

ASTM Design Wind Speed and Shingle Testing Standards

Wind Speed	Shingle Testing Standard/Classification
110 mph	ASTM D3161 (Class F) or ASTM D7158 Class G or H
120 mph	ASTM D7158 Class G or H
130 mph and greater	ASTM D7158 Class H

Provide these installation guidelines to your roofing contractor to ensure proper product selection and installation.

## INSTALLING SHINGLES

Shingles should be installed using the number of nails required by the manufacturer for high-wind fastening. In areas where the local building code requires more fasteners than are required by the manufacturer, fasteners should comply with the local building code. Placing nails in accordance with manufacturer installation instructions *is absolutely critical* for the performance of shingles in high-wind events.

## PAY SPECIAL ATTENTION TO ATTACHMENT AT EAVES, RAKES, VALLEYS, GABLE ENDS, AND STARTER STRIPS

Set shingles and starter strips at all intersections, eaves, valleys and gable ends, using a minimum 8-inch wide strip of flashing cement. Maximum thickness of flashing cement should be 1/8 inch. Provide a drip edge at eaves and gables with a minimum 3-inch overlap at the ends of drip edge segments. Eave drip edges should extend down the fascia 1/2 inch below sheathing and extend back on the roof deck a minimum of 2 inches. Mechanically fasten the drip edge to the roof deck at a maximum of 4 inches on center. Shingles should not extend more than 1/4 inch beyond the drip edge.



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# Roofing the Right Way

RE-ROOFING THE RIGHT WAY FOR SHINGLE ROOFS IN HURRICANE-PRONE AREAS



When it's time to replace your roof, due to weather-related damage or simply age, follow the advice in this guide to improve the long-term performance of your new roof. When you're ready to get started, find a qualified roofing contractor. Proper installation directly impacts a roof's long-term performance. Take the time to check the contractor's references and their insurance coverage [or "professional liability insurance"] and to talk to the contractor about your expectations.

## NINE STEPS TO REPAIRING YOUR ROOF THE RIGHT WAY

- 1 REMOVE THE OLD ROOF COVER:** Remove the damaged or aged roof cover and underlying building paper or underlayment to expose the roof deck. This allows strengthening of the roof deck connection to the roof structure and provides the solid, smooth surface needed to help ensure that the new roof cover achieves its full strength.
- 2 INSPECT FOR DAMAGE:** Look at the roof deck for rotting, delaminating, warping or other signs it may be structurally unsound. If any of these signs exist, replace the damaged sections with similar materials of the same thickness.
- 3 RE-NAIL THE ROOF DECK:** This will provide a wind-resistant connection to the roof framing.
- 4 ANCHOR GABLE END OUTLOOKERS:** Outlookers are roof framing members that are sometimes used to support the roof overhang at the gable end of a house. They start at the second truss or rafter back from the gable end wall and extend out over the gable wall framing to support the edge of the roof. Improve the anchorage of outlookers at gable ends, if present, by connecting the outlookers to the roof framing with metal straps.
- 5 SEAL THE ROOF DECK AGAINST WATER INTRUSION:** This will help keep water out of the house if the roof cover blows off. Large amounts of wind-driven water can pour into the attic through unsealed gaps between pieces of roof sheathing.
- 6 INSTALL FLASHING:** Proper flashing is important to the performance of your roof. Flashing is necessary at all penetrations (i.e., pipes and vents that create openings in the roof deck); where the roof intersects with vertical surfaces, in roof valleys, at any location where the roof changes slope, and at eaves and gable rakes. Valley areas without flashing are especially vulnerable to leakage.
  - Installation of a 36-inch wide self-adhered polymer-modified bitumen membrane underlayment or metal flashing centered on the valley is critical.
  - At intersections of the roof with vertical surfaces such as walls and chimneys, flashing should extend up the vertical surface, be covered with wall cladding and lapped in shingle fashion.
  - A corrosion-resistant drip edge should be provided at eaves and gables of shingle roofs. The overlap between the ends of sections of drip edge should be at least 3 inches.
  - Drip edges should extend down the fascia ½ inch below the sheathing and extend back on the roof deck a minimum of 2 inches.
  - Drip edges should be fastened to the roof deck at 4 inches on center.
- 7 ROOF COVER:** Apply a building-code approved, wind-resistant roof cover. Follow the manufacturer's installation instructions for high-wind areas or local code requirements, if they are more restrictive.
- 8 ROOF VENTS:** All roof vents should be high-wind rated and properly installed. Vents that have passed Florida Building Code Test Standard TAS 100 (A) are tested for both wind and water intrusion.
- 9 SOFFITS:** Retrofit or replace vulnerable soffits. Make sure they are installed according to manufacturer's instructions. Most aluminum and vinyl soffit high-wind installations require an intermediate support when the soffit extends more than 12 inches from the wall. When soffit covers are blown out during a hurricane, a tremendous amount of water can enter the attic. It is important to make sure that the soffit material stays in place.

While this guide focuses on a few critical elements of correctly re-roofing a shingle roof, information about re-roofing for all roof types and the topics below are available at [www.DisasterSafety.org](http://www.DisasterSafety.org):

- Hiring a roofing professional
- Ensuring a well-anchored roof deck by re-nailing the roof deck
- Installing a wind- and water-resistant underlayment (sealed roof deck)
- Choosing and installing a wind-resistant roof covering

## HIRING A CONTRACTOR

*Quality installation is a core part of getting a roof right. IBHS and the National Roofing Contractors Association (NRCA) recommend these steps for choosing the right roofing professional:*

- Check for a permanent place of business, telephone number, tax ID number and, where required, a business license.
- Request verification of professional liability insurance.
- Look for a company with a proven track record; ask for, and check, client references and request a list of completed projects.
- Verify whether the contractor is properly licensed or bonded.
- Insist on a written proposal. The proposal should include complete descriptions of the work and specifications, including approximate start and completion dates and payment procedures.
- Check to see if the contractor is a member of any regional or national industry associations, such as NRCA.
- Call your local Better Business Bureau to check for any complaints that have been filed.
- Have the contractor explain his project supervision and quality control procedures.

- Carefully read and make sure you understand any roofing warranty offered; watch for provisions that would void the warranty. Remember, price is only one criterion for selecting a roofing contractor. Professionalism and quality workmanship also should weigh heavily in your decision.

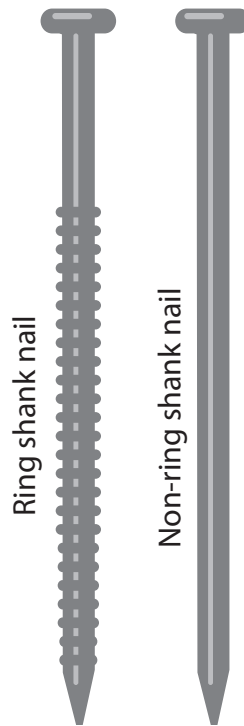
## RE-NAILING THE ROOF DECK

IBHS field and laboratory research has found that use of staples and the minimum size smooth nails allowed in older building codes (no matter the spacing) are inadequate to keep a roof from lifting up in hurricane-force winds. This is particularly true along trusses and rafters in the middle of the roof sheathing panels, where it has been common practice to space the fasteners 12 inches apart. When an old roof cover and underlayment is torn off, it is easy to inspect existing fasteners and install additional fasteners. IBHS recommends installing ring shank nails (nails that have annular rings formed along most of their length) to strengthen roof deck attachment.

Re-nailing the deck of a typically sized roof (2,000 sq. ft.) should only cost a few hundred dollars. Research conducted by Clemson University using closed insurance claim data from Hurricane Andrew, which hit Florida in 1992, showed that when a piece of roof sheathing was lost, water flowing through the resulting hole caused nine times greater damage than the repair costs of fixing the hole.

## RE-NAILING REQUIREMENTS

A simple, conservative approach to re-nailing that will work virtually everywhere is to have the roof sheathing re-nailed with 8d ring shank nails, spaced 6 inches on center, along all framing members supporting the roof sheathing.



Additional information about roof deck nail sizes and spacing that addresses roofs covered with board planking – and limits the number of additional nails to be added – is available in the Hurricane Section at [www.DisasterSafety.org](http://www.DisasterSafety.org). This re-nailing guidance considers what is known as the “design wind speed” and strength of existing fasteners in specifying the minimum number of additional nails needed to provide adequate anchorage of the roof deck. The “design wind speed” is the wind speed used by engineers to calculate wind forces used in the design of homes and most other buildings in the area where your home was built.

## SEALING THE ROOF DECK

Too often when a hurricane strikes, roof cover (typically shingles, tile, or metal) blows off, exposing the roofing layers underneath to the full fury of wind and rain. Post-hurricane damage investigations and tests at the IBHS Research Center have demonstrated that many commonly used roofing felts, which are placed between roof cover and decking, easily blow off in hurricane-force winds. While the roofing industry historically has referred to roofing felt as a suitable backup to reduce chances of roof leaks, IBHS does not consider typical felt underlayments the protective equivalent of a sealed roof deck. As a result, IBHS defines a properly sealed roof deck as one where seams or gaps between pieces of decking are sealed so that water cannot flow into the attic. This sealant bonding or attachment to the



Sealing the roof deck

deck materials must be strong enough to stay in place if the roof cover blows off.

### OPTIONS FOR SEALING THE ROOF DECK\*

*Install a "peel and stick" type membrane over the entire roof deck.*

- Cover the entire roof deck with a self-adhering polymer modified bitumen membrane, which is labeled as meeting the ASTM D1970 standard. ASTM is a nationally recognized organization that publishes technical standards for the performance of a wide range of materials and products, including the wind resistance of asphalt shingles. Most manufacturers rightly warn that extra care should be paid to attic ventilation if these products are used, because moisture built up in the attic cannot evaporate through such membranes. Roofers also find that shingles can bond with many of these membranes. To prevent the peel and stick membrane from adhering to shingles, it should be covered with a "bond break" such as a 15 pound, ASTM D226, Type I-compliant underlayment. This bond break underlayment only needs to be fastened sufficiently to keep it on the roof surface and provide safety to the roofers until shingles are applied.

*Install a 4-inch to 6-inch wide "peel and stick" type tape over all wood/OSB roof panel seams and then cover the deck with a 30 pound felt underlayment.*

- Apply the peel and stick tape directly to the roof deck to seal horizontal and vertical joints between roof sheathing panels. Next, apply 30 pound, ASTM D226, Type II-compliant underlayment over the self-adhering tape. Attach the underlayment using ring shank roofing fasteners, with minimum 1-inch diameter caps, at no more than 6 inches on center spacing along all laps and at 12 inches on center in the field.

*Install a reinforced, high-tear strength synthetic underlayment with all vertical and horizontal seams taped.*

- This underlayment should have an International Code Council (ICC) approval, as an alternate to ASTM D226 Type II felt paper. The synthetic underlayment must have minimum tear strength of 20 lbs (per ASTM D1970 or ASTM D4533). The underlayment should be attached using annular ring or deformed shank roofing fasteners with minimum 1-inch diameter caps at no more than 6 inches on center spacing along all

laps, and at 12 inches on center in the field. Vertical and horizontal seams should be sealed with a compatible adhesive or tape.

\*Check with the local building department for any restrictions or additional underlayment requirements.

### CHOOSING AND INSTALLING HIGH-WIND RATED SHINGLES

#### Selecting Shingles

Make sure your roofing professional uses shingles that match or exceed the testing standard/classification from the table below for the design wind speed in your area. The ASTM shingle testing standards and classification system, **not the advertised warranty period and warranty wind speed for the shingles**, will determine which shingles are best-suited for the wind speeds in your area.

NOTE: Although this guidance is directed at hurricane-resistant roofs, some regions of the country with vulnerability to hurricanes also face risks from hail and wildfire. Underwriters Lab (UL) has designated shingles with a UL 2218 Class 4 rating as the most impact-resistant products. This rating should be considered, in addition to the ASTM shingle wind rating, in areas subject to frequent hail storms. In addition, shingles with a Class A fire rating issued by UL or ASTM are best suited for areas with a risk of wildfire.

