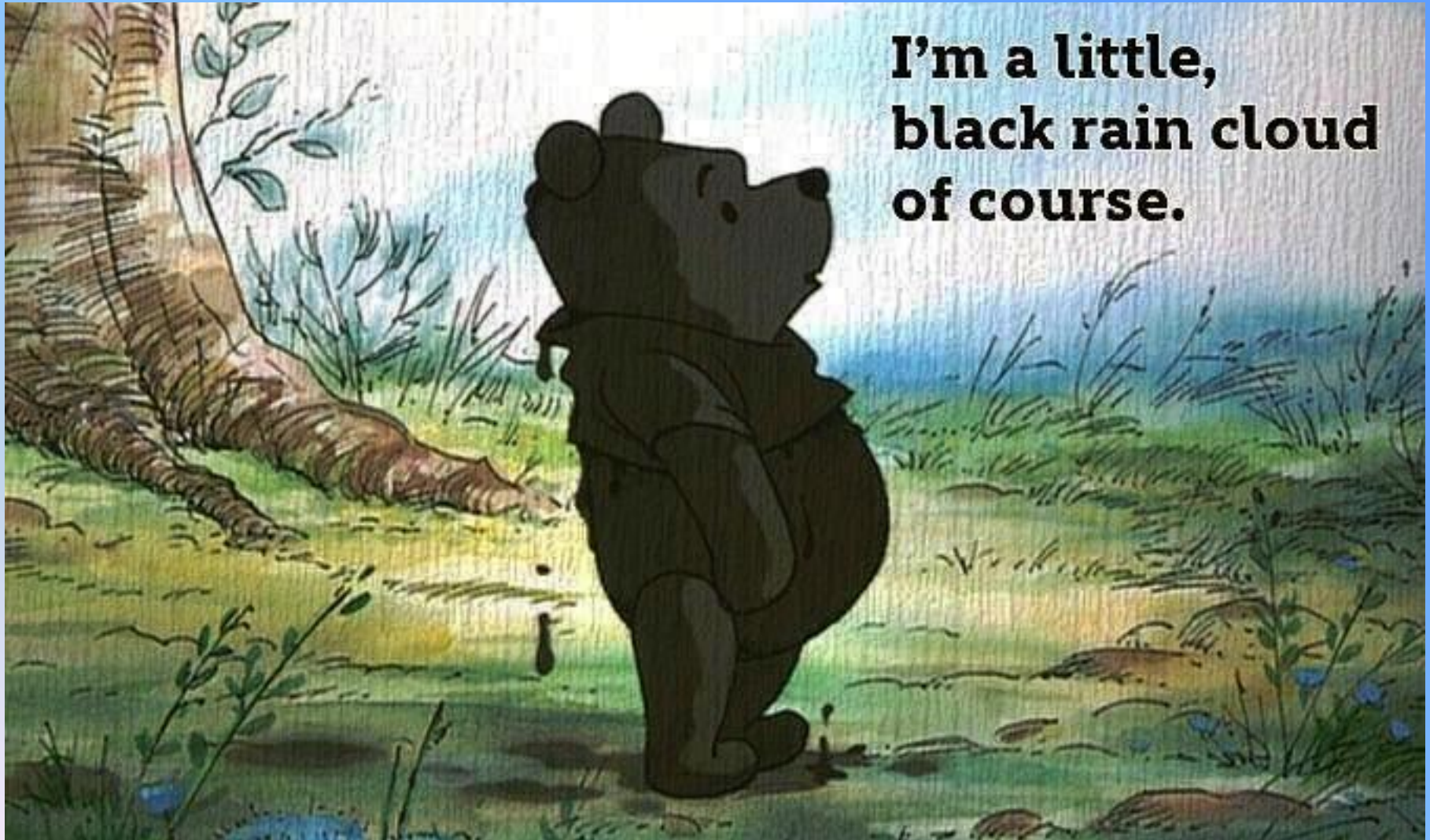


CHANGES TO THE
PENNSYLVANIA UNIFORM
CONSTRUCTION CODE
INCLUDING THE 2015
INTERNATIONAL
RESIDENTIAL CODE

Who dreams this stuff up?

This presentation will cover the 2015 International Residential Code including the changes made by the Legislature and the Review and Advisory Council

Why would anyone provide this training?



**I'm a little,
black rain cloud
of course.**

Sunrooms R301.2.1.1.1

We are starting with a softball. The code now lists 5 different types of sunrooms and has different requirements for each of them.

Sunrooms. Sunrooms shall comply with AAMA/NPEA/NSA 2100.

Category I: A thermally isolated sunroom with walls that are open or enclosed with insect screening or plastic film. The space is nonhabitable and unconditioned.

Category II: A thermally isolated sunroom with enclosed walls. With plastic or glass. The space is nonhabitable and unconditioned.

Category III: A thermally isolated sunroom with enclosed walls. With better plastic or glass. The space is nonhabitable and unconditioned.

Category IV: A thermally isolated sunroom with enclosed walls. The space is nonhabitable and conditioned. With a separate hvac system

Category V: A sunroom with enclosed walls. The space is habitable and conditioned. Using the homes hvac system.

N1102.3.5 (R402.3.5) *Sunrooms enclosing conditioned space* shall meet the fenestration requirements of this code. **Category V**

Exception: For *sunrooms with thermal isolation and enclosing conditioned space*, the maximum fenestration *U-factor* shall be 0.45 **Category II, III, & IV**

Building Planning R301.2

Climatic and geographic design criteria

Many of the maps charts and wind speed calculations have been changed to an ultimate wind speed design. The engineering calculations may have changed but the final design will be very similar.

TABLE R301.2.1.3
WIND SPEED CONVERSIONS^a

V_{ult}	110	115	120	130	140	150	160	170	180	190	200
V_{asd}	85	89	93	101	108	116	124	132	139	147	155



R301.3 Story height. The wind and seismic provisions of this code shall apply to buildings with story heights not exceeding the following:

1. For wood wall framing, the story height shall not exceed 11 feet 7 inches and the laterally unsupported bearing wall stud height permitted by Table R602.3(5) and Table R602.3(6) in Pennsylvania

**TABLE R602.3(6)
ALTERNATE WOOD BEARING WALL STUD SIZE, HEIGHT AND SPACING**

STUD HEIGHT	SUPPORTING	STUD SPACING ^a	115 mph	
			Maximum roof/floor span ^c	
			12 ft.	24 ft.
11 ft.	Roof Only	12 in.	2 x 4	2 x 4
		16 in.	2 x 4	2 x 4
		24 in.	2 x 6	2 x 6
	Roof and One Floor	12 in.	2 x 4	2 x 6
		16 in.	2 x 6	2 x 6
		24 in.	2 x 6	2 x 6
12 ft.	Roof Only	12 in.	2 x 4	2 x 4
		16 in.	2 x 4	2 x 6
		24 in.	2 x 6	2 x 6
	Roof and One Floor	12 in.	2 x 4	2 x 6
		16 in.	2 x 6	2 x 6
		24 in.	2 x 6	2 x 6

**TABLE R602.3(5)
SIZE, HEIGHT AND SPACING OF WOOD STUDS^a**

STUD SIZE (Inches)	BEARING WALLS				NONBEARING WALLS		
	Laterally unsupported stud height ¹ (feet)	Maximum spacing when supporting a roof-ceiling assembly or a habitable attic assembly, only (Inches)	Maximum spacing when supporting one floor, plus a roof-ceiling assembly or a habitable attic assembly (Inches)	Maximum spacing when supporting two floors, plus a roof-ceiling assembly or a habitable attic assembly (Inches)	Maximum spacing when supporting one floor height ² (Inches)	Laterally unsupported stud height ¹ (feet)	Maximum spacing (Inches)
2 x 3 ^b	—	—	—	—	—	10	16
2 x 4	10	24 ^c	16 ^c	—	24	14	24
3 x 4	10	24	24	16	24	14	24
2 x 5	10	24	24	—	24	16	24
2 x 6	10	24	24	16	24	20	24

Residential building—Detached one-family and two-family dwellings and townhouses which are not more than three stories above grade plane in height with a separate means of egress and their accessory structures.

R302.3 Two-family dwellings. *Dwelling units* in two-family dwellings shall be separated from each other by wall and floor assemblies having not less than a **1-hour fire-resistance** rating where tested in accordance with ASTM E 119 or UL 263. Fire-resistance-rated floor/ceiling and wall assemblies shall extend to and be tight against the *exterior wall*, and wall assemblies shall extend from the foundation to the underside of the roof sheathing.

Exceptions:

1. A fire-resistance rating of 1/2 hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13.
2. Wall assemblies need not extend through *attic* spaces where the ceiling is protected by not less than 5/8-inch Type X gypsum board, an *attic* draft stop constructed as specified in Section R302.12.1 is provided above and along the wall assembly separating the *dwellings* and the structural framing supporting the ceiling is protected by not less than 1/2-inch gypsum board or equivalent.

R302.5.1 Opening protection.

Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between the garage and residence shall be equipped with solid wood doors not less than 1 3/8 inches (35 mm) in thickness, solid or honeycomb core steel doors not less than 1 3/8 inches (35 mm) thick, or 20-minute fire-rated doors, ~~equipped with a self-closing device.~~

R303.4 Mechanical ventilation. Where the air infiltration rate of a *dwelling unit* is 5 air changes per hour or less where tested with a blower door at a pressure of 0.2 inch w.c (50 Pa) in accordance with Section N1102.4.1.2, the *dwelling unit* shall be provided with whole-house mechanical ventilation in accordance with Section M1507.3.

N1102.4 (R402.4) Air leakage (Mandatory).

N1102.4.1.2 (R402.4.1.2) Testing. The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding five air changes per hour in Climate Zones 1 and 2, and ~~three air changes per hour in Climate Zones 3 through 8.~~ **In Pennsylvania, five air changes per hour is the required maximum therefore mechanical ventilation is also required.**

SECTION R305 CEILING HEIGHT

R305.1 Minimum height. *Habitable space*, hallways and portions of *basements* containing these spaces shall have a ceiling height of not less than **7 feet**. The ceiling height above bathroom and toilet room fixtures shall be such that the fixture is capable of being used for its intended purpose. A shower or tub equipped with a showerhead shall have a ceiling height of not less than **6 feet 8 inches above an area of not less than 30 inches by 30 inches at the showerhead**. Beams, girders, ducts or other obstructions in *basements* containing *habitable space* shall be permitted to project to within 6 feet 4 inches of the finished floor.

R308.4.2 Glazing adjacent to doors. Glazing in an individual fixed or operable panel adjacent to a door shall be considered to be a hazardous location where the bottom exposed edge of the glazing is less than 60 inches above the floor or walking surface and it meets either of the following conditions:

1. Where the glazing is within 24 inches of either side of the door in the plane of the door in a closed position.
2. Where the glazing is on a wall perpendicular to the plane of the door in a closed position and within 24 inches of the hinge side of an in-swinging door.

This section was rewritten but the only important changes are these.

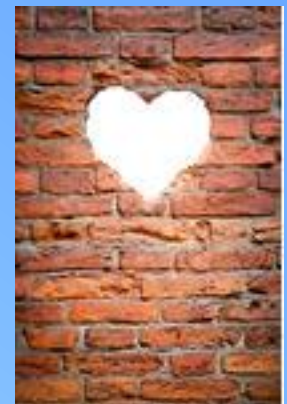
R310.3 Emergency escape and rescue doors. Where a door is provided as the required emergency escape and rescue opening, it shall be permitted to be a side-hinged door or a slider. Where the opening is below the adjacent ground elevation, it shall be provided with a bulkhead enclosure.

Does this mean all or any of the opening?

R310.3.1 Minimum door opening size. The minimum net clear height opening for any door that serves as an emergency and escape rescue opening shall be in accordance with Section R310.2.1.

R310.3.2 Bulkhead enclosures. Bulkhead enclosures shall provide direct access from the *basement*. The bulkhead enclosure shall provide the minimum net clear opening equal to the door in the fully open position.

A 36" standard door is 20 square feet, is any shape acceptable?
The underlined sections are new and troubling.



R310.6 Alterations or repairs of existing basements

An emergency escape and rescue opening is not required where existing *basements* undergo alterations or repairs.

Exception: New sleeping rooms created in an existing *basement* shall be provided with emergency escape and rescue openings in accordance with Section R310.1.

The Legislature exempt all but structural alterations; so the underlined section should not apply in Pennsylvania.

R319.1 Address identification. Buildings shall be provided with *approved* address identification. The address identification shall be legible and placed in a position that is visible from the street or road fronting the property. Address identification characters shall contrast with their background. Address numbers shall be Arabic numbers or alphabetical letters. Numbers shall not be spelled out. Each character shall be not less than 4 inches in height with a stroke width of not less than 0.5 inch.

SECTION R314 SMOKE ALARMS

New Location Rules

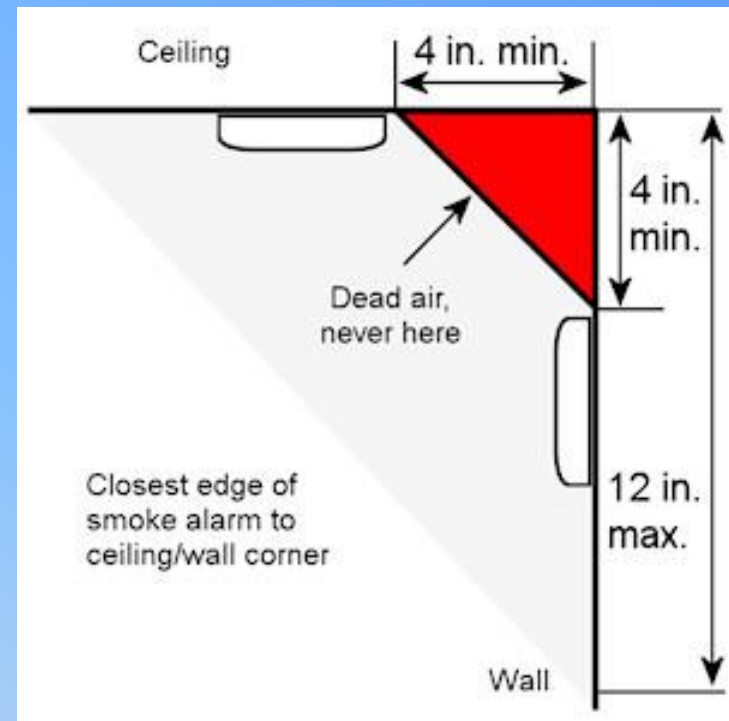
Smoke alarms shall be installed not less than 3 feet horizontally from the door or opening of a bathroom that contains a bathtub or shower unless this would prevent placement of a smoke alarm required by Section R314.3.

R314.3.1 Installation near cooking appliances. Smoke alarms shall not be installed in the following locations unless this would prevent placement of a smoke alarm in a location required by Section R314.3.

Ionization smoke alarms shall not be installed less than 20 feet horizontally from a permanently installed cooking *appliance*.

Ionization smoke alarms with an alarm-silencing switch shall not be installed less than 10 feet horizontally from a permanently installed cooking *appliance*.

Photoelectric smoke alarms shall not be installed less than 6 feet horizontally from a permanently installed cooking *appliance*.



SECTION R315 CARBON MONOXIDE ALARMS

R315.5 Power source. Carbon monoxide alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and, where primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection.

Exceptions:

1. Carbon monoxide alarms shall be permitted to be battery operated where installed in buildings without commercial power.
2. Carbon monoxide alarms installed in accordance with Section R315.2.2 shall be permitted to be battery powered.

Carbon monoxide detectors in additions may be battery powered.

SECTION R322 FLOOD-RESISTANT CONSTRUCTION

R322.2.1 Elevation requirements.

1. Buildings and structures in flood hazard areas, including flood hazard areas designated as Coastal A Zones, shall have the lowest floors elevated to or above the base flood elevation ~~plus 1 foot~~, or the design flood elevation.
2. In areas of shallow flooding (AO Zones), buildings and structures shall have the lowest floor (including basement) elevated to a height of not less than the highest adjacent grade as the depth number specified in feet on the FIRM ~~plus 1 foot~~, or not less than 3 feet if a depth number is not specified.
3. Basement floors that are below grade on all sides shall be elevated to or above base flood elevation ~~plus 1 foot~~, or the design flood elevation, whichever is higher.

Strike through sections do not apply in Pennsylvania

SECTION 324 SOLAR ENERGY SYSTEMS

Solar energy systems are mentioned and requirements are specified for the first time in Pennsylvania. This includes both water heating and photovoltaic systems. The new sections are in several places.

R902.3 Building-integrated photovoltaic product

R902.4 Rooftop-mounted photovoltaic panels and modules

R905.16 Photovoltaic shingles.

Section R907 Rooftop-mounted photovoltaic systems

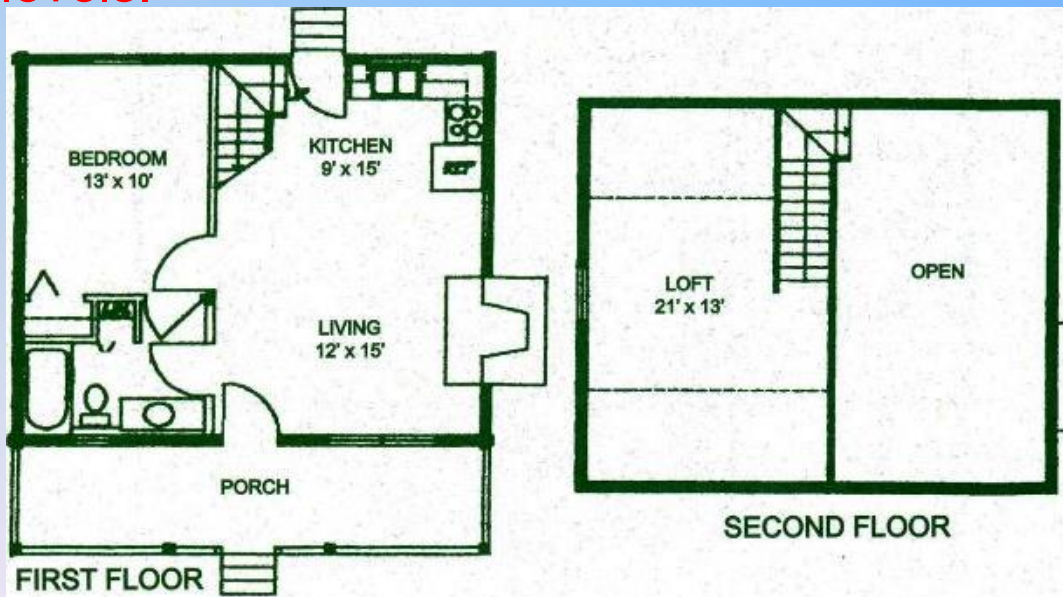
Section R909 Rooftop-mounted photovoltaic panel systems

APPENDIX U SOLAR-READY PROVISIONS—DETACHED ONE- AND TWO-FAMILY DWELLINGS, MULTIPLE SINGLEFAMILY DWELLINGS (TOWNHOUSES) **was not adopted in Pennsylvania.**

SECTION R325 MEZZANINES

MEZZANINE. An intermediate level or levels between the floor and ceiling of any *story*. Mezzanines are now regulated in the International Residential Code. In Pennsylvania, the maximum wall height was lowered to 36" to match the 2018 IRC.

I don't know what an opening from one story to another would be considered; but it doesn't meet the definition of a mezzanine. I don't believe this has any effect on balconies, lofts, or similar areas overlooking lower levels.



These are not mezzanines

SECTION R326 SWIMMING POOLS, SPAS AND HOT TUBS

R326.1 General. The design and construction of pools and spas shall comply with the *International Swimming Pool and Spa Code*.

Chapter 42 of the IRC still covers the electrical requirements of swimming pools, but the barrier requirements from Appendix G have been removed. Probably to this new code.



SECTION R403 FOOTINGS

TABLE R403.1(1) MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS FOR LIGHT-FRAME CONSTRUCTION (inches)a, b 30 psf ground snow load

load bearing value of soil	1500	2000	2500	3000	3500	4000
1 story—slab-on-grade	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>
1 story—with crawl space	13X6	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>
1 story—plus basement	19X6	14X6	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>
2 story—slab-on-grade	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>
2 story—with crawl space	17X6	13X6	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>
2 story—plus basement	23X6	17X6	14X6	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>
3 story—slab-on-grade	15X6	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>
3 story—with crawl space	20X6	15X6	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>	<u>12X6</u>
3 story—plus basement	26X8	20X6	16X6	13X6	<u>12X6</u>	<u>12X6</u>

There are now 3 pages of different footer sizes. I have underlined those that are 12X6.

R606.2 Masonry construction materials.

R606.2.7.1 Mortar for masonry foundation walls constructed as set forth in Tables R404.1.1(1) through R404.1.1(4) shall be Type M or S mortar.

R606.2.7.2 Mortar for masonry serving as the lateral force resisting system in Seismic Design Categories A, B and C shall be Type M, S or N mortar.

R606.2.10 Mortar for use with adhered masonry veneer shall conform to ASTM C 270 Type S or Type N or shall comply with ANSI A118.4 for latex-modified portland cement mortar.

R606.2.11 Grout shall consist of cementitious material and aggregate in accordance with ASTM C 476 or the proportion specifications of Table R606.2.11. Type M or Type S mortar to which sufficient water has been added to produce pouring consistency shall be permitted to be used as grout.

R606.3 Construction requirements.

R606.3.1 Unless otherwise required or indicated on the project drawings, head and bed joints shall be 3/8 inch thick, except that the thickness of the bed joint of the starting course placed over foundations shall be not less than 1/4 inch and not more than 3/4 inch. Mortar joint thickness for load bearing masonry shall be within the following tolerances from the specified dimensions:

Bed joint: + 1/8 inch **Head joint:** - 1/4 inch, + 3/8 inch **Collar joints:** - 1/4 inch, + 3/8 inch

R606.3.2 The mortar shall be sufficiently plastic and units shall be placed with sufficient pressure to extrude mortar from the joint and produce a tight joint. Deep furrowing of bed joints that produces voids shall not be permitted. Any units disturbed to the extent that initial bond is broken after initial placement shall be removed and relaid in fresh mortar. Surfaces to be in contact with mortar shall be clean and free of deleterious materials.

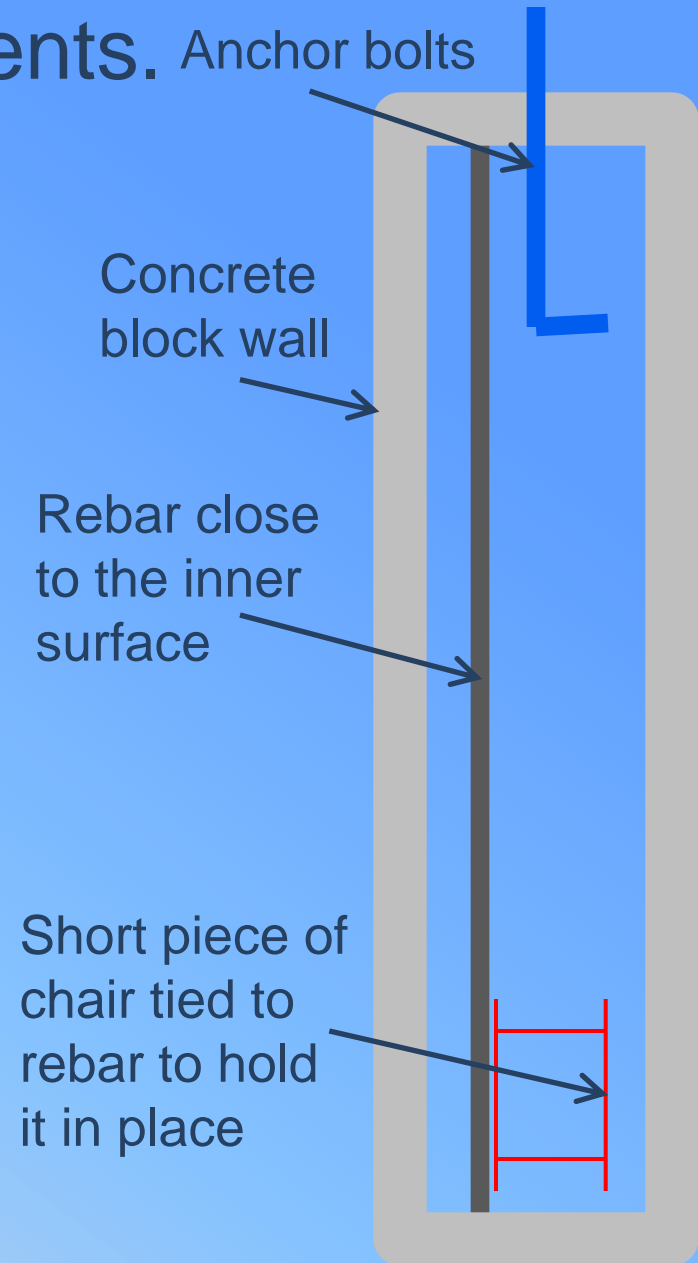


R606.3.5 Grouting requirements.

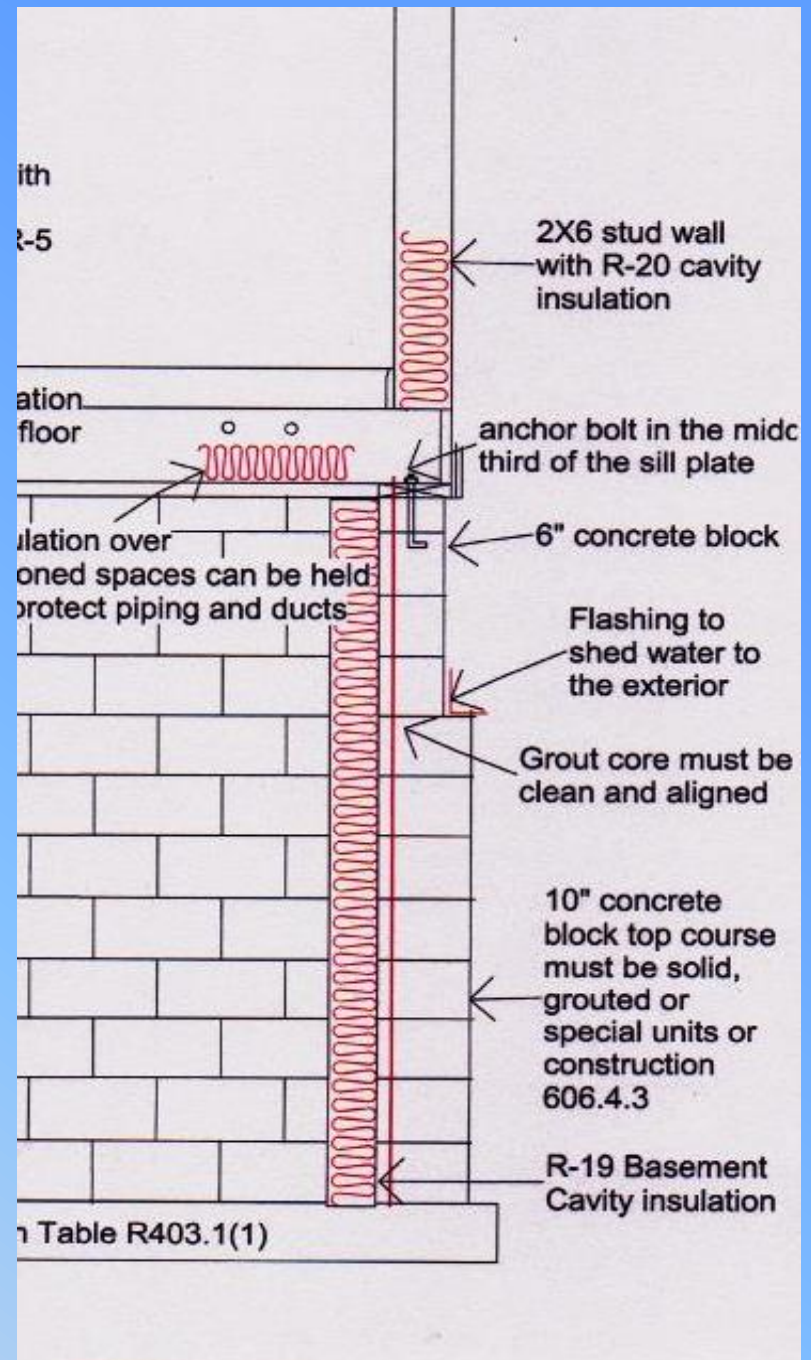
R606.3.5.2 Cleanouts. Provisions shall be made for cleaning the space to be grouted.

Mortar that projects more than 1/2 inch (12.7 mm) into the grout space and any other foreign matter shall be removed from the grout space prior to inspection and grouting. **Where required by the building official**, cleanouts shall be provided in the bottom course of masonry for each grout pour where the grout pour height exceeds 64 inches (1626 mm). In solid grouted masonry, cleanouts shall be spaced horizontally not more than 32 inches (813 mm) on center. The cleanouts shall be sealed before grouting and after inspection.

Vertical reinforcement shall be held in position at top and bottom and at intervals not exceeding 200 diameters of the reinforcement.



R606.4.3 Change in thickness. Where walls of masonry of hollow units or masonry-bonded hollow walls are decreased in thickness, a course of solid masonry or masonry units filled with mortar or grout shall be constructed between the wall below and the thinner wall above, or special units or construction shall be used to transmit the loads from face shells or wythes above to those below.

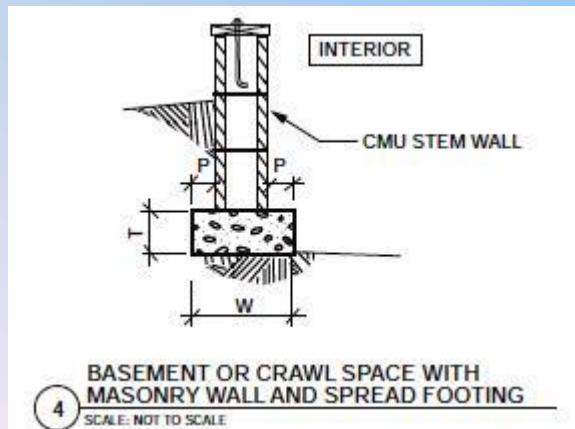


R403.1.6 Foundation anchorage.

Exceptions:

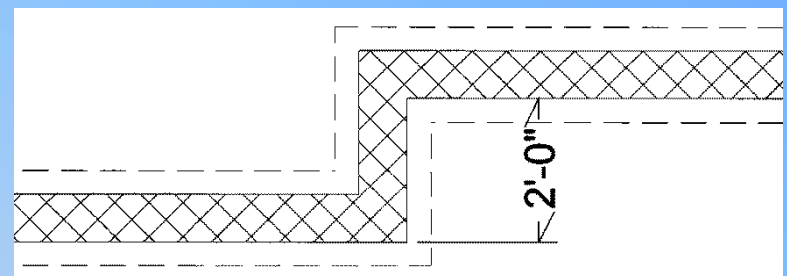
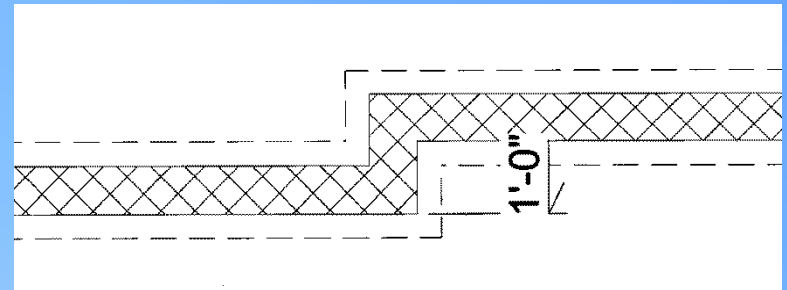
1. Walls 24 inches total length or shorter connecting offset braced wall panels shall be anchored to the foundation with a minimum of one anchor bolt located in the center third of the plate section and shall be attached to adjacent braced wall panels at corners as shown in Item 9 of Table R602.3(1).
2. Connection of walls 12 inches total length or shorter connecting offset *braced wall panels* to the foundation without anchor bolts shall be permitted. The wall shall be attached to adjacent braced wall panels at corners as shown in Item 9 of Table R602.3(1).

Clarification of anchoring for small walls.



No anchor
bolt required

One anchor
bolt required



R404.1.9.2 Masonry piers supporting floor girders.

Masonry piers supporting wood girders sized in accordance with Tables R602.7(1) and R602.7(2) shall be permitted in accordance with this section. Piers supporting girders for interior bearing walls shall have a minimum nominal dimension of 12 inches and a maximum height of 10 feet from top of footing to bottom of sill plate or girder. Piers supporting girders for exterior bearing walls shall have a minimum nominal dimension of 12 inches and a maximum height of 4 feet from top of footing to bottom of sill plate or girder. Girders and sill plates shall be anchored to the pier or footing in accordance with Section R403.1.6 or Figure R404.1.5(1). Floor girder bearing shall be in accordance with Section R502.6.

Clarification of masonry columns for beam supports

TABLE R502.3.1(1) FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES

(Residential sleeping areas)

TABLE R502.3.1(2) FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES

(Residential living areas)

The spans for floor joist were changed and reduced for douglas fir, hem-fir, and southern pine.

TABLE R502.3.1(1)
FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES
 (Residential sleeping areas, live load = 30 psf, L/Δ = 360)^a

JOIST SPACING (Inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf				DEAD LOAD = 20 psf			
			2 × 6	2 × 8	2 × 10	2 × 12	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum floor joist spans							
		(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	
16	Douglas fir-larch	SS	11-4	15-0	19-1	23-3	11-4	15-0	19-1	23-3
	Douglas fir-larch	#1	10-11	14-5	18-5	21-4	10-8	13-6	16-5	19-1
	Douglas fir-larch	#2	10-9	14-2	17-5	20-3	10-1	12-9	15-7	18-1
	Douglas fir-larch	#3	8-7	10-11	13-4	15-5	7-8	9-9	11-11	13-10
	Hem-fir	SS	10-9	14-2	18-0	21-11	10-9	14-2	18-0	21-11
	Hem-fir	#1	10-6	13-10	17-8	21-1	10-6	13-4	16-3	18-10
	Hem-fir	#2	10-0	13-2	16-10	19-8	9-10	12-5	15-2	17-7
	Hem-fir	#3	8-5	10-8	13-0	15-1	7-6	9-6	11-8	13-6
	Southern pine	SS	11-2	14-8	18-9	22-10	11-2	14-8	18-9	22-10
	Southern pine	#1	10-9	14-2	18-0	21-4	10-9	13-9	16-1	19-1
	Southern pine	#2	10-3	13-3	15-8	18-6	9-4	11-10	14-0	16-6
	Southern pine	#3	7-11	10-0	11-1	14-4	7-1	8-11	10-10	12-10
	Spruce-pine-fir	SS	10-6	13-10	17-8	21-6	10-6	13-10	17-8	21-4
	Spruce-pine-fir	#1	10-3	13-6	17-2	19-11	9-11	12-7	15-5	17-10
	Spruce-pine-fir	#2	10-3	13-6	17-2	19-11	9-11	12-7	15-5	17-10
	Spruce-pine-fir	#3	8-5	10-8	13-0	15-1	7-6	9-6	11-8	13-6

**TABLE 1
GIRDER SPANS^a AND HEADER^b SIZES^c
(Maximum spans for Douglas fir-larch, hem-fir, southern pine)**

GIRDERS AND HEADERS SUPPORTING	SIZE	30					
		30					
		20		28		36	
		Span	NJ ^d	Span	NJ ^d	Span	NJ ^d
Roof and ceiling	1-2 x 8	4-6	1	3-10	1	3-5	1
	1-2 x 10	5-8	1	4-11	1	4-4	1
	1-2 x 12	6-11	1	5-11	2	5-3	2
	2-2 x 4	3-6	1	3-2	1	2-10	1
	2-2 x 6	5-5	1	4-8	1	4-2	1
	2-2 x 8	6-10	1	5-11	2	5-4	2
	2-2 x 10	8-5	2	7-3	2	6-6	2
	2-2 x 12	9-9	2	8-5	2	7-6	2
	3-2 x 8	8-4	1	7-5	1	6-8	1
	3-2 x 10	10-6	1	9-1	2	8-2	2
	3-2 x 12	12-2	2	10-7	2	9-5	2
	4-2 x 8	9-2	1	8-4	1	7-8	1
	4-2 x 10	11-8	1	10-6	1	9-5	2
	4-2 x 12	14-1	1	12-2	2	10-11	2
Roof, ceiling and one center-bearing floor	1-2 x 8	3-11	1	3-5	1	3-0	1
	1-2 x 10	5-0	2	4-4	2	3-10	2
	1-2 x 12	5-10	2	4-9	2	4-2	2
	2-2 x 4	3-1	1	2-9	1	2-5	1
	2-2 x 6	4-6	1	4-0	1	3-7	2
	2-2 x 8	5-9	2	5-0	2	4-6	2
	2-2 x 10	7-0	2	6-2	2	5-6	2
	2-2 x 12	8-1	2	7-1	2	6-5	2
	3-2 x 8	7-2	1	6-3	2	5-8	2
	3-2 x 10	8-9	2	7-8	2	6-11	2
	3-2 x 12	10-2	2	8-11	2	8-0	2
	4-2 x 8	8-1	1	7-3	1	6-7	1
	4-2 x 10	10-1	1	8-10	2	8-0	2
	4-2 x 12	11-9	2	10-3	2	9-3	2
Roof, ceiling and one clear span floor	1-2 x 8	3-6	1	3-0	1	2-8	1
	1-2 x 10	4-6	1	3-10	1	3-3	1
	1-2 x 12	5-6	1	4-2	2	3-3	2
	2-2 x 4	2-8	1	2-4	1	2-1	1
	2-2 x 6	3-11	1	3-5	2	3-0	2
	2-2 x 8	5-0	2	4-4	2	3-10	2
	2-2 x 10	6-1	2	5-3	2	4-8	2
	2-2 x 12	7-1	2	6-1	3	5-5	3
	3-2 x 8	6-3	2	5-5	2	4-10	2
	3-2 x 10	7-7	2	6-7	2	5-11	2
	3-2 x 12	8-10	2	7-8	2	6-10	2
	4-2 x 8	7-2	1	6-3	2	5-7	2
	4-2 x 10	8-9	2	7-7	2	6-10	2
	4-2 x 12	10-2	2	8-10	2	7-11	2

GIRDERS AND HEADERS SUPPORTING	SIZE	30						
		20		28		36		
		Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	
		Roof, ceiling and two center-bearing floors	2-2 x 4	2-7	1	2-3	1	2-0
2-2 x 6	3-9		2	3-3	2	2-11	2	
2-2 x 8	4-9		2	4-2	2	3-9	2	
2-2 x 10	5-9		2	5-1	2	4-7	3	
2-2 x 12	6-8		2	5-10	3	5-3	3	
3-2 x 8	5-11		2	5-2	2	4-8	2	
3-2 x 10	7-3		2	6-4	2	5-8	2	
3-2 x 12	8-5		2	7-4	2	6-7	2	
4-2 x 8	6-10		1	6-0	2	5-5	2	
4-2 x 10	8-4		2	7-4	2	6-7	2	
4-2 x 12	9-8		2	8-6	2	7-8	2	
Roof, ceiling, and two clear-span floors	2-2 x 4		2-1	1	1-8	1	1-6	2
	2-2 x 6		3-1	2	2-8	2	2-4	2
	2-2 x 8		3-10	2	3-4	2	3-0	3
	2-2 x 10	4-9	2	4-1	3	3-8	3	
	2-2 x 12	5-6	3	4-9	3	4-3	3	
	3-2 x 8	4-10	2	4-2	2	3-9	2	
	3-2 x 10	5-11	2	5-1	2	4-7	3	
	3-2 x 12	6-10	2	5-11	3	5-4	3	
	4-2 x 8	5-7	2	4-10	2	4-4	2	
	4-2 x 10	6-10	2	5-11	2	5-3	2	
	4-2 x 12	7-11	2	6-10	2	6-2	3	

R502.5 Allowable girder and header spans. The allowable spans of girders and headers fabricated of dimension lumber shall not exceed the values set forth in Tables R602.7(1), R602.7(2) and R602.7(3).

- a. Spans are given in feet and inches.
- b. Tabulated values assume #2 grade lumber.
- c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
- d. NJ = Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.
- e. Use 30 psf ground snow load for cases in which ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.

These Tables can not be used for decks.

SECTION R507 EXTERIOR DECKS

This table was removed from the 2015 IRC and replaced with the same table from the 2018 IRC

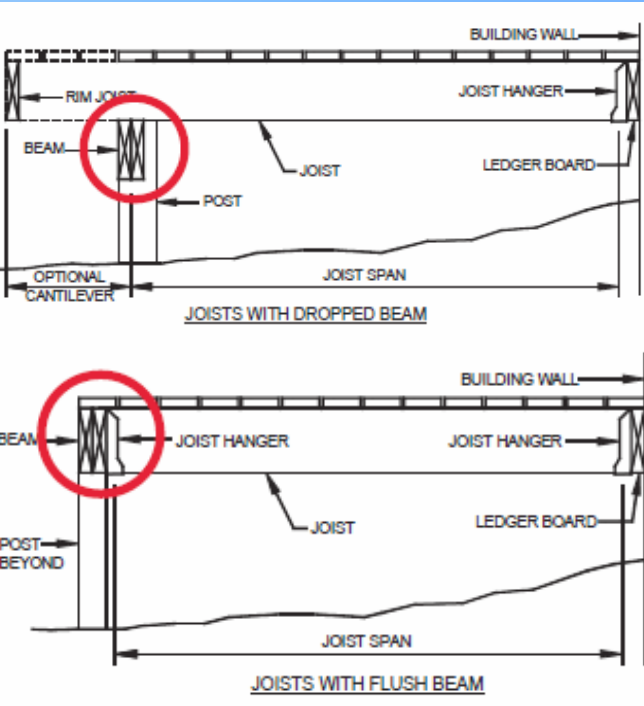


FIGURE R507.5
TYPICAL DECK JOIST SPANS

TABLE R507.5
DECK BEAM SPAN LENGTHS^{a, b, c} (feet - inches)

SPECIES ^c	SIZE ^d	DECK JOIST SPAN LESS THAN OR EQUAL TO: (feet)						
		6	8	10	12	14	16	18
Southern pine	1 - 2 x 6	4-11	4-0	3-7	3-3	3-0	2-10	2-8
	1 - 2 x 8	5-11	5-1	4-7	4-2	2-10	3-7	3-5
	1 - 2 x 10	7-0	6-0	5-5	4-11	4-7	4-3	4-0
	1 - 2 x 12	8-3	7-1	6-4	5-10	5-5	5-0	4-9
	2 - 2 x 6	6-11	5-11	5-4	4-10	4-6	4-3	4-0
	2 - 2 x 8	8-9	7-7	6-9	6-2	5-9	5-4	5-0
	2 - 2 x 10	10-4	9-0	8-0	7-4	6-9	6-4	6-0
	2 - 2 x 12	12-2	10-7	9-5	8-7	8-0	7-6	7-0
	3 - 2 x 6	8-2	7-5	6-8	6-1	5-8	5-3	5-0
	3 - 2 x 8	10-10	9-6	8-6	7-9	7-2	6-8	6-4
Douglas fir-larch ^e , hem-fir ^e , spruce-pine-fir ^e , redwood, western cedars, ponderosa pine ^f , red pine ^f	3 x 6 or 2 - 2 x 6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	3 x 8 or 2 - 2 x 8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	3 x 10 or 2 - 2 x 10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3 x 12 or 2 - 2 x 12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	4 x 6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	4 x 8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	4 x 10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	4 x 12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	3 - 2 x 6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	3 - 2 x 8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
3 - 2 x 10	12-0	10-5	9-4	8-6	7-10	7-4	6-11	
	13-11	12-1	10-9	9-10	8-6	8-1		

DECK JOIST SPANS FOR COMMON LUMBER SPECIES^e (ft. - in.)

SPECIES ^a	SIZE	SPACING OF DECK JOISTS WITH NO CANTILEVERS ^b (inches)			SPACING OF DECK JOISTS WITH CANTILEVERS ^c (inches)		
		12	16	24	16	24	36
Southern pine	2 x 6	9-11	8-0	7-7	6-8	6-8	6-8
	2 x 8	13-1	11-10	9-8	10-1	10-1	9-8
	2 x 10	16-2	14-0	11-5	14-6	14-0	11-5
	2 x 12	18-0	16-0	13-6	18-0	16-6	13-6
Douglas fir-larch ^d , hem-fir ^d , spruce-pine-fir ^d	2 x 6	9-8	8-8	7-2	6-3	6-3	6-3
	2 x 8	12-6	11-1	9-1	9-5	9-5	9-1
	2 x 10	15-8	13-7	11-1	13-7	13-7	11-1
	2 x 12	18-0	15-9	13-0	18-0	15-9	12-10
Redwood, western cedars, ponderosa pine ^f , red pine ^f	2 x 6	10-0	9-0	7-6	8-7	8-7	8-6
	2 x 8	13-8	12-0	9-8	12-3	12-3	10-7
	2 x 10	17-1	13-0	10-7	16-5	15-1	12-4
	2 x 12	19-0	15-1	12-4	18-5	16-5	12-4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.
a. No. 2 grade with wet service factor.
b. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied at the end.
c. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied at the end.
d. Includes incising factor.
e. Northern species with no incising factor.
f. Cantilevered spans not exceeding the nominal depth of joist are permitted.

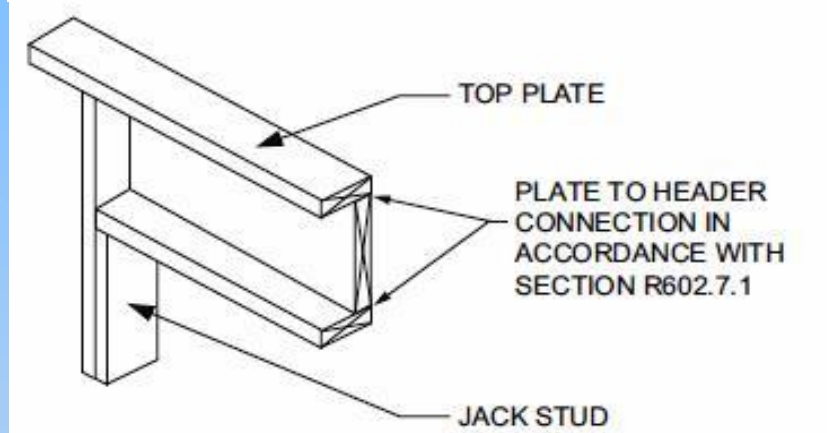
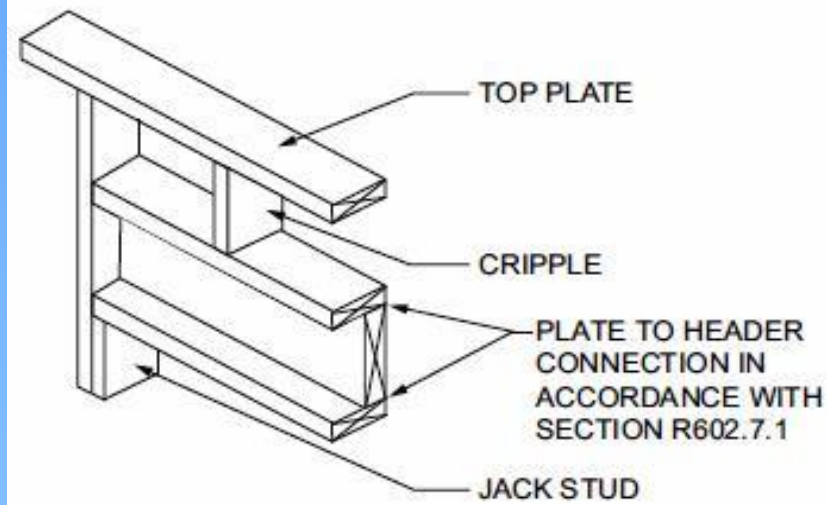
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.
a. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied at the end.
b. Beams supporting deck joists from one side only.
c. No. 2 grade, wet service factor.
d. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.
e. Includes incising factor.
f. Northern species. Incising factor not included.
g. Beam cantilevers are limited to the adjacent beam's span divided by 4.

R602.7.1 Single member headers. Single headers shall be framed with a single flat 2-inch-nominal (51 mm) member or wall plate not less in width than the wall studs on the top and bottom of the header in accordance with Figures R602.7.1(1) and R602.7.1(2) and face nailed to the top and bottom of the header with 10d box nails (3 inches × 0.128 inches) spaced 12 inches on center.

TABLE R507.5
DECK BEAM SPAN LENGTHS^{a, b, g} (feet - inches)

SPECIES ^e	SIZE ^d	DECK JOIST SPAN LESS THAN OR EQUAL TO: (feet)						
		6	8	10	12	14	16	18
Southern pine	1 - 2 × 6	4-11	4-0	3-7	3-3	3-0	2-10	2-8
	1 - 2 × 8	5-11	5-1	4-7	4-2	2-10	3-7	3-5
	1 - 2 × 10	7-0	6-0	5-5	4-11	4-7	4-3	4-0
	1 - 2 × 12	8-3	7-1	6-4	5-10	5-5	5-0	4-9
	2 - 2 × 6	6-11	5-11	5-4	4-10	4-6	4-3	4-0
	2 - 2 × 8	8-9	7-7	6-9	6-2	5-9	5-4	5-0
	2 - 2 × 10	10-4	9-0	8-0	7-4	6-9	6-4	6-0
	2 - 2 × 12	12-2	10-7	9-5	8-7	8-0	7-6	7-0
	3 - 2 × 6	8-2	7-5	6-8	6-1	5-8	5-3	5-0
	3 - 2 × 8	10-10	9-6	8-6	7-9	7-2	6-8	6-4
3 - 2 × 10	13-0	11-3	10-0	9-2	8-6	7-11	7-6	
3 - 2 × 12	15-3	13-3	11-10	10-9	10-0	9-4	8-10	
Douglas fir-larch ^f , hem-fir ^f , spruce-pine-fir ^f , redwood, western cedars, ponderosa pine ^f , red pine ^f	3 × 6 or 2 - 2 × 6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	3 × 8 or 2 - 2 × 8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	3 × 10 or 2 - 2 × 10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3 × 12 or 2 - 2 × 12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	4 × 6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	4 × 8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	4 × 10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	4 × 12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	3 - 2 × 6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	3 - 2 × 8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	3 - 2 × 10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	3 - 2 × 12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

For SF: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.
a. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied at the end.
b. Beams supporting deck joists from one side only.
c. No. 2 grade, wet service factor.
d. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.
e. Includes incising factor.
f. Northern species. Incising factor not included.
g. Beam cantilevers are limited to the adjacent beam's span divided by 4.



R602.7.5 Supports for headers. Headers shall be supported on each end with one or more jack studs or with approved framing anchors in accordance with Table R602.7(1) or R602.7(2). The full-height stud adjacent to each end of the header shall be end nailed to each end of the header with four-16d nails (3.5 inches x 0.135 inches). The minimum number of full-height studs at each end of a header shall be in accordance with Table R602.7.5.

This chart was replaced by that chart in PA

TABLE R602.7.5
MINIMUM NUMBER OF FULL HEIGHT STUDS AT EACH END OF HEADERS IN EXTERIOR WALLS

HEADER SPAN (feet)	MAXIMUM STUD SPACING (inches) [per Table R602.3(5)]	
	16	24
≤ 3'	1	1
4'	2	1
8'	3	2
12'	5	3
16'	6	4

TABLE R602.7.5
MINIMUM NUMBER OF FULL-HEIGHT STUDS AT EACH END OF HEADERS IN EXTERIOR WALLS^a

MAXIMUM HEADER SPAN (feet)	ULTIMATE DESIGN WIND SPEED AND EXPOSURE CATEGORY	
	< 140 mph, Exposure B or < 130 mph, Exposure C	≤ 115 mph, Exposure B ^b
4	1	1
6	2	1
8	2	1
10	3	2
12	3	2
14	3	2
16	4	2
18	4	2

R602.10 Wall bracing.

In Pennsylvania the Legislature passed Act 1 of 2011 removing the 2009 wall bracing and replaced it with the 2006 wall bracing. Therefore Section R602.10 through Section R602.12.8 of the 2015 IRC are not included and Section R602.10 to Section 602.11.3 of the 2006 IRC apply.

**TABLE R602.10.1
WALL BRACING**

SEISMIC DESIGN CATEGORY OR WIND SPEED	CONDITION	TYPE OF BRACE ^{b, c}	AMOUNT OF BRACING ^{a, d, e}
Category A and B ($S_s \leq 0.35g$ and $S_{dr} \leq 0.33g$) or 100 mph or less	One story Top of two or three story	Methods 1, 2, 3, 4, 5, 6, 7 or 8	Located in accordance with Section R602.10 and at least every 25 feet on center but not less than 16% of braced wall line for Methods 2 through 8.
	First story of two story Second story of three story	Methods 1, 2, 3, 4, 5, 6, 7 or 8	Located in accordance with Section R602.10 and at least every 25 feet on center but not less than 16% of braced wall line for Method 3 or 25% of braced wall line for Methods 2, 4, 5, 6, 7 or 8.
	First story of three story	Methods 2, 3, 4, 5, 6, 7 or 8	Located in accordance with Section R602.10 and at least every 25 feet on center but not less than 25% of braced wall line for Method 3 or 35% of braced wall line for Methods 2, 4, 5, 6, 7 or 8.

**TABLE R602.10.5
LENGTH REQUIREMENTS FOR BRACED WALL PANELS IN A CONTINUOUSLY SHEATHED WALL^{a, b, c}**

MINIMUM LENGTH OF BRACED WALL PANEL (inches)			MAXIMUM OPENING HEIGHT NEXT TO THE BRACED WALL PANEL (% of wall height)
8-foot wall	9-foot wall	10-foot wall	
48	54	60	100
32	36	40	85
24	27	30	65

R606.14 Anchored and adhered masonry veneer

R606.14.1 Anchored masonry veneer installed over a backing of wood or cold-formed steel shall meet the requirements of Section R703.8.

This section has been rewritten and applies to brick and stone veneers

R606.14.2 Adhered masonry veneer shall be installed in accordance with the requirements of Section R703.12.

This section has been rewritten and applies to stucco and artificial stone / brick veneers

R703.7.3 Water-resistive barriers.

When installed over wood based sheathing material shall include a water-resistive vapor-permeable barrier with a performance at least equivalent to **two** layers of Grade D paper separately applied.

Tyvek is one example of a grade D paper.



R703.15 Cladding attachment over foam sheathing to wood framing

**TABLE R703.15.1
CLADDING MINIMUM FASTENING REQUIREMENTS FOR DIRECT ATTACHMENT
OVER FOAM PLASTIC SHEATHING TO SUPPORT CLADDING WEIGHT^a**

CLADDING FASTENER THROUGH FOAM SHEATHING	CLADDING FASTENER TYPE AND MINIMUM SIZE ^b	CLADDING FASTENER VERTICAL SPACING (inches)	MAXIMUM THICKNESS OF FOAM SHEATHING ^c (inches)					
			16" o.c. Fastener Horizontal Spacing			24" o.c. Fastener Horizontal Spacing		
			Cladding Weight:			Cladding Weight:		
			3 psf	11 psf	25 psf	3 psf	11 psf	25 psf
Wood Framing (minimum 1 1/4-inch penetration)	0.113" diameter nail	6	2	1	DR	2	0.75	DR
		8	2	1	DR	2	0.5	DR
		12	2	0.5	DR	2	DR	DR
	0.120" diameter nail	6	3	1.5	0.5	3	0.75	DR
		8	3	1	DR	3	0.5	DR
		12	3	0.5	DR	2	DR	DR
	0.131" diameter nail	6	4	2	0.75	4	1	DR
		8	4	1.5	0.5	4	0.75	DR
		12	4	0.75	DR	2	0.5	DR
	0.162" diameter nail	6	4	4	1.5	4	2	1
		8	4	3	1	4	1.5	0.75
		12	4	2	0.75	4	1	DR

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

DR = Design required.

o.c. = On center.

- a. Wood framing shall be Spruce-pine-fir or any wood species with a specific gravity of 0.42 or greater in accordance with AWC NDS.
- b. Nail fasteners shall comply with ASTM F 1667, except nail length shall be permitted to exceed ASTM F 1667 standard lengths.
- c. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with ASTM C 578 or ASTM C 1289.

R802.3 Framing details

Hip and valley rafters shall be supported at the ridge by a brace to a bearing partition. Table R802.4(1) through Table R802.5.1 (9)

These tables all contain reduced spans for Douglas Fir, Hem Fir, and Southern Pine

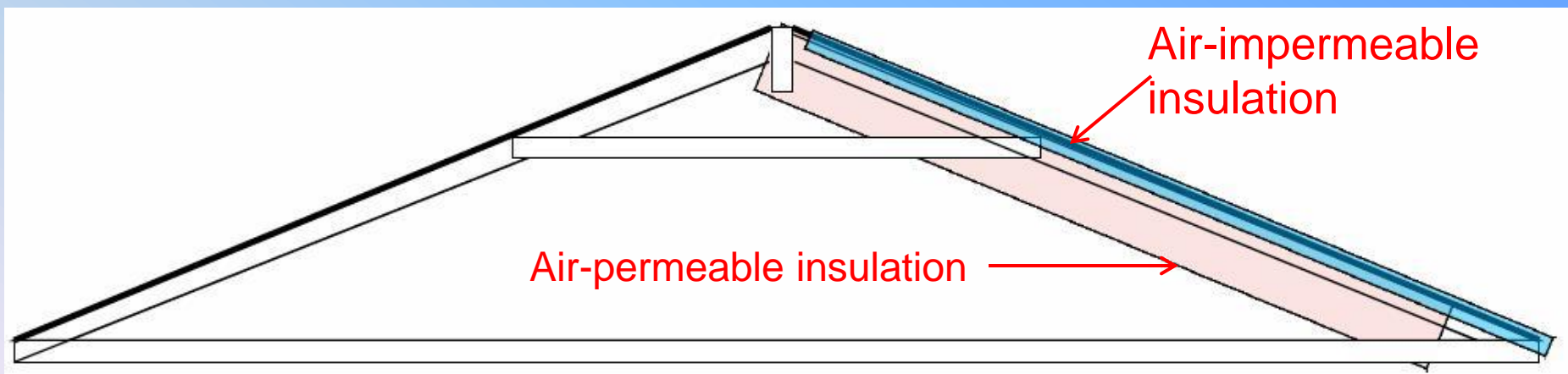
R802.11 Roof tie-down. Where the uplift force does not exceed 200 pounds, rafters and trusses spaced not more than 24 inches on center shall be permitted to be attached to their supporting wall assemblies in accordance with Table R602.3(1).

Table R802.11 indicates when loads exceed 200 lbs

RAFTER OR TRUSS SPACING	ROOF SPAN (feet)	110	
		Roof Pitch	
		< 5:12	≥ 5:12
12" o.c.	12	95	88
	18	121	111
	24	148	136
	28	166	152
	32	184	168
	36	202	185
	42	229	210
	48	256	234
16" o.c.	12	126	117
	18	161	148
	24	197	181
	28	221	202
	32	245	223
	36	269	246
	42	305	279
	48	340	311
24" o.c.	12	190	176
	18	242	222
	24	296	272
	28	332	304
	32	368	336
	36	404	370
	42	458	420
	48	512	468

Section R806 ROOF VENTILATION

R806.5 Unvented *attics* and unvented enclosed roof framing assemblies created by ceilings that are applied directly to the underside of the roof framing members and structural roof sheathing applied directly to the top of the roof framing members/rafters, shall be permitted. Where only *air-impermeable insulation* is provided, it shall be applied in direct contact with the underside of the structural roof sheathing. Where both *air-impermeable* and *air-permeable insulation* are provided, the *air-impermeable insulation* shall be applied in direct contact with the underside of the structural roof sheathing in accordance with the *R-values* in Table R806.5 for condensation control. **Zone 4A, 4B R-15, Zone 5 R-20, & Zone 6 R-25**



R902.3 Building-integrated photovoltaic product

R902.4 Rooftop-mounted photovoltaic panels
and modules

R905.16 Photovoltaic shingles.

Section R907 Rooftop-mounted photovoltaic
systems

Section R909 Rooftop-mounted photovoltaic
panel systems

Appendix U includes additional framing
requirements that were **not** adopted.

SECTION R905 REQUIREMENTS FOR ROOF COVERINGS

TABLE R905.1.1(2) UNDERLAYMENT APPLICATION

MAXIMUM ULTIMATE DESIGN WIND SPEED, $V_{ult} < 140$ MPH

For roof slopes from 2:12, up to 4:12, underlayment shall be **two** layers R905.1.2 Ice barriers lowest edges of all roof surfaces to a point not less than 24 inches inside the exterior wall. Except detached accessory structures

R905.2.8.3 Sidewall flashing. Base flashing against a vertical sidewall shall be continuous or step flashing and shall be not less than 4 inches in height and 4 inches in width and **shall direct water away from the vertical sidewall onto the roof or into the gutter.**

R905.2.8.5 Drip edge. Underlayment shall be installed **over** the drip edge along eaves and **under** the underlayment along rake edges.

R905.10 Metal roof panels. The minimum slope for lapped, nonsoldered-seam metal roofs without applied lap sealant shall 3:12 units.

SECTION R908 Reroofing **Exempt by legislation.**

TABLE R905.1.1(2) UNDERLAYMENT APPLICATION		
ROOF COVERING	SECTION	MAXIMUM ULTIMATE DESIGN WIND SPEED, $V_{ult} < 140$ MPH
Asphalt shingles	R905.2	<p>For roof slopes from two units vertical in 12 units horizontal (2:12), up to four units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied in the following manner: apply a 19-inch strip of underlayment felt parallel to and starting at the eaves. Starting at the eave, apply 36-inch-wide sheets of underlayment, overlapping successive sheets 19 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal.</p> <p>For roof slopes of four units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied in the following manner: underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet.</p>
Clay and concrete tile	R905.3	<p>For roof slopes from two and one-half units vertical in 12 units horizontal ($2\frac{1}{2}$:12), up to four units vertical in 12 units horizontal (4:12), underlayment shall be a minimum of two layers applied as follows: starting at the eave, apply a 19-inch strip of underlayment parallel with the eave. Starting at the eave, apply 36-inch-wide strips of underlayment felt, overlapping successive sheets 19 inches.</p> <p>For roof slopes of four units vertical in 12 units horizontal (4:12) or greater, underlayment shall be a minimum of one layer of underlayment felt applied shingle fashion, parallel to and starting from the eaves and lapped 2 inches. End laps shall be 4 inches and shall be offset by 6 feet.</p>
Metal roof shingles	R905.4	Apply in accordance with the manufacturer's installation instructions.
Mineral-surfaced roll roofing	R905.5	
Slate and slate-type shingles	R905.6	
Wood shingles	R905.7	
Wood shakes	R905.8	
Metal panels	R905.10	

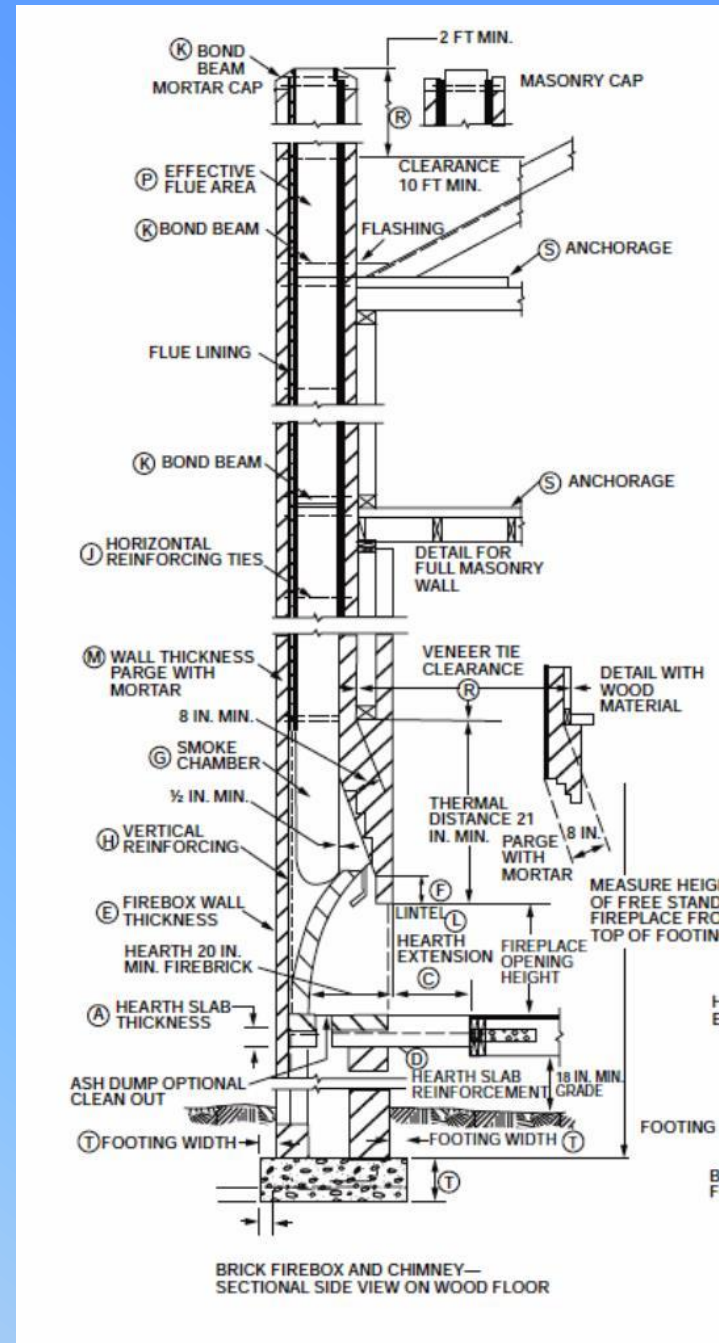
R1001.11 Fireplace clearance.

Exception: Exposed combustible trim and the edges of sheathing materials such as wood siding, flooring and gypsum board shall be permitted to abut the masonry fireplace sidewalls and hearth extension in accordance with Figure R1001.11, provided such combustible trim or sheathing is not less than 12 inches from the inside surface of the nearest fire box lining.

R1003.18 Chimney clearances.

Exception: Exposed combustible trim and the edges of sheathing materials, such as wood siding and flooring, shall be permitted to abut the masonry chimney side walls, in accordance with Figure R1003.18, provided such combustible trim or sheathing is not less than 8 inches from the inside surface of the nearest flue lining.

R1006.2 Exterior air intake. The exterior air intake shall be capable of supplying all *combustion air* from the exterior of the *dwelling*



Part IV—Energy Conservation

Chapter 11 Energy Efficiency

Now it's time to pay attention! Pennsylvania includes Climate Zones 4, 5, & 6. You may also use the PA Alternative Energy Code.

N1101.5 (R103.2) Information on construction documents. Details shall include, but are not limited to, as applicable:

1. Insulation materials and their R -values.
2. Fenestration U -factors and SHGCs.
3. Area-weighted U -factor and SHGC calculations.
4. Mechanical system design criteria.
5. Mechanical and service water heating system and equipment types, sizes and efficiencies.
6. Equipment and system controls.
7. Duct sealing, duct and pipe insulation and location.
8. Air sealing details.

N1101.5.1 (R103.2.1) Thermal envelope depiction. The building's thermal envelope shall be represented on the construction drawings.

Documentation Requirements and Definitions

INSULATED SIDING. A type of continuous insulation with manufacturer-installed insulating material as an integral part of the cladding product having a minimum R -value of $R-2$. For insulated siding, the R -value shall be labeled on the product's package and shall be listed on the certification. The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

N1101.10.2 (R303.1.2) Insulation mark installation. Insulating materials shall be installed such that the manufacturer's R -value mark is readily observable upon inspection.

N1101.10.4.1 (R303.1.4.1) Insulated siding. The thermal resistance (R -value) of insulated siding shall be determined in accordance with ASTM C 1363. Installation for testing shall be in accordance with the manufacturer's installation instructions.

N1101.14 (R401.3) Certificate (Mandatory). A permanent certificate shall be completed by the **builder** or registered design professional and posted on a wall in the space where the furnace is located, a utility room or an approved location inside the building.

SECTION N1102 (R402) Building Thermal Envelope

N1102.1.2 (R402.1.2) Insulation and fenestration criteria. The *building thermal envelope* shall meet the requirements of Table N1102.1.2 based on the climate zone.

**TABLE N1102.1.2 (R402.1.2)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a**

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b, c}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13 + 5 ^h	8/13	19	5/13 ^f	0	5/13
4 except Marine	0.35	0.55	0.40	49	20 or 13 + 5 ^h	8/13	19	10 /13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13 + 5 ^h	13/17	30 ^g	15/19	10, 2 ft	15/19
6	0.32	0.55	NR	49	20 + 5 or 13 + 10 ^h	15/20	30 ^g	15/19	10, 4 ft	15/19
7 and 8	0.32	0.55	NR	49	20 + 5 or 13 + 10 ^h	19/21	38 ^g	15/19	10, 4 ft	15/19

For SI: 1 foot = 304.8 mm.

- R-values are minimums. U-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed R-value of the insulation shall not be less than the R-value specified in the table.
- The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration.
Exception: Skylights may be excluded from glazed fenestration SHGC requirements in Climate Zones 1 through 3 where the SHGC for such skylights does not exceed 0.30.
- "15/19" means R-15 continuous insulation on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the home. "10/13" means R-10 continuous insulation on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.
- R-5 shall be added to the required slab edge R-values for heated slabs. Insulation depth shall be the depth of the footing or 2 feet, whichever is less in Zones 1 through 3 for heated slabs.
- There are no SHGC requirements in the Marine Zone.
- Basement wall insulation is not required in warm-humid locations as defined by Figure N1101.10 and Table N1101.10.
- Or insulation sufficient to fill the framing cavity, R-19 minimum.
- The first value is cavity insulation, the second value is continuous insulation, so "13+5" means R-13 cavity insulation plus R-5 continuous insulation.
- The second R-value applies when more than half the insulation is on the interior of the mass wall.

N1102.1.3 (R402.1.3) R-value computation.

Computed R -values shall not include an R -value for other building materials or air films. Where insulated siding is used for the purpose of complying with the continuous insulation requirements of Table N1102.1.2, the manufacturer's labeled R -value for insulated siding shall be reduced by **R-0.6**.

N1102.2.4 (R402.2.4) Access hatches and doors

Exception: Vertical doors that provide access from conditioned to unconditioned spaces shall be permitted to meet the fenestration requirements of Table R1102.1.2

N1102.2.8 (R402.2.8) Floors.

Exception: The floor framing-cavity insulation shall be permitted to be in contact with the topside of sheathing or continuous insulation installed on the bottom side of floor framing where combined with insulation that meets or exceeds the minimum wood frame wall R -value in Table 1102.1.2 and that extends from the bottom to the top of all perimeter floor framing members.

N1102.2.9 (R402.2.9) Basement walls.

Walls associated with conditioned basements shall be insulated from the **top of the basement wall** down to 10 feet below grade or to the basement floor, whichever is less. Walls associated with unconditioned basements shall meet this requirement unless the floor overhead is insulated in accordance with Sections N1102.1.2 and N1102.2.8.

N1102.4 (R402.4) Air leakage (Mandatory)!

N1102.4.1.2 (R402.4.1.2) Testing. The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding **five** air changes per hour in Climate Zones 1 through 8. **This is different than in the IRC. Five air changes at 50 pascals (5ACH50) was the compromise arrived at by the RAC for Pennsylvania. A blower door test will now be required in all new residential construction in Pennsylvania. With care and practice this is achievable.**

N1102.4.4 (R402.4.4) Rooms containing fuel-burning appliances. In Climate Zones 3 through 8, where open combustion air ducts provide combustion air to open combustion fuel-burning appliances, the appliances and combustion air opening shall be located outside the building thermal envelope or enclosed in a room, isolated from inside the thermal envelope. **Can you think of an example we still use? How about draft hood equipped water heaters, conventional gas or oil furnaces, What about a gas stove or clothes dryer? Wood burners? It will take some time to find out how far this will go.**

TABLE N1102.4.1.1 (402.4.1.1) Air Barrier And Insulation Installation
This is the how to table and its all new.

N1103.1.1 (R403.1.1) Programmable thermostat (Mandatory)

N1103.1.2 (R403.1.2) Heat pump supplementary heat (Mandatory).

N1103.3.3 (R403.3.3) Duct testing (Mandatory) **Exception:** A duct air leakage test shall not be required where the ducts and air handlers are located entirely within the building thermal envelope. **Get it right!**

~~N1103.3.5 (R403.3.5) Building cavities (Mandatory). Building framing cavities shall not be used as ducts or plenums.~~ **Still allowed in Pennsylvania.**

N1103.5.1.1 (R403.5.1.1) Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. ~~Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for hot water within the occupancy.~~

Demand systems are not required in Pennsylvania.

N1103.5.3 (R403.5.3) Hot water pipe insulation (Prescriptive) Insulation for hot water pipe with a minimum thermal resistance of R-3 shall be applied to the following:

1. Piping 3/4 inch and larger in nominal diameter.
4. Piping from the water heater to a distribution manifold.
7. Supply and return piping in recirculation systems other than demand recirculation systems.

N1103.7 (R403.7) Equipment sizing and efficiency rating (Mandatory).

N1103.10 (R403.10) Pools and permanent spa energy consumption (Mandatory).

N1104.1 (R404.1) Lighting equipment (Mandatory). Not less than 75 % of the lamps in permanently installed luminaires shall be high-efficacy lamps

SECTION N1107 (R501) EXISTING BUILDINGS—GENERAL

SECTION N1109 (R503) ALTERATIONS **Does not apply in Pennsylvania. Only Structural Alterations require permits.**

SECTION N1110 (R504) REPAIRS **Exempt by legislation.**

SECTION N1111 (R505) CHANGE OF OCCUPANCY OR USE

N1111.1 (R505.1) General. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code.

N1111.2 (R505.2) General. Any space that is converted to a dwelling unit or portion thereof from another use or occupancy shall comply with this code.

Exception: Where the simulated performance option in Section N1105 is used to comply with this section, the annual energy cost of the proposed design is permitted to be 110 percent of the annual energy cost otherwise allowed by Section N1105.3.

These alternatives would require a professional
SECTION N1105 (R405) Simulated Performance Alternative
Still available as an alternative

SECTION N1106 (R406) Energy Rating Index Compliance Alternative
An all new alternative. The red numbers are from the 2018 IRC

TABLE N1106.4 (R406.4)
MAXIMUM ENERGY RATING INDEX

CLIMATE ZONE	ENERGY RATING INDEX
1	52
2	52
3	51
4	54 62
5	55 61
6	54 61
7	53
8	53

Another alternative to the prescriptive IRC energy code is the “2018 Pennsylvania Alternative Energy Provisions”. This is an alternative developed by the Pennsylvania Housing Research Center at Penn State. If you are using one of the entrance requirements, it offers several advantages over the IRC. However the blower door test is still required.

SECTION N1108 ADDITIONS

N1108.1.1 Additions shall comply with Sections N1108.1.1.1 through N1108.1.1.4.

N1108.1.1.1 New building envelope assemblies that are part of the addition shall comply with Sections N1102.1, N1102.2, N1102.3.1 through N1102.3.5, and N1102.4.

Exception: Where nonconditioned space is changed to conditioned space, the building envelope of the addition shall comply where the UA, as determined in Section N1102.1.4, of the existing building and the addition, ~~and any alterations that are part of the project,~~ is less than or equal to UA generated for the existing building.

N1108.1.1.2 New heating, cooling and duct systems that are part of the addition shall comply with Sections N1103.1, N1103.2, N1103.3, N1103.5 and N1103.6.

Exception: Where ducts from an existing heating and cooling system are extended to an addition, duct systems with less than 40 linear feet in unconditioned spaces shall not be required to be tested in accordance with Section N1103.2.2.

N1108.1.1.3 New service hot water systems that are part of the addition shall comply with Section N1103.4.

N1108.1.1.4 New lighting systems that are part of the addition shall comply with Section N1104.1.

New rules to clarify compliance with the IRC for additions

CHAPTER 13 GENERAL MECHANICAL SYSTEM REQUIREMENTS

Small Changes and Whole House Ventilation

M1305.1.3.1 Electrical requirements. **Appliances in Attics**

M1305.1.4.3 Electrical requirements. **Appliances in Crawlspace**

Exposed lamps shall be protected from damage by location or lamp guards.

M1308.2 Protection against physical damage

M1308.2.1 Piping through bored holes or notches

M1308.2.2 Piping in other locations

M1308.2.3 Shield plates.

SECTION M1411 Heating And Cooling Equipment

M1411.3.2 Drain pipe materials and sizes

M1411.3.3 Drain line maintenance

M1411.4 Condensate pumps **Pump failure must prevent Appliance Operation**

M1411.7 Location and protection of refrigerant piping

M1502.4.4 Dryer exhaust duct power ventilators. **Duct length can be increased by a power ventilator or dryer manufacturer instructions, if marked**

M1503.4 Kitchen hoods over 400 cfm Makeup air required **Gravity dampers are allowed. Air must discharge into the same space.**

TABLE M1506.2 Duct Length

SECTION M1507 MECHANICAL VENTILATION

M1507.3.3 Mechanical ventilation rate. The wholehouse mechanical ventilation system shall provide outdoor air at a continuous rate of not less than that determined in accordance with Table M1507.3.3(1).

**TABLE M1507.3.3(1)
CONTINUOUS WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM AIRFLOW RATE REQUIREMENTS**

DWELLING UNIT FLOOR AREA (square feet)	NUMBER OF BEDROOMS				
	0 - 1	2 - 3	4 - 5	6 - 7	> 7
	Airflow in CFM				
< 1,500	30	45	60	75	90
1,501 - 3,000	45	60	75	90	105
3,001 - 4,500	60	75	90	105	120
4,501 - 6,000	75	90	105	120	135
6,001 - 7,500	90	105	120	135	150
> 7,500	105	120	135	150	165

For SI: 1 square foot = 0.0929 m², 1 cubic foot per minute = 0.0004719 m³/s.

**TABLE M1507.3.3(2)
INTERMITTENT WHOLE-HOUSE MECHANICAL VENTILATION RATE FACTORS^{a, b}**

RUN-TIME PERCENTAGE IN EACH 4-HOUR SEGMENT	25%	33%	50%	66%	75%	100%
Factor ^a	4	3	2	1.5	1.3	1.0

- a. For ventilation system run time values between those given, the factors are permitted to be determined by interpolation.
- b. Extrapolation beyond the table is prohibited.

M1601.4.1 Joints, seams and connections.

Closure systems used to seal all ductwork shall be installed in accordance with the manufacturers' instructions.

Exceptions: 3. For ducts having a static pressure classification of less than 2 inches of water column (500 Pa), additional closure systems shall not be required for continuously welded joints and seams and locking-type joints and seams of other than the snap-lock and button-lock types.

This exception shall not apply to snap-lock and button-lock type joints and seams that are located outside of conditioned spaces."

M1601.4.2 Duct lap. Crimp joints for round and oval metal ducts shall be lapped not less than 1 inch and the male end of the duct shall extend into the adjoining duct in the direction of airflow.

M1601.4.4 Support Referenced Standards for support of factory and field built ducts.

SECTION M1602 RETURN AIR

M1602.2 Return air openings. Return air openings for heating, ventilation and air conditioning systems shall comply with all of the following:

1. Openings shall not be located less than 10 feet measured in any direction from an open combustion chamber or draft hood of another appliance located in the same room or space.
2. The amount of return air taken from any **perimeter** room or space shall be not greater than the flow rate of supply air delivered to such room or space.
3. Return and transfer openings shall be sized in accordance with the appliance or equipment manufacturers' installation instructions, Manual D or the design of the registered design professional.
4. Return air shall not be taken from a closet, bathroom, toilet room, kitchen, garage, mechanical room, boiler room, furnace room or unconditioned attic.

Exceptions:

1. Taking return air from a kitchen is not prohibited where such return air openings serve the kitchen only, and are located not less than 10 feet from the cooking appliances.

SECTION M2105 Ground-source Heat-pump System Loop Piping

This section has been totally rewritten.

FUEL GAS SECTION G2404.11 (307.6) Condensate pumps located in uninhabitable spaces, such as attics and crawlspaces, shall be connected to the *appliance or equipment served* such that when the pump fails, the *appliance or equipment* will be prevented from operating.

G2411.1.1 (310.1.1). Corrugated stainless steel tubing (CSST) gas *pipng* systems and piping systems containing one or more segments of CSST shall be bonded to the electrical service grounding electrode system.

G2411.1.1.1 (310.1.1.1). The bonding jumper shall connect to a metallic pipe, pipe fitting or CSST fitting.

G2411.1.1.2 (310.1.1.2) The bonding jumper shall be not smaller than 6 AWG copper wire.

G2411.1.1.3 (310.1.1.3) The length of the bonding jumper between the connection to a gas piping system and the connection to a grounding electrode system shall not exceed 75 feet. Any additional grounding electrodes used shall be bonded to the electrical service grounding electrode system.

G2414.6 (403.6) Plastic pipe PVC and CPVC plastic pipe, tubing and fittings shall not be used to supply fuel gas.

CHAPTER 25 PLUMBING

P2503.5 Drain, waste and vent systems testing

P2503.5.1 Rough plumbing. DWV systems shall be tested on completion of the rough piping installation by water or, ~~for piping systems other than plastic,~~ by air, without evidence of leakage. Either test shall be applied to the drainage system in its entirety or in sections after rough-in piping has been installed, as follows:

Water test. Each section shall be filled with water to a point not less than 5 feet above the highest fitting connection in that section,

CHAPTER 26 GENERAL PLUMBING

P2601.2 Connections to drainage system Plumbing fixtures, shall be directly connected to the sanitary drainage system

Exception: Bathtubs, showers, lavatories, clothes washers and laundry trays shall not be required to discharge to the sanitary drainage system where such fixtures discharge to systems complying with Sections P2910 and P2911.

P2603.3 Protection against corrosion.

P2604.2 Water service and building sewer in same trench.

P2906.4.1 Separation of water service and building sewer

P2604.4 Protection of footings.

CHAPTER 29 Water Supply And Distribution

SECTION P2901 GENERAL

P2901.1 Potable water required.

P2901.2 Identification of nonpotable water systems.

P2901.2.2 Distribution pipe labeling and marking.

P2902.4 Protection of potable water outlets

P2902.5 Protection of potable water connections.



FIGURE P2901.2.1
PICTOGRAPH—DO NOT DRINK

SECTION P2904 Dwelling Unit Fire Sprinkler Systems This Section is not required for one and two family dwellings if you follow the requirements of Act 1 of 2011

P2906.4.1 Separation of water service and building sewer

Trenching, pipe installation and backfilling shall be in accordance with Section P2604. Where water service piping is located in the same trench with the building sewer, such sewer shall be constructed of materials listed in Table P3002.1(2). Where the building sewer piping is not constructed of materials indicated in Table P3002.1(2), the water service pipe and the building sewer shall be horizontally separated by not less than 5 feet of undisturbed or compacted earth. The required separation distance shall not apply where a water service pipe crosses a sewer pipe, provided the water service is sleeved to a point not less than 5 feet horizontally from the sewer pipe centerline on both sides of such crossing. The sleeve shall be of pipe materials indicated in Table P2906.4, P3002.1(2) or P3002.2. The required separation distance shall not apply where the bottom of the water service pipe that is located within 5 feet of the sewer is not less than 12 inches above the highest point of the top of the building sewer.

CHAPTER 30 SANITARY DRAINAGE

P3003.9.2 Solvent cementing.

Exception: A primer shall not be required where all of the following conditions apply:

1. The solvent cement used is third-party certified as conforming to ASTM D 2564.

2. The solvent cement is used only for joining PVC drain, waste and vent pipe and fittings in non pressure applications in sizes up to and including 4 inches in diameter.

P3005.2 Cleanouts required For the requirements of this section, removal of a water closet shall **not** be required to provide cleanout access.

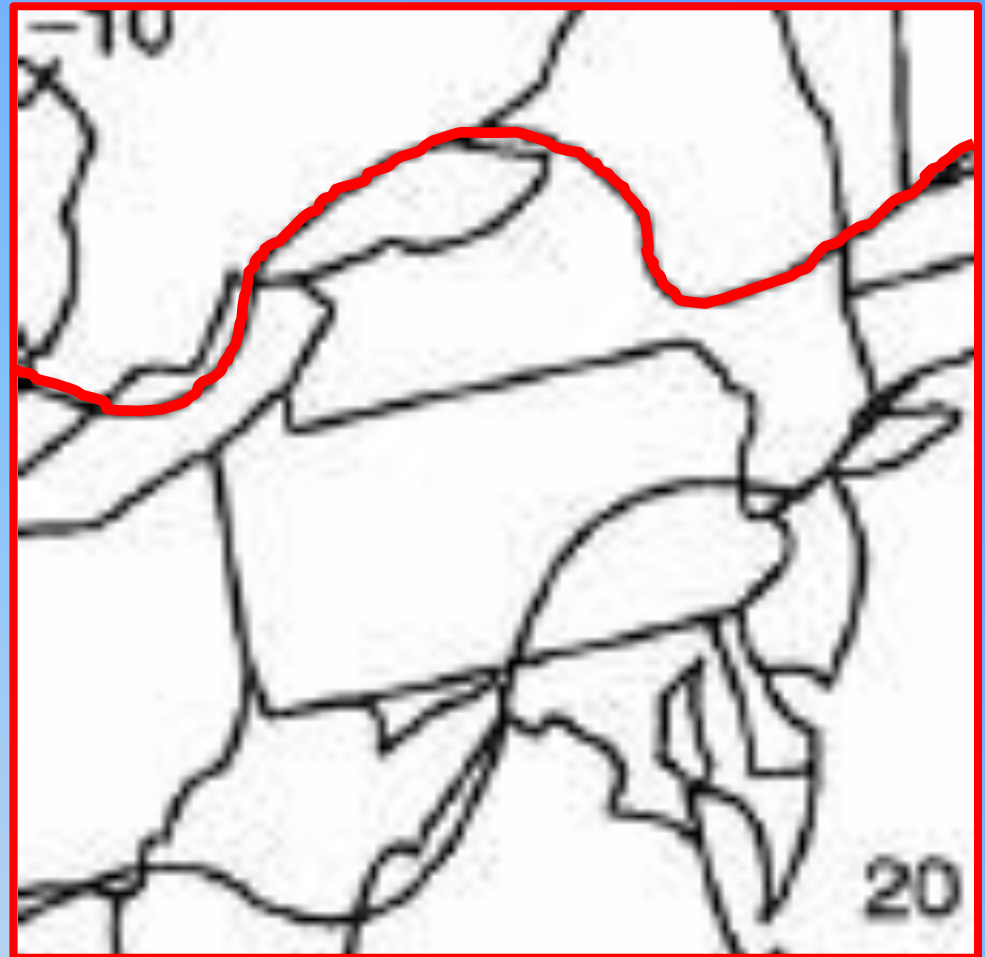
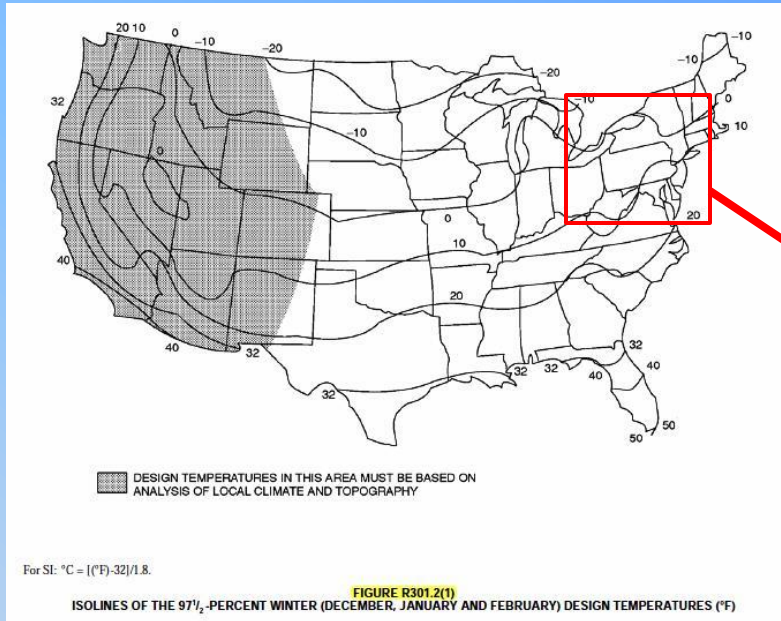
P3005.2.4 Changes of direction. Where a horizontal pipe, has a change of horizontal direction greater than 45 degrees a cleanout shall be installed at the change of direction.

P3005.2.5 Cleanout size. Cleanouts shall be the same size as the piping served by the cleanout, except cleanouts for piping larger than 4" need not be larger than 4".

Exceptions:

1. Cleanouts located on stacks can be one size smaller than the stack size.

P3103.2 Frost closure



SECTION P3111 COMBINATION WASTE AND VENT SYSTEM

P3111.2.2 Connection. The combination waste and vent system shall be provided with a dry vent connected at any point within the system or the system shall connect to a horizontal drain that serves vented fixtures located on the same floor. Combination waste and vent systems connecting to *building drains* receiving only the discharge from one or more stacks shall be provided with a dry vent. The vent connection to the combination waste and vent pipe shall extend vertically to a point not less than 6 inches (152 mm) above the flood level rim of the highest fixture being vented before offsetting horizontally.

SECTION P3201 FIXTURE TRAPS

P3201.2 Trap seals. Each fixture trap shall have a liquid seal of not less than 2 inches (51 mm) and not more than 4 inches.

P3201.2.1 **Trap seal protection**. Traps seals of emergency floor drain traps and traps subject to evaporation shall be protected by one of the methods in Sections P3201.2.1.1 through P3201.2.1.4.

P3201.2.1.1 Potable water-supplied trap seal primer valve. A potable water-supplied trap seal primer valve shall supply water to the trap. Water-supplied trap seal primer valves shall conform to ASSE 1018. The discharge pipe from the trap seal primer valve shall connect to the trap above the trap seal on the inlet side of the trap. **I skipped two**

P3201.2.1.4 A barrier-type trap seal protection device shall protect the floor drain trap seal from evaporation. Barrier-type floor drain trap seal protection devices shall conform to ASSE 1072. The devices shall be installed in accordance with the manufacturer's instructions.



P3201.4 Building traps. Building traps shall be prohibited

P3201.7 Size of fixture traps. Trap sizes for plumbing fixtures shall be as indicated in Table P3201.7. Where the tailpiece of a plumbing fixture is larger than that indicated in Table P3201.7, the trap size shall be the same nominal size as the fixture tailpiece. A trap shall not be larger than the drainage pipe into which the trap discharges.

**TABLE P3201.7
SIZE OF TRAPS FOR PLUMBING FIXTURES**

PLUMBING FIXTURE	TRAP SIZE MINIMUM (inches)
Bathtub (with or without shower head and/or whirlpool attachments)	1½
Bidet	1¼
Clothes washer standpipe	2
Dishwasher (on separate trap)	1½
Floor drain	2
Kitchen sink (one or two traps, with or without dishwasher and food waste disposer)	1½
Laundry tub (one or more compartments)	1½
Lavatory	1¼
Shower (based on the total flow rate through showerheads and bodysprays) Flow rate:	
5.7 gpm and less	1½
More than 5.7 gpm up to 12.3 gpm	2
More than 12.3 gpm up to 25.8 gpm	3
More than 25.8 gpm up to 55.6 gpm	4

For SI: 1 inch = 25.4 mm.

ELECTRICAL CHAPTER 34 GENERAL REQUIREMENTS

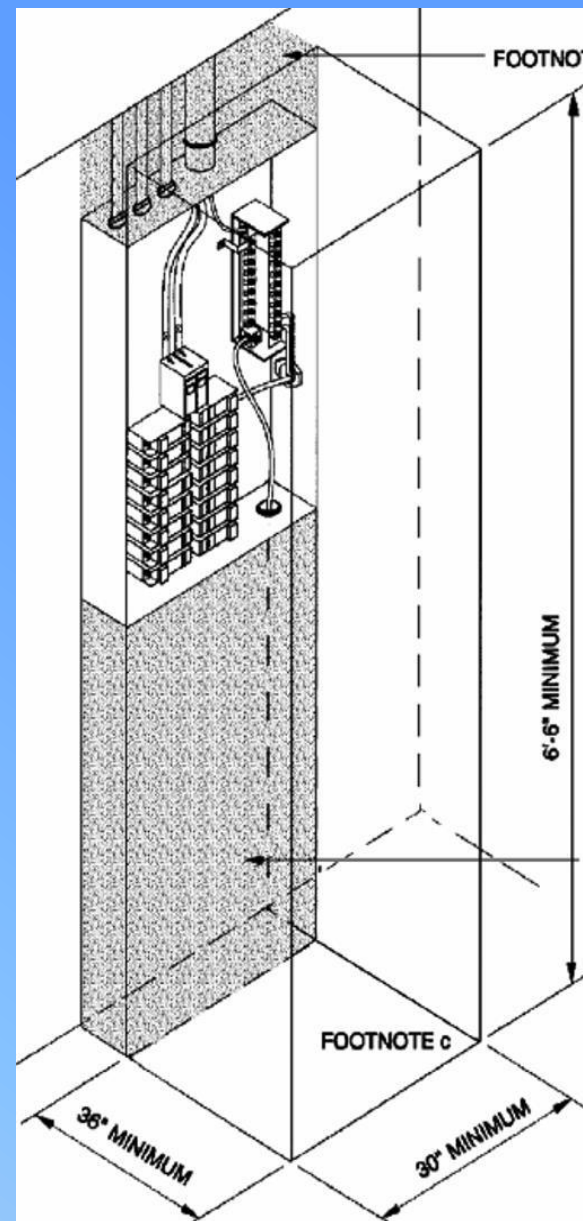
E3404.12 Field-applied hazard markings. Where caution, warning, or danger signs or labels are required by this code, the labels shall meet the following requirements:

1. The marking shall adequately warn of the hazard using effective words, colors, or symbols or combinations of such.
2. Labels shall be permanently affixed to the equipment or wiring method.
3. Labels shall not be hand written except for portions of labels or markings that are variable, or that could be subject to changes. Labels shall be legible.
4. Labels shall be of sufficient durability to withstand the environment involved. [110.21(B)]



E3405.3 Indoor dedicated panelboard space. The indoor space equal to the width and depth of the panelboard and extending from the floor to a height of 6 feet above the panelboard, or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. Piping, ducts, leak protection apparatus and other equipment foreign to the electrical installation shall not be installed in such dedicated space. The area above the dedicated space shall be permitted to contain foreign systems, provided that protection is installed to avoid damage to the electrical equipment from condensation, leaks and breaks in such foreign systems (see Figure E3405.1). Exception: Suspended ceilings with removable panels shall be permitted within the 6-foot dedicated space.

E3405.4 Outdoor dedicated panelboard space. The outdoor space equal to the width and depth of the panelboard, and extending from grade to a height of 6 feet above the panelboard, shall be dedicated to the electrical installation. Piping and other equipment foreign to the electrical installation shall not be located in this zone.



E3406.13 The connection of equipment grounding conductors, grounding electrode conductors and bonding jumpers shall be in accordance with Sections E3406.13.1 and E3406.13.2.

E3406.13.1 Permitted methods. Equipment grounding conductors, grounding electrode conductors, and bonding jumpers shall be connected by one or more of the following means:

1. Listed pressure connectors.
2. Terminal bars.
3. Pressure connectors listed as grounding and bonding equipment.
4. Exothermic welding process.
5. Machine screw-type fasteners that engage not less than two threads or are secured with a nut.
6. Thread-forming machine screws that engage not less than two threads in the enclosure.
7. Connections that are part of a listed assembly.
8. Other listed means. [250.8 (A)]

E3406.13.2 Methods not permitted. Connection devices or fittings that depend solely on solder shall not be used. [250.8 (B)]

SECTION E3603 SERVICE, FEEDER AND GROUNDING ELECTRODE CONDUCTOR SIZING

E3603.1 Grounded and ungrounded service conductor size. Service and feeder conductors supplied by a single-phase, 120/240-volt system shall be sized in accordance with Sections E3603.1.1 through E3603.1.4 and Table 3705.1.

E3603.1.1 For a service rated at 100 through 400 amperes, the service conductors supplying the entire load associated with a one-family dwelling, or the service conductors supplying the entire load associated with an individual dwelling unit in a two-family dwelling, shall have an ampacity of not less than 83 percent of the service rating.

E3603.1.2 For a feeder rated at 100 through 400 amperes, the feeder conductors supplying the entire load associated with a one-family dwelling, or the feeder conductors supplying the entire load associated with an individual dwelling unit in a two-family dwelling, shall have an ampacity of not less than 83 percent of the feeder rating.

E3702.13 Electric vehicle branch circuit. Outlets installed for the purpose of charging electric vehicles shall be supplied by a separate branch circuit. Such circuit shall not supply other outlets. (210.17)

E3705.4.5 Conductors of Type SE cable. Where used as a branch circuit or feeder wiring method within the interior of a building and installed in thermal insulation, the ampacity of the conductors in Type SE cable assemblies shall be in accordance with the 60°C (140°F) conductor temperature rating.

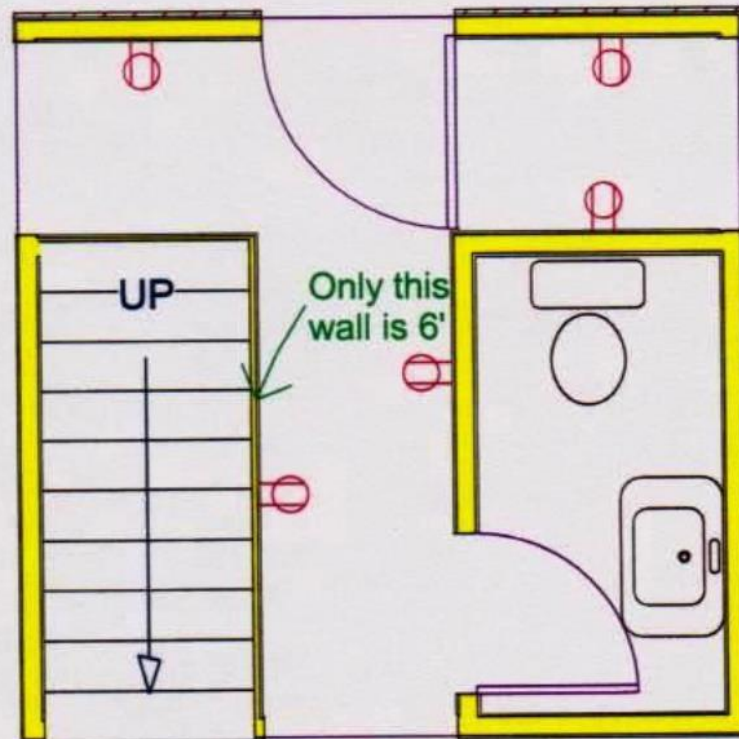
E3803.11 Under buildings. Underground cable and conductors installed under a building **shall be in a raceway**. [300.5(C)]

E3901.7 Outdoor outlets. **Pennsylvania retained the 20 square foot minimum for balconies to require an outlet.**

E3901.9 Basements, garages and accessory buildings. Not less than one receptacle outlet, in addition to any provided for specific equipment, shall be installed in each separate unfinished portion of a basement, in each attached garage, and in each detached garage or accessory building that is provided with electrical power. The branch circuit supplying the receptacles in a garage shall not supply outlets outside of the garage and **not less than one receptacle outlet shall be installed for each motor vehicle space**. [210.52(G)(1), (2), and (3)]

E3901.11 Foyers. Foyers that are not part of a hallway in accordance with Section E3901.10 and that have an area that is greater than 60 ft² shall have a receptacle(s) located in each wall space that is \geq 6 feet (914 mm) or more in width. Doorways, door-side windows that extend to the floor, and similar openings shall not be considered as wall space. [210.52(H)] **But not less than one.**

2015 IRC requires five outlets in this foyer.
Pennsylvania modification requires only one



E3902.8 Bathtub or shower stall receptacles. 125-volt, single phase, 15- and 20-ampere receptacles that are located within 6 feet of the outside edge of a bathtub or shower stall shall have ground-fault circuit interrupter protection for personnel. [210.8(A)(8)]

E3902.9 Laundry areas. 125-volt, single-phase, 15- and 20-ampere receptacles installed in laundry areas shall have ground-fault circuit interrupter protection for personnel. [210.8(A)(9)]

E3902.10 Kitchen dishwasher branch circuit. Ground-fault circuit-interrupter protection shall be provided for outlets that supply dishwashers in dwelling unit locations. [210.8(D)]

E3902.15 Location of arc-fault circuit interrupters. Arc-fault circuit interrupters shall be installed in readily accessible locations.

E3902.16 Arc-fault circuit-interrupter protection. Branch circuits that supply 120-volt, single-phase, 15- and 20- ampere outlets installed in kitchens, family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreations rooms, closets, hallways, laundry areas and similar rooms or areas shall be protected by any of the following: [210.12(A)]

1. A listed combination-type arc-fault circuit interrupter, installed to provide protection of the entire branch circuit. [210.12(A)(1)]

2. A listed branch/feeder-type AFCI installed at the origin of the branch-circuit in combination with a listed outlet branch-circuit type arc-fault circuit interrupter installed at the first outlet box on the branch circuit. The first outlet box in the branch circuit shall be marked to indicate that it is the first outlet of the circuit.

3. A listed supplemental arc protection circuit breaker installed at the origin of the branch circuit in combination with a listed outlet branch-circuit type arc-fault circuit interrupter installed at the first outlet box on the branch circuit where all of the following conditions are met:

3.1. The branch-circuit wiring shall be continuous from the branch-circuit overcurrent device to the outlet branch-circuit arc-fault circuit interrupter.

3.2. The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 50 feet for 14 AWG conductors and 70 feet for 12 AWG conductors.

3.3. The first outlet box on the branch circuit shall be marked to indicate that it is the first outlet on the circuit. [210.12(A)(3)]

4. A listed outlet branch-circuit type arc-fault circuit interrupter installed at the first outlet on the branch circuit in combination with a listed branch-circuit overcurrent protective device where all of the following conditions are met:

- 4.1. The branch-circuit wiring shall be continuous from the branch-circuit overcurrent device to the outlet branch-circuit arc-fault circuit interrupter.
- 4.2. The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 50 feet for 14 AWG conductors and 70 feet for 12 AWG conductors.
- 4.3. The first outlet box on the branch circuit shall be marked to indicate that it is the first outlet on the circuit.
- 4.4. The combination of the branch-circuit overcurrent device and outlet branch-circuit AFCI shall be identified as meeting the requirements for a system combination-type AFCI and shall be listed as such. [210.12(A)(4)]



E3905.11 Damp or wet locations. In damp or wet locations, boxes, conduit bodies and fittings shall be placed or equipped so as to prevent moisture from entering or accumulating within the box, conduit body or fitting. Boxes, conduit bodies and fittings installed in wet locations shall be listed for use in wet locations. Where drainage openings are installed in the field in boxes or conduit bodies listed for use in damp or wet locations, such openings shall be approved and not larger than 1/4 inch. For listed drain fittings, larger openings are permitted where installed in the field in accordance with the manufacturer's instructions. (314.15)

E3905.12.2.2 Clamp fill. Where one or more internal cable clamps, whether factory or field supplied, are present in the box, a single volume allowance in accordance with Table E3905.12.2.1 shall be made based on the largest conductor present in the box. An allowance shall not be required for a cable connector having its clamping mechanism outside of the box. A clamp assembly that incorporates a cable termination for the cable conductors shall be listed and marked for use with specific nonmetallic boxes. Conductors that originate within the clamp assembly shall be included in conductor fill calculations provided in Section E3905.12.2.1 as though they entered from outside of the box. The clamp assembly shall not require a fill allowance, but, the volume of the portion of the assembly that remains within the box after installation shall be excluded from the box volume as marked in accordance with Section E3905.12.1.2. [314.16(B)(2)]

E4001.15 Switches controlling lighting loads. The grounded circuit conductor (neutral) for the controlled lighting circuit shall be provided at the location where switches control lighting loads that are supplied by a grounded general-purpose branch circuit for other than the following:

1. Where conductors enter the box enclosing the switch through a raceway, provided that the raceway is large enough for all contained conductors, including a grounded conductor.
2. Where the box enclosing the switch is accessible for the installation of an additional or replacement cable without removing finish materials.
3. Where snap switches with integral enclosures comply with E3905.1.3.
4. Where the switch does not serve a habitable room or bathroom.
5. Where multiple switch locations control the same lighting load such that the entire floor area of the room or space is visible from the single or combined switch locations.
6. Where lighting in the area is controlled by automatic means.
7. Where the switch controls a receptacle load □ [404.2(C)]