



**Webinar**  
May 18, 2018

**Building codes and compliance**  
**applicable to roof systems**



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Rosemont, Illinois

**Topics**

- Code applicability
- Roofing-specific code requirements
- Recent code changes
- Attic ventilation
- Additional resources/information
- Questions

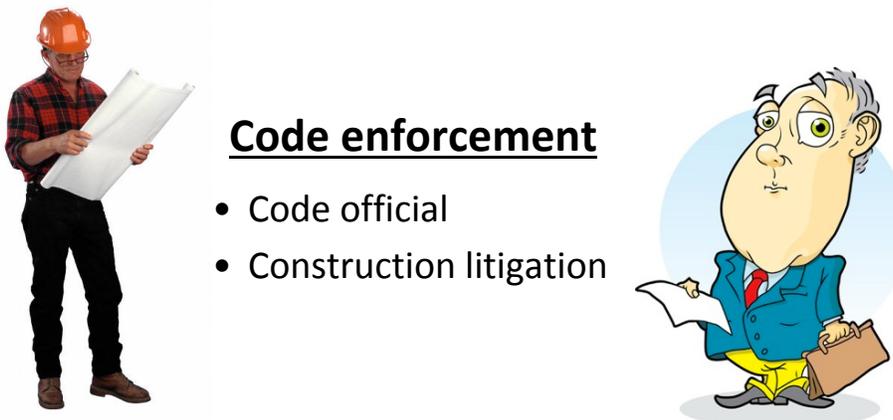
### **Prerequisite**

Understand... I am the messenger

– “...don't shoot the messenger...”

### **Some background**

- The I-codes are “model codes” developed by the International Code Council (ICC)
- Model codes serve as the technical basis for state or local code adoption
- The code provides the minimum legal requirements for building construction...and operation
- The code is enforced by the “authority having jurisdiction” (AHJ)
- The code can also provide a basis for construction claims-related litigation



**Code enforcement**

- Code official
- Construction litigation



- 2000 edition
- 2003 edition
- 2006 edition
- 2009 edition
- 2012 edition
- 2015 edition
- 2018 edition

*Three-year code development and publication cycle*

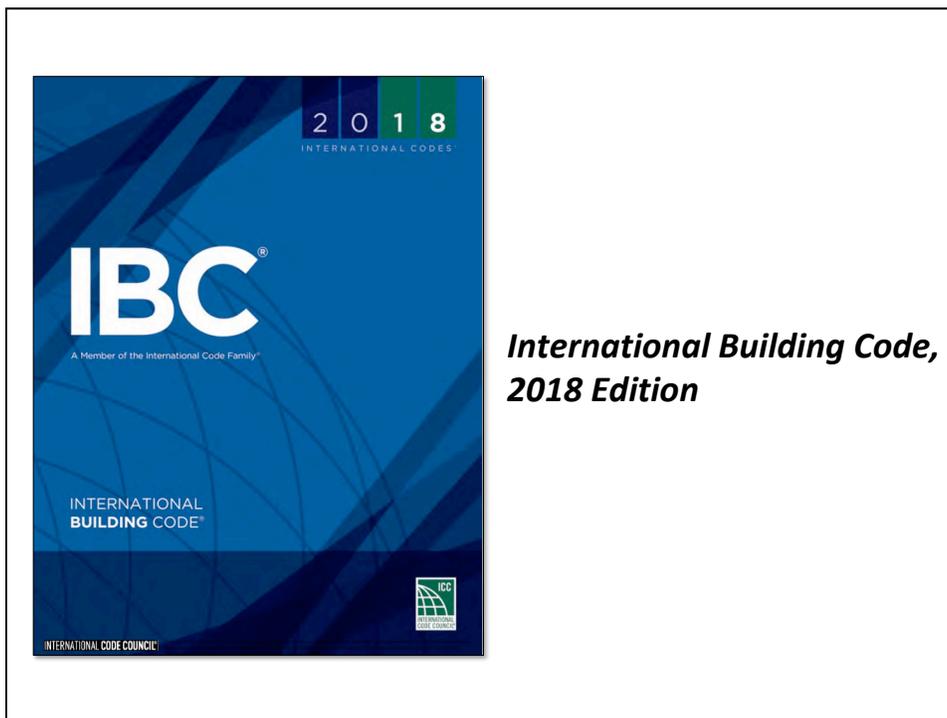
 **This program**



### **Code requirements**

IBC 2018, Chapter 15-Roof Assemblies and Rooftop Structures

- Wind resistance (uplift)
- Fire resistance (external fire)
- Manufacturers' installation instructions
- Prescriptive requirements
- Reroofing



**CHAPTER 15**  
**ROOF ASSEMBLIES AND ROOFTOP STRUCTURES**

**User notes:**

*About this chapter: Chapter 15 provides minimum requirements for the design and construction of roof assemblies and rooftop structures. The criteria address the weather-protective barrier at the roof and, in most circumstances, a fire-resistant barrier. The chapter is largely prescriptive in nature and is based on decades of experience with various traditional materials, but it also recognizes newer products such as photovoltaic shingles. Section 1510 addresses rooftop structures, which include penthouses, tanks, towers and spires. Rooftop penthouses larger than prescribed in this chapter must be treated as a story under Chapter 5.*

*Code development reminder: Code change proposals to sections preceded by the designation [BF], [BG] or [P] will be considered by one of the code development committees meeting during the 2018 (Group A) Code Development Cycle. All other code change proposals will be considered by the IBC—Structural Code Development Committee during the 2019 (Group B) Code Development Cycle. See explanation on page iv.*

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**SECTION 1502**  
**ROOF DRAINAGE**

**[P] 1502.1 General.** Design and installation of roof drainage systems shall comply with Section 1502 of this code and Sections 1109 and 1108, as applicable, of the *International Plumbing Code*.

**[P] 1502.2 Secondary (emergency overflow) drains or scuppers.** Where roof drains are required, secondary (emergency overflow) roof drains or scuppers shall be provided where the roof perimeter construction extends above the roof in such a manner that water will be entrapped if the primary drains allow building for any reason. The installation and sizing of secondary emergency overflow drains, leaders and conductors shall comply with Sections 1109 and 1108, as applicable, of the *International Plumbing Code*.

**1502.3 Scuppers.** Where scuppers are used for secondary (emergency overflow) roof drainage, the quantity, size, location and inlet elevation of the scuppers shall be sized to prevent the depth of ponding water from exceeding that for which the roof was designed as determined by Section 1611.1. Scuppers shall not have an opening dimension of less than 4 inches (102 mm). The flow through the primary system shall not be considered when locating and sizing scuppers.

**1502.4 Gutters.** Gutters and leaders placed on the outside of buildings, other than Group R-3, private garages and buildings of Type V construction, shall be of noncombustible material or not less than Schedule 40 plastic pipe.

**1503.2 Flashing.** Flashing shall be installed in such a manner so as to prevent water from entering the wall and roof through joints in copings, through moisture-permeable materials and at intersections with parapet walls and other penetrations through the roof plane.

**1503.2.1 Locations.** Flashing shall be installed at wall and roof intersections, at gutters, wherever there is a change in roof slope or direction and around roof openings. Where flashing is of metal, the metal shall be corrosion resistant with a thickness of not less than 0.019 inch (0.483 mm) (No. 26 galvanized sheet).

**1503.3 Coping.** Parapet walls shall be properly coped with noncombustible, weatherproof materials of a width not less than the thickness of the parapet wall.

**1503.4 Attic and rafter ventilation.** Intake and exhaust vents shall be provided in accordance with Section 1202.2 and the vent product manufacturer's installation instructions.

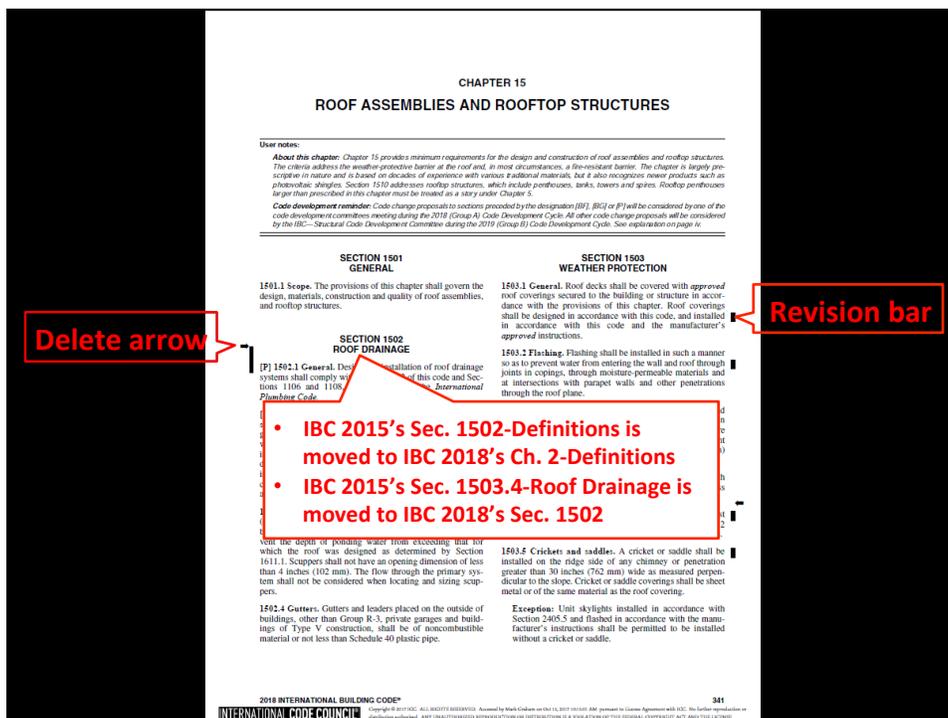
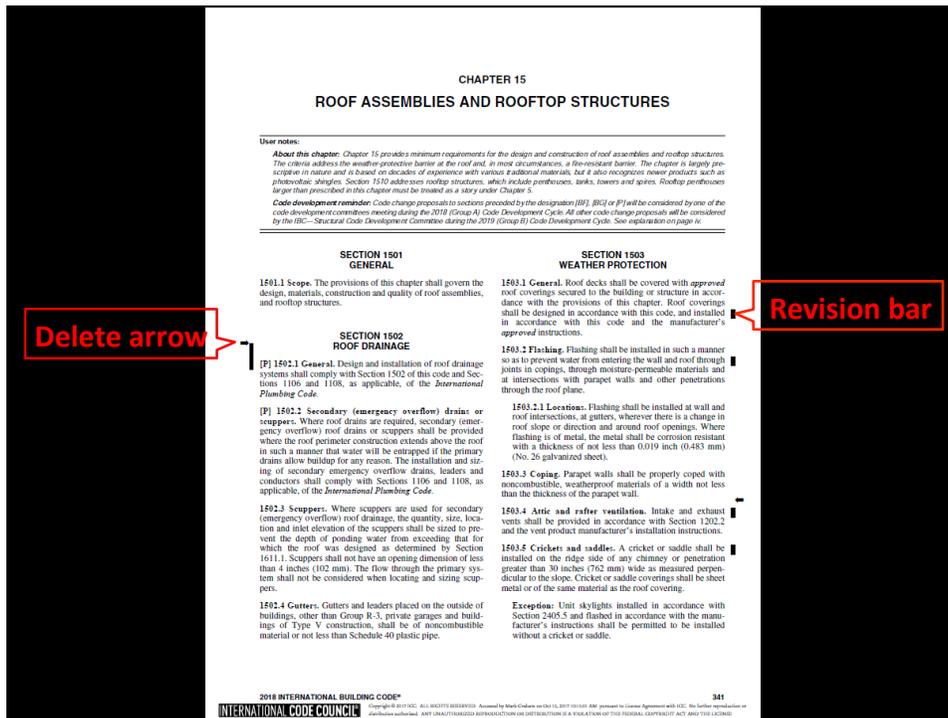
**1503.8 Crickets and saddles.** A cricket or saddle shall be installed on the ridge side of any chimney or penetration greater than 30 inches (762 mm) wide as measured perpendicular to the slope. Crickets or saddle coverings shall be sheet metal or of the same material as the roof covering.

**Exception:** Unit skylights installed in accordance with Section 2405.5 and flashed in accordance with the manufacturer's instructions shall be permitted to be installed without a cricket or saddle.

in accordance with this code and the manufacturer's approved instructions.

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ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

### SECTION 1505 FIRE CLASSIFICATION

**[BF] 1505.1 General.** Roof assemblies shall be divided into the classes defined in this section. Class A, B and C roof assemblies and roof coverings required to be listed by this section shall be tested in accordance with ASTM E108 or UL 790. In addition, *fire-retardant-treated wood* roof coverings shall be tested in accordance with ASTM E108 or UL 790. Minimum roof coverings installed on buildings shall comply with Table 1505.1 based on the type of construction of the building.

**Exception:** Skylights and sloped glazing that comply with Chapter 24 or Section 2610.

FOR TYPES OF CONSTRUCTION

#### TABLE 1505.1<sup>a, b</sup> MINIMUM ROOF COVERING CLASSIFICATION FOR TYPES OF CONSTRUCTION

IA	IB	IIA	IIB	IIIA	IIIB	IV	VA	VB
B	B	B	C <sup>c</sup>	B	C <sup>c</sup>	B	B	C <sup>c</sup>

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Class A, B or C

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**Exception:** Skylights and sloped glazing that comply with Chapter 24 or Section 2610.

**[BF] 1505.2 Class A roof assemblies.** Class A roof assemblies are those that are effective against severe fire test exposure. Class A roof assemblies and roof coverings shall be listed and identified as Class A by an approved testing agency. Class A roof assemblies shall be permitted for use in buildings or structures of all types of construction.

**Exceptions:**

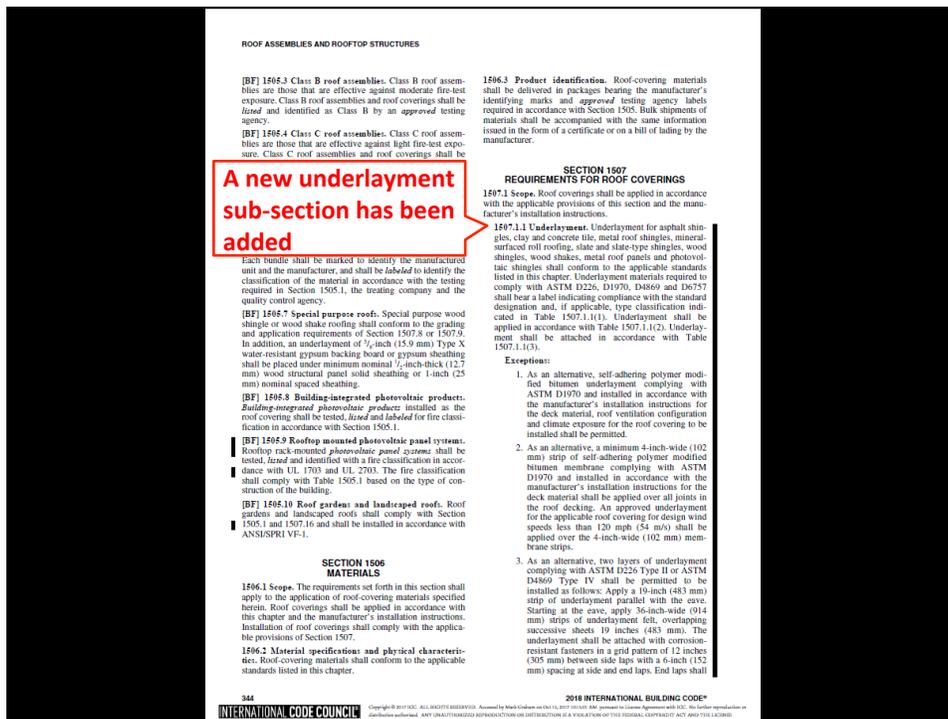
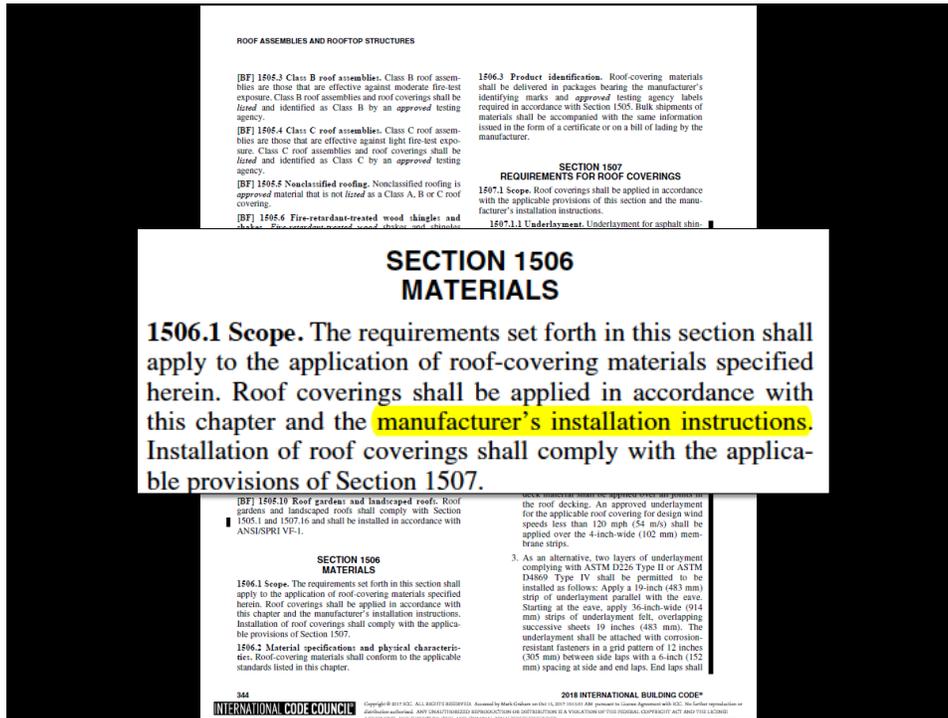
- Class A roof assemblies include those with coverings of brick, masonry or an exposed concrete roof deck.
- Class A roof assemblies also include ferrous or copper shingles or sheets, metal sheets and shingles, clay or concrete roof tile or slate installed on non-combustible decks or ferrous, copper or metal sheets installed without a roof deck on noncombustible framing.
- Class A roof assemblies include minimum 16 ounce per square foot (0.0416 kg/m<sup>2</sup>) copper sheets installed over combustible decks.
- Class A roof assemblies include slate installed over ASTM D328, Type II underlayment over combustible framing.

**[BF] 1505.9 Rooftop mounted photovoltaic panel systems.** Rooftop rack-mounted *photovoltaic panel systems* shall be tested, listed and identified with a fire classification in accordance with UL 1703 and UL 2703. **UL 2703 added** shall comply with Table 1505.1 based on the type of construction of the building.

**[BF] 1505.10 Roof gardens and landscaped roofs.** Roof gardens and landscaped roofs shall comply with Section 1505.1 and 1507.16 and shall be installed in accordance with ANSI/SPRI VF-1.

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Fire classes added



**A new underlayment sub-section has been added**

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be 4 inches (102 mm) and shall be offset by 6 feet (1 829 mm). Underlayment shall be attached using metal or plastic cap nails with a nominal cap diameter of not less than 1 inch (25.4 mm). Metal caps shall have a thickness of not less than 32-gauge sheet metal. Power-driven metal caps shall have a thickness of not less than 0.010 inch (mm). Thickness of the outside edge

1507.2 Asphalt shingles. The installation of asphalt shingles shall comply with the provisions of this section.

1507.2.1 Deck requirements. Asphalt shingles shall be fastened to solidly sheathed decks.

1507.2.2 Slope. Asphalt shingles shall only be used on roof slopes of two units vertical in 12 units horizontal (17-percent slope) or greater. For roof slopes from two units vertical in 12 units horizontal (17-percent slope) or greater

**TABLE 1507.1.1(1)  
UNDERLAYMENT TYPES**

ROOF COVERING	SECTION	MAXIMUM BASIC DESIGN WIND SPEED, V < 140 MPH	MAXIMUM BASIC DESIGN WIND SPEED, V ≥ 140 MPH
Asphalt shingles	1507.2	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV ASTM D6757	ASTM D226 Type II ASTM D4869 Type IV ASTM D6757
Clay and concrete tiles	1507.3	ASTM D226 Type II ASTM D2626 Type I ASTM D6380 Class M mineral surfaced roll roofing	ASTM D226 Type II ASTM D2626 Type I ASTM D6380 Class M mineral surfaced roll roofing
Metal panels	1507.4	Manufacturer's instructions	ASTM D226 Type II ASTM D4869 Type IV
Metal roof shingles	1507.5	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV	ASTM D226 Type II ASTM D4869 Type IV
Mineral-surfaced roll roofing	1507.6	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV	ASTM D226 Type II ASTM D4869 Type IV
Slate shingles	1507.7	ASTM D226 Type II ASTM D4869 Type III or IV	ASTM D226 Type II ASTM D4869 Type IV
Wood shingles	1507.8	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV	ASTM D226 Type II ASTM D4869 Type IV
Wood shakes	1507.9	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV	ASTM D226 Type II ASTM D4869 Type IV
Photovoltaic shingles	1507.17	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV ASTM D6757	ASTM D226 Type II ASTM D4869 Type IV ASTM D6757

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**TABLE 1507.1.1(2)  
UNDERLAYMENT APPLICATION**

ROOF COVERING	SECTION	MAXIMUM BASIC DESIGN WIND SPEED, V < 140 MPH	MAXIMUM BASIC DESIGN WIND SPEED, V ≥ 140 MPH
Asphalt shingles	1507.2	<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 as follows: 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. End laps shall be 4 inches and shall be offset by 6 feet. 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 as follows: 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>	Same as Maximum Basic Design Wind Speed, V < 140 mph except all laps shall be not less than 4 inches

COVERING	SECTION	MANUFACTURER'S INSTALLATION INSTRUCTIONS	BY 6 FEET.
Slate shingles	1507.7	For roof slopes from three units vertical in 12 units horizontal (3:12), up to four units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied as follows: 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. End laps shall be 4 inches and shall be offset by 6 feet. Distortions in the underlayment shall not interfere with the ability of the shingles to seal.	For roof slopes of four units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied as follows: 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.
Wood shakes	1507.8		
Wood shingles	1507.9		
Photovoltaic shingles	1507.17	For roof slopes from three units vertical in 12 units horizontal (3:12), up to four units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied as follows: 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. End laps shall be 4 inches and shall be offset by 6 feet. Distortions in the underlayment shall not interfere with the ability of the shingles to seal.	Same as Maximum Basic Design Wind Speed, V < 140 mph except all laps shall be not less than 4 inches

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.

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wood complying with Section 2303.2 for exterior installation.

3. Where exterior wall covering panels are used, the panels shall have a flame spread index of 25 or less when tested in the minimum and maximum thicknesses intended for use, with each face tested independently in accordance with ASTM E84 or UL 723. The panels shall be tested in the minimum and maximum thicknesses intended for use in accordance with Section 1505.9.

[BC] 1510.7.2 **Photovoltaic panels and modules.** Rooftop-mounted photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703 and shall be installed in accordance with the manufacturer's instructions.

[BC] 1510.8 **Other rooftop structures.** Rooftop structures not regulated by Sections 1510.2 through 1510.7 shall comply with Sections 1510.8.1 through 1510.8.5, as applicable.

[BC] 1510.8.1 **Aerial supports.** Aerial supports shall be constructed of noncombustible materials.

**Exception:** Aerial supports not greater than 12 feet (3658 mm) in height as measured from the roof deck to the highest point on the aerial supports shall be permitted to be constructed of combustible materials.

[BC] 1510.8.2 **Bulkheads.** Bulkheads used for the shelter of mechanical or electrical equipment or vertical shaft openings in the roof assembly shall comply with Section 1510.2 as penultimate. Bulkheads used for any other purpose shall be considered as an additional story of the building.

[BC] 1510.8.3 **Dormers.** Dormers shall be of the same type of construction as required for the roof in which such dormers are located or the exterior walls of the building.

## SECTION 1511 REROOFING

### 1511.1 General. Materials and methods of application used for recovering or replacing an existing roof covering shall comply with the requirements of Chapter 15.

**Exceptions:**

1. *Roof replacement or roof recover of existing low-slope roof coverings shall not be required to meet the minimum design slope requirement of one-quarter unit vertical in 12 units horizontal (2-percent slope) in Section 1507 for roofs that provide positive roof drainage.*

1511.2 **Structural and construction loads.** Structural roof components shall be capable of supporting the roof-covering system and the material and equipment loads that will be encountered during installation of the system.

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ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

wood complying with Section 2303.2 for exterior installation.

3. Where exterior wall covering panels are used, the panels shall have a flame spread index of 25 or less when tested in the minimum and maximum thicknesses intended for use, with each face tested independently in accordance with ASTM E84 or UL 723. The panels shall be tested in the minimum and maximum thicknesses intended for use in accordance with the acceptance criteria of NFPA 285 and shall be installed as tested. Where the panels are tested as part of an exterior wall assembly in accordance with NFPA 285, the panels shall be installed on the face of the mechanical equipment screen supporting structure in the same manner as they were installed on the exterior wall assembly.

[BC] 1510.7.2 **Photovoltaic panels and modules.** Rooftop-mounted photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703 and shall be installed in accordance with the manufacturer's instructions.

[BC] 1510.8 **Other rooftop structures.** Rooftop structures not regulated by Sections 1510.2 through 1510.7 shall comply with Sections 1510.8.1 through 1510.8.5, as applicable.

[BC] 1510.8.1 **Aerial supports.** Aerial supports shall be constructed of noncombustible materials.

**Exception:** Aerial supports not greater than 12 feet (3658 mm) in height as measured from the roof deck to the highest point on the aerial supports shall be permitted to be constructed of combustible materials.

[BC] 1510.8.2 **Bulkheads.** Bulkheads used for the shelter of mechanical or electrical equipment or vertical shaft openings in the roof assembly shall comply with Section 1510.2 as penultimate. Bulkheads used for any other purpose shall be considered as an additional story of the building.

[BC] 1510.8.3 **Dormers.** Dormers shall be of the same type of construction as required for the roof in which such dormers are located or the exterior walls of the building.

### 1511.3 Roof replacement. *Roof replacement shall include the removal of all existing layers of roof coverings down to the roof deck.*

**Exception:** Where the existing roof assembly includes an ice barrier membrane that is adhered to the roof deck, the existing ice barrier membrane shall be permitted to remain in place and covered with an additional layer of ice barrier membrane in accordance with Section 1507.

1511.2 **Structural and construction loads.** Structural roof components shall be capable of supporting the roof-covering system and the material and equipment loads that will be encountered during installation of the system.

2. Recovering or replacing an existing roof covering shall not be required to meet the requirement for secondary (emergency overflow) drains or scuppers in Section 1503.4 for roofs that provide positive roof drainage. For the purposes of this exception, existing secondary drainage or scupper systems required in accordance with this code shall not be removed unless they are replaced by secondary drains or scuppers designed and installed in accordance with Section 1503.4.

1511.3 **Structural and construction loads.** Structural roof components shall be capable of supporting the roof-covering system and the material and equipment loads that will be encountered during installation of the system.

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**1511.3.1 Roof recover.** The installation of a new roof covering over an existing roof covering shall be permitted where any of the following conditions occur:

1. Where the new roof covering is installed in accordance with the roof covering manufacturer's approved instructions.
2. Complete and separate roofing systems, such as standing-seam metal roof panel systems, that are designed to transmit the roof loads directly to the building's structural system and that do not rely on existing roofs and roof coverings for support, shall not require the removal of existing roof coverings.
3. Metal panel, metal shingle and concrete and clay tile roof coverings shall be permitted to be installed over existing wood shake roofs when applied in accordance with Section 1511.4.
4. The application of a new protective roof coating over an existing protective roof coating, metal roof panel, built-up roof, spray polyurethane foam roofing system, metal roof shingles, mineral-surfaced roll roofing, modified bitumen roofing or thermoset and thermoplastic single-ply roofing shall be permitted without tear off of existing roof coverings.

**1511.3.1.1 Exceptions.** A *roof recover* shall not be permitted where any of the following conditions occur:

1. Where the existing roof or roof covering is water soaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.
2. Where the existing roof covering is slate, clay, cement or asbestos-cement tile.
3. Where the existing roof has two or more applications of any type of roof covering.

ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

**SECTION 1512  
PHOTOVOLTAIC PANELS AND MODULES**

**1512.1 Photovoltaic panels and modules.** Photovoltaic panels and modules installed on a roof or as an integral part of a roof assembly shall comply with the requirements of this code and the *International Fire Code*.

**1511.3 Roof replacement.** *Roof replacement* shall include the removal of all existing layers of roof coverings down to the roof deck.

**Exception:** Where the existing roof assembly includes an ice barrier membrane that is adhered to the roof deck, the existing ice barrier membrane shall be permitted to remain in place and covered with an additional layer of ice barrier membrane in accordance with Section 1507.

**1511.3.1 Roof recover.** The installation of a new roof covering over an existing roof covering shall be permitted where any of the following conditions occur:

1. Where the new roof covering is installed in accordance with the roof covering manufacturer's approved instructions.
2. Complete and separate roofing systems, such as standing-seam metal roof panel systems, that are designed to transmit the roof loads directly to the building's structural system and that do not rely on existing roofs and roof coverings for support, shall not require the removal of existing roof coverings.
3. Metal panel, metal shingle and concrete and clay tile roof coverings shall be permitted to be installed over existing wood shake roofs when applied in accordance with Section 1511.4.

**4. The application of a new protective roof coating over an existing protective roof coating, metal roof panel, built-up roof, spray polyurethane foam roofing system, metal roof shingles, mineral-surfaced roll roofing, modified bitumen roofing or thermoset and thermoplastic single-ply roofing shall be permitted without tear off of existing roof coverings.**

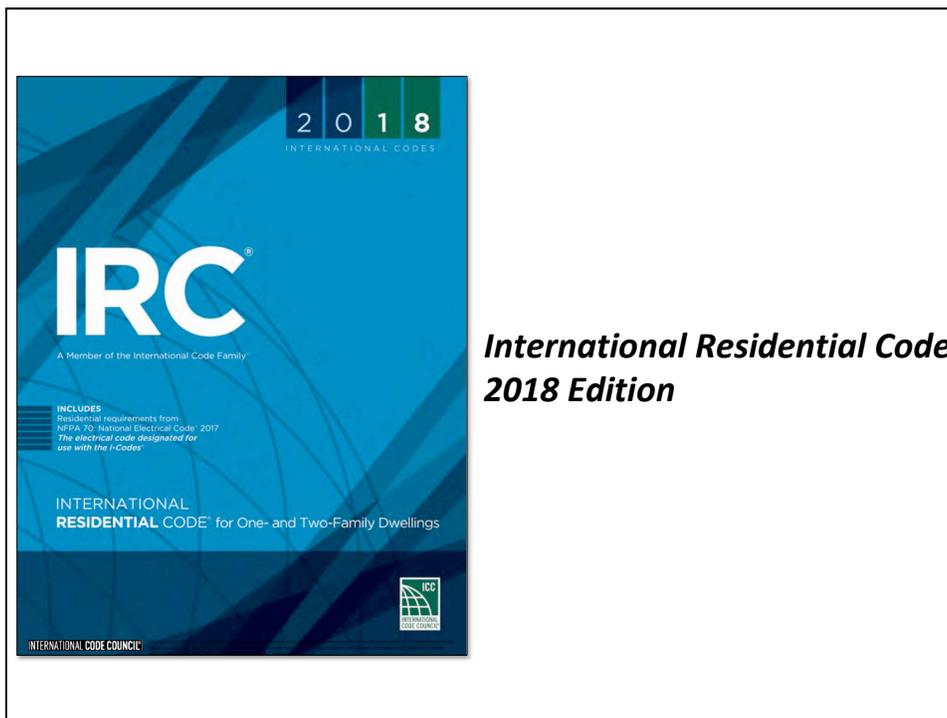
3. Where the existing roof has two or more applications of any type of roof covering.

**1511.4 Roof reovering.** Where the application of a new roof covering over wood shingle or shake roofs creates a combustible concealed space, the entire existing surface shall be covered with gypsum board, mineral fiber, glass fiber or other approved materials securely fastened in place.

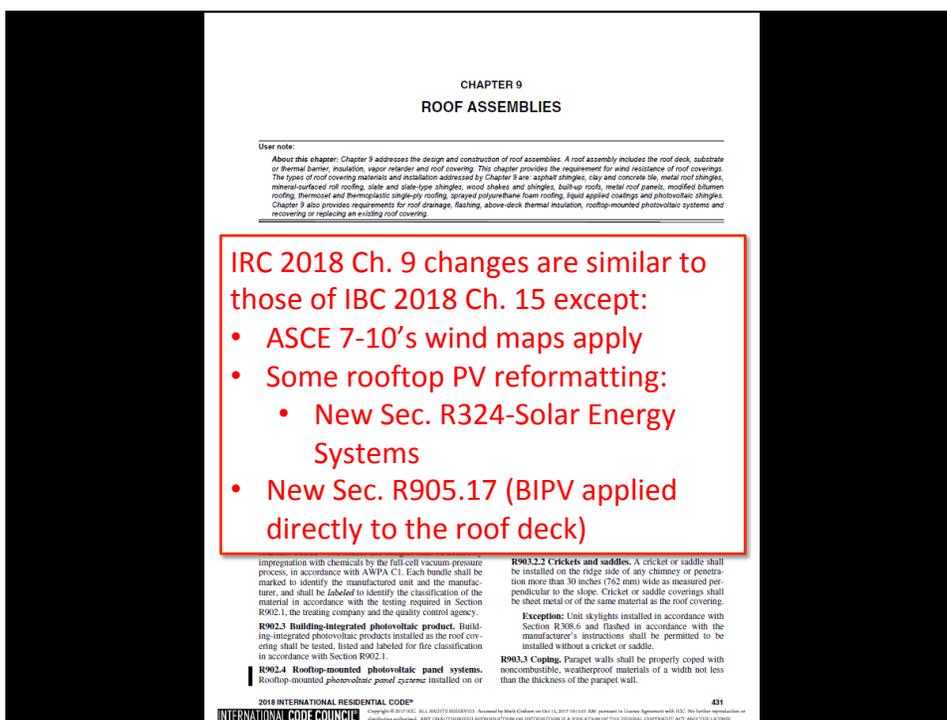
**1511.5 Reinstallation of materials.** Existing slate, clay or cement tile shall be permitted for reinstallation, except that damaged, cracked or broken slate or tile shall not be reinstalled. Existing vent flashings, metal edgings, drain outlets, collars and metal counterflashings shall not be reinstalled where rusted, damaged or deteriorated. Aggregate surfacing materials shall not be reinstalled.

**1511.6 Flashings.** Flashings shall be reconstructed in accordance with approved manufacturer's installation instructions. Metal flashing to which bituminous materials are to be adhered shall be primed prior to installation.

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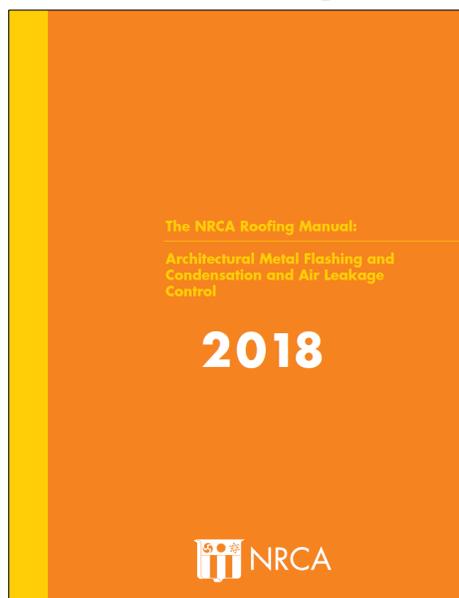
**International Residential Code, 2018 Edition**



## Attic ventilation

<p style="text-align: center;">CHAPTER 12 INTERIOR ENVIRONMENT</p> <p><b>1202.2.1 Ventilated attics and rafter spaces.</b> Enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof framing members shall have cross ventilation for each separate space by ventilation openings protected against the entrance of rain and snow. Blocking and bridging shall be arranged so as not to interfere with the movement of air. An airspace of not less than 1 inch (25 mm) shall be provided between the insulation and the roof sheathing. The net free ventilating area shall be not less than <math>\frac{1}{150}</math> of the area of the space ventilated. Ventilators shall be installed in accordance with manufacturer's installation instructions.</p> <p><b>Exception:</b> The net free cross-ventilation area shall be permitted to be reduced to <math>\frac{1}{300}</math> provided both of the following conditions are met:</p> <ol style="list-style-type: none"> <li>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.</li> </ol> <p><small>1. Ventilators shall be installed in accordance with manufacturer's installation instructions. 2. The net free cross-ventilation area shall be permitted to be reduced to <math>\frac{1}{300}</math> provided both 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. 3. Where wood shingles or shakes are used, not less than a <math>\frac{1}{8}</math>-inch (3.2 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 framing assembly. 5. Where wood shingles or shakes are used, not less than a <math>\frac{1}{8}</math>-inch (3.2 mm) vented airspace separates the shingles or shakes and the roofing underlayment above the structural sheathing. 6. In Climate Zones 5, 6, 7 and 8, any air-impermeable insulation shall be a Class II vapor retarder or shall</small></p> <p style="text-align: center;"><small>2018 INTERNATIONAL BUILDING CODE® INTERNATIONAL CODE COUNCIL 301</small></p>	<p style="text-align: center;">CHAPTER 8 ROOF-CEILING CONSTRUCTION</p> <p><b>R806.2 Minimum vent area.</b> The minimum net free ventilating area shall be <math>\frac{1}{150}</math> of the area of the vented space.</p> <p><b>Exception:</b> The minimum net free ventilation area shall be <math>\frac{1}{300}</math> of the vented space provided both of the following conditions are met:</p> <ol style="list-style-type: none"> <li>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.</li> <li>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. The balance of the required ventilation provided shall be located in the bottom one-third of the attic space. 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.</li> </ol> <p><small>1. Identification of the treating manufacturer. 2. Identification of the treating manufacturer. 3. The name of the fire-retardant treatment. 4. The species of wood treated. 5. The species of wood treated. 6. The species of wood treated.</small></p> <p style="text-align: center;"><small>2018 INTERNATIONAL RESIDENTIAL CODE® INTERNATIONAL CODE COUNCIL 303</small></p>
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## The NRCA Roofing Manual



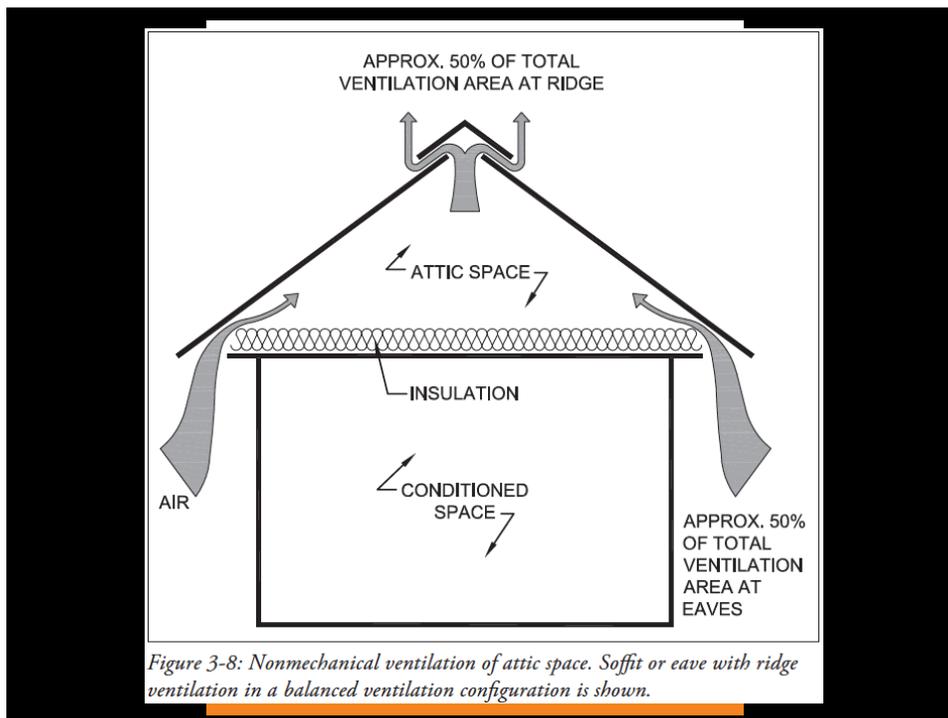


Figure 3-8: Nonmechanical ventilation of attic space. Soffit or eave with ridge ventilation in a balanced ventilation configuration is shown.

Keeping an eye on  
**I-CODES:**  
Part one

Professional Roofing, December 2017  
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Keeping an eye on  
**I-CODES:**  
Part two

**Changes to the 2018 codes affect roof assemblies**  
by Jason Wilen, AIA, CDT, RRO

Professional Roofing, January 2018  
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Keeping an eye on

# I-CODES:

Part one



**Editor's note:** Following is part one of a two-part series addressing building codes. Part two will appear in the January 2018 issue.

**M**odel codes such as those developed by the International Code Council® (ICC) serve as the technical basis for state, county and local adoption of codes that regulate the design, construction and operations of buildings.

ICC, promulgator of the International Building Code® and other related international codes, recently updated and published revised editions of its model codes, known as the “I-Codes,” as part of its normal three-year update cycle.

The *International Building Code, 2018 edition* (IBC 2018) presents the code as it originally was published in 2000; changes reflected in the 2003, 2006, 2009, 2012 and 2015 editions; and further changes approved through ICC’s code development process through 2017.

As jurisdictions begin the process of updating their codes, you should be aware of the changes incorporated into the 2018 I-Codes. Following is an overview of some of the more significant roofing-related changes in IBC, the International Energy Conservation Code,® International Fire Code® and International Plumbing Code.®

## IBC 2018

IBC 2018 applies to all buildings except detached one- and two-family dwellings and multiple single-family dwellings not more than three stories above grade plane.

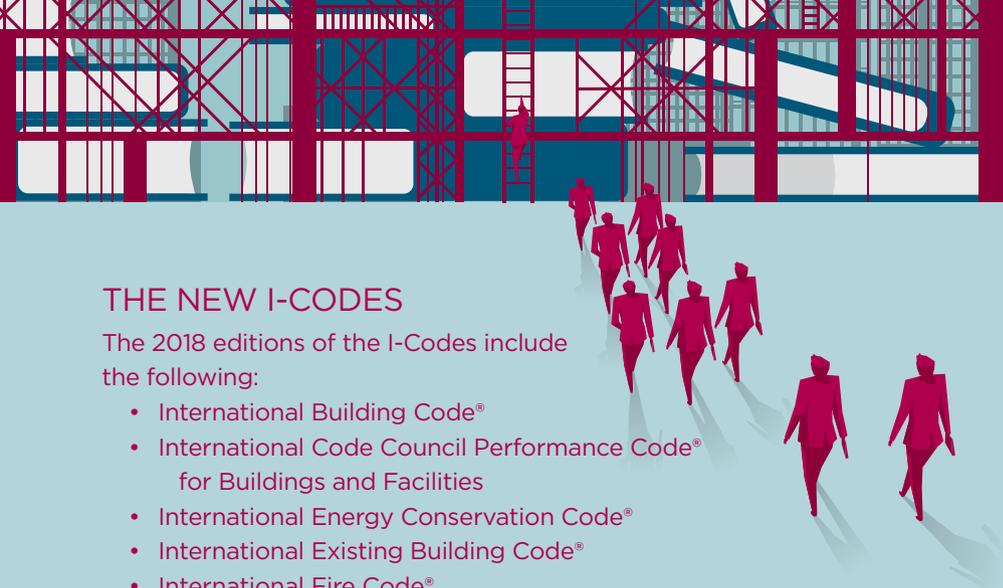
The most significant roofing-related change is the 2018 edition references ASCE Standard 7-16, “Minimum Design Loads and Associated Criteria for Buildings and Other Structures.” The previous edition references ASCE 7-10, “Minimum Design Loads for Buildings and Other Structures.”

Referencing ASCE 7-16 (and related changes in IBC 2018’s Chapters 15 and 16) is significant for roof assembly design because ASCE 7-16’s major revisions include revised basic wind speed maps, changes to and the addition of new pressure coefficients, and revised perimeter and corner zones.

In many cases, roof system designers will find higher field, perimeter and corner uplift pressures for designs per ASCE 7-16 vs. ASCE 7-10. Also, the percentage of roof area within the highest-pressure zones has increased in the updated standard. In other words, wind design for roof assemblies is more complex and, for some projects, design wind pressures will be greater. NRCA recommends roof system designers coordinate with local building code officials and roofing material manufacturers to ensure roof assembly wind design methods are consistent with jurisdictional requirements.

## Changes to the 2018 codes affect roof assemblies

by Jason Wilen, AIA, CDT, RRO



## THE NEW I-CODES

The 2018 editions of the I-Codes include the following:

- International Building Code®
- International Code Council Performance Code® for Buildings and Facilities
- International Energy Conservation Code®
- International Existing Building Code®
- International Fire Code®
- International Fuel Gas Code®
- International Green Construction Code®
- International Mechanical Code®
- International Plumbing Code®
- International Private Sewage Disposal Code®
- International Property Maintenance Code®
- International Residential Code® for One- and Two-Family Dwellings
- International Swimming Pool and Spa Code™
- International Wildland-Urban Interface Code®
- International Zoning Code®

The 2018 editions of the I-Codes are available from the International Code Council at (800) 786-4452 or [www.iccsafe.org](http://www.iccsafe.org). All I-Codes now are available except the 2018 International Green Construction Code, which is scheduled to be released during the first quarter of 2018 and, for the first time, will feature technical content based on ASHRAE 189.1, “Standard for the Design of High-Performance Green Buildings.”

Located in Chapter 2—Definitions, several terms and definitions relevant to roof assemblies have been added or revised: attic; building-integrated photovoltaic roof panel (BIPV roof panel); continuous insulation; repair; roof assembly; roof coating; skylights and sloped glazing; underlayment; vapor retarder class; vegetative roof; windborne debris region; and wind speed. The definitions for these terms generally are consistent with those understood in the roofing industry. In the previous IBC edition, a list of roofing-related terms was included in Chapter 15 with a reference to Chapter 2. The roofing-related term list and reference are absent from IBC 2018.

A majority of IBC 2018’s roofing-related requirements appear in Chapter 15—Roof Assemblies and Rooftop Structures.

The exception to Section 1504.1.1—Wind Resistance of Asphalt Shingles has been updated to make clear shingle packaging is required to bear compliance labeling but not the shingles themselves.

Section 1504.2.1.1—Overturning Resistance has been reworded to require concrete and clay roof tiles be tested to determine their wind resistances in accordance with IBC 2018’s Chapter 15 and either Southern Building Code Congress International Inc. Standard 11 (SBCCI SSTD 11), “Test Standard for Determining Wind Resistance of Concrete or Clay Roof Tiles,” or ASTM C1568, “Standard Test Method for Wind Resistance of Concrete and Clay Roof Tiles (Mechanical Uplift Resistance Method).” Although SBCCI SSTD 11 appeared in the previous version, the reference to ASTM C1568 is new for IBC 2018.

A new subsection appears in Section 1504.3—Wind Resistance of Nonballasted Roofs: 1504.3.3—Metal Roof Shingles. Listed are test standard options, including ASTM D3161, “Standard Test Method for Wind-Resistance of Steep Slope Roofing Products (Fan-Induced Method)”; FM 4474, “American National Standard for Evaluating the Simulated Wind Uplift Resistance of Roof Assemblies Using Static Positive and/or Negative Differential Pressures”; UL 580, “Standard for Tests for Uplift Resistance of Roof Assemblies”; and UL 1897, “Standard for Uplift Tests for Roof Covering Systems.” Metal roof shingles tested in accordance with ASTM D3161 are required to meet the classification requirements of Table 1504.1.1—Classification of Steep Slope Roof Shingles Tested in Accordance with ASTM D3161 or D7158, “Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method).”

Section 1505.9 now is titled “Rooftop Mounted Photovoltaic Panel Systems” (formerly “Photovoltaic Panels and Modules”). The section requires photovoltaic (PV) panel systems installed on roofs be tested, listed and identified with a fire classification in accordance with two UL standards: UL 1703, “Standard for Flat-Plate Photovoltaic Modules and Panels,” and UL 2703, “Standard for Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels.” UL 1703 was referenced in the previous edition, but UL 2703 is a new reference. The section requires the fire classification comply with Table 1505.1—Minimum Roof Covering Classification for Types of Construction.

In Section 1505.10—Roof Gardens and Landscaped Roofs, a reference to Section 1505.1—General has been added to clarify the codes’ intent that vegetative roof systems shall meet the requirements in Section 1505—Fire Classification.

Section 1507—Requirements for Roof Coverings contains a section-wide change where underlayment and ice barrier requirements formerly included (and repeated) in subsections addressing each roof covering type have been moved to single locations: Section 1507.1.1—Underlayment and Section 1507.1.2—Ice Barriers. Each subsection includes a reference to these new sections when appropriate. Material standards for underlayment are listed in Table 1507.1.1(1)—Underlayment Types, and application information is provided in Table 1507.1.1(2)—Underlayment Application.

In Section 1507.8—Wood Shingles, a new subsection has been added: Section 1507.8.9—Label Required indicating shingles bundles be identified by a label of an approved grading or inspection bureau or agency.

In Section 1507.9—Wood Shakes, a new subsection has been added: Section 1507.9.10—Label Required indicating shakes bundles be identified by a label of an approved grading or inspection bureau or agency. Also, in Table 1507.9.6—Wood Shake Material Requirements, a note related to American Wood Protection Association Standard U1 (AWPA U1), “Use Category System: User Specification for Treated Wood Except Commodity Specification H,” Commodity Specification H has been updated to reference “Special Requirement 4.6” (formerly the reference was “Use Category 3B and Section 5.6”). AWPA U1 is associated with Southern Pine preservative-treated taper sawn shakes.

Subsection 1507.11.2.1—Base Sheet has been added and identifies three options: a sheet that complies with Section 1507.11.2—Material Standards; a sheet that complies with ASTM D1970, “Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection”; or ASTM D4601, “Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.”

In Section 1507.12—Sprayed Polyurethane Foam Roofing, an additional standard is referenced in Subsection 1507.14.2—Material Standards: ASTM D7425, “Standard Specification for Spray Polyurethane Foam Used for Roofing Applications.”

In Section 1507.17—Photovoltaic Shingles, there is a change in Subsection 1507.17.2—Deck Slope. The minimum permissible deck slope has been changed to not less than 2 units vertical in 12 units horizontal (2:12). Formerly, the minimum permissible deck slope was not less than 3 units vertical in 12 units horizontal (3:12).

Section 1507.18—Building-integrated Photovoltaic Roof Panels is new and includes requirements for deck, deck slope, underlayment, ice barrier, material standards, attachment and wind resistance. Unlike other subsections in Section 1507, underlayment and ice barrier requirements are included within Section 1507.18 and do not reference Sections 1507.1.1—Underlayments and 1507.1.2—Ice Barriers.

In Table 1508.2—Material Standards for Roof Insulation, the standard listed for composite boards is ASTM C1289, “Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.” The following insulation board types (per ASTM C1289) are indicated in Section 1508.2:

“IBC 2018 applies to all buildings except detached one- and two-family dwellings and multiple single-family dwellings not more than three stories”

- Type III: Faced with a perlite insulation board on one major surface of the core foam and a fiberglass-reinforced cellulosic felt or uncoated or coated polymer-bonded fiberglass mat facer on the other major surface of the core foam
- Type IV: Faced with a cellulosic fiber-insulating board on one major surface of the core foam and a fiberglass-reinforced cellulosic felt or uncoated or coated polymer-bonded fiberglass mat facer on the other major surface of the core foam
- Type V: Faced with oriented strand board or plywood on one major surface of the core foam and a fiberglass-reinforced cellulosic felt or uncoated or coated polymer-bonded fiberglass mat facer on the other major surface of the core foam

- Type VIII: Faced with glass mat-faced gypsum board on one major surface of the core foam and fiberglass-reinforced cellulosic felt or uncoated or coated polymer-bonded fiberglass mat facer on the other major surface of the core foam.

Type VIII is new for IBC 2018, and Type VI (faced with perlite insulation board on both major surfaces of

## CONFLICTING CLIMATE ZONES

The 2018 edition of the International Energy Conservation Code's (IECC's) Chapter 3—General Requirements in the commercial and residential sections include climate zone information unchanged from the previous edition. For commercial buildings, IECC 2018's Section C401.2 provides code users with an option of using the 2016 edition of ASHRAE 90.1, "Energy Standard for Buildings Except Low-rise Residential Buildings," (ASHRAE 90.1-2016) instead of IECC as a method to demonstrate compliance with energy code requirements. This option creates a potential conflict as ASHRAE 90.1-2016 references more recent weather data than IECC 2018, resulting in about 10 percent of U.S. counties being in two climate zones—one for users referencing IECC 2018 and another for users referencing the same county in ASHRAE 90.1-2016.

For more information regarding the roofing-related provisions of the 2016 edition of ASHRAE 90.1, see "Setting the standard," September 2017 issue, page 34.

the core foam) has been removed from the reference to reflect the most recent version of ASTM C1289.

Also, in Table 1508.2 the listed standard for wood fiberboard was updated. "Type II" was added to the reference for ASTM C208, "Standard Specification for Cellulosic Fiber Insulating Board," (previously, no type designation was indicated). Of the six types of wood fiberboard addressed in ASTM C208, only Type II is used for roof insulation.

Additionally, a listing for high-density polyisocyanurate board was added to the table, and ASTM C1289, Type II, Class 4 is indicated as a material standard. As

part of the 13E1 edition of ASTM C1289, Type II, Class 4 was added to the standard to address high-density polyisocyanurate board.

Section 1510.7—Photovoltaic Panels and Modules has been simplified. A subsection related to wind resistance was removed because such requirements already exist elsewhere in the code. Also, wording requiring installation in accordance with the manufacturer's instructions was added to Subsection 1510.7.2—Photovoltaic Panels and Modules (the subsection has the same title as its parent section).

Section 1511.3.1—Roof Recover, Subsection (4) has been expanded to indicate roof coatings shall be permitted without tear-off of existing roof coverings. Identified substrates where such roof coatings may be installed as a re-cover include an existing roof coating; metal roof panel; metal roof shingle; mineral-surfaced roll roofing; built-up roofing; polymer-modified bitumen roofing; thermoset and thermoplastic single-ply roofing; and spray polyurethane foam (SPF) roofing. Previously, only SPF roofing was identified.

Roofing-related requirements also have been revised in Chapter 12—Interior Environment. Roof ventilation now is addressed in Section 1202—Ventilation (Ventilation was formerly Section 1203). A short introductory section has been added, Section 1202.2—Roof Ventilation, that indicates roof assemblies shall be ventilated in accordance with this section or shall comply with Section 1202.3—Unvented Attic and Unvented Enclosed Rafter Assemblies. Technical requirements for vented and unvented attics remain unchanged.

## IECC 2018

The *International Energy Conservation Code*,<sup>®</sup> 2018 Edition (IECC 2018) applies to all buildings with separate sections dedicated to address commercial and residential construction.

Several terms and definitions relevant to roof assemblies have been added or revised in Chapter 2—Definitions in the commercial and residential portions, including the terms air barrier, building thermal envelope, roof assembly and skylights (as part of the definition of "fenestration"). The definitions for these terms generally are consistent with those understood in the roofing industry.

Most noteworthy is the requirement for thermal resistance for roof systems has not changed. Specifically, the minimum required R-values listed in Table



## “IECC 2018 applies to all buildings with sections dedicated to commercial and residential”

C402.1.3—Opaque Thermal Envelope Insulation Component Minimum Requirements, R-value Method and in Table C402.1.4—Opaque Thermal Envelope Insulation Component Minimum Requirements, U-factor Method have remained unchanged for roof systems.

A majority of IECC 2018's roofing-related requirements appear in Chapter 4[CE]—Commercial Energy Efficiency, Section C402—Building Envelope Requirements. Section C402.2—Specific Building Thermal Envelope Insulation Requirements (Prescriptive) contains two roofing-related subsections: C402.2.1—Roof Assembly and C402.2.1.1—Skylight Curbs. These subsections have been reorganized, but the technical provisions remain consistent with the previous version. New clarification text has been added to note two layers of insulation are not required where insulation tapers to the roof deck, such as at roof drains (generally two layers of insulation are required when continuous above-deck insulation systems are used per Section C402.2.1).

In Section C402.5.1.1—Air Barrier Construction, text has been added in subsection three addressing the sealing of penetrations through air barriers. The new text requires such sealing shall allow for expansion, contraction and mechanical vibration.

### IFC 2018

The *International Fire Code,® 2018 Edition* (IFC 2018) applies to all buildings though jurisdictions make the final determination as part of the adoption process. IFC 2018 contains several provisions applicable to roof systems.

Section 1204—Solar Photovoltaic Power Systems, Subsection 1204.1—General (formerly Section 605.11 in the previous edition) has new language indicating only the

electrical portion of solar PV systems shall be installed in accordance with NFPA (National Fire Protection Association) Standard 70, “National Electrical Code.®”

Section 1204.2—Access and Pathways (formerly Section 605.11.1 in the previous edition) now requires pathways be over areas capable of supporting firefighters accessing the roof and located in areas with minimal obstructions such as vent pipes, conduit or mechanical equipment. Text has been eliminated noting roof access, pathways and spacing requirements need not be provided where the fire chief has determined rooftop operations will not be employed.

Section 1204.2.1—Solar Photovoltaic Systems for Group R-3 Buildings (formerly Section 605.11.1.2) has extensively been revised and, as with previous editions, does not apply to structures designed and constructed in accordance with IRC (IRC has its own requirements for access and pathways where rooftop PV is installed). New for IFC 2018 is an exception in Section 1204.2.1 indicating section requirements do not apply for roofs with

### WITHDRAWN STANDARDS

The following sections have been removed from the *International Building Code,® 2018 Edition* because the standards have been withdrawn by the Canadian General Standards Board (CGSB).

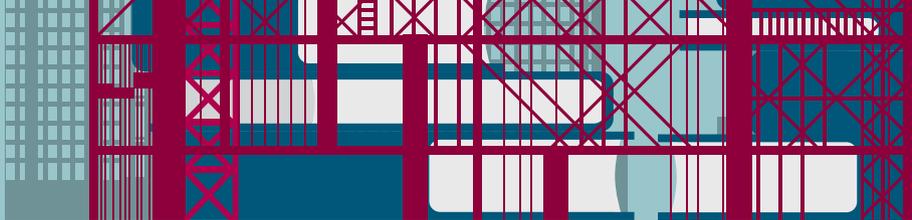
Section 1504.7—Impact Resistance, a reference to CGSB 37-GP-52M, “Standard for Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric,” has been removed.

Section 1507.11—Modified Bitumen Roofing, CGSB 37-GP-56M, “Standard for Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing,” has been removed from Subsection 1507.11.2—Material Standards.

Section 1507.12—Thermoset Single-ply Roofing, CGSB 37-GP-52M, “Standard for Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric,” has been removed from Subsection 1507.12.2—Material Standards.

Section 1507.13—Thermoplastic Single-ply Roofing, CGSB CAN/SGSB 37.54, “Standard for Polyvinyl Chloride Roofing and Waterproofing Membrane,” has been removed from Subsection 1507.13.2—Material Standards.





slopes of 2 units vertical in 12 units horizontal or less. Section 1204.2.1 includes provisions for pathways to roof ridges and for setbacks at roof ridges. There also is alternative setback at ridge requirements for some buildings where automatic sprinkler systems are installed. Code users should be aware IFC 2018's Chapter 2—Definitions includes a listing for “Residential Group R-3.” This listing is helpful for determining when Section 1204.2.1 is applicable for particular projects.

Section 3304.5—Fire Watch has been expanded beyond the single section included in the previous edition. The section now requires, where required by the fire code official or the pre-fire plan

per Section 3308.3—Prefire Plans, a fire watch be provided for building demolition and for building construction hazardous in nature, such as temporary heating or hot work. Subsections include additional requirements that apply during new construction, to fire watch personnel conduct and training, and to fire watch location and records.

In Section 3304.6—Cutting and Welding, “open torches and other hot work operations” has been added to “welding and cutting” for those activities that shall comply with the requirements of Chapter 35—Welding and Other Hot Work.

## IPC 2018

The *International Plumbing Code,® 2018 Edition* (IPC 2018) applies to all buildings except detached one- and two-family dwellings and multiple single-family dwellings not more than three stories above grade plane, though jurisdictions make the final determination as part of the adoption process.

IPC 2018 contains changes from the previous edition that indirectly apply to roof system design.

## NRCA GUIDELINES FOR ROOFTOP-MOUNTED PHOTOVOLTAIC SYSTEMS

NRCA will release an updated version of *NRCA Guidelines for Rooftop-mounted Photovoltaic Systems, 2018 Edition*, in early 2018. The document will include code compliance information applicable to rooftop-mounted and building-integrated photovoltaic systems based on *NFPA 70: National Electrical Code,® 2017 Edition*; *International Building Code,® 2018 Edition*; *International Residential Code® for One- and Two-Family Dwellings, 2018 Edition*; *International Fire Code,® 2018 Edition*; and *NFPA 1: Fire Code, 2018 Edition*.



Section 1106.5—Parapet Wall Scuppers (formerly Parapet Wall Scupper Location) has been expanded and applies where scuppers are used for primary roof drainage or for secondary or emergency overflow roof drainage. The section requires sufficient placement, sizing and quantity of scuppers to prevent water depth that would result in exceeding the maximum water depth buildings were designed to accommodate per structural requirements (IBC 2018's Section 1611.1). Section requirements also note scupper openings shall be not less than 4 inches in height and have a width that is equal to or greater than the circumference of a roof drain sized for the same roof area. Also, the flow through the primary system shall not be considered when locating and sizing secondary scuppers.

## Implementation

ICC intends for the most recent I-Codes to be adopted by jurisdictions beginning in 2018. Typically, the I-Codes are adopted at the local, county or state levels. In some instances, a jurisdiction may adopt one or more of the I-Codes but not all of them. IECC is most commonly adopted at the state level; however, in some instances, individual local jurisdictions may adopt IECC 2018 before state adoptions or in states without a state-wide energy conservation code.

Next month, in part two of “Keeping an eye on I-Codes,” I’ll address some of the more significant roofing-related changes to the International Residential Code® and International Existing Building Code.® 📞🌐

**JASON WILEN, AIA, CDT, RRO**, is an NRCA director of technical services.

“ICC intends for the most recent I-Codes to be adopted by jurisdictions beginning in 2018”

# Keeping an eye on I-CODES: Part two

**Editor's note:** Following is part two of a two-part series addressing building codes. Part one appeared in the December 2017 issue.

**T**he International Code Council® (ICC), promulgator of the International Residential Code®, International Existing Building Code® and other related international codes, recently updated and published revised editions of its model codes, known as the “I-Codes,” as part of its normal three-year update cycle.

In part one of this two-part series, I reviewed the more significant roofing-related changes to the International Building Code®, International Energy Conservation Code®, International Fire Code® and International Plumbing Code®. Part two addresses the significant roofing-related changes to the International Residential Code and International Existing Building Code.

## Changes to the 2018 codes affect roof assemblies

by Jason Wilen, AIA, CDT, RRO

### IRC 2018

The *International Residential Code for One- and Two-Family Dwellings, 2018 edition* (IRC 2018) applies to detached one- and two-family dwellings and multiple single-family dwellings not more than three stories above grade plane though jurisdictions make the final determination as part of the adoption process.

As with the *International Building Code, 2018 Edition* (IBC 2018), ASCE Standard 7-16, “Minimum Design Loads and Associated Criteria for Buildings and Other Structures,” was accepted and appears in Chapter 44—Referenced Standards, but many proposed changes that correlate to IRC 2018’s roofing-related code sections with ASCE 7-16 were not approved by ICC voting members.

For example, ASCE 7-16 wind speed maps and roof pressure loading were not adopted and remain as they were for IRC’s 2015 edition that references ASCE 7-10. As a result, IRC 2018 is inconsistent with IBC 2018 regarding wind design for roof assemblies. NRCA recommends roof system designers coordinate with local building code officials and roofing material manufacturers to ensure roof assembly wind design methods are consistent with jurisdictional requirements.

Several terms and definitions relevant to roof assemblies have been added or revised in Chapter 2—Definitions, including the terms BIPV roof panel, repair, roof assembly, roof coating, skylights and sloped glazing. The definitions for these terms generally are consistent with those understood in the roofing industry.





## THE NEW I-CODES

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The 2018 editions of the I-Codes are available from the International Code Council at (800) 786-4452 or [www.iccsafe.org](http://www.iccsafe.org). All I-Codes now are available except the 2018 International Green Construction Code, which is scheduled to be released during the first quarter of 2018 and, for the first time, will feature technical content based on ASHRAE 189.1, “Standard for the Design of High-Performance Green Buildings.”

A majority of IRC 2018’s roofing-related requirements appear in Chapter 9—Roof Assemblies.

Section R902.4, “Rooftop-mounted Photovoltaic Panel Systems” (formerly “Rooftop-mounted Photovoltaic Panels and Modules”), requires photovoltaic (PV) panel systems installed on roofs be tested, listed and identified with a fire classification in accordance with two UL standards: UL 1703, “Standard for Flat-Plate Photovoltaic Modules and Panels,” and UL 2703, “Standard for Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels.”

UL 1703 was referenced in the previous IRC edition, but UL 2703 is a new reference for IRC 2018. The section requires Class A, B or C PV panel systems and modules be installed per jurisdictional provisions or where a roof edge is less than 3 feet from a lot line.

Section R905.1.1—Underlayment has been updated to include requirements for PV shingles. Underlayment complying with ASTM D4869, “Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing,” Type III has been added to Table R905.1.1(1)—Underlayment Types and now is acceptable in areas with a maximum ultimate design wind speed,  $V_{ult} \geq 140$  mph. Also, an additional alternative method for underlayment installation has been added as exception

three in Section R905.1.1, and side and end lap provisions have been added in Tables R905.1.1(2)—Underlayment Application and R905.1.1(3)—Underlayment Attachment.

Subsection R905.11.2.1—Base Sheet has been added and identifies three options for base sheets: a sheet that complies with IBC 2018’s Section 1507.11.2—Material Standards, ASTM D1970, “Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection,” or ASTM D4601, “Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.”

Section R905.17—Building-integrated Photovoltaic (BIPV) Roof Panels Applied Directly to the Roof Deck is new and includes requirements for deck, deck slope, underlayment, ice barrier, material standards, attachment and wind resistance.

In Section R906—Roof Insulation, mineral wool board was added to Table R906.2—Material Standards for Roof Insulation. The listing for mineral wool board references ASTM C726, “Standard Specification for Mineral Wool Roof Insulation Board.”

In Section R907—Rooftop-Mounted Photovoltaic Systems, most of the information formerly located in this section has been moved to Section R324—Solar Energy Systems—what remains is a reference to

Section R324 and a provision that rooftop-mounted PV systems also be designed and installed in accordance with NFPA (National Fire Protection Association) Standard 70, “National Electrical Code.®” Information formerly located in Section R909—Rooftop-mounted Photovoltaic Panel Systems has been moved to Section R324; Section R909 does not appear in IRC 2018.

Section R324 contains subsection R324.4—Rooftop-mounted Photovoltaic Systems. The revised structural requirements include new, specific roof load requirements in Section R324.4.1.1—Roof Load. This section indicates 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—Dead Load and R301.6—Roof Load. Portions of roof structures covered with PV panel systems shall be designed for the following two specific load cases:

- Dead load (including PV panel weight) plus snow load in accordance with Table R301.2(1)—Climatic and Geographic Design Criteria
- Dead load (excluding PV panel weight) plus roof live load or snow load, whichever is greater, in accordance with Section R301.6—Roof Load

Additionally, Section R324.4.1.2—Wind Load has been updated. Added to the requirements for rooftop-mounted PV panel or module systems to be designed and installed to resist the component and cladding loads specified in Table R301.2(2)—Component and Cladding Loads is the supports for such systems are to be included in wind load calculations. In situations where structural loads are to be determined, roof system designers should consider consulting with structural professionals.

Also, Subsection R324.6—Roof Access and Pathways has been updated. Requirements for pathways, setbacks at ridges, and panel and module locations in relation to emergency escape and rescue openings have been revised.

Section R908.3.1—Roof Recover includes a new subsection indicating roof coatings shall be permitted without tearing off existing roof coverings. Identified substrates where such roof coatings may be installed as a re-cover include an existing roof coating; metal roof panels or shingles; mineral-surfaced roll roofing; built-up roofing; polymer-modified bitumen roofing; thermoset and thermoplastic single-ply roofing; and SPF roofing.

Chapter 8—Roof-Ceiling Construction, Section R806—Roof Ventilation also contains revised roofing-related requirements.

In Section R806.1—Ventilation Required, perforated vinyl has been added for providing ventilation openings into attic spaces. Other methods remain unchanged from the code’s previous edition and include corrosion-resistant wire cloth screening and hardware cloth.

In Section R806.2—Minimum Vent Area, the conditions for when a minimum attic vent area can be reduced have been made more stringent by requiring both listed conditions be met (the previous version required only one condition be met). Additionally, the wording of exception two related to the placement of attic ventilators was revised to make clear that 50 to 60 percent of ventilation must occur in the lower third of attic spaces as part of the conditions for reducing the minimum required vent area.

## WITHDRAWN TEXT

The following sections have been removed from the *International Residential Code® for One- and Two-Family Dwellings, 2018 edition* because the standards have been withdrawn by the Canadian General Standards Board (CGSB).

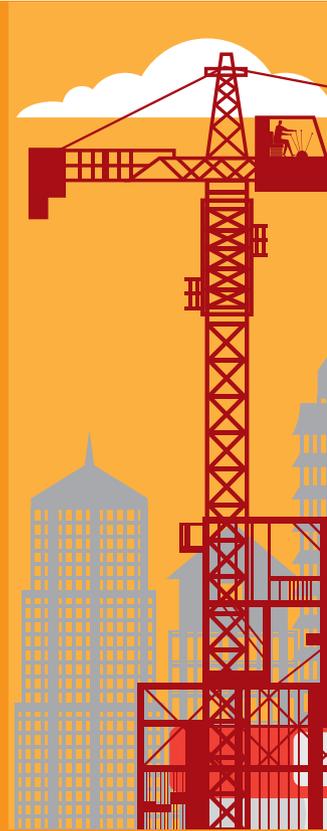
Section R905.11—Modified Bitumen Roofing, CGSB Standard 37-GP-56M, “Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing,” has been removed from Table R905.11.2—Modified Bitumen Roofing Material Standards.

Section R905.12—Thermoset Single-ply Roofing, CGSB Standard 37-GP-52M, “Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric,” has been removed from Subsection R905.12.2—Material Standards.

Section R905.13—Thermoplastic Single-ply Roofing, CGSB CAN/SGSB Standard 37.54, “Polyvinyl Chloride Roofing and Waterproofing Membrane,” has been removed from Subsection R905.13.2—Material Standards.

In Section R806.5—Unvented Attic and Unvented Enclosed Rafter Assemblies, a new subsection was added that applies to air-permeable insulation installed in unvented attics in climate zones 1, 2 and 3. The new requirements address the use of vapor diffusion ports, roof slope, insulation placement and air flow rate.

IRC 2018 also contains changes that indirectly apply



to roof system design. Section P3103.1—Vent Pipes Terminating Outdoors (formerly Roof Extension) has been expanded. Added in Section P3103.1—Vent Pipes Terminating Outdoors are alternative requirements for vent pipes in certain situations. Longer exposed vent pipe dimensions are required for some roofs used for recreational purposes (see Section P3103.1.2—Roof Used for Recreational Purposes), and shorter exposed vent pipe dimensions are allowed in some situations where the vent will be shielded by another element such as a solar collector or a decorative shroud (see Section P3101.1.3—Roof Extension Covered).

## IEBC 2018

The *International Existing Building Code, 2018 Edition* (IEBC 2018) applies to the repair, alteration, change of occupancy, addition and relocation of existing buildings except detached one- and two-family dwellings and multiple single-family dwellings not more than three stories

above grade plane though jurisdictions make the final determination as part of the adoption process.

Several terms and definitions relevant to roof assemblies have been added or revised in Chapter 2—Definitions, including the terms building, existing structure, roof coating and roof repair. The definitions for these terms generally are consistent with those understood in the roofing industry.

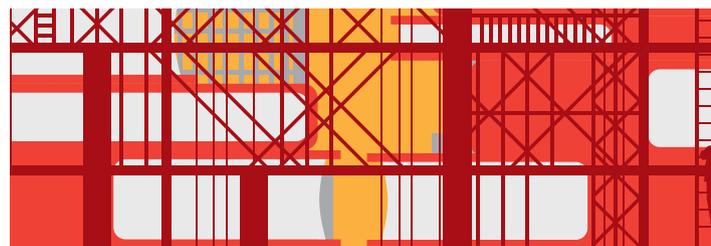
A majority of IEBC 2018's roofing-related requirements appear in Chapter 7—Alterations—Level 1.

A level 1 alteration includes the removal and replacement or the covering of existing materials, elements, equipment or fixtures using new materials, elements, equipment or fixtures that serve the same purpose. Roof replacement and roof re-cover specifically are addressed in Chapter 7.

Section 705—Reroofing (formerly Section 706) has been reorganized and revised to closely align with IBC 2018's Section 1511—Reroofing.

Section 706.2—Addition or Replacement of Roofing or Replacement of Equipment has been revised and now

“ICC intends for the most recent I-Codes to be adopted by jurisdictions beginning this month”



## RELATED CONTENT:

Part one of “Keeping an eye on I-Codes” addresses roofing-related changes to the International Building Code,<sup>®</sup> International Energy Conservation Code,<sup>®</sup> International Fire Code<sup>®</sup> and International Plumbing Code<sup>®</sup>; it was published in the December 2017 issue.



requires any existing gravity load-carrying structural element for which an alteration causes an increase in a roof design's dead, live or snow load, including snow drift effects, of more than 5 percent shall be replaced or altered as needed to carry the gravity loads required by IBC for new structures. The new requirements are more general in nature than the more roofing-specific text in the previous IEBC edition and include an exception for some residential buildings. In situations where loads may be increased, roof system designers should consider consulting with structural professionals to determine how to demonstrate compliance with Section 706.2 provisions.

IEBC also includes provisions for level 2 and 3 alterations (more substantial construction than would be part of a typical roof replacement or re-cover project). For level 2 and 3 alterations, IEBC 2018 also requires compliance with level 1 alterations.

## Begin preparing

With the publication of the 2018 I-Codes, you should begin preparing for the codes' adoptions in the areas in which you work. ICC intends for the most recent I-Codes to be adopted by jurisdictions beginning this month. 📍🌐

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