

Shakes

Handsplit and resawn shakes are split faced, exposed with a naturally rustic appearance, and sawn on the back. The most common sizes are 18 inch and 24 inch nominal lengths. Butt thicknesses range from 3/8 inch to over 2 inches.

Tapersawn shakes are sawn on both sides for a semi-textured look with a stronger shadow line than shingles. The most common are 18 inch and 24 inch nominal lengths. Butt thicknesses range from 5/8 inch to 1 1/2 inch.

Shingles

Shingles are sawn on both sides for a tailored appearance. They are available in several sizes: 16 inches or Fivex; 18 inches or Perfection; and 24 inches or Royal nominal lengths. The butt thickness is gauged using a stack of shingles to meet the proper measurement. Rebutted and rejoined (R&R) sidewall shingles are remanufactured on all four sides to ensure square butts and parallel edges for a superior appearance. Faces can be also obtained in sanded or machine profiles. Fancy butt shingles are available in a variety of designs and are useful in creating a variety of sidewall pattern designs.

Prefinished Rebutted and Rejoined Sidewall Shingles

Prefinished sidewall shingles make a wise, low maintenance sidewall system. Specifying prefinished shingles depends upon project needs. Three basic types of prefinish systems are available: preprimed, prestained, and opaque. Coatings and finishes are classified as film forming or penetrating. Paint and solid body stains are film forming. Penetrating stains penetrate wood. Latex stains are classified as film forming although some formulations are showing better penetration characteristics. Latex stains are evolving.

Custom colors as well as product and coating manufacturers' warranties are available.

- **Preprimed:** Kiln dried, rebutted and rejoined shingles should be coated on all surfaces with an alkyd oil, stain blocking primer at the manufacturer's recommended spread rates. Latex stain blocking primers are evolving.
- **Prestained:** Penetrating stains have been traditionally oil or alkyd oil-based. New latex formulations are being developed which show better penetration characteristics than older latex formulations. Pre-staining coats the shingle on all surfaces. Penetrating stains are available in clear, lightly pigmented and semi-transparent. Alkyd oil refers to a type of durable synthetic resin or coating.
- **Opaque:** Opaque color finishes are applied to the shingle after an alkyd oil stain- blocking primer has been applied to all surfaces of the shingle. Two or three coat systems are available. Factory finish equipment generally uses different formulations than over-the-counter solid body stains and paints. The factory finish topcoats are referred to as a finish coat.

If adding a coating at the job site, the base coat should contain a stain-blocking primer. The primer is to be applied to all surfaces of the shingle after the shingle has achieved equilibrium (12-14 percent and less moisture content in most of North America). Applying a coating on wood which is green (above the equilibrium point) will result in premature coating failure.

All forest products, including Western Red Cedar, contain extractives (tannins). Extractives are either water borne or solvent borne. Western Red Cedar contains water borne extractives. Extractive bleeding (stains) on the surface of Western Red Cedar occurs when extractives are dissolved and leached from the Western Red Cedar by water. The water then moves to the finished/coated surface, evaporates and leaves the extractive discoloration which may be dark red or reddish-brown in appearance. Extractive bleeding is easily prevented when the proper primer and topcoats are applied using the coating manufacturer's recommended spread rates, time of application (i.e., not too cold/hot or in direct sunlight). Environment and moisture content level should be considered during the proper application phase.

Wood should not be left to weather prior to applying a coating; exposure to the weather causes photodegradation of the top layer of the wood. The color changes as a result from the decomposition of extractives at the surface. The sunlight will decompose the lignin (the natural "glue" which holds wood fiber together) leading to a poorer adhesive bond when a film forming coating product is used. Photodegradation is the chemical transformation of a compound into smaller compounds caused by the absorption of ultraviolet, visible, or infrared radiation (light).

Proper preparation of the shingles and application of a good quality coating or finish are key to good coating performance and life.

Pressure Impregnated Fire Retardant Treated Cedar Shakes and Shingles

In areas prone to wildfires, pressure impregnated fire retardant treated cedar shakes and shingles are a wise choice. Through pressure injection at the factory, a special fire retardant treatment is forced into the cells of the wood. Kiln drying solidifies the formula and locks in the fire protection. For roofs, there are Class A, Class B, Class C, and unrated roofing systems. Cedar shake and shingle roofs exist in all these classifications. These classes are the same for all roofing materials, including asphalt, metal and concrete tile.

- Class A is appropriate for institutional applications, such as hospitals and correctional facilities. This classification uses a Class B fire retardant treated product along with a rated fire retardant fiberglass cap sheet underlay. A Class A roofing system is effective against severe fire exposures. Under such exposures, roof coverings are:
 - Not readily flammable
 - Afford a fairly high degree of fire protection to the roof deck
 - Do not slip from position
 - Pose no flying brand hazard
- Class B is often used in apartment buildings, condominiums, commercial buildings, and dwellings in wildland interface areas. Class B fire retardant treatment is effective against moderate fire exposures. Under such exposures, roof coverings of this class are not readily flammable, afford a moderate degree of fire protection to the roof deck, do not slip from position and pose no flying-brand hazard.
- Class C is typically used for single-family residences and duplexes, where fire retardant roofing is desired. This is a product that is effective against light fire exposures. Under such exposures, roof coverings of this class are not readily flammable, afford a measurable degree of fire protection to the roof deck, do not slip from position and pose no flying-brand hazard.

U.S. building codes require that fire retardant treated wood roofing products are subjected to rigorous fire retardancy tests. The Spread of Flame test is performed to measure the spread of flame over a deck and the Intermittent Flame, Burning Brand and Flying Brand tests are completed before and after both accelerated weathering and long term weathering of one, two, three, five, and ten years.

Wildfire mitigation should include residential fire prevention strategies for building design, construction materials, and plant selection. Vegetation management practices, including sensible landscape choices, brush setbacks, firebreaks and forest debris clearing, are critical to preventing and minimizing firestorm damage. Local building officials have specific information regarding jurisdictional regulations and these should be included in project specifications.

Pressure Impregnated Preservative Treated Cedar Shakes and Shingles

For long material life span in areas of high humidity, pressure impregnated preservative treated cedar shakes or shingles may be specified. This product will help prevent moss and mildew build up.

Product Grading

The Cedar Shake and Shingle Bureau (CSSB), an industry organization, created and updates the industry's grading rules, known as CSSB-97. These CSSB-97 grading rules are incorporated into the U.S. national building codes International Building Code and International Residential Code, as published by the International Code Council. These are the standard reference guides for commercial and residential projects and have been adopted by most states.

The CSSB maintains a quality control program for grading and inspections. Trained professionals perform random, unannounced inspections of member manufacturers' sites. These inspections ensure that grading rules are applied for product consistency. The CSSB's Cedar Quality Auditor operates separately from the inspectors, also performs unannounced mill visits, and provides a second set of eyes on the quality control procedures at manufacturers' locations.

Grain

The terms edge grain, vertical grain, and flat grain are used when comparing products and grades. Edge grain and vertical grain refer to annual growth rings for a 45 to 90 degree angle with the product surface. Flat grain refers to product that has annual growth rings that form less than a 45 degree angle with the product surface. Both top grades for shakes (Premium Grade) and shingles (Number One Grade) do not allow any flat grain in the bundle. Up to 20 percent flat grain only is permitted in each Number One Grade shake bundle.

Top quality, edge or vertical grain cedar roofing and siding materials are available in a variety of product types. Lower grades of products allow a mixture of edge and flat grain, knots, and other imperfections. Lower grades are acceptable for some projects; however, this should be verified against installation exposure requirements and local building codes.

Product Qualities and Characteristics

Cedar offers a full range of product benefits. It has high insulation value, which reduces energy consumption throughout the year. Many types of cedar shakes and shingles have been tested and proved to be resistant to wind, impact and fire.

Fire Resistance

Class A, B, and C pressure impregnated fire retardant treated roofing systems are available with cedar shakes and shingles. (See earlier section on pressure impregnated fire retardant treated products).

Wind Resistance

Cedar shakes and shingles offer outstanding hurricane-force wind resistance, as proven through UL-1897 uplift resistance testing using parameters for a test model home located in Dade County, Florida, the highest U.S. standard for wind resistance requirements. These test results are applicable to CSSB member product only:

- Shakes and shingles have been subjected to the UL 1897 fourth edition "Uplift tests for roof covering systems" with exemplary results. The classification for uplift resistance is expressed in pounds per square foot. The test method subjects a minimum 10 by 10 ft. test sample to various short term (1 minute interval) static pressures which represent the uplift forces imposed on roofing systems securement to a specified roof deck when exposed to high velocity winds. In other words, it tests how well shakes and shingles hold up when subjected to high winds. It measures the degree to which the roofing material is uplifted from the roof deck.

A subsequent report by a Florida Registered Professional Engineer converted the PSF numbers into miles per hour using the analytical method for wind design of roof cladding set forth in Section 6 of ASCE 7-98 (American Society of Engineers).

It should be noted that these calculations were conducted for a specific house in the Dade County area of Florida. When converting from PSF to MPH using ASCE 7-98, results will vary depending on many factors including building height, location, roof slope, environment, etc. Be advised that all design parameters, assumptions and limitations of use set forth in the Florida engineer's report are necessary components of further interpretation. These test results exceed Dade County, Florida wind resistance requirements testing protocol PA 100-95. CSSB member products are accepted by Dade County, Florida as an accepted roofing material.

IMPACT RESISTANCE

When the insurance industry asked the roofing industry to test product resistance to hail damage, the steel ball drop UL-2218 impact resistance test placed CSSB member cedar shakes and shingle products at the top of the scale with Class 3 and Class 4 results.

UL-2218 is the Underwriters Laboratories test standard for Impact Resistance of Prepared Roof Covering Materials. The acceptance criteria upon examination after being subjected to the test procedure is: prepared roof covering material exposed surface, back surface and underneath layers shall show no evidence of tearing, fracturing, cracking, splitting, rupture or other evidence of opening of the prepared roof covering layer. For further information on this testing procedure please visit www.ul.com. The classifications for impact resistance are expressed as Class 1, 2, 3 or 4 which relate to a roof covering's ability to withstand impacts from 1 1/4, 1 1/2, 1 3/4 and 2" diameter steel balls, respectively. CSSB member products are available with a Class 3 or 4 impact resistance rating, depending upon product type. Some insurance companies in hailstorm prone areas will offer discounts on premiums if an impact resistance rated roofing material is used.

Cedar products are highly resilient in earthquakes, and are lightweight with no re-decking required, as with other heavier roofing materials. As a natural material, there are no artificial layers that can delaminate in freeze-thaw cycles. Since cedar naturally weathers to an attractive gray color, matching factory color lots if repairs are needed is not a concern.

Workmanship Issues

As with all construction materials, good workmanship practices that comply with local building codes are important design and construction issues. It should be noted that shake and shingle applications are not the same.

Basic application criteria include the following:

- Never interlay shingles with felt. Consult local building codes.
- Be sure that interlay felt on shakes does not extend below a line that is twice the exposure above the butt (i.e., a 24-inch shake at 10-inch exposure would have felt applied 20 inches above the butt)
- Keyways must not be aligned and must be a minimum 1 1/2" offset from the course above. Keyways are the spaces between adjacent shakes or shingles.
- Overdriving or underdriving the fasteners can seriously damage the integrity of the roof or wall system
- Only use stainless steel (type 304 or 316) hot-dipped zinc coated, or aluminum nails or other fasteners as accepted by the local building official. Always check with the pressure impregnation treatment company for the types of fasteners required for its products.
- Ring shank nails provide significantly higher wind uplift resistance

Both reduced exposure and staggered butt applications can result in additional product quantity requirements. A staggered butt design is achieved by shortening the exposure to less than the greater maximum exposure, not by overexposing some of the product or mixing product types. A staggered butt or a reduced exposure application can easily result in additional material costs, if appropriate calculations are not performed regarding the number of squares required for the project.

Extending the Life of a Cedar Roof

Cedar has been proven to last over hundreds of years. The life of a cedar roof depends on various factors, including the quality of the product. Quality shakes and shingles are generally manufactured by mills subscribing to a third party inspection agency program. The grade of the product on the label is also important. Premium Grade shakes or Number One grade shingles are 100 percent edge (vertical) grain and will yield the longest life.

Installation should be performed by an experienced, quality-oriented roofing contractor. Subcontracting to crews is an acceptable industry practice, but architectural specifications should list required qualifications for subcontractors, including that they should be experienced, trained professionals.

Maintenance

The environment surrounding the structure is an important element for maintenance and roofing longevity. If there are overhanging trees near the roof, the branches should be pruned back regularly, or frequent maintenance will be needed by a qualified person to sweep the roof clear of debris.

Cedar needs to breathe, and allowing leaves, pine needles and other materials to build up on the roof is not advised. Sealants and debris both lock in moisture that would otherwise naturally evaporate during normal weather conditions.

The roof should be properly ventilated using a guideline of total net free ventilation area to the area of the attic should be not less than 1:150 or 1:300 if split equally between the attic and the eave. Gutters and downspouts need to be kept clean in order to prevent clogging. A downspout should not be allowed to drain directly onto a roof surface below. Instead, the flow of water should be directed away from the building.

The life of a cedar roof depends upon the amount of maintenance performed. All roofing materials need periodic maintenance checks and repairs. Cedar roof maintenance should be performed by professional inspectors familiar with safety precautions, generally at least twice a year, or after major storms, so that any damage can be repaired or built up debris removed.

Typically, the ridge cap used at peaks and hips (where two sloping sides of the roof meet at areas which are not the apex of the structure) on a roof will require replacement first, as this area takes the brunt of any weather system affecting the structure. The roof should also be checked for loose fasteners, split product where felt is exposed, or damage from hailstorms. With proper preventative maintenance and installation of quality materials, a heavy handsplit and resawn cedar roof can last 50 years or more. Identifying the difference in naturally weathered and storm damaged cedar roofs is sometimes a difficult task. It takes a trained eye to assess a cedar roof and determine if it is in fact damaged due to hail, or if it is just naturally weathered. It also takes a trained eye to determine the amount of repair required. Use appropriate repair versus replacement methodology (contact the CSSB for more details).

Another benefit to using cedar shakes and shingles is that repairs can be made readily only to those roof sections that need it, rather than tearing off the entire roof after storm damage.

If an enhanced lifespan is of critical importance, then using a pressure impregnated preservative treated cedar shake or shingle product should be considered. Another option is to nail zinc or copper strips at the ridge for moss control. However, for some roofs, this method is only effective for a few courses underneath the metal strip and this alone should not be considered sufficient to complete the maintenance program. Use of a bleach and water solution to clean surface debris and halt the growth of lichens and moss is another option. The United States Department of Agriculture (USDA) Forest Product Laboratory in Madison, Wisconsin is an excellent source of information. (www.fpl.fs.fed.us/)

Pressure or Power Washing

Pressure or power washing in the roofing industry refers to a machine-driven, high velocity stream of water being directed at the surface below, conducted from the water source via a wand held by a human operator.

When weighing the benefits and drawbacks of using pressure washer machines on a cedar roof, several factors should be considered, including the experience of the person performing the work, the age and condition of the roof, the pressure per square inch, spray tip, distance from the roof, and washing technique. Pressure washing equipment, when placed in the hands of an inexperienced person, can cause significant damage to a roof. When used properly, pressure washers can be effective in removing surface debris. It is critical to clean from the top down, using proper technique, in order not to blow water up into the attic area. An inspection of the roof first should be performed to note any shakes or shingles in need of replacement.

Topical sprays can be considered for preservative reasons. These sprays are not a replacement for the pressure impregnation treatment that is available from the factory prior to the roof being installed. Design professionals who wish to use a topical treatment product on an untreated roof should be aware of several important guidelines.

Do use a topical treatment product that:

- Offers a Material Safety Data Sheet (MSDS), that lists product ingredients and safety precautions
- Is labeled as a cedar roof treatment product or has a letter from the manufacturer stating that treating cedar roofs is an appropriate use for this product
- Is a water repellent, ultraviolet (UV) inhibitor, and/or U.S. Environmental Protection Agency (EPA) registered wood preservative
- Has a manufacturer's performance guarantee

Do not use a topical treatment product that:

- Makes outrageous claims (such as a 10-year effectiveness)
- Makes fire retardant claims
- Is a sealant, waterproofer or plasticizer
- Contains unfortified linseed oil, diesel fuel or crank case oil

Before considering any treatment or cleaning solution application to a pressure impregnated treated roof, always check with the pressure impregnation treatment company to see if it will affect the treatment warranty.

Industry reference guides include the "New Roof Construction Manual" and "Exterior and Interior Wall Manual," available for free from the CSSB.

Glossary Terms

- **Bundle strap:** Metal or plastic band used to hold a bundle of shakes or shingles together
- **Extractive bleeding:** Extractive bleeding (stains) on the surface of Western Red Cedar occur when extractives are dissolved and leached from the Western Red Cedar by water. The water then moves to the finished/coated surface, evaporates and leaves the extractive discoloration which may be dark red or reddish-brown in appearance. Extractive bleeding is easily prevented when the proper primer and topcoats are applied using the coating manufacturer's recommended spread rates, time of application (i.e., not too cold/hot or in direct sunlight). Environment and moisture content level should be considered during the application phase.
- **Fivex:** A shingle of 16" nominal length

- **Froe:** Sharp metal blade with handle used in conjunction with mallet to split shakes by hand
- **Keyway:** Space between adjacent shakes or shingles
- **Mallet:** Hammer-like tool used in conjunction with froe to split shakes by hand
- **Pallet strapping:** Metal band used to hold multiple bundles of shake or shingle products together on pallet
- **Perfection:** A shingle of 18" nominal length
- **Pressure impregnated fire retardant treatment:** Permanent fire protection is provided by factory pressure-impregnating fire retardant polymers into the innermost cells of shakes and shingles to meet Class A, B and C testing standards.
- **Pressure impregnated preservative treatment:** Long term protection from fungal decay is provided with factory pressure-impregnated treatment of preservatives that will extend the life of cedar shake and shingle roofs.
- **Rebuted and Rejointed (R&R) sidewall shingles:** A sawn shingle, remanufactured on four sides to ensure square butts and parallel edges for superior appearance on sidewall applications. Also available with sanded or machine grooved face. Predominately kiln dried. Pre-primed or pre-stained options available.
- **Ridge (hip and ridge) material:** Two shakes or shingles preassembled into units that cap the peaks or hips of a roof structure
- **Royal:** A shingle of 24" nominal length
- **Shake:** There are two main types: (1) handsplit and resawn and (2) tapersawn. Handsplit and resawn shakes have the split face exposed with a naturally rustic appearance, and are sawn on the back. Tapersawn shakes are sawn on both sides for a semi-textured look with a stronger shadowline than a shingle.

- **Shingle:** A shingle is sawn on both sides for a tailored appearance with a less strong shadowline than a tapersawn shake. Shingles are available in 16" Fivex, 18" Perfection or 24" Royal nominal lengths.
- **Square:** Amount of material required to cover 100 square feet