After power washing and repairing this red-cedar roof, a worker sprays on Cunapsol 5, which will keep it free of mold, lichen, and decay for up to five years.

RESTORING *and* TREATING WOOD SHAKES *and* SHINGLES

Double or triple the service life of a cedar-shingle roof by power washing and treating

by Brian Buchanan

Dating back to the earliest days of colonization in North America, cedar shakes and shingles have offered strength, durability, insulation, and beauty to our homes. A wood roof imparts a look of quality that few other roof coverings can match.

Only a few years of exposure to the weather, however, can drastically change this "quality" roofing. Through the interaction of sunlight and rainfall, cedar shakes and shingles can lose virtually all their natural preservatives in as short a time as five years. At this age, most cedar roofs begin to show signs of cupping, curling, splitting, and decay.

Unlike most roofing materials, however, cedar shingles and shakes can be restored and maintained through proper care and treatment, often doubling or tripling the remaining service life.

Why Wood Roofs Weather

Western red cedar is an extremely durable material even under adverse conditions, but its useful life depends upon the environment. Cedar roofs left unprotected suffer photodegradation by ultraviolet light (sunlight), leaching, hydrolysis, shrinking and swelling by water, and discoloration and degradation by decay microorganisms.

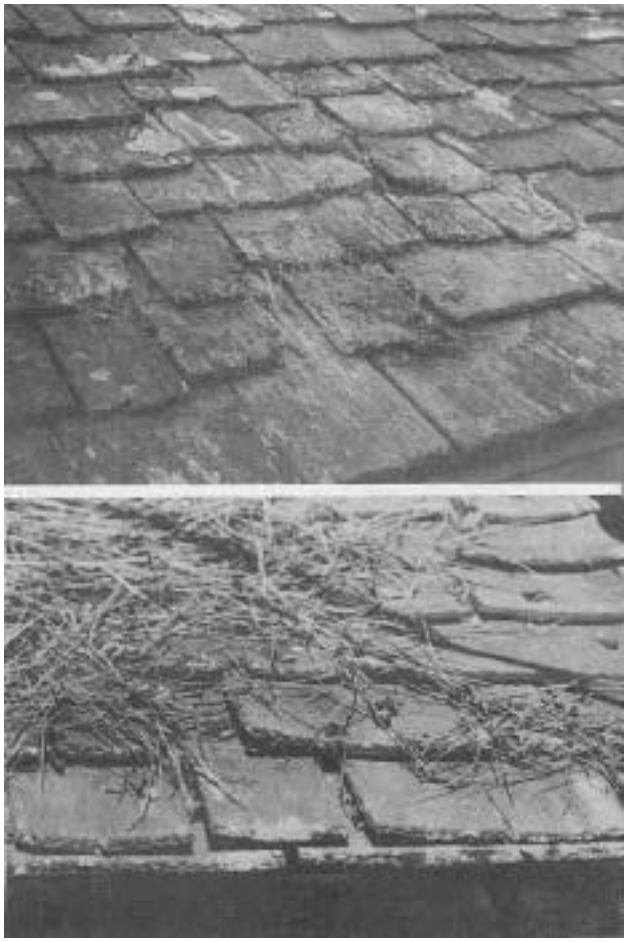
Photodegradation by sunlight. Solar radiation is the most damaging component of the outdoor environment. Photodegradation due to sunlight occurs fairly rapidly on the exposed shingle surface. The initial color change from the golden, orange-brown color to gray is related to the decomposition of lignin in the surface wood cells. (Lignin is Mother Nature's way of holding wood cells together.) The wood cells at the shingle surface lose their strength and eventually are washed away by rainwater. In addition, microscopic cracks and checks develop, allowing deeper water penetration.

Degradation by moisture. Accompanying this loss of wood fiber at the shingle surface are the shrinking and swelling stresses set up by fluctuations in moisture content. These stresses cause deeper checks and splits to develop. The result: shakes and shingles begin to cup, curl, split, and check at an accelerated rate.

Degradation by wood-destroying fungi. The natural decay resistance of western red cedar is due to its heartwood extractives, including the *thujaplicins* and a variety of *phenolic compounds.* The thujaplicins contribute to the decay resistance of red cedar while the phenolic compounds and resins give cedar its water repellency and *lubricity* (slippery surface).

Since the natural preservatives in cedar are somewhat water soluble, they can be depleted in service. In roof exposure, extractives may leach out in a relatively short time and allow colonization by wood-inhabiting fungi. Aided by favorable climatic conditions, these in turn allow the growth of wood destroying fungi, which ultimately cause the early failure of a roof. The wood becomes soft and spongy, stringy, pitted, and cracked or crumbly. This usually occurs first at the butt region of the shingles where they overlap.

An added factor is that more shakes



These 14-year-old untreated shingles (top) in the humid Houston area show severe decay, splitting, and heavy accumulations of moss and lichen. Organic debris left on the roof (bottom) traps moisture and hastens decay.

and shingles are being manufactured today from younger, less decay-resistant cedar since old, high-thujaplicin-content logs are no longer readily available. This shortens the roofs life expectancy even more.

How fast a wood roof weathers is a function of slope, direction, and shading. The shallower a roof is, the more likely it is to suffer decay from fungi. South-facing slopes suffer because they experience the greatest swings in temperature and humidity – leading to more splits and other degradation. Shade is also a concern. Wood roofs shaded by trees are more likely to develop mold, mildew, and decay than unshaded roofs.

Shake and Shingle Quality

Grade No. 1 (Blue Label) shingles and shakes in the past were cut from 100-percent clear, vertical-grain heartwood. However, grading standards have been relaxed over the years allowing more flat-grain and defects. These shakes and shingles are particularly susceptible to cupping, curling, and splitting. Improper nailing, nailing too high or too far in from the edge, only worsens the problem.

To Repair or Not

The older the roof, the more difficult it is to repair satisfactorily (see "Repair Procedures"). Although you can salvage a roof that requires as many as 30 repairs per square, it may not be cost-effective. A good rule of thumb is that shingle roofs older than 20 years, and shake roofs older than 25 years, will be extremely difficult, if not impossible, to repair satisfactorily. In some geographic areas such as the Gulf States, repairs on shingle roofs over ten years old and shake roofs over 15 years old should not be attempted. Foot traffic on these roofs will cause considerable breakage or dislodge the shingles.

The final decision to repair, clean, and preservative-treat a wood roof is going to be a subjective one. There are no iron-clad rules. But don't go ahead with restoration if the benefits are questionable.

Cleaning with Bleach

Depending on the condition of the wood roof, there are two methods of cleaning prior to treatment: chemical cleaners (bleaching) and power washing. In many areas of the country, wood roofs are discolored primarily by sunlight and surface mildews or algae. These roofs can be cleaned quite easily and effectively with bleaching agents such as sodium hypochlorite (household bleach) or calcium hypochlorite (swimming-pool chlorine) mixed in tapwater. These chlorine solutions quickly remove the oxidized wood fibers on the shingle surface as well as kill surface mildews and algae. The roof is transformed from its initial dirty gray color to a "buff' or buckskin tan color.

To use liquid chlorine (Purex, Chlorox, etc.): Mix one gallon of liquid bleach (5 percent sodium hypochlorite) with one gallon of water to remove mold, mildew, and the gray color. Higher concentrations of bleach (12 to 15 percent sodium hypochlorite) are available through commercial cleaning-supply companies. They can be diluted with water or used up to "full strength" if necessary to remove discoloration.

Stronger, more cost-effective chlorine solutions can be formulated using granular chlorine (calcium hypochlorite) mixed at a rate of 2 to 4 ounces per gallon of water. The type found at swimming pool supply companies (65-percent available chlorine) does a very good job of removing mildew and discoloration due to weathering. Bleach solutions are not effective, however, in removing dirt, rust stains, extractive stains, heavy moss, or lichen growth.

Whichever type of chlorine you use, you can apply the solution of chlorine and water to the roof using a typical garden-pump sprayer. Scrubbing or brushing is not necessary. Let the chemical do the work. The recommended coverage rate is 1 to 1½ gallons per hundred square feet of roof area. Let the solution stay on the roof 15 to 30 minutes, then rinse thoroughly with a high-pressure power washer or a garden hose. The high-pressure rinsing gives more dramatic results and aids in removing the oxidized wood fibers, plant organisms, and leaf debris from the roof.

Take care not to spray vegetation. If this does happen, rinse the plants thoroughly with water. Also, chlorine solutions are corrosive and should be applied using commercial spray equipment with stainless steel or plastic internal parts. Pump-up garden sprayers work fine for small roofs but are too slow and cumbersome for large jobs or commercial applications. High-pressure spray rigs or airless sprayers are not necessary to effectively bleach the wood. Pressures of 100 to 125 psi are adequate with flow rates of ½ to 1 gallon per minute. To minimize any possible damage to shrubbery and grass, the area should be sprayed with water thoroughly before, during, and after bleaching. This eliminates the need to cover shrubbery with plastic tarps.

Power Washing

Because certain forms of algae, moss, and lichen are unaffected by chlorine solutions, they must be mechanically removed using a high-pressure washer, similar to those used to clean automobiles. Power washing of wood roofs works quite well and is used extensively on the West Coast. Power washing essentially removes the top layer of wood fibers from the shingles much the same way sandblasters remove rust from metal. Take care not to damage the shingles by using too high a pressure. Pressures of 1,000 to 1,500 psi are generally adequate to clean the roof quickly and efficiently. Although power washing is slow and dirty work, the results are truly remarkable with the roof returning to its original cedar-brown color.

Power washers can be rented through local equipment rental companies or paint stores such as Sherwin Williams

Repair Procedures

Replacement. One common way to spot-repair demaged or decayed shingles is merely to replace them with new ones.

Tools required for shingle replacement are: roofing hammer, metal hacksaw blade or heavy wire cutters, a wood block, a nail set, shingle nails (hot-dipped galvanized), and new No. 1 grade shingles or shakes.

The replacement of a shingle or shake can be completed in seven easy steps:

1. Split the old shingle using the blade end of the roofing hammer, in line with the original attachment nails.
2. Then remove the broken shingle with the serrated head of the roofing hammer.
3. Saw or clip off the nail heads left just under the butt of the overlapping shingle.
4. Then drive a new shingle into the void until the butt is within approximately one inch of the butt line of the adjacent shingles.
5. At this point, toenail two nails (which should be about ½ inch longer than the original nails) through the shingle up under the overlapping shingle at a 45-degree angle.
6. Complete driving of the nails, using the nailset to avoid damaging the shingles.
7. After setting the nails, drive the shingle in by striking the wood block held against the butt of the shingle, until the butt of the new shingle is even with the shingle course line.

The entire process generally takes about five minutes to complete. *Under no circumstances* should new shingles be "facenailed" leaving the nailheads exposed. When face nailing, the nails tend to extrude and the shingles tend to crack through fastener holes in the weathered surface.

Repeated wetting of shingles causes them to swell, grabbing the nails and raising them. As the shingles dry, the wood shrinks, leaving the nails elevated. Over time, this can cause loose shingles and lost nails. In addition, as the wood ages, it tends to shrink, causing holes to enlarge, and leaving the nails loose in the nail holes.

One problem with removing damaged or decayed shingles is that surrounding shingles can be loosened or broken.

Undershimming. Another method of spot repair, especially on older and more weathered roofs, is "undershimming." Undershimming involves placing a waterproof shim under the damaged shingle. Recommended shimming materials are heavy 45-pound roofing felt, aluminum, or galvanized sheet metal.

Undershimming is easily accomplished. With a claw hammer, the shingle is raised, and a 4x8-inch shim is slipped in under the shingle. Friction between the wood and the asphalt-impregnated felt is sufficient to hold the felt shim in place. Metal shims have either a rough burr on the surface, or the lower corners can be bent down to bite into the wood to hold the shim in place. The shim should not be visible after installation. Obviously this technique is only suitable when the shingles or shakes are split and not decayed or loose. This technique is faster and less expensive than replacing individual shingles and it doesn't disturb surrounding shingles.

Any wood roof that requires more than 30 repairs per square, such as this one, is probably not worth restoring. Shingle roofs over 20 years old and shake roofs over 30 may be too far gone.

Green Shingles Are Here: Move Over, Red Cedar

Pressure-treated pine shakes will weather to an attractive buckskin tan — the same color as pressure-treated wood—regardless of climate.

Many home buyers choose cedar shingles for their natural decay-resistance as well as their beauty. In some regions of the country, cedar roofs can last 50 years or longer. In warm, moist areas, however, the service life of a wood roof rarely exceeds 15 years due to decay, curling, and splitting.

In addition, the future availability of good quality cedar shakes and shingles to the U.S. builder is in question. The timber supply in the Northwest is depleted and four-hundred-year-old trees rake rime to replace. So to meet consumer demand, in 1977 the Texas Forest Products Laboratory began research aimed at developing southern-yellow-pine shakes and shingles that would have the advantages of cedar, but be more durable, stronger, and best of all, more affordable.

Developing Grade Rules

Preliminary work centered around developing grade rules for manufacture. Early in the study, the group determined that it was not feasible to produce a handsplit-resawn pine shake, due to the prevalence of knots and irregular grain. They decided to concentrate on sawing shingles with butt widths of greater than 3/8 inch. These are called "taper-sawn shakes."

Literally thousands of pine shakes of varying dimensions were exposed to both long-term and accelerated testing. The first complete pine roof (3,000 square feet) was installed in 1979. The shingles used were nearly all quartersawn, but were allowed to contain all types of defects — knots, pitch pockets and crossgrain — to aid in developing grading rules. After one year, the roof was inspected. As expected, there was considerable splitting in those shakes with large percentages of "flat grain." This problem was solved by limiting the amount of flat grain and keeping it away from the center of the shake. Most of the problems encountered with the shakes on that particular roof were related to one or more of the following:

- Shakes too wide (over 8 inches)
- Presence of large, exposed knots
- Excessive flat grain
- Non-uniform butt thickness
- Density less than four rings per inch

Since then, the Forest Service coveted 11 more office-building roofs, bringing the installed area of pine shingles up to about 50,000 square feet. Based on results from both accelerated- and long-term exposure testing, the Forest Service developed a set of manufacturing specs for pine-shake mills to follow.

Preservative Treatment

Since southern pine is not naturally resistant to decay or insect attack, it was a foregone conclusion that the pine shakes would need preservative treatment to ensure long-term durability. Preliminary results of *dip-treated* shingles were promising. But concerns were raised about the untreated wood cores being exposed where shakes were cut or trimmed on the job. With this in mind, the developers of the product decided to seek code approval only for *pressure-treated* shakes.

The three model codes—BOCA, UBC, and SBCCI— unanimously approved the use of pine shakes pressure-impregnated with preservatives according co the Amercian Wood Preservers Bureau (AWPB) Standards LP 2 and LP 3.

Before treating, the shakes must be dried to 19 percent moisture content or less. Since air drying in East Texas can take up to 65 days in summer or 160 days in winter, the shakes are kiln dried. Unlike western red-cedar, the pine shakes are easily treated using the full-cell process. Since the CCA will fix quite rapidly once the treated shakes are installed, kiln drying after treatment is neither required nor recommended.

Most plants treat to 40 percent pcf chromated-copper arsenate (CCA) and some now provide a 30-year warranty similar to that given for structural lumber by companies such as Koppers and Osmose. The labelling of the treated shingles will he monitored by one of the recognized agencies such as Timber Products Inspection (TPI) or Southern Pine Inspection Bureau (SPIB).

With the preservative treatment, the pine shingles will weather uniformly much the same as pressure-treated wood decking—to a pleasing "buckskin-tan" color.

Installation

Pressure-treated taper-sawn pine shakes are installed in essentially the same way as cedar shakes over spaced or solid decking. Minimum allowable roof pitch is 4-in-12.

Maximum weather exposure for 24- and 18-inch shakes are 10 and 7 inches, respectively. In general, courses should be interlaid with 18-inch wide strips of 30-pound felt (see "Wood Shakes and Shingles," 5/87, for details). However, roofing-felt interlay is not needed where pine shakes are applied in snow-free areas or where the weather exposure of the shingles is less than one-third the total shake length (three-ply coverage).

The shakes should be installed about 1/4- to 3/8-inch apart and adjacent courses offset by at least 1½ inches.

Nail with two (only) corrosion-resistant nails — hot-dipped galvanized, aluminum, or stainless-steel type 304-3/16, driven 3/4 inch from each edge and 1 inch above the butt line. Drive the nails flush, but don't crush the wood. Use No. 6 common galvanized nails or 2-inch staples. Although staples are not recommended for cedar shakes or shingles because of their tendency to shoot through and leave a loose shingle, you can use them with the sawn pine shingles. Use a heavy, 16-gauge galvanized staple with 7/16 to 1/2-inch crown, and make sure the air pressure is adjusted to prevent "overdrive" of the staples.

Cost

Initially, pine shakes should sell in the neighborhood of $80 to $90 per square compared with cedar at $85 to $125. But ultimately, the superior performance of pine and its warranties will probably support prices higher than that of cedar. Currently three pine-shake mills are in production, with 25 to 50 mills expected to open over the next five years.

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for $50 to $75 per day. Those wishing to purchase power washers should specify that the units: be gasoline or diesel powered, provide 1,500 to 3,000 pounds pressure, and have a flow rate of 4 to 6 gallons per minute.

Power washing roofs is fairly straightforward. Always work from the top of the roof down, keeping your feet on the dry portion of the roof. Keep the spray wand moving a distance of 8 to 12 feet from the shingle surface. Use cold fresh water. Hot water washing or the use of strong soaps or cleaners is unnecessary. Experiment with various tip sizes to get the best results. A 15-degree spray fan is recommended.

Preservative Treatments

Until recently, it made little sense to preservative-treat an existing wood roof because of the low cost to replace. But as replacement costs rapidly approach $3 to $4 per square foot, the economics of preservative treatment look much better. One roofer's advertisement reads, "Why worry about a dirty roof? Because a clean and preserved roof looks a lot better than a re-roofer's bill!"

The high replacement costs of wood roofs and the development of new preservative finishes that are cheaper, less toxic, and more durable has made treating wood roofs feasible and desirable.

Since 1975, the Texas Forest Service (Forest Products Laboratory) has been evaluating preservative treatments for wood shakes and shingles. Results from both accelerated and long-term outdoor exposure tests indicate that a number of both water-borne and oil-borne treatments are quite effective in controlling the effects of weathering and decay for up to 5 years. The most effective products are those that contain one or more of the following:

- Copper octoate (1 percent metal content)
- Copper naphthenate (1 percent metal content)
- Zinc naphthenate (3 to 4 percent zinc metal content)
- Busan 1009 or Busan 1025 (2 to 5 percent TCMTB)
- Polyphase (.5 to 1 percent 3-iodo-2-propynyl butyl carbamate)

The following is a more detailed examination of these preservatives, their cost, availability, and use. They are ranked in order of overall performance. This ranking is based upon actual long-term outdoor exposure tests on wood roofing in East Texas.

Water-Borne Preservatives

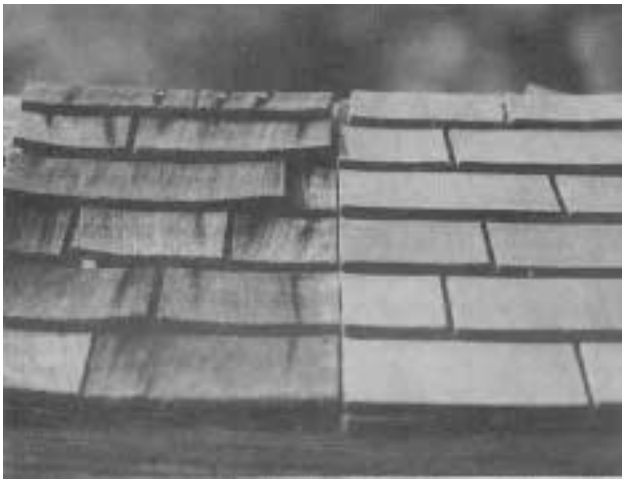
Cunapsol 5. For maximum mildew and decay resistance in a water-borne treatment, Cunapsol 5 is recommended. Cunapsol 5 (cut 1:4 with water) is quite popular with roof applicators in northern California and the Pacific Northwest because of its low cost and effectiveness in controlling moss and lichen growth. Because Cunapsol contains copper napthenate, it imparts an initial green color to the wood. If allowed to weather naturally, the color changes to a pleasing cedar brown. To hide the initial bright green color, you can pigment the Cunapsol solution with Presco Cedar Brown Pigment or Millbrite 582 Pigment. Cunapsol 5 and the pigments are available from Chapman Chemical Company in Memphis, Tenn. (800/238-2523). Cunapsol 5 provides excellent mold, mildew, and decay resistance for up to 5 years or longer. But like other water-borne preservatives, it has *little effect* on cupping, curling, or splitting of the wood. The cost per gallon of a pigmented, ready-to-use solution is ap-

Power washing with water (top), popular in California, restores cedar roofs to their original brown color (bottom), even if they are covered with bleach-resistant lichen and algae. Power washers can be rented at many paint stores. Roofs that are merely discolored can be bleached, instead, which is easier on the wood.

These 12 year-old shingles from an arid climate suffer more from sunlight than wood decay: the UV breaks down the wood, leading to cupping, curling, and splitting. Oil-borne treatments are needed to fight these drying stresses.

proximately $2.50 to $3.50. Cunapsol is available in both *concentrate* and *ready-to-use* form in 5 and 55 gallon quantities.

Busan 1009 (TCMTB). Busan 1009 is a liquid microbicide, which when mixed with water at a 2- to 5-percent concentration, provides effective mold and mildew control for up to three years. Outdoor exposure tests now in progress show Busan 1009 superior to zinc naphthenate in controlling surface discoloration due to molds and mildew. How well the Busan 1009 formulations will do over a five-year period remains to be seen. Current results lead me to recommend Busan 1009 at a 5- to 9-percent concentration as a suitable alternative to zinc.



In a side-by-side test, cedar shingles treated with Cunapsol when new (right) outshine untreated shingles (left) after four years of exposure in the humid Gulf Coast region.

Busan 1009 is available in concentrate form from Buckman Laboratories in Memphis, Tenn. (901/278-0330). A 5-percent concentration of Busan 1009 in water will cost approximately $2 to $2.50 per gallon.

Oil-Borne Preservatives

One of the main drawbacks of waterborne treatments is they do very little to control the drying effects of the sun and subsequent cupping, curling, splitting, and surface checking. A durable oil-borne preservative containing a suitable naphthenic or paraffinic oil will replenish the wood with oils that have been lost by sun and rainfall. Both naphthenic and paraffinic oils (when applicable) are resistant to oxidation by sunlight, do not contribute to the flammability of the treated wood, and are reasonable in price. Care should be taken to choose only those oils *not* restricted by the Federal Occupational Safety and Health Administration's (OSHA) Hazard Communication Standard (29 CFR Part 1910.1200) which became effective November 25, 1985. In essence, it states that certain oils manufactured today have been tested and concluded to be carcinogenic. As of November 25, 1985, these oils and any products that contain them, require special labeling. Please check with the oil supplier for clarification on this. Examples of good naphthenic oils are Chevron Shingle and Floor Oil or Sun Oil Co. Sunthene 410.

Copper octoate. New on the market, copper octoate shows great promise not only in controlling mildew and decay, but also in giving "life" back to aged wood when combined with a suitable naphthenic oil. A 10-percent concentrate of copper octoate must be diluted 1:9 with naphthenic oil. Like Cunapsol, the preservative is green in color and therefore must be, pigmented to provide natural-looking finishes for wood roofs. It is available in 55-gallon drums only. The cost per gallon of a ready-to-use solution (with pigment) is $5 to $6. It's available from Interstab Chemicals, New Brunswick, N.J.; 201/247-2202.

Oil-soluble copper naphthenates. An alternative to copper octoate is copper naphthenate. Oil-soluble copper naphthenates are available from many suppliers including Mooney Chemicals in Cleveland, Ohio (8 percent MGARD S-520), and Continental Products in Euclid, Ohio (8 percent CNS Wood Preservative-Green). Pound for pound, copper naphthenate and copper octoate are equal in performance. However, the copper octoate is available in higher concentrations than copper naphthenate making it more cost-effective to large-volume users. In addition, there is less odor with the copper octoate. Prices for one-percent copper naphthenate solutions can vary from $3 to $6 a gallon. Copper naphthenate solutions will be green in color but can be pigmented.

Zinc naphthenates. Although zinc naphthenates in oil are readily available and in use in many areas of the country, I cannot recommend zinc naphthenate in oil at concentrations lower than 3 to 4 percent. In mildew-prone areas, particularly in the South, l- to 2-percent zinc-naphthenate solutions are poor performers over time. They have some merit in areas not prone to mildew and decay. Price per gallon of 3-percent zinc-naphthenate solutions will vary from $4 to $7 a gallon. Zinc naphthenate is available from manufacturers such as Interstab Chemicals and Mooney Chemicals (MGARD S-150).

Because many of the preservative suppliers cannot or will not sell their products in small quantities (less than 5 gallons), the applicator should consider the following ready-to-use treatments because of their availability, price, and performance:

- Natural Seal X-100, American Building Resstoration Chemicals, Inc., Franklin, Wis; 414/761440.
- Seal Treat II, W.M. Barr, Co., Memphis, Tenn.; 901/775-0100.
- TWP Roof and Deck Coat, AMTECO, Inc., St. Louis, Mo.; 314/436-4811.

The Texas Forest Products Laboratory is continually searching for new and effective finishes for wood roofing. The recommendations given in this report are based solely upon tests performed here in East Texas. The opinions given here are just that—opinions—and by no means should be interpreted as an official endorsement by the Texas Forest Service.

Equipment Needed for Roof Restoration

There are as many different designs for spray equipment as there are people who sell it. Because of its low cost and availability, the common garden sprayer is an easy and effective way of applying bleach solutions, water-borne preservatives, and preservatives in light solvent. It is not suited, however, for the naphthenic-oil treatments. Also note that this is a slow and cumbersome way to apply chemicals to the roof.

Many commercial applicators choose an airless sprayer such as those manufactured by Graco, Binks, or Hero. These are excellent choices but are quite expensive and "overqualified" for roof-restoration work.

Small commercial applicators can purchase spray equipment for bleach or preservatives from lawn-care or golf-course suppliers. This unit is the Suburban Sprayer from Weatherguard Systems, Inc., in Marshall, Texas.

A much cheaper and more reliable sprayer can be made with a diaphragm pump. Twin diaphragm pumps such as those available from Hypro Co. (New Brighton, Minn.), are an excellent choice for wood restoration work. They are economical, dependable, long-lived, and highly adaptable. They are capable of delivering oil- or water-borne chemicals to the roof with plenty of pressure and volume. Diaphragm pumps are superior to gear and piston pumps in handling the abrasiveness of preservative solutions, particularly those containing pigments or mildewcides.

For information on quality diaphragm sprayers, contact manufacturers that supply the lawn, turf, and pest control industry such as the Broyhill Company in Dakota City, Neb., or Oldham Chemicals Co. in Memphis, Tenn. Both provide complete sprayer packages including diaphragm pumps, storage tanks, hose reels, and spray guns. Most complete spray packages sell for under $2,000.

Sprayers can be truck-mounted or totally portable depending on personal preference. Truck-mounted units eliminate the need to continually move the sprayer around the job site. Everything is self-contained on the truck bed. Usually 300 feet of hose is adequate to reach most roofs. Manual or electric hose reels are advisable when using over 100 feet of hose. Pumps are usually driven by gasoline or diesel engines.

Spray guns can be purchased from companies such as Spraying Systems Co. in Wheaton, Ill. They should be the high-pressure type (800 to 3,000 psi capacity) with spray tips of .015 to .040 orifice and a 15- to 65-degree fan. Attaching a 10-inch extension wand to the gun makes the coating process less tiring. Longer wands up to 64 inches can provide greater reach but can be heavy. They are very useful where foot traffic on the roof is limited or dangerous.

Not Eternal

Wood shingle and shake roofs are not eternal, but they can provide long-lasting performance if cleaned and treated periodically. There are many products and techniques to choose from which offer varying degrees of protection. The worst thing to do, however is to do nothing at all. ■

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