Asphalt Shingle Roofing for High-Wind Regions

FEMA

HOME BUILDER'S GUIDE TO COASTAL CONSTRUCTION FEMA 499/August 2005 Technical Fact Sheet No. 20

Purpose: To recommend practices for installing asphalt roof shingles that will enhance wind resistance in high-wind, coastal regions.

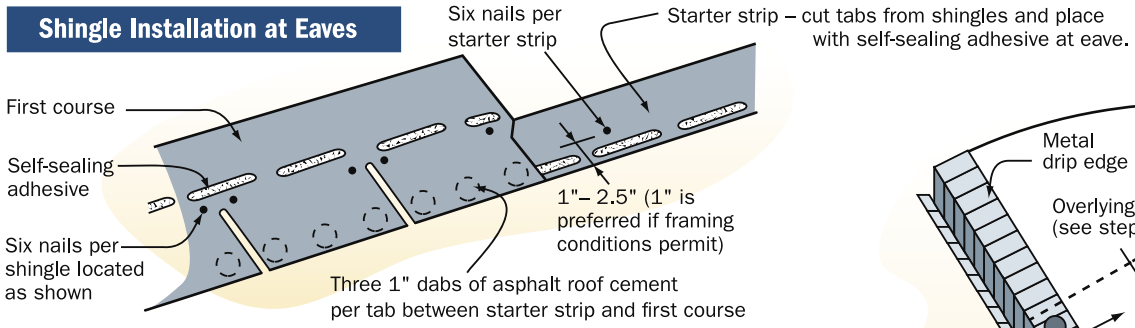
Key Issues

- Special installation methods are recommended for asphalt roof shingles used in high-wind, coastal regions (i.e., greater than 90-mph gust design wind speed).
- Use wind-resistance ratings to choose among shingles, but do not rely on ratings for performance.
- Consult local building code for specific installation requirements. Requirements may vary locally.
- Always use underlayment. See Fact Sheet No. 19 for installation techniques in coastal areas.
- Pay close attention to roof-to-wall flashing and use enhanced flashing techniques (see Fact Sheet No. 24).

Construction Guidance

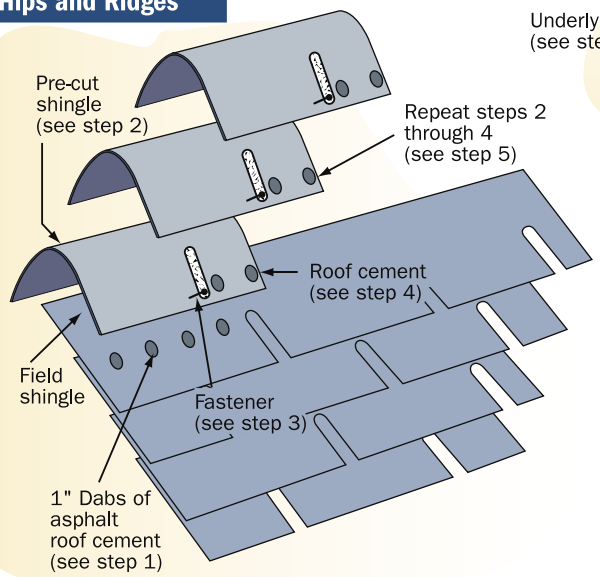
1 Follow shingle installation procedures for enhanced wind resistance.

Shingle Installation at Eaves

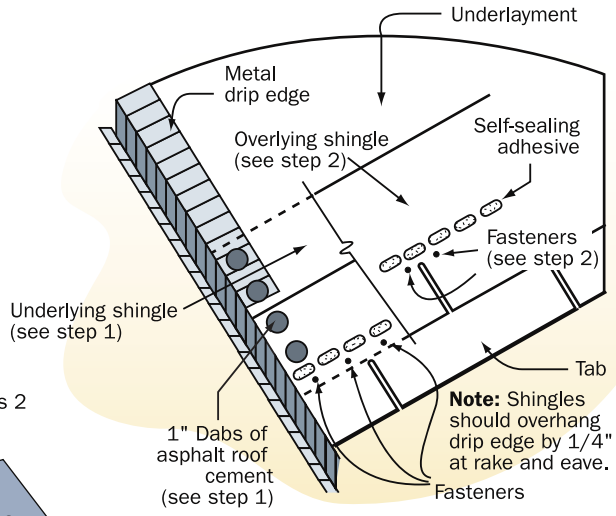


Shingle Installation at Hips and Ridges

1. Apply four 1-inch dabs of roof cement to field shingle.
2. ***Set pre-cut shingle in place and press down in dabs of roof cement before installing fasteners.***
3. Install fastener on each side of ridge. Note: Because of extra thickness of shingles at hips and ridges, longer nails may be needed.
4. Apply two 1-inch dabs of roof cement to shingle where shown.
5. Repeat steps 2 through 4.



Enhanced shingle securement



Shingle Installation at Rakes

1. Apply two 1-inch dabs of asphalt roof cement on underlying shingle, and two 1-inch dabs on metal drip edge as shown.
2. Set overlying shingle in place and install fasteners except for last fastener at rake.
3. ***Press shingle down to set in dabs of asphalt cement before installing final fastener.***
4. Install final fastener at rake edge.
5. Repeat steps for each course.

2 Consider shingle physical properties.

Properties	Design Wind Speed[1] >90 to 120 mph	Design Wind Speed[1] >120 mph
Fastener Pull-Through[2] Resistance	Minimum Recommended 25 lb at 73 degrees Fahrenheit (F)	Minimum Recommended 30 lb

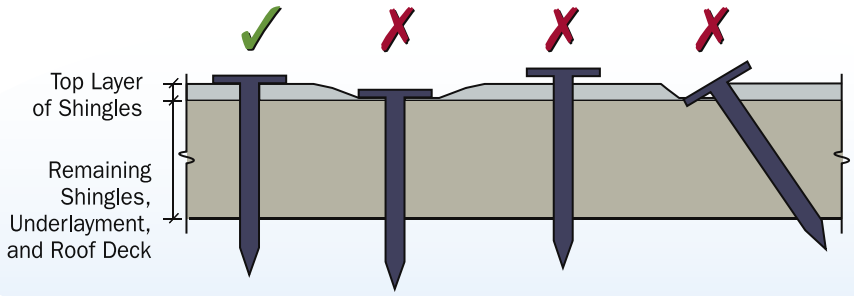
1. Design wind speed based on 3-second peak gust.
2. ASTM D 3462 specifies a minimum fastener pull-through resistance of 20 lb at 73° F. If a higher resistance is desired, it must be specified.

Shingle Type	Standard	Characteristics
Organic-Reinforced	ASTM D 225	Relatively high fastener pull-through resistance
Fiberglass-Reinforced	ASTM D 3462	Considerable variation in fastener pull-through resistance offered by different products
SBS Modified Bitumen	A standard does not exist for this product. It is recommended that SBS Modified Bitumen Shingles meet the physical properties specified in ASTM 3462.	Because of the flexibility imparted by the SBS polymers, this type of shingle is less likely to tear if the tabs are lifted in a windstorm.

3 Ensure that the fastening equipment and method results in properly driven roofing nails for maximum blow-off resistance. The minimum required bond strength must be specified (see **Wind-Resistance Ratings**, below).

Fastener Guidelines

- Use roofing nails that extend through the underside of the roof sheathing, or a minimum of 3/4 inch into planking.
- Use roofing nails instead of staples.
- Use stainless steel nails when building within 3,000 feet of saltwater.



"The Good, the bad, and the ugly" – Properly driving roofing nails.

Weathering and Durability

Durability ratings are relative and are not standardized among manufacturers. However, selecting a shingle with a longer warranty (e.g., 30-year instead of 20-year) should provide greater durability in coastal climates and elsewhere.

Organic-reinforced shingles are generally more resistant to tab tear-off but tend to degrade faster in warm climates. Use fiberglass-reinforced shingles in warm coastal climates and consider organic shingles only in cool coastal climates. Modified bitumen shingles may also be considered for improved tear-off resistance of tabs. Organic-reinforced shingles have limited fire resistance – verify compliance with code and avoid using in areas prone to wildfires.

After the shingles have been exposed to sufficient sunshine to activate the sealant, inspect roofing to ensure that the tabs have sealed. Also, shingles should be of "interlocking" type if seal strips are not present.

Wind-Resistance Ratings

Wind resistance determined by test methods ASTM D 3161 and UL 997 does not provide adequate information regarding the wind performance of shingles, even when shingles are tested at the highest fan speed prescribed in the standard. Rather than rely on D 3161 or UL 997 test data, wind resistance of shingles should be determined in accordance with UL 2390. Shingles that have been evaluated in accordance with UL 2390 have a Class D (90 mph), G (120 mph), or H (150 mph) rating. Select shingles that have a class rating equal to or greater than the basic wind speed specified in the building code. If the building is sited in Exposure D, or is greater than 60 feet tall, or is a Category III or IV, or is sited on an abrupt change in topography (such as an isolated hill, ridge, or escarpment), consult the shingle manufacturer. (Note: for definitions of Exposure D and Category III and IV, refer to ASCE 7.)