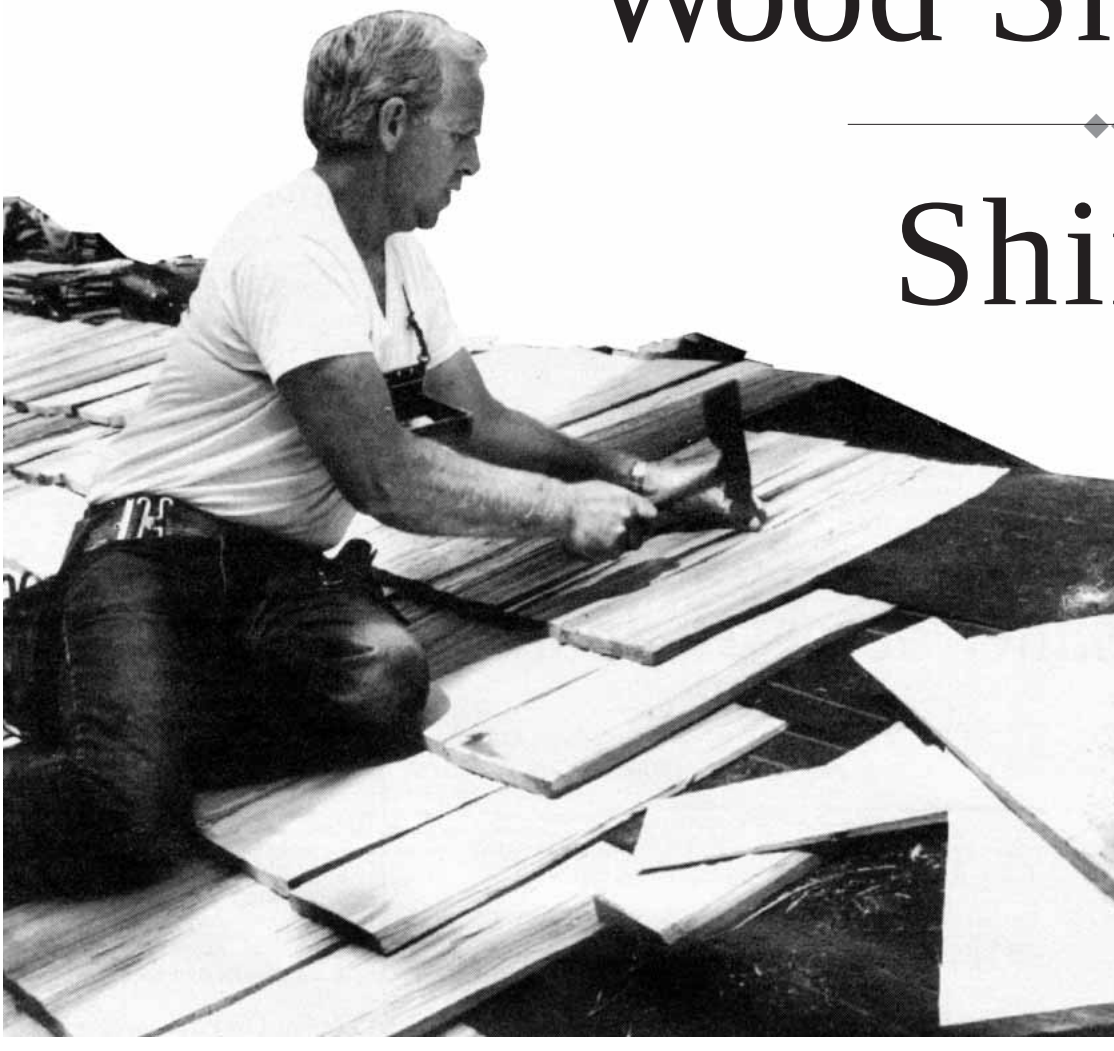
# Wood Shakes & Shingles



*A roofer installs wood shakes with strips of 30-pound felt laid between courses to keep out windswept snow and rain.*

## *How to install, treat, and maintain wood roofs*

by Henri de Marne

Wood shakes and shingles have been a staple of North American construction for centuries. American colonists used handsplit white pine and white cedar shakes to roof and side their buildings, and the Indians of the Pacific Northwest used red cedar to build dugout canoes and side their houses.

Wood shakes and shingles are still a building material of choice. They are lightweight and extremely durable, so they are easy to handle and suitable for reroofing over existing shingles. Wood roofs also help to keep a house cool in the summertime, although this is less important these days with improved ventilation and insulation practices. Moreover, shakes and shingles can withstand high winds and hailstorms better than most other roof coverings. They also add racking strength to a roof structure.

They are not, however, without problems. For one thing, they are extremely flammable. A spark from a woodstove, chimney, or forest fire can quickly set a wood-roofed home ablaze.

Wood roofs are also affected by fungus, moss, lichen, and moisture. Despite manufacturer's claims that wood roofs last 20 to 35 years in a temperate northern climate, many of them must be replaced in as little as 10 years if poorly installed, used in a wet, shaded environment, used on too shallow a roof, or not properly maintained.

### Sheathing and Felting

Wood shingles should never be laid directly over solid sheathing or felt underlayment. Moisture trapped between their flat underside and the roof deck promotes organic growth and causes cupping and checking because the exposed surface dries faster than the underside. The traditional solution to this problem is to use spaced sheathing — sometimes called "skip" sheathing — without felt underlayment because it allows the shingles to "breathe" from underneath and dry from both sides. Begin with a starter course of four 1x6s, then fasten single 1x6s on centers equal to the weather exposure of the shingles.

Where heavy snow or seismic loads prohibit the use of spaced sheathing, you can lay furring strips over felt underlayment before installing wood shingles to gain some of the benefits of skip sheathing. Frame the eaves and rakes with furring before laying strips on the solid roof deck.

Another, more recent option is to use a new product called *Cedar Breather* (Benjamin Obdyke, John Fitch Industrial Park, Warminster, PA 18974; 800/458-2309) as an underlayment. The material is formed into a three-dimensional matrix 3/8 inch thick and, according to the manufacturer, provides continuous airflow between the solid roof deck and the wood roofing.

The irregular surface of handsplit shakes makes them self-ventilating, so they can be installed over either spaced or solid sheathing. The prevailing weather is the determining factor. In areas where windblown snow is expected, use solid sheathing, since fine snow can penetrate the coarse shakes. Conversely, in hot and humid areas, use spaced sheathing to help with drying.

Regardless of the type of sheathing used, you should always install shakes with 18-inch-wide strips of #30 felt interlaid between courses to keep wind-driven snow and rain from penetrating the roofing. Since it is hard to find precut felt in 18-inch strips, you'll probably have to cut your own. I use cheap, disposable circular-saw blades to cut through the rolls while someone else holds them firmly in place and rotates them as needed. But it's risky business and

quickly gums up the blade. A roofing contractor I know uses a radial-arm saw with a 12-inch blade to precut the rolls with greater ease and safety.

It's faster and easier if you fasten all of the felt strips to the sheathing before starting to install the shakes. Begin by nailing a 36-inch-wide strip of #30 felt at the eaves. Fasten the first 18-inch felt strip in place so that the bottom edge is twice as far from the eaves as the weather exposure you plan to use, but not more than 20 inches, including the overhang (see Figure 1). Then nail 18-inch strips laid out on centers equal to the weather exposure as far as you expect to go during the day. Lay the strips of felt straight so you can use them as a guide to lay the shakes. Nail only along the upper edge because when you install the shakes you will need to slip the tops under each strip of felt.

Installing the felt is easy two-man work. One worker fastens the felt at the top of the roll, then unrolls it, sending it to a worker at the other end of the roof, who straightens out the curls, measures it for alignment, and nails it with roofing nails.

One person can cut the roll and move up to the next 1x6, while the other checks measurements in the middle of the roof and nails the top of the sheet. Place other nails every 10 feet or so, just enough to hold the felt in place. Repeat the process all the way up the roof.

## Roofing Over Existing Roofing

Both shingles and shakes can be installed over existing roofing, but it isn't always prudent.

*Existing shakes.* Old shakes are too irregular to make a good base and should be torn off before a new wood roof is laid.

*Existing wood shingles.* Old wood shingles provide a more uniform base that is still irregular enough to allow drying from underneath. If you're installing new wood shingles, you should still avoid using felt underlayment. You can install new shakes directly over old wood shingles following the same procedures you would use on a bare roof deck.

The biggest problem is finding solid nailing for the new shingles or shakes, particularly if the original shingles were installed on spaced sheathing. Unless your nails penetrate the sheathing, you're just nailing new roofing to old roofing and the new layer is likely to blow off in a stiff wind.

*Existing asphalt.* If the existing roof already has more than one layer of asphalt roofing, you should tear it back down to the original roof deck. Otherwise, you can install new shakes directly over the asphalt, but make sure the nails are long enough to penetrate the roof deck. Wood shingles, on the other hand, should be laid on furring strips firmly nailed through the asphalt to the roof deck or rafters.

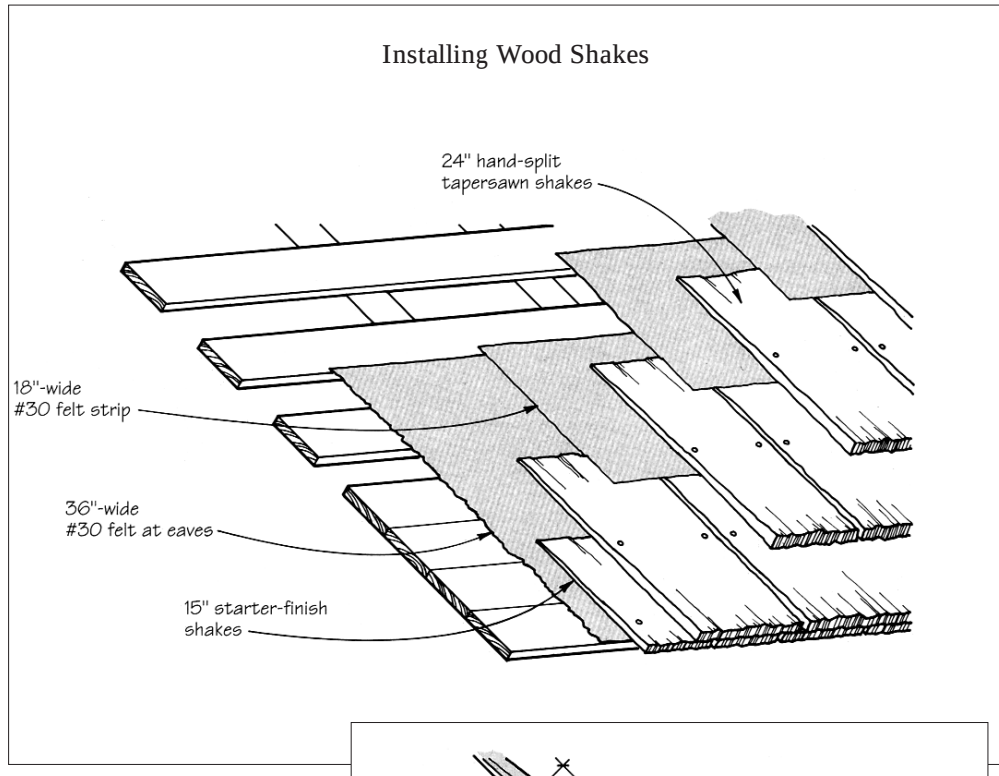



Figure 1. *Always use interlaid felt strips with shakes to keep windblown snow and rain from penetrating between the irregular surfaces. Use solid sheathing in snowy regions and skip sheathing in hot, humid climates. Space the skip sheathing on centers equal to the weather exposure of the shakes (inset) to give solid nailing.*

## Installation

Begin installing shingles with a double layer at the eaves, using low-grade "undercourse" shingles on the bottom. If there are no gutters, overhang the shingles by 2 inches to provide a drip edge. Set the gauge on your shingling hatchet to the desired weather exposure, and use it locate each successive course. Check the dimensions every four or five courses to make sure they are straight. Stagger all joints by at least 1½ inches and allow two courses to intervene before joints align vertically (see Figure 2).

With shakes, the eaves course should be doubled or tripled and all joints staggered. You can use 15-inch starter-finish shakes to cut down costs. Remember to overhang the starter course by 2 inches to provide a proper drip edge where there are no gutters.

As you lay the shakes, tuck them under the strips of felt so that, for a 10-inch exposure, for example, 4 inches at the top of each shake is covered by felt and 20 inches is exposed. For the first two courses, check the exposure often to ensure an even row. At the third course, you can look between the shakes and line up the butt of the shakes with the felt interlay one course below.

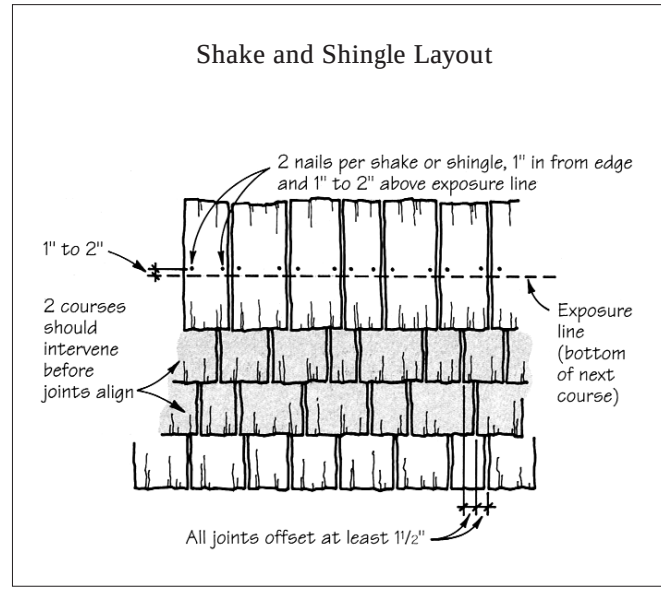



Figure 2. *All joints in wood shake and shingle roofs should be offset by at least 1½ inches in adjacent courses. Two courses should intervene before joints align vertically.*

As with shingles, joints between adjacent shakes should be offset at least 1 1/2 inches, and two courses should intervene before joints align vertically.

*Hips, valleys, and ridges.* As you go along, you should set aside all wide shakes or shingles to use at the valleys and hips. Or you can pull them out ahead of time and precut all valleys. Don't throw away the cut-off pieces — you can use them on the opposite side of a hip. To cap a hip or ridge, use premanufactured hip and ridge units if available, and make sure you alternate the joints from side to side.

## Nailing

Use hot-dipped, zinc-coated box nails — 3d for 16- and 18-inch shingles, 4d for 24-inch shingles, and 6d or 7d for shakes. Use 8d for shake hips and ridges. When reroofing over an existing roof, use box nails long enough to penetrate at least 1/2 inch into the sheathing.

You'll need about two pounds of nails per square. Use only two nails per shingle or shake, and drive them so that the head touches the wood without breaking the fibers or distorting the shingle. Place the nails about 1 inch in from the edge and about 1 to 2 inches above the exposure line.

Since 1979, the Red Cedar Shingle and Handsplit Shake Bureau (515 116th Ave. N.E., Suite 275, Bellevue, WA 98004; 206/453-1323) has endorsed the use of pneumatic nailers, but only with aluminum or types 304 or 316 stainless-steel fasteners. Galvanized staples used on wood roofs have been known to rust, allowing the shingles to blow away in the breeze. It's also important to adjust the nailer so the staples do not tear the wood fibers, which reduces their holding power.

## Fire Safety

Shakes and shingles will burn readily if they are not treated. A number of communities in dry, windy areas, such as California and Texas, have banned or restricted wooden roofs. Although few fires originate on roofs, houses with wood roofs have been lost because of flying embers from brush fires and chimneys that ignite the shingles.

Where fire-resistant roofs are required or desirable, you can use pressure-treated shingles or shakes to achieve a Class B or C roof covering. The cost will be at least double the price of untreated wood. Existing wood roofs in good condition can be made fire-resistant to Class C specifications by spraying, but this treatment needs to be repeated frequently because the chemicals leach out.

An inexpensive treatment developed by the Texas Forest Service (Forest Products Laboratory, P.O. Box 310, Lufkin, TX 76901; 409/639-8180) uses dissolved granular diammonium phosphate at a concentration of one pound per gallon of water. The proportions of nitrogen, phosphorus, and potassium (NPK number) of this readily available chemical fertilizer should be at least 18:48:0, which indicates a high percentage of phosphorus. Spray the solution liberally onto the shakes or shingles. Because it easily leaches out of the roof, the solution should be applied every six months under normal conditions and every month in brush-fire regions. You can also use "triple super" diammonium phosphate (NPK 0:48:0), or liquid ammonium polyphosphate (NPK 11:37:0) in a 1:1 ratio with water. The liquid is more expensive, but it is easier to store because it is noncorrosive.

## Moisture Problems

The other major enemy of wood shingles is organic growth (see Figure 3). Moss, lichen, fungus, and rot are at home on wood roofs, particularly low-pitched roofs in humid, wooded areas. Portions of the roof under overhanging trees are especially vulnerable because of both the shade and the organic debris that lands on the roof. Moss and lichen take hold, encouraged by pine needles and other vegetable matter that accumulates on shallow roofs and retains moisture. These growths capture rainfall, which saturates the wood cells. Sunlight and rain interact to rob wood shakes and shingles of their natural preservatives, and within a few years the shingles begin to curl, cup, split, and absorb water.

## Maintenance

Chemical treatments that control these problems are available both for new shakes and shingles — using pressure or dip treatment — and for existing roofs. The Texas Forest Service has tested many chemical treatments and has come up with a practical and inexpensive recommendation. A one percent solution of Cunapsol (ISK Biotech, 6075 Poplar Ave., Suite 306, Memphis, TN 38119; 800/238-2523) in water can be sprayed on the roof with a garden sprayer. The solution is not toxic to vegetation, so there is no need to cover plants, but avoid overspraying and wear eye and skin protection during the application.

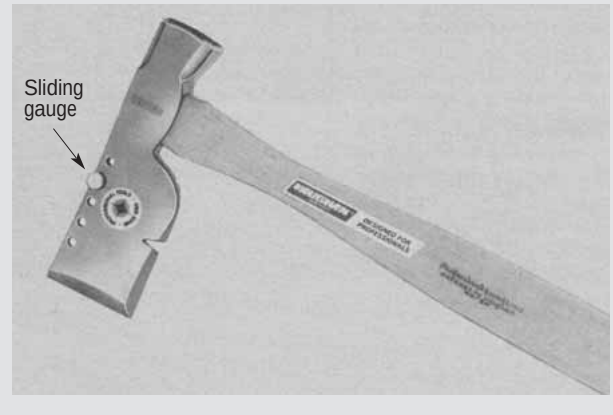
Cunapsol becomes highly insoluble once it dries in the wood cells. Nevertheless, treatment should be renewed every five years. The solution has a light green color, but this dissipates in a few weeks. Faithful treatment should double the life of the roof (see Figure 4).

Pentachlorophenol is also a good preservative, but all of its formulations are toxic and have been banned from sale to anyone except treated wood fabricators. Other light-pigmented stains are expensive and

Figure 3. *Moss, lichen, fungus, and rot are major enemies of wood shakes, especially where trees overhang a low-pitched roof (above). Periodic cleaning with a power washer (right) can dramatically extend a wooden roof's life span.*

## Tools of the Trade

*A nail stripper (left) can greatly speed up shingling. The shingle hatchet (below) has a blade for trimming and a shingle gauge for checking courses.*



# Grades and Coverage for Shakes and Shingles

Shingles are sawn on both sides to produce smooth surfaces.

### Grades

The four grades commonly used for roofing are:

- #1 (or Blue Label) are clear heartwood, edge grained
- #2 (or Red Label) are flat grained and have limited sapwood
- #3 (or Black Label) are economical utility shingles
- #4 shingles are used for shims and undercoursing

All shakes are #1 grade and come in three different types. *Handsplit, resawn* shakes are tapered; the top side is heavily textured while the other is sawn smooth. They are heavier and thicker at the butt than other shakes. *Tapersplit* shakes are of medium thickness and texture and are produced by reversing the cedar block and handsplitting to obtain a natural taper. *Straight-split* shakes, also called "barn shakes," are handsplit without reversing the block; this results in a more uniform, untapered thickness.

### Lengths

Shingles come in three lengths: 16-inch (called "5X"), 18-inch ("perfections"), and 24-inch ("royals").

Shakes come in 18- and 24-inch lengths, as well as a 15-inch starter-finish shake, and in two weights — *mediums*, with 1/2-inch butts, and *heavies*, which average 3/4 inch at the butt.

### Weather Exposure

The Red Cedar Shingle and Handsplit Shake Bureau recommends different weather exposures depending on the roof pitch. The chart below indicates maximum exposures at different roof pitches and shows how these affect coverage. The figures for wood shingles assume you are using #1 Blue Label shingles. If you use #2 or #3 shingles, you must reduce the exposure. The Bureau will provide details upon request.

*Spacing.* Leave a 1/2-inch space between the shakes, and 1/4 inch between shingles to allow for expansion during wet weather. If the shingles are butted too tightly, they can buckle. If the shingles or shakes are very wet when applied, however, many roofers space them more tightly — down to 1/8 inch for shingles — to ensure weathertightness when they dry and shrink.

*— H. de M.*

**Wood Shingle Roof Coverage (in sq.ft.) at Varying Weather Exposures**

| Length | No. of Bundles | Weather Exposure | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3 1/2" | 3 3/4" | 4" | 4 1/4" | 4 1/2" | 5" | 5 1/2" | 5 3/4" | 6" | 6 1/2" | 7" | 7 1/2" |
| 16" | 4 | 70 | 75* | 80 | 85 | 90 | 100** | — | — | — | — | — | — |
| 18" | 4 | — | — | 72 1/2 | 77* | 81 1/2 | 90 1/2 | 100** | — | — | — | — | — |
| 24" | 4 | — | — | — | — | — | — | — | 77* | 80 | 86 1/2 | 93 | 100** |

*Maximum exposure at a 3:12 to 4:12 roof pitch
**Maximum exposure at a 4:12 or steeper roof pitch

Note: Do not use wood shingles at roof pitches less than 3:12.

**Wood Shake Roof Coverage (in sq.ft.) at Varying Weather Exposures**

| Length and Thickness | Type of Shake | No. of Bundles | Weather Exposure | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 5 1/2" | 6 1/2" | 7" | 7 1/2" | 8" | 8 1/2" | 10" |
| 18" x 1/2" to 3/4" | Handsplit-and-resawn | 4 | 55* | 65 | 70 | 75** | — | — | — |
| 18" x 3/4" to 1 1/4" | Handsplit-and-resawn | 5 | 55* | 65 | 70 | 75** | — | — | — |
| 24" x 1/2" to 3/4" | Handsplit-and-resawn | 4 | — | 65 | 70 | 75* | 80 | 85 | 100** |
| 24" x 3/4" to 1 1/4" | Handsplit-and-resawn | 5 | — | 65 | 70 | 75* | 80 | 85 | 100** |
| 24" x 1/2" to 5/8" | Tapersplit | 4 | — | 65 | 70 | 75* | 80 | 85 | 100** |
| 18" x 3/8" | Straight-split | 5 | 65* | — | — | — | — | — | — |
| 24" x 3/8" | Straight-split | 5 | — | 65 | 70 | 75* | — | — | — |

*Maximum exposure for triple overlap coverage
**Maximum exposure for double overlap coverage

Note: Do not use shakes at pitches less than 4:12.

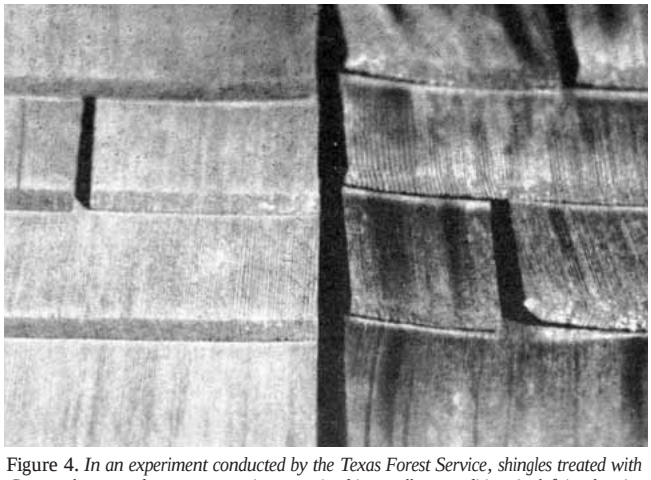


Figure 4. *In an experiment conducted by the Texas Forest Service, shingles treated with Cunapsol, a waterborne preservative, remained in excellent condition (at left in photo) while untreated shingles, at right, showed cupping, splitting, and staining. Both treated and untreated shingles were installed over spaced sheathing and left in the weather for four years.*

must be applied on a yearly basis. Copper naphthanate and zinc naphthanate are the active ingredients in most of products. Copper is twice as effective a preservative as zinc, but its greenish color is unsightly.

Few homeowners realize that maintenance is essential to a long-lasting roof. Sweeping the roof with a stiff broom or brush is not enough; all material that has accumulated on or between the shakes or shingles must be removed periodically. A high-pressure water jet does the best job.

If moss and lichen have taken hold, they should be scraped off as much as possible and the roof pressure-washed with cold water using a 2,000 to 3,000 psi power washer. The equipment can be rented, but because the power spray can be strong enough to pierce the skin, I recommend subcontracting this work.

If you have to replace damaged shingles or patch into an existing roof while remodeling, don't leave behind a patchwork of new and weathered shingles. You can blend the two by speeding up the weathering process. Spray or brush coat the new shingles with a solution of one pound baking soda dissolved in a half gallon of water. A few hours of sunlight will do the trick and the chemical reaction is permanent. ■

*Henri de Marne was a remodeling contractor and custom builder for 25 years in Washington, D.C., and Vermont. He is now a home inspector and building consultant and writes a nationally syndicated column.*