Reroofing With Asphalt Shingles

To ensure a watertight job, don't skimp on the underlayment

by Jim Bennette

I'm a second-generation roofing contractor, a certified installer of most common types of roofing. In this article, I'll discuss what it takes to apply a guaranteed, watertight asphalt-shingle roof. While basic installation guidelines are printed on every shingle wrapper, there's a lot more to know if you're really interested in preventing callbacks. About 80 percent of our asphalt-shingle installations are replacement jobs working directly for the homeowner in which we use laminated "architectural" shingles — by far the most popular roofing choice here in New England.

No Go-Overs

Roofs age differently under different exposures and in different climates, but the roofs we replace are generally between 20 and 30 years old. Although shingling directly over an old roof eliminates the considerable effort and expense of stripping and disposing of the shingles (building codes permit a second layer only), we strongly discourage the practice, for several good reasons.

First, old step flashing can't be inspected and replaced as needed. Second, adding another layer of shingles piles a lot

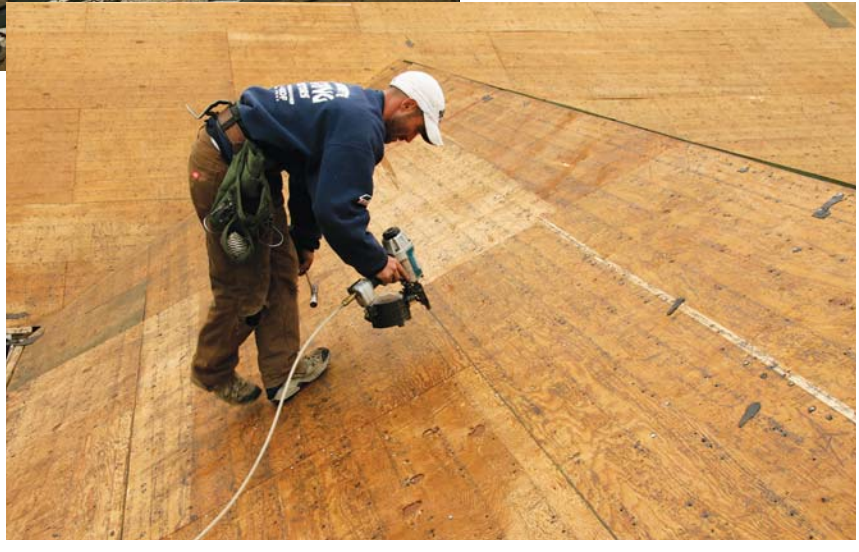

Figure 1. Stripping the roof down to the sheathing exposes any hidden problems and provides the best conditions for reinstallation (left). The author strongly advises renailing afterward because stripping shingles can loosen sheathing nails. Workers carry a hammer along with the nail gun to whack down stray heads (below).

of extra dead load on the roof structure — a particular concern in the case of older homes whose framing may not be up to snuff (see "Reroofing Over Asphalt Shingles," *Practical Engineering,* 2/96). It's a lot better to stick with what's worked for that roof over time than to assume it'll handle the extra weight.

Third, if you don't strip the roof, you don't know what you're walking on. The sheathing may require repair in areas that can't be reliably detected from the attic. Also, for homeowners looking to spruce the home up for sale, multiple layers of shingles on its roof are sure to prompt a lower assessment of value.

Finally, some roofers argue that a go-over has a shorter service life because the thicker the layer of shingles, the more solar heat is absorbed and held. When I explain these issues to the homeowner, it's rare that they still insist on going over the old roof.

Tools for stripping. Stripping a go-over is particularly brutal work (yet another reason not to layer shingles). The tried-and-true dedicated shingle stripper, a spadelike tool with serrated teeth and a prying wedge on the underside, is our tool of choice (**see Figure 1**). We particularly like the Shingle Eater (508/248-7800, shingleeater.com). When stripping, the most comfortable and secure way to work on most slopes is in a seated position, working from the ridge down to the eaves. Two or three workers can typically clear a four-square area in about an hour.

It's important to protect foundation plantings and the face of the building from falling debris. We cover shrubs with tarps tacked up under the roof overhangs and keep one worker on the ground continually cleaning up and loading the truck. Tarps don't last long around these loads. I like to recycle those big lift wraps from the lumberyard that are otherwise tossed in the dumpster. They're almost as tough as standard poly tarps, and some of them will last through several jobs. But even if we get only one use out them, they'll have done double-duty and saved me a little dough.

We generate a lot of disposable debris. As often as possible, I truck old asphalt shingles to a regional depot that charges $90 per ton and sends the material to be recycled into asphalt roadbed.

We strip only as much as we can cover again with underlayment that day. To define the strip area, we slit a line through the old shingles with a hook blade,

straight up the roof, and tear off up to that line. Sheffield hook blades (516/746-5352, sheffield-tools.com) are by far the best, outlasting every other brand we've used by a wide margin. I buy them in bulk at a local lumberyard.

Renail the sheathing. It's important to renail the roof sheathing before installing underlayment, because the violent action of stripping the roof can easily loosen the original sheathing nails. We use 8-penny galvanized ring-shank nails and hammer the old nail heads back down to prevent nail pops through the roofing. If any of the sheathing is in bad shape, now's the time to replace it.

Underlayments and Flashing

An asphalt roof is not a waterproof barrier; it's a durable water-shedding system that must be installed to strict standards in order not to leak. I've seen torn and poorly applied felt underlayment shingled over as if it were only a temporary dry-in measure. But properly installed underlayment is the last line of defense against leaks (**Figure 2**).

Instead of 30-pound felt paper, we like to use CertainTeed's Roofer's Select, a fiberglass-reinforced asphalt-impregnated organic felt. It seems to have higher asphalt content than competing products. It goes down easily, resists tearing around fasteners in windy conditions, and provides a better grip underfoot than ordinary felt paper.

Although Roofer's Select is less absorptive than ordinary felt — which readily absorbs atmospheric moisture, producing wrinkles that interfere with chalk lines and prevent shingles from lying flat — it too can hump up when wetted. As a quick and effective remedy, we dry wrinkled underlayment with a leaf blower that we carry with us as standard equipment. It works like a charm and is also great for clearing out gutters, a routine aspect of our work.

Figure 2. Carefully installed underlayment is the last best defense against ice dams and wind-driven rain (above). Plastic caps (left) provide superior holding power and prevent the roofing paper from tearing around fasteners. Slopes from 4/12 to 2/12 are covered with self-adhering membrane, which is also run up the rakes to protect the trim.

No staples. When it comes to securing the underlayment, I don't find pneumatic cap tools to be worth the bother or expense. We hand-nail with plastic roofing caps. Since hammer-tackers and staples do more harm than good, they aren't allowed on our jobs. Staples don't have the holding power of the caps, and they set the underlayment up for tear-throughs and blowoffs. If an overlooked nail head pops through while we're installing the underlayment, we pull the nail and repair the breach with a patch, making sure it sheds water. We never leave a hole or a void anywhere in the underlayment.

On slopes from 4/12 to 2/12, we use only self-adhering membranes. Actually, I prefer to treat a 2-in-12 slope as a flat roof and apply an impermeable EPDM membrane — but that's not comfortable for every budget.

With self-adhering membranes, Grace Ice & Water Shield (617/498-4997, grace construction.com) is the one to beat. But it costs twice as much as CertainTeed's WinterGuard — our standard waterproof membrane — so I use it only on high-budget jobs. I like WinterGuard because it makes a better sealed overlap than other

Figure 3. All shingle bundles are stocked on the roof weather-side up for fumble-free application (inset, top). Self-adhering membrane covers eaves to a point measured horizontally 2 feet inside the exterior walls. Valleys are protected with full-width membrane folded up the center (above). The material is less sticky in cooler temperatures, making solo installation easier (left).

Figure 4. This copper step flashing around a cupola is still in good condition 25 years after installation. Thin aluminum flashing is less durable, and in many cases cheek siding must be removed to replace it.

granulated membranes (and I've tried them all).

We always install continuous water and ice membrane along eaves to a point 2 feet inside the exterior wall plane (**Figure 3**). Valleys receive full-length, 36-inch-wide membrane centered on the divide. We run membrane up the rakes, too, covering the top edge of the trim with a 12-inch strip. We also use self-adhering membrane around all penetrations like chimneys and roof vents. At chimneys and dormer cheeks (when accessible), we fold the membrane up the vertical face as a backup to conventional metal step flashing.

Self-adhering membranes become exceptionally sticky in the heat of the sun and require careful handling to prevent frustration and wasted material. Never leave the rolls in the sun. Immediately store them in the shade or in the basement if possible, right up until use.

Applying the membrane is a two-person performance. First, cut it to length, roll it out, and position the edge accurately against a chalk line. Then, roll it back halfway along its length, carefully score the backing paper across the roll, and peel it away as you redistribute the roll. Repeat this process from the opposite end, and the membrane will end up right where it belongs.

Step Flashing

You can't always inspect or predict the condition or quality of existing flashing along dormers and sidewall cheeks (**Figure 4**). After tearoff, we often find the typical paper-thin aluminum step flashing worn through from a couple of decades of acid rain. Depending on the type of siding and how tightly it was installed, worn-out step flashing can be difficult to replace. In some cases, I have to present the client with a change order to strip and replace the siding and trim before proceeding. Removal is certainly

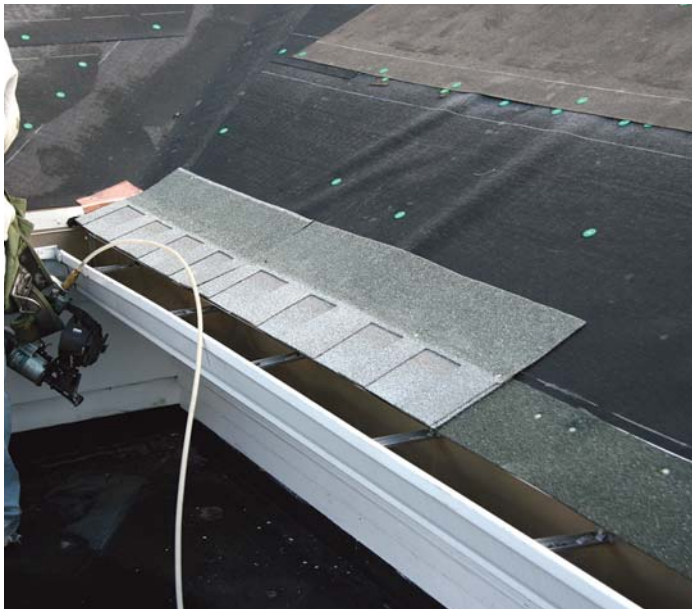

Figure 5. Aluminum drip edge is nailed over the self-adhering membrane (above left). The starter course is ripped so that the first full course installs at the same attitude as following courses and self-seals. Note the short piece of copper drip intended to mesh with copper valley flashing, preventing a galvanic reaction between dissimilar metals (above). Rake starters provide a surface for the shingles to seal against (left).

the best case, since it gives us the opportunity to run self-adhering membrane between the roof and the wall before installing new step flashing.

It's important to note that 5-inch-by-7-inch aluminum steps aren't suited to the wider coursing of metric-size shingles, now the prevalent size. However, most suppliers carry appropriately sized step flashing for metric shingles. Custom-bent flashing made of heavier aluminum or copper stock is best, but it can tax the average roofing budget.

We often find aluminum flashing folded around outside dormer corners in a tortured wrap that stands little chance of keeping water out. This is a common leak location. Here, we absolutely have to remove the corner trim and shape a piece of lead around the corner transition.

Quality Installation

Everyone pitches in to strip the roof, but after that the crew divides tasks. Two experienced roofers handle the shingle installation while the others focus on installing underlayment, stocking the roof with shingles, and keeping the job site cleaned up. It's a team effort that keeps everyone moving at an efficient pace.

After installing aluminum drip edge on the eaves, we install starter strips both along the eaves and up the rakes (**Figure 5**). Proprietary starters are available, but we cut our own.

Proper starters are about 7 inches wide. If you use a full shingle for a starter, the excess thickness of the first course will force the bottom edge of the second course to lift. This prevents the self-sealer from bonding properly and leaves the bottom edge of the roof vulnerable to blowoffs. Be sure to overhang the shingles beyond the metal drip edge by 1/2 to 3/4 inch; otherwise, water will follow the smooth metal surface and run down behind the gutter — a surefire callback. We always overhang the rake starters by 3/4 inch to help protect the trim.

Snap lines. With tab shingles, which

Figure 6. Chalk lines are measured against the ridge line to ensure a parallel outcome. Here, the line guides the layout beyond a completed open valley and provides alignment for the opposite slope (left). Shingles are initially nailed high, then secured in the fastening zone to complete the infill (above).

produce a geometric roofing pattern, both horizontal and vertical chalk lines are a must, snapped at strict regular intervals. With laminated — or architectural — shingles, there is no vertical pattern, and we snap horizontal lines less frequently, about every 10 courses (**Figure 6**). Winding up with a wandering or tapering course against the ridge cap is the kiss of death.

Figure 7. The GAF/Elk laminated shingles installed on this roof are rated for 110-mph winds. Asphalt shingles are available with ratings up to 130 mph.

Nails. While four nails per shingle is the minimum acceptable standard, a high-wind application calls for six per shingle. This is the only way we install shingles, regardless of wind considerations. We consider it cheap insurance. As a rule of thumb, it takes about one coil of nails to fasten one bundle of shingles, so we use a coil and a half per bundle.

Nailing by hand would deliver more regular results than using pneumatic nailers, but competition and sanity preclude that option. We deal with the occasional punch-through or angled head by immediately adding a good nail alongside it. Nail heads must be flat and flush with the surface of the shingle to ensure good adhesion of the sealer and prevent pop-throughs. The acceptable nailing area on a shingle is very narrow, only about 2 inches wide or less.

It's critical to keep the nailing within the prescriptive zone in order to fasten through and secure both layers of a laminated shingle. Nailing higher than this area forces the upper lamination to the deck, distorting the shingle and creating lateral channels that can capture water and introduce leaks. Nailing lower, of course, exposes the nail to the elements. In either case, you need to tear the shingle off and start over. The same rule goes for those nails that happen to coincide with the butt joint between the next course of shingles. Pull the shingle and either replace nails at least 1 inch away from the joint or secure a piece of flashing under the joint.

In coastal areas, premium lifetime shingles are the rule to comply with high-wind requirements. But electroplated galvanized nails are not lifetime nails. I've inspected fairly new coastal roofs and found completely rusty nails holding them down — for the time being. Both double-dip galvanized and stainless steel roofing coils are available at an upcharge; they can cost up to three times more than a standard case. But a premium roof deserves a premium nail.

High-wind shingles. Nails alone, however, are no guarantee that the roof won't fail in a high-wind event. For optimal


Figure 8. The "Tamko" valley is a fast, watertight, manufacturer-approved method for completing a valley, but it's best-suited to laminated shingles, where its sawtooth pattern remains inconspicuous. One slope — the shallower, if applicable — is completed first, with its courses running across the valley by at least 12 inches. To outline the valley, whole shingles are then nailed end-to-end along a chalk line. An optional bead of roofing mastic adds insurance against uplift (left). The opposite slope is completed from the valley line back, with square-cut corners toeing the valley line (center). A dab of mastic glues the sawtooth tips to the valley starter (right).

performance, select a shingle specifically offered by the manufacturer as a high-wind product, with up to a 130-mph rating (**Figure 7, page 6**). These shingles are stiffer, to resist wind uplift.

It's just as important to make sure that the shingle courses self-seal to each other. In winter installations, self-sealing strips may not be activated until warmer temperatures arrive in the spring. In winter conditions, you may decide to apply roofing adhesive under every shingle. We don't, and to this date haven't had any problems. We do apply adhesive along the rake starters to reinforce this vulnerable edge against uplift.

Scuff protection. Warm weather actually presents greater installation obstacles than winter temperatures do. Protecting shingles from damage and shoe scuffs during hot-weather installation takes a little extra care. You can keep the shingles cool by hosing them down — but only installed shingles, never the underlayment. That precaution makes watering the least desired method.

We protect walkways and work areas with rubberized carpet pad or other foam rubber sheeting, which provides good traction on the roof while protecting the granules from smearing. Ordinarily, we use a minimum of roofing brackets and staging planks. On a 10-pitch or lower, we just set a plank at the eaves and work an open roof. In warm weather, though, we stage the entire roof to prevent wear and tear in the loading zones.

Last but not least, we wear sneakers, which are the most comfortable shoes to wear on a roof and the least likely to scuff.

Speed. There are a few roofers who just want to get the job over with as quickly as possible. Speed matters to me, too, but not at the expense of a good installation. Racking — or running the shingles up the roof in vertical columns — is a slightly faster method than cutting "books," which is starting shingles at one edge of the roof in 6-inch staggers and extending them laterally in a pyramid pattern. Racking is the technique preferred by roofers who get paid by the square rather than by the hour. I pay my crew by the hour. Racking requires you to bend shingles back to nail those fed in underneath from the successive column. But with laminated shingles, this bending can crack the shingles and separate the laminations. Racking can also create an obvious patchwork appearance in the finished roof, since it concentrates shingles from a single bundle in one area. Shingle color typically varies slightly from one bundle to the next, so it's best to blend shingles from different bundles. Poor color blending is a common complaint and it's not covered by any warranty.

Valleys. While there are several accepted valley types — including woven, closed-cut, and open — we prefer the method illustrated on Tamko's bundle wrappers. (**Figure 8**). It's by far the fastest but is suitable for use only with laminated shingles, which effectively disguise the distinctive sawtooth pattern it produces.

The technique is similar to that for a closed-cut valley, where one slope's shingles are run across the valley and up the opposite slope by at least 12 inches. The opposite slope's shingles overlap these and are cut to the valley line. The Tamko valley line is defined by butting whole shingles

Figure 9. Vented ridges look best when the shingle-over material runs all the way to the ends (left). Proper end closures are created by folding a shingle over the ridge opening underneath the vent material. The common method of stopping the vent shy of the end creates a pinched look and draws attention to the ridge (below).

end-to-end up the divide, preferably along a chalk line. The opposite slope shingles are then started with their square bottom corner toeing the valley line, producing the sawtooth pattern.

Some roofers claim that woven valleys are the best for high-wind installations, but because both slopes must be worked simultaneously, they're slow to install. Also, the weave is too bulky for thick, laminated shingles and doesn't work in valleys of unequal pitch.

Capping Off

I see lots of capped, vented ridges where the ridge-vent product stops about a foot short of the gable, forcing the cap to taper downward at the ends (**Figure 9**). It's a bad look and a misinterpretation of prescriptive ridge-vent installation. For the best appearance, the venting slot should stop short by one foot and be covered by roofing material at gable ends and penetrations (such as chimneys), but the vent material should always run through.

We fold the top course of shingles over the ridge for the first 12 inches at the ends and run the ridge vent full length, followed by cap shingles. The same method should be used at chimneys and cheek walls. Although exposed nails on a roof aren't generally advisable, they're unavoidable in the last cap shingle and in apron nailing. We like to use stainless steel box nails along with a dab of roofing cement to hold the shingles in place. The small heads don't cause rust streaks and are nearly invisible in the roofing.

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Shingle Manufacturers

ORGANIC BASED

Building Products of Canada Corp.
800/567-2726, bpcan.com

CertainTeed Corp.
610/341-7000, certainteed.com

FIBERGLASS BASED

GAF-Elk Corp.
973/628-3000, gaf.com

IKO
416/781-5545, iko.com

Owens Corning
419/248-8000, owenscorning.com

Pacific Coast Building Products
www.pabcoroofing.com

RGM Products
559/499-2222, ridglass.com

Tamko
800/641-4691, tamko.com