



Overview of Significant Updates-- 2018 IRC Codes



Disclaimer


This listing of codes, standards or any other regulations within this presentation is for informational purposes only. They do not constitute the full scope of provisions that may be applicable to your project and cannot be relied upon as evidence of compliance or enforcement.

Any code provision not mentioned in this presentation does not alleviate the person responsible for the design (owner, designer, etc.) from full compliance with necessary codes and standards nor does it diminish the importance of any specific feature or element.





Agenda

- Authority to use new IRC Adoption
 - Changes to the 2018 IRC
 - Definitions
 - Building Planning
 - Building Envelope & Ventilation
 - Exterior Decks (Section R507)
 - Photovoltaics & Stationary Storage Battery Stations
 - Energy Conservation
 - Mechanical
- 



Authority to use new I Codes

PA UCC Regulations and L&I Bulletin B-2202

PA UCC Regulation updates were approved by the IRRC on 1/26/2022, provisions taking effect on date of 2/14/2022 per Section 304(a) (*with a 6-month grace period per Section 304(c)(4) of Act 45 of 1999*).

- **Effective February 14, 2022** the following shall be considered “residential provisions” of the I Codes
 - ***2018 IRC – as amended and including referenced standards***
 - ***2018 IECC – as amended and including referenced standards***






Authority to use new IRC 2018 Codes

Important dates and time frames for compliance

As is typical with code changes, a “grace period” exists for new accessibility provisions

- **February 14, 2022** – the 2018 provisions go into effect
 - **February 14, 2022 – August 14, 2022** – designs can use either the 2015 or 2018 IRC Codes for one-and-two family dwellings
 - If no selection between the two is clearly shown on the construction documents, the Department will enforce 2015 I Codes provisions in accordance with Code Bulletin B-2202
 - **August 14, 2022** – the new 2018 IRC provisions are mandatory for compliance
 - No other selection on the construction documents will be accepted
 - Department will enforce 2018 IRC and IECC Codes for one-and-two family dwellings
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Significant Changes in the 2018 IRC

Significant changes in the 2018 IRC provisions for discussion purposes

In the following slides we'll go over specific changes deemed significant based on the Department's experience with compliance for One-and-Two family dwellings

- If items require any interpretation, they will be offered as needed. Some items require further review by the Department before final interpretation, if needed, can be offered
- The 2018 IRC and Referenced Amendments can be accessed free at the following links:
 - [2018 International Residential Code \(IRC\) | ICC Digital Codes \(iccsafe.org\)](#)
 - [PA UCC RAC--2018 I-Codes Adoption Final Report](#)
 - [L+I FAQs | Significant Changes between 2015 to 2018 IRC](#)
 - [PA Bulletin 52, No. 7 -- 2018 Code Adoption](#)





Definitions

2018 IRC Section R202 Definitions.

New Definitions introduced to include the following:

- Distinctly define CO Alarms from CO Detectors

[RB]CARBON MONOXIDE ALARM.

A single- or multiple-station alarm intended to detect carbon monoxide gas and alert occupants by a distinct audible signal. It incorporates a sensor, control components and an alarm notification appliance in a single unit.

[RB]CARBON MONOXIDE DETECTOR.

A device with an integral sensor to detect carbon monoxide gas and transmit an alarm signal to a connected alarm control unit.

- Identify “Crawl Space” as NOT as basement

[RB]CRAWL SPACE.

An underfloor space that is not a basement.

- Amend “Repair” to be inclusive of replacement worksopes

[RB]REPAIR.

The reconstruction, replacement or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.

For the definition applicable in Chapter 11, see Section N1101.6.





2018 IRC CODE UPDATES

BUILDING PLANNING





Building Planning

2018 IRC Section R302.1 Exterior Walls.

Amendments to exceptions for rated exterior walls at accessory structures have been clarified to be applicable only to “individual dwelling units” and their accessory structures.

R302.1 Exterior walls.

Construction, projections, openings and penetrations of *exterior walls* of *dwelling*s and accessory buildings shall comply with Table R302.1(1); or *dwelling*s equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
2. Walls of *individual dwelling units and their accessory structures* located on the same *lot*.



Building Planning

2018 IRC Section R302.2 Townhouses.

Amended to clarify requirements for a double wall separation of two (2) 1-hour fire-resistance rated wall assemblies, or the use of common walls under Section R302.2.2, Item 1 & 2.

R302.2 Townhouses.

Walls separating townhouse units shall be constructed in accordance with Section R302.2.1 or R302.2.2.

R302.2.1 Double walls.

Each townhouse shall be separated by two 1-hour fire-resistance-rated wall assemblies tested in accordance with ASTM E119, UL 263 or Section 703.3 of the *International Building Code*.

R302.2.2 Common walls.

Common walls separating *townhouses* shall be assigned a fire-resistance rating in accordance with Item 1 or 2. The common wall shared by two *townhouses* shall be constructed without plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be in accordance with Chapters 34 through 43. Penetrations of the membrane of common walls for electrical outlet boxes shall be in accordance with Section R302.4.

1. Where a fire sprinkler system in accordance with Section P2904 is provided, the common wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E119, UL 263 or Section 703.3 of the *International Building Code*.
2. Where a fire sprinkler system in accordance with Section P2904 is not provided, the common wall shall be not less than a 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E119, UL 263 or Section 703.3 of the *International Building Code*.

- Provisions are still maintained for Common Wall installations in sprinklered and unsprinklered buildings, where plumbing and mechanical equipment is not found in the common wall cavity.



Building Planning

2018 IRC Section R302.5.1 Dwelling-Garage Opening Protective.

The PA UCC RAC amendment removed the 2018 reference to automatic or self-closing door requirements for openings into garages, maintaining the previous 2015 RAC amendments.

***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.*



Building Planning

2018 IRC Section R310.1 Emergency Escape & Rescue Openings

Amended to allow for exceptions to any required emergency escape & rescue openings at sleeping rooms located in a basement level, where a sprinklered building per Section P2904 is provided.

SECTION R310 EMERGENCY ESCAPE AND RESCUE OPENINGS

R310.1 Emergency escape and rescue opening required.

Basements, habitable attics and every sleeping room shall have not less than one operable emergency escape and rescue opening. Where *basements* contain one or more sleeping rooms, an emergency escape and rescue opening shall be required in each sleeping room. Emergency escape and rescue openings shall open directly into a public way, or to a *yard* or court that opens to a public way.

Exceptions:

1. Storm shelters and *basements* used only to house mechanical *equipment* not exceeding a total floor area of 200 square feet (18.58 m²).
2. Where the *dwelling* or *townhouse* is equipped with an automatic sprinkler system installed in accordance with Section P2904, sleeping rooms in basements shall not be required to have emergency escape and rescue openings provided that the basement has one of the following:
 - 2.1. One means of egress complying with Section R311 and one emergency escape and rescue opening.
 - 2.2. Two means of egress complying with Section R311.

- Basement level is required to provide either two (2) means of egress OR one (1) means of egress and one (1) emergency escape and rescue opening.



Building Planning

2018 IRC Section R310.3 Emergency Escape & Rescue Openings – Area Wells

Amendments have replaced reference to “bulkhead enclosures” with “Area Wells” for emergency escape and rescue openings.

R310.3 Emergency escape and rescue doors.

Where a door is provided as the required emergency escape and rescue opening, it shall be a side-hinged door or a slider. Where the opening is below the adjacent grade, it shall be provided with an area well.


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 Area wells.

Area wells shall have a width of not less than 36 inches (914 mm). The area well shall be sized to allow the emergency escape and rescue door to be fully opened.

R310.3.2.1 Ladder and steps.

Area wells with a vertical depth greater than 44 inches (1118 mm) shall be equipped with a permanently affixed ladder or steps usable with the door in the fully open position. Ladders or steps required by this section shall not be required to comply with Section R311.7. Ladders or rungs shall have an inside width of not less than 12 inches (305 mm), shall project not less than 3 inches (76 mm) from the wall and shall be spaced not more than 18 inches (457 mm) on center vertically for the full height of the exterior stairwell. 

- Provisions now provide a “minimum width” for area wells of 36-inches
 - Introduces requirements for ladder/step installations for area wells with a vertical depth greater than 44-inches
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Building Planning

2018 IRC Section R311.7 Stairs

Amendments around stairs introduced in throughout this section:

- Section R311.7.4 PA UCC RAC Amendments for Winder Tread—Walklines

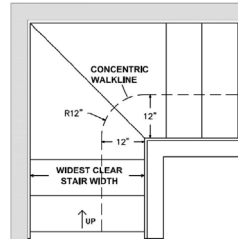


Figure R311.7.4
WINDER TREAD AND LANDING DETAIL

- Section R311.7.5.3 Amendments mandating a radiused or beveled “nosing” for Treads
- Section R311.7.8 Clarifications for Handrail design requirements regarding handrail projection, clearance, and continuity
- Section R311.11 & R311.12 Exception introduced for the use of Alternative Tread Devices & Ship Ladders where they serve as a means of egress from a small area < 200 SF gross



Building Planning

2018 IRC Section R314.2.2 Smoke Alarms; Where Required—Alterations, Repairs, Additions

Amendments have changed requirements for smoke alarms in existing buildings to be applicable only when such work REQUIRES A PERMIT.

R314.2 Where required.

Smoke alarms shall be provided in accordance with this section.

R314.2.1 New construction.


Smoke alarms shall be provided in *dwelling units*.

R314.2.2 Alterations, repairs and additions.

Where *alterations, repairs or additions* requiring a permit occur, the individual *dwelling unit* shall be equipped with smoke alarms located as required for new *dwelling units*.

Exceptions:

1. Work involving the exterior surfaces of *dwelling units*, such as the replacement of roofing or siding, the *addition* or replacement of windows or doors, *or the addition of a porch or deck*.
2. Installation, alteration or repairs of plumbing or *mechanical systems*.

- Previous 2015 language amended to now remove reference to alarm requirements for worksopes adding or creating sleeping rooms, eliminating requirements where living spaces are converted unless a permit is required.
 - Note that provisions of the Fire Code, Section F-1103.8 for smoke alarms still govern all existing Group R occupancies, even where no alterations take place.
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Building Planning

2018 IRC Section R314.4 Smoke Alarms Interconnections

PA UCC RAC amendments maintains the 2015 IRC exception to Smoke Alarm interconnections for existing buildings undergoing alterations.

R314.4 Interconnection. *Where more than one smoke alarm is required to be installed within an individual dwelling unit in accordance with Section R314.3, the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual dwelling unit. Physical interconnection of smoke alarms shall not be required where listed wireless alarms are installed and all alarms sound upon activation of one alarm.*

Exception: *Interconnection of smoke alarms in existing areas shall not be required where alterations or repairs do not result in removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available that could provide access for interconnection without the removal of interior finishes.*

- Exception aligns with provisions of the Fire Code, Section F-1108.3.2, Exception 2 for smoke alarm interconnections.
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Building Planning

2018 IRC Section R315.2.2 CO Alarms; Where Required—Alterations, Repairs, Additions


Amendments have changed requirements for CO alarms in existing buildings to be applicable only when such work REQUIRES A PERMIT.

R315.2.2 Alterations, repairs and additions.

Where *alterations, repairs or additions* requiring a permit occur, the individual *dwelling unit* shall be equipped with carbon monoxide alarms located as required for new *dwelling*s.

Exceptions:

1. Work involving the exterior surfaces of *dwelling*s, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck.
2. Installation, alteration or repairs of plumbing or *mechanical systems*.

- Previous 2015 language amended to now remove reference to alarm requirements for workscopes adding or creating sleeping rooms, eliminating requirements where living spaces are converted unless a permit is required.
 - Note that provisions of the Fire Code, Section F-1103.9 for CO alarms still govern all existing sleeping areas and dwelling units, even where no alterations take place.
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Building Planning

2018 IRC Section R315.5 CO Alarm Interconnections

Amendment now requires interconnection of CO alarms, similar to provisions for Smoke Alarms.

R315.5 Interconnectivity.

Where more than one carbon monoxide alarm is required to be installed within an individual *dwelling unit* in accordance with Section R315.3, the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual *dwelling unit*. Physical interconnection of carbon monoxide alarms shall not be required where *listed* wireless alarms are installed and all alarms sound upon activation of one alarm.

Exception: Interconnection of carbon monoxide alarms in existing areas shall not be required where *alterations* or *repairs* do not result in removal of interior wall or ceiling finishes exposing the structure, unless there is an *attic*, crawl space or basement available that could provide access for interconnection without the removal of interior finishes.





Building Planning

2018 IRC Section R322.3 Flood-Resistant Construction

Amendments have been introduced for structures proposed in Special Flood Hazard Areas for V-Zones and Coastal Zone A developments.

- Section R322.3.4 – Added provisions regarding installation of concrete slabs in Coastal A Zones, which are now required to be Independent structures.

R322.3.4 Concrete slabs.

Concrete slabs used for parking, floors of enclosures, landings, decks, walkways, patios and similar uses that are located beneath structures, or slabs that are located such that if undermined or displaced during base flood conditions could cause structural damage to the building foundation, shall be designed and constructed in accordance with one of the following:

1. To be structurally independent of the foundation system of the structure, to not transfer flood loads to the main structure, and to be frangible and break away under flood conditions prior to base flood conditions. Slabs shall be a maximum of 4 inches (102 mm) thick, shall not have turned-down edges, shall not contain reinforcing, shall have isolation joints at pilings and columns, and shall have control or construction joints in both directions spaced not more than 4 feet (1219 mm) apart.
2. To be self-supporting, structural slabs capable of remaining intact and functional under base flood conditions, including erosion and local scour, and the main structure shall be capable of resisting any added flood loads and effects of local scour caused by the presence of the slabs.

- Section R322.3.7 & R322.3.8 – Added regulations for stairway/ramp and deck/porch installations located in Coastal A Zones
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Building Planning

2018 IRC Section R325.3 Mezzanine – Area Limitations


Introduces new exceptions for larger mezzanine area allowance, without being considered a story, in fully sprinklered buildings

- Exceptions allows for mezzanine sizes up to one-half of the floor area of the room in which they are located in, provided that all conditions of the exception are met

R325.3 Area limitation.

The aggregate area of a mezzanine or mezzanines shall be not greater than one-third of the floor area of the room or space in which they are located. The enclosed portion of a room shall not be included in a determination of the floor area of the room in which the *mezzanine* is located.

Exception: The aggregate area of a mezzanine located within a dwelling unit equipped with a fire sprinkler system in accordance with Section P2904 shall not be greater than one-half of the floor area of the room, provided that the mezzanine meets all of the following requirements:

1. Except for enclosed closets and bathrooms, the mezzanine is open to the room in which such mezzanine is located.
 2. The opening to the room is unobstructed except for walls not more than 42 inches (1067 mm) in height, columns and posts.
 3. The exceptions to Section R325.5 are not applied.
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Building Planning

2018 IRC Section R325.5 Mezzanine – Openness

PA UCC RAC Amendments have reduced the maximum wall height conditions governing Mezzanine openness, with removal of exceptions for sprinkler installations

***R325.5 Openness.** Mezzanines shall be open and unobstructed to the room in which they are located except for walls not more than ~~42 inches (1067 mm)~~ 36 inches (914 mm) in height, columns and posts.*

Exceptions:

- 1. Mezzanines or portions thereof are not required to be open to the room in which they are located, provided that the aggregate floor area of the enclosed space is not greater than 10 percent of the mezzanine area.*
- ~~2. In buildings that are not more than two stories above grade plane and equipped throughout with an automatic sprinkler system in accordance with NFPA 13R or NFPA 13D, a mezzanine having two or more means of egress shall not be required to be open to the room in which the mezzanine is located.~~*

- Maximum wall heights are now reduced to 36-inches, instead of 42-inches
- Exceptions to openness based on sprinkler installations are now removed




Building Planning

2018 IRC Section R325.6 Habitable Attics

PA UCC RAC Amendments have relocated the location of the definition for the limits of a “Habitable Attic” to R325, and has removed the 4th condition from the requirements

R325.6 Habitable attic. *A habitable attic shall not be considered a story where complying with all of the following requirements:*

- 1. The occupiable floor area is not less than 70 square feet (17 m²), in accordance with Section R304.*
 - 2. The occupiable floor area has a ceiling height in accordance with Section R305.*
 - 3. The occupiable space is enclosed by the roof assembly above, knee walls (if applicable) on the sides and the floor-ceiling assembly below.*
 - ~~4. The floor of the occupiable space shall not extend beyond the exterior walls of the floor below.~~*
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Building Planning

2018 IRC Section R802, Wood Roof Framing

Various amendments have been made throughout this section for hip & gable roofs


- Section R802.2, Amended language for connector tie installations to address Roof Thrust
- Section R802.3, Amended language to clarify “framing details” as “ridge” framing scoping, with added provisions around ridge beam requirements

R802.2 Design and construction.

The roof and ceiling assembly shall provide continuous ties across the structure to prevent roof thrust from being applied to the supporting walls. The assembly shall be designed and constructed in accordance with the provisions of this chapter and Figures R606.11(1), R606.11(2) and R606.11(3) or in accordance with AWC NDS.

R802.3 Ridge.

A ridge board used to connect opposing rafters shall be not less than 1 inch (25 mm) nominal thickness and not less in depth than the cut end of the rafter. Where ceiling joist or rafter ties do not provide continuous ties across the structure, a ridge beam shall be provided and supported on each end by a wall or girder.

- Section R802.4, repurposed to apply to “rafter” joists
 - Section R802.5, repurposed to apply to “ceiling” joists
 - Section R802.5.2, added provisions for ceiling joist-rafter connections
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2018 IRC CODE UPDATES

BUILDING ENVELOPE & VENTILATION



Building Envelope & Ventilation

2018 IRC Section R405.1, Foundation Drainage

Amended revisions to identify the location of your drainage substrate to be installed at or below the top of the footing, or below the bottom of the slab, to be discharged by gravity or mechanical means

SECTION R405 FOUNDATION DRAINAGE

R405.1 Concrete or masonry foundations.

Drains shall be provided around concrete or masonry foundations that retain earth and enclose habitable or usable spaces located below *grade*. Drainage tiles, gravel or crushed stone drains, perforated pipe or other *approved* systems or materials shall be installed at or below the top of the footing or below the bottom of the slab and shall discharge by gravity or mechanical means into an *approved* drainage system. Gravel or crushed stone drains shall extend not less than 1 foot (305 mm) beyond the outside edge of the footing and 6 inches (152 mm) above the top of the footing and be covered with an *approved* filter membrane material. The top of open joints of drain tiles shall be protected with strips of building paper. Except where otherwise recommended by the drain manufacturer, perforated drains shall be surrounded with an *approved* filter membrane or the filter membrane shall cover the washed gravel or crushed rock covering the drain. Drainage tiles or perforated pipe shall be placed on not less than 2 inches (51 mm) of washed gravel or crushed rock not less than one sieve size larger than the tile joint opening or perforation and covered with not less than 6 inches (152 mm) of the same material.

Exception: A drainage system is not required where the foundation is installed on well-drained ground or sand-gravel mixture soils according to the Unified Soil Classification System, Group I soils, as detailed in Table R405.1.

Building Envelope & Ventilation

2018 IRC Section R408.3, Unvented Crawl Space

PA UCC RAC Amendments have included new provisions to allow for dehumidification in place of ventilation openings in underfloor spaces where sized with the manufacturer's specifications.

R408.3 Unvented crawl space. *Ventilation openings in under-floor spaces specified in Sections R408.1 and R408.2 shall not be required where the following items are provided:*

1. *Exposed earth is covered with a continuous Class I vapor retarder. Joints of the vapor retarder shall overlap by 6 inches (152 mm) and shall be sealed or taped. The edges of the vapor retarder shall extend not less than 6 inches (152 mm) up the stem wall and shall be attached and sealed to the stem wall or insulation.*
2. *One of the following is provided for the under-floor space:*
 - 2.1. *Continuously operated mechanical exhaust ventilation at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet (4.7 m²) of crawl space floor area, including an air pathway to the common area (such as a duct or transfer grille), and perimeter walls insulated in accordance with Section N1102.2.11 of this code.*
 - 2.2. *Conditioned air supply sized to deliver at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet (4.7 m²) of under-floor area, including a return air pathway to the common area (such as a duct or transfer grille), and perimeter walls insulated in accordance with Section N1102.2.11 of this code.*
 - 2.3. *Plenum in existing structures complying with Section M1601.5, if under-floor space is used as a plenum.*
 - 2.4. *Dehumidification sized in accordance with manufacturer's specifications.*



Building Envelope & Ventilation

2018 IRC Section R703.1, Exterior Covering; Water Resistance

Amended language for water-resistive barrier location and drainage system requirements from references to “exterior veneer” and exterior “assembly” and clarified as “exterior cladding”

SECTION R703 EXTERIOR COVERING ES

R703.1 General.

Exterior walls shall provide the building with a weather-resistant exterior wall envelope. The exterior wall envelope shall include flashing as described in Section R703.4.

Exception: Log walls designed and constructed in accordance with the provisions of ICC 400.

R703.1.1 Water resistance.

The exterior wall envelope shall be designed and constructed in a manner that prevents the accumulation of water within the wall assembly by [providing a water-resistant barrier behind the exterior cladding](#) as required by Section R703.2 and a means of draining to [the exterior water that penetrates the exterior cladding](#).



Building Envelope & Ventilation

2018 IRC Section R703.7.1, Exterior Plaster (Stucco); Lath

PA UCC RAC Amendments have included language around lath installation requirements, with additional attachment requirements where Exterior Plaster is being specified as the proposed Wall Bracing Method under R602.10.4.

R703.7.1 Lath. *Lath and lath attachments shall be of corrosion-resistant materials in accordance with ASTM C1063-2018B. Expanded metal, welded wire, or woven wire lath shall be attached to wood framing members or furring. Where the exterior plaster is serving as wall bracing in accordance with Table R602.10.4, the lath shall be attached directly to framing. The lath shall be attached with 1-1/2-inch-long (38 mm), 11-gage nails having a 7/16 -inch (11.1 mm) head, or 7/8 -inch-long (22.2 mm), 16-gage staples, spaced not more than 7 inches (178 mm) on center along framing members or furring and not more than 24 inches (610 mm) on center between framing members or furring, or as otherwise approved. Additional fastening between wood framing members shall not be prohibited. Lath attachments to cold-formed steel framing or to masonry, stone, or concrete substrates shall be in accordance with ASTM C1063-2018B. Where lath is installed directly over foam sheathing, lath connections shall also be in accordance with Section R703.15, R703.16 or R703.17. Where lath is attached to furring installed over foam sheathing, the furring connections shall be in accordance with Section R703.15, R703.16 or R703.17.*

Exception: *Lath is not required over masonry, cast-in-place concrete, precast concrete or stone substrates prepared in accordance with ASTM C1063-2018B.*

703.7.1.1 Furring. *Where provided, furring shall consist of wood furring strips not less than 1 inch by 2 inches (25 mm by 51 mm), minimum 3/4-inch (19 mm) metal channels, or self-furring lath, and shall be installed in accordance with ASTM C1063-2018B. Furring shall be spaced not greater than 24 inches (600 mm) on center and, where installed over wood or cold-formed steel framing, shall be fastened into framing members.*



Building Envelope & Ventilation

2018 IRC Section R703.7.2, Exterior Plaster (Stucco); Plaster

Amendments now reference applicable ASTM standards associated with exterior plaster applications, provides further guidance on appropriate construction specifications to these exterior covering applications.

R703.7.2 Plaster.

Plastering with cement plaster shall be in accordance with ASTM C926. Cement materials shall be in accordance with one of the following:

1. Masonry cement conforming to ASTM C91 Type M, S or N.
2. Portland cement conforming to ASTM C150 Type I, II, or III.
3. Blended hydraulic cement conforming to ASTM C595 Type IP, IS (< 70), IL, or IT (S < 70).
4. Hydraulic cement conforming to ASTM C1157 Type GU, HE, MS, HS, or MH.
5. Plastic (stucco) cement conforming to ASTM C1328.



Building Envelope & Ventilation

2018 IRC Section R703.7.2, Exterior Plaster (Stucco); Water-Resistive Barriers

PA UCC RAC Amendments have now adopted Stucco provisions of the IRC 2021, bringing us up to the latest standard. Significant modification to requirements for drainage layers, with requirements for Dry and Moist/Marine Climates.

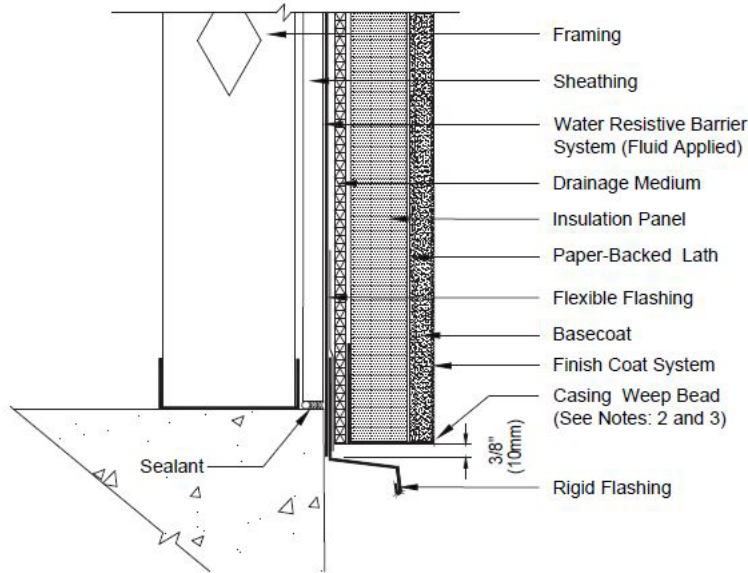
R703.7.3 Water-resistive barriers. *Water-resistive barriers shall be installed as required in Section R703.2 and, where applied over wood-based sheathing, shall comply with Section R703.7.3.1 or R703.7.3.2.*

R703.7.3.1 Dry climates. *In Dry (B) climate zones indicated in Figure N1101.7, water-resistive barriers shall comply with one of the following:*

- 1. The water-resistive barrier shall be two layers of 10-minute Grade D paper or have a water resistance equal to or greater than two layers of a water-resistive barrier complying with ASTM E2556-10, Type I. The individual layers shall be installed independently such that each layer provides a separate continuous plane. Flashing installed in accordance with Section R703.4 and intended to drain to the water-resistive barrier shall be directed between the layers.*
- 2. The water-resistive barrier shall be 60-minute Grade D paper or have a water resistance equal to or greater than one layer of a water-resistive barrier complying with ASTM E2556-10, Type II. The water-resistive barrier shall be separated from the stucco by a layer of foam plastic insulating sheathing or other non-water-absorbing layer, or a designed drainage space.*

R703.7.3.2 Moist or marine climates. *In the Moist (A) or Marine (C) climate zones indicated in Figure N1101.7, water-resistive barriers shall comply with one of the following:*

Building Envelope & Ventilation



2018 IRC Section R703.7.2, Exterior Plaster (Stucco); Water-Resistive Barriers (cont'd)

Applications will now be required to comply with provisions under Section R703.7.3.2 for Moist/Marine environments for a drainage layer installation exterior to the WR barrier

1. In addition to complying with Section R703.7.3.1, a space or drainage material not less than 3/16 inch (5 mm) in depth shall be added to the exterior side of the water-resistive barrier.
2. In addition to complying with Section R703.7.3.1, Item 2, drainage on the exterior of the water-resistive barrier shall have a drainage efficiency of not less than 90 percent, as measured in accordance with ASTM E2273-2018 or Annex A2 of ASTM E2925-17.

- Item 1: Drainage layer material \geq 3/16 inch depth added on the exterior side of the WR Barrier OR;
- Item 2: Drainage layer with a drainage efficiency $>$ 90% (per referenced ASTM standards) on exterior side of the WR Barrier



Building Envelope & Ventilation

2018 IRC Section R806.2 Roof Ventilation

PA UCC RAC amends the minimum ventilation area exceptions associated with regard to the installation of mixed ventilation elements to be provided by eave or cornice vents where 40% to 50% of the required ventilating area is provided at the upper portion of the attic or rafter space.

R806.2 Minimum vent area. *The minimum net free ventilating area shall be 1/150 of the area of the vented space.*

Exception: *The minimum net free ventilation area shall be 1/300 of the vented space provided one or more of the following conditions are met:*

- 1. In Climate Zones 6, 7 and 8, a Class I or II vapor retarder is installed on the warm-in-winter side of the ceiling.*
- 2. Not less than 40 percent and not more than 50 percent of the required ventilating area is provided by ventilators located in the upper portion of the attic or rafter space. Upper ventilators shall be located not more than 3 feet (914 mm) below the ridge or highest point of the space, measured vertically, with the balance of the required ventilation provided by eave or cornice vents. Where the location of wall or roof framing members conflicts with the installation of upper ventilators, installation more than 3 feet (914 mm) below the ridge or highest point of the space shall be permitted.*



Building Envelope & Ventilation

2018 IRC Section R806.1 & R806.3 Roof Ventilation—Restricted Obstructions

- Section R806.1 -- PA UCC RAC Amendments remove provisions to require screening in roof ventilation

***R806.1 Ventilation required.** Enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain or snow. Ventilation openings shall have a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Ventilation openings having a least dimension larger than 1/4 inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth, perforated vinyl or similar material with openings having a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Openings in roof framing members shall conform to the requirements of Section R802.7. Required ventilation openings shall open directly to the outside air ~~and shall be protected to prevent the entry of birds, rodents, snakes and other similar creatures.~~*

- Section R806.3 – PA UCC RAC Amendments revises language to prohibit all obstructions for roof ventilation air movement.

***R806.3 Vent and insulation clearance.** Where eave or cornice vents are installed, ~~blocking, bridging and insulation~~ nothing shall ~~not~~ block the free flow of air. Not less than a 1-inch (25 mm) space shall be provided between the insulation and the roof sheathing and at the location of the vent.*

Building Envelope & Ventilation

2018 IRC Section R806.5 Unvented Attic and Unvented Enclosed Rafter Assemblies

Amendments provide clarification around necessary conditions to be met for attic and enclosed rafter spans to be allowed to be unvented, to include specified location of the air permeable insulation installation.

R806.5 Unvented attic and unvented enclosed rafter assemblies.

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 all the following conditions are met:

1. The unvented *attic* space is completely within the *building thermal envelope*.
2. Interior Class I vapor retarders are not installed on the ceiling side (*attic* floor) of the unvented *attic* assembly or on the ceiling side of the unvented enclosed roof framing assembly.
3. Where wood shingles or shakes are used, a minimum ¼-inch (6.4 mm) vented airspace separates the shingles or shakes and the roofing underlayment above the structural sheathing.
4. In Climate Zones 5, 6, 7 and 8, any *air-impermeable insulation* shall be a Class II vapor retarder, or shall have a Class II vapor retarder coating or covering in direct contact with the underside of the insulation.
5. *Insulation shall comply with Item 5.3 and either Item 5.1 or 5.2:*
 - 5.1. Item 5.1.1, 5.1.2, 5.1.3 or 5.1.4 shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.
 - 5.1.1. Where only *air-impermeable insulation* is provided, it shall be applied in direct contact with the underside of the structural roof sheathing.
 - 5.1.2. Where *air-permeable insulation* is installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing in accordance with the R-values in Table R806.5 for condensation control.



Building Envelope & Ventilation

2018 IRC Section R1005.8 Factory Built Chimneys—Insulation Shield

PA UCC RAC Amendment removes provisions introducing requirements for insulation shields in factory built chimney installations.

- Chapter 10 Chimneys and Fireplaces, was adopted **without** the inclusion of Section R1005.8 Insulation shield





2018 IRC CODE UPDATES

EXTERIOR DECKS



Exterior Decks

2018 IRC Table R507.3.1 Minimum Footing Size for Decks

New addition of prescriptive design tables for exterior deck installations in 2018 IRC.

- Designs based on square and round footing dimensions
- Deck configurations exceeding prescriptive limits should be designed by an engineering analysis per 2018 IRC, Section R301.1.1.

TABLE R507.3.1 MINIMUM FOOTING SIZE FOR DECKS

LIVE OR GROUND SNOW LOAD ^b (psf)	TRIBUTARY AREA (sq. ft.)	LOAD BEARING VALUE OF SOILS ^{a, c, d} (psf)											
		1500 ^a			2000 ^a			2500 ^a			≥ 3000 ^a		
		Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)
40	20	12	14	6	12	14	6	12	14	6	12	14	6
	40	14	16	6	12	14	6	12	14	6	12	14	6
	60	17	19	6	15	17	6	13	15	6	12	14	6
	80	20	22	7	17	19	6	15	17	6	14	16	6
	100	22	25	8	19	21	6	17	19	6	15	17	6
	120	24	27	9	21	23	7	19	21	6	17	19	6
	140	26	29	10	22	25	8	20	23	7	18	21	6
160	28	31	11	24	27	9	21	24	8	20	22	7	
20	20	12	14	6	12	14	6	12	14	6	12	14	6
	40	15	17	6	13	15	6	12	14	6	12	14	6

Exterior Decks

2018 IRC Table R507.6.1 Deck Joist Spans for Common Lumber Species

Revised tables for deck joist span designs, prescriptively identifies maximum cantilever lengths.

- Provides greater consistency than previous edition, which identified different span allowances for deck joists with and without cantilevers.

TABLE R507.6 DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft. - in.)

SPECIES ^a	SIZE	ALLOWABLE JOIST SPAN ^b			MAXIMUM CANTILEVER ^{c, f}		
		SPACING OF DECK JOISTS (inches)			SPACING OF DECK JOISTS WITH CANTILEVERS ^c (inches)		
		12	16	24	12	16	24
Southern pine	2 × 6	9-11	9-0	7-7	1-3	1-4	1-6
	2 × 8	13-1	11-10	9-8	2-1	2-3	2-5
	2 × 10	16-2	14-0	11-5	3-4	3-6	2-10
	2 × 12	18-0	16-6	13-6	4-6	4-2	3-4
Douglas fir-larch ^d , hem-fir ^d spruce-pine-fir ^d ,	2 × 6	9-6	8-8	7-2	1-2	1-3	1-5
	2 × 8	12-6	11-1	9-1	1-11	2-1	2-3
	2 × 10	15-8	13-7	11-1	3-1	3-5	2-9
	2 × 12	18-0	15-9	12-10	4-6	3-11	3-3
Redwood, western cedars, ponderosa pine ^e , red pine ^e	2 × 6	8-10	8-0	7-0	1-0	1-1	1-2
	2 × 8	11-8	10-7	8-8	1-8	1-10	2-0
	2 × 10	14-11	13-0	10-7	2-8	2-10	2-8
	2 × 12	17-5	15-1	12-4	3-10	3-9	3-1

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.

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 to end.

d. Includes incising factor.

e. Northern species with no incising factor.

f. Cantilevered spans not exceeding the nominal depth of the joist are permitted.



Exterior Decks

2018 IRC Table R507.9.1.2 Band Joist Details

Revised language associated with band joist attachment, which now clarifies the intent of the code to allow bearing on a primary structure capable of supporting required loads.

- Previously required to be supported by a wall or sill plate below.

R507.9 Vertical and lateral supports at band joist.

Vertical and lateral supports for decks shall comply with this section.

R507.9.1 Vertical supports.

Vertical loads shall be transferred to band joists with ledgers in accordance with this section.

R507.9.1.1 Ledger details.

Deck ledgers shall be a minimum 2-inch by 8-inch (51 mm by 203 mm) nominal, pressure-preservative-treated Southern pine, incised pressure-preservative-treated hem-fir, or approved, naturally durable, No. 2 grade or better lumber. Deck ledgers shall not support concentrated loads from beams or girders. Deck ledgers shall not be supported on stone or masonry veneer.

R507.9.1.2 Band joist details.

Band joists supporting a ledger shall be a minimum 2-inch-nominal (51 mm), solid-sawn, spruce-pine-fir or better lumber or a minimum 1-inch by 9/2-inch (25 mm x 241 mm) dimensional, Douglas fir or better, laminated veneer lumber. Band joists shall bear fully on the primary structure capable of supporting all required loads.

R507.9.1.3 Ledger to band joist details.

Fasteners used in deck ledger connections in accordance with Table R507.9.1.3(1) shall be hot-dipped galvanized or stainless steel and shall be installed in accordance with Table R507.9.1.3(2) and Figures R507.9.1.3(1) and R507.9.1.3(2).

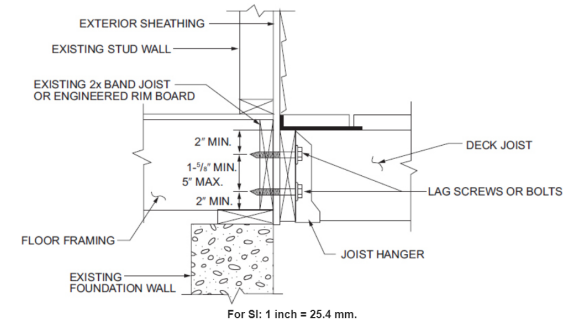



FIGURE R507.9.1.3(2) PLACEMENT OF LAG SCREWS AND BOLTS IN BAND JOISTS



2018 IRC CODE UPDATES

PHOTOVOLTAICS & STATIONARY BATTERY STORAGE SYSTEMS



Photovoltaics & Stationary Battery Storage Stations

2018 IRC Section R324.3 Photovoltaic Systems—Equipment Listings

Revised language to directly reference NFPA Standard 70, as well as the following UL listings:

- UL 1703 for PV panel and module installations
- UL 1741 for PV inverter installations

SECTION R324 SOLAR ENERGY SYSTEMS

R324.1 General.

Solar energy systems shall comply with the provisions of this section.

R324.2 Solar thermal systems.

Solar thermal systems shall be designed and installed in accordance with Chapter 23.

R324.3 Photovoltaic systems.

Photovoltaic systems shall be designed and installed in accordance with Sections R324.3.1 through R324.7.1, NFPA 70 and the manufacturer's installation instructions.

R324.3.1 Equipment listings.

Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703. Inverters shall be *listed and labeled* in accordance with UL 1741. Systems connected to the utility grid shall use inverters *listed* for utility interaction.

R324.4 Rooftop-mounted photovoltaic systems.

Rooftop-mounted *photovoltaic panel systems* installed on or above the roof covering shall be designed and installed in accordance with this section.

Photovoltaics & Stationary Battery Storage Stations

2018 IRC Section R324.4.1.1 Rooftop Mounted Photovoltaic Systems—Roof Load

Revised language to clarify Roof Design Load cases to be applied in the design analysis of PV panel installations

- Load Case 1: Deadload (inclusive of PV panel weight) and Snowload
- Load Case 2: Deadload (exclusive of PV panel weight) and the greater of Roof Live Load or Snow Load

R324.4.1 Structural requirements.

Rooftop-mounted *photovoltaic panel systems* shall be designed to structurally support the system and withstand applicable gravity loads in accordance with Chapter 3. The roof on which these systems are installed shall be designed and constructed to support the loads imposed by such systems in accordance with Chapter 8.

R324.4.1.1 Roof load.

Portions of roof structures not covered with *photovoltaic panel systems* shall be designed for dead loads and roof loads in accordance with Sections R301.4 and R301.6. Portions of roof structures covered with *photovoltaic panel systems* shall be designed for the following load cases:

1. Dead load (including *photovoltaic panel* weight) plus snow load in accordance with Table R301.2(1).
2. Dead load (excluding *photovoltaic panel* weight) plus roof live load or snow load, whichever is greater, in accordance with Section R301.6.

R324.4.1.2 Wind load.

Rooftop-mounted *photovoltaic panel* or *module* systems and their supports shall be designed and installed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).

R324.4.2 Fire classification.

Rooftop-mounted *photovoltaic panel systems* shall have the same fire classification as the roof assembly required in Section R902.

R324.4.3 Roof penetrations.

Roof penetrations shall be flashed and sealed in accordance with Chapter 9.



Photovoltaics & Stationary Battery Storage Stations

2018 IRC Section R324.6 Solar Energy Systems—Roof Access & Pathways

NEW added language to provide requirements around pathway requirements around solar energy systems


Roof access and pathways are not required for the following conditions

- Where roof slopes greater than or equal to 2:12 (17% slope)
- Detached, non-habitable structures
- Where code official has determined rooftop operations will not be employed (associated with emergency access/egress)

R324.6 Roof access and pathways.

Roof access, pathways and setback requirements shall be provided in accordance with Sections R324.6.1 through R324.6.2.1. Access and minimum spacing shall be required to provide emergency access to the roof, to provide pathways to specific areas of the roof, provide for smoke ventilation opportunity areas, and to provide emergency egress from the roof.

Exceptions:

1. Detached, nonhabitable structures, including but not limited to detached garages, parking shade structures, carports, solar trellises and similar structures, shall not be required to provide roof access.
 2. Roof access, pathways and setbacks need not be provided where the code official has determined that rooftop operations will not be employed.
 3. These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (17-percent slope) or less.
- 

Photovoltaics & Stationary Battery Storage Stations

2018 IRC Section R324.6 Solar Energy Systems—Roof Access & Pathways (cont'd)

- No fewer than two pathways to be provided on separate roof planes on all buildings
- Required setbacks at horizontal ridge of the roof based on PV array coverage of roof area
- Note clear width requirements for an unobstructed path from emergency escape & rescue openings

R324.6.1 Pathways.

Not fewer than two pathways, on separate roof planes from lowest roof edge to ridge and not less than 36 inches (914 mm) wide, shall be provided on all buildings. Not fewer than one pathway shall be provided on the street or driveway side of the roof. For each roof plane with a photovoltaic array, a pathway not less than 36 inches wide (914 mm) shall be provided from the lowest roof edge to ridge on the same roof plane as the photovoltaic array, on an adjacent roof plane, or straddling the same and adjacent roof planes. Pathways shall be over areas capable of supporting fire fighters accessing the roof. Pathways shall be located in areas with minimal obstructions such as vent pipes, conduit, or mechanical equipment.

R324.6.2 Setback at ridge.

For photovoltaic arrays occupying not more than 33 percent of the plan view total roof area, not less than an 18-inch (457 mm) clear setback is required on both sides of a horizontal ridge. For photovoltaic arrays occupying more than 33 percent of the plan view total roof area, not less than a 36-inch (914 mm) clear setback is required on both sides of a horizontal ridge.

R324.6.2.1 Alternative setback at ridge.

Where an automatic sprinkler system is installed within the dwelling in accordance with NFPA 13D or Section P2904, setbacks at ridges shall comply with one of the following:

1. For photovoltaic arrays occupying not more than 66 percent of the plan view total roof area, not less than an 18-inch (457 mm) clear setback is required on both sides of a horizontal ridge.
2. For photovoltaic arrays occupying more than 66 percent of the plan view total roof area, not less than a 36-inch (914 mm) clear setback is required on both sides of a horizontal ridge.

R324.6.2.2 Emergency escape and rescue opening.

Panels and modules installed on dwellings shall not be placed on the portion of a roof that is below an emergency escape and rescue opening. A pathway not less than 36 inches (914 mm) wide shall be provided to the emergency escape and rescue opening.

Photovoltaics & Stationary Battery Storage Stations

2018 IRC Section R327 Stationary Storage Battery Systems

NEW provisions introduced around stationary storage battery system installations

- Battery systems to be listed with UL 9540
- Not permitted to be installed within habitable spaces of a dwelling unit
- Per R327.5, note ventilation system requirements for compartments to ensure off-gassing of flammable by-products do not accumulate within the structure.

SECTION R327 STATIONARY STORAGE BATTERY SYSTEMS

R327.1 General.

Stationary storage battery system shall comply with the provisions of this section.

R327.2 Equipment listings.

Stationary storage battery systems shall be *listed* and *labeled* for residential use in accordance with UL 9540.

Exceptions:

1. Where *approved*, repurposed unlisted battery systems from electric vehicles are allowed to be installed outdoors or in detached sheds located not less than 5 feet (1524 mm) from exterior walls, property lines and public ways.
2. *Battery systems* that are an integral part of an electric vehicle are allowed provided that the installation complies with Section 625.48 of NFPA 70.
3. Battery systems less than 1 kWh (3.6 megajoules).

R327.3 Installation.

Stationary storage battery systems shall be installed in accordance with the manufacturer's instructions and their *listing*, if applicable, and shall not be installed within the habitable space of a dwelling unit.



Photovoltaics & Stationary Battery Storage Stations

2018 IRC Section R902.4 Rooftop Mounted PV Panel Systems

Amended language to identify requirements for fire classification in accordance with UL 1703 & UL 2703.

- All panel installations located on a roof structure less than 3 ft from a lot line shall be required to be rated with a Class A, B, or C classification rating.

R902.4 Rooftop-mounted photovoltaic panel systems.

Rooftop-mounted *photovoltaic panel systems* installed on or above the roof covering shall be tested, listed and identified with a fire classification in accordance with UL 1703 and UL 2703. *Class A, B or C photovoltaic panel systems and modules* shall be installed in jurisdictions designated by law as requiring their use or where the edge of the roof is less than 3 feet (914 mm) from a lot line.





Photovoltaics & Stationary Battery Storage Stations

2018 IRC Section R905.17 Building Integrated PV Panels

NEW provisions governing BIPVs, requiring compliance with NFPA 70

- Note that BIPVs are only permitted on roof slopes greater than or equal to 2:12 (17% slope)
- Roof access & pathway provisions under Section R324.6 are still applicable to BIPV installations

R905.17 Building-integrated Photovoltaic (BIPV) roof panels applied directly to the roof deck.


The installation of *BIPV roof panels* shall comply with the provisions of this section, Section R324 and NFPA 70.

R905.17.1 Deck requirements.

BIPV roof panels shall be applied to a solid or closely-fitted deck, except where the roof covering is specifically designed to be applied over spaced sheathing.

R905.17.2 Deck slope.

BIPV roof panels shall be used only on roof slopes of two units vertical in 12 units horizontal (17-percent slope) or greater.





2018 IRC CODE UPDATES

ENERGY CONSERVATION





Energy Conservation

2018 IRC Section N1101.4 Above Code Programs

PA UCC RAC amendment maintains the previous 2015 language around Above Code energy efficiency programs and removes language of the 2018 to require compliance with “Mandatory” provisions of the IECC.

***N1101.8 Above code programs.** The building official or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this chapter. Buildings approved in writing by such an energy efficiency program shall be considered in compliance with this chapter.*



Energy Conservation

2018 IRC Table N1102.1.2 Insulation & Fenestration Requirement by Component

PA UCC RAC amendments of the 2018 provisions only affect Zone 3, for a U-Factor value of 0.35. Does not affect Philadelphia, but adoption brings the IRC provisions in line with IECC Residential provisions to a Max U-factor of 0.32.

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

CLIMATE ZONE	FENESTRATION U-FACTOR ^a	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{c,e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE	FLOOR R-VALUE	BASEMENT ^f WALL R-VALUE	SLAB ^g R-VALUE & DEPTH	CRAWL SPACE ^h 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 ^b	8/13	19	5/13 ⁱ	0	5/13
4 except Marine	0.32	0.55	0.40	49	20 or 13 + 5 ^b	8/13	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.30	0.55	NR	49	20 or 13 + 5 ^b	13/17	30 ^h	15/19	10, 2 ft	15/19
6	0.30	0.55	NR	49	20 + 5 ^b or 13 + 10 ^b	15/20	30 ^h	15/19	10, 4 ft	15/19
7 and 8	0.30	0.55	NR	49	20 + 5 ^b or 13 + 10 ^b	19/21	38 ^h	15/19	10, 4 ft	15/19

For SI: 1 foot = 304.8 mm.

NR = Not Required.

a. R-values are minimums. U-factors and SHGC are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed R-value of the insulation shall be not less than the R-value specified in the table.

b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration.
Exception: In Climate Zones 1 through 3, skylights shall be permitted to be excluded from glazed fenestration SHGC requirements provided that the SHGC for such skylights does not exceed 0.30.

c. "10/13" means R-10 continuous insulation on the interior or exterior of the home or R-13 cavity insulation on the interior of the basement wall. "15/19" means R-15 continuous insulation on the interior or exterior of the home or R-19 cavity insulation on the interior of the basement wall. Alternatively, compliance with "15/19" shall be R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the home.

d. R-5 insulation shall be provided under the full slab area of a heated slab in addition to the required slab edge insulation R-value for slabs, as indicated in the table. The slab edge insulation for heated slabs shall not be required to extend below the slab.

e. There are no SHGC requirements in the Marine Zone.

f. Basement wall insulation shall not be required in warm-humid locations as defined by Figure N1101.10 and Table N1101.10.

g. Alternatively, insulation sufficient to fill the framing cavity providing not less than an R-value of R-19.

h. The first value is cavity insulation, the second value is continuous insulation. Therefore, as an example, "13+5" means R-13 cavity insulation plus R-5 continuous insulation.

i. Mass walls shall be in accordance with Section N1102.2.5. The second R-value applies where more than half of the insulation is on the interior of the mass wall.

Energy Conservation

2018 IRC Table N1102.4.1.2 Air Leakage--Testing

- Amendment identifies RESNET/ICC 380 standard as an acceptable air leakage testing method,
- Now establishes a maximum air change per hour rate of 3 ACH for structures designed under the IRC (a change from 5 ACH previously enforced based on PA UCC RAC amendments).

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. Testing shall be conducted [in accordance with RESNET/ICC 380, ASTM E779 or ASTM E1827](#) and reported at a pressure of 0.2 inch w.g. (50 Pascals). Where required by the *building official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *building official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope*.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures.
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures.
3. Interior doors, where installed at the time of the test, shall be open.
4. [Exterior or interior terminations for continuous ventilation systems shall be sealed.](#)
5. Heating and cooling systems, where installed at the time of the test, shall be turned off.
6. Supply and return registers, where installed at the time of the test, shall be fully open.



Energy Conservation

2018 IRC Table N1103.3.3 Duct Testing

Amendment includes additional exception around duct leakage testing associated with ducts serving heat & energy recovery ventilators that are not integrated with ducts serving heating or cooling systems

N1103.3.3 (R403.3.3) Duct testing (Mandatory).


Ducts shall be pressure tested to determine air leakage by one of the following methods:

1. Rough-in test: Total leakage shall be measured with a pressure differential of 0.1 inch w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure if installed at the time of the test. Registers shall be taped or otherwise sealed during the test.
2. Postconstruction test: Total leakage shall be measured with a pressure differential of 0.1 inch w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. Registers shall be taped or otherwise sealed during the test.

Exceptions:

1. A duct air-leakage test shall not be required where the ducts and air handlers are located entirely within the *building thermal envelope*.
2. A duct air-leakage test shall not be required for ducts serving heat or energy recovery ventilators that are not integrated with ducts serving heating or cooling systems.

A written report of the results of the test shall be signed by the party conducting the test and provided to the *building official*.





Energy Conservation

2018 IRC Table N1103.3.5 Ducts—Building Cavities

PA UCC RAC amendment maintains the previous 2015 language, effectively maintaining allowance of building framing to serve as return plenums but not supply air ducts.

N1103.3.5 (R403.3.5) Building cavities (Mandatory). Building framing cavities shall not be used as supply ducts.





Energy Conservation

2018 IRC Table N1103.3.6 Ducts Buried within Ceiling Insulation


New added provision introduces regulations around ducts buried within ceiling insulation,

- Duct insulation value of R-8 to be installed, OR
- Sum of ceiling insulation against and above the top of duct, and against and below the bottom of the duct, shall be not less than R-19

Provisions under N1103.3.6.1 provide prescriptive means to determine effective insulation rating for ducts deeply buried within ceiling insulation

2018 IRC Table N1103.3.7 Ducts Located inside Conditioned Space

New added provision clarifies conditions under which a duct can be considered “inside a conditioned space”





Energy Conservation—Simulated Performance Method


2018 IRC Section N1105.1 Scope


Amendment provides clarification of mechanical ventilation analysis to be included within the Performance Compliance path energy usage.

**SECTION N1105 (R405)
SIMULATED PERFORMANCE ALTERNATIVE (PERFORMANCE)**

N1105.1 (R405.1) Scope.

This section establishes criteria for compliance using simulated energy performance analysis. [Such analysis shall include heating, cooling, mechanical ventilation and service water heating energy only.](#)






Energy Conservation—Simulated Performance Method

2018 IRC Section N1105.4.2 Compliance Report

PA UCC RAC Amendments maintains previous 2015 provisions, removing any 2018 reference to the allowance of batch sampling for final compliance reports. Amendment effectively requires each building to be provided with their own Final Compliance report.

N1105.4.2 (R405.4.2) Compliance report. Compliance software tools shall generate a report that documents that the proposed design complies with Section N1105.3. A compliance report on the proposed design shall be submitted with the application for the building permit. Upon completion of the building, a compliance report based on the as-built condition of the building shall be submitted to the code official before a certificate of occupancy is issued. Batch sampling of buildings to determine energy code compliance for all buildings in the batch shall be prohibited.



Energy Conservation—Simulated Performance Method

2018 IRC Table N1105.5.2(1) Specifications for Standard Reference and Proposed Designs

Amended revisions to the Standard Reference Design for Mechanical Ventilation & Thermal Distribution Systems

- Mechanical Ventilation—Revision to the calculation of energy usage related to mechanical ventilation within the Standard Reference design

Mechanical ventilation	Where mechanical ventilation is not specified in the proposed design: None Where mechanical ventilation is specified in the proposed design, the annual vent fan energy use, in units of kWh/yr, shall equal $(1/e_f) \times [0.0876 \times CFA + 65.7 \times (N_{br}+1)]$ where: e_f = the minimum exhaust fan efficacy, as specified in Table R403.6.1, corresponding to a flow rate of $0.01 \times CFA + 7.5 \times (N_{br}+1)$ CFA = conditioned floor area, ft ² .	As proposed
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- Thermal Distribution System—Added exception associated with non-ducted heating and cooling systems that do not have a fan




Energy Conservation—Energy Rating Index

2018 IRC Section N1106.3 Energy Rating Index

PA UCC RAC Amendments maintains allowance from the 2015 IRC and allows for minimum requirement in the 2006 IRC to be utilized as the basis of design compliance. This code amendment will allow for less efficient ERI buildings than previously allowed.

***N1106.3 (R406.3) Energy rating index.** The Energy Rating Index (ERI) shall be a numerical integer value that is based on a linear scale constructed such that the ERI reference design has an Index value of 100 and a residential building that uses no net purchased energy has an Index value of 0. Each integer value on the scale shall represent a 1 percent change in the total energy use of the rated design relative to the total energy use of the ERI reference design. The ERI shall consider all energy used in the residential building.*

***N1106.3.1 (R406.3.1) ERI reference design.** The ERI reference design shall be configured such that it meets the minimum requirements of the 2006 International Energy Conservation Code prescriptive requirements. The proposed residential building shall be shown to have an annual total normalized modified load less than or equal to the annual total loads of the ERI reference design.*



Energy Conservation—Energy Rating Index

2018 IRC Section N1106.4 ERI-based Compliance

Amendment increases the amount of energy the final design can use by allowing a higher ERI, allowing a less stringent design than the previous 2015 edition.

N1106.4 (R406.4) ERI-based compliance.

Compliance based on an ERI analysis requires that the *rated design* be shown to have an ERI less than or equal to the appropriate value indicated in Table N1106.4 when compared to the *ERI reference design*.

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

CLIMATE ZONE	ENERGY RATING INDEX ^a
1	57
2	57
3	57
4	62
5	61
6	61
7	58
8	58

a. Where on-site renewable energy is included for compliance using the ERI analysis of Section N1106.4, the building shall meet the mandatory requirements of Section N1106.2, and the building thermal envelope shall be greater than or equal to the levels of efficiency and SHGC in Table N1102.1.2 or Table N1102.1.4 of the 2015 *International Residential Code*.

- Includes additional footnote for consideration of on-site renewables for ERI analysis, which will still require the design to comply with mandatory minimum building envelope requirements of the 2015 standard.



Energy Conservation—Energy Rating Index

2018 IRC Section N1106.7 Calculation Tools


PA UCC RAC Amendment maintains the 2015 IRC text regarding ERI Compliance software requirements, removing reference to the RESNET/ICC 301 standard.

N1106.7 (R406.7) Calculation software tools. Calculation software, where used, shall be in accordance with Sections N1106.7.1 through N1106.7.3.

N1106.7.1 (R406.7.1) Minimum capabilities. Calculation procedures used to comply with this section shall be software tools capable of calculating the ERI as described in Section N1106.3, and shall include the following capabilities:

1. *Computer generation of the ERI reference design using only the input for the rated design.*

The calculation procedure shall not allow the user to directly modify the building component characteristics of the ERI reference design.

- Section N1106.7.2 will allow for a jurisdiction to approve of any specified analysis tools used for ERI analysis, which can include RESNET/ICC 301 if employed.
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Energy Conservation—Alterations


2018 IRC Section N1109.1.2 Alterations; Heating and Cooling Systems

PA UCC RAC Amendment maintains the 2015 IRC text regarding alterations for heating and cooling systems

- Effectively mandating selective compliance for new heating, cooling and duct systems when such new work is part of an alterations workscope (whereas 2018 IRC provisions would mandate full compliance).

N1109.1.2 (R503.1.2) Heating and cooling systems. New heating, cooling and duct systems that are part of the alteration shall comply with Sections N1103.1, N1103.2, N1103.3 and N1103.6.

Exception: Where ducts from an existing heating and cooling system are extended, duct systems with less than 40 linear feet (12.19 m) in unconditioned spaces shall not be required to be tested in accordance with Section N1103.3.3.





2018 IRC CODE UPDATES

MECHANICAL



Mechanical

2018 IRC Section M1503 Domestic Cooking Exhaust Equipment

Extensive amendments to provisions for domestic cooking exhaust equipment installations, to include

- Section M1503.2 -- Includes new specified hood equipment listings
- Section M1503.2.1 – Provisions for Open-Top Broiler Exhaust requirements
- Section M1503.6 – Make-up Air Requirements for equipment without direct venting or mechanical draft for any equipment capable of exhausting in excess of 400 CFM

M1503.6 Makeup air required.

Where one or more gas, liquid or solid fuel-burning appliance that is neither direct-vent nor uses a mechanical draft venting system is located within a dwelling unit's air barrier, each exhaust system capable of exhausting in excess of 400 cubic feet per minute (0.19 m³/s) shall be mechanically or passively provided with makeup air at a rate approximately equal to the exhaust air rate. Such makeup air systems shall be equipped with not fewer than one damper complying with Section M1503.6.2.

Mechanical

2018 IRC Section M1505.4.3 Mechanical Ventilation Rate

Amendment introduces a new method for determining whole-house mechanical ventilation rates based on a calculation. Provisions still maintain the prescriptive table for designers.

M1505.4.3 Mechanical ventilation rate.

The whole-house mechanical ventilation system shall provide outdoor air at a continuous rate as determined in accordance with Table M1505.4.3(1) or Equation 15-1.

Ventilation rate in cubic feet per minute = $(0.01 \times \text{total square foot area of house}) + [7.5 \times (\text{number of bedrooms} + 1)]$

Equation 15-1



Questions?



Thank You