Roof Assemblies

June 2020

SIGNIFICANT CHANGES TO ROOFING REQUIREMENTS IN THE 7TH EDITION (2020) FLORIDA BUILDING CODE – BUILDING, RESIDENTIAL, AND EXISTING BUILDING

Overview

The 7th Edition (2020) Florida Building Code includes several key changes to the requirements for roof assemblies. Many changes strengthen the code to improve the resistance wind and water infiltration damage. Several of the changes apply to both new construction and roof replacement. This Fact Sheet provides a summary of the following key changes:

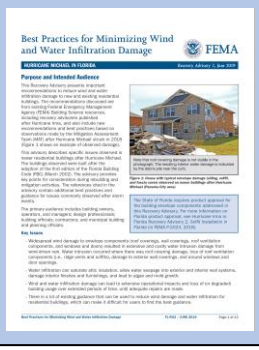
- Changes to roofing underlayment (sealed roof deck)
- Changes to wind loads on roofs (ASCE 7-16)
- Roof mitigation
- Roof diaphragms resisting wind loads in high-wind regions
- Soffits
- Cable- and raceway-type wiring methods on roofs

Underlayment (Sealed Roof Deck)

The requirements for type and installation of underlayment in the 7th Edition (2020) Florida Building Code, Building (FBCB) and the Florida Building Code, Residential (FBCR) have been strengthened. The new underlayment requirements are consistent with those recommended by the Insurance Institute for Business and Home Safety (IBHS) to create a sealed roof deck (SRD). When the primary roof covering is lost due to a wind event such as a hurricane, water infiltration can cause extensive damage to interior finishes, furnishings, and other contents, and can lead to ceiling collapse when insulation is saturated. Also, where power is lost and/or a building cannot otherwise be quickly dried out, mold growth is common. Research by IBHS demonstrates that a sealed roof deck can significantly reduce the amount of water infiltration when the primary roof covering is lost.

FEMA Hurricane Michael in Florida Recovery Advisory 2

FEMA Hurricane Michael in Florida, Recovery Advisory 2 *Best Practices for Minimizing Wind and Water Infiltration Damage* provides guidance on creating a Sealed Roof Deck and additional recommendations for reducing wind and water infiltration damage to new and existing residential buildings. (https://www.fema.gov/media-library/resources-documents/collections/24f)



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The key differences from the 6th Edition (2017) FBCB and FBCR are

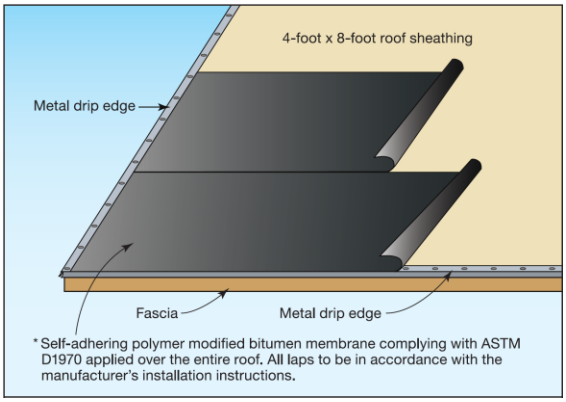
- where felt underlayment is used, it must be 30# or equivalent (ASTM D 226 Type II, ASTM D4869 Types III or IV)
- installation techniques such as number of plies, lapping, and fastener spacing has been strengthened

There are essentially three options for creating a sealed roof deck that vary a bit depending on the type of roof covering. A summary of the three options is as follows:

Option #1 – a self-adhering polymer-modified bitumen underlayment complying with ASTM D1970 applied over the entire roof.

Option #2 – a minimum 4-inch wide strip of self-adhering polymer-modified bitumen complying with ASTM D1970 or a minimum 3 ¾ - inch wide strip of self-adhering flexible flashing tape complying with AAMA 711, applied over all joints in the roof decking. A felt underlayment complying with ASTM D226 Type II, ASTM D4869 Type III or IV, or ASTM D6757, or a synthetic underlayment meeting the performance requirements specified, is required to be applied over the strips/tape over the entire roof. (See Table 1507.1.1.1 of the FBCB or Table R905.1.1.1 of the FBCR for fastener type and spacing).

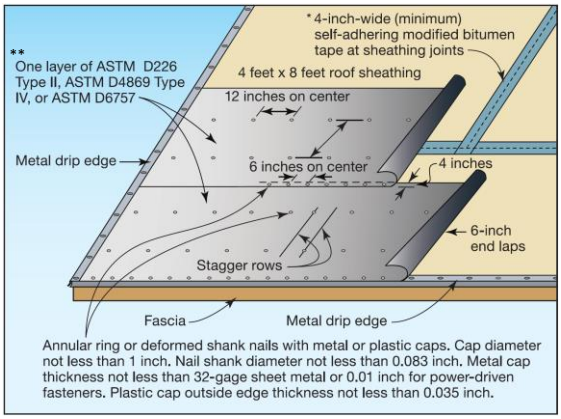
Option #3 – two layers of felt underlayment comply ASTM D226 Type II or ASTM D4869 Type III or IV, or two layers of a synthetic underlayment meeting the performance requirements specified, lapped and fastened as specified.



Source: FEMA Hurricane Michael in Florida Recovery Advisory 2

Sealed Roof Deck Option #1

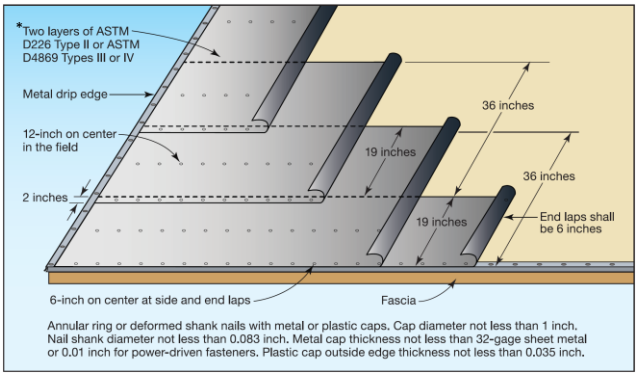
*3 ¾ inch AAMA 711 flashing tape is also permitted.
**Synthetic underlayment meeting the performance requirements specified is also permitted.



Source: FEMA Hurricane Michael in Florida Recovery Advisory 2

Sealed Roof Deck Option #2

*Synthetic underlayment meeting the performance requirements specified is also permitted.



Source: FEMA Hurricane Michael in Florida Recovery Advisory 2

Sealed Roof Deck Option #3

For asphalt, metal, mineral surfaced, slate and slate-type roof coverings, Options 1, 2, or 3 are permitted. For concrete and clay roof tile, underlayment is required to be in accordance with the FRSA/TRI *Florida High Wind Concrete and Clay Roof Tile Installation*

Manual, Sixth Edition. For wood shakes and shingles, Options 2 and 3 are permitted. It's worth noting that these requirements do not apply to the High-Velocity Hurricane Zones (HVHZ). For additional details see Section 1507.1.1 of the 7th Edition (2020) FBCB and Section R905.1.1 of the 7th Edition (2020) FBCR.

A new exception to Section1507.1.1.1 in the FBCB permits an existing self-adhered membrane to remain on the roof provided that, if required, re-nailing of the roof deck in accordance with Section 706.7.1 of the FBCEB can be confirmed or verified. An approved underlayment for the applicable roof coverings is required to be applied over the existing self-adhered membrane.

Wind Loads on Roofs (ASCE 7-16)

BASF Wind Loads – Impacts from ASCE 7-16 Fact Sheet

The BASF Wind Loads – Impacts from ASCE 7-16 Fact Sheet provides an overview of the significant changes to wind loads in ASCE 7-16 and the 7th Edition (2020) FBC. The BASF Wind Loads – Impacts from ASCE 7-16Fact Sheet can be downloaded at www.floridabuilding.org.

Roof component and cladding loads for buildings with mean roof heights of 60 feet or less have been revised significantly from ASCE 7-10. The changes mostly result in significant increases in design wind pressures on roofs compared to ASCE 7-10. Due to changes to roof wind loads, the FRSA/TRI *Florida High Wind Concrete and Clay Roof Tile Installation Manual* has been updated to comply with ASCE 7-16.

Additionally, the prescriptive fastening requirements for wood structural panel roof sheathing in Section R803.2 of the FBCR have been updated to comply with ASCE 7-16. Two new tables have been added. Table R803.2.2 specifies the minimum sheathing thickness for framing spaced 24 inches on center based on exposure category and wind speed. An excerpt of Table R803.2.2 is shown in the next column.

While ring shank nails are still required, the nail size depends on the sheathing thickness. Where the sheathing thickness is 15/32 inches and less, roof sheathing is required to be fastened with ASTM F1667 RSRS-01 (2 3/8" × 0.113") nails. Where the sheathing thickness is greater than 15/32 inches, roof sheathing is required to be fastened with ASTM F1667 RSRS-03 (2 ½" × 0.131") nails or ASTM F1667 RSRS-04 (3" × 0.120") nails. The RSRS designation indicates the fastener is a ring shank roof sheathing nail.

Excerpt of Table R803.2.2
7th Edition (2020) FBCR

Table R803.2.2
Minimum Roof Sheathing Thickness
(*excerpt*)

Roof Sheathing Thickness			
Rafter/Truss Spacing 24 in. o.c.	**Wind Speed**		
	140 mph	150 mph	160 mph
Minimum Sheathing Thickness, inches (Panel Span Rating) Exposure B	7/16 (24/16)	15/32 (32/16)	19/32 (40/20)
Minimum Sheathing Thickness, inches (Panel Span Rating) Exposure C	19/32 (40/20)	19/32 (40/20)	19/32 (40/20)
Minimum Sheathing Thickness, inches (Panel Span Rating) Exposure D	19/32 (40/20)	19/32 (40/20)	19/32 (40/20)

Table R803.2.3.1 specifies the maximum fastener spacing based on framing specific gravity, exposure category, and wind speed. An excerpt of Table R803.2.3.1 is shown below.

Excerpt of Table R803.2.3.1
7th Edition (2020) FBCR

Table R803.2.3.1
Roof Sheathing Attachment[a,b]
(*excerpt*)

Roof Sheathing Attachment						
Rafter/Truss Spacing 24 in. o.c.	**Wind Speed**					
	140 mph		**150 mph**		**160 mph**	
	E	**F**	**E**	**F**	**E**	**F**
Exposure B						
Rafter/Truss SG = 0.42	6	6	6	6	4	4
Rafter/Truss SG = 0.49	6	6	6	6	6	6
Exposure C						
Rafter/Truss SG = 0.42	4	4	4	4	4	4
Rafter/Truss SG = 0.49	6	6	6	6	6	6
Exposure D						
Rafter/Truss SG = 0.42	4	4	4	4	3	3
Rafter/Truss SG = 0.49	6	6	4	4	4	4

Roof Mitigation (FBCEB and FBCR)

The Florida Building Code, Existing Building (FBCEB) has historically required a certain level of mitigation on roof assemblies when existing roofs are removed and replaced. This is primarily because the best time to perform mitigation on roof assemblies is when the roof covering is removed. Sections 706.7 and 706.8 in the FBCEB (Sections R908.7 and R908.8 in the FBCR) required that where roof covering is removed and replaced on a site-built single-family dwelling permitted prior to the implementation of the FBC, the following mitigation measures to be completed:

- Adding supplement ring shank fasteners to attach the roof decking where the existing deck has insufficient fasteners such as staples or 6d nails or where the spacing of fasteners is lacking (see Table 706.7.1).
- Applying a secondary water barrier (similar to the sealed roof deck that will now be required outside the HVHZ).
- Install roof to wall connections in some circumstances.

The 7th Edition (2020) FBCEB has expanded the required mitigation techniques to apply to all buildings with wood roof decks not just site-built single-family buildings. Buildings such as apartments, office buildings, and modular buildings with wood roof decks will now be required to comply with mitigation provisions of 706.6 and 706.7 of the FBCEB.

Section 706.7
7th Edition (2020) FBCEB

706.7 Mitigation. When a roof covering on an existing structure with a sawn lumber, wood plank, or wood structural panel roof deck is removed and replaced, the following procedures shall be permitted to be performed by the roofing contractor:

(a) Roof-decking attachment shall be as required by Section 706.7.1.
(b) A secondary water barrier shall be provided as required by Section 706.7.2.

Exception: Structures permitted subject to the Florida Building Code are not required to comply with this section.

In the 6th Edition (2017) FBCEB, where roofing materials are removed from more than 50 percent of the roof diaphragm, Section 707.3.2 required an evaluation of the roof diaphragm, its connection to roof framing, and roof-to-wall connections. Where they were not capable of resisting75% of current wind loads, they were required to be replaced or strengthened. The applicability of this section has been reduced significantly in the 7th Edition (2020). The evaluation and potential strengthening required now only apply where structural deck is removed from more than 30 percent of the structural roof diaphragm.

Section 707.3.2
7th Edition (2020) FBCEB

707.3.2 Roof diaphragms resisting wind loads in high-wind regions. Where the structural roof deck is removed from more than 30 percent of the structural diaphragm or section of a building located where the ultimate design wind speed, V_{ult}, is greater than 115 mph, as defined in Section 1609 (the HVHZ shall comply with Section 1620) of the *Florida Building Code, Building*, roof diaphragms, connections of the roof diaphragm to roof framing members, and roof-to-wall connections shall be evaluated for the wind loads specified in the *Florida Building Code, Building*, including wind uplift. If the diaphragms and connections in their current condition are not capable of resisting at least 75 percent of those wind loads, they shall be replaced or strengthened in accordance with the loads specified in the *Florida Building Code, Building*.

Exception: This section does not apply to buildings permitted subject to the Florida Building Code.

FEMA Hurricane Irma in Florida Recovery Advisory 3

FEMA Hurricane Irma in Florida, Recovery Advisory 3 *Mitigation Triggers for Roof Repair and Replacement in the 6th Edition (2017) Florida Building Code* provides an in depth analysis of the roof repair and replacement mitigation triggers in the FBC. (https://www.fema.gov/media-library/resources-documents/collections/24)


Mitigation Triggers for Roof Repair and Replacement in the 6th Edition (2017) Florida Building Code

FEMA

HURRICANE IRMA IN FLORIDA

Recovery Advisory 3, May 2018

Purpose and Intended Audience

Soffits (FBCR)

Field investigations in the aftermath hurricanes have identified widespread failure of soffits on buildings built to the FBC. Problems with soffits have been observed as far back as the 2004 Hurricane Season (Hurricanes Charley, Frances, Jeanne, and Ivan). When soffits fail, wind driven rain can enter the attic area of a building unimpeded resulting significant water intrusion damage. Design wind loads for soffits were added to the 2007 FBCB and FBCR. The FEMA Hurricane Irma and Hurricane Michael Mitigation Assessment Team (MAT) reports noted that many soffit failures were due to poor installation. To improve soffit installation, the 7th Edition (2020) FBCR contains a new section specifically addressing design wind loads and installation details for soffits. Prescriptive details have been added for various soffit materials including vinyl, fiber-cement, hardboard, and wood structural panel soffit. Two new figures that clearly depict the appropriate installation of vinyl soffit panels have been added. These new figures limit the span of vinyl soffit panels to 12 inches (unless the Product Approval specifies otherwise) and illustrate that vinyl soffit panels have to be fastened at both ends of the panel – at the fascia ad at the wall. Additionally, a new prescriptive table for wood structural panel soffit has been added that specifies the minimum wood structural panel thickness, fastener size and fastener spacing to meet the tabulated design wind pressure.

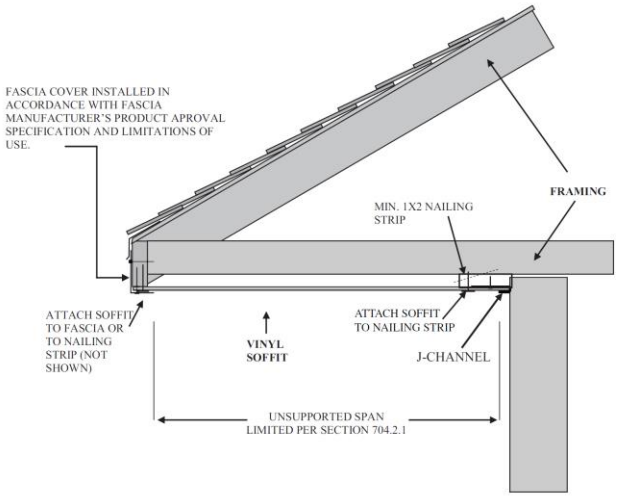


FIGURE R704.2.1
TYPICAL SINGLE-SPAN VINYL SOFFIT PANEL SUPPORT

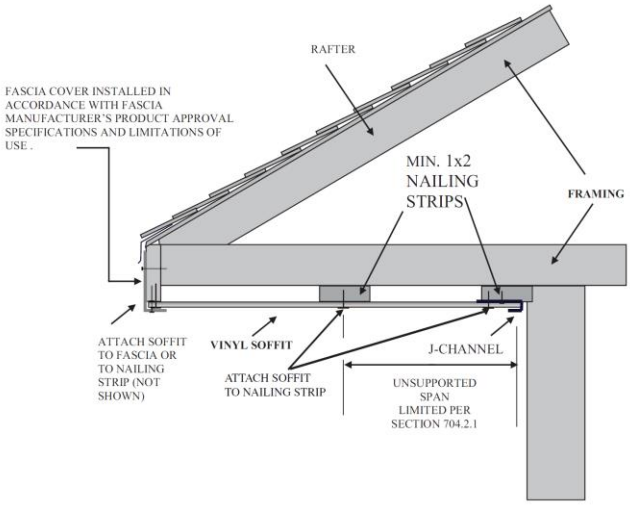
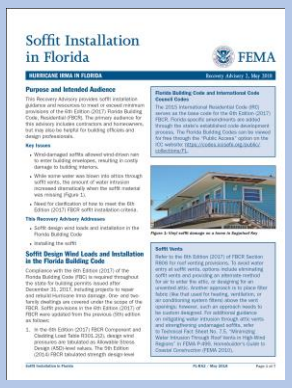


FIGURE R704.2.1
TYPICAL MULTI-SPAN VINYL SOFFIT PANEL SUPPORT

FEMA Hurricane Irma in Florida Recovery Advisory 2

FEMA Hurricane Irma in Florida, Recovery Advisory 2 *Best Soffit Installation in Florida* provides additional soffit installation and guidance to meet the FBC. (https://www.fema.gov/media-library/resources-documents/collections/24)


Soffit Installation in Florida

FEMA

HURRICANE IRMA IN FLORIDA

Purpose and Intended Audience

Florida Building Code and International Code Council Codes

Key Issues

This Recovery Advisory Addresses

Soffit Design Wind Loads and Installation in the Florida Building Code

Soffit Vents

Cable- and Raceway-type Wiring Methods on Roofs

When reroofing, the presence of cable- and race-way wiring systems embedded within a roof assembly or installed under and close to metal roof decking can present a particular hazard in the event of accidental damage to metal electrical conduit during reroofing operations. To provide additional protection against accidental damage, the code now requires metal electrical conduit to be encased in concrete or supported above the roof covering when installed on roofs. Additionally, where metal electrical conduit is installed under corrugated metal sheet roof decking, it has to be located not less than 1.5 inches from the lowest surface of the roof decking.

Resources

Florida Building Code, www.floridabuilding.org

International Code Council, www.iccsafe.org

Insurance Institute for Business and Home Safety, www.ibhs.org

American Society of Civil Engineers, www.asce.org

FRSA - Florida Roofing and Sheet Metal Contractors Association (www.floridaroof.com)

FEMA Hurricane Michael in Florida Recovery Advisory 2, *Best Practices for Minimizing Wind and Water Infiltration Damage*, https://www.fema.gov/media-library-data/1560174739479-8856110e0c3fa30e750370dc5129348a/MichaelRA2_060719_508_FNALforposting.pdf

FEMA P-2077 Hurricane Michael in Florida Mitigation Assessment Team Report, https://www.fema.gov/media-library/assets/documents/186057

FEMA P-2023 Hurricane Irma in Florida Mitigation Assessment Team Report, https://www.fema.gov/media-library/assets/documents/176315

Significant Changes to the Minimum Design Load Provisions of ASCE 7-16, https://sp360.asce.org/PersonifyEbusiness/Merchandise/Product-Details/productId/233136876

Don't know where to go for an answer to a specific question?

Contact: Florida Building Commission 850-487-1824 www.floridabuilding.org

Contact: Building A Safer Florida, Inc. 850-222-2772 www.buildingasaferflorida.org