



Faculty Retreat on Roofing

Clemson University

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Building codes and standards

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Definitions

Standard: something established for use as a rule or basis of comparison in measuring or judging capacity, quantity, content, extent, value or quality.

Code: 1) a body of laws, as a nation, city, etc., arranged systematically for easy reference; 2) any set of principles or rules of conduct (e.g., the moral code).

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Roofing-related standards

- Promulgators: AAMA, ASCE, ASTM, CSA, CSSB, FM, SPRI, UL and WDMA
- Types of standards:
 - Test method (e.g., ASTM E108)
 - Specification/product standard (ASTM D6878)
 - Practice (ASTM D7186)
 - Guide (ASTM D6630) – Not enforceable

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TECH TODAY

An ASTM primer

Establishing and maintaining standards for the roofing industry
by Mark S. Graham

A majority of the standards that apply within the roofing industry are developed by ASTM International. Although you most likely are aware of the "ASTM" designation, you may not be aware of how the organization operates and the different types of standards it develops and maintains.

Overview
ASTM International is a globally recognized leader in the development and delivery of voluntary consensus standards. ASTM International publishes more than 12,000 standards annually used around the world to establish product quality levels, enhance health and safety, facilitate market access and trade, and establish consumer confidence. ASTM International has no technical research or testing facilities of its own. Instead, the organization relies on its members—more than 30,000 of the world's top technical experts and business professionals from more than 140 countries—and facilitates the process and provides venues for carrying out its mission.

ASTM International's standards development and maintenance activities are carried out by more than 140 ASTM technical committees. For example, in Committee D08 on Roofing and Waterproofing is responsible for a majority of ASTM's roofing-related standards. Committee C16 on Thermal Insulation, Committee E05 on Fire Standards and Committee E06 on Performance of Building Address roofing-related thermal insulation, fire testing and performance issues, respectively.

Standards
ASTM International committees can develop four types of standards:
Test method standards define a specific method or series of methods for testing a material or product attribute. For example, ASTM D228, "Standard Test Methods for Sampling, Testing, and Analysis of Asphalt Roll Roofing, Cap Sheets, and Shingles Used in Roofing and Waterproofing," defines test methods for asphalt shingles, roll roofing and cap sheets.
Specification standards describe specific materials, products, systems or services and mutually include requirements for testing using ASTM International standard test methods. For example, ASTM D3462, "Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules," is the U.S. product standard for asphalt shingles.
A standard practice is an accepted procedure for the performance of one or more operations or functions. In some cases, practice may include one or more test methods necessary for full use of the practice. For example, ASTM D7186, "Standard Practice for Quality Assurance Observation of Roof Construction and Repair," is the recognized consensus method for performing and reporting rooftop quality assurance observation.
A standard guide is a compendium of information or series of options that does not recommend a specific course of action. Guides are intended to increase the awareness of information and approaches in a given subject area. Guides may propose a series of options or instructions that offer direction without recommending a definite course of action. A guide standard offers guidance based on a consensus of experience but not to establish a standard practice to follow in all cases. For example, ASTM D7877, "Standard Guide for Electronic Methods for Detecting and Locating Leaks in Waterproof Membranes," provides consensus regarding electrical conductance testing of waterproof membranes but does not provide specific practice or test method information. ASTM International test methods, specifications and practice standards are appropriate to be referenced in project specifications, contracts and building codes. Because of their "information only" nature, ASTM International guide specifications are not.

Participation
A large number of NSCA member companies and, in some cases, individual company personnel are members of ASTM International, and many of them participate in various ASTM committees.
NSCA's Technical Services Section's staff members also are members of various ASTM technical committees. For example, I am a member of Committee C15 on Manufactured Masonry Units, C16, D08, E05 and E06. I also serve on the Executive Committee for Committee D08.
Additional information regarding ASTM International is available at www.astm.org.
If you are not already an ASTM member, I encourage you to consider joining and participating in one or more of ASTM's technical committees. ■■■

MARK S. GRAHAM is NSCA's vice president of technical services.

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November 2016

[Link](#)

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Most roofing-related standards are developed/maintained by Committee D08. Most roofing-related standards are contained in Vol. 4.04

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Some background

Building code and standards in roofing

- 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)
- Code enforcement occurs at the time of installation and occupancy/use
- The code can also provide a basis for construction claims-related litigation



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The purpose of the code

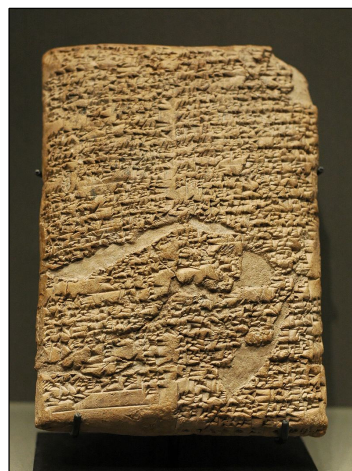
International Building Code, 2021 Edition

- **[A] 101.3 Purpose.** The purpose of this code is to establish the minimum requirements to provide a reasonable level of safety, health and general welfare through structural strength, *means of egress*, stability, sanitation, light and *ventilation*, energy conservation, and for providing a reasonable level of life safety and property protection from the hazards of fire, *explosion* or *dangerous* conditions, and to provide a reasonable level of safety to fire fighters and emergency responders during emergency operations.

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Code of Hammurabi

- Babylonian empire (1754 BC)
- 282 laws, scaled punishment
- "...an eye for an eye, a tooth for a tooth..."
- Specific provisions to construction and contracts



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Legal considerations

“In most states, a building code violation is considered to be evidence of negligence. In some situations, a building code violation may be considered *negligence per se*...”

--Stephen M. Phillips
Hendrick, Phillips, Salzman & Seigel, PC

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Legacy codes

Early 1900s up to 1999

- Building Officials and Code Administrators International (BOCA)
 - *The BOCA National Building Code*
- Southern Building Code Congress International (SBCCI)
 - *The Standard Building Code (SBC)*
- International Conference of Building Officials
 - *Uniform Building Code (UBC)*

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2021 I-codes



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I-codes commonly applicable to roofing

- IBC: International Building Code
- IRC: International Residential Code
- IECC: International Energy Conservation Code

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International Building Code, 2021 Edition



- Applicable to all buildings and structures, excepts those applicable to IRC 2021
- Roofing-related requirements:
 - Ch. 10-Means of egress
 - Ch. 12-Interior environment
 - Ch. 13-Energy efficiency
 - Ch. 15-Roof assemblies and rooftop structures
 - Ch. 16-Structural design
 - Ch. 20-Aluminum
 - Ch. 22-Steel
 - Ch. 24-Glass and glazing
 - Ch. 26-Plastic

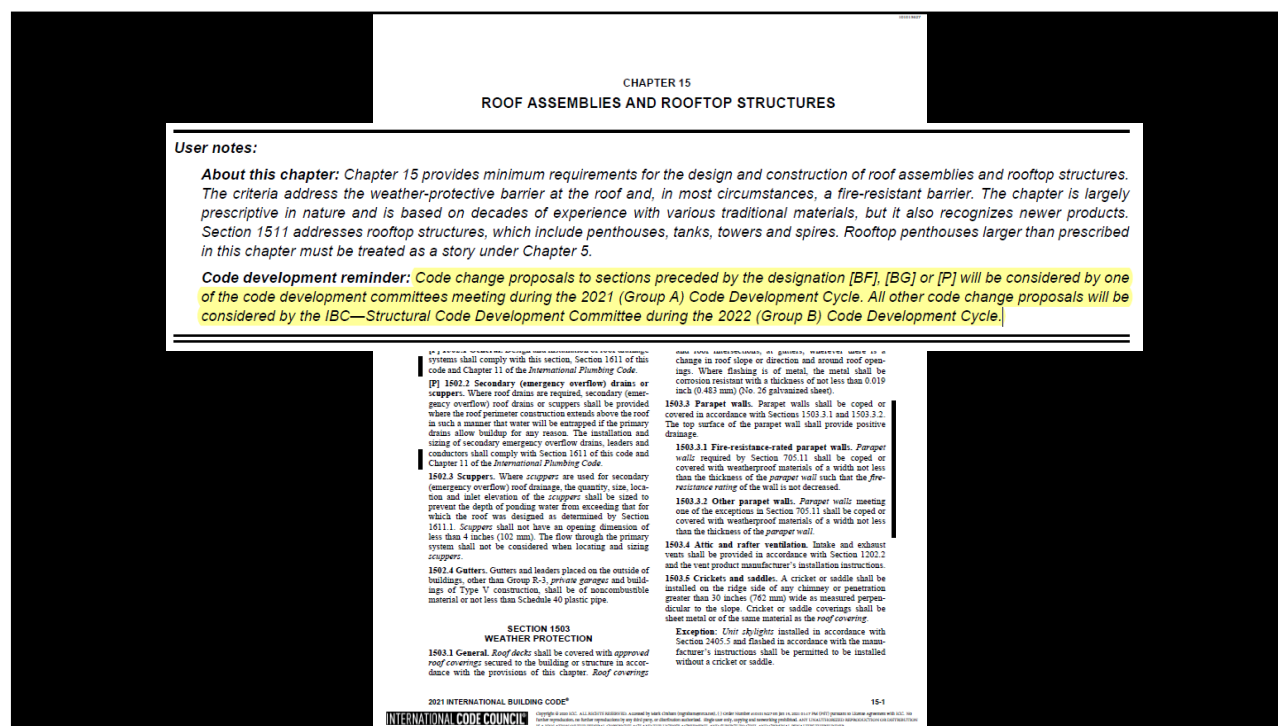
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Significant roof requirements

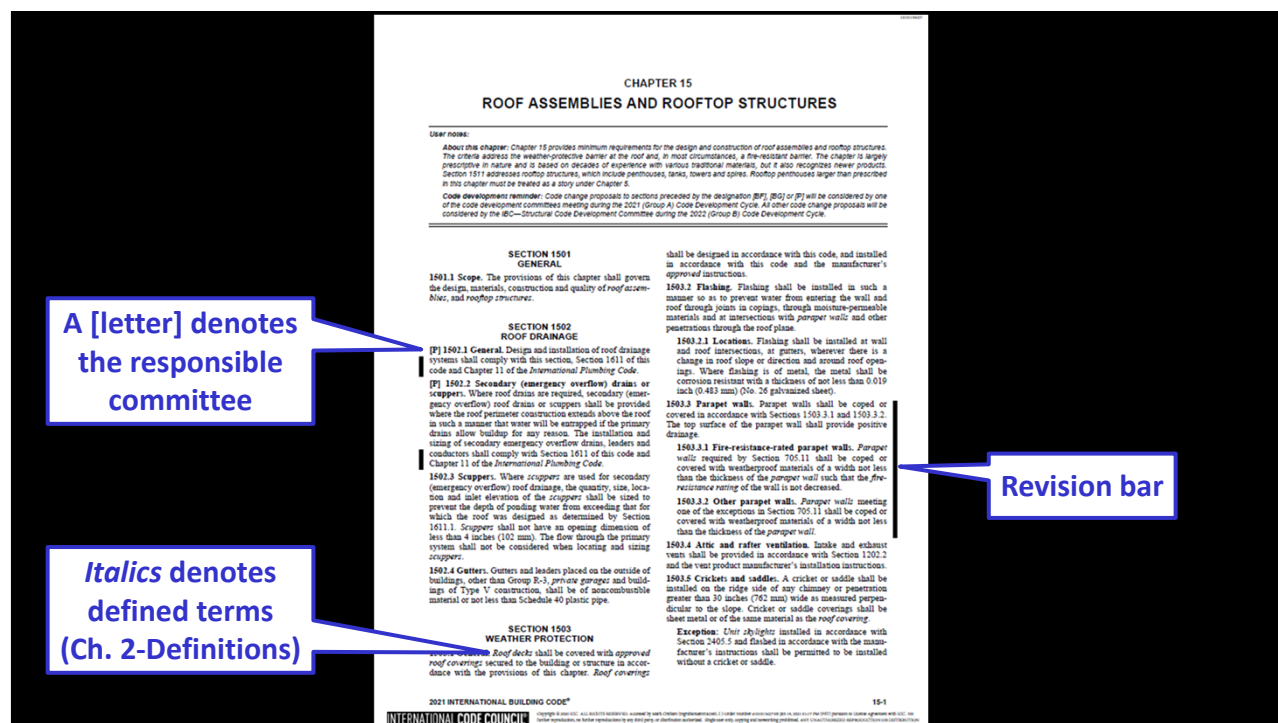
International Building Code, 2021 Edition, Chapter 15-Roof Assemblies and Rooftop Structures

- Wind resistance
- Fire classification
- Installation requirements
- Prescriptive requirements
- Reroofing

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ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

SECTION 1504
PERFORMANCE REQUIREMENTS

**SECTION 1504
PERFORMANCE REQUIREMENTS**

1504.1 Wind resistance of roofs. Roof decks and roof coverings shall be designed for wind loads in accordance with Chapter 16 and Sections 1504.2, 1504.3 and 1504.4.

ASCE 7-16

required classification in Table 1504.2.

1504.3 Wind resistance of clay and concrete tile. Wind loads on clay and concrete tile roof coverings shall be in accordance with Section 1609.5.

1504.3.1 Testing. Testing of concrete and clay roof tiles shall be in accordance with Sections 1504.3.1.1, 1504.3.1.2 and 1504.3.1.3.

1504.3.1.1 Overturning resistance. Concrete and clay roof tiles shall be tested to determine their resistance to overturning due to wind in accordance with Chapter 15 and either SBCCI 55TD 11 or ASTM C1568.

1504.3.1.2 Wind tunnel testing. Where concrete and clay roof tiles do not satisfy the limitations in Chapter 16 for rigid tile, a wind tunnel test shall be used to determine the wind characteristics of the concrete or clay tile roof covering in accordance with Chapter 15 and either SBCCI 55TD 11 or ASTM C1569.

1504.3.1.3 Air permeability testing. The lift coefficient for concrete and clay tile shall be 0.2 or shall be determined in accordance with SBCCI 55TD 11 or ASTM C1570.

1504.4 Wind resistance of nonballasted roofs. Roof coverings installed on roofs in accordance with Section 1507 that are mechanically attached or adhered to the roof deck shall be designed to resist the design wind load pressures for components and cladding in accordance with Section 1609.5.2. The wind load on the roof covering shall be permitted to be determined using allowable stress design.

ASCE 7-16's ASD method

Exceptions:

1. Metal roofs constructed of cold-formed steel shall be permitted to be designed and tested in accordance with the applicable referenced structural design standard in Section 2210.1.
2. Metal roofs constructed of aluminum shall be permitted to be designed and tested in accordance with the applicable referenced structural design standard in Section 2002.1.

1504.4.3 Metal roof shingles. Metal roof shingles applied to a solid or closely framed deck shall be tested in accordance with ASTM D3161, FM 4474, UL 580 or UL 1897. Metal roof shingles tested in accordance with ASTM D3161 shall meet the classification requirements of Table 1504.2 for the appropriate maximum basic wind speed and the metal shingle packaging shall bear a label to indicate compliance with ASTM D3161 and the required classification in Table 1504.2.

**TABLE 1504.2
CLASSIFICATION OF STEEP SLOPE ROOF SHINGLES TESTED IN ACCORDANCE WITH ASTM D3161 OR D7158**

MAXIMUM BASIC WIND SPEED, V, FROM FIGURES 1609.3(1)-(8) OR ASCE 7 (mph)	MAXIMUM ALLOWABLE STRESS DESIGN WIND SPEED, V _{ASD} , FROM TABLE 1609.3.1 (mph)	ASTM D7158 ^a CLASSIFICATION	ASTM D3161 or UL 7158 CLASSIFICATION
110	85	D, G or H	A, D or F
116	90	D, G or H	A, D or F
129	100	G or H	A, D or F
142	110	G or H	F
155	120	G or H	F
168	130	H	F
181	140	H	F
194	150	H	F

For SI: 1 foot = 304.8 mm; 1 mph = 0.447 m/s.
a. The standard calculations contained in ASTM D7158 assume Exposure Category B or C and building height of 60 feet or less. Additional calculations are required for conditions outside of these assumptions.

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1504.1.1 Wind resistance of asphalt shingles. Asphalt shingles shall be tested in accordance with ASTM D7158. Asphalt shingles shall meet the classification requirements of Table 1504.1.1 for the appropriate maximum basic wind speed. Asphalt shingle packaging shall bear a label to indicate compliance with ASTM D7158 and the required classification in Table 1504.1.1.

Exception: Asphalt shingles not included in the scope of ASTM D7158 shall be tested and labeled in accordance with ASTM D3161. Asphalt shingle packaging shall bear a label to indicate compliance with ASTM D3161 and the required classification in Table 1504.1.1.

**TABLE 1504.1.1
CLASSIFICATION OF STEEP SLOPE ROOF SHINGLES TESTED IN ACCORDANCE WITH ASTM D316 OR D7158¹**

MAXIMUM BASIC WIND SPEED, V, FROM FIGURES 1609.3(1)-(8) OR ASCE 7 (mph)	MAXIMUM ALLOWABLE STRESS DESIGN WIND SPEED, V _{ASD} , FROM TABLE 1609.3.1 (mph)	ASTM D7158 ^a CLASSIFICATION	ASTM D3161 CLASSIFICATION
110	85	D, G or H	A, D or F
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a. The standard calculations contained in ASTM D7158 assume Exposure Category B or C and building height of 60 feet or less. Additional calculations are required for conditions outside of these assumptions.

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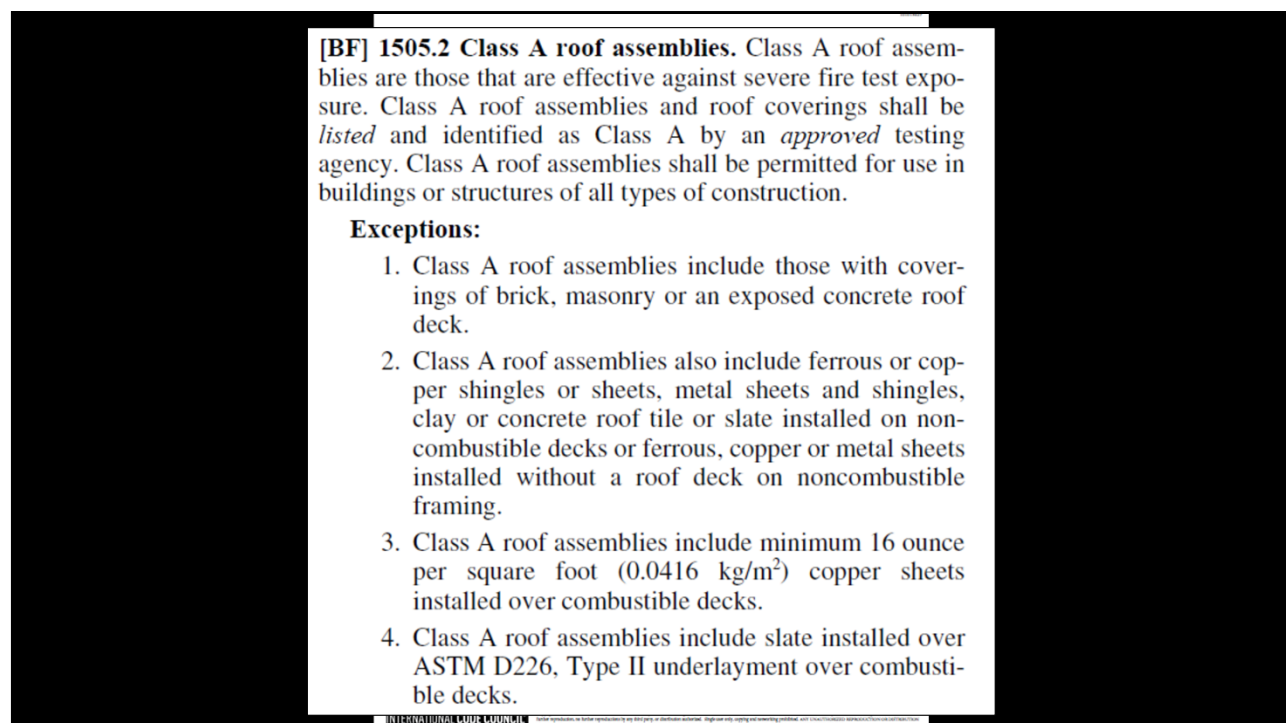
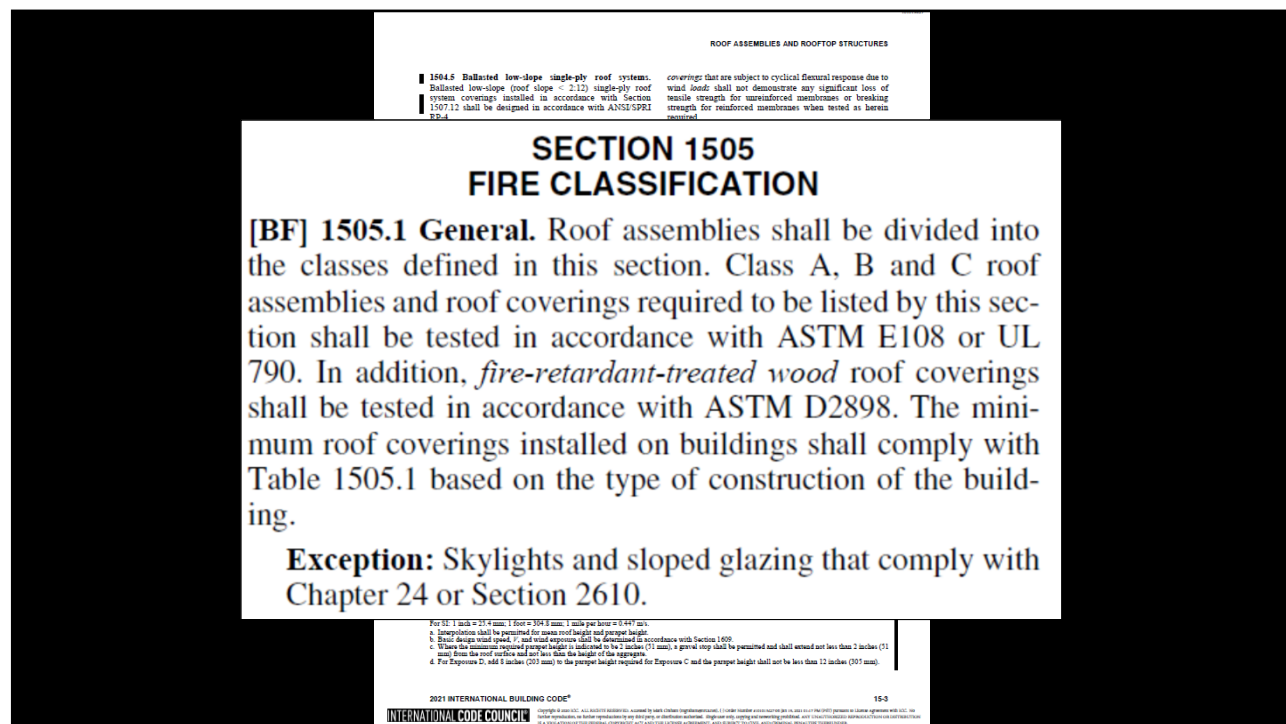


TABLE 1505.1 ^{a, b} MINIMUM ROOF COVERING CLASSIFICATION FOR TYPES OF CONSTRUCTION								
IA	IB	IIA	IIB	IIIA	IIIB	IV	VA	VB
B	B	B	C ^c	B	C ^c	B	B	C ^c

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m².

a. Unless otherwise required in accordance with the *International Wildland-Urban Interface Code* or due to the location of the building within a fire district in accordance with Appendix D.

b. Nonclassified roof coverings shall be permitted on buildings of Group R-3 and Group U occupancies, where there is a minimum fire-separation distance of 6 feet measured from the leading edge of the roof.

c. Buildings that are not more than two stories above grade plane and having not more than 6,000 square feet of projected roof area and where there is a minimum 10-foot fire-separation distance from the leading edge of the roof to a lot line on all sides of the building, except for street fronts or public ways, shall be permitted to have roofs of No. 1 cedar or redwood shakes and No. 1 shingles constructed in accordance with Section 1505.7.

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(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:

1. Class A roof assemblies include those with coverings of brick, masonry or an exposed concrete roof deck.
2. Class A roof assemblies include copper shingles or tiles, glass, clay or concrete noncombustible deck sheaths installed with battile framing.
3. Class A roof assemblies include one-ply or two-ply sheets installed over
4. Class A roof assemblies include one-ply or two-ply sheets installed over ASTM D2128, combustible decks.

(BF) 1505.3 Class B roof assemblies. Class B roof assemblies are those that are effective against moderate fire test exposure. Class B roof assemblies shall be listed and identified as Class B by an approved testing agency.

(BF) 1505.4 Class C roof assemblies. Class C roof assemblies are those that are effective against light fire test exposure. Class C roof assemblies shall be listed and identified as Class C by an approved testing agency.

(BF) 1505.5 Nonclassified roofing. Nonclassified roofing is approved material that is not listed as a Class A, B or C roof covering.

(BF) 1505.6 Fire-retardant-treated wood shingles and shakes. Fire-retardant-treated wood shingles and shakes shall be treated by impregnation with chemicals by the full-cell vacuum-pressure process, in accordance with AWPA C1. Each bundle shall be marked to identify the manufacturer unit and the manufacturer, and shall be labeled to identify the classification of the material in accordance with the testing required in Section 1505.1, the testing company and the quality control agency.

(BF) 1505.7 Special purpose roofs. Special purpose wood shingle or wood shake roofing shall conform to the grading and application requirements of Section 1507.8 or 1507.9. In addition, an underlayment of 1/2-inch (12.7 mm) Type X water-resistant gypsum backing board or gypsum sheathing shall be placed under minimum nominal 1/2-inch-thick (12.7 mm) wood structural panel solid sheathing or 1-inch (25 mm) nominal spaced sheathing.

(BF) 1505.8 Building-integrated photovoltaic (BIPV) products. BIPV products installed as the roof covering shall be tested, listed and labeled for fire classification in accordance with Section 1505.1.

(BF) 1505.9 Rooftop mounted photovoltaic (PV) panel systems. Rooftop mounted photovoltaic (PV) panel systems shall be tested, listed and identified with a fire classification in accordance with UL 2703. Listed systems shall be installed in accordance with the manufacturer's installation instructions and their listing. The fire classification shall comply with Table 1505.1 based on the type of construction of the building.

(BF) 1505.10 Landscaped roofs. Landscaped roofs shall comply with Sections 1505.1 and 1507.15 and shall be installed in accordance with ANSI SPRI VF-1.

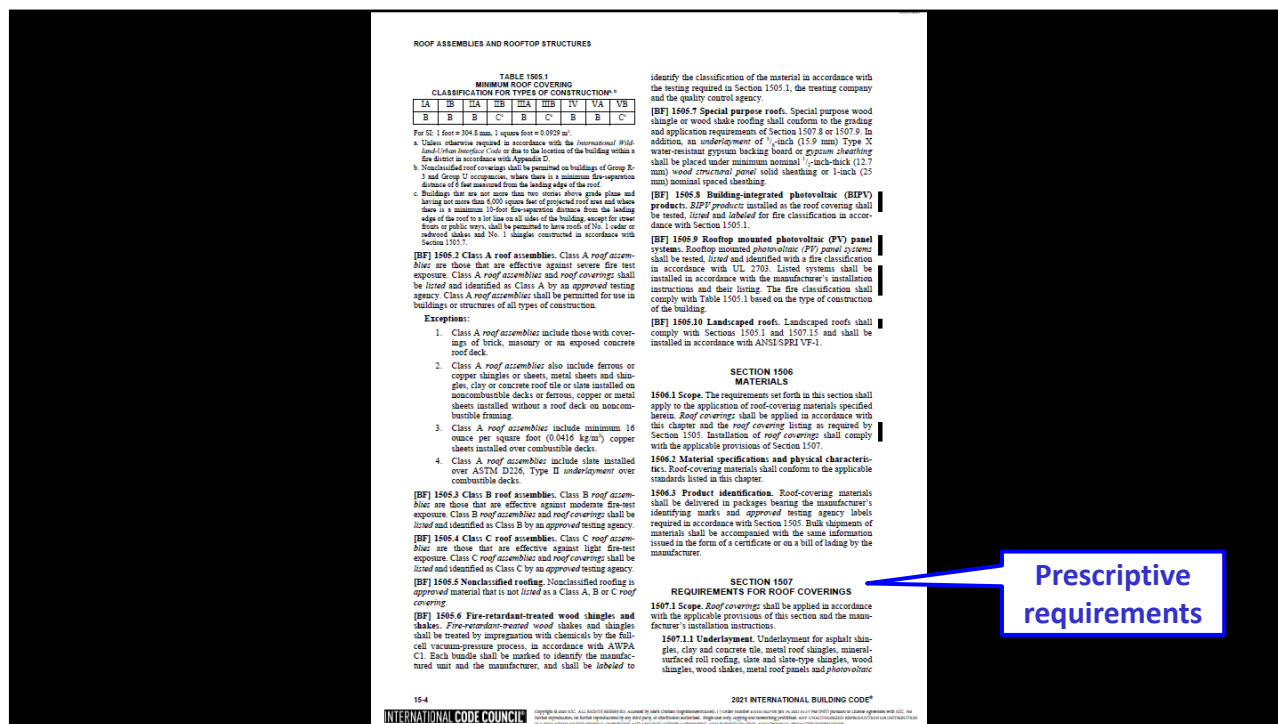
**SECTION 1506
MATERIALS**

1506.1 Scope. The requirements set forth in this section shall apply to the application of roof-covering materials specified herein. *Roof coverings* shall be applied in accordance with this chapter and the *roof covering* listing as required by Section 1505. Installation of *roof coverings* shall comply with the applicable provisions of Section 1507.

**SECTION 1507
REQUIREMENTS FOR ROOF COVERINGS**

1507.1 Scope. *Roof coverings* shall be applied in accordance with the applicable provisions of this section and the manufacturer's installation instructions.

1507.1.1 Underlayment. Underlayment for asphalt shingles, clay and concrete tile, metal roof shingles, mineral-surfaced roll roofing, stone and stone-type shingles, wood shingles, wood shakes, metal roof panels and photovoltaic



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Roof system types

Prescriptive requirement in Section 1507

- Asphalt shingles
- Clay and concrete tile
- Metal panels
- Metal shingles
- Mineral-surfaced roll roofing
- Slate shingles
- Wood shingles
- Wood shakes
- Built-up roofs
- Modified bitumen roofing
- Single-ply roofing
- Spray polyurethane foam
- Liquid-applied roofing
- Vegetative roofs, roof gardens and landscaped roofs
- Photovoltaic shingles
- Building-integrated photovoltaic roof panels

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1507.12 Single-ply roofing. The installation of single-ply roofing shall comply with the provisions of this section.

1507.12.1 Slope. Single-ply membrane roofs shall have a design slope of not less than 1/4 unit vertical in 12 units horizontal (2-percent slope) for drainage.

1507.12.2 Material standards. Single-ply roof coverings shall comply with the material standards in Table 1507.12.2.

TABLE 1507.12.2
SINGLE-PLY ROOFING MATERIAL STANDARDS

MATERIAL	MATERIAL STANDARD
Chlorosulfonated polyethylene (CSPE) or polyisobutylene (PIB)	ASTM D5019
Ethylene propylene diene monomer (EPDM)	ASTM D4637
Ketone Ethylene Ester (KEE)	ASTM D6754
Polyvinyl Chloride (PVC) or (PVC/KEE)	ASTM D4434
Thermoplastic polyolefin (TPO)	ASTM D6878

1507.12.3 Ballasted low-slope roofs. Ballasted low-slope roofs (roof slope < 2:12) shall be installed in accordance with this section and Section 1504.5. Stone used as ballast shall comply with ASTM D448 or ASTM D7655.

ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

1507.14.2 Material standards. Liquid-applied roofing shall comply with ASTM C836, ASTM C957 or ASTM D3468.

1507.15 Vegetative roofs and landscaped roofs. Vegetative roofs and landscaped roofs shall comply with the requirements of this chapter, Section 1607.14.2.2 and the International Fire Code.

[BF] 1507.16.3 Structural fire resistance. The structural frame and roof construction supporting the load imposed on the roof by the vegetative roof or landscaped roofs shall comply with the requirements of Table 601.

1507.16 Photovoltaic shingles. The installation of photovoltaic shingles shall comply with the provisions of this section.

1507.16.1 Deck requirements. Photovoltaic shingles shall be applied to a solid or closely fitted deck, except where the shingles are specifically designed to be applied over spaced sheathing.

1507.16.2 Deck slope. Photovoltaic shingles shall be installed on roof slopes of not less than 2 units vertical in 12 units horizontal (2:12).

1507.16.3 Underlayment. Underlayment shall comply with Section 1507.1.1.

1507.16.4 Ice barrier. Where required, ice barriers shall comply with Section 1507.1.2.

1507.16.5 Fasteners. Fasteners for photovoltaic shingles shall be galvanized, stainless steel, aluminum or copper roofing nails, minimum 12-gauge (0.105 inch (2.67 mm)) shank with a minimum 1/8-inch-diameter (9.5 mm) head, of a length to penetrate through the roofing materials and not less than 1/2 inch (19.1 mm) into the roof sheathing. Where the roof sheathing is less than 1/2 inch (19.1 mm) thick, the nails shall penetrate through the sheathing. Fasteners shall comply with ASTM F1667.

1507.16.6 Material standards. Photovoltaic shingles shall be listed and labeled in accordance with UL 7103 or with both UL 61796-1 and UL 61796-2.

1507.16.7 Attachment. Photovoltaic shingles shall be attached in accordance with the manufacturer's installation instructions.

1507.16.8 Wind resistance. Photovoltaic shingles shall comply with the classification requirements of Table 1504.2 for the appropriate maximum nominal design wind speed.

1507.17 Building-integrated photovoltaic roof panels. The installation of building-integrated photovoltaic (BIPV) roof panels shall comply with the provisions of this section.

1507.17.1 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.

1507.17.2 Deck slope. BIPV roof panels shall be used only on roof slopes of 2 units vertical in 12 units horizontal (2:12) or greater.

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1507.17.3 Underlayment. Underlayment shall comply with ASTM D226, ASTM D4899 or ASTM D6757.

1507.17.4 Underlayment application. Underlayment shall be applied chingle fashion, parallel to and starting from the eave, lapped 2 inches (51 mm) and fastened sufficiently to hold in place.

1507.17.4.1 High-wind attachment. Underlayment applied in areas subject to high winds (F_w greater than 110 mph (49 m/s) as determined in accordance with Section 1609.3.1) shall be applied in accordance with the manufacturer's instructions. Fasteners shall be applied along the overlap at not more than 16 inches (414 mm) on center. Underlayment installed where F_w is not less than 120 mph (54 m/s) shall comply with ASTM D226, Type III, ASTM D4899, Type IV or ASTM D6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. The underlayment shall be applied in accordance with Section 1507.1.1 except all laps shall be not less than 4 inches (102 mm). Underlayment shall be attached using cap nails or cap staples. Caps shall be metal or plastic with a nominal head diameter of not less than 1 inch (25.4 mm). Metal caps shall have a thickness of not less than 0.010 inch (0.25 mm). Power-driven metal caps shall have a thickness of not less than 0.010 inch (0.25 mm). Thickness of the outside edge of plastic caps shall be not less than 0.031 inch (0.89 mm). The cap nail shank shall be not less than 0.083 inch (2.11 mm) for ring shank cap nails and 0.091 inch (2.31 mm) for smooth shank cap nails. Single gage shall be not less than 21 gage (0.02 inch (0.81 mm)). Cap nail shank and cap single legs shall have a length sufficient to penetrate through the roof sheathing or not less than 1/2 inch (19.1 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D3070 shall be permitted.

1507.17.4.2 Ice barrier. In areas where there has been a history of ice forming along the eave causing a back-up of water, an ice barrier consisting of not fewer than two layers of underlayment fastened together or of a self-adhering polymer modified bitumen sheet shall be used instead of normal underlayment and extend from the lowest edge of all roof surfaces to a point not less than 24 inches (610 mm) inside the exterior wall line of the building.

Exception: Detached accessory structures that do not contain conditioned floor area.

1507.17.5 Material standards. BIPV roof panels shall be listed and labeled in accordance with UL 7103 or with both UL 61796-1 and UL 61796-2.

1507.17.6 Attachment. BIPV roof panels shall be attached in accordance with the manufacturer's installation instructions.

ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

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Exception: Detached accessory structures that do not contain conditioned floor area.

1507.17.5 Material standards. BIPV roof panels shall be listed and labeled in accordance with UL 7103 or with both UL 61796-1 and UL 61796-2.

1507.17.6 Attachment. BIPV roof panels shall be attached in accordance with the manufacturer's installation instructions.

SECTION 1508
ROOF INSULATION

[BF] 1508.1 General. The use of above-deck thermal insulation shall be permitted provided that such insulation is covered with an approved roof covering and passes the tests of NFPA 276 or UL 1256 when tested as an assembly.

Exceptions:

1. Foam plastic roof insulation shall conform to the material and installation requirements of Chapter 24.

2. Where a concrete or composite metal and concrete roof deck is used and the above-deck thermal insulation is covered with an approved roof covering.

[BF] 1508.2 Material standards. Above-deck thermal insulation board shall comply with the standards in Table 1508.2.

[BF] TABLE 1508.2
MATERIAL STANDARDS FOR ROOF INSULATION

Cellular glass board	ASTM C552
Composite boards	ASTM C1289, Type III, IV, V or VII
Expanded polystyrene	ASTM C578
Extruded polystyrene	ASTM C578
Fiber-reinforced gypsum board	ASTM C1278
Glass-faced gypsum board	ASTM C1177
High-density polyisocyanurate board	ASTM C1289, Type II, Class 4
Mineral fiber insulation board	ASTM C726
Perlite board	ASTM C728
Polyisocyanurate board	ASTM C1289, Type I or II
Wood fiberboard	ASTM C208, Type II

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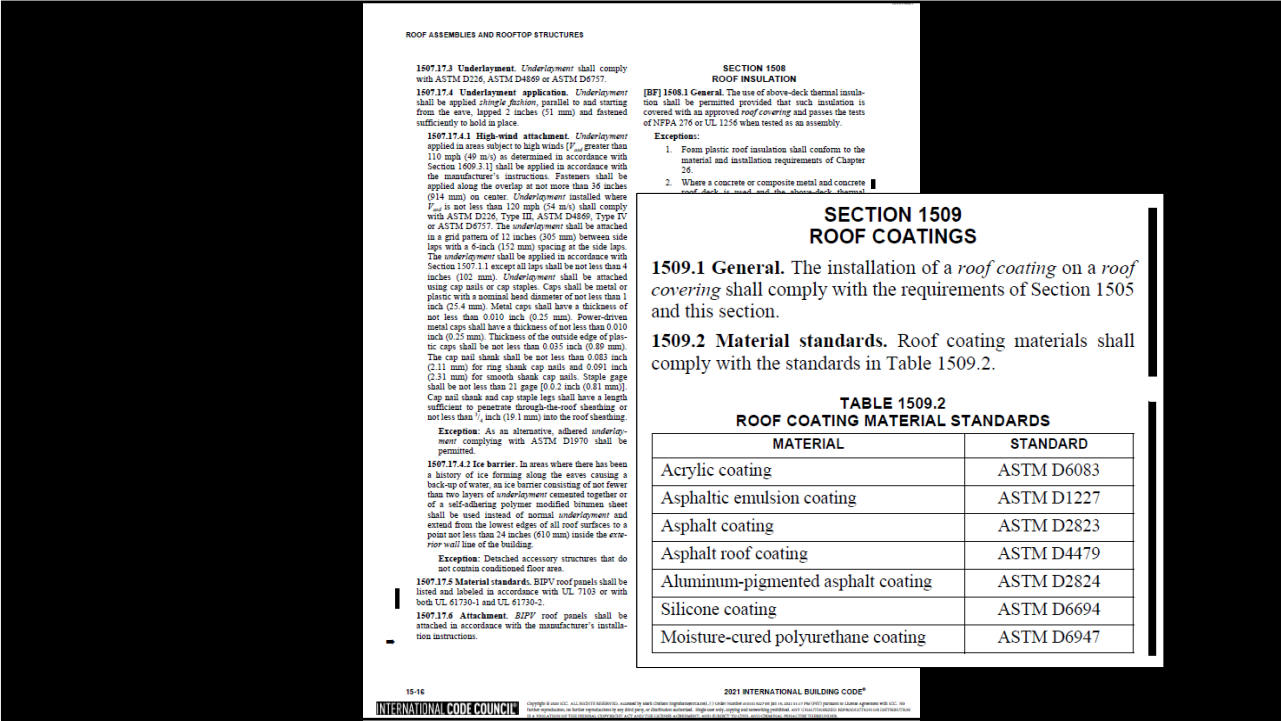
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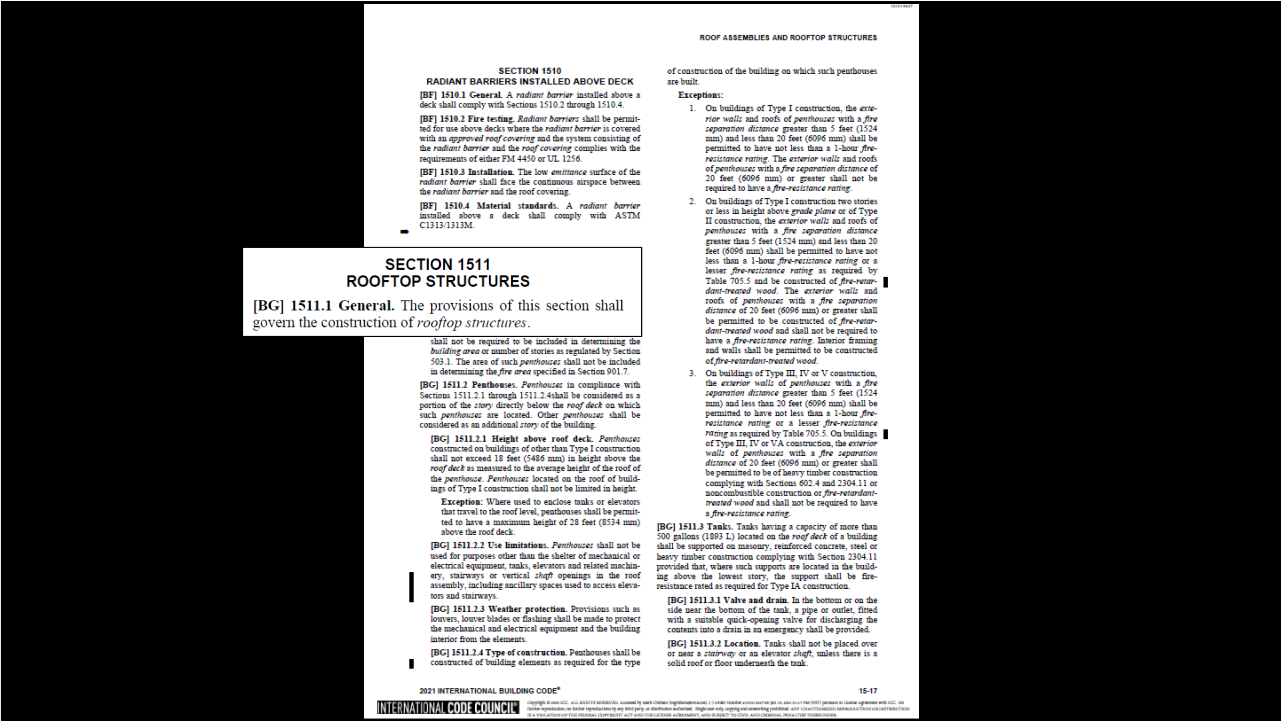
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Types of roof structures

IBC 2021, Section 1511-Roof Structures

- Penthouses
- Tanks
- Cooling towers
- Towers, spires, domes and cupolas
- Mechanical equipment screens
- Photovoltaic panels and modules
- Other rooftop structures:
 - Aerial supports
 - Dormers
 - Fences
 - Flagpoles

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ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

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.
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 for 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.

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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.

Continued...

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ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

3. The mechanical equipment screen shall be constructed of fire-retardant-treated wood complying with Section 2303.2 for exterior installation.

4. Where the fire exposure distance is not less than 10 feet (3048 mm), the mechanical equipment

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.

Section 1507 for roofs that provide positive roof drainage.

2. Recovering or replacing an existing roof covering shall not be required to meet the requirement for secondary (emergency overflow) drains or sumps in Section 1505.3 for roofs that provide for

Exceptions:

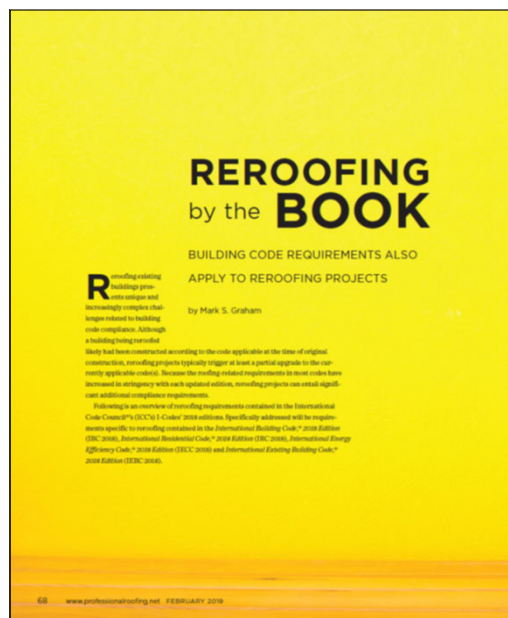
1. Roof replacement or roof recover of existing low-slope roof covering shall not be required to meet the minimum design slope requirement of 1/4" unit vertical in 12 units horizontal (2-percent slope) in
2. Where the existing roof covering is slate, clay, cement or asbestos-cement tile.
3. Where the existing roof has two or more applications of any type of roof covering.

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International Residential Code, 2021 Edition



- Applicable to one- and two-family dwellings and townhouses no more than three stories in height
- Roofing-related requirements:
 - Ch. 8-Roof/ceiling construction
 - Ch. 9-Roof assemblies

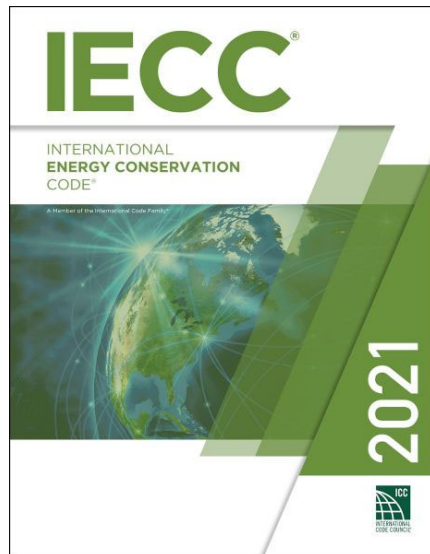
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Ch. 9-Roof assemblies

International Residential Code, 2021 Edition

- Ch. 9 closely mirrors IBC Ch. 15's requirements
- Except IRC only requires fire classified roof assemblies where:
 - Required by local ordinance
 - Roof edge is less than 3 ft. from the lot line

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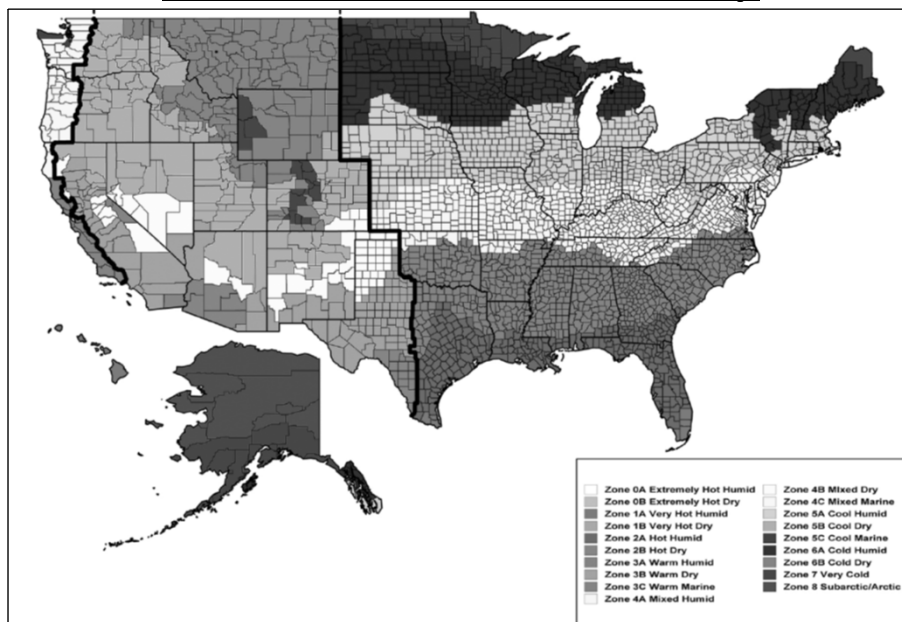


Roof requirements:

- R-value
- Roof reflectivity
- Air retarder

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2021 IECC – Climate zone map



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Alternative materials, design and methods of construction and equipment

- IBC 2021, Sec. 104.11
- IRC 2021, Sec. R104.11
- IECC 2021, Sec. C102 and Sec. R102
- IEBC 2021, Sec. 104.11
- IFC 2021, Sec. 104.9
- IPC 2021, Sec. 105.2

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RESEARCH+TECH

Consider alternatives
Code interpretations, modifications and alternatives provide some code compliance flexibility
by Mark S. Graham

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April 2019

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2021 International Energy Conservation Code (IECC)



2021 International Property Maintenance Code (IPMC)



2021 ICC Performance Code for Buildings and Facilities (ICCPC)

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