

CHAPTER 15

ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

SECTION 1501 GENERAL

1501.1 Scope. The provisions of this chapter shall govern the design, materials, construction and quality of roof assemblies, and rooftop structures.

Exception: Buildings and structures located within the high-velocity hurricane zone shall comply with the provisions of Section 1503.6 and Sections 1512 through 1525.

SECTION 1502 DEFINITIONS

1502.1 General. The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

BUILT-UP ROOF COVERING. Two or more layers of felt cemented together and surfaced with a cap sheet, mineral aggregate, smooth coating or similar surfacing material.

INTERLAYMENT. A layer of felt or nonbituminous saturated felt not less than 18 inches (457 mm) wide, shingled between each course of a wood-shake roof covering.

MECHANICAL EQUIPMENT SCREEN. A partially enclosed rooftop structure used to aesthetically conceal heating, ventilating and air conditioning (HVAC) electrical or mechanical equipment from view.

METAL ROOF PANEL. An interlocking metal sheet having a minimum installed weather exposure of 3 square feet (0.279 m²) per sheet.

METAL ROOF SHINGLE. An interlocking metal sheet having an installed weather exposure less than 3 square feet (0.279 m²) per sheet.

MODIFIED BITUMEN ROOF COVERING. One or more layers of polymer-modified asphalt sheets. The sheet materials shall be fully adhered or mechanically attached to the substrate or held in place with an approved ballast layer.

PENTHOUSE. An enclosed, unoccupied structure above the roof of a building, other than a tank, tower, spire, dome cupola or bulkhead, occupying not more than one-third of the roof area.

POSITIVE ROOF DRAINAGE. The drainage condition in which consideration has been made for all loading deflections of the roof deck, and additional slope has been provided to ensure drainage of the roof within 48 hours of precipitation.

REROOFING. The process of recovering or replacing an existing roof covering. See “Roof recover” and “Roof replacement.”

ROOF ASSEMBLY. A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly

includes the roof deck, vapor retarder, substrate or thermal barrier, insulation, vapor retarder and roof covering.

ROOF COVERING. The covering applied to the roof deck for weather resistance, fire classification or appearance.

ROOF COVERING SYSTEM. See “Roof assembly.”

ROOF DECK. The flat or sloped surface not including its supporting members or vertical supports.

ROOF RECOVER. The process of installing an additional roof covering over a prepared existing roof covering without removing the existing roof covering.

ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

ROOF REPLACEMENT. The process of removing the existing roof covering, repairing any damaged substrate and installing a new roof covering.

ROOF SECTION. A separation or division of a roof area by existing joints, parapet walls, flashing (excluding valleys), difference of elevation (excluding hips and ridges), roof type or legal description; not including the roof area required for a proper tie-off with an existing system.

ROOF VENTILATION. The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, attics, cathedral ceilings or other enclosed spaces over which a roof assembly is installed.

ROOFTOP STRUCTURE. An enclosed structure on or above the roof of any part of a building.

SCUPPER. An opening in a wall or parapet that allows water to drain from a roof.

SINGLE-PLY MEMBRANE. A roofing membrane that is field applied using one layer of membrane material (either homogeneous or composite) rather than multiple layers.

UNDERLAYMENT. One or more layers of felt, sheathing paper, nonbituminous saturated felt or other approved material over which a steep-slope roof covering is applied.

SECTION 1503 WEATHER PROTECTION

1503.1 General. Roof decks shall be covered with approved roof coverings secured to the building or structure in accordance with the provisions of this chapter. Roof coverings shall be designed, installed and maintained in accordance with this code and the approved manufacturer’s instructions such that the roof covering shall serve to protect the building or structure.

1503.2 Flashing. Flashing shall be installed in such a manner so as to prevent moisture 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.

Exception: Flashing is not required at hip and ridge junctions.

Where flashing is of metal, the metal shall be corrosion resistant with a thickness not less than provided in Table 1503.2.

**TABLE 1503.2
METAL FLASHING MATERIAL**

MATERIAL	MINIMUM THICKNESS (INCHES)	GAGE	WEIGHT (LBS PER SQ FT)
Copper			1 (16 oz)
Aluminum	0.024		
Stainless Steel		28	
Galvanized Steel	0.0179	26 (zinc coated G90)	
Aluminum Zinc Coated Steel	0.0179	26 (AZ50 Alum Zinc)	
Zinc Alloy	0.027		
Lead			2.5 (40 oz)
Painted Terne	----		1.25 (20 oz)

1503.3 Coping. Parapet walls shall be properly coped or sealed with noncombustible, weatherproof materials of a width no less than the thickness of the parapet wall. **Metal coping shall comply with ANSI/SPRI ES-1 or RAS 111.**

1503.4 Roof drainage. Unless roofs are sloped to drain over roof edges, design and installation of roof drainage systems shall comply with the *Florida Building Code, Plumbing Chapter 11*.

1503.4.1 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 a minimum of Schedule 40 plastic pipe.

1503.4.2 Scupper. Where required for roof drainage, a scupper shall be placed level with the roof surface in a wall or parapet. The scupper shall be located as determined by the slope and the contributing area of the roof. The exterior facing or lining of a scupper, if metal, shall be the same as flashing material required by Sections 1503 through 1510 for the particular type of covering specified for the building. For other type materials, follow manufacturer’s specifications.

1503.4.3 Overflow scuppers. When other means of drainage of overflow water is not provided, overflow scuppers shall be placed in walls or parapets not less than 2 inches (51 mm) nor more than 4 inches (102 mm) above the finished roof covering and shall be located as close as practical to required vertical leaders or downspouts or wall and parapet scuppers. An overflow scupper shall be sized in accordance with the *Florida Building Code, Plumbing*.

1503.5 Roof ventilation. Attic ventilation shall be provided in accordance with Section 1203.2 and the manufacturer’s installation instructions.

1503.6 Protection against decay and termites. Condensate lines and roof downspouts shall discharge at least 1 foot (305 mm) away from the structure sidewall, whether by underground piping, tail extensions, or splash blocks. Gutters with downspouts are required on all buildings with eaves of less than 6 inches (152 mm) horizontal projection except for gable end rakes or on a roof above another roof.

**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.

1504.1.1 Wind resistance of asphalt shingles. Asphalt shingles shall be designed for wind speeds in accordance with Section 1507.2.10.

1504.2 Wind resistance of clay and concrete tile. Clay and concrete tile roof coverings shall be connected to the roof deck in accordance with Chapter 16.

1504.2.1 Alternative test method. Testing the acceptability of special fastening methods using the methodology in this section is permitted. The wind-induced uplift force on the shingle shall be determined using the method in UL 2390. The resistance of the shingle to the uplift force shall be determined using ASTM D 6381. Shingles passing this test shall be considered suitable for roofs located where the basic wind speed per Figure 1609 is as given in Table 1504.2.1.

Classification requires that the resistance of the shingle to wind uplift, measured using the method in ASTM D 6381, exceed the calculated load imposed by wind in the applicable zone as determined using UL 2390.

Classification by this method applies to buildings less than 60 feet (18 288 mm) high and with Wind Exposures B and C only in an Occupancy Category of I or II. Wrappers of shingle bundles that have been qualified using this alternative method shall be labeled with the tested wind classification and reference UL 2390/ASTM D 6381.

**TABLE 1504.2.1
ROOF COVERING CLASSIFICATION
USING ALTERNATIVE METHOD**

MAXIMUM BASIC WIND SPEED (mph)	ASTM D 6381 CLASSIFICATION
90	Class D
120	Class G
150	Class H

For SI: 1 mile per hour = 0.447m/s.

1504.3 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 cladding in Chapter 16.

1504.3.1 Other roof systems. Roof systems with built-up, modified bitumen, fully adhered or mechanically attached single-ply through fastened metal panel roof systems, and other types of membrane roof coverings shall also be tested in accordance with FM 4450, FM 4470, UL 580 or UL 1897.

1504.3.2 Metal panel roof systems. Metal panel roof systems through fastened or standing seam shall be tested in accordance with UL 580 or ASTM E 1592 or TAS 125..

Exception: Metal roofs constructed of cold-formed steel, where the roof deck acts as the roof covering and provides both weather protection and support for structural loads, shall be permitted to be designed and tested in accordance with the applicable referenced structural design standard in Section 2209.1.

1504.4 Ballasted low-slope roof systems. Ballasted low-slope (roof slope < 2:12) single-ply roof system coverings installed in accordance with Section 1507 shall be designed in accordance with Section 1504.8 and ANSI/SPRI RP-4.

1504.5 Edge securement for low-slope roofs. Low-slope membrane roof systems metal edge securement, except gutters, installed in accordance with Section 1507, shall be designed in accordance with ANSI/SPRI ES-1 or RAS 111 except the basic wind speed shall be determined from Figure 1609.

1504.6 Physical properties. Roof coverings installed on low-slope roofs (roof slope < 2:12) in accordance with Section 1507 shall demonstrate physical integrity over the working life of the roof based upon 2,000 hours of exposure to accelerated weathering tests conducted in accordance with ASTM G 152, ASTM G 153, ASTM G 155 or ASTM G 154. Those roof coverings that are subject to cyclical flexural response due to wind loads shall not demonstrate any significant loss of tensile strength for unreinforced membranes or breaking strength for reinforced membranes when tested as herein required.

1504.7 Impact resistance. Roof coverings installed on low-slope roofs (roof slope < 2:12) in accordance with Section 1507 shall resist impact damage based on the results of tests conducted in accordance with ASTM D 3746, ASTM D 4272, CGSB 37-GP-52M or the “Resistance to Foot Traffic Test” in Section 5.5 of FM 4470. All structural metal roofing systems having a thickness equal to or greater than 22 gage and, all non-structural metal roof systems having a thickness equal to or greater than 26 gage shall be exempt from the tests listed above.

1504.8 Gravel and stone. Gravel or stone shall not be used on the roof of a building located in a hurricane-prone region as defined in Section 1609.2, or on any other building with a mean roof height exceeding that permitted by Table 1504.8 based on the exposure category and basic wind speed at the building site.

**TABLE 1504.8
MAXIMUM ALLOWABLE MEAN ROOF HEIGHT PERMITTED FOR BUILDINGS WITH GRAVEL OR STONE ON THE ROOF IN AREAS OUTSIDE A HURRICANE-PRONE REGION**

BASIC WIND SPEED FROM FIGURE 1609 (mph) ^b	MAXIMUM MEAN ROOF HEIGHT (ft) ^{a,c}		
	Exposure category		
	B	C	D
85	170	60	30

90	110	35	15
95	75	20	NP
100	55	15	NP
105	40	NP	NP
110	30	NP	NP
115	20	NP	NP
120	15	NP	NP
Greater than 120	NP	NP	NP

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

- a. Mean roof height in accordance with Section 1609.2.
- b. For intermediate values of basic wind speed, the height associated with the next higher value of wind speed shall be used, or direct interpolation is permitted.
- c. NP = gravel and stone not permitted for any roof height.

1504.9 Margin of Safety. A margin of safety of 2:1 shall be applied to all wind uplift resistance test results except when a margin of safety is specified in the test standard.

**SECTION 1505
FIRE CLASSIFICATION**

1505.1 General. Roof assemblies shall be divided into the classes defined below. Class A, B and C roof assemblies and roof coverings required to be listed by this section shall be tested in accordance with ASTM E 108 or UL 790. In addition, fire-retardant-treated wood roof coverings shall be tested in accordance with ASTM D 2898. The 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.

**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 in height 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.

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.

Exception: Class A roof assemblies include those with coverings of brick, masonry, slate, clay or concrete roof tile, exposed concrete roof deck, ferrous or copper shingles or panels.

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

Exception: Class B roof assemblies include those with coverings of metal sheets and shingles.

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

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

1505.6 Fire-retardant-treated wood shingles and shakes. Fire-retardant-treated wood shakes and shingles 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 manufactured unit and the manufacturer, and shall also be labeled to identify the classification of the material in accordance with the testing required in Section 1505.1, the treating company and the quality control agency.

1505.7 Special purpose roofs. *Reserved.*

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 manufacturer's installation instructions. Installation of roof coverings shall comply with the applicable provisions of Section 1507.

1506.2 Compatibility of materials. Roofs and roof coverings shall be of materials that are compatible with each other and with the building or structure to which the materials are applied.

1506.3 Material specifications and physical characteristics. Roof-covering materials shall conform to the applicable standards listed in this chapter. In the absence of applicable standards or where materials are of questionable suitability, testing by an approved agency shall be required by the building official to determine the character, quality and limitations of application of the materials.

1506.4 Product identification. Roof-covering materials shall be delivered in packages bearing the manufacturer's identifying marks and approved testing agency labels required in accordance with Section 1505. Bulk shipments of materials shall be accompanied with the same information issued in the form of a certificate or on a bill of lading by the manufacturer.

1506.5 Nails. Nails shall be corrosion resistant nails conforming to ASTM F 1667. The corrosion resistance shall meet ASTM A 641, Class 1 or an equal corrosion resistance by coating, electro galvanization, mechanical galvanization, hot dipped galvanization, stainless steel, nonferrous metal and alloys or other suitable corrosion resistant material.

1506.6 Screws. Wood screws conform to ANSI/ASME B 18.6.1. Screws shall be corrosion resistant by coating, galvanization, stainless steel, nonferrous metal or other suitable corrosion resistant material. The corrosion resistance shall be demonstrated through one of the following methods:

1. Corrosion resistance equivalent to ASTM A 641, Class 1. or
2. Corrosion resistance in accordance with TAS114, Appendix E. or
3. Corrosion resistant coating exhibiting not more than 5% red rust after 1000 hours exposure in accordance with ASTM B 117.

1506.7 Clips. Clips shall be corrosion resistant clips. The corrosion resistance shall meet 0.90 oz per sq ft (0.458 kg/m²) measured according to ASTM A 90/A 90M, *TAS 114 Appendix E* or an equal corrosion resistance coating, electro galvanization, mechanical galvanization, hot dipped galvanization, stainless steel, nonferrous metals and alloys or other suitable corrosion resistant material. Stainless steel clips shall conform to ASTM A 167, Type 304.

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.

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

Table 1507.2 Asphalt Shingle Application. *Reserved.*

➔ **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) up to four units vertical in 12 units horizontal (33-percent slope), double underlayment application is required in accordance with Section 1507.2.8.

1507.2.3 Underlayment. Unless otherwise noted, required underlayment shall conform to ASTM D 226, Type I or Type II, or ASTM D 4869 Type I or Type II.

1507.2.4 Self-adhering polymer modified bitumen sheet. Self-adhering polymer modified bitumen sheet shall comply with ASTM D 1970.

1507.2.5 Asphalt shingles. Asphalt shingles shall have self-seal strips or be interlocking and comply with ASTM D

225 or ASTM D 3462. Shingles shall also comply with Table 1507.2.10. Asphalt shingle packaging shall bear labeling indicating compliance with ASTM D 3161 or a listing by an approved testing agency in accordance with the requirements of Section 1609.5.2.

1507.2.6 Fasteners. Fasteners for asphalt shingles shall be galvanized, stainless steel, aluminum or copper roofing nails, minimum 12 gage [0.105 inch (2.67 mm)] shank with a minimum 0.375 inch-diameter (9.5 mm) head, of a length to penetrate through the roofing materials and a minimum of 0.75 inch (19.1 mm) into the roof sheathing. Where the roof sheathing is less than 0.75 inch (19.1 mm) thick, the nails shall penetrate through the sheathing. Fasteners shall comply with ASTM F 1667.

1507.2.6.1 The nail component of plastic cap nails shall meet the corrosion resistance requirements of 1507.2.6.

1507.2.7 Attachment. Asphalt shingles shall have the minimum number of fasteners required by the manufacturer, but not less than four fasteners per strip shingle or two fasteners per individual shingle. Where the roof slope, exceeds 21 units vertical in 12 units horizontal (21:12), shingles shall be installed as required by the manufacturer.

1507.2.8 Underlayment application. For roof slopes from two units vertical in 12 units horizontal (17-percent slope) and up to four units vertical in 12 units horizontal (33-percent slope), underlayment shall be two layers applied in the following manner. Apply a minimum 19-inch-wide (483 mm) strip of underlayment felt parallel with and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply 36-inch-wide (914 mm) sheets of underlayment overlapping successive sheets 19 inches (483 mm), by fastened sufficiently to hold in place. 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 (33-percent slope) or greater, underlayment shall be one layer applied in the following manner. Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches (51 mm), fastened sufficiently to hold in place. Distortions in the underlayment shall not interfere with the ability of the shingles to seal.

1507.2.8.1 High wind attachment. Underlayment applied in areas subject to high winds (greater than 110 mph in accordance with Figure 1609) shall be applied with corrosion-resistant fasteners in accordance with the manufacturer's instructions. Fasteners are to be applied along the overlap at a maximum spacing of 36 inches (914 mm) on center.

1507.2.8.2 Ice dam membrane. Reserved.

1507.2.9 Flashings. Flashing for asphalt shingles shall comply with this section. Flashing shall be applied in accordance with this section and the asphalt shingle manufacturer's printed instructions.

1507.2.9.1 Base and counter flashing. Base and counter flashing shall be installed as follows:

1. In accordance with manufacturer's installation instructions, or

2. A continuous metal "L" flashing shall be set in approved flashing cement and set flush to base of wall and over the underlayment. Both horizontal and vertical metal flanges shall be fastened 6 inches (152 mm) on center with approved fasteners. All laps shall be a minimum of 4 inches (102 mm) fully sealed in approved flashing cement. Flashing shall start at the lower portion of roof to insure water-shedding capabilities of all metal laps. The entire edge of the horizontal flange shall be sealed covering all nail penetrations with approved flashing cement and membrane. Shingles will overlap the horizontal flange and shall be set in approved flashing cement.

Base flashing shall be of either corrosion resistant metal with a minimum thickness provided in Table 1503.2 or mineral surface roll roofing weighing a minimum of 77 pounds per 100 square feet (3.76 kg/m²). Counter flashing shall be corrosion resistant metal with a minimum thickness provided in Table 1503.2.

1507.2.9.2 Valleys. Valley linings shall be installed in accordance with the manufacturer's instructions before applying shingles. Valley linings of the following types shall be permitted:

1. For open valleys lined with metal, the valley lining shall be at least 16 inches (406 mm) wide and of any of the corrosion-resistant metals in Table 1503.2.
2. For open valleys, valley lining of two plies of mineral-surfaced roll roofing complying with ASTM D 6380 Class M or ASTM D 3909 shall be permitted. The bottom layer shall be 18 inches (457 mm) and the top layer a minimum of 36 inches (914 mm) wide.
3. For closed valleys, valley lining of one ply of smooth roll roofing complying with ASTM D 6380 Class S and at least 36 inches (914 mm) wide or types as described in Items 1 or 2 above shall be permitted. Specialty underlayment complying with ASTM D 1970 may be used in lieu of the lining material.

Table 1507.2.9.2 Valley Lining Material. Reserved.

1507.2.9.3 Drip edge. Provide drip edge at eaves and gables of shingle roofs. Overlap to be a minimum of 2 inches (51 mm). Eave drip edges shall extend ½ inch (13 mm) below sheathing and extend back on the roof a minimum of 2 inches (51 mm). Drip edge at eaves shall be permitted to be installed either over or under the underlayment. If installed over the underlayment, there shall be a minimum 4 inches (51 mm) width of roof cement installed over the drip edge flange. Drip edge shall be mechanically fastened a maximum of 12 inches (305 mm) on center. Where the basic wind speed per Figure 1609 is 110 mph (177 km/h) or greater or the mean roof height exceeds 33 feet (10 058 mm), drip edges shall be mechanically fastened a maximum of 4 inches (102 mm) on center.

1507.2.9.4 Crickets or 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. Cricket or saddle coverings shall be sheet metal or of the same material as the roof covering.

Exception: Any penetration that allows water to flow around it shall not require a cricket or saddle.

1507.2.10 Wind Resistance of Asphalt Shingles. Asphalt Shingles shall be classified in accordance with ASTM D3161, TAS 107 or ASTM D7158 to resist the basic wind speed per Figure 1609. Shingles classified as ASTM D 3161 Class D or ASTM D 7158 Class G are acceptable for use in the 100-mph wind zone. Shingles classified as ASTM D3161 Class F, TAS107 or ASTM D 7158 Class H are acceptable for use in all wind zones. Asphalt shingle wrappers shall indicate compliance with one of the required classifications as shown in Table 1507.2.10.

TABLE 1507.2.10
WIND RESISTANCE OF ASPHALT SHINGLES

MAXIMUM BASIC WIND SPEED MPH (per Figure R301.2(4) 1609)	CLASSIFICATION
100	ASTM D3161 Class D or ASTM D 7158 Class G or TAS 107
110	ASTM D3161 Class F or ASTM D 7158 Class G or TAS 107
120	ASTM D3161 Class F or ASTM D 7158 Class G or TAS 107
130	ASTM D3161 Class F or ASTM D 7158 Class H or TAS 107
140	ASTM D3161 Class F or ASTM D 7158 Class H or TAS 107
150	ASTM D3161 Class F or ASTM D 7158 Class H or TAS 107

1507.3 Clay and concrete tile. The installation of clay and concrete tile shall comply with the provisions of this section.

1507.3.1 Deck requirements. Concrete and clay tile shall be installed only over solid sheathing **except where the roof covering is specifically designed and tested in accordance with Section 1609.7.2 to be applied over structural spaced sheathing boards.**

1507.3.2 Deck slope. Clay and concrete roof tile shall be installed in accordance with the recommendations of FRSA/RTI 07320.

1507.3.3 Underlayment. Unless otherwise noted, required underlayment shall conform to: ASTM D 226, Type II; ASTM D 2626; ASTM D 1970 or ASTM D 6380 mineral-surfaced roll roofing. Underlayment shall be applied according to the tile manufacturer’s installation instructions or the recommendations of the FRSA/TRI 07320.

1507.3.3.1 Slope and underlayment requirements. Refer to FRSA/TRI manual for underlayment and slope requirements for specific roof tile systems.

1507.3.3.2 High-slope roofs. Reserved.

1507.3.4 Clay tile. Clay roof tile shall comply with ASTM C 1167.

1507.3.5 Concrete tile. Concrete roof tile shall comply with ASTM C 1492.

1507.3.6 Fasteners. Tile fasteners shall be corrosion resistant and not less than 11 gage, 5/16-inch (8.0 mm) head, and of sufficient length to penetrate the deck a minimum of 0.75 inch (19.1 mm) or through the thickness of the deck, whichever is less or in accordance with the FRSA/TRI 07320 manual. Attaching wire for clay or concrete tile shall not be smaller than 0.083 inch (2.1 mm).

1507.3.7 Attachment. Clay and concrete roof tiles shall be fastened in accordance with Section 1609 or in accordance with FRSA/TRI 07320 Installation Manual.

1507.3.8 Application. Tile shall be applied according to the manufacturer’s installation instructions or recommendations of the FRSA/TRI 07320.

1507.3.9 Flashing. At the juncture of the roof vertical surfaces, flashing and counterflashing shall be provided in accordance with the manufacturer’s installation instructions or the recommendations of the FRSA/TRI 07320 Manual.

1507.4 Metal roof panels. The installation of metal roof panels shall comply with the provisions of this section.

1507.4.1 Deck requirements. Metal roof panel roof coverings shall be applied to a solid or closely fitted deck, except where the roof covering is specifically designed to be applied to spaced supports.

1507.4.2 Deck slope. Minimum slopes for metal roof panels shall comply with the following:

1. The minimum slope for lapped, nonsoldered seam metal roofs without applied lap sealant shall be three units vertical in 12 units horizontal (25-percent slope).
2. The minimum slope for lapped, nonsoldered seam metal roofs with applied lap sealant shall be one-half unit vertical in 12 units horizontal (4-percent slope). Lap sealants shall be applied in accordance with the approved manufacturer’s installation instructions.
3. The minimum slope for standing seam of roof systems shall be one-quarter unit vertical in 12 units horizontal (2-percent slope).

1507.4.3 Material standards. Metal-sheet roof covering systems that incorporate supporting structural members shall be designed in accordance with Chapter 22. Metal-sheet roof coverings installed over structural decking shall comply with Table 1507.4.3(1). **The materials used for metal-sheet roof coverings shall be naturally corrosion resistant or provided with corrosion resistance in accordance with the standards and minimum thicknesses shown in Table 1507.4.3(2).**

TABLE 1507.4.3(2)
MINIMUM CORROSION RESISTANCE

**TABLE 1507.4.3(1)
METAL ROOF COVERINGS**

ROOF COVERING TYPE	STANDARD	STANDARD APPLICATION RATE/THICKNESS
Aluminum	ASTM B 209	0.024 inch minimum thickness for roll-formed panels and 0.019 inch minimum thickness for press-formed shingles.
Aluminum-zinc coated steel	ASTM A 792	0.013 inch minimum thickness, AZ 50 (coated minimum application rate)
Cold-rolled copper	ASTM B 370	Minimum 16 oz./sq. ft. and 12 oz./sq. ft. high yield copper for metal-sheet roof covering systems; 12 oz./sq. ft. for preformed metal shingle systems.
Copper	ASTM B 370	16 oz./sq. ft. for metal-sheet roof-covering systems; 12 oz./sq. ft. for preformed metal shingle systems.
Galvanized steel	ASTM A 653	0.013 inch minimum thickness, G-90 zinc-coated ^a .
Hard lead		2 lbs./sq. ft.
Lead-coated copper	ASTM B 101	
Prepainted steel	ASTM A 755	
Soft lead		3 lbs./sq. ft.
Stainless steel	ASTM A 240	300 Series Alloys
Steel	ASTM A 924	
Terne and terne-coated stainless		Terne coating of 40 lbs. per double base box, field painted where applicable in accordance with manufacturer's installation instructions.
Zinc		0.027 inch minimum thickness; 99.995% electrolytic high grade zinc with alloy additives of copper (0.08% - 0.20%), titanium (0.07% - 0.12%) and aluminum (0.015%).

For SI: 1 ounce per square foot = 0.0026 kg/m²,
1 pound per square foot = 4.882 kg/m²,
1 inch = 25.4 mm, 1 pound = 0.454 kg.

a. For Group U buildings, the minimum coating thickness for ASTM A 653 galvanized steel roofing shall be G-60.

55% Aluminum-Zinc Alloy Coated Steel	ASTM A 792 AZ 50
5% Aluminum Alloy-coated steel	ASTM A875 GF60
Aluminum-coated steel	ASTM A463 T2 65
Galvanized Steel	ASTM A 653 G-90
Prepainted Steel	ASTM A 755 ^a

a. Paint systems in accordance with ASTM A 755 shall be applied over steel products with corrosion resistant coatings complying with ASTM A 792, ASTM A 875, ASTM A 463, or ASTM A 653.

1507.4.4 Attachment. Metal roof panels shall be secured to the supports in accordance with the approved manufacturer's fasteners. In the absence of manufacturer recommendations, the following fasteners shall be used:

- Galvanized fasteners shall be used for steel roofs.
- 300 series stainless-steel fasteners shall be used for copper roofs.

3. Aluminum-zinc coated fasteners are acceptable for aluminum-zinc coated roofs.

4. Stainless-steel fasteners are acceptable for all types of metal roofs.

1507.4.5 Underlayment. Underlayment shall be installed as per manufacturer's installation guidelines.

1507.5 Metal roof shingles. The installation of metal roof shingles shall comply with the provisions of this section.

1507.5.1 Deck requirements. Metal roof shingles shall be applied to a solid or closely fitted deck, except where the roof covering is specifically designed to be applied to spaced sheathing.

1507.5.2 Deck slope. Metal roof shingles shall not be installed on roof slopes below three units vertical in 12 units horizontal (25-percent slope).

1507.5.2.1 Underlayment shall be installed as per manufacturer's installation guidelines.

1507.5.3 Underlayment. Underlayment shall comply with ASTM D226, Type I or Type II or ASTM D 1970 or ASTM D 4869.

1507.5.4 Material standards. Metal roof shingle roof coverings shall comply with Table 1507.4.3(1). The materials used for metal-roof shingle roof coverings shall be naturally corrosion resistant or provided with corrosion resistance in accordance with the standards and minimum thicknesses specified in the standards listed in Table 1507.4.3(2).

1507.5.5 Attachment. Metal roof shingles shall be secured to the roof in accordance with the approved manufacturer’s installation instructions.

1507.5.6 Flashing. Roof valley flashing shall be of corrosion-resistant metal of the same material as the roof covering or shall comply with the standards in Table 1507.4.3. The valley flashing shall extend at least 8 inches (203 mm) from the centerline each way and shall have a splash diverter rib not less than 0.75 inch (19.1 mm) high at the flow line formed as part of the flashing. Sections of flashing shall have an end lap of not less than 4 inches (102 mm).

1507.6 Mineral-surfaced roll roofing. The installation of mineral-surfaced roll roofing shall comply with this section.

1507.6.1 Deck requirements. Mineral-surfaced roll roofing shall be fastened to solidly sheathed roofs.

1507.6.2 Deck slope. Mineral-surfaced roll roofing shall not be applied on roof slopes below one unit vertical in 12 units horizontal (8-percent slope).

1507.6.3 Underlayment. Underlayment shall comply with ASTM D 226, Type I or Type II or ASTM D 1970 or ASTM D 4869.

1507.6.4 Material standards. Mineral-surfaced roll roofing shall conform to ASTM D 6380 Class M or Class WS or ASTM D 3909.

1507.7 Slate shingles. The installation of slate shingles shall comply with the provisions of this section.

1507.7.1 Deck requirements. Slate shingles shall be fastened to solidly sheathed roofs.

1507.7.2 Deck slope. Slate shingles shall only be used on slopes of four units vertical in 12 units horizontal (4:12) or greater.

1507.7.3 Underlayment. Underlayment shall comply with ASTM D 226, Type II or ASTM D 4869.

1507.7.4 Material standards. Slate shingles shall comply with ASTM C 406.

1507.7.5 Application. Minimum headlap for slate shingles shall be in accordance with Table 1507.7.5. Slate shingles shall be secured to the roof with two fasteners per slate.

**TABLE 1507.7.5
SLATE SHINGLE HEADLAP**

SLOPE	HEADLAP (inches)
4:12 < slope < 8:12	4
8:12 < slope < 20:12	3

slope ≥ 20:12	2
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For SI: 1 inch = 25.4 mm.

1507.7.6 Flashing. Flashing and counter flashing shall be made with sheet metal. Valley flashing shall be a minimum of 16 inches (381 mm) wide. Valley and flashing metal shall be a minimum thickness provided in Table 1503.2 nonferrous metal or stainless steel.

1507.8 Wood shingles. The installation of wood shingles shall comply with the provisions of this section and Table 1507.8.

1507.8.1 Deck requirements. Wood shingles shall be installed on solid or spaced sheathing. Where spaced sheathing is used, sheathing boards shall not be less than 1-inch by 4-inch (25 mm by 102 mm) nominal dimensions and shall be spaced on centers equal to the weather exposure to coincide with the placement of fasteners.

1507.8.1.1 Solid sheathing required. Reserved.

1507.8.2 Deck slope. Wood shingles shall be installed on slopes of three units vertical in 12 units horizontal (25-percent slope) or greater.

1507.8.3 Underlayment. Underlayment shall comply with ASTM D 226, Type I or ASTM D 4869.

1507.8.4 Material standards. Wood shingles shall be of naturally durable wood and comply with the requirements of Table 1507.8.4.

**TABLE 1507.8.4
WOOD SHINGLE MATERIAL REQUIREMENTS**

MATERIAL	APPLICABLE MINIMUM GRADES	GRADING RULES
Wood shingles of naturally durable wood	1, 2 or 3	CSSB

CSSB = Cedar Shake and Shingle Bureau

1507.8.5 Attachment. Fasteners for wood shingles shall be corrosion resistant with a minimum penetration of 0.75 inch (19.1 mm) into the sheathing. For sheathing less than 0.5 inch (12.7 mm) in thickness, the fasteners shall extend through the sheathing. Each shingle shall be attached with a minimum of two fasteners.

1507.8.6 Application. Wood shingles shall be laid with a side lap not less than 1.5 inches (38 mm) between joints in adjacent courses, and not be in direct alignment in alternate courses. Spacing between shingles shall be 0.25 to 0.375 inches (6.4 to 9.5 mm). Weather exposure for wood shingles shall not exceed that set in Table 1507.8.6.

**TABLE 1507.8.6
WOOD SHINGLE WEATHER EXPOSURE AND ROOF SLOPE**

ROOFING MATERIAL	LENGTH (inches)	GRADE	EXPOSURE (inches)	
			3:12 pitch to < 4:12	4:12 pitch or steeper

Shingles of naturally durable wood	16	No. 1	3.75	5
		No. 2	3.5	4
		No. 3	3	3.5
	18	No. 1	4.25	5.5
		No. 2	4	4.5
		No. 3	3.5	4
	24	No. 1	5.75	7.5
		No. 2	5.5	6.5
		No. 3	5	5.5

For SI: 1 inch = 25.4 mm.

1507.8.7 Flashing. At the juncture of the roof and vertical surfaces, flashing and counterflashing shall be provided in accordance with the manufacturer’s installation instructions, and where of metal, shall not be less than 0.019-inch (0.48 mm) (No. 26 galvanized sheet gage) corrosion-resistant metal. The valley flashing shall extend at least 11 inches (279 mm) from the centerline each way and have a splash diverter rib not less than 1 inch (25 mm) high at the flow line formed as part of the flashing. Sections of flashing shall have an end lap of not less than 4 inches (102 mm). For roof slopes of three units vertical in 12 units horizontal (25-percent slope) and over, the valley flashing shall have a 36-inch-wide (914 mm) underlayment of one layer of Type I underlayment running the full length of the valley, in addition to other required **underlayment**.

1507.9 Wood shakes. The installation of wood shakes shall comply with the provisions of this section and Table 1507.8.

1507.9.1 Deck requirements. Wood shakes shall only be used on solid or spaced sheathing. Where spaced sheathing is used, sheathing boards shall not be less than 1-inch by 4-inch (25 mm by 102 mm) nominal dimensions and shall be spaced on centers equal to the weather exposure to coincide with the placement of fasteners. Where 1-inch by 4-inch (25 mm by 102 mm) spaced sheathing is installed at 10 inches (254 mm) o.c., additional 1-inch by 4-inch (25 mm by 102 mm) boards shall be installed between the sheathing boards.

1507.9.1.1 Solid sheathing required. Reserved.

1507.9.2 Deck slope. Wood shakes shall only be used on slopes of **three** units vertical in 12 units horizontal (33-percent slope) or greater.

1507.9.3 Underlayment. Underlayment shall comply with ASTM D 226, Type I or **ASTM D 4869**.

1507.9.4 Interlayment. Interlayment shall comply with ASTM D 226, Type I.

1507.9.5 Material standards. Wood shakes shall comply with the requirements of Table 1507.9.5.

**TABLE 1507.9.5
WOOD SHAKE MATERIAL REQUIREMENTS**

MATERIAL	MINIMUM GRADES	APPLICABLE GRADING RULES
Wood shakes of naturally durable wood	1	CSSB
Taper sawn shakes of naturally durable wood	1 or 2	CSSB
Preservative-treated shakes and shingles of naturally durable wood	1	CSSB

Fire-retardant-treated shakes and shingles of naturally durable wood	1	CSSB
Preservative-treated taper sawn shakes of Southern pine treated in accordance with AWWA U1 (Commodity Specification A, Use Category 3B and Section 5.6)	1 or 2	TFS

CSSB = Cedar Shake and Shingle Bureau.

TFS = Forest Products Laboratory of the Texas Forest Services.

1507.9.6 Attachment. Fasteners for wood shakes shall be corrosion resistant with a minimum penetration of 0.75 inch (19.1 mm) into the sheathing. For sheathing less than 0.5 inch (12.7 mm) in thickness, the fasteners shall extend through the sheathing. Each shake shall be attached with a minimum of two fasteners.

1507.9.7 Application. Wood shakes shall be laid with a side lap not less than 1.5 inches (38 mm) between joints in adjacent courses. Spacing between shakes in the same course shall be 0.375 to 0.625 inches (9.5 to 15.9 mm) for shakes and taper sawn shakes of naturally durable wood and shall be 0.25 to 0.375 inch (6.4 to 9.5 mm) for preservative taper sawn shakes. Weather exposure for wood shakes shall not exceed those set in Table 1507.9.7.

**TABLE 1507.9.7
WOOD SHAKE WEATHER EXPOSURE AND ROOF SLOPE**

ROOFING MATERIAL	LENGTH (inches)	GRADE	EXPOSURE (inches) 4:12 PITCH OR STEEPER
Shakes of naturally durable wood	18	No. 1	7.5
	24	No. 1	10 ^a
Preservative-treated taper sawn shakes of Southern yellow pine	18	No. 1	7.5
		No. 1	10
	24	No. 2	5.5
		No. 2	7.5
Taper sawn shakes of naturally durable wood	18	No. 1	7.5
		No. 1	10
	24	No. 2	5.5
		No. 2	7.5

For SI: 1 inch = 25.4 mm.

a. For 24-inch by 0.375-inch handsplit shakes, the maximum exposure is 7.5 inches.

1507.9.8 Flashing. At the juncture of the roof and vertical surfaces, flashing and counterflashing shall be provided in accordance with the manufacturer’s installation instructions, and where of metal, shall not be less than 0.019-inch (0.48 mm) (No. 26 galvanized sheet gage) corrosion-resistant metal. The valley flashing shall extend at least 11 inches (279 mm) from the centerline each way and have a splash diverter rib not less than 1 inch (25 mm) high at the flow line formed as part of the flashing. Sections of flashing shall have an end lap of not less than 4 inches (102 mm). For roof slopes of 3 units vertical in 12 units horizontal (25-percent slope) and over, the valley flashing shall have a 36-inch-wide (914 mm) underlayment of one layer of Type I underlayment running the full length of the valley, in addition to other required **underlayment**.

ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

1507.10 Built-up roofs. The installation of built-up roofs shall comply with the provisions of this section.

1507.10.1 Slope. Built-up roofs shall have a design slope of a minimum of one-fourth unit vertical in 12 units horizontal (2-percent slope) for drainage, except for coal-tar built-up roofs that shall have a design slope of a minimum

one-eighth unit vertical in 12 units horizontal (1-percent slope).

1507.10.2 Material standards. Built-up roof covering materials shall comply with the standards in Table 1507.10.2.

**TABLE 1507.8
WOOD SHINGLE AND SHAKE INSTALLATION**

ROOF ITEM	WOOD SHINGLES	WOOD SHAKES
1. Roof slope	Wood shingles shall be installed on slopes of three units vertical in 12 units horizontal (3:12) or greater.	Wood shakes shall be installed on slopes of four units vertical in 12 units horizontal (4:12) or greater.
2. Deck requirement	—	—
Temperate climate	Shingles shall be applied to roofs with solid or spaced sheathing. Where spaced sheathing is used, sheathing boards shall not be less than 1" x 4" nominal dimensions and shall be spaced on center equal to the weather exposure to coincide with the placement of fasteners.	Shakes shall be applied to roofs with solid or spaced sheathing. Where spaced sheathing is used, sheathing boards shall not be less than 1" x 4" nominal dimensions and shall be spaced on center equal to the weather exposure to coincide with the placement of fasteners. When 1" x 4" spaced sheathing is installed at 10 inches, boards must be installed between the sheathing boards.
In areas where the average daily temperature in January is 25°F or less or where there is a possibility of ice forming along the eaves causing a backup of water.	Solid sheathing required.	Solid sheathing is required.
3. Interlayment	No requirements.	Interlayment shall comply with ASTM D 226, Type 1.
4. Underlayment	—	—
Temperate climate	Underlayment shall comply with ASTM D 226, Type 1.	Underlayment shall comply with ASTM D 226, Type 1.
In areas where there is a possibility of ice forming along the eaves causing a backup of water.	An ice shield that consists of at least two layers of underlayment cemented together or of a self-adhering polymer-modified bitumen sheet shall extend from the eave's edge to a point at least 24 inches inside the exterior wall line of the building.	An ice shield that consists of at least two layers of underlayment cemented together or of a self-adhering polymer-modified bitumen sheet shall extend from the eave's edge to a point at least 24 inches inside the exterior wall line of the building.
5. Application	—	—
Attachment	Fasteners for wood shingles shall be corrosion resistant with a minimum penetration of 0.75 inch into the sheathing. For sheathing less than 0.5 inch thick, the fasteners shall extend through the sheathing.	Fasteners for wood shakes shall be corrosion resistant with a minimum penetration of 0.75 inch into the sheathing. For sheathing less than 0.5 inch thick, the fasteners shall extend through the sheathing.
No. of fasteners	Two per shingle.	Two per shake.
Exposure	Weather exposures shall not exceed those set forth in Table 1507.8.6	Weather exposures shall not exceed those set forth in Table 1507.9.7
Method	Shingles shall be laid with a side lap of not less than 1.5 inches between joints in courses, and no two joints in any three adjacent courses shall be in direct alignment. Spacing between shingles shall be 0.25 to 0.375 inch.	Shakes shall be laid with a side lap of not less than 1.5 inches between joints in adjacent courses. Spacing between shakes shall not be less than 0.375 inch or more than 0.625 inch for shakes and tapersawn shakes of naturally durable wood and shall be 0.25 to 0.375 inch for preservative taper sawn shakes.
Flashing	In accordance with Section 1507.8.7.	In accordance with Section 1507.9.8.

For SI: 1 inch = 25.4 mm, °C = [(°F) - 32]/1.8.

1507.10.3 Red rosin paper. Red rosin paper shall be used when the membrane is applied directly to a wood deck or cementitious fiber decks.

1507.11 Modified bitumen roofing. The installation of modified bitumen roofing shall comply with the provisions of this section.

**TABLE 1507.10.2
BUILT-UP ROOFING MATERIAL STANDARDS**

MATERIAL STANDARD	STANDARD
Acrylic coatings used in roofing	ASTM D 6083
Aggregate surfacing	ASTM D 1863
Asphalt adhesive used in roofing	ASTM D 3747
Asphalt cements used in roofing	ASTM D 3019; D 2822; D 4586
Asphalt-coated glass fiber base sheet	ASTM D 4601
Asphalt coatings used in roofing	ASTM D1227; D 2823; D 4479
Asphalt glass felt	ASTM D 2178
Asphalt primer used in roofing	ASTM D 41
Asphalt-saturated and asphalt-coated organic felt base sheet	ASTM D 2626
Asphalt-saturated organic felt (perforated)	ASTM D 226
Asphalt used in roofing	ASTM D 312
Coal-tar cements used in roofing	ASTM D 4022; D 5643
Coal-tar saturated organic felt	ASTM D 227
Coal-tar pitch used in roofing	ASTM D 450; Type I or II
Coal-tar primer used in roofing, dampproofing and waterproofing	ASTM D 43
Glass mat, coal tar	ASTM D 4990
Glass mat, venting type	ASTM D 4897
Mineral-surfaced inorganic cap sheet	ASTM D 3909
Thermoplastic fabrics used in roofing	ASTM D 5665, D 5726

1507.11.1 Slope. Modified bitumen membrane roofs shall have a design slope of a minimum of one-fourth unit vertical in 12 units horizontal (2-percent slope) for drainage.

1507.11.2 Material standards. Modified bitumen roof coverings shall comply with CGSB 37-GP-56M, ASTM D 6162, ASTM D 6163, ASTM D 6164, ASTM D 6222, ASTM D 6223 or ASTM D 6298.

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

1507.12.1 Slope. Thermoset single-ply membrane roofs shall have a design slope of a minimum of one-fourth unit vertical in 12 units horizontal (2-percent slope) for drainage.

1507.12.2 Material standards. Thermoset single-ply roof coverings shall comply with ASTM D 4637, ASTM D 5019 or CGSB 37-GP-52M.

1507.13 Thermoplastic single-ply roofing. The installation of thermoplastic single-ply roofing shall comply with the provisions of this section.

1507.13.1 Slope. Thermoplastic single-ply membrane roofs shall have a design slope of a minimum of one-fourth unit vertical in 12 units horizontal (2-percent slope).

1507.13.2 Material standards. Thermoplastic single-ply roof coverings shall comply with ASTM D 4434, ASTM D 6754, ASTM D 6878 or CGSB CAN/CGSB 37-54.

1507.14 Sprayed polyurethane foam roofing. The installation of sprayed polyurethane foam roofing shall comply with the provisions of this section.

1507.14.1 Slope. Sprayed polyurethane foam roofs shall have a design slope of a minimum of one-fourth unit vertical in 12 units horizontal (2-percent slope) for drainage.

1507.14.2 Material standards. Spray-applied polyurethane foam insulation shall comply with ASTM C 1029.

1507.14.3 Application. Foamed-in-place roof insulation shall be installed in accordance with the manufacturer's instructions. A liquid-applied protective coating that complies with Section 1507.15 shall be applied no less than 2 hours nor more than 72 hours following the application of the foam.

1507.14.4 Foam plastics. Foam plastic materials and installation shall comply with Chapter 26.

1507.15 Liquid-applied coatings. The installation of liquid-applied coatings shall comply with the provisions of this section.

1507.15.1 Slope. Liquid-applied roofs shall have a design slope of a minimum of one-fourth unit vertical in 12 units horizontal (2-percent slope).

1507.15.2 Material standards. Liquid-applied roof coatings shall comply with ASTM C 836, ASTM C 957, ASTM D 1227 or ASTM D 3468, ASTM D 6083 or ASTM D 6694.

**SECTION 1508
ROOF INSULATION**

1508.1 General. The use of above-deck thermal insulation shall be permitted provided such insulation is covered with an approved roof covering and passes the tests of FM 4450 or UL 1256 when tested as an assembly.

Exceptions:

1. Foam plastic roof insulation shall conform to the material and installation requirements of Chapter 26.
2. Where a concrete roof deck is used and the above-deck thermal insulation is covered with an approved roof covering.

1508.1.1 Cellulosic fiberboard. Cellulosic fiberboard roof insulation shall conform to the material and installation requirements of Chapter 23.

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

**TABLE 1508.2
MATERIAL STANDARDS FOR ROOF INSULATION**

Cellular glass board	ASTM C 552
Composite boards	ASTM C 1289, Type III, IV, V or VI
Expanded polystyrene	ASTM C 578
Extruded polystyrene board	ASTM C 578
Perlite board	ASTM C 728
Polyisocyanurate board	ASTM C 1289, Type I or Type II
Wood fiberboard	ASTM C 208

**SECTION 1509
ROOFTOP STRUCTURES**

1509.1 General. The provisions of this section shall govern the construction of rooftop structures.

1509.2 Penthouses. A penthouse or other projection above the roof in structures of other than Type I construction shall not exceed 28 feet (8534 mm) above the roof where used as an enclosure for tanks or for elevators that run to the roof and in all other cases shall not extend more than 18 feet (5486 mm) above the roof. The aggregate area of penthouses and other rooftop structures shall not exceed one-third the area of the supporting roof. A penthouse, bulkhead or any other similar projection above the roof shall not be used for purposes other than shelter of mechanical equipment or shelter of vertical shaft openings in the roof. Provisions such as louvers, louver blades or flashing shall be made to protect the mechanical equipment and the building interior from the elements. Penthouses or bulkheads used for purposes other than permitted by this section shall conform to the requirements of this code for an additional story. The restrictions of this section shall not prohibit the placing of wood flagpoles or similar structures on the roof of any building.

1509.2.1 Type of construction. Penthouses shall be constructed with walls, floors and roof as required for the building.

Exceptions:

1. On buildings of Type I and II construction, the exterior walls and roofs of penthouses with a fire separation distance of more than 5 feet (1524 mm) and less than 20 feet (6096 mm) shall be of at least 1-hour fire-resistance-rated noncombustible construction. Walls and roofs with a fire separation distance of 20 feet (6096 mm) or greater shall be of noncombustible construction. Interior framing and walls shall be of noncombustible construction.
2. On buildings of Type III, IV and V construction, the exterior walls of penthouses with a fire separation distance of more than 5 feet (1524 mm) and

less than 20 feet (6096 mm) shall be at least 1-hour fire-resistance-rated construction. Walls with a fire separation distance of 20 feet (6096 mm) or greater from a common property line shall be of Type IV or noncombustible construction. Roofs shall be constructed of materials and fire-resistance rated as required in Table 601. Interior framing and walls shall be Type IV or noncombustible construction.

3. Unprotected noncombustible enclosures housing only mechanical equipment and located with a minimum fire separation distance of 20 feet (6096 mm) shall be permitted.
4. On one-story buildings, combustible unroofed mechanical equipment screens, fences or similar enclosures are permitted where located with a fire separation distance of at least 20 feet (6096 mm) from adjacent property lines and where not exceeding 4 feet (1219 mm) in height above the roof surface.
5. Dormers shall be of the same type of construction as the roof on which they are placed, or of the exterior walls of the building.

1509.3 Tanks. Tanks having a capacity of more than 500 gallons (2 m³) placed in or on a building shall be supported on masonry, reinforced concrete, steel or Type IV construction provided that, where such supports are located in the building above the lowest story, the support shall be fire-resistance rated as required for Type IA construction.

1509.3.1 Valve. Such tanks shall have in the bottom or on the side near the bottom, a pipe or outlet, fitted with a suitable quick opening valve for discharging the contents in an emergency through an adequate drain.

1509.3.2 Location. Such tanks shall not be placed over or near a line of stairs or an elevator shaft, unless there is a solid roof or floor underneath the tank.

1509.3.3 Tank cover. Unenclosed roof tanks shall have covers sloping toward the outer edges.

1509.4 Cooling towers. Cooling towers in excess of 250 square feet (23.2 m²) in base area or in excess of 15 feet (4572 mm) high where located on building roofs more than 50 feet (15 240 mm) high shall be of noncombustible construction. Cooling towers shall not exceed one-third of the supporting roof area.

Exception: Drip boards and the enclosing construction of wood not less than 1 inch (25 mm) nominal thickness, provided the wood is covered on the exterior of the tower with noncombustible material.

1509.5 Towers, spires, domes and cupolas. Any tower, spire, dome or cupola shall be of a type of construction not less in fire-resistance rating than required for the building to which it is attached, except that any such tower, spire, dome or cupola that exceeds 85 feet (25 908 mm) in height above grade plane, exceeds 200 square feet (18.6 m²) in horizontal area or is used

for any purpose other than a belfry or an architectural embellishment shall be constructed of and supported on Type I or II construction.

1509.5.1 Noncombustible construction required. Any tower, spire, dome or cupola that exceeds 60 feet (18 288) in height above the highest point at which it comes in contact with the roof, or that exceeds 200 square feet (18.6 m²) in area at any horizontal section, or which is intended to be used for any purpose other than a belfry or architectural embellishment, shall be entirely constructed of and supported by noncombustible materials. Such structures shall be separated from the building below by construction having a fire-resistance rating of not less than 1.5 hours with openings protected with a minimum 1.5-hour fire-protection rating. Structures, except aerial supports 12 feet (3658 mm) high or less, flagpoles, water tanks and cooling towers, placed above the roof of any building more than 50 feet (15 240 mm) in height, shall be of noncombustible material and shall be supported by construction of noncombustible material.

1509.5.2 Towers and spires. Towers and spires where enclosed shall have exterior walls as required for the building to which they are attached. The roof covering of spires shall be of a class of roof covering as required for the main roof of the rest of the structure.

1509.6 Equipment and appliances on roofs or elevated structures. Where equipment and appliances requiring access are installed on roofs or elevated structures at a height exceeding 16 feet (4877 mm), such access shall be provided by a permanent approved means of access, the extent of which shall be from grade or floor level to the equipment and appliances' level service space. Such access shall not require climbing over obstructions greater than 30 inches (762 mm) high or walking on roofs having a slope greater than 4 units vertical in 12 units horizontal (33-percent slope).

Permanent ladders installed to provide the required access shall comply with the following minimum design criteria:

1. The side railing shall extend above the parapet or roof edge not less than 30 inches (762 mm).
2. Ladders shall have rung spacing not to exceed 14 inches (356 mm) on center.
3. Ladders shall have a toe spacing not less than 6 inches (152 mm) deep.
4. There shall be a minimum of 18 inches (457 mm) between rails.
5. Rungs shall have a minimum 0.75-inch (19 mm) diameter and be capable of withstanding a 300-pound (136.1 kg) load.
6. Ladders over 30 feet (9144 mm) in height shall be provided with offset sections and landings capable of withstanding 100 pounds (488.2 kg/m²) per square foot.
7. Ladders shall be protected against corrosion by approved means.

Catwalks installed to provide the required access shall be not less than 24 inches (610 mm) wide and shall have railings as required for service platforms.

Exception: This section shall not apply to Group R-3 occupancies.

1509.7 Mechanical units. Roof mounted mechanical units shall be mounted on curbs raised a minimum of 8 inches (203 mm) above the roof surface, or where roofing materials extend beneath the unit, on raised equipment supports providing a minimum clearance height in accordance with Table 1509.7.

**TABLE 1509.7
CLEARANCE BELOW RAISED ROOF
MOUNTED MECHANICAL UNITS**

WIDTH OF MECHANICAL UNIT (inches)	SURFACES (inches)
<24	14
24 < 36	18
36 < 48	24
48 < 60	30
> 60	48

For SI: 1 inch = 25.4 mm.

**SECTION 1510
REROOFING**

1510.1 General. Materials and methods of application used for recovering or replacing an existing roof covering shall comply with the requirements of Chapter 15.

Exception: Reroofing 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.

1510.2 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.

1510.3 Recovering versus replacement. New roof coverings shall not be installed without first removing all existing layers of roof coverings 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 wood shake, slate, clay, cement or asbestos-cement tile.
3. Where the existing roof has two or more applications of any type of roof covering.
4. When blisters exist in any roofing, unless blisters are cut or scraped open and remaining materials secured down before applying additional roofing.
5. Where the existing roof is to be used for attachment for a new roof system and compliance with the securement provisions of 1504.1 can not be met.

Exceptions:

1. Complete and separate roofing systems, such as standing-seam metal roof 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.

2. 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 1510.4.
3. The application of a new protective coating over an existing spray polyurethane foam roofing system shall be permitted without tear-off of existing roof coverings.

1510.4 Roof recovering. 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.

1510.5 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 flashing, metal edgings, drain outlets, collars and metal counterflashings shall not be reinstalled where rusted, damaged or deteriorated. Aggregate surfacing materials shall not be reinstalled.

1510.6 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.

**SECTION 1511
RESERVED**

**SECTION 1512
HIGH-VELOCITY HURRICANE ZONES – GENERAL**

1512.1 Scope. Sections 1512 through 1525 set forth minimum requirements for the installation of roofing components, roofing systems, roofing assemblies and the waterproofing thereof.

1512.2 Application. These high-velocity hurricane zone roofing requirements with associated roofing application standards (RAS) and testing application standards are solely to be implemented in areas of high basic wind speeds, and where the jurisdiction having authority has adopted their use.

1512.2.1 All roofing components, roofing systems and roofing assemblies for construction regulated by this code shall comply with this chapter. All roofing components, roofing systems and roofing assemblies shall have a valid and current Product Approval. In the event that the manufacturers published literature or instructions are in conflict with those of the Product Approval, the Product Approval shall prevail. Where items specifically and expressly addressed in this chapter are in conflict with the Product Approval, the provisions of this chapter shall prevail.

1512.2.2 Innovative products and/or systems outside those currently recognized under this chapter may have a product approval issued based on performance testing; in such

case(s) the conditions set in the Product Approval shall prevail.

1512.2.3 For roofing systems to be installed on a specific building or structure, where an existing Product Approval may not be applied, such roofing system may be granted a one time approval by the authority having jurisdiction, provided the applicant demonstrates, by testing and/or rational analysis that such roofing system complies with the provision of this code.

1512.2.4 Where a Product Approval does not address a detail for a specific job condition, the permit applicant may propose to the building official an alternate detail to address the specific need of the job. The building official may accept such proposal if it can be demonstrated that the provisions of this code will be met.

1512.2.5 Workmanship standards. All roofing work shall be performed by a qualified contractor licensed to perform roofing, in compliance with the tolerances, quality and methods of construction established herein or set forth in the standards adopted by these high-velocity hurricane zone requirements. Roofing assemblies detailed in the Product Approval shall be installed in strict compliance with the method of application set forth in such Product Approval or, if not part of the product approval, in compliance with manufacturer's published application instructions, or as approved by the building official. (Aesthetic issues not affecting the performance of the roof are not part of this chapter.)

1512.2.5.1 Appearance. If the architectural appearance is to be preserved from below, an alternate method of attachment complying with the windload requirements of Chapter 16 (High-Velocity Hurricane Zones) may be proposed unless otherwise addressed in Chapter 15. The alternative attachment shall be prepared, signed and sealed by a Florida-registered architect or a Florida-registered engineer, which architect or engineer shall be proficient in structural design.

1512.3 Permits outside these high-velocity hurricane zone requirements shall comply with Section 105. Permits within high wind areas shall be required for all work in connection with the application, repair or maintenance of any roofing component or any roofing assembly and/or any of its components except as otherwise permitted in Section 105 of this code.

1512.3.1 All new roofing construction, including recovering and reroofing, repair or maintenance shall have a uniform roofing permit application, as established by the authority having jurisdiction, completed and executed by a licensed contractor.

1512.3.2 The uniform roofing permit shall include calculations per Chapter 16 (High-Velocity Hurricane Zone) of this code, unless the roofing assembly is less than the height/pressure threshold allowed in the applicable protocols herein.

1512.3.3 Reserved.

1512.3.4 Attachments to the uniform roofing permit application shall include two copies of each of the following documents: properly executed OWNERS NOTIFICATION

FOR ROOFING CONSIDERATIONS herein; the fire directory listing pages, Product Approval, and applicable detail drawings; the municipal permit application; other components approvals; and any other additional data reasonably required by the authority having jurisdiction needed to determine the integrity of the roofing system.

1512.3.5 In new construction, a licensed roofing contractor may dry-in the wood deck (no mopping) on a specific structure, prior to the roofing permit being issued provided:

1512.3.5.1 The master building permit for that specific structure has been obtained;

1512.3.5.2 The sheathing inspection has been made and approved by the building official; and

1512.3.5.3 The required roofing permit application is submitted to the building official within 10 days after dry-in work is started and the slope of the roof deck is 2:12 or greater.

1512.4 Inspections performed outside these high-velocity hurricane zone requirements shall comply with Section 109.

1512.4.1 All roofing work for which a permit is required shall be inspected by the building official. One or more inspections may be performed at the same time at the request of the roofing contractor or when feasible. Lack of roofing contractor’s personnel at the job site, in and of itself, shall not be cause to fail the inspection. Certain roofing inspections shall be performed during specific phases of the applications as noted below:

1512.4.2 For discontinuous roofing systems (as defined herein or Chapter 2):

1512.4.2.1 During or after application of the base sheet, anchor sheet or underlayment of any roofing system.

1512.4.2.2 During the installation of the cap sheet.

1512.4.2.3 During the installation of any prepared roof covering, such as shingles, tiles, slates, shakes and similar.

1512.4.2.4 Upon completion of all adhesive-set and mortar-set tile systems, and prior to the final inspection, a field verification and static uplift test, in compliance with TAS 106 shall be required to confirm tile adhesion to the underlayment. This test may be required by the building official for mechanically attached tile systems. All results of this test shall be submitted to the building official.

1512.4.3 For continuous roofing systems (as defined in herein or Chapter 2):

1512.4.3.1 During application of any roofing system prior to the full concealment of the adhesion/attachment process to the roof deck or to the existing roofing assembly.

1512.4.3.2 In cases where a roof area is less than 1,500 square feet (139 m²), and when the building official is not able to perform any of the above requested inspection in a timely manner, the building official may authorize to continue with the work and may require that satisfactory

evidence be provided to show that the covered work was performed in compliance with this code.

1512.4.3.3 After all roofing work has been completed, a final inspection shall be performed by the building official.

**SECTION 1513
HIGH-VELOCITY HURRICANE ZONES—
DEFINITIONS**

1513.1 Definitions. For definitions outside Sections 1512 through 1525 and accompanied RAS and TAS, see Chapter 2. For the purposes of Sections 1512 through 1525, accompanying RAS, TAS and roofing Products Approval, roofing terms shall be defined in compliance with ASTM D 1079, unless otherwise defined below. The definitions listed below shall take preference. Other terms used herein shall be defined as set forth in Chapter 2 of this code.

AIR PERMEABLE ROOFING SYSTEM. A roofing system consisting of a prepared roof covering over an approved underlayment on a sloped roof. The components within the prepared roof covering are discontinuously laid and small, with unsealed side and head laps. Air permeable roofing systems shall be applied over sheathed decks with either mechanical attachment or a mortar/adhesive bond. Any roofing system with sealed side or head laps shall not be defined as an air permeable roofing system. The authority having jurisdiction may require testing in compliance with TAS 116, to determine whether a roofing system is air permeable.

ANCHOR SHEET. A roofing felt mechanically attached to a nailable deck with approved fasteners to which insulation is then installed in a solid mopping of asphalt. The roofing membrane is then installed to the insulation in the usual manner.

ARCHITECTURAL METAL PANEL. Water shedding (hydrokinetic) roof panel fastened to a roof deck.

ASTM (ASTM International). A scientific and technical organization that is responsible for the development of standards on characteristics and performance of materials, products, systems, as adopted for the high-velocity hurricane zone.

NET FREE VENTILATING AREA (NFVA). The gross area of the smallest plane area of the ventilating device reduced by the percentage of physical obstruction to the plane area.

BASE SHEET. The bottom or first ply of a roofing assembly over which subsequent roofing plies are applied. A base sheet may be designed for mechanical attachment, full or partial adhesion to the substrate.

“CLASS A” ROOFING ASSEMBLY. A roofing assembly that, in combination with the roof slope, has been classified by an approved testing agency, with a listing and follow-up service, as “Class A” in compliance with ASTM E 108 or UL 790.

“CLASS B” ROOFING ASSEMBLY. A roofing assembly that, in combination with the roof slope, has been classified by an approved testing agency, with a listing and follow-up service, as “Class B” in compliance with ASTM E 108 or UL 790.

“CLASS C” ROOFING ASSEMBLY. A roofing assembly that, in combination with the roof slope, has been classified by

an approved testing agency, with a listing and follow-up service, as “Class C” in compliance with ASTM E 108 or UL 790.

CONTINUOUS ROOFING SYSTEM. An impervious roof covering, composed from a single or multiple layers, forming a homogenous membrane over the entire roof surface, applied to either a flat or pitched roof surfaces.

CORROSION RESISTANT. Any component that passes appendix of FMRC’s Test Standard 4470, as modified, and set forth in TAS 114.

COUNTER BATTENS. Vertical wood strips installed on sloped roofs over which horizontal battens are secured. The primary roof covering is attached or secured to these horizontal battens.

COUNTERFLASHING. Formed metal or elastomeric sheeting secured on or into a wall, curb, pipe, roof-top unit or other surface to cover and protect the upper edge of a base flashing and its associated fasteners.

DISCONTINUOUS ROOFING SYSTEM. A roofing system with unsealed overlapping components, where the combined roofing system has openings at the point of overlap, applied to a sloped surface with a pitch of 2:12, or greater. Discontinuous roofing systems include asphalt shingles; concrete, clay or metal tile; wood shingles or shakes; and cement fiber roofing systems.

DRY-IN. The process of applying the first layer of felt in a roofing system.

FMRC (Factory Mutual Research Corporation). A research and testing organization that is responsible for examination and testing of construction and other products on behalf of member insurance companies.

FASTENER WITHDRAWAL RESISTANCE TEST. A static pullout test of mechanical fasteners, which are used to anchor any roofing component, to determine the force required to withdraw a fastener from the substrate. Testing shall be in compliance with the test procedure detailed in TAS 105.

FIRE-RESISTANT ROOF COVERING. Any Class A, Class B or Class C roofing system applied to the appropriate deck type within the specified slope of the listed classification.

FLASHING. The roofing component used to seal roofing systems, where the system is interrupted or terminated.

LAP. See NRCA Manual, 4th edition.

METAL PROFILE. Including but not limited to eave and gable drip, gravel stop, raised edge systems and fascia systems. All composite and nonmetallic flashing materials shall have a Product Approval.

MINIMUM CHARACTERISTIC RESISTANCE FORCE. A force or pressure which is representative of data from withdrawal resistance testing; static uplift testing; and/or wind uplift testing after the data has been statistically analyzed to a 95-percent level of precision.

METAL ROOF PANEL. An interlocking metal sheet having an installed weather exposure equal or greater than three square feet per sheet.

METAL ROOF SHINGLE. An interlocking metal sheet having an installed weather exposure less than 3 square feet (.3 m²) per sheet.

MOMENT. A quantity that represents the affect of a force applied at a particular point in relation to a specific point or axis.

NRCA. The NRCA *Roofing and Waterproofing Manual*, 5th edition, as published by the National Roofing Contractors Association.

PREPARED ROOF COVERING. Any manufactured or processed roof covering designed for use as the top layer of a discontinuous roofing system applied to a sloped roof.

RAS. Roofing Application Standards.

RECOVERING. The process of covering an existing roofing assembly with a new roofing system or a prepared roofing system.

REPAIR. The work of corrective procedures by replacing or altering an existing roofing component or system to eliminate water intrusion.

REROOFING. The process of recovering or replacing an existing roofing system, either in its entirety or in existing sections.

RIDGE VENT. A ventilator located within 18 inches (457 mm) of the ridge that allows the escape of warm and/or moist air from the attic area or rafter cavity.

ROOFING ACCESSORY. A type of roofing product as described in Section 1517.6 of this code.

ROOFING ASSEMBLY. An assembly of interacting roofing components [includes the roof deck, vapor retarder (if present), insulation, and roof covering].

ROOFING COATINGS, ADHESIVES AND MASTICS. Any and all liquid materials applied to the roofing membrane layer to enhance ultraviolet light resistance; increase resistance to fire; increase reflectivity of the roofing assembly; or, in some way, enhance the performance of the roofing assembly. Roofing coatings, adhesives or mastics shall not contain asbestos materials.

ROOF COVERING. An assembly of multiple field-applied components or a single component designed to weatherproof a building’s top surface. A roof covering may be a roofing assembly or form a portion thereof.

ROOFING COMPONENT. A roofing product that is incorporated into various roofing assemblies.

ROOF DECK. Solid or spaced sheathing to which the roofing or waterproofing system is applied.

ROOFING MAINTENANCE. Is the work of extending the longevity of a roofing system through preventative care, such as refilling pitch pans, applying coatings, regraveling, resurfacing and recaulking.

ROOF SECTION. A separation or division of a roof area by existing expansion joints, parapet walls, flashing (excluding valleys), difference of elevation (excluding hips and ridges), roof type or legal description; not including the roof area required for a proper tie-off with an existing system.

ROOFING SYSTEM. A system of interacting roofing components, generally consisting of membrane or primary roof covering and insulation (not including the roof deck) designed to weatherproof, and sometimes to improve, the building's thermal resistance.

HIGH ROOF TILE PROFILE. Those tiles having a rise-to-width ratio greater than 0.20.

LOW ROOF TILE PROFILE. Those tiles having a rise-to-width ratio less or equal than 0.20; except those tiles meeting the flat profile definition.

FLAT ROOF TILE PROFILE. Those tiles with less than 1/2-inch (12.7 mm) rise.

STRUCTURAL METAL PANEL. Roof covering intended to be self-supporting between structural members (see Sections 2003.8.2 and 2222.4).

TAS. Testing Application Standard.

UNDERLAYMENT. One or more water-shedding layers applied to a sloped roof prior to the application of a prepared roof covering. The primary purpose of an underlayment is defined as a water shedding layer to function in combination with a prepared roof covering.

WOOD SHAKES. Tapered or straight pieces of red cedar, or other wood types, of widths ranging from 3 inches to 14 inches (76 mm to 356 mm) ranging in lengths from 18 inches to 32 inches (457 mm to 813 mm) applied to a sloped roof, in conjunction with an approved underlayment, forming a discontinuous prepared roof system.

WOOD SHINGLES. Tapered pieces of red cedar, or other wood types, sawn on both faces, of widths ranging from 3 inches to 14 inches (356 mm) and lengths of 16 inches (406 mm), 18 inches (457 mm), and 24 inches (610 mm) applied to a sloped roof forming a discontinuous prepared roof system.

SECTION 1514 HIGH-VELOCITY HURRICANE ZONES— WEATHER PROTECTION

1514.1 General. Roof decks shall be covered with roof coverings secured to the building or structure in accordance with the provisions of this chapter. Roof coverings shall be designed, installed and maintained in accordance with this code and the manufacturer's installation instructions such that the roof covering shall serve to protect the building or structure. All roof coverings, roof systems and roof assemblies shall be designed and installed to resist the windload requirements of Chapter 16 (High-Velocity Hurricane Zones) of this code.

1514.2 Flashings. Flashings shall be installed in such a manner as to prevent moisture entering the wall through the joints in the coping, through moisture permeable materials, at intersections with the roof plane or at parapet wall penetrations. All roof flashing and terminations shall be designed and installed to resist the windload requirements of Chapter 16 (High-Velocity Hurricane Zone) of this code, and shall be in compliance with the provisions set forth in RAS 111.

1514.2.1 Locations. Flashings shall be installed at (1) wall and roof intersections, (2) at gutters, (3) wherever there is a

change in roof slope or direction, this requirement does not apply to the hip and ridge junctions, and (4) around roof openings. Where flashing is of metal, the metal shall conform with the provisions of RAS 111.

1514.2.2 Membrane flashings. All membrane flashing shall be installed according to the roof assembly manufacturer's published literature and in accordance with the provisions set forth in RAS 111.

1514.2.3 Metal flashings and terminations. Metal flashing and terminations shall be of the material and thickness described in Section 1517.6 and RAS 111 of this code, and shall be designed and installed in accordance with RAS 111. Metal flashing shall be installed after the roofing felts have been laid and turned up the vertical surfaces, in compliance with the roofing assembly Product Approval.

1514.2.3.1 Such felts shall be embedded in hot bitumen or an approved adhesive.

1514.2.3.2 Metal surfaces shall be primed with an ASTM D 41 or ASTM D 43 primer, as appropriate and allowed to dry prior to receiving hot bitumen or cold adhesive.

1514.2.4 Metal counterflashing. Metal counterflashing shall be of the material and thickness described in Section 1517.6 and RAS 111 of this code, and shall be installed in accordance with RAS 111.

1514.2.4.1 Metal counterflashing shall be built into walls, set in reglets or applied as stucco type and shall be turned down over base flashing not less than 3 inches (76 mm).

1514.2.4.2 Metal counterflashing shall be side lapped a minimum of 4 inches (102 mm).

1514.2.4.3 Metal counterflashing, where set in reglets or surface-mounted, shall be waterproofed, in accordance with applicable application standards.

1514.2.4.4 Where metal counterflashing is used as the means of sealing (such as a vented system) it shall be set in an approved sealant, sealed with an approved adhesive on the top flange and all joints shall be sealed with an approved sealant and lapped a minimum of 4 inches (102 mm).

1514.2.5 Roof penetration flashing.

1514.2.5.1 All pipes shall be flashed with approved lead sleeve-type, pitch pans or other approved methods detailed in the roofing system assembly Product Approval. Lead flashing shall not be less than 2.5 pounds per square foot (12.2 kg/m²). Flanges shall be a minimum of 4 inches (102 mm).

1514.2.5.2 Other roof penetrations shall be suitably flashed with curbs, collars, pitch pans, in compliance with RAS 111 or an approved method, in compliance with the roofing system assembly Product Approval.

1514.2.5.3 No roof penetration shall be located in roof valleys.

1514.3 Coping. Where required, parapet walls shall be properly coped with noncombustible, weatherproof materials of a

width no less than the thickness of the parapet wall. Copings shall be designed and installed to resist the windload requirements of Chapter 16 (High-Velocity Hurricane Zones) of this code, and shall be in accordance with the provisions set forth in RAS 111.

1514.4 Roof drainage. Unless roofs are sloped to drain over roof edges, roof drains shall be installed at each low point of the roof. Where required for roof drainage, scuppers shall be placed level with the roof surface in a wall or parapet. The scupper shall be located as determined by the roof slope and contributing roof area. Scuppers shall be sized in accordance with the provisions contained in ASCE 7, Section 8 with commentary and shall comply with Section 1617 herein.

1514.4.1 Gutters. Gutters and leaders placed on the outside of buildings, other than one- or two-family dwellings, private garages and buildings of Type II-B construction, shall be of noncombustible material or a minimum of Schedule 40 plastic pipe.

1514.4.1.1 Gutters and leaders shall be constructed of metal or approved plastic for outdoor exposure with lapped, soldered or caulked joints and shall be securely fastened to the building with a corrosion resistant fastening device of similar or compatible material to the gutters and downspouts. Gutters shall be in compliance with RAS 111.

1514.4.2 Overflow drains and scuppers. Where roof drains are required, overflow drains or overflow scuppers sized in accordance with *Florida Building Code, Plumbing* shall be installed with the inlet flow line located not less than 2 inches (51 mm) or more than 4 inches (102 mm) above the low point of the finished roofing surface, excluding sumps. Overflow scuppers shall be a minimum of 4 inches (102 mm) in any dimension and shall be located as close as practical to required vertical leaders, conductors or downspouts. Overflow drains and scuppers shall also comply with the *Florida Building Code, Plumbing*, and Section 1617 of this code.

1514.4.2.1 When overflow scuppers and roof drains are installed, they shall be lined with approved metal or other approved materials set forth in the roofing system assembly Product Approval.

1514.4.2.2 When recovering, reroofing or repairing an existing roof, the existing number of scuppers and/or roof drains shall not be reduced, unless a new drainage system is designed by an architect or engineer, in compliance with the provisions of this code.

1514.4.3 Sizing and discharge. Roof drains, gutters, conductors and leaders shall be sized and discharge in accordance with the *Florida Building Code, Plumbing*.

**SECTION 1515
HIGH-VELOCITY HURRICANE ZONES—
PERFORMANCE REQUIREMENTS**

1515.1 General. All roof assemblies, roof coverings and roof systems shall have Product Approval, and shall meet the following minimum requirements.

1515.1.1 All continuous roofing assemblies shall be tested in compliance with FMRC Test Standards 4470 and/or 4471 (for metal roofing), as modified for the purposes of this code and set forth in TAS 114. Only those components listed within the roofing assembly Product Approval shall be approved for use with the roof covering. Roofing assemblies shall be acceptable for use in this code’s jurisdiction providing they are in compliance with the fire classification required for the structure to which the roofing assembly is to be installed.

1515.1.2 All fastening devices and fastening assemblies used for insulation, anchor sheet or roof coverings shall be tested in compliance with Section 1523 of this code.

1515.1.3 All roofing assemblies shall be tested by a testing laboratory, certified by the certification agency in accordance with TAS 301, to confirm compliance with the fire classification and other sections of this code.

1515.1.4 All roofing membranes and components shall be tested in compliance with the physical property test requirements detailed in TAS 110.

1515.1.5 No loose laid ballasted or nonballasted system shall be allowed.

1515.2 Guidelines for roofing applications.

1515.2.1 Decks. All roofing systems and prepared roof coverings shall be installed over solid decks, unless otherwise specifically allowed in other sections of this code.

1515.2.2 Minimum slope. All roofing assemblies must be installed in compliance with the slope requirements specified in the product control approval, in compliance with Table 1515.2.

**TABLE 1515.2
MINIMUM SLOPE**

SYSTEM TYPE	SLOPE	
Fibrous Cement Shingles	4:12	
Metal Panels	Architectural	
	2:12	
Metal Shingles	4:12	
Tile	Mortar or Adhesive	
	2:12 (min) to 7:12 (max) unless tested for steeper slope and it is noted in Product Approval	
	Mechanically Fastened	
	Direct Deck	Battens
Asphaltic Shingles	Dimensional	3_Tab
		2:12
Quarry Slate	3½:12	

Wood	Shakes	Shingles
	4:12	3 ¹ / ₂ :12

1515.2.2.1 All roofing systems must be installed to ensure positive drainage. In new construction the minimum deck slope shall be not less than 1/4:12.

1515.2.2.2 All roofing assemblies shall be installed at a slope no greater than the maximum allowed for the required fire classification.

1515.2.3 Deck preparation. All roof decks, substrates, existing roofing systems to which a new roofing assembly is to be installed shall be broom cleaned, free from dirt and silt and dry prior to commencement of the roofing application.

1515.2.3.1 Cant strips, if required, shall be extended not less than 3-inch (76 mm) up vertical flashing surfaces, measured from the top of the new roof covering.

1515.2.3.2 All eaves shall provide a firm nailable substrate for secure attachment of perimeter edge metal in compliance with RAS 111.

1515.2.3.3 Perimeter edge metal shall be fastened with nails or fasteners fabricated from similar or compatible material. The nails or fasteners shall be as set forth in the roofing assembly Product Approval.

1515.2.3.4 All precast and prestressed concrete deck components shall be leveled with leveling fill, where such components' edges are greater than 1/2 inch (12.7 mm) from being flush.

1515.2.4 Impact resistance. Roof coverings installed on low slope roofs in accordance with Section 1519 shall resist impact damage based on the results of test conducted in accordance with ASTM D 3746, ASTM D 4272, CGSB 37, FM 4470 or TAS 114.

1515.2.5 Ridge vents. Ridge vents shall have a Product Approval, and shall be tested for wind driven rain in accordance with TAS 110 and Section 1523.

**SECTION 1516
HIGH-VELOCITY HURRICANE ZONES—
FIRE CLASSIFICATION**

1516.1 General. Roof assemblies shall be divided into the classes defined below. Class A, B and C roof assemblies and roof coverings required to be listed by this section shall be tested in accordance with ASTM E 108 or UL 790. In addition, fire retardant treated wood roof coverings shall be tested in accordance with ASTM D 2898.

1516.2 Fire resistant roofing assemblies and coverings shall be provided on all structures. Fire classification of roofing assemblies and coverings shall be based on the exposure hazard as follows:

1516.2.1 Class A. Zero feet to 20 feet (0 to 6.1 m) distance separation measured horizontally from the closest point of any building edge to the nearest point to an adjoining struc-

ture, and all buildings with occupation greater than 300 persons.

Exception: Brick, masonry, slate, clay or concrete roof tile and exposed concrete roof deck are considered to meet Class A roof covering provisions without testing.

1516.2.2 Class B. All other structures, except as noted below

1516.2.3 Class C. Structures not occupied by humans.

**SECTION 1517
HIGH-VELOCITY HURRICANE ZONES—MATERIALS**

1517.1 Scope. Every roofing component shall comply with the applicable ASTM material standards adopted by this code. All such products shall bear the testing logo imprinted on the material and/or container or shall be marked in a distinctive manner to define compliance with the standards and shall be subject to be evaluated for compliance. The certification agency shall carry out random testing of labeled products to confirm compliance with ASTM material standard.

1517.2 Compatibility of materials. Roofs and roof coverings shall be of materials that are compatible with each other and with the building or structure to which the materials are applied.

1517.3 Material specification and physical characteristics. No roofing component containing asbestos shall be used in any roofing assembly.

1517.4 Product identification. All roofing components shall be labeled and/or identified as mandated by the Product Approval.

1517.4.1 ASTM standard roll goods shall be marked with a yellow line to identify the ASTM standard, or such other marking as may be deemed appropriate by the Product Approval.

1517.5 Fasteners.

1517.5.1 Nails shall be minimum 12 gage, annular ring shank nails having not less than 20 rings per inch, heads not less than 3/8 inch (9.5 mm) in diameter; and lengths sufficient to penetrate through the thickness of plywood panel or wood plank decking not less than 3/16 inch (4.8 mm), or to penetrate into a 1 inch (25 mm) or greater thickness of lumber not less than 1 inch. Nails or wood screws shall be hot dipped electro or mechanically galvanized to a thickness sufficient to resist corrosion in compliance with TAS 114, Appendix E, Section 2 (ASTM G 85). All nails shall be listed by a certification agency. All nail cartons or carton labels shall be labeled to note compliance with the corrosion resistance requirements. No roofing material shall be fully or partially adhered directly to a nailable deck, unless otherwise noted in the roof assembly Product Approval.

1517.5.2 "Tin caps" shall be not less than 1 5/8 inches (41 mm) and not more than 2 inches (51 mm) in diameter and of not less than 32 gage (0.010 inch) sheet metal. "Cap nails" or prefabricated fasteners with integral heads complying with this section shall be an acceptable substitute. All "tin caps," "cap nails" or prefabricated fasteners with integral

heads shall be tested for corrosion resistance in compliance with TAS 114 Appendix E, Section 2 (ASTM G 85), and shall be product control listed. All of cartons or carton labels “tin caps,” “cap nails” or prefabricated fasteners with integral heads shall be labeled to note compliance with the corrosion resistance requirements.

1517.6 Metal roofing accessories. All metal accessories for roofs shall be not less than 26 gage G-90 galvanized or stainless steel, 16 ounce copper, 0.025-inch (0.6 mm) thick aluminum, lead sheet with a minimum 2.5 lb/sf (12.2 kg/m²) or equivalent noncorrosive metal alloys or composite materials manufactured for use as roof termination. All composite and nonmetallic flashing materials shall have a Product Approval.

1517.6.1 Metal accessories may be of a manufactured, shop-fabricated or field-fabricated type, providing the materials and fasteners are in compliance with the minimum requirements of this code and shall be sized, designed and installed in compliance with methods set forth in RAS 111.

1517.6.2 Gravel stop or drip edge profiles shall be as follows:

1517.6.2.1 The vertical face shall be a minimum of 1½ inches (38 mm) and shall extend down not less than ½ inch (12.7 mm) below the sheathing or other member immediately contiguous thereto. In all cases, the deck flange shall be not less than 2 inches (51 mm) in width. Gravel stop or drip edge shall be sized, designed and installed in compliance with RAS 111.

1517.6.2.2 Gravel stop or drip edge shall be designed so that the bottom (the kick of the metal) of the drip edge shall have a minimum of ½-inch (12.7 mm) clearance from the structure.

1517.6.2.3 Gravel stops or eaves drip shall be installed in compliance with RAS 111.

1517.6.2.4 Gravel stops shall be installed after all roofing felts have been applied, or in compliance with the application method set forth in the roofing assembly Product Approval. All asphalt or approved cold adhesive bonding areas shall be coated with ASTM D 41 or ASTM D 43, as required, and allowed to dry prior to application.

1517.6.2.5 Gravel stops and drip edges shall be joined by lapping a minimum of 4 inches (102 mm) and the entire interior of the joints shall be coated with approved flashing cement. Cover and splice plates shall be of the same material as the gravel stop and drip edge, and shall be sized, fabricated and installed in compliance with RAS 111.

1517.6.2.6 The deck flange shall be nailed with an approved minimum 12 gage annular ring shank nail at 4 inches (102 mm) o.c. The nail shall be manufactured from similar and/or compatible material to the termination profile. All composite materials shall be fastened with nonferrous nails.

1517.6.3 Valley metal. Valley metal shall be of the materials set forth in Section 1517.6.

SECTION 1518 HIGH-VELOCITY HURRICANE ZONES—ROOF COVERINGS WITH SLOPES 2:12 OR GREATER

1518.1 General. Prepared roof coverings shall be as defined in Section 1513 and in general limited to application over sloped roof decks capable of receiving mechanical fasteners. Prepared roof coverings may be mechanically fastened or, in specific limited cases noted in the Product Approval, set in an adhesive bond.

1518.2 Underlayments. Underlayment shall be as defined in Section 1513. Underlayment shall be installed in compliance with the roofing component Product Approval and shall be in compliance with the following minimum requirements:

1518.2.1 Underlayment shall be attached to a nailable deck in a grid pattern of 12 inches (305 mm) between the overlaps, with 6-inch (152 mm) spacing at the overlaps.

1518.2.2 Where the architectural appearance of the underside is to be preserved, the underlayment shall be secured in accordance with Section 1519.5.2.

1518.2.3 Tin caps and nails or cap nails shall be applied as defined in Section 1517.5.2.

1518.2.4 Underlayment nails shall be as defined in Section 1517.5.1.

1518.3 If the underlayment is a self-adhering membrane, the membrane shall be applied over a mechanically attached anchor sheet, attached in compliance with Section 1518.2.1.

1518.4 All underlayment applications for prepared roof coverings shall be applied in compliance with the manufacturer roofing assembly Product Approval, and shall be not less than one of the following: (1) A double layer of an ASTM D 226 Type I, with a 19-inch (483 mm) headlap; or (2) A single layer of an ASTM D 226, type II with a 4-inch (102 mm) headlap; or (3) A single layer of an ASTM D 2626 coated base sheet with a 4 inch (102 mm) headlap, and (4) All endlaps shall be a minimum of 6 inches (152 mm).

1518.5 Fiber cement shingles. Fiber-cement shingles shall be applied in compliance with the shingle manufacturer’s roofing assembly Product Approval. The roofing system assembly Product Approval shall meet the following minimum requirements:

1518.5.1 All nonasbestos fiber-cement shingles shall conform to ASTM C 1225.

1518.5.2 Fiber-cement shingles shall be installed in compliance with the nailing requirements set forth in the Product Approval; however, attachment of each component shall be with not less than two corrosion resistant fasteners. If adhesive is used at the head or side laps, the system shall be defined as a “sealed system” with load calculations in compliance with Chapter 16 (High-Velocity Hurricane Zones).

1518.5.3 All intersections shall be flashed in metal as provided in Section 1517.6 and RAS 111.

1518.5.4 Fiber-cement shingles shall be tested as set forth in Section 1523.

1518.6 Quarry slate. Quarry slates shall be applied in compliance with the slate manufacturer’s Product Approval. The

roofing assembly Product Approval shall meet the following minimum requirements:

1518.6.1 Quarry slates shall be installed with not less than two approved fasteners per slate.

1518.6.2 All terminations and intersections shall be flashed in metal as provided in Section 1517.6 and RAS 111.

1518.6.3 Quarry slates shall be tested in compliance with the requirements set forth in Section 1523.

1518.6.4 Installation of all quarry roof slates shall be limited to a roof mean height of 33 feet (10 m), unless otherwise specifically noted in the Product Approval.

1518.7 Asphaltic shingles. Asphaltic shingles layout, alignment and placement of mechanical attachment shall be in compliance with the Product Approval, and shall be installed in accordance with RAS 115.

1518.7.1 Underlayments exceeding minimum underlayments, as detailed in Section 1518, shall be applied in compliance with the application methods detailed in the Product Approval. Where the architectural appearance of the underside of the roof is to be preserved, refer to Section 1519.5.2.

1518.7.2 Installation of all asphaltic shingles shall be limited to a roof mean height of 33 feet (10 m), unless otherwise specifically noted in the Product Approval.

1518.7.3 The asphaltic shingle Product Approval shall meet the following minimum requirements.

1518.7.3.1 Where asphaltic shingles are to be installed over insulated roof deck, a suitable nailable substrate, in accordance with Section 1520.5.7 must be installed over the insulation prior to the installation of approved underlayment and shingles.

1518.7.3.2 Asphaltic shingles shall be installed in compliance with the Product Approval, but in no case with less than six approved roofing nails or approved fastening devices which penetrate through the thickness of sheathing or wood plank a minimum of $\frac{3}{16}$ inch (4.8 mm) or penetrate into a 1 inch (25 mm) or greater thickness of lumber a minimum of 1 inch (25 mm), except where architectural appearance is to be preserved, in which case a minimum of $\frac{3}{4}$ inch (19 mm) ring shank roofing nail may be used.

1518.7.3.3 Intersections, eaves, rakes, valleys, gable ends, and the starter course of asphaltic shingles shall be set in an 8-inch (203 mm) wide bed of approved cold adhesive or roofing cement. Application of adhesive or cement shall be in compliance with the application instructions of the Product Approval. Shingles shall not extend more than $\frac{1}{4}$ inch (6.4 mm) beyond the eave drip.

1518.7.3.4 All perimeter termination and valleys shall be fabricated from metal. Minimum metal requirements are set forth in Section 1517.6 and RAS 111.

1518.7.3.5 Asphaltic shingles shall be tested in compliance with the provisions set forth in Section 1523.

1518.8 Clay and concrete roof tile. Tile shall be clay, concrete or composition material of various configurations complying

with the physical property requirements of this code. All tile and tile systems shall be tested in compliance with the provisions set forth in 1523. Tile shall have a Product Approval for a complete tile system, which shall include the tile, underlayment and all tile related accessories required to provide a waterproof system.

1518.8.1 Application. All tile systems shall be installed over solid sheathed decks. All tile installation shall be in accordance with RAS 118, RAS 119, and RAS 120, as applicable.

1518.8.1.1 Roof tile mortar shall either be a pre-mixed unit having a Product Approval and tested in compliance with TAS 123 or a job-site mix approved by the building official and in compliance with RAS 113.

1518.8.2 The roof tile Product Approval shall specify the slope requirement for each tile and underlayment system in accordance with Table 1515.2.

1518.8.3 All roof tile fasteners shall be tested and comply with the requirements set forth in Section 1523.

1518.8.4 All tile systems. All tile application designs shall comply with the following limitations in order to withstand the wind loads prescribed in this section, as well as all wind load requirements set forth in Chapter 16 (High-Velocity Hurricane Zones).

1518.8.4.1 Roof tile systems, combining mechanically fastened tile and mortar and/or adhesive, shall be acceptable.

1518.8.4.2 In an air permeable tile roofing systems: (1) the length of each tile shall be not less than 12 inches (305 mm) and not greater than 21 inches (533 mm) and the exposed width of the tile shall be between 8.5 inches and 15 inches (216 and 381 mm); (2) the maximum thickness of the nose (leading edge) of the tile shall not exceed 1.3 inches (33 mm); and (3) mortar or adhesive set system shall have at least two-thirds of the tile free of mortar and/or adhesive contact.

1518.8.5 The proposed method of attachment for tile systems which are considered to be air permeable, shall provide sufficient attachment resistance (M_f) (listed in tile product approval) to meet or exceed the moment of resistance (M_r) as determined by following the procedures outlined in RAS 127. The aerodynamic multiplier (k) needed in RAS 127 shall be part of the tile Product Approval and shall be derived from the following formula:

for direct deck application $k = (0.156) \times (b) \times (l)2$

for batten application $k = (0.144) \times (b) \times (l)2$

Where b (in feet) = exposed width of the tiles

Where l (in feet) = length of tiles

1518.8.6 The proposed method of attachment for tile systems which are not considered air permeable shall provide a minimum characteristic force (F') (listed in tile product control approval) to meet or exceed the required uplift resistance (F_r) as determined by following the procedures outlined in RAS 127.

1518.8.7 Tile systems shall extend beyond the drip edge (not including the rake) not less than $\frac{3}{4}$ inch (19 mm) but not more than 2 inches (51 mm).

1518.8.8 Spanish “S” tile, barrel tile or other tile systems that create a void between the deck and the underside of the tile shall be closed at the eaves with a prefabricated closure or mortar filler to close the eaves and elevate the butt ends of the first course, as detailed in the tile system Product Approval.

1518.8.9 Apply a minimum $\frac{3}{8}$ -inch (9.5 mm) diameter weephole, spaced not more than 12 inches (305 mm) apart, located flush with the underlayment of all tile systems, except tile systems using thick-butt tile.

1518.8.10 Mortar or adhesive set tiles applied at an incline from 6:12 up to and including 7:12 shall have the first course of tile (this applies to pan only on two-piece barrel tile) mechanically fastened with not less than one fastener per tile. As an alternate, the first course of tile shall be applied in mortar over a single layer of minimum 20 gage galvanized wire mesh with openings of not less than $\frac{1}{2}$ inch (12.7 mm) or greater than $1\frac{1}{2}$ inches (38 mm) with minimum exposure of 12 inches (305 mm) which is mechanically attached to the deck through the underlayment with approved fasteners and tin-cap when backnailing the cap sheet. Additionally, for roof inclines of 6:12 up to and including 7:12, every third tile of every fifth course, shall be mechanically fastened with not less than one fastener per tile. For roof inclines above 7:12, in addition to the mortar or adhesive, all tiles shall be mechanically fastened with not less than one fastener per tile. Apply approved flashing cement to seal all tile fastener penetrations, for all roof inclines.

1518.8.11 All tile systems shall be shingle lapped interlocking and installed with the headlap as specified in the tile system Product Approval. In no case shall the minimum headlap be less than 2 inches (51 mm) for mortar or adhesive set tile, or less than 3 inches (76 mm) for mechanically set tile, unless restricted by product design.

1518.8.12 Where tiles are to be installed over an insulated roof deck, a suitable nailable substrate, in accordance with Sections 1520.5.6 and 1520.5.7 must be installed over the insulation prior to the installation of approved underlayment and tiles.

1518.8.13 For mortar or adhesive set tile, no more than two tiles shall be loose per roofing square [100 square feet (9.3 m²)]. No loose tile shall be adjacent to each other.

1518.9 Metal panels/shingles. Steel panels/shingles shall be a minimum of G-90 corrosion resistant, and shall be not less than 26 gage in thickness. Aluminum panels/shingles shall not be less than 0.025-inch (0.685 mm) thick. All other metal panel/shingle products shall be an equivalent weight. All metal panel/shingle assemblies shall be capable of withstanding foot traffic without damage to the metal panels/shingles. Metal panels/shingles shall have Product Approval for a complete metal system, which shall include the panel/shingle, underlayment and all related accessories to provide a complete waterproof system.

1518.9.1 All metal panels/shingles assemblies shall be tested in accordance with Section 1523, and TAS 125.

1518.9.2 The entire application method of all metal panel/shingle systems shall be detailed in the Product Approval and RAS 133, as applicable.

1518.9.3 Metal shingles may be applied as a recover over a single layer of asphaltic shingles or smooth surface roofing, providing the deck is solid sheathed and in compliance with the provisions of this code, the existing prepared roof covering is in compliance with provisions of this code and the entire metal shingle system is applied as set forth in the Product Approval.

1518.9.4 Metal panel/shingle systems shall not extend more than 1 inch (25 mm) beyond the roof eave.

1518.9.5 All intersections shall be flashed in metal as provided in Section 1517.6, RAS 111 and the roof assembly Product Approval.

1518.10 Wood shingles and shakes. All wood shingles and shakes shall be installed in accordance with RAS 130. Installation of all wood shingles and shakes shall be limited to a roof mean height of 33 feet (10 m), unless otherwise specifically noted in the Product Approval.

1518.10.1 All wood shingle/shake systems shall be tested in accordance with Section 1523.

SECTION 1519 HIGH-VELOCITY HURRICANE ZONES—ROOF COVERINGS WITH SLOPES LESS THAN 2:12

1519.1 General. All adhered roofing components shall be bonded to the various types of substrates in compliance with the requirements set forth in the roofing assembly Product Approval and the following minimum requirements. The authority having jurisdiction may adopt RAS 150 as the means of complying with the requirements listed in this section.

1519.2 All packaged asphalt shall have the following data printed on the carton wrapper:

1519.2.1 ASTM designation and type;

1519.2.2 Flash point as determined by ASTM D 92, *Flash and Fire Point by Cleveland Open Cup*; and

1519.2.3 Equiviscous temperature (EVT) at which the asphalt attains a viscosity of 125 centipoise (25 centipoise for coal tar) as determined by ASTM D 4402, *Viscosity Determinations of Unfilled Asphalt Using The Brookfield Thermoset Apparatus*.

1519.3 Asphalt types, as defined by ASTM D 312, shall be employed in all roofing assemblies. Application of asphalt shall be in compliance with Table 1519.3A and Table 1519.3B or as detailed in the roofing assembly Product Approval.

1519.4 Back nailing of interply sheets shall not be required when using ASTM D 312 Type IV asphalt on slopes less than 3:12.

1519.5 Mechanical attachment. All mechanically attached roofing components shall be attached to the various types of substrates in compliance with the requirements set forth in the

roofing assembly Product Approval and the following minimum requirements.

1519.5.1 Base sheet attachment on wood decks. Nails shall be minimum 12 gage, annular ring shank nails having not less than 20 rings per inch; heads not less than $\frac{3}{8}$ inch (9.5 mm) in diameter; and lengths sufficient to penetrate through the thickness of plywood panel or wood plank decking not less than $\frac{3}{16}$ inch (5 mm), or to penetrate into a 1-inch (25.4 mm), or greater, thickness of lumber not less than 1 inch (25.4 mm). Nails shall be hot dipped; electro or mechanically galvanized to a thickness sufficient to resist corrosion in compliance with Appendix E of TAS 114. All nails shall have Product Approval. All nail cartons or carton labels shall be labeled to note compliance with the corrosion resistance requirements. No roofing material shall be fully or partially adhered, unless otherwise noted in the roof assembly Product Approval directly to a nailable deck.

1519.5.1.1 Such fasteners shall be applied through “tin caps” not less than $1\frac{5}{8}$ inches (43 mm) and not more than 2 inches (51 mm) in diameter and of not less than 32 gage [0.010-inch (.25 mm)] sheet metal. All tin caps and cap nails shall be listed by the certification agency.

1519.5.1.2 Prefabricated fastener systems complying with Section 1519.5.1 and Section 1519.5.1.1 may be used, provided they are Product Approved.

1519.5.1.3 Spacing of such fasteners shall be in compliance with patterns set forth in the roofing assembly Product Approval.

1519.5.2 Where the architectural appearance of the underside is to be preserved, a base sheet may be secured in an alternate method of attachment prepared, signed, and sealed by a Florida-registered architect or engineer, or in buildings where the mean roof height does not exceed 15 feet (4.6 m), a base sheet may be secured with $1\frac{1}{4}$ -inch (32 mm) fasteners on supporting members, with a minimum of $\frac{1}{2}$ -inch (12.7 mm) fasteners between the supporting members, all of which shall be secured through tin caps and nailed 6 inches (152 mm) o.c. in all directions.

1519.5.3 Lightweight insulating concrete. All lightweight insulated concrete shall be vented per roofing system manufacturer recommendations.

1519.5.3.1 Lightweight concrete shall not be applied over an existing roof deck unless the supporting structure has been approved as adequate to sustain the added weight. Calculations verifying the adequacy of the existing structure to sustain the added weight shall be prepared, signed, sealed and dated by a Florida-registered architect or engineer, who is proficient in structural design, and submitted with the uniform roofing permit application.

1519.5.4 Other nailable decks. The mechanical attachment of roofing components to other nailable decks shall be governed by the roofing assembly Product Approval.

1519.6 Cast-in-place and precast structural concrete decks. Cast-in-place and precast structural concrete decks are considered non-nailable. Concrete decks shall be clean, dry and fully primed with ASTM D 41 or ASTM D 43, as required, primer

applied at a rate of not less than 1 gallon (3.8 L) per square. Hot asphalt or cold adhesive shall not be applied until the primer has fully dried.

1519.6.1 In hot mopped applications over precast panels, a minimum of 12-inch (305 mm) wide strips of roofing felt or modified bitumen shall be applied to all panel joints. Said strips shall be bonded to the panel joints with asphalt, approved mastic or approved cold applied adhesive or shall be torched to a primed surface.

1519.7 Steel decks. Steel decks shall be covered with a roof insulation panel having its own Product Approval and listed in the roofing assembly product approval. Insulation panels shall be mechanically fastened in compliance with the mechanical attachment patterns listed in the roofing assembly Product Approval and in accordance with the provisions of RAS 117.

1519.7.1 If the deck thickness on an existing steel deck is less than 22 gage, a field fastener withdrawal resistance test shall be conducted in compliance with TAS 105, to confirm compliance with the wind load requirements of Chapter 16 (High-Velocity Hurricane Zones). Test results shall be submitted with the uniform roofing permit application for review prior to issuance of the roofing permit. The field fastener withdrawal resistance test shall be carried out by an approved testing laboratory.

1519.7.2 Steel decks shall be welded or mechanically attached to the structure in compliance with the design pressure requirements set forth in Chapter 16 (High-Velocity Hurricane Zones).

1519.7.3 Composite wood and insulation panels shall be mechanically attached to steel decks in compliance with the attachment requirements enumerated in the insulation roofing component Product Approval. The composite wood insulation panel shall be in compliance with the minimum sheathing requirements of this code.

1519.8 Flashing. All flashing shall be installed according to the roof assembly manufacturer’s published details and literature and in accordance with RAS 111.

1519.9 Valleys. Valleys in BUR shall be installed according to the roof assembly manufacturer’s published literature for high wind areas and in compliance with the applicable detail described in the Product Approval.

1519.10 Parapet walls. All parapet wall details shall be installed in accordance with the roofing system product approval, manufacturer’s published details and literature and in accordance with approved methods detailed in RAS 111.

1519.11 Insulation. Roof insulation shall be applied in compliance with the roofing system Product Approval and RAS 117.

1519.12 Surfacing. Roofing assemblies shall be surfaced in compliance with the Product Approval. Surfacing shall be in sufficient quantity to comply with the required fire classification. Aggregate surfacing shall not be used on slopes greater than 3:12. Aggregate shall be embedded in a flood coat of bitumen applied over a prepared top ply.

1519.12.1 On slopes of 3:12 or less, not less than 400 pound (182 kg) of roofing gravel or 300 pounds (145 kg) of slag

per square shall be applied. A minimum of 50 percent of the total aggregate shall be embedded in the flood coat of bitumen. Aggregate shall be dry and free from dirt and shall be in compliance with the sizing requirements set forth in ASTM D 1863. A building official may request a test to confirm compliance with these requirements.

1519.12.2 On inclines greater than 3:12, a smooth surface coating shall be applied.

1519.12.3 Mineral surfaced cap sheet applications shall not require any additional surfacing unless required with the particular assembly for a fire classification.

1519.12.4 All smooth surface applications shall be coated with an aluminized or emulsion coating, having a valid and current Product Approval and shall be in compliance with the application instructions in said Product Approval. Coating quantity shall be in compliance with the required fire rating classification for the structure.

1519.13 Attachment of metal termination. All edge metal and terminations shall be installed according to manufacturer's published literature, provided it meets the minimum requirements as set for in RAS 111 and Chapter 16 (High-Velocity Hurricane Zones).

1519.14 Expansion joints. Expansion joint covers and expansion joint components shall be constructed and installed in accordance with the roofing assembly manufacturer's published literature.

1519.15 Venting roofing assemblies. All roof assemblies shall be applied to a dry substrate. Vapor retarders shall be installed, where applicable, to reduce moisture vapor flow into insulation from the warm, humid building interior, leading to internal condensation. Vents shall be installed to assist in the expulsion of moisture vapor where such vapor may enter the roofing assembly or moisture, as defined in Section 1521.12. Venting units shall not allow vapor to enter the roofing assembly when the high vapor pressure side is above the roofing membrane.

SECTION 1520 HIGH-VELOCITY HURRICANE ZONES— ROOF INSULATION

1520.1 General. All roof insulation shall have a product approval as an approved roofing component for use in roofing assemblies. All insulation shall be tested for physical properties in accordance with TAS 110.

1520.2 Foam plastic. Foam plastic roof insulation shall conform to the material and insulation requirements of Chapter 26.

1520.2.1 Foam insulation panels shall be overlaid with a perlite, fiberglass, wood fiber or mineral wool overlay unless specifically stated to the contrary in the roof assembly Product Approval.

1520.3 Cellulose fiberboard. Cellulosic fiberboard roof insulation requirements shall conform to the materials and insulation requirements of Chapter 23.

1520.4 Insulation fasteners, membrane fasteners and stress plates. All insulation fasteners, membrane fasteners and stress

plates shall have a roof component Product Approval, and shall be tested in compliance with RAS 117 Appendixes A, B and C, and TAS 110 and TAS 114, Appendix E, Section 3 (DIN 50018), for corrosion resistance.

1520.5 Application. Roof insulation shall be applied in strict compliance with the application methods detailed in the roof assembly Product Approval and with the requirements set forth in RAS 117.

1520.5.1 Roof insulation, either on the ground or on the roof top, shall be kept dry. The building official shall instruct the removal of the insulation from the job when elevated moisture levels are found in the insulation or where panels cannot achieve 85-percent adhesion.

1520.5.2 When applied in hot asphalt or cold adhesive, no insulation panel's dimension shall be greater than 4 feet (1219 mm).

1520.5.3 Strip or spot mopping of insulation panels shall be used as an application method only when approved in the roof assembly Product Approval.

1520.5.4 Where more than one layer of insulation is applied, joints between layers shall be staggered.

1520.5.5 Application in approved cold adhesive shall be as detailed in the Product Approval and shall be in compliance with the required fire classification.

1520.5.6 Nail boards or composite panels with a nailable surface may be applied to sloped decks for the application of prepared roof covering or metal roofing systems, providing that the nailing surface is minimum $1\frac{5}{32}$ -inch (12 mm) exterior grade plywood sheathing, and has been attached to the deck with approved fastening assemblies in accordance with the windload requirements of Chapter 16 (High-Velocity Hurricane Zones). Composite panels shall be gapped a minimum of $\frac{1}{8}$ inch (3.2 mm) to allow for expansion of the sheathing panel.

1520.5.7 Suitable nailable decks installed over rigid board roof insulation in buildings of mean roof height of 35 feet (10.7 m) or less, shall be a minimum of $1\frac{5}{32}$ -inch (12 mm) exterior grade plywood sheathing. These decks shall be fastened to every structural roof frame member or to the existing deck under the insulation, at intervals of not more than 24 inches (610 mm) apart, with a minimum #12 approved insulation fastener spaced at a maximum of 12 inches (305 mm) apart in one direction with a minimum penetration of $1\frac{1}{2}$ inches (38 mm) into the structural member or deck. In these cases the maximum thickness of the rigid insulation board shall not exceed 2 inches (51 mm). An alternate method of attachment may be proposed, provided it is in compliance with Chapter 16 (High-Velocity Hurricane Zones), and it is prepared, signed and sealed by a Florida-registered architect or a Florida professional engineer, which architect or engineer shall be proficient in structural design.

1520.5.8 Mechanical attachment of insulation panels at uneven areas shall be acceptable. Hollowing, cutting or scoring of insulation panels to provide contact shall not be acceptable.

**SECTION 1521
HIGH-VELOCITY HURRICANE
ZONES—REROOFING**

1521.1 General. Materials and methods of application used for recovering or replacing an existing roof covering, system or assembly shall comply with the requirements set forth in Sections 1512 through 1525.

1521.2 Repairs shall be carried out with roofing components as defined in this chapter having a Product Approval.

1521.3 Repairs shall be carried out in such a manner as to not create additional ponding water.

1521.4 Reserved.

1521.5 A roofing system shall not be applied over an existing roof or over an existing roof deck where the roof sheathing has not been fastened in compliance with this code or where the roof sheathing will not permit effective fastening or where sheathing is water soaked or deteriorated so that effective attachment is not possible. All areas of deteriorated sheathing shall be removed and replaced. The building official shall not be required to inspect the re-nailing of the sheathing under this section.

1521.6 Structural concrete decks shall be allowed to dry or shall be dried prior to application of an ASTM D 41 or ASTM D 43, as required, or roofing system proprietary primer where the base sheet or base insulation layer is bonded to the concrete deck.

1521.7 On lightweight concrete, gypsum and cementitious wood fiber roof decks a field fastener withdrawal resistance test, in compliance with TAS 105, shall be carried out to confirm compliance with wind load requirements of Chapter 16 (High-Velocity Hurricane Zones).

1521.7.1 If the tested fasteners exhibit a minimum characteristic resistance force less than 80 percent than that listed in the Product Approval, a structural engineer shall examine the deck's integrity and provide a proposed attachment specification. Such specification shall be submitted with the uniform roofing permit application for review and approval by the building official prior to the issuance of a roofing permit. Calculations for the attachment of the anchor sheet/base sheet or insulation over these deck types, shall be in compliance with RAS 117.

1521.8 Steel decks shall be examined prior to recover for indication of corrosion. Any corrosion shall be treated with a rust inhibitor, providing the field fastener withdrawal resistance values of the proposed mechanical fasteners comply with the requirements of Chapter 16 (High-Velocity Hurricane Zone) of this code. All steel decks less than 22 gage shall be field tested for fastener withdrawal resistance for compliance with Chapter 16 (High-Velocity Hurricane Zones) prior to application of a new roofing system. Test results shall be submitted with the uniform roofing permit application.

1521.9 One additional roofing system may be applied over an original roofing assembly, providing the existing roofing assembly complies with the requirements of Section 1521.

1521.10 If the recover roofing assembly is to be bonded to an existing roofing membrane, the existing roofing membrane

shall be tested in compliance with TAS 124 for uplift resistance. The existing roofing membrane shall resist the design pressures calculated under Chapter 16 (High-Velocity Hurricane Zones) of this code. Test results shall be submitted with the uniform roofing permit application.

1521.11 If the recover roofing assembly is mechanically attached through either a base sheet or insulation layer, the attachment assembly shall be field tested for fastener withdrawal resistance, in compliance with TAS 105, and laboratory tested for pull-over resistance to insure compliance with wind uplift requirements set forth in Chapter 16 (High-Velocity Hurricane Zones) of this code. Test results shall be submitted with the uniform roofing permit application.

1521.12 Moisture content of the existing roofing assembly to be covered by a new roofing system shall not exceed 5 percent by weight in the roofing membrane and 8 percent by weight in commercially manufactured rigid board roof insulation as verified by moisture survey performed in accordance with TAS 126. Test results shall be submitted with the Uniform Roofing Permit Application. Testing for moisture content shall not be required for existing light weight insulating concrete, gypsum, and cementitious wood fiber roof decks shall be tested per section 1521.7 to confirm compliance with wind load requirements of Chapter 16 (High Velocity Hurricane Zones).

1521.13 Prior to starting the work the contractor has the responsibility of notifying the owner, by means of the roofing permit and required owners notification for roofing considerations herein, of any possibility of ponding water and recommend a structural review if ponding water is a possibility.

1521.14 If the new roofing system is to be bonded to the existing roof surface, the surface shall be free of all loose gravel, dirt and silt and dry prior to commencement of the roofing application. All blisters shall be cut and repaired prior to roofing application.

1521.14.1 If the existing roof surface has gravel embedded in hot asphalt, all loose gravel shall be removed together with any dirt and silt. The dry membrane surface shall be primed with ASTM D 41 primer or proprietary roofing system primer and allowed to dry thoroughly. A flood coat of ASTM D 312, type III or IV asphalt shall be applied to sufficient depth to cover the remaining embedded gravel. The prepared substrate shall be suitable for application of a new insulation layer only.

1521.14.2 In the case of existing coal tar assemblies, the existing roof surface shall be primed with ASTM D 43 primer or covered with a mechanically attached separation board prior to application of a new coal tar assembly. If an existing coal tar assembly is to be covered with an asphalt applied roofing system, only the separation board is acceptable. The attachment of the entire assembly, including the separation board, shall meet the design pressure requirements set forth in Chapter 16 (High-Velocity Hurricane Zones).

1521.14.3 Insulation shall have a Product Approval as a roofing component approved for use as a part of the roofing assembly. The insulation panels shall be bonded or mechanically attached in compliance with the Product Approval and RAS 117.

1521.15 Where an existing sloped roof is sheathed with spaced sheathing, any existing prepared roof covering shall be removed. New sheathing shall be applied in compliance with Chapter 16 (High-Velocity Hurricane Zones), or open spacing shall be filled with dimensional lumber to create solid wood sheathing providing the spaced sheathing is in compliance with this code. Spaced sheathing is approved for use with wood shakes and wood shingles only.

1521.16 No recover application shall take place over existing wood shingles, shakes, slate, tile or metal shingles.

1521.17 Asphaltic shingle assemblies may be applied over one existing layer of asphaltic shingles having not more than $\frac{1}{8}$ -inch (3.2 mm) difference in level in the existing shingle material. Recover over an existing shingle system shall be with a product having a Product Approval as prepared roof covering, in strict compliance with the application method detailed in the product approval.

1521.18 Sprayed polyurethane foam (PUF) and elastomeric coating systems may be applied over existing roofing assemblies providing the PUF system has obtained a product approval, the deck has been prepared in compliance with the product approval and this code, the application is in strict compliance with the foam manufacturer's published application instructions for the environmental conditions at the time of application and post-application inspections conform to RAS 109.

1521.18.1 No PUF and/or elastomeric coating systems shall be applied over existing composition shingles.

1521.18.2 Upon completion of a PUF system, an inspection of the system shall be carried out by an authorized representative of the coating manufacturer. A certification shall be furnished to the building official within 30 days of completion, confirming that the quality control tests detailed in the PUF system Product Approval have been carried out with satisfactory results.

1521.18.3 Should a PUF system have inadequate adhesion to meet the design pressures, as set forth in Chapter 16 (High-Velocity Hurricane Zones), the roofing system shall be removed and replaced with a roofing system tested to adequate adhesion. An additional inspection shall be required once the roofing system has been replaced. A field adhesion test may be requested by the building official during the application or at the completion of the project to confirm adequate adhesion.

1521.18.4 The PUF system shall comply with Section 1521.

1521.18.5 All PUF systems shall be installed by licensed roofing contractors holding an applicator's certificate from the manufacturer holding the product approval for the PUF system.

1521.19 Roof coverings or roofing components, such as tile, slate or similar, shall not be applied over an existing roofing system.

1521.20 Lightweight insulated concrete shall not be applied over an existing roofing system unless the existing roofing assembly is verified to be adequate to accept the new light-

weight insulating concrete and is in compliance with the testing required herein.

1521.21 Existing ventilation. Ridge ventilation is recommended whenever possible to create airflow entering the soffit and exiting the ridge. Ridge ventilation shall not be installed without adequate soffit ventilation to draw outside air through the ridge void. When recovering, repairing or reroofing, the existing amount of attic ventilation shall not be reduced.

Exception:

Attic spaces, designed by a Florida licensed engineer or registered architect to eliminate the attic venting.

**SECTION 1522
HIGH-VELOCITY HURRICANE ZONES—
ROOFTOP STRUCTURES AND COMPONENTS**

1522.1 Rooftop structures. Rooftop structures shall be designed and constructed in accordance with the *Florida Building Code*.

1522.2 Rooftop mounted equipment. All rooftop equipment and supports shall be secured to the structure in compliance with the loading requirements of Chapter 16 (High-Velocity Hurricane Zones). The use of wood "sleepers" shall not be permitted.

Where equipment and appliances requiring access are installed on roofs or elevated structures at a height exceeding 16 feet (4877 mm), such access shall be provided by a permanent approved means of access, the extent of which shall be from grade or floor level to the equipment and appliances' level service space. Such access shall not require climbing over obstructions greater than 30 inches (762 mm) high or walking on roofs having a slope greater than 4 units vertical in 12 units horizontal (33-percent slope).

Permanent ladders installed to provide the required access shall comply with the following minimum design criteria:

1. The side railing shall extend above the parapet or roof edge not less than 30 inches (762 mm).
2. Ladders shall have rung spacing not to exceed 14 inches (356 mm) on center.
3. Ladders shall have a toe spacing not less than 6 inches (152 mm) deep.
4. There shall be a minimum of 18 inches (457 mm) between rails.
5. Rungs shall have a minimum 0.75-inch (19 mm) diameter and be capable of withstanding a 300-pound (136.1 kg) load.
6. Ladders over 30 feet (9144 mm) in height shall be provided with offset sections and landings capable of withstanding 100 pounds (488.2 kg/m²) per square foot.
7. Ladders shall be protected against corrosion by approved means.

Catwalks installed to provide the required access shall be not less than 24 inches (610 mm) wide and shall have railings as required for service platforms.

Exception: This section shall not apply to Group R-3 occupancies. Minimum clearances below roof mounted mechanical units shall be in accordance with Section 1509.7, *Florida Building Code, Building*.

1522.3 Machinery, piping, conduit, ductwork, signs and similar equipment may be mounted on roofs in compliance with the following:

1522.3.1 Permanently mounted rooftop equipment shall be installed to provide clearances, in accordance with Table 1522.3, to permit repairs, replacement and/or maintenance of the roofing system or any of its components.

**TABLE 1522.3
ROOF MOUNTED EQUIPMENT HEIGHT REQUIREMENTS**

WIDTH OF EQUIPMENT (in.)	HEIGHT OF LEGS (in.)
Up to 24	14
25 to 36	18
37 to 48	24
49 to 60	30
61 and wider	48

For SI: 1 inch = 25.4 mm.

1522.3.2 When reroofing, recovering, performing repair or roof maintenance, and where the roof top equipment is moved to properly execute such work, the minimum clearances of the said equipment support shall be in accordance with Table 1522.3.

1522.3.3 In buildings where the existing rooftop equipment, in the opinion of the building official, provides sufficient clearance to repair, recover, replace and/or maintain the roofing system or any of its components, such existing equipment need not comply with Table 1522.3.

1522.3.4 Electrical conduit, mechanical piping or any other service lines running on the roof shall be raised not less than 8 inches (203 mm) above the finished roof surface.

1522.3.5 Condensate lines shall not drain on the roofing system or any of its components. Condensate lines need not comply with the minimum clearance requirements.

**SECTION 1523
HIGH-VELOCITY HURRICANE ZONES—TESTING**

1523.1 Scope. This section defines the minimum testing requirements for substrates, roofing components, roofing systems and roofing assemblies. All roofing products shall be tested for physical properties, water-infiltration, uplift performance and fire resistance, as addressed within this code.

1523.1.1 Testing requirements for physical properties of all roofing products shall be as set forth in TAS 110.

1523.1.2 Testing requirements for fire resistance shall be in compliance with ASTM E 108 or UL 790.

1523.2 Application. Testing for substrates, roofing components, roofing systems and roofing assemblies shall comply with the provisions herein and those of *Florida Building Code, Building*, TAS and RAS listed in this code.

1523.3 Laboratory certification. All testing required by this code shall be performed by an approved testing laboratory.

1523.4 Margin of safety. A margin of safety of 2:1 shall be applied to all wind uplift resistance test results. All in-situ (on site) testing shall have an applied 1.45:1 margin of safety.

1523.5 Material labeling. All products shall be identified with the product approval number or logo; or the manufacturer’s name or logo. ASTM standard roll goods shall be marked with a yellow line to identify the ASTM standard, or such other marking indicated in the Product Approval.

1523.5.1 All asphaltic shingles, tile products and metal roofing panels and clips shall be labeled on the underside with the *Florida Building Code, Building* insignia, or Product Approval number, or the wording “*Florida Building Code, Building* Product Approved,” and manufacturer’s initials or manufacturer’s logo, or as specified in the manufacturer’s Product Approval.

1523.6 Testing requirements.

1523.6.1 The certification agency, at its discretion, may carry out, observe or delegate the inspection and testing to an independent testing laboratory for any approved product. Should the manufacturer fail to meet the minimum requirements set forth in this code or specifically listed in the manufacturer’s product control approval, the certification agency shall have the authority to withdraw the approval until such time as the manufacturer complies with the approved physical properties. The certification agency shall have the authority, and shall charge the manufacturer for any cost incurred.

1523.6.2 Continuous roofing systems. All continuous roofing systems shall be tested in compliance with TAS 110 and TAS 114 in its entirety. All continuous roofing systems shall resist a minimum of 90 pounds per square foot (psf) (4309 Pa) tested wind uplift pressure resistance. Continuous roofing system testing requirements shall be as follows:

1523.6.2.1 Spray applied polyurethane foam. All spray applied polyurethane foam systems shall be tested in compliance to RAS 109 and TAS 110 and TAS 114.

1523.6.2.1.1 Physical properties testing for acrylic coatings used on spray applied polyurethane foam roofing assemblies shall be tested in compliance with ASTM D 6083 and federal specification TTC-555B, *Test Specification for Wind Driven Rain Infiltration Resistance*.

1523.6.3 Liquid applied roofing membranes systems. All liquid applied roofing membranes systems shall be tested in compliance with TAS 114, in addition to the physical properties testing requirements set forth in TAS 110, and fire resistance.

1523.6.3.1 For liquid applied acrylic roofing membrane assemblies, physical properties testing shall be in compliance with ASTM D 6083 and federal specification TTC-555B, *Test Specification for Wind Driven Rain Infiltration Resistance*.

1523.6.4 The building official may request that a quality control field uplift test be carried out on a continuous roof-

ing system in compliance with test procedure TAS 124. Single-ply systems are not required to meet the deflection requirements established in the test protocol. The roofing system shall resist the design pressures as calculated in compliance with Chapter 16 (High-Velocity Hurricane Zones), and as established in TAS 124.

1523.6.4.1 Should a roofing system fail to meet a quality control field uplift test, the roofing contractor may propose to the building official an acceptable method of repair that is in compliance with the requirements of this code.

1523.6.5 Discontinuous roofing systems. All discontinuous roofing systems shall be tested in compliance with TAS 100 for wind-driven water infiltration resistance. Test specimens used for this test shall be constructed at the approved test facility. Testing requirements shall be as follows:

1523.6.5.1 Asphaltic shingle systems. All asphaltic shingle systems shall comply with the following requirements: TAS 100, TAS 107, ASTM D 3462 and ASTM D 3018. Asphaltic shingle systems shall have a quality control testing program by an approved independent listing agency having an unannounced follow-up visit. Follow-up test results shall be made available to the certification agency upon request.

1523.6.5.2 Clay and cement roof tiles. All roof tiles shall be tested in compliance with TAS 100. Physical properties testing for clay roof tiles shall be in compliance with ASTM D 1167. Physical properties testing for concrete roof tiles shall be in compliance with TAS 112. All approved roof tile manufacturers shall submit a quarterly TAS 112 Appendix A test report to the certification agency for review. All roof tiles shall resist a minimum wind uplift resistance as determined by Chapter 16 (High-Velocity Hurricane Zones) of this code and RAS 127. Clay and cement roof tile systems requirements are as follows:

1523.6.5.2.1 Underlayment. All underlayments used in discontinuous roof tile systems shall be tested in compliance with TAS 103 and TAS 104, unless otherwise specifically listed in the applicable RAS.

1523.6.5.2.2 Mortar or adhesive set tile systems. All mortar or adhesive set tile systems shall be tested for static uplift resistance in compliance with TAS 101, the results of which shall be listed in the system manufacturer's Product Approval.

1523.6.5.2.2.1 Additionally, roof tile system manufacturers may test for wind characteristics in compliance with TAS 108, provided the system is determined to be air permeable by testing in compliance with TAS 116; and the tiles meet the size criteria set forth in TAS 108. The result from this testing shall be an aerodynamic multiplier (λ) which represents the system's wind characteristics and shall be listed in the system manufacturer's Product Approval.

1523.6.5.2.2.2 Systems which are tested for wind characteristics, in compliance with TAS 108 as

specified above, shall have the results of the TAS 101 testing treated as attachment resistance moment (M_f), which is representative of the tile bond's resistance to overturning moment, and the tile's restoring moment due to gravity (M_g). Such systems shall use the system's aerodynamic multiplier (l) in conjunction with the system's attachment resistance moment (M_f) and restoring moment due to gravity (M_g), as determined from the TAS 101 static uplift testing. These results shall be used in conjunction with the attachment calculations outlined in RAS 127 as a moment-based system. Such calculations shall be submitted to the building official for review.

1523.6.5.2.2.3 Systems that are not tested in compliance with TAS 108 as specified above shall have their product control approval based on the system's uplift minimum characteristic resistance force (F'), as determined from TAS 101 static uplift testing. These results shall be used in conjunction with the attachment calculations outlined in RAS 127 as an uplift-based system. Such calculations shall be submitted to the building official for review.

1523.6.5.2.2.4 Testing in accordance with TAS 106 shall be considered a product application quality control test to determine the general adhesion properties of the system.

1523.6.5.2.3 Mechanically fastened, rigid roofing systems. All mechanically attached set tile systems shall be tested for static uplift resistance in compliance with TAS 102 or TAS 102(A), the results of which shall be listed in the system manufacturer's NOA.

1523.6.5.2.3.1 Additionally, roof tile system manufacturers may test for wind characteristics in compliance with TAS 108, provided the system is determined to be air permeable by testing in compliance with TAS 116; and the tiles meet the size criteria set forth in TAS 108. The result from this testing shall be an aerodynamic multiplier (k) which represents the system's wind characteristics and shall be listed in the system manufacturer's Product Approval.

1523.6.5.2.3.2 Systems which are tested for wind characteristics in compliance with TAS 108 as specified above shall have the results of the TAS 102 or TAS 102(A) testing treated as an attachment resistance moment (M_f) which is representative of the rigid component's attachment resistance to an overturning moment, and the tile's restoring moment due to gravity (M_g). Such systems shall use the system's aerodynamic multiplier (k), in conjunction with the system's attachment resistance moment (M_f) and restoring moment due to gravity (M_g), as determined from the TAS 102 or TAS 102(A) static uplift testing. These results shall be used in conjunction with the attachment

calculations outlined in RAS 127 as a moment-based system. Such calculations shall be submitted to the building official for review.

1523.6.5.2.3.3 Systems that are not tested in compliance with TAS 108 as specified above shall have their product control approval based on the system's uplift minimum characteristic resistance force (F'), as determined from TAS 102 or TAS 102(A) static uplift testing. These results shall be used in conjunction with the attachment calculations outlined in RAS 127 as an uplift-based system. Such calculations shall be submitted to the building official for review.

1523.6.5.2.3.4 TAS 106 quality control field static uplift testing shall be considered a product application quality control test to determine the general uplift resistance properties of the system.

1523.6.5.2.4 Metal shingles/panels. All metal roofing shall be tested in compliance with TAS 100. All metal roofing shall resist a minimum wind uplift resistance as determined by Chapter 16 (High-Velocity Hurricane Zones) for a roof slope of 9.5 degrees (0.0166 rad) and a roof mean height of 15 feet (4.6 m). All metal roofing systems testing requirements shall be as follows:

1523.6.5.2.4.1 All metal roofing shall be test in compliance with requirements set forth in TAS 110 and TAS 125, and shall be tested for wind driven rain infiltration resistance in compliance with TAS 100.

1523.6.5.2.4.2 Rigid metal shingle systems may be tested in an identical manner to nail-on or batten tile systems as set forth in this code.

1523.6.5.2.5 Wood shingles or shakes. All wood shingles and shakes shall be tested, as a system, for wind driven rain infiltration resistance in compliance with TAS 100. The same specimens as tested in TAS 100 shall be tested for pull-through tear resistance, and such values shall be listed in the manufacturer's Product Approval.

1523.6.5.2.6 Fiber cement shingle or tile panels. All fiber cement shingles or tiles shall resist a minimum wind uplift resistance as determined by Chapter 16 (High-Velocity Hurricane Zones) for a roof slope of 9.5 degrees (0.0166 rad) and a roof mean height of 15 feet (4.6 m). All fiber cement shingle or tiles shall be tested in compliance with the following requirements. Wind driven water resistance in compliance with TAS 100, physical properties in compliance with TAS 110, TAS 135 and uplift resistance.

1523.6.5.2.6.1 Additionally, fiber cement tile system manufacturers may test for wind characteristics in compliance with TAS 108, provided the system is determined to be air permeable by testing in compliance with TAS 116 and the tiles meet the size criteria set forth in TAS 108. The result from this testing shall be an aerodynamic multiplier (k) which represents the system's wind characteristics

and shall be listed in the system manufacturer's Product Approval.

1523.6.5.2.6.2 Systems which are tested for wind characteristics in compliance with TAS 108 as specified above shall have the results of the TAS 102 or TAS 102(A) testing treated as an attachment resistance moment (M_f) which is representative of the rigid component's attachment resistance to an overturning moment, and the tile's restoring moment due to gravity (M_g). Such systems shall use the system's aerodynamic multiplier (λ), in conjunction with the system's attachment resistance moment (M_f) and restoring moment due to gravity (M_g), as determined from the TAS 102 or TAS 102(A) static uplift testing. These results shall be used in conjunction with the attachment calculations outlined in RAS 127 as a moment-based system. Such calculations shall be submitted to the building official for review.

1523.6.5.2.6.3 Systems that are not tested in compliance with TAS 108 as specified above shall have their product approval based on the system's uplift minimum characteristic resistance force (F'), as determined from TAS 102 or TAS 102(A) static uplift testing. These results shall be used in conjunction with the attachment calculations outlined in RAS 115 as an uplift-based system. Such calculations shall be submitted to the building official for review.

1523.6.5.2.6.4 TAS 106 quality control field static uplift testing shall be considered a product application quality control test to determine the general uplift resistance properties of the system.

1523.6.5.2.7 Quarry roof slate. All quarry roof slate shall be tested in compliance with TAS 100 and TAS 110.

1523.6.5.2.8 Roof board insulation. All roof board insulation shall be tested for physical properties as set forth in Section 7 of TAS 110.

1523.6.5.2.9 Insulation fasteners, membrane fasteners and stress plates. All insulation fasteners, membrane fasteners and stress plates shall be tested in compliance with RAS 117 Appendices A, B and C, and TAS 110 and TAS 114, Appendix E, Section 3, (DIN 50018), for corrosion resistance.

1523.6.5.2.10 Roofing nails and tin-caps. All roofing nails and tin-caps shall be tested for corrosion resistance in compliance with TAS 114, Appendix E, Section 2 (ASTM G 85).

1523.6.5.2.11 Roof tile nails or fasteners. All roof tile nails or fasteners, except those made of copper, monel, aluminum or stainless steel, shall be tested for corrosion in compliance with TAS 114, Appendix E, Section 2 (ASTM G 85), for salt spray for 1000 hr.

1523.6.5.2.11.1 Tile fasteners used in coastal building zones, as defined in Chapter 16

(High-Velocity Hurricane Zone), shall be copper, monel, aluminum or stainless steel.

1523.6.5.2.12 Roofing adhesives, mastics and coatings. All roofing adhesives, mastics and coatings shall be tested in compliance with TAS 110 and TAS 121.

1523.6.5.2.12.1 All roofing adhesives, mastics and coatings shall have a quality control testing program by an approved independent listing agency having unannounced follow-up visits.

1523.6.5.2.12.2 Acrylic roof coatings shall be tested for physical properties in compliance with ASTM D 6083.

1523.6.5.2.13 Ridge vents of metal, plastic or composition material. All ridge vents shall be tested in compliance with TAS 100(A) for for wind driven water infiltration. All ridge ventilators shall be restricted to roof mean height as tested in compliance with TAS 100(A), and shall be listed in the system manufacturer's Product Approval.

1523.6.5.2.13.1 All plastic ridge ventilators shall be tested for physical properties as set forth in TAS 110 and Chapter 26 of this code.

1523.6.5.2.13.2 All plastic ridge ventilator manufacturers shall have an unannounced follow-up quality control program from an approved listing agency. Follow-up test results shall be made available to the certification agency upon request.

1523.6.5.2.14 Edge metal, flashings, and coping. All edge metal, flashing and copings, not specifically described in RAS 111, shall be tested in compliance with TAS 110, TAS 111(A), TAS 111(B) or TAS 111(C), respectively.

1523.6.5.2.15 Roof tile pre-mixed bagged mortar. All premixed roof tile mortar shall comply with the requirements set forth in TAS 110 and TAS 123, and shall have a quality control testing program by an approved independent listing agency having unannounced follow-up visits. Follow-up test results shall be made available to the certification agency upon request.

1523.6.5.2.16 Roof tile adhesive used in repair or supplemental tile attachment. All roof tile adhesive used in repair or supplemental tile attachment shall comply with the requirements set forth in TAS 110 and TAS 123(A).

1523.6.5.2.17 Roof tile adhesive used in adhesive set tiles systems. All roof tile adhesive used in adhesive set tile systems shall comply with the requirements set forth in TAS 110 and TAS 123. Physical properties shall be as follows:

1523.6.5.2.17.1 Tested for compressive strength in compliance with ASTM D 1621 with a minimum strength of 18 psi (121 kPa) parallel to rise, and 12 psi (82.7 kPa) perpendicular to rise.

1523.6.5.2.17.2 Tested for density in compliance with ASTM D 1622 with a minimum density of 1.6 lb/ft³ (25.6 kg/m³).

1523.6.5.2.17.3 Tested for tensile strength in compliance with ASTM D 1623 with a minimum requirement of 28 psi (193 kPa) parallel to rise.

1523.6.5.2.17.4 Tested for dimensional stability taken from a free rise sample specimen. Tested in compliance with ASTM D 2126 with a maximum volume change of +0.07 percent volume change at -40°F (-40°C) for two weeks; and +6.0 percent volume change at 158°F (70°C) and 100 percent RH for two weeks.

1523.6.5.2.17.5 Tested in compliance with ASTM D 2856 from a free rise sample specimen with a minimum requirement for 85 percent.

1523.6.5.2.17.6 Tested for water absorption in compliance with ASTM D 2842 with a maximum requirement of 10 percent.

1523.6.5.2.17.7 Tested in compliance with ASTM E 96 for moisture vapor transmission for a maximum of 3.1 perms.

SECTION 1524 HIGH-VELOCITY HURRICANE ZONES— REQUIRED OWNERS NOTIFICATION FOR ROOFING CONSIDERATIONS

1524.1 Scope. As it pertains to this section, it is the responsibility of the roofing contractor to provide the owner with the required roofing permit, and to explain to the owner the content of this section. The provisions of Chapter 15 of the *Florida Building Code, Building* govern the minimum requirements and standards of the industry for roofing system installations. Additionally, the following items should be addressed as part of the agreement between the owner and the contractor. The owner's initial in the designated space indicates that the item has been explained.

- 1. Aesthetics-workmanship:** The workmanship provisions of Chapter 15 (High-Velocity Hurricane Zone) are for the purpose of providing that the roofing system meets the wind resistance and water intrusion performance standards. Aesthetics (appearance) are not a consideration with respect to workmanship provisions. Aesthetic issues such as color or architectural appearance, that are not part of a zoning code, should be addressed as part of the agreement between the owner and the contractor.
- 2. Renailing wood decks:** When replacing roofing, the existing wood roof deck may have to be renailed in accordance with the current provisions of Chapter 16 (High-Velocity Hurricane Zones) of the *Florida Building Code, Building*. (The roof deck is usually concealed prior to removing the existing roof system.)
- 3. Common roofs:** Common roofs are those which have no visible delineation between neighboring units (i.e., townhouses, condominiums, etc.). In buildings with

common roofs, the roofing contractor and/or owner should notify the occupants of adjacent units of roofing work to be performed.

4. **Exposed ceilings:** Exposed, open beam ceilings are where the underside of the roof decking can be viewed from below. The owner may wish to maintain the architectural appearance; therefore, roofing nail penetrations of the underside of the decking may not be acceptable. The owner provides the option of maintaining this appearance.
5. **Ponding water:** The current roof system and/or deck of the building may not drain well and may cause water to pond (accumulate) in low-lying areas of the roof. Ponding can be an indication of structural distress and may require the review of a professional structural engineer. Ponding may shorten the life expectancy and performance of the new roofing system. Ponding conditions may not be evident until the original roofing system is removed. Ponding conditions should be corrected.
6. **Overflow scuppers (wall outlets):** It is required that rainwater flow off so that the roof is not overloaded from a buildup of water. Perimeter/edge walls or other roof extensions may block this discharge if overflow scuppers (wall outlets) are not provided. It may be necessary to install overflow scuppers in accordance with the requirements of: Chapter 15 and 16 herein and the *Florida Building Code, Plumbing*.
7. **Ventilation:** Most roof structures should have some ability to vent natural airflow through the interior of the structural assembly (the building itself). The existing amount of attic ventilation shall not be reduced.

Exception:

Attic spaces, designed by a Florida licensed engineer or registered architect to eliminate the attic venting, venting shall not be required.

Owner's/Agent's Signature Date Contractor's Signature

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