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# Installation, Care, and Maintenance of Wood Shake and Shingle Roofs

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## Abstract

This article gives general guidelines for selection, installation, finishing, and maintenance of wood shake and shingle roofs. The authors have gathered information from a variety of sources: research publications on wood finishing, technical data sheets from paint manufacturers, installation instructions for shake and shingle roofs, and interviews with experts having decades of experience in constructing and inspecting shake and shingle roofs. Where possible, recommendations are based on research results; however, some information is determined from practical experience installing shake and shingle roofs. More detailed information is available from shake and shingle suppliers and the Cedar Shake and Shingle Bureau (CSSB). Note: Installation instructions contained herein are not intended to supercede local building codes.

Keywords: Shakes, shingles, ultraviolet radiation, UV degradation, water-repellent preservatives, semitransparent stains, solid-color stains, paints

## Safety Precautions

It is best to apply cleaners on a cloudy day. This slows the evaporation and allows the cleaner to work more effectively. Wear eye protection, rubber gloves, an apron, boots, and other protective gear when using and preparing cleaning

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Authors are members of the Joint Coatings Forest Product Committee. The American Coatings Association and the Forest Products Laboratory co-sponsor the committee and it is comprised of representatives from the wood and coatings industries. The committee functions through task groups organized to write articles on wood/paint interaction. Tony Bonura chaired the task group and he is the author to contact for more information. (Mr. Tony Bonura, District Manager/Northeast, Cedar Shake and Shingle Bureau, 1019 Fort Salonga Rd., Suite 10-#203, Northport, NY 11768-2209, Phone/FAX 631-643-7839, [tony@cedarbureau.com](mailto:tony@cedarbureau.com), [www.cedarbureau.org](http://www.cedarbureau.org)).

solutions. Avoid getting cleaning solutions on yourself, other parts of the structure, and vegetation. If the cleaning solution comes in contact with you or these other areas, rinse promptly and thoroughly with water. Follow all additional instruction on labels and technical data sheets supplied by manufactures of cleaning products and finishes.

## Acknowledgments

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The Cedar Shake and Shingle Bureau (CSSB) is a nonprofit organization that oversees the inspection of western redcedar (*Thuja plicata*), Alaska yellow-cedar (*Chamaecyparis nootkatensis*) and redwood (*Sequoia sempervirens*) shakes and shingles. The CSSB publishes quality standards (grade rules) and ensures that the member mills producing shakes and shingles meet these standards through periodic third-party inspection. Shakes and shingles having their "Certigrade®," "Certi-Split®," or "Certi-Sawn®" designations have been inspected to meet grade standards. A grade stamp/label (with color code for the grade) is placed on each bundle or carton of shakes or shingles and clearly shows the grade. The label contains other information such as wood species, certifying agency, building code standards, and manufacturer (Fig. 1). This "Certi" label assures the consumer that the shake and shingle manufacturer is adhering to grading rules as prescribed by building codes.

# Installation, Care, and Maintenance of Wood Shake and Shingle Roofs

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## Introduction

Western redcedar (*Thuja plicata*), Alaska yellow-cedar (*Chamaecyparis nootkatensis*, also called yellow cedar), and redwood (*Sequoia sempervirens*) are the wood species most commonly specified by architects and are included in building codes for the USA and Canada. To meet these building code requirements, shakes/shingles must meet wood quality standards, which are verified through third party inspections (Table 1). Other species have historically been used for shakes/shingles: northern white-cedar, also known as eastern white cedar (*Thuja occidentalis*) (Table 2), white oak (*Quercus alba*), and Southern Pine (also called southern yellow pine (*Pinus* spp.)). The quality of northern white-cedar, white oak, and Southern Pine shakes/shingles is not assured through CSSB inspection. Therefore, check local building codes for compliance before using these species on residential or commercial roofs. The exception to this code requirement may be use of these species for historical restoration.

Wood shakes and shingles have been used for centuries as a roofing material. Asphalt, steel, and polymeric materials are newcomers. If properly installed and maintained, wood shakes and shingles should last more than 30 years (Fig. 2).

## Product Selection

The first requirement for long service life is the selection of the shake or shingle. These products are available in a range of grades and are described in Table 1 (listed in order of decreasing quality). This is where “money talks!” The higher the grade (and price), the longer the roof can be expected to last. Shakes and shingles that contain only heartwood are more resistant to decay than are shingles that contain sapwood. Vertical-grain (or edge-grain) shakes and shingles will perform better than flat-grain grades; vertical-grain wood is more dimensionally stable and therefore less likely to warp and split. Narrow shakes and shingles are less likely to warp than wide ones. Thicker shakes and shingles are less likely to warp than are thinner ones. Also, check with your local building code official because some localities often have additional requirements (for example, fire-retardant or preservative treatment).

**Table 1—Grade and description of shakes and shingles from western redcedar, Alaska yellow-cedar, and redwood**

Grade <sup>a</sup>	Description
<b>Shakes<sup>b</sup></b>	
Premium	Handsplit, tapersawn, tapersplit, or straight-split shakes from 100% clear vertical-grained heartwood. Tapersplit shakes have a natural taper that is similar to the taper of a shingle. Straight-split shakes are of the same thickness throughout the length of the shake.
No. 1	Handsplit and tapersawn shakes of clear heartwood with no more than 20% flat-grained pieces in each bundle.
<b>Shingles<sup>c</sup></b>	
No. 1	The top grade of shingles. This grade of shingle can be used for sidewalls and roofs. This grade of shingle must be 100% clear, 100% heartwood, and 100% vertical grain. These shingles are available in three lengths (16, 18, and 24 in.). <sup>d</sup>
No. 2	No. 2 grade can be used in various applications. This grade of shingle must have at least 10 in. of clear wood (butt end) on a 16-in. shingle, 11 in. on an 18-in. shingle, and 16 in. on a 24-in. shingle. This grade allows no limitation on flat grain. Limited sapwood is also allowed in this grade.
No. 3	No. 3 grade is a utility grade intended to be used on economy applications as well as on secondary buildings. This grade must have at least 6 in. of clear wood (butt end) on 16-in. and 18-in. shingles and 10 in. on a 24-in. shingle.
No. 4	No. 4 grade is to be used for the under course of double-coursed sidewalls only. This shingle is never to be used for roof application or as a starter course on roofs.

<sup>a</sup>Refer to CSSB 97 for more information on grade rules for cedars and redwood.

<sup>b</sup>Graded on the split side.

<sup>c</sup>Sawn on both sides and graded on one face.

<sup>d</sup>1 in. = 25.4 mm.

## Shakes

Split shakes differ from sawn shakes and shingles in that the side to the weather is a split surface, and therefore the wood cells are aligned with the surface of the shake. This gives a lateral surface with minimal cut wood cells and thus decreases water penetration into this surface. Shingles and tapersawn shakes are sawn to give a uniform surface, but in the process, the surface fibers are cut, increasing the chance

**Table 2—Grade and description of shingles from northern white-cedar<sup>a</sup>**

Grade <sup>b</sup>	Description <sup>c</sup>
Extra	No defects are allowed in this grade.
Clears	No limitations on flat grain. Knots are allowed no closer than 7 in. from the butt end. <sup>d</sup> Holes of 1 in. in diameter allowed, not closer than 8 in. from the butt. Rot is not allowed. Sapwood can be 3/4 in. wide, not closer than 10 in. from the butt end. Wane can be 3/4 in. wide, not closer than 10 in. from the butt end.
Second clears	No limitations on flat grain. Knots must be sound with no restriction. Coarse or black knots may be a maximum of 1 in. in diameter, not closer than 6 in. from the butt end. Holes of 1 in. in diameter allowed, not closer than 6 1/2 in. from the butt end. Rot streaks not closer than 6 in. from the butt end. Sapwood can be 1 1/2 in. wide, not closer than 6 in. from the butt end. Wane can be 3/4 in. wide, not closer than 6 1/2 in. from the butt end.
Clear walls	No limitations on flat grain. Knots must be sound with no restriction. Coarse or black knots may be a maximum of one-third the width of the shingle, but not closer than 6 in. from the butt end. Holes of 1 in. in diameter allowed, not closer than 6 in. from the butt end. Rot streaks not closer than 6 in. from the butt end. Sapwood, no restriction. Wane is allowed not closer than 6 in. from the butt end.
Utility	No limitations on flat grain. All defects found in wood shall be permitted provided that the extent of the defects, singular or in combination, do not impair the use of the shingle.

<sup>a</sup>*Thuja occidentalis*.

<sup>b</sup>Refer to Quebec Lumber Manufacturer's Association (QLMA) for complete information on grades of eastern white-cedar.

<sup>c</sup>All eastern white-cedar grades contain flat grain.

<sup>d</sup>1 in. = 25.4 mm.

for water penetration. Shakes come in a variety of sizes, shapes, and surfaces. Shakes are most commonly available in 18-in. (457-mm)<sup>1</sup> and 24-in. (610-mm) lengths, but longer lengths can be special-ordered. Shakes can be split on the face and have sawn backs (handsplit), split on both sides (straight-split and tapersplit), or sawn on both sides (tapersawn). Tapersawn shakes are commonly available having butt-end thickness of 5/8, 3/4, and 7/8 in. (16, 19, and 22 mm) and may be special ordered up to 2 in. (51 mm) butt-end thickness. All shakes are available in two grades (Premium and No. 1) and are graded to one face according to the grain angle, flaws, and amount of heartwood/sapwood. A brief description of each grade is contained in Table 1 and Figure 3a. Additional information on grade is readily available on the Cedar Shake & Shingle Bureau website ([www.cedarbureau.org](http://www.cedarbureau.org)). Click the Products, Codes and Testing tab and then click Shakes. Click the appropriate shake or shingle and then click Grading Rules. There are three rules for three different types of shakes and three rules for three different shingles. You will see the drop-down for the CSSB-97 Grade Rules.

## Shingles

Shingles are similar in appearance to tapersawn shakes except that they are thinner. Whereas the minimum butt-end

thickness for tapersawn shakes is at least 5/8 in. (16 mm), shingles have a butt-end thickness of about 3/8 to 1/2 in. (10–13 mm). Western redcedar, yellow cedar, and redwood shingles are graded according to the grain angle, flaws, and the amount of heartwood/sapwood and are available in four grades: No. 1, No. 2, No. 3, and No. 4 (Fig. 3b, Table 1). No. 1 grade shingles must be 100% clear, 100% heartwood, and 100% vertical grain. Lower grades may contain sapwood, flat grain, and knots. Lengths may be 16, 18, or 24 in. (406, 457, or 610 mm). Thickness of shingles is described as the number of shingles per the total of butt-end thickness of that number of shingles. For example, a 24-in. by 4/2-in. (610-mm by 4/51-mm) “Royal” shingle measures approximately 1/2 in. at the butt end. That is, the total butt-end thickness of 4 shingles must be at least 2 in. (51 mm). An 18-in. by 5/2¼-in. (457-mm by 5/57-mm) “Perfection” measures approximately 7/16 in. at the butt. That is, the total butt-end thickness of 5 shingles must be at least 2¼ in. (57 mm). A 16-in. (406-mm) shingle is referred to as a “5X” because they are installed with a maximum 5-in. exposure. They are a 5/2-in. shingle; butt-end thickness of 5 shingles must be at least 2 in. (51 mm). Shingles are available in specified widths or random widths (Fig. 4).

Local code jurisdictions may have requirements for the grade of shake or shingle permitted for roof application in your area and special requirements, such as fire-retardant-treatments. Only Premium and No. 1 grades of shakes and No. 1 grades of shingles are pressure-impregnated with

<sup>1</sup> The variability in manufacturing results in large variance in measured values of shakes and shingles, which are not necessarily reflected in the precision of the reported conversions to SI units.



Figure 1. Information on a Certi-Label™: 1) “Certi” brand name; 2) Product grade; 3) Product type; 4) Independent third party quality control agency; 5. Compliance with total quality processes; 6) Manufacturer; 7) Industry product description; 8) Product dimensions; 9) Cedar Bureau label number; 10) Building code compliance numbers; 11) Product performance tests passed; 12) Label identification number; 13) UPC code; 14) Coverage showing the number of bundles/100 square-foot and recommended exposure; 15) Application instruction on reverse side. Used with permission from Cedar Shake & Shingle Bureau, *New Roof Construction Manual*.



Figure 2. Example of shingle roof after decades of service.

fire retardants to meet Class A, B, and C fire requirements. Other grades are not. Spray-on fire-retardant treatments are also available, but their effectiveness is not guaranteed by any inspection agency because the treatment may wash out by rain. There may also be requirements for preservative treatments. Only Premium and No. 1 grades of shakes and No. 1 grades of shingles may be pressure-impregnated with preservative treatments. Factory impregnation of shakes and shingles with preservatives such as chromated copper arsenate (CCA) can dramatically extend the life of shakes and shingles, especially in areas where warm temperatures and humid conditions are present for substantial parts of the year. Non-pressure treatments such as copper-8-quinolate and copper naphthenate are also available, but these are not as leach resistant as pressure-applied preservatives.

## CERTI-LABEL WESTERN CEDAR SHAKES

Certi-Split® Handsplit Shakes



Certi-Sawn® Tapersawn Shakes



Certi-Split® Tapersplit Shakes



Certi-Split® Straight-Split Shakes



Figure 3a. Certi-Label western redcedar shakes. Used with permission from Cedar Shake & Shingle Bureau, *New Roof Construction Manual*.

## Installation

Shakes and shingles can be installed on roofs over spaced sheathing or solid deck sheathing. Various installation methods are described below. Spaced sheathing or rain-screen systems are common in geographic regions that experience high humidity. Direct application of shakes and shingles to solid sheathing is common in dry/arid regions. However, shakes require a solid plywood deck in geographical regions that experience wind-driven snow. In addition, check with local building codes for deck type requirements in high-wind- or hurricane-prone areas. For all these methods, the spacing between shakes/shingles depends on the grain angle, the width of the shake/shingle, and the moisture content at the time of installation. Flat-grained shakes/shingles shrink and swell almost twice as much as vertical-grained ones and require more space between them to avoid buckling (Fig. 5). Wide shingles require more space than narrow shingles. If the moisture content is low (5–6%), leave a little extra space; if it is high (above 20%), decrease the spacing slightly. As a general rule for shingles equilibrated to ambient conditions (about 12% moisture content), shin-

## CERTIGRADE® WESTERN CEDAR SHINGLES

Number 1 Blue Label®



Number 2 Red Label



Number 3 Black Label



Number 4 Undercoursing



Figure 3b. Certigrade western redcedar shingles. Used with permission from Cedar Shake & Shingle Bureau, *New Roof Construction Manual*.

gles should be installed about ¼ to 3/8 in. (6–10 mm) apart, whereas shakes should be spaced at least 3/8 in. (10 mm) apart and not more than 5/8 in. (16 mm) apart. Adjacent courses should be offset at least 1 1/2 in. (38 mm). Shakes and shingles may be attached to roofs in a variety of ways.

### Spaced Sheathing

Spaced sheathing is the traditional roof system used for shakes and shingles. Shakes or shingles are attached to 1 by 4 in. (19 by 89 mm) or 1 by 6 in. (19 by 140 mm) boards placed horizontally across the rafters (Fig. 6). Note that 1 by 4 and 1 by 6 are nominal sizes and hereafter will be referred to as 1 by 4 or 1 by 6 boards. The boards are spaced on centers equal to the recommended exposed surface of the shake or shingle. A well-ventilated attic allows the back side of the shakes/shingles to dry, which generally improves their performance.

**NOTE: The installation of shakes (split shakes, and tapersawn shakes) and shingles is different.** Shakes (split and tapersawn) can be installed in two- or three-ply applications. For two-ply application, shakes (split and tapersawn)



**Figure 4. Thirteen-year-old shingle roof with random-width shingles.**

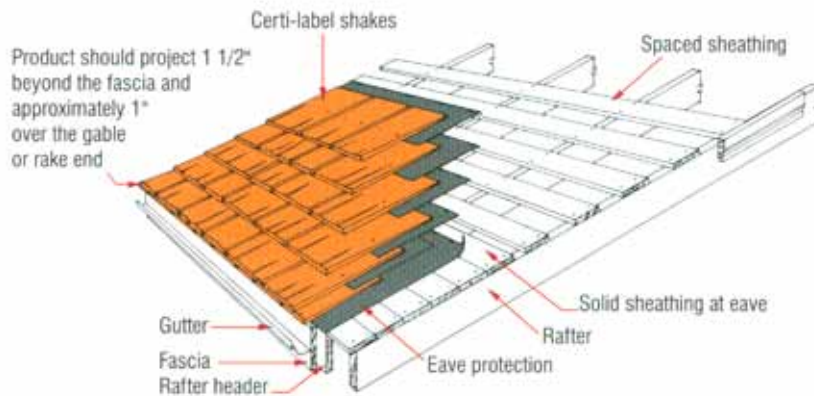


**Figure 5. Buckling of shingles installed with insufficient space between adjacent shakes/shingles to accommodate swelling.**

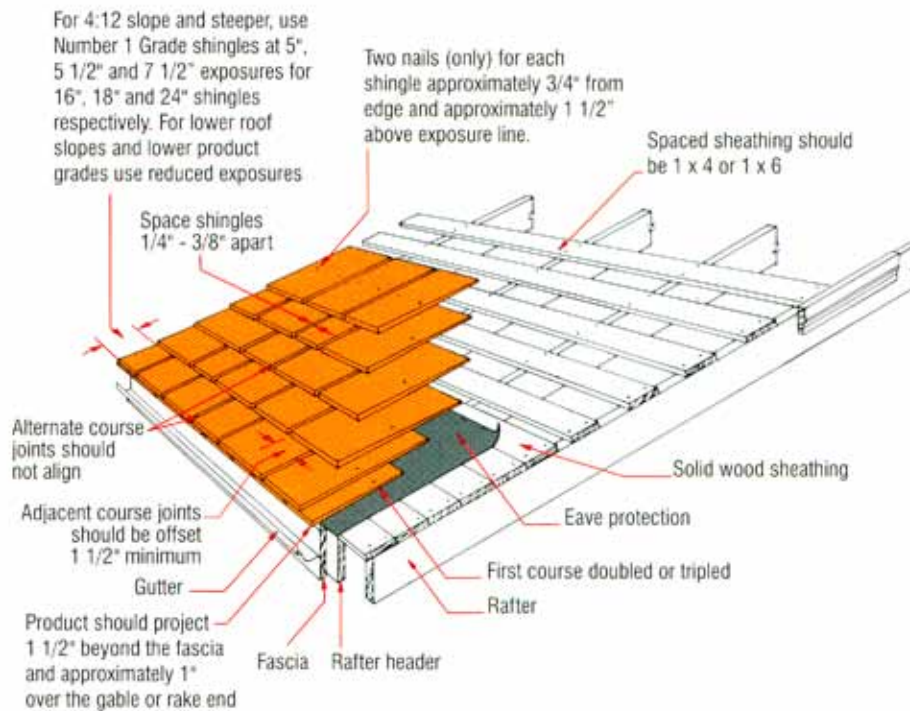
must be interlaid with Number 30 felt (See text box) to decrease the infiltration of windblown rain and snow (Fig. 6). For three-ply application, split shakes require felt interlay; however, tapersawn shakes do not. A layer of felt is installed with each course of shake. The bottom of the felt should be placed above the butt-end of the shake at a distance equal to double the weather exposure. For example, if the exposure of an 18-in. shake is 7 ½ in. (190 mm), the bottom of the felt should be 15 in. (381 mm) from the bottom of the shake. This means only the top 3 in. (76 mm) of the shake should be covered by the felt. Flashing must be installed just as with any roof system. Refer to page 20 of the Roof Manual found in the CSSB website under “installation and maintenance” for additional information on requirements for two- and three-ply shake installation.

Shingles must be installed in a three-ply application and are not interlaid with felt as this impedes drying of the shingle, thus decreasing the service life (Fig. 7). Interlaying shingles with felt will cause them to rot (“rot-felting”). The smooth surface of the shingle or three-ply application of tapersawn shakes makes a tight seal with the felt between each course of shingle, which does not permit the shingles to dry if water gets beneath them.

NOTE: The amount of asphalt in building felt (and hence its water repellency) is described by the weight per square (10 ft by 10 ft (about 3 by 3 m)). Traditionally, this coverage of felt weighed 30 pounds, hence the name 30-lb felt. This is no longer the case. The general category is now referred to as Number 30 felt. Within Number 30 felt are various “types” as specified by ASTM Standards D 226 and D 4869. Section R905.9.2 of the International Residential Code specifies Number 30 felt for wood roofing material.



**Figure 6. Two-ply shake roof over spaced sheathing showing interlaid Number 30 felt. Used with permission from Cedar Shake & Shingle Bureau, *New Roof Construction Manual*.**



**Figure 7. Shingle roof over spaced sheathing. Used with permission from Cedar Shake & Shingle Bureau, *New Roof Construction Manual*.**

## Solid Deck Sheathing

Rain screen, horizontal-nailing strips, and direct application are three common methods for installing shakes and shingles over solid sheathing. In modern construction, plywood is placed over the rafters to give solid deck sheathing. We recommend at least  $\frac{3}{4}$  in. (19 mm) thick plywood to ensure proper nail holding. Local building codes for plywood thickness may allow a lesser thickness, but this is counter to best practices as specified by the CSSB. Solid deck application is recommended for shake application in areas that experience high winds or wind-driven snow and may be a local code requirement in these areas. Where solid deck sheathing is required, we recommend using the rain-screen technique or horizontal nailing strips. This ventilation between the shakes/shingles and the plywood sheathing improves performance. When shakes or shingles are installed directly on the sheathing in geographical regions having high humidity, they need to be preservative treated.

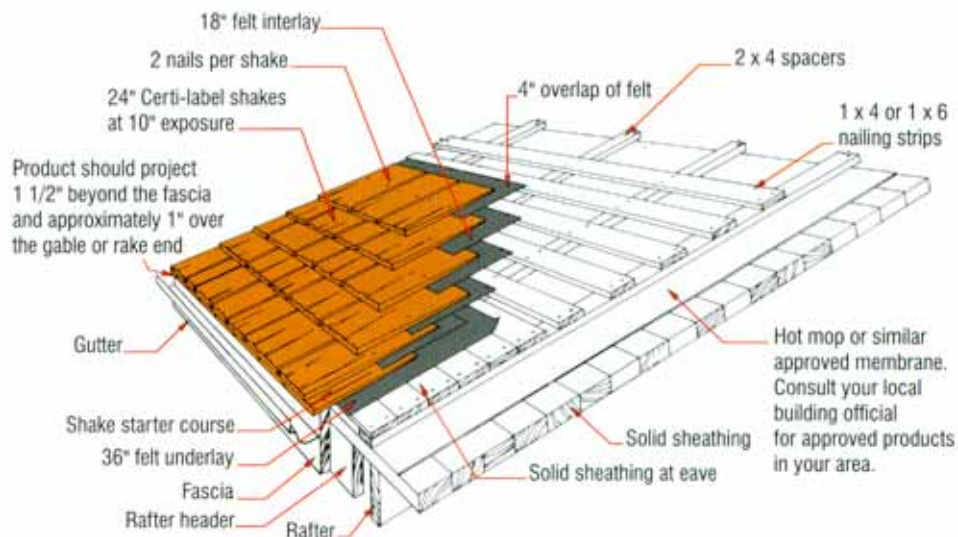
NOTE: There are two reasons for using plywood sheathing instead of oriented strandboard (OSB) for shake and shingle roofs. Plywood gives better nail holding than OSB and also has better moisture transmission properties. If plywood gets wet, the water is distributed over a larger area than with OSB. Plywood has a higher permeability to water vapor and thus dries more quickly than OSB.

## Rain-Screen

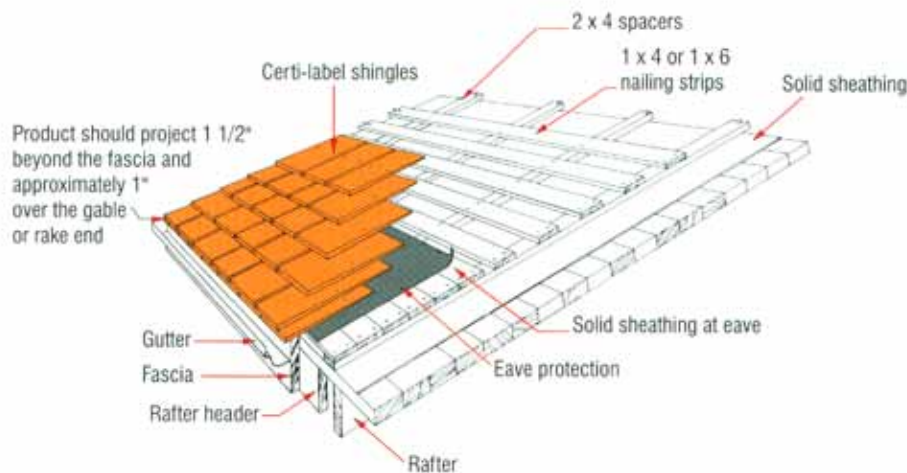
The rain-screen technique simulates traditional roof systems by allowing the back side of shakes or shingles to dry (Fig. 8). The rain screen gives an air space between the back side of the siding and the plywood sheathing and possibly a secondary barrier to water. Sheathing is placed over the rafters. Although the shakes/shingles are not being nailed directly to the roof sheathing in a rain-screen application, local codes usually still require plywood or solid lumber sheathing. “Vertical” spacers (usually 2 by 4s) are placed directly over each rafter and are fastened securely through the sheathing to the rafters. Horizontal boards (nailing strips) 1 by 4 or 1 by 6 are placed across the 2 by 4 spacers to give an open space between the back side of the shakes or shingles and the solid roof deck. Use stainless steel or hot-dipped galvanized screws of sufficient length to penetrate well into the underlying rafter to attach the “vertical” 2 by 4 spacers. Attach the horizontal nailing strips securely to the “vertical” strips with screws. The space can be vented at the roof peak and at the fascia and must be screened to keep out insects. When using this solid deck technique for roof slopes less than 4:12 for shakes and 3:12 for shingles, a “hot mop” or similar code-approved membrane is required over the sheathing.

As with spaced sheathing described above, two-ply or three-ply handsplit shake and two-ply tapersawn shake installations require interlaid felt (Fig. 8). However, do not interlay shingles with felt as this impedes drying and decreases service life (Fig. 9).





**Figure 8. Rain screen installation of shakes over solid sheathing. Used with permission from Cedar Shake & Shingle Bureau, *New Roof Construction Manual*.**



**Figure 9. Rain screen installation of shingles over solid sheathing. Used with permission from Cedar Shake & Shingle Bureau, *New Roof Construction Manual*.**

### Horizontal Nailing Strips

Apply 1 by 4 or 1 by 6 nailing strips horizontally directly to plywood sheathing. A decay-resistant species should be used for the nailing strip. The nailing strips are spaced at a distance equal to the exposed surface of the shake or shingle. Although this system does not have as much venting as the rain screen, the space between the shakes or shingles and the sheathing helps the roof stay dry.

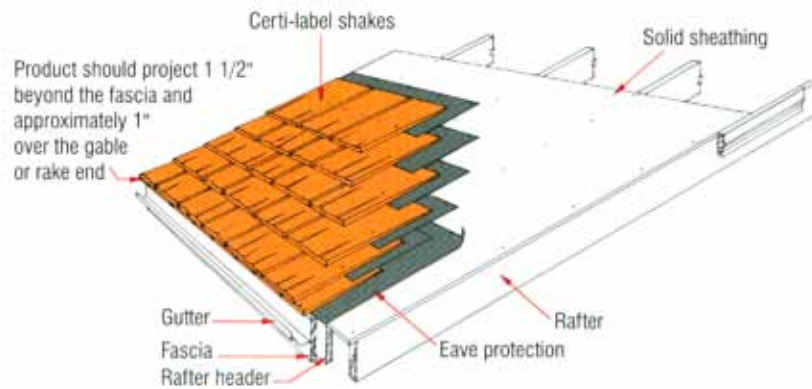
### Direct Application

Shakes and shingles may be attached directly to roof sheathing. Whereas shingles must be three-ply application, shakes may be a two- or three-ply application. Handsplit, straight-split, and tapersplit shakes must be installed with an 18-in. wide Number 30 felt interlay to improve protection against wind driven snow and rain (Fig. 10). However, do not

interlay felt with shingles or a 3-ply application of Premium and No. 1 grades of tapersawn shakes unless required by a local building code. Two-ply application of tapersawn shakes must have felt interlay.

CCA-treated shakes and shingles are required for direct shingle application to solid decks. CCA-treated sheathing is not required. This method does not have a secondary water barrier; therefore, when the roof begins to leak at the end of its service life, the sheathing is likely to decay. We do not consider direct application of shingles and tapersawn shakes to sheathing as robust as other roof systems.

**NOTE:** Always check with the manufacturer of the product as well as with your local code official for approved application methods in your local area.



**Figure 10. Installation of shakes directly on solid sheathing with interlaid Number 30 felt. Used with permission from Cedar Shake & Shingle Bureau, *New Roof Construction Manual*.**

## Fasteners

Fasten shakes and shingles using corrosion-resistant ring-shank nails having blunt tips. Consult with fastener manufacturers for the best fastener. Fasteners manufactured for asphalt shingles are not appropriate for wood shakes or shingles. Fasteners must be hot-dipped galvanized as per ASTM A 153/D or stainless steel (Type 304 or 316). Place nails 3/4 in. (19 mm) (from each edge and 1-1/2 in. (38 mm) above the exposure line. The head of the fastener should be flush with the surface of the shake or shingle. Do not over- or underdrive the fasteners. Overdriving causes spalling, in which wood on the back side of the shingle detaches from the rest of the shingle. Corrosion-resistant nails are needed to avoid iron stains caused by extractives in the wood and corrosion by acid rain, salt air, etc. Certain preservative- and fire-retardant treatments may be corrosive. Contact the preservative or fire-retardant manufacturer for additional requirements for corrosion resistance of fasteners for use with their products.

## Zinc or Copper Strips

Interlaying a zinc or copper strip at the ridge cap/vent can be effective for controlling the surface growth of algae, mold, and moss for a short distance down the surface of the roof. Some literature specifies 12 feet (4 m) between zinc or copper strips, however, this spacing may be inadequate; excessive spacing gives inconsistent protection causing a striped appearance. Recent experience shows that the spacing needs to be about 6 ft (2 m). Shakes and shingles below galvanized flashing around a chimney often have little algae or mildew because of the small amount of zinc eroding from the galvanized steel and washing down the roof.

For complete details on shake/shingle installation consult the “New Roof Construction Manual” at the CSSB website ([www.cedarbureau.org](http://www.cedarbureau.org)), the product manufacturer, and local building code officials. Local codes may have additional requirements to those described above.

## Finish Selection and Application

Because western redcedar, Alaska yellow-cedar, and redwood are naturally durable, applying a finish is not mandatory. Sometimes wood roofs are finished to preserve the color of shakes or shingles on the roof. This section provides information on various types of finishes and the application of those finishes. Always consult the particular finish manufacturer for information regarding the specific application criteria for their product and if their product is suitable for wood roof application.

### Water-Repellent Preservatives

Water-repellant preservative (WRP) is a generic term that describes a clear penetrating finish that traditionally was formulated with about 10–20% oil or alkyd binder, 1–3% wax or similar water repellent, a preservative, and an organic solvent such as mineral spirits or turpentine. They were an excellent pretreatment for shakes/shingles prior to installation. Bundles of shakes/shingles could be dipped. Most of the finish was absorbed into the end-grain at the butt-end of the shake/shingle and gave years of protection minimizing end-grain water penetration. To meet stringent air quality requirements, these types of WRPs are no longer available. They have been largely replaced by waterborne formulations and formulations having low organic solvents content. Many of these formulations are intended for use on wood decks, but they can be used on roofs. These finishes often are tinted with a small amount of pigments, UV stabilizers, and other additives to improve their service life. Shakes and shingles should not be dipped in the tinted products in bundles because the pigments in them do not distribute evenly. If tinted products are used, it is necessary to dip them individually and back-brush to ensure even application and appearance. They give some water repellency and inhibit mold and algae growth. They give about 1–2 years of service on the exposed surfaces, but will decrease end-grain water absorption for many years and thus increase the life of the shake or shingle. This end-grain protection is more important than the 1–2 year protection that is obtained on the

exposed surfaces where the WRP merely decreases mildew growth.

### **Semitransparent Stains**

Semitransparent penetrating oil-based stains are similar to WRPs, but have considerably more pigments. As with WRPs, recently formulated semitransparent finishes are low in organic solvents and may not penetrate wood as well as traditional solvent-borne semitransparent stains. Semitransparent stain provides a color without entirely concealing the grain and texture of the wood. Stains with the highest pigment concentration will provide the longest service life and provide the most protection from weathering. Some companies formulate stains especially for use on wood shakes and shingles. Check the internet under “wood shingles and paint” to find leads on paint manufacturers having products for wood shakes and shingles. Stains that contain a water-repellent and wood preservative will provide additional protection and further extend the service life of your roof. As with water-repellent preservatives, oil-based stains penetrate wood; they degrade by slow erosion of the pigment from the surface. It is seldom necessary to do extensive surface preparation prior to refinishing.

As with tinted WRPs, the best way to apply a solvent-borne semitransparent stain is by dipping them prior to installation. Immerse the shake or shingle individually at least two-thirds of its length, measured from the butt-end, back-brush following dipping, then stand them vertically or hang them from a line until they are dry. Back-brushing helps work the finish into the wood surface. If shakes or shingles need to be trimmed during application, the cut surfaces should be touched up with finish.

Film-forming finishes should not be used on roofs because they trap moisture in the wood, thus decreasing the life of the shake or shingle. Higher moisture contents in the wood over longer times will increase the chance of wood decay. Film-forming finishes include paint, solid-color stains, latex semitransparent stains, and varnish. These finishes will crack and peel within a few years, giving an unsightly appearance. Consult with the particular finish manufacturer to ensure that their product is suitable for wood roof application.

NOTE: As mentioned previously, the wood cells of split shakes are aligned parallel with the surface. There are few cut cells to accommodate penetration of the finish; therefore, semitransparent stains last about 1—2 years on the lateral surfaces of split shakes. However, they will absorb into the end grain and give years of protection against water absorption.

### **Factory Finishing**

Factory finished shakes and shingles are available, but only those having penetrating finishes should be used on roofs. Shakes and shingles having other finishes such as

solid-color stains are intended for use on side walls. Penetrating finishes are water-repellent preservatives (WRPs) and oil-based semitransparent stains. As mentioned above, latex semitransparent stains, solid-color stains, and paints form films and should not be used on roofs because they trap moisture in the wood and decrease the service life of the roof.

Factory finishing offers several advantages over on-site finishing. Factory finishing avoids the need for workers to walk on the roof after it is installed. The back side and end grain of shakes and shingles are easily finished along with the front side. Finish on the back side decreases water absorption and extractives bleed. The finish should extend about half to two-thirds up the back side of the shake or shingle. Factory finishing eliminates weather limitations and avoids damage by UV radiation to the unfinished wood. If pre-finished shakes or shingles need to be trimmed during application, the cut surfaces should be touched up with finish.

### **On-Site Finishing**

On-site finishing can be done prior to placing the shakes/shingle on the roof or after the roof is complete. Finishing prior to installation makes it possible to back-prime the shakes/shingles, but it is more labor-intensive than finishing following installation. The disadvantage to finishing following installation is possible damage to the roof during finish application. Take care to avoid unnecessary walking on the roof. Apply liberal amounts to the shake/shingle by brush and strive to get the finish to absorb into the end grain.

When applying tinted WRPs and semitransparent stains following installation, it is necessary to prevent lap marks. Apply the finish in a single direction, usually across the roof from one side to the other keeping a wet edge throughout the application of this section. The lateral edges of the advancing strip of finish must coincide with the top and bottom edge of a shake or shingle. When applying finish adjacent to the area that is already finished (the next strip), take care not to apply additional finish to the area that is already finished. This causes a lap mark (an area with two coats rather than one coat of finish) and gives an unsightly blotchy appearance.

If finishes are applied following installation, brushing is the best method. If the finish is roller- or spray-applied, back brushing is essential to ensure that the finish is spread evenly and worked into the wood surface. Ensure that the butt-end gets a liberal application of finish, as this is the most important surface. Contact preservative treatment or fire-retardant manufacturer for their specific criteria for finishing.

### **Maintenance**

As shakes and shingles age, they may become brittle. Walking on the roof can cause extensive cracking of aged shakes or shingles and may lead to leaks.

**We recommend that you hire a contractor having experience with maintaining wood roofs.** The following information is given mainly so that you can be better informed when discussing your roof maintenance and refinishing with your contractor. The contractor will likely have proper ladders, scaffolds, safety equipment, and footwear and should know where to walk to minimize damage. Walking on the butt-end (lower edge of the shake or shingle) causes cracking. Cracking can be minimized by stepping on the upper part of the shake or shingle directly against the butt-end of the row above.

## Cleaning

Keep a clean roof. Eliminate the causes of debris accumulation and mold and moss growth. Remove all overhanging branches and if necessary, trees that encroach on the roof. If moss is growing on the roof or if leaves and other debris collect on the roof, they trap moisture and encourage decay, thereby decreasing the life expectancy of the roof. The use of zinc or copper strips mentioned previously can greatly decrease the growth of moss, algae, and mold, thus decreasing the need for cleaning.

A discolored roof caused by weathering and the growth of algae and molds can be cleaned quite effectively with chlorine bleach (5% sodium/calcium hypochlorite) or oxygen bleach (sodium percarbonate) mixed with water. We recommend commercial cleaners having sodium percarbonate as the active ingredient. Oxygen or chlorine bleach solutions quickly kill surface molds and algae. As the mildew is removed, the wood normally changes color from a dirty gray to buff tan. Over time, the ultraviolet radiation in sunlight will partially degrade wood surfaces. The bleach solution will remove some of the weathered wood fibers from the surface. It is best to use the weakest strength of cleaner possible and to apply it using a sprayer, sponge, or soft bristle brush to avoid further damage to the partially degraded surface. Strong cleaning solutions will remove excessive amounts of fiber from the surface. If you choose to use household bleach, begin with a mixture of one part bleach, five parts water, and a small amount of powdered detergent.

**Note: Do not use liquid detergents because they may react with bleach to form toxic fumes.** After about 15 minutes, rinse thoroughly using a garden hose; keep the water stream pointed down the roof to avoid forcing water behind the courses of shakes or shingles. If this concentration doesn't remove the mildew, then increase the concentration of bleach. It should not be necessary to use more than one part bleach and three parts water concentration. If the bleach solution is not effective, it is because residual finish in the surface of the wood is keeping the solution from absorbing into the wood.

Except in rare cases where there is an extensive build-up of moss growth and debris accumulation, it should not be

necessary to power-wash wood roofs. Aggressive power-washing in combination with strong cleaning solutions can damage wood roofs, particularly those made of cedar and redwood. If it is necessary to power-wash shake or shingle roofs, hire professionals having experience cleaning wood roofs, because in the wrong hands, power washers can easily remove an excessive amount of wood fiber. Loss of fiber drastically decreases the life expectancy of the roof. Contact preservative treatment or fire-retardant manufacturer for their specific criteria for cleaning.

### Power Washing

In the rare case that power-washing of shakes and shingles is necessary, it should be done only by contractors having experience cleaning cedar. Keep the water stream pointed down the roof to avoid forcing water behind the courses of shakes or shingles.

## Refinishing

After the wood has dried (normally 2–4 days), reapply the WRP or oil-based semitransparent stain. A roof previously finished with a WRP can be refinished with a semitransparent stain. Follow the manufacturer's recommendations for application, which usually includes recommendations for the proper wood moisture content and ambient temperature at the time of application. In general, finishes should not be applied to wood having a moisture content above 20%. The temperature during application and for 24 hours following application should be above 40–50° F (5–10° C), depending on the manufacturer. Minimum temperature is usually given on the label along with other application instructions and additional information is available from the company "help desk." The telephone number is usually listed on the label.

## Other Sources of Information

Cedar Shake and Shingle Bureau  
P.O. Box 1178  
Sumas, WA 98295-1178  
604-820-7700  
[www.cedarbureau.org](http://www.cedarbureau.org)

U.S. Forest Service  
Forest Products Laboratory  
One Gifford Pinchot Dr.  
Madison, WI 53705-2398  
608-231-9200  
[www.fpl.fs.fed.us](http://www.fpl.fs.fed.us)

Copper Development Association  
P.O. Box 144  
Pocopson, PA 19366-0144  
610-793-3868  
[www.copper.org](http://www.copper.org)

Installation, Care, and Maintenance of Wood Shake and Shingle Roofs

Maze Nails  
100 Church St.  
Peru, IL 61354  
800-435-5949  
[www.mazenails.com](http://www.mazenails.com)

Swan Secure Products, Inc.  
7525 Perryman Court  
Baltimore, MD 21226  
800-966-2801  
[www.swansecure.com](http://www.swansecure.com)