Roof Assemblies – Significant Changes to Roofing Requirements in the 7th Edition (2020) Florida Building Code

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 of wind and water infiltration damage. Several of the changes apply to both new construction and roof replacement. The information in this article 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)

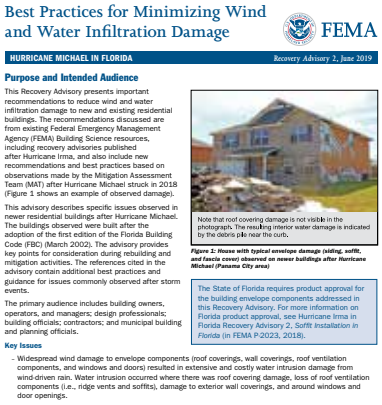
The requirements for the type and installation of underlayment in the 7th Edition (2020) Florida Building Code, Building (FBCB) and the Florida Building Code, Residential (FBCR) have been strengthened. The new underlayment requirements are consistent with those recommended by the Insurance Institute 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 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.

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 have 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 follows:

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


Best Practices for Minimizing Wind and Water Infiltration Damage

FEMA

HURRICANE MICHAEL IN FLORIDA — Recovery Advisory 2, June 2019

Purpose and Intended Audience

This Recovery Advisory presents important recommendations to reduce wind and water infiltration damage to new and existing residential buildings. The recommendations discussed are from existing Federal Emergency Management Agency (FEMA) Building Science resources, including recovery advisories published after Hurricane Irma, and also include new recommendations and best practices based on observations made by the Mitigation Assessment Team (MAT) after Hurricane Michael struck in 2018 (Figure 1 shows an example of observed damage).

This advisory describes specific issues observed in newer residential buildings after Hurricane Michael. The buildings observed were built after the adoption of the first edition of the Florida Building Code (FBC) (March 2002). The advisory provides key points for consideration during rebuilding and mitigation activities. The references cited in the advisory contain additional best practices and guidance for issues commonly observed after storm events.

The primary audience includes building owners, operators, and managers; design professionals; building officials; contractors; and municipal building and planning officials.

Key Issues

- Widespread wind damage to envelope components (roof coverings, wall coverings, roof ventilation components, and windows and doors) resulted in extensive and costly water intrusion damage from wind-driven rain. Water intrusion occurred where there was roof covering damage, loss of roof ventilation components (i.e., ridge vents and soffits), damage to exterior wall coverings, and around windows and door openings.

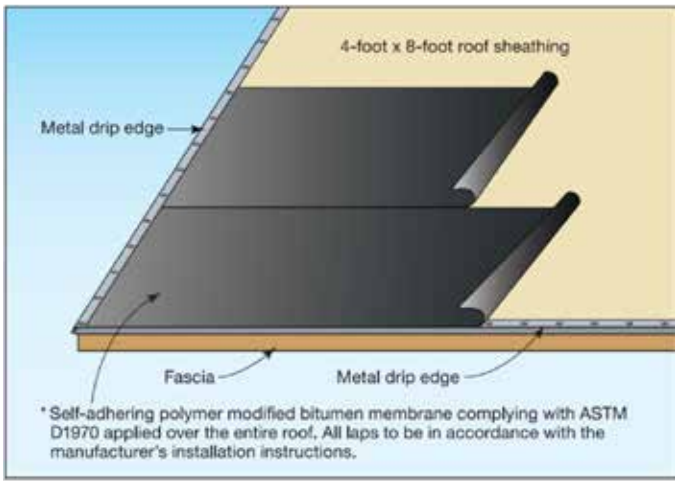
Note that roof covering damage is not visible in the photograph. The resulting interior water damage is indicated by the debris pile near the curb.

Figure 1: House with typical envelope damage (siding, soffit, and fascia cover) observed on newer buildings after Hurricane Michael (Panama City area)

The State of Florida requires product approval for the building envelope components addressed in this Recovery Advisory. For more information on Florida product approval, see Hurricane Irma in Florida Recovery Advisory 2, *Soffit Installation in Florida* (in FEMA P-2023, 2018).

(https://www.fema.gov/media-library/resources-documents/collections/24f)

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

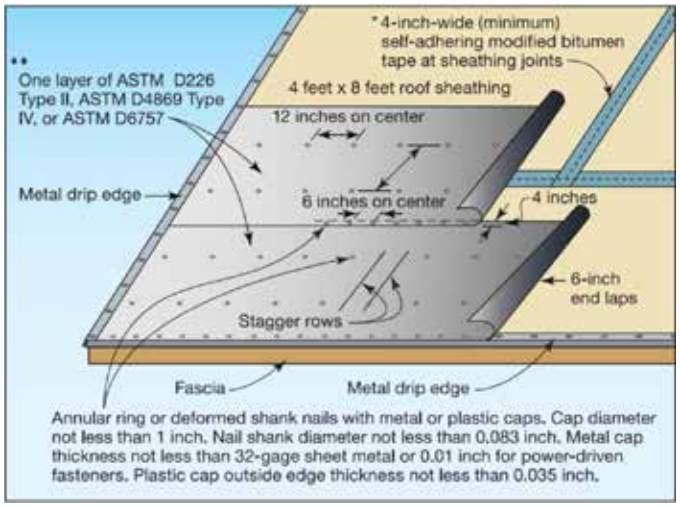


Sealed Roof Deck Option #1

**3-3/4-inch AAMA 711 flashing tape is also permitted.*
***Synthetic underlayment meeting the performance requirements specified is also permitted.*

Option #2 – A minimum 4-inch wide strip of self-adhering polymer-modified bitumen complying with ASTM D1970 or a minimum 3-3/4-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

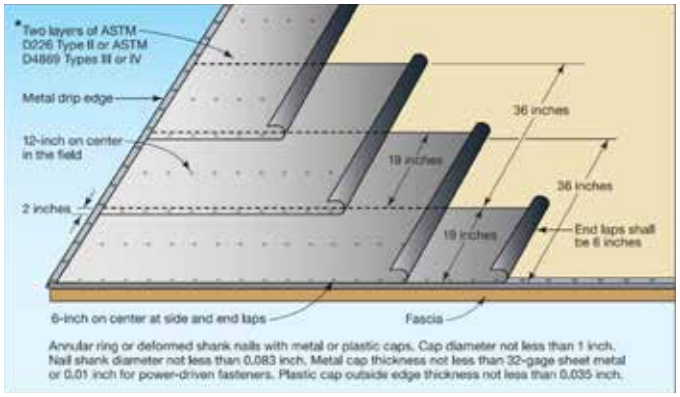
requirements specified, is required to be applied over the strips/tape over the entire roof (see Table 1507.1.1.1 of the FBCB or Table R905.1.1.1 of the FBCR for fastener type and spacing).



Sealed Roof Deck Option #2

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

Option #3 – Two layers of felt underlayment complying to 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.



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 Section 1507.1.1.1 in the FBCB permits an existing self-adhered membrane to remain on the roof provided that, if required, renailing 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.

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 7-16 Fact Sheet can be downloaded at www.floridabuilding.org.

Wind Loads on Roofs (ASCE 7-16)

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, Sixth Edition* 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 below.

Excerpt of Table R803.2.2 7th Edition (2020) FBCR Minimum Roof Sheathing Thickness (excerpt)

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

While ring shank nails are still required, the nail size depends on the sheathing thickness. Where the sheathing thickness is 15/32 inches or 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 (2-1/2" × 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.

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.

Table R803.2.3.1 Roof Sheathing Attachment (excerpt)

Roof Sheathing Attachment						
Rafter/Truss Spacing 24 in. o.c.	Wind Speed (mph)					
	140		150		160	
	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 needed to be completed:

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.

- 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.
- 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.

In the 6th Edition (2017) FBCEB, where roofing

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, Vult, 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.

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 resisting 75 percent 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 applies where the structural deck is removed from more than 30 percent of the structural roof diaphragm.

Soffits (FBCR)

Field investigations in the aftermath of hurricanes have identified widespread failure of soffits on buildings built to FBC specifications. 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 in 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 and 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

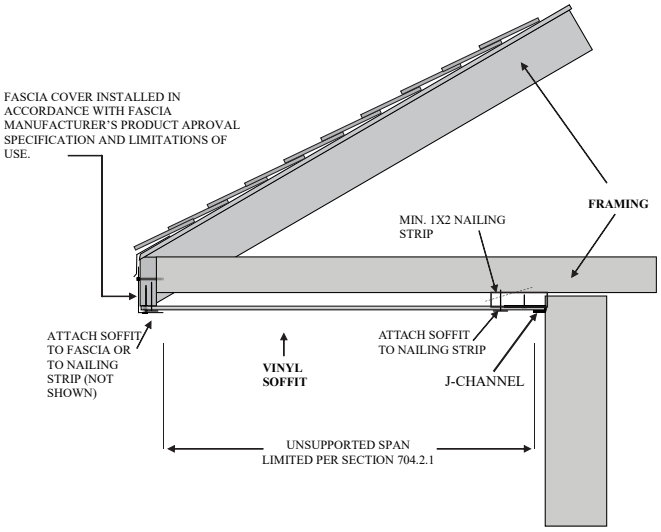
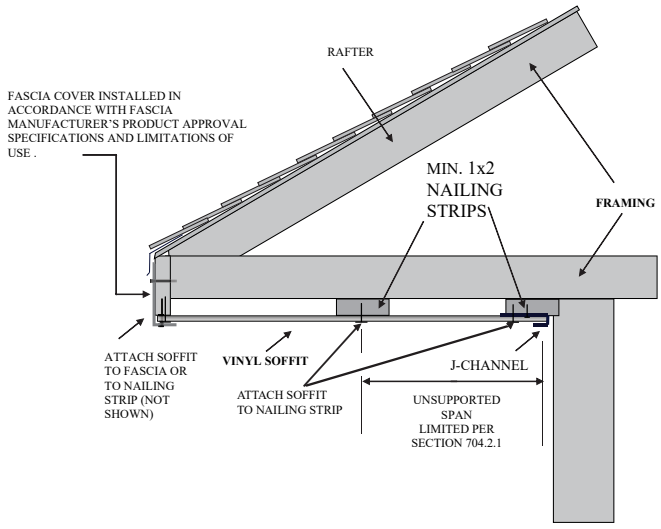


Figure R704.2.1 – Typical Multi-Span Vinyl Soffit Panel Support



Cable- and Raceway-Type Wiring Methods on Roofs

When reroofing, the presence of cable- and raceway 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

Continued on page 41

while year three training gets product specific and finishes off with a module on Leadership and Project Management.

Industry support for the program continues to be phenomenal. Unique times call for unique solutions. The Orlando and Fort Lauderdale year three groups are now combined and the format has been transitioned to primarily online learning, to adopt to COVID-19 restrictions. Trent Begley and Michael Snyder of SOPREMA provided a great overview of modified bitumen history, material composition and installation techniques. Dave Scott and Wally Brown of GAF conducted an online training session. Michael Scardina, Metal Division Manager at Advanced Roofing Inc. supported the gutter and downspout module with his extensive knowledge of metal fabrication and installation. Mike Silvers, CPRC, FRSA Technical Director, continues to provide powerful industry insight and extensive code knowledge to help apprentices understand why we do what we do.

In the coming months, PolySchool will be conducting a torch-applied modified bitumen lab and Gulf Coast Supply and Manufacturing will be conducting metal panel installation training. Sunbelt Equipment rentals will be certifying apprentices on boom lifts, scissor lifts and lulls. The group will also be installing gutter and downspouts as a charity project. Soft skills development is also a feature of the program. The goal of the ABCI Roofing Apprentice program is to expose the participants to all aspects of the roofing industry and prepare them to achieve to their full potential. The apprentices attend 450 hours of classroom and hands on labs as well as log 6,000 hours of on-the-job training during the course of the program. The ABCI Roofing Apprentice program is open to all contractors in a spirit of creating a qualified workforce for the entire industry.

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Interested in learning more about the ABCI Roofing Apprenticeship Program? Visit FRSA's website, www.floridaroof.com/roofing-apprenticeship-program and learn how you can invest in your employees', your company's and the industry's future. More information available on the next page.

FBC 2020 Changes, continued from page 34

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.

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This document was provided by Building a Safer Florida (BASF). Florida's contractors, architects, engineers and trades professionals share a common goal of building a better Florida through use of hurricane-related mitigation techniques and energy-efficiency standards. Construction professionals can meet these challenges thanks to a grant from the Florida Department of Community Affairs, Building a Safer Florida, Inc. and its affiliated organizations. For more information, visit www.buildingasaferflorida.org.

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