

Asphalt Shingle Q&A

A team of industry experts provides answers you won't find printed on a bundle wrapper

by Jon Vara

Asphalt shingles are the most popular residential roofing material on the market, and for good reason: They're cost effective, adaptable to a wide variety of roof forms, and come in an array of styles and colors to suit almost everyone. But while most builders have spent their share of time nailing off shingles, there's no shortage of unanswered questions on the subject. How do 20-year shingles differ from 25-year shingles? Why is felt underlayment required in fire-rated roof assemblies? What's the most leakproof valley detail?

To fill in some of the blanks, we put those questions and others to a half-dozen industry

experts: Carl Cash, a former chair of the ASTM D-08 committee on roofing, waterproofing, and bituminous materials and principal with the engineering firm of Simpson, Gumpertz & Heger in Arlington, Mass.; Allan Snyder, roofing systems technical service manager for CertainTeed; Kent Blanchard, assistant vice president of manufacturing for TAMKO Roofing Products; Sid Dinwiddie, division quality manager for PABCO Roofing Products; William Rose, a researcher and architect with the Building Research Council of the University of Illinois at Urbana-Champaign; and Darrel Higgs, exterior systems business technical manager for Owens Corning.

Q. When is it permissible to apply shingles with staples?

A. Although many building codes permit the use of staples, they're never a good idea. The holding power of a fastener is determined entirely by the surface area under the head, and although staples are efficient and cheap, they have far less head area than roofing nails, making them much more prone to tearing through the shingle in high winds.

—C.C.

Q. What causes nails to back out, punching a hole in or raising the overlapping shingle?

A. Seasonal temperature swings and changes in the moisture content of the roof deck can cause inadequate or improperly driven nails to back out. To prevent that, use 11- or 12-gauge roofing nails with barbed or deformed shanks and ³/₈- to ⁷/₁₆-inch heads. Many builders are convinced that plywood holds nails better than OSB. Whatever sheet material is used, the nails must be long enough to penetrate through all roofing material and completely through the decking. If you're working on a board-type deck, the nail should penetrate ³/₄ inch into the wood.

—K.B.

Q. Are there any hard-and-fast rules on nail placement?

A. Not really. Each manufacturer provides its own instructions, and you risk voiding the warranty if you don't follow them. But it's possible to make a few generalizations. As far as I know, all manufacturers of three-tab shingles require nailing below the sealant line. Nailing too high gives the wind more leverage and increases the odds that the shingles will be damaged by wind, especially right after application. Once the shingles have sealed, this becomes less important. Nailing through the sealant stripe is a bigger problem, because the nails get in the way and often prevent the shingles from sealing properly at all. Plus, nails that pass through the sealant line tend to hold the shingles a little higher, giving the wind more of a chance to get under them.

Nail location is especially critical with laminated shingles because nails need to go through both laminations to ensure that they stay together after application. If they're too high, they can miss the lower piece. If they are just barely too high, they can actually tear the shingles because of the "step effect" of the lower lamination.

Some companies seem to use their application standards as an excuse not to cover legitimate product failures. I hear this only secondhand, but I hear it a lot. If consumers would pay more attention to which products have performed well, rather than buying on the basis of price, this might change.

—S.D.

Q. Is there really a practical difference between 20-year, 25-year, and 30-year shingles?

A. There's no objective standard behind those ratings. They're used by manufacturers for competitive reasons, to differentiate between their various product lines. The durability of a 30-year shingle from company A might or might not be comparable to the durability of a 30-year shingle from company B. In the field, a shingle's durability depends on a number of factors, including the direction in which the roof faces, its geographical location, the degree of shading provided, and the color of the shingles. Most of the shingles offered for sale have not yet been available for 20 years, much less 25, 30, or 40 years.

—C.C.

Q. What do the wind ratings on shingles mean?

A. A given wind rating means that the properly applied shingles have survived a specific fan or vacuum-box test, most often by a third party such as Underwriters Laboratories or Factory Mutual. As with durability ratings, a lot depends on field conditions, so a shingle that passes an 80-mph test in the laboratory might not survive a real-world wind of the same speed. On the other hand, wind ratings do have an objective basis, so, all other things being equal, it's reasonable to believe that an 80-mph shingle will stand up better than one rated at 60 mph.

The most important factor affecting wind resistance is whether the tabs have sealed prop-

erly. Careful specifiers require the installer to go back 30 days after the installation to confirm that all the shingles have in fact sealed and manually seal any that have not.

—C.C.

Q. *Why is felt required in fire-rated roof assemblies?*

A. This is a function of one part of the standard fire test, which involves building what amounts to a pretty big campfire on top of a test assembly in a simulated wind. To pass, the assembly must block the fire from burning through the deck for a specified time. A shingle roof laid over 1/2-inch plywood would probably

UNDERWRITERS LABORATORIES



The industry standard “burning brand” test measures a roof system’s resistance to burning through. Ordinary felt underlayment increases fire resistance and is required for fire-rated roofs.

pass the burn test without underlayment, but since 3/8-inch roof decks have become common, manufacturers have begun using underlayment in their test assemblies to buy a little more time. The underlayment is basically an additional barrier that the fire has to burn through (the additional asphalt and paper do provide some added fuel, but that is more than offset by the added thickness). Because the assembly with underlayment is what manufacturers use to pass the burn test, it’s what’s required in fire-rated applications.

—S.D.

Q. *Why do some shingles have a C fire rating and some have an A rating? What’s the difference?*

A. There are three tests for each rating. They are the spread of flame, the flame exposure (where the fire is cycled on and off), and the burning brand test. The requirements are very different for each class. For example, a shingle passes the class C spread of flame test if the flame does not go over the top of the sloping 13-foot test deck. A shingle passes the class A spread of flame if the flames do not go over 6 feet. (This is more impressive when you know the flame is 5 to 6 feet long at the start of the test.) Generally speaking, organic-based asphalt shingles achieve only a C rating, because the amount of asphalt required to saturate the felt base is a major source of fuel. Most fiberglass shingles are A-rated.

—C.C.

Q. *In general, is it a bad idea to apply multiple layers of roofing? Are there pros and cons, or just cons?*

A. There are situations where roof-overs work fine, such as laying simple three-tabs over good flat existing three-tabs. The biggest problem is that roof-overs make installation errors more likely. Things that can go wrong include failure to replace bad decking, use of nails that are too short to hold well, and reuse of flashing that seems okay to a cursory inspection but doesn’t have much life left. Also, lightweight shingles that are applied over rough or laminated shingles may not lie flat, which looks bad and often results in poor sealing.

—A.S.



Over-roofing can save time and money, especially when the new shingles are applied over nice flat three-tabs. Be sure to check the condition of the deck and use the right nails.

Q. Do organic mat shingles outlast fiberglass shingles?

A. Organic shingles tend to be tougher than fiberglass, which makes them more resistant to wind uplift when not sealed. As a result, they're preferred by some homeowners and contractors in cold-climate areas where fiberglass shingles have blown off or cracked in the past. These failures were very common in the 1970s and persisted into the '90s for some products. On the downside, organic shingles are somewhat more susceptible to curling and blistering in warm climates.

The real issue is whether a fiberglass shingle will resist blow-off if it has been applied in cold weather that prevented the sealant from activating. The critical measure of winter performance is the Elmendorf tear test, which is part of ASTM D3462. Fiberglass shingles that meet the standard should do as well as organic shingles under nonsealed cold-weather conditions. Another measure of cold-weather performance can be found in the terms of the manufacturer's warranty: If it excludes wind damage unless the sealant has activated, cold-weather application is probably risky.

—A.S.

Q. Do laminated "architectural" shingles outlast plain old three-tab shingles?

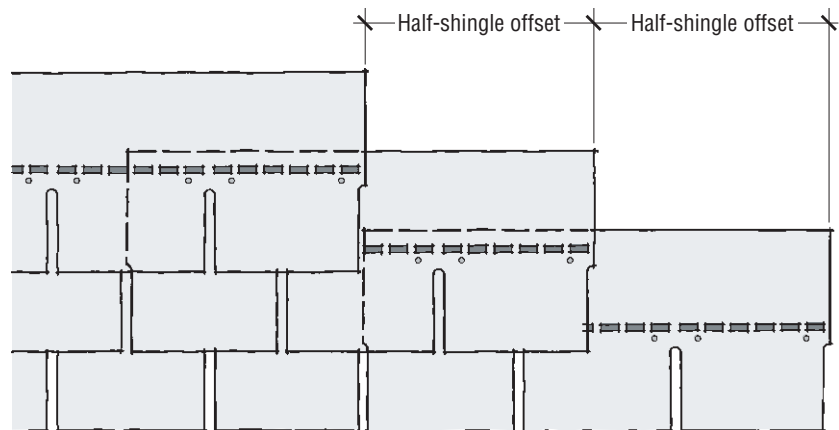
A. Laminated shingles have two layers over about half of their weathering surface, so you might expect them to be more durable than three-tab shingles. Laminated shingles now account for about half of all shingles sold, up from just 7% in 1985, and relatively few of those 15- to 20-year-old roofs have failed yet. The consumer preference for laminated shingles is driven by appearance, however, rather than concern about durability.

—K.B.

Q. Professional roofers sometimes step shingles back and forth by half their width with every course. This makes for easy alignment and a sectional approach to large areas, but it also means that the butts line up every other course instead of every third course or more. Is this an approved method?

A. The "two-course step-off" method is not recommended by any manufacturer (see illustration). For standard shingles at a decent pitch — above 4/12, say — leakage probably wouldn't be a problem, although some specialty shingles might leak if applied this way.

Not Recommended



Avoid using the two-course step-off method. Although it makes for easy alignment, it's prone to leakage and alters the manufacturer's intended color pattern.

Another problem is that shingles applied this way probably won't match the manufacturer's photos or color boards. Shingles are topped with a blend of different granules that are applied during the manufacturing process in a pattern that repeats after every few shingles. If the shingles aren't laid out on the roof as intended, you might get a blotchy or zigzag color pattern, or some other unpredictable result. This is mostly likely in shingles with strongly contrasting granules, but even solid black shingles ordinarily contain several slightly different shades of granules. If the shingle manufacturer's application guidelines aren't followed, the contractor has no defense against a homeowner who doesn't like the appearance of the resulting roof.

—A.S.

Q. *Are there any preventive measures a roofer can take to minimize surface damage to the mineral granules during hot-weather installations?*

A. The best idea is to start roofing early and take a break at midday. Some contractors will work early in the day, break around 10 a.m., then return in the evening. Using portable electrical lighting can extend the work times in both the mornings and evenings.

During the day the best suggestion is to minimize traffic over the shingles and keep an eye out for any damage to the granules. Using a foam mat, a plywood sheet, or other protection over the shingle as a working platform can also be helpful during hot weather.

—K.B.

Q. *Is felt underlayment really necessary?*

A. Felt serves several functions: Its primary job is to keep the roof deck dry before the shingles go on, but it also provides added protection from wind-driven rain or in the event of wind damage to the shingles years later. While felt is far from a perfect weather barrier — each shingle makes at least four nail holes in it — it can substantially reduce interior damage when water gets past the shingles. Finally, felt provides increased fire resistance.

—S.D.

Q. *How can you prevent felt from wrinkling?*

A. Felt wrinkles as a result of dimensional change that follows wetting and drying. Not all felts wrinkle, but unfortunately, there's no easy way to tell which ones will and which won't. Even with felt from the same manufacturer, performance can vary depending on the specific mill that produced the paper. The issue seems to have to do with the paper itself, rather than the asphalt. There have been some lively discussions within the ASTM about establishing a dimensional stability standard for roofing felt, and that may happen eventually. In the meantime, the best advice is to shop around until you come up with some felt that you like, find out which mill manufactured it, and try to get all your felt from that source.

—S.D.

Q. *What's the most leakproof valley detail — open, closed, or woven?*

A. My preference is for an open metal valley with a V-crimp center. Most valleys fail because they act as funnels, concentrating flow from a wide area. If the valley contains granule surfacing — as with cut or woven valleys — the resulting heavy flow erodes the granules and leads to UV deterioration. A metal valley doesn't have that problem, and the V-crimp prevents fast-flowing water that enters one side of the valley from surging up the far side and eroding the shingles beyond. Open valleys are also easier to repair neatly.

—W.R.

Q. *How important is roof ventilation to shingle durability, and how much ventilation do you really need?*

A. Roof ventilation as a recommended practice dates back to the late 1930s, when insulation manufacturers began promoting it as a way to defend themselves against claims that attic insulation could cause condensation and paint failure. Roofing manufacturers began linking shingle warranties to code vent requirements in the mid-1980s, when there were many consumer complaints about cracked shingles. But in my opinion, arguments in favor of roof venting aren't supported by the research data.

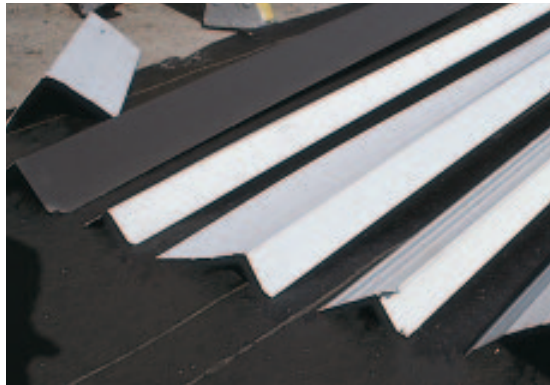
Venting does cool shingles slightly, but I don't know of anyone who is actively trying to correlate shingle temperatures with service life.

Commonsense observation seems to bear this out. Roofs are often cut up and complicated. Some areas have swooshing airflow, while other areas have little or no airflow. Vents are located high, low, and in between. Some roofs face north, while others face south. Despite the wide variety of venting strategies out there, shingles generally perform well.

—W.R.

Q. How much should shingles overhang at the drip-edge?

A. Too much overhang can cause shingles to bend and crack, and too little will allow water to run down the wall or fascia, causing staining or rot. If a drip-edge is used (a code requirement in



Drip-edge is available in many different profiles, but no matter what pattern is used, shingles should hang over the edge by no more than $\frac{3}{4}$ inch. If no drip-edge is used, shingles should overhang the deck by at least $\frac{1}{2}$ inch but no more than 1 inch.

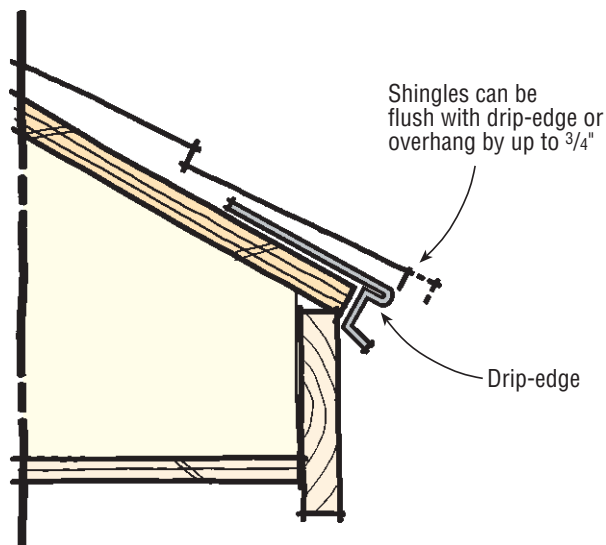
many areas and strongly recommended even where it's not required), shingles can be positioned flush with the drip-edge, or overhang the edge by no more than $\frac{3}{4}$ inch (see drawing at right). If no drip-edge is used, the shingles should be positioned to overhang the edge of the deck by at least $\frac{1}{2}$ inch but no more than 1 inch.

—D.H.

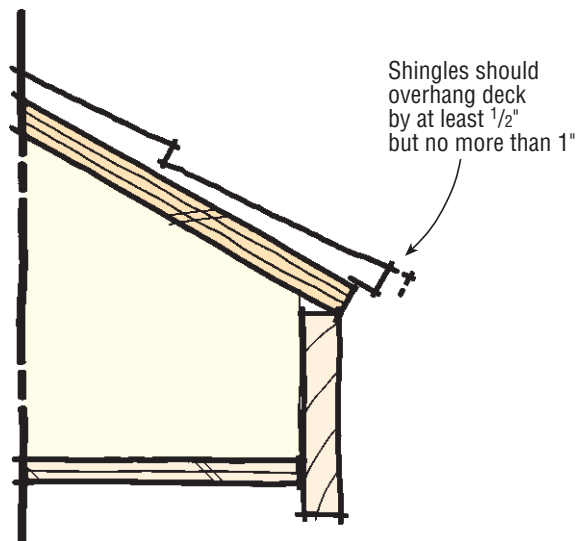
Q. What are the rules for applying shingles to a vertical surface, such as a mansard roof?

A. Roof slopes that exceed 60 degrees or 21 inches per foot require special application pro-

Shingle Overhang



With Drip-Edge



Without Drip-Edge

cedures. If you're using three-tab shingles, use six nails per shingle and place two 1-inch spots of asphalt roofing cement under each tab. The spots of cement should be from 1 to 2 inches from the ends of the tabs, and far enough from the bottom that the cement won't squeeze out when the tabs are pressed down. Laminated shingles also require six nails, with four evenly spaced spots of cement.

—D.H.

