

# RETROFIT Improvements

Making Homes Safer & More Resilient in Disaster-Prone Areas

## Attachment of Shingles



### SCOPE

This document provides homeowners with an overview of the proper selection and attachment of asphalt shingles when repairing or replacing roofing on existing homes in coastal high-wind areas.

### PURPOSE

Proper shingle attachment can help to minimize the risk of water intrusion due to shingles being damaged or blown off the roof during a hurricane or other extreme storm.

### BENEFITS

- Protects the integrity of the shingles
- Protects roof underlayment from becoming exposed and damaged
- Protects against water damage to roof sheathing, insulation, interior finishes, and house contents
- Reduces windborne debris when roofing stays attached

### RETROFIT OPPORTUNITY

Can be installed when the entire roof is replaced or when a portion of a damaged roof is replaced.

A roof replacement is also an opportunity to enhance roof deck attachment, roof framing connections, and roofing underlayment, as needed.

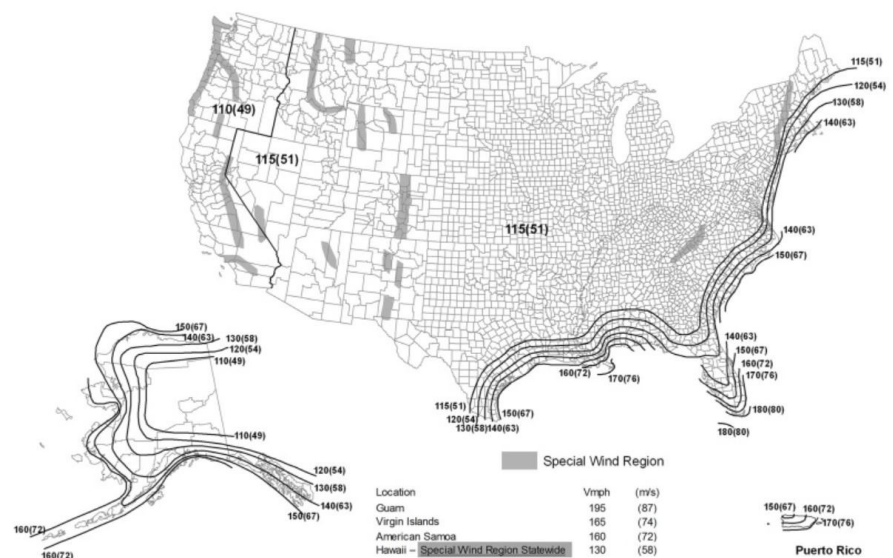
### HAZARD AND RISK

During a hurricane or other extreme storm, roof shingles can be damaged or blown off the roof, exposing the underlayment as the only protection against rainwater. A damaged roof can allow rainwater to enter the building that could saturate insulation and damage roof sheathing, ceilings, interior finishes, and household contents. Severe water damage can occur if the exposed underlayment is compromised.

### SOLUTION

Asphalt shingles properly selected and installed for high-wind applications are much less likely to be damaged or blown off the roof during a storm. Impact-resistant shingles are also available to help protect against damage by windborne debris. Replacing the roof covering is a prime opportunity to upgrade shingles and shingle attachment to meet new standards and building codes, and to decide if selecting an above-code strategy for an added level of protection is the right choice for the project.

**Does my home need enhanced shingle attachment?** Building codes require asphalt shingles to be rated for the local wind zone. Homes located in coastal high-wind areas including Hurricane-Prone Regions (see Figure 1) generally require enhanced attachment that can withstand greater wind speeds than the rest of the country. Ask the local building department if your house is in a high-wind or hurricane-prone region or if local requirements exceed those of the national code.



### Wind Region Terminology

**Hurricane-Prone Regions:** Areas along the Atlantic and Gulf coasts where  $V > 115$  mph, and Hawaii, Puerto Rico, Guam, Virgin Islands, and American Samoa.

**High-Wind Areas** (not code defined): Generally where  $V > 115$  mph including portions of Alaska

**FIGURE 1. Wind Regions.** Source: Figure R301.2(5)A Excerpted from the 2018 International Residential Code; Copyright 2017; Washington, D.C.: International Code Council. Reproduced with permission. All rights reserved. [www.ICCSAFE.org](http://www.ICCSAFE.org)

## TIPS

- Roofing should be inspected and installed by a professional roofing contractor.
- Remove all existing roofing (shingles and underlayment) and replace any damaged wood sheathing.
- Inspect the roof deck attachment fasteners and re-nail as required to meet current requirements for nail type, size, and spacing.
- Consider impact rated shingles for durability; these may qualify for insurance discounts.
- Consider solar reflective shingles for a cooler roof and energy savings in warmer climates.
- Consider a sealed roof deck for added protection and that may qualify for an insurance discount—see Retrofit Improvements: Sealed Roof Decks.
- Install drip edges at eaves/rakes and proper flashing at roof penetrations and roof/wall intersections.
- Properly secure ridge, soffit, and gable vents – the loss of these can expose large openings susceptible to wind and water infiltration.

## COST

Costs will vary considerably by product and local labor rates. Selecting Class H or F shingles likely will not increase cost for most shingle brands. Selecting impact resistant shingles will increase cost.

Implementing best practices for enhanced attachment (additional nailing and sealing) will increase cost—the additional cost for an example 2,400 sq. ft. single-story house with a 2,900 sq. ft. roof is estimated at \$600-1,000.

**Code Considerations.** A building permit may be required for a roof replacement—ask your local building department. Building codes require asphalt shingles, including hip and ridge shingles, to be tested and classified for wind resistance in accordance with ASTM D7158 or D3161 (see Table 1). Codes also specify type and minimum size of fasteners (nails) and mandate that the number of fasteners is per manufacturer installation instructions but not less than four fasteners per strip shingle. Local jurisdictions may also require specific approval for roofing products (e.g., ridge vents tested and labeled to show resistance to water intrusion) or specific installation enhancements such as those shown below under Best Practices.

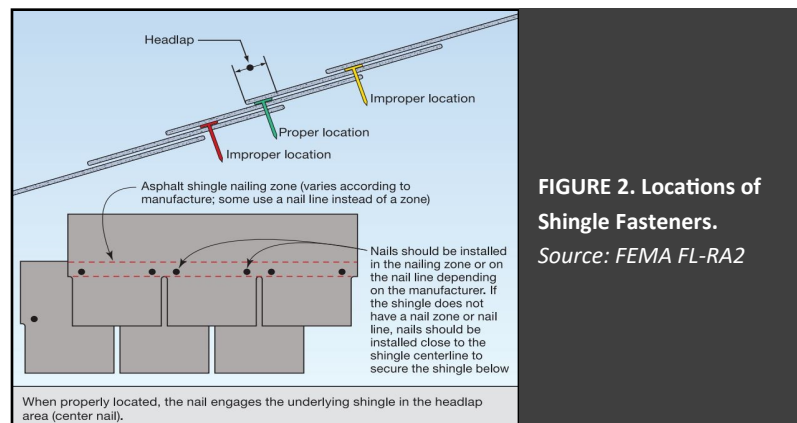
**TABLE 1. Classification of Asphalt Roof Shingles.**

Source: Adapted from 2018 IRC Table R905.2.4.1

Maximum Ultimate Design Wind Speed, from Figure 1 (mph)	Maximum Basic Wind Speed (for documents based on nominal wind speed maps) (mph)	ASTM D7158 Shingle Classification	ASTM D3161 Shingle Classification
116	90	D, G, or H	A, D, or F
129	100	G or H	A, D, or F
142	110	G or H	F
155	120	G or H	F
194	150	H	F

**Best Practices.** Generally, a six-nail installation should be used in high-wind areas, and the location of fasteners on the shingle is also important for a durable installation (see Figure 2). Use nails, properly driven, instead of staples. Apply dabs or continuous bands of asphalt roof cement beneath shingles along eaves, rakes, hips, and ridges to enhance shingle securement (may be required in some jurisdictions).

Many shingle manufacturers rate their entire product line as Class H or F for all shingle types including strip (3-tab), dimensional (architectural/laminate), and premium (luxury) shingles. Further, manufacturers now offer shingles that are impact rated in accordance with UL 2218 (Class 1 through 4, with 4 being the highest rating) and known as SBS polymer modified asphalt shingles. The rubberizing aspects of SBS shingles also improves granule adhesion, tear strength, nail pull resistance, and cold flexibility.



**FIGURE 2. Locations of Shingle Fasteners.**

Source: FEMA FL-RA2

## ADDITIONAL RESOURCES

1. Federal Emergency Management Agency (FEMA) FL-RA2/June 2019, best practices: [https://www.fema.gov/media-library-data/1560174739479-8856110e0c3fa30e750370dc5129348a/MichaelRA2\\_060719\\_508\\_FINALforposting.pdf](https://www.fema.gov/media-library-data/1560174739479-8856110e0c3fa30e750370dc5129348a/MichaelRA2_060719_508_FINALforposting.pdf)
2. FEMA, FEMA P-2022, see section 4-21 for roof shingle applications: [https://www.fema.gov/media-library-data/1551991528553-9bb91b4bfe36f3129836fedaf263ef64/995941\\_FEMA\\_P-2022\\_FINAL\\_508c.pdf](https://www.fema.gov/media-library-data/1551991528553-9bb91b4bfe36f3129836fedaf263ef64/995941_FEMA_P-2022_FINAL_508c.pdf)
3. FEMA, Hurricane Harvey in Texas RA2: [https://www.fema.gov/media-library-data/1536097919473-3d7b1bc1d6d6d712a8655ed1c542657f/TX\\_Harvey\\_RA2\\_V090418\\_508.pdf](https://www.fema.gov/media-library-data/1536097919473-3d7b1bc1d6d6d712a8655ed1c542657f/TX_Harvey_RA2_V090418_508.pdf)
4. Insurance Institute for Business & Home Safety® (IBHS) FORTIFIED Home™: <https://fortifiedhome.org/>
5. IBHS FORTIFIED Roof™ Re-Roofing Checklist: [http://fortifiedhome.org/wp-content/uploads/2019/08/re-roofing-checklist\\_hurricane.pdf](http://fortifiedhome.org/wp-content/uploads/2019/08/re-roofing-checklist_hurricane.pdf)

