Inspecting Wood Shingle and Shake Roofs

Upon successful completion of this course, the student will have a good working knowledge of the inspection of wood shingle and shake roofs including identification of the different types, performance and aging characteristics, common defects, and wind and hail damage.

- Standards
- Grading
- Performance
- Preservative-Treated
- Shakes and Shingles
- Sidewall
- Grain
- Longevity
- Roof Sheathing
- Spaced Sheathing
- Solid Sheathing
- Climate Zones
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- Waterproof
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- Caps
- Weathering
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- Defect Recognition
- Distortion
- Cupping
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- Splitting
- Checking
- Wind Damage
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- Mechanical Damage
- Chemical
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- Roof Maintenance
- Repair Methods
- End of Useful Life

Manufacturing and Application Standards

Wood shakes and shingles are made primarily from western red cedar. They are available in a variety of types and grades, and categorized according to their level of resistance to wind, impact and fire.

Standards for wood shake and shingle manufacturing and application are provided by a number of standard and code-producing organizations, including:

- ASTM International;
- Underwriters Laboratories (UL);
- the Cedar Shake and Shingle Bureau (CSSB);
- the International Residential Code (IRC);
- the Canadian Standards Association (CSA); and
- the National Fire Protection Association (NFPA).

Grading

For shake and shingle grading rules, the IRC generally defers to the CSSB.

Performance Standards

Shakes and shingles must undergo and meet the following types of testing and performance standards. However, you won't be able to confirm visually that the wood roof you're inspecting has qualified for any of these ratings unless documentation is provided.

Testing procedures are not specific to each roof-covering material. The different types of roof-covering materials all undergo the same tests.

- **Wind**

Shakes and shingles may be UL-certified to resist winds of up to 245 mph and 173 mph, respectively.

- **Impact**

Shakes and shingles are available in Class 3 and 4 impact ratings, with Class 4 being the most resistant to impact damage.

- **Fire**

Shakes and shingles are available in Class A, B or C fire rating, but you can't just go out and buy a Class A-rated shingle or shake. Achieving a Class A rating requires that a Class B fire retardant-treated shake or shingle be installed above a heavy asphalt cap sheet. This is called a component system. It requires more than one component to achieve the Class A fire rating.

Achieving the desired fire rating also requires adhering to the recommendations of the company that treated the shakes or shingles. These requirements may vary among treatment companies. Failure to adhere to specific recommendations may void the warranty. You won't be able to identify the fire rating of a shake or shingle just by looking at it. Again, documentation would have to be provided in order for you to provide confirmation of a sellers claim that a roof is rated Class A.

Preservative-Treated

CCA pressure-treated shakes and shingles are available that resist decay in humid climates. You won't be able to tell by looking at them whether wood roofs have been treated with a fire-retardant or preservative.

Shake and Shingle Types

Shakes are heavier, thicker and sometimes longer than wood shingles.

Shakes

Shakes come in four main types based on how they're sawn or split. Sawn surfaces are smoother than split surfaces. The surface facing up is called the face, and the surface facing down is called the back.

Taper-split shakes have a split face and split back, and are tapered from butt to tip.

Straight-split shakes have a split face and split back, and are not tapered.

Hand-split shakes have a split face, a sawn back, and are tapered.

Taper-sawn shakes are sawn on both sides, similar to a shingle, but have a heavier butt, similar to a shake.

Medium and heavy shakes are available. The medium is typically thinner than ¾-inch, and the heavy is thicker. Shakes are available in 18-inch and 24-inch lengths, and longer for applications at historical properties.

Shingles

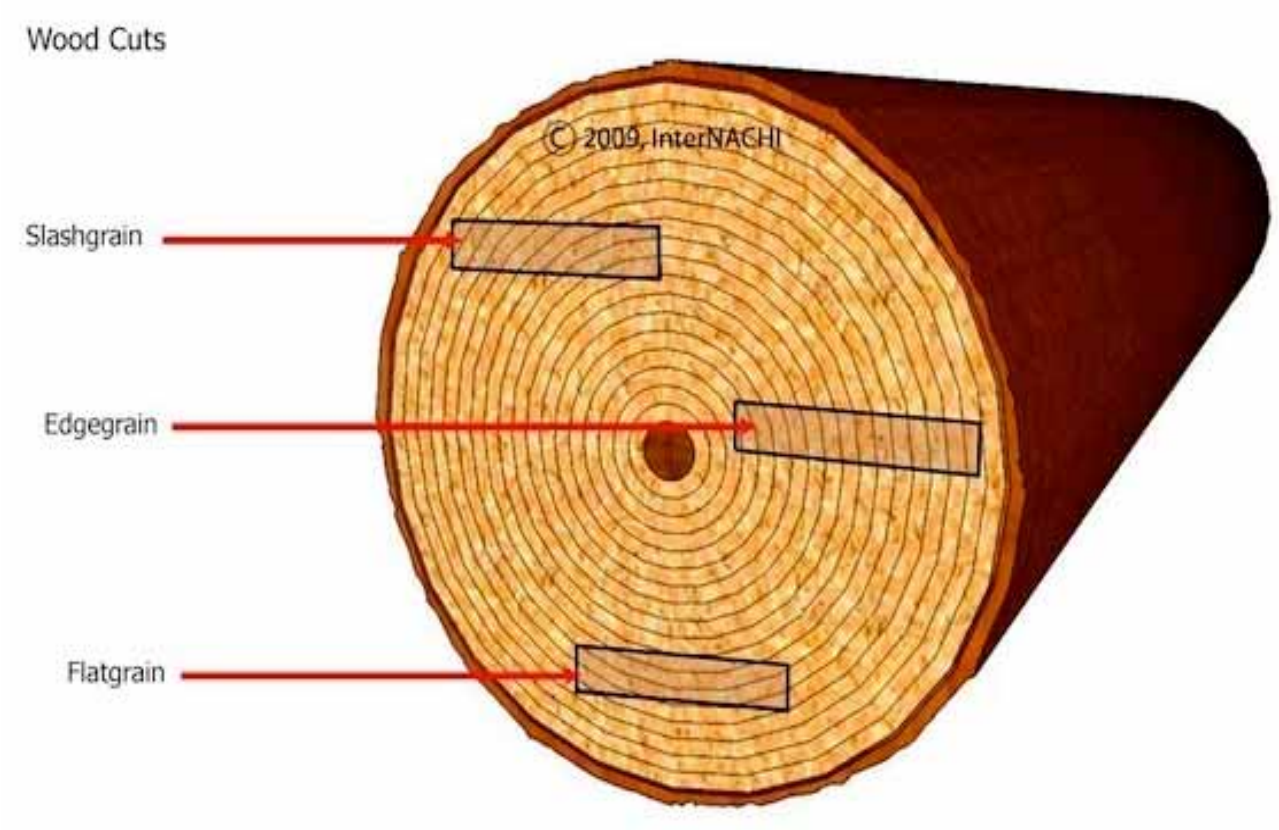
Shingles are always tapered, always sawn, and are thinner than shakes. They're available in 16-inch, 18-inch and 24-inch lengths.

Sidewall Shingles

Sidewall shingles are made for installation on exterior walls. They may have one of many types of pre-finish or finish coatings different from the shingles used on roofs.

Shake and Shingle Grain Exposure

Shingles come in three basic grain exposures: edge grain, flat grain and slash grain. The quality can be judged by the appearance of the grain.



Grain appearance is determined by the part of the log from which the shake or shingle is cut. Grain is important because it has a great influence on the long-term stability of the shake or shingle. Stability is determined by how likely the shake or shingle is to check, split, erode or suffer distortion, such as twisting, curling or cupping. Checking is cracking that doesn't continue clear through the shake or shingle.

Edge grain and flat grain are the most common types of shingles, although it's not unusual to find some flat-grain shingles on a roof that has mostly edge grain.

- **Edge Grain**

Edge-grain shakes and shingles have tight, straight grain and are the most stable.

Edge-grain shakes and shingles are cut perpendicular to the growth rings.

In edge-grain shingles, the grain is allowed to slant a maximum of 45° from vertical. Edge-grain shingles are the most stable over time and offer the greatest resistance.

Premium-grade shakes and shingles must be 100% edge grain. Bundles of #1 shakes and shingles may include up to 20% flat-grain shingles.

- **Flat Grain**

Flat-grain shakes and shingles have visible heartwood.

Flat-grain shakes and shingles are cut parallel to growth rings, with the grain oriented horizontally when viewed from the butt-end. The face of the shingles shows very wide grain with a fairly obvious centerline, as you can see here.

Because this type of shingle exposes the most sapwood to weather, it's the least stable and most likely to check, split, erode and distort.

Flat-grain shakes and shingles are likely to split along the centerline during natural weathering.

- **Slash Grain**

Slash-grain shakes and shingles have wavy grain.

Slash-grain shakes and shingles are also cut perpendicular to the growth rings but at an angle of more than 45° from vertical when viewed from the butt. Grain on the face of the shingle may appear wavy. Because the angle of the cut exposes more sapwood than edge-

grain shingles do, slash-grain shingles are the least stable of the three types and are more prone to checking, splitting, erosion and distortion.

SHAKE AND SHINGLE GRADING

Grading Authority

For shake and shingle grading rules, the International Residential Code (IRC) generally defers to the Cedar Shake and Shingle Bureau (CSSB). The CSSB is an international trade association whose members are shake and shingle manufacturers. In addition to helping develop manufacturing and application standards, the CSSB is a good source for general information on wood roof-covering products.

The IRC and the CSSB differ somewhat in their recommended installation requirements. Local authorities having jurisdiction (AHJs) may also have differing requirements. The CSSB-97 Grading Rules have been adopted by the IRC, the International Building Code (IBC), and the National Building Code of Canada (NBC).

Available Grades

Shakes are available in four grades: premium, #1, #2 and #3.

Wood shingles are graded according to how they're cut and the location of their knots and checks. You probably won't be able to identify the grade, and you're not required to.

Warranties

Manufacturers' warranties vary and may require installation by a certified installer. A common warranty caveat that is widely accepted is that installation must be performed by a CSSB-approved installer.

Longevity

What is the average lifespan of a wood roof? It depends on a variety of factors, including:

- climate zone and local environmental factors, such as salt content of the air, heat, humidity, precipitation and hail;
- the quality of the shake or shingle;
- the quality of installation;

- the quality of maintenance;
- the amount of foot traffic; and
- any overhanging tree branches.

A typical limited warranty is 25 years, but a lifespan of 30 to 40 years is not unusual. It's best to check with local contractors or suppliers for a realistic idea of the wood shakes' and shingles' lifespans in your area.

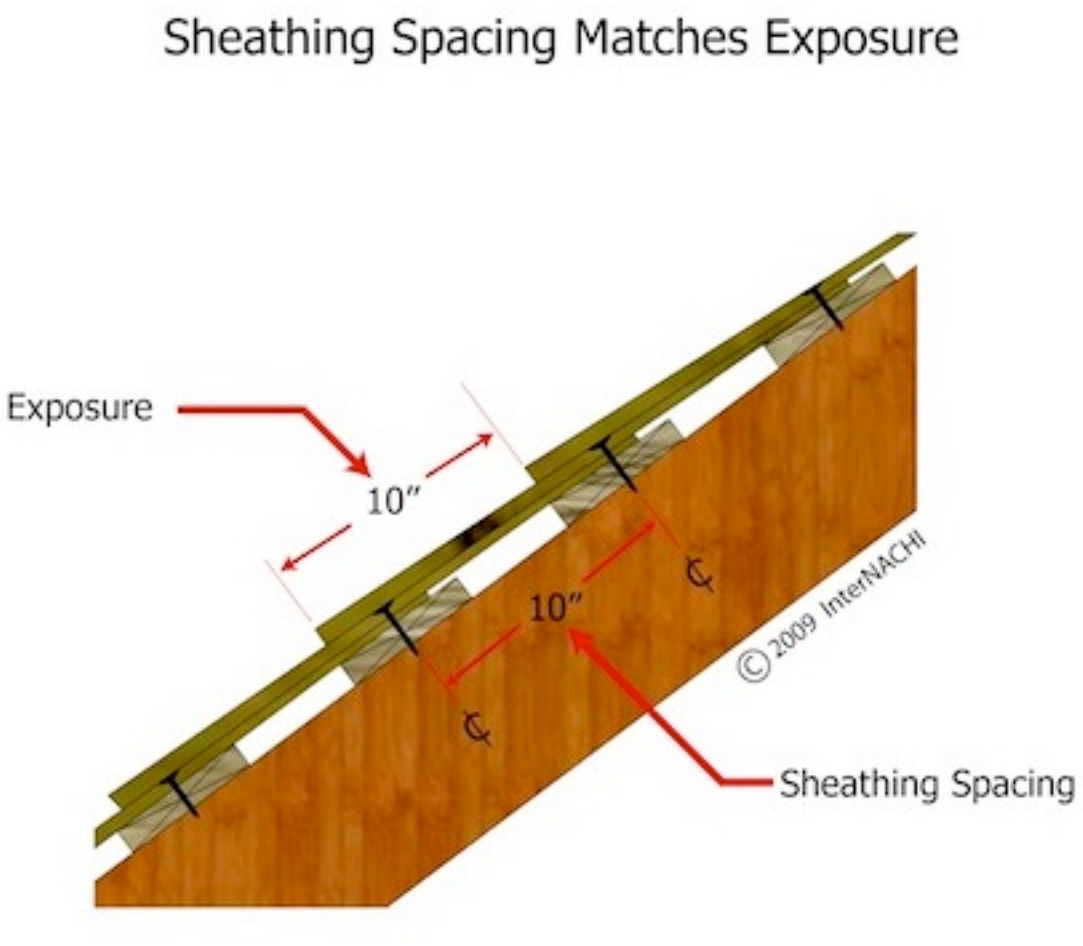
WOOD ROOF INSTALLATION

Roof Sheathing Requirements

Both shakes and shingles may be installed on either solid or spaced roof sheathing. You'll be inspecting the sheathing from the attic**.** Watch for other problems while you're there. Note that the center support post in the roof framing pictured below has been cut.

Spaced Sheathing

Both shakes and shingles can be applied over spaced sheathing, with 1x4 as the minimum size. In new construction where 1x4s are used on 10-inch centers, an additional 1x4 should be installed between sheathing boards. In older homes, you'll see a variety of board sizes and you should refrain from reporting this as a defect unless you see failure of some kind.



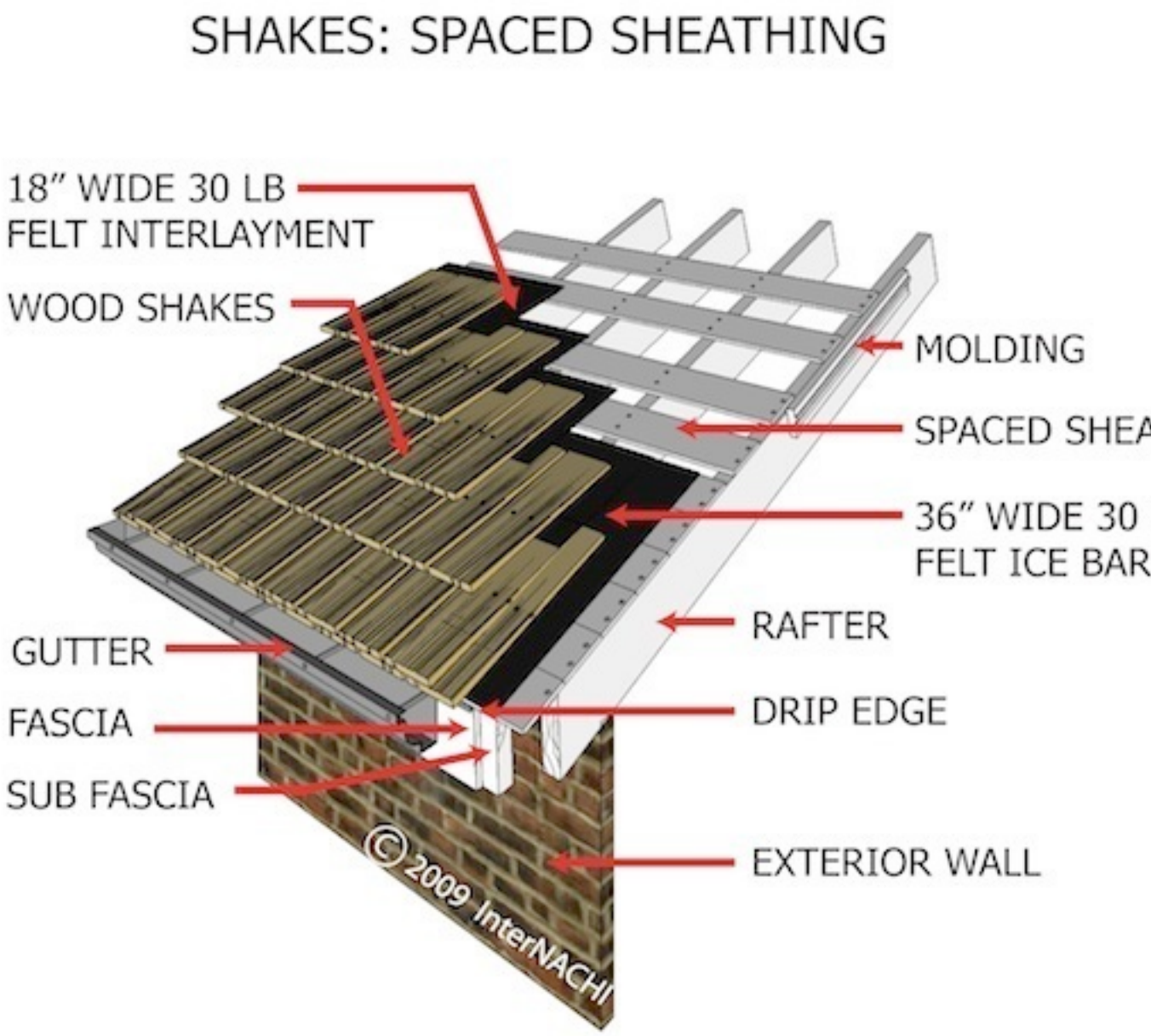
Shakes

When shakes are installed on spaced sheathing, the distance from centerline to centerline of the sheathing boards should match the weather exposure of the shakes. So, for example, 24-inch shakes with a 10-inch exposure should have boards spaced so that they measure 10 inches from center to center, and 18-inch shakes should have sheathing spaced a maximum of 7½ inches from center to center. Roofs covered with shakes are usually sheathed with 1x6 boards.

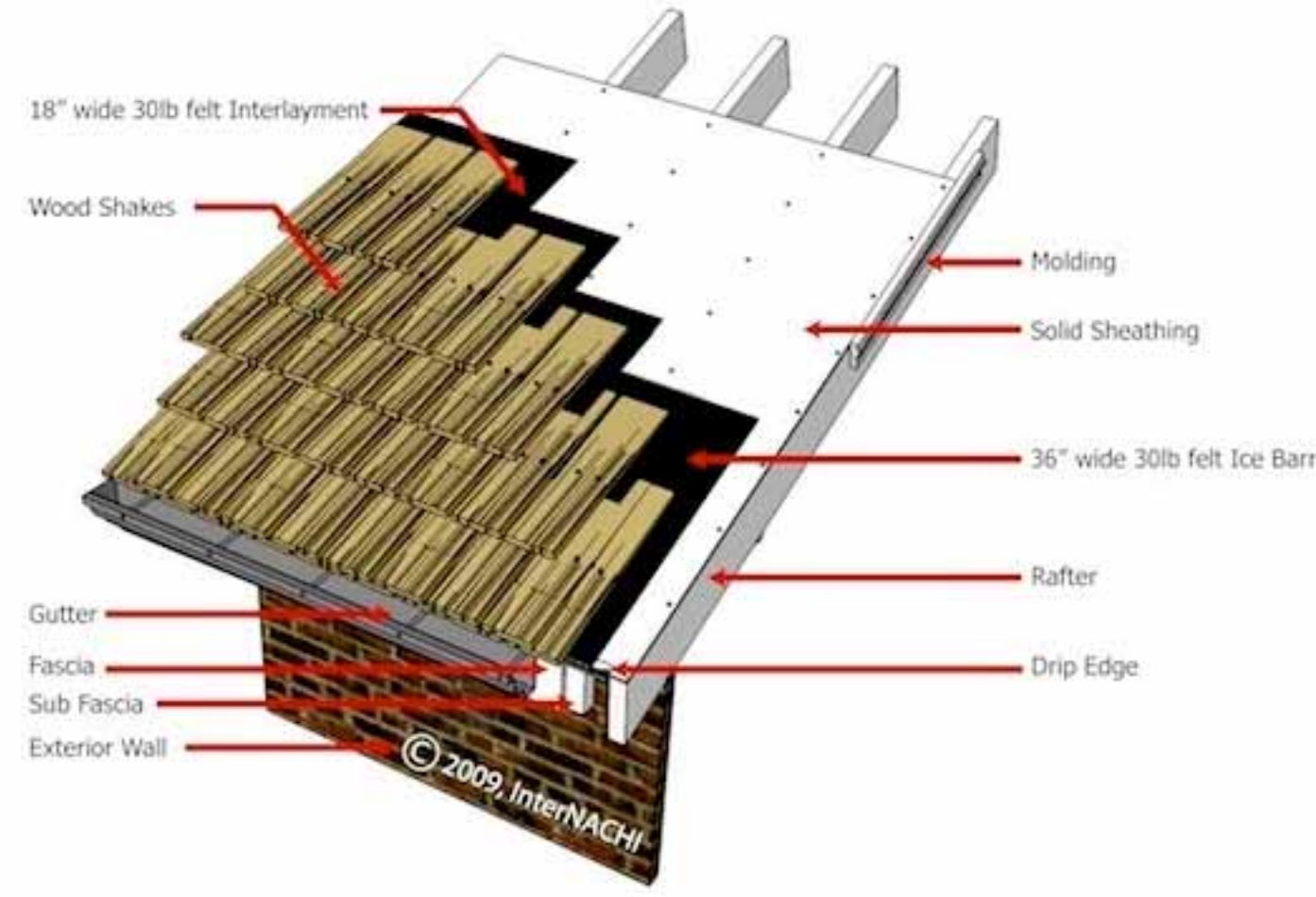
For new construction in most places in the U.S., the maximum gap allowed between boards is 3½ inches. Again, in older homes, limit your comments to signs of failure, such as sagging rafters or sheathing. The advantage of spaced sheathing is that it allows shakes and shingles to dry more easily.

Shingles

Spaced sheathing for wood shingles should also be installed so that the board spacing matches the shingle exposure. For example, if the exposure is 5½ inches, the sheathing boards should be installed on 5½-inch centers.



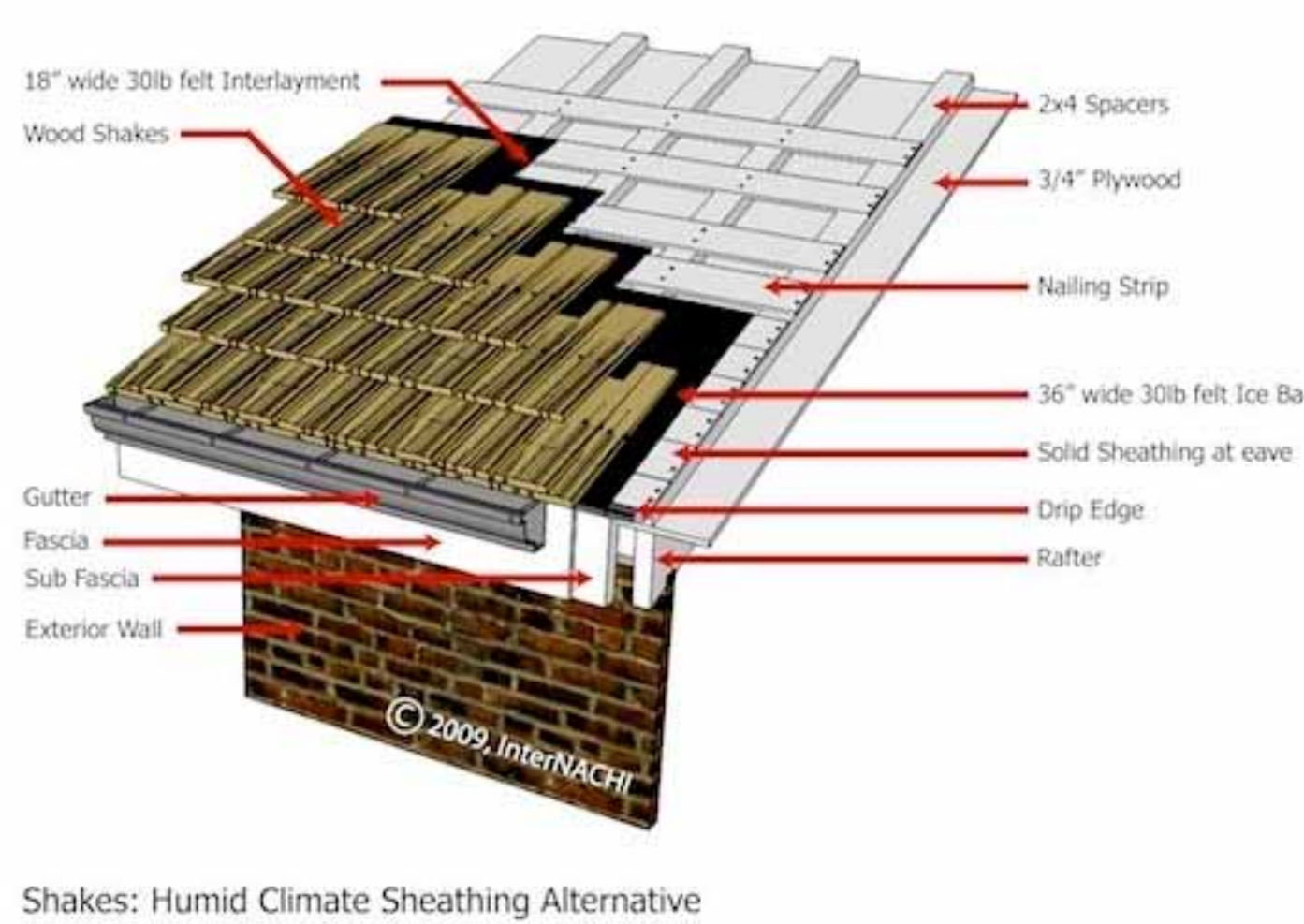
On roofs with spaced sheathing, the portion of the roof deck requiring an ice barrier should be solid decking.



Shakes: Solid Sheathing

Solid Sheathing

The CSSB recommends solid sheathing for shakes in new construction. However, installing shakes on spaced sheathing was widely accepted in the past. Solid sheathing can be used under shakes and shingles, and may be required in areas subject to seismic activity and when treated shakes and shingles are used.



Shakes: Humid Climate Sheathing Alternative

In humid climate zones, a ventilation system that includes horizontal battens installed across nailing strips may need to be installed on top of solid sheathing, as you see in the illustration above and in the photo below.

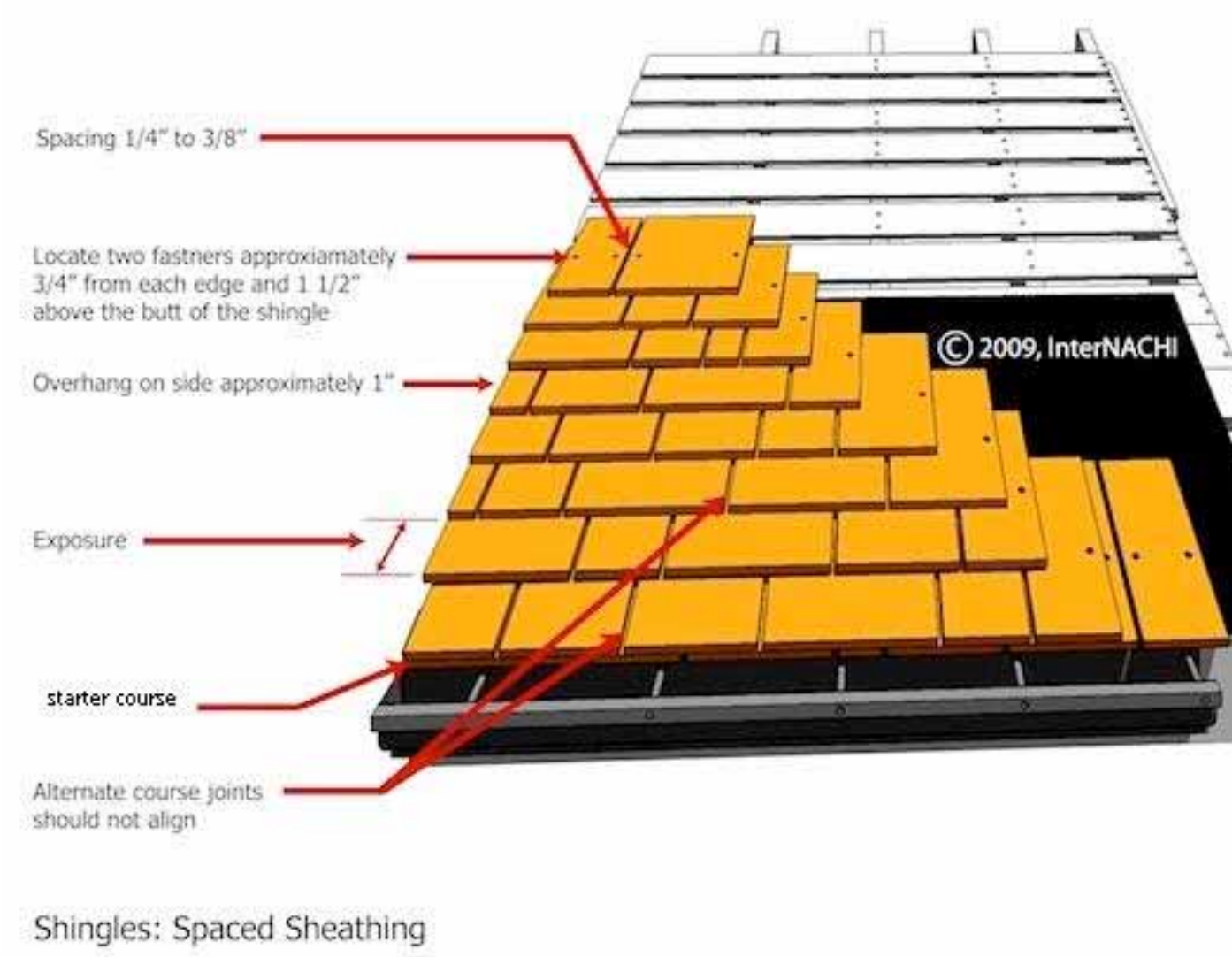
You may be able to confirm the presence of this type of system by calculating the roof thickness, looking into soffit vents, or viewing the pattern of nails penetrating the underside of the sheathing.

Another potential solution to moisture problems in humid climates is the use of preservative-treated shakes or shingles.

UNDERLAYMENT AND INTERLAYMENT

In cold climate zones where ice dams are common, both shake and shingle roofs should have an ice barrier installed as eave protection along the lower roof edge. Even if shakes or shingles are installed on spaced sheathing, the roof deck beneath the ice barrier should be solid sheathing.

Shakes and shingles have very different requirements regarding the installation of a water-resistant membrane in the field.



Shingles: Spaced Sheathing

Shingles

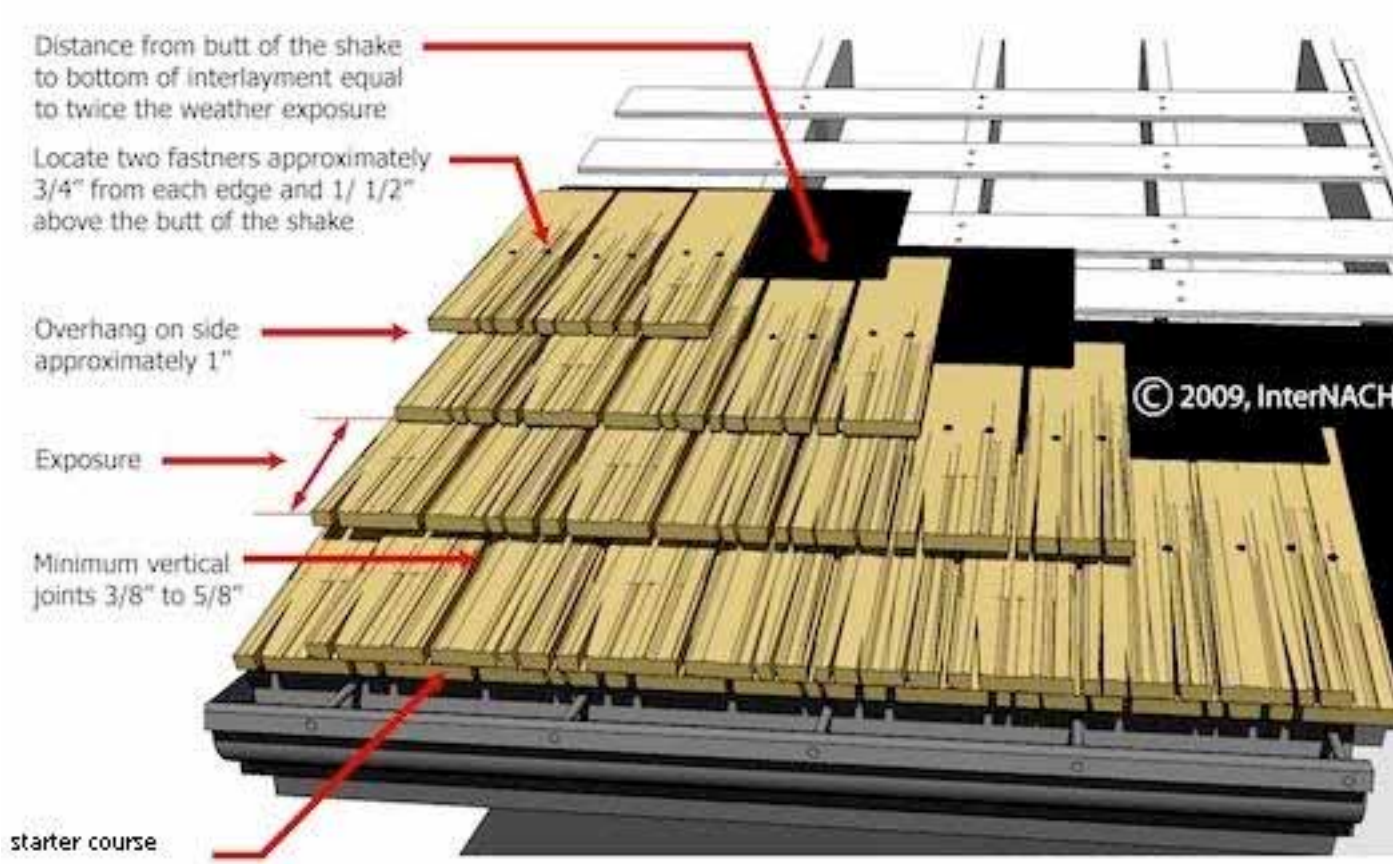
Both the CSSB and the IRC recommend that shingles in the main portion of the roof have no underlayment installed due to concerns about moisture, especially condensation. The exception is where an ice barrier is required at the eave.

The photo above shows a wood shingle roof which has had interlayment installed, which is a defective installation. This will slow drying, encourage distortion and decay, and cause the roof to fail prematurely.

Interlayment is the installation of an underlayment (typically, felt paper) between each course of shingles. Interlayment is acceptable on a shake roof, but never on a wood shingle roof. The roof in this photo, installed five years ago, needs to have all the shingles removed and new shingles installed correctly at the contractor's expense.

Interlayment for Shakes

Shakes should never have underlayment installed except where an ice barrier is required over solid sheathing. Instead, interlayment is required. Interlayment consists of an 18-inch-wide strip of 30-pound black felt installed between courses of shakes. The bottom of the felt should be positioned above the butt of the shakes at a distance equal to twice the exposure. The interlayment should never be visible.



Shakes: Spaced Sheathing
Front View

So, on a roof with 24-inch shakes and a 10-inch exposure (which is common), the interlayment would cover only the top 4 inches of the shakes in each course. The upper 14 inches of interlayment would rest partially on the interlayment of the course below and partially on the bare sheathing.

Interlayment acts as a weather baffle and helps prevent wind-driven snow and rain from penetrating the roof. Because shakes are usually rougher and coarser than shingles, wind-driven precipitation is more likely to penetrate shakes than shingles. Interlayment requirements may vary by area.

Waterproof Underlayment

Neither shakes nor shingles should have a waterproof underlayment installed unless the shakes or shingles are installed on a batten system, which allows for good air flow between the underlayment and the underside of the shakes or shingles.

2-Ply vs. 3-Ply

You may occasionally see shakes installed without interlayment. If this is the case, the shake installation should be 3-ply. The roof should be covered with three layers of shakes at any given point in the roof system. This is not a method approved by any existing building codes or by the CSSB, but may be approved by the local AHJ on an individual basis. Three-ply systems should use only #1 or premium-grade taper-sawn shakes. Installing interlayment on 3-ply roofs may result in trapping moisture and reducing the lifespan of the shakes.

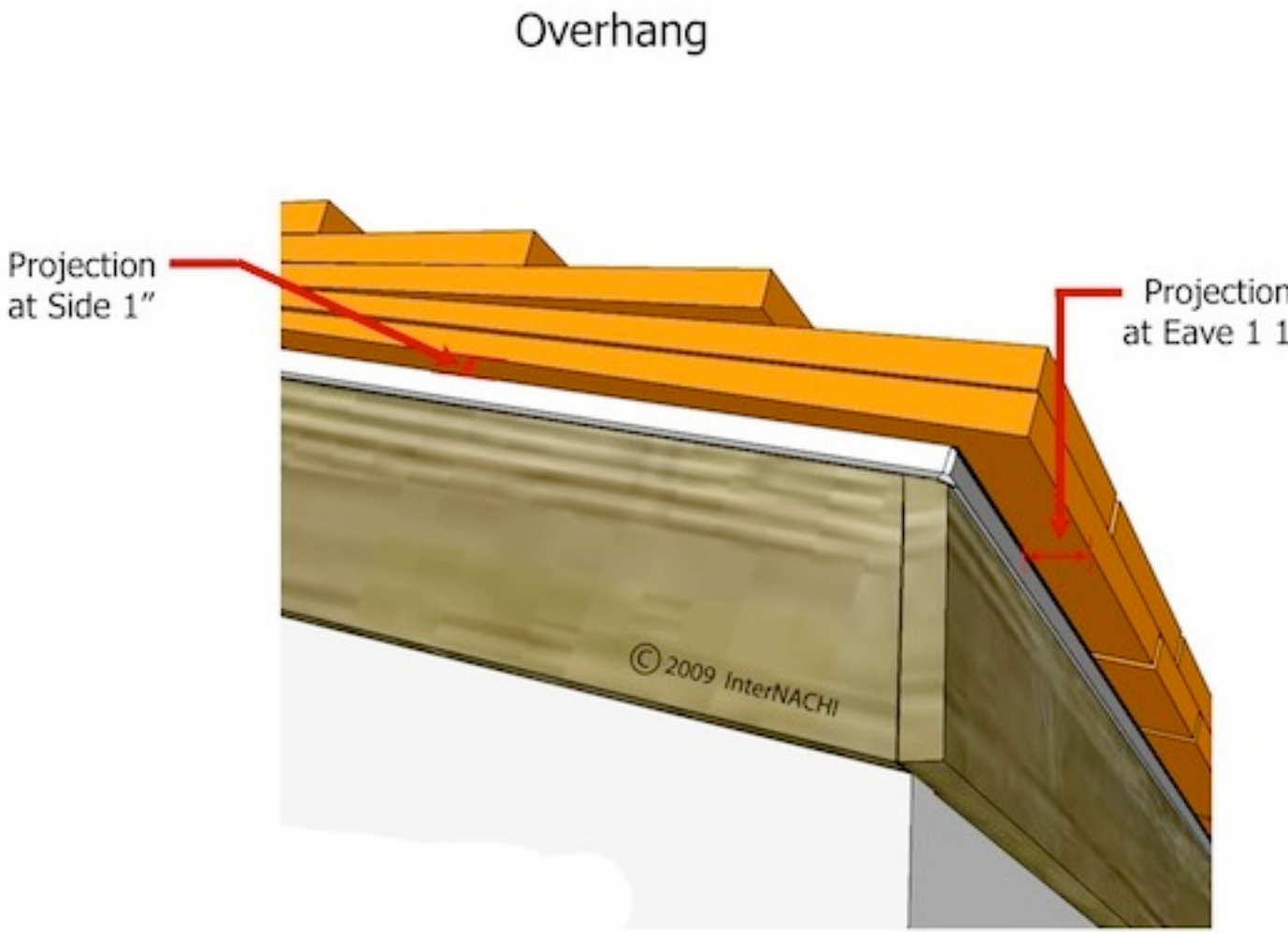
A 3-ply roof can be installed over either spaced board or solid roof sheathing. Three-ply systems should never be used on roofs with a slope of less than 4:12.

Shake roofs installed using the 2-ply method in which the roof is covered with two layers of shakes at any given point in the roof system must have interlayment installed.

INSTALLATION

Starter Course

The first course of shingles can be doubled or tripled, with the joints between upper and lower shakes offset by at least 1½ inches. Shakes measuring 15 inches are made for starter and finish courses (finish courses being the courses at the peak), but are seldom used. Most installers use similar shakes and shingles for the starter and finish courses.



Projection at the Roof Edges

The amount of overhang at rakes and eaves should be the same for shakes and shingles: 1½ inches at the bottom, and 1 inch on the sides. Sidelaps in the starter course should be 1½ inches minimum.

Allowable Exposure

The proper exposure for both shakes and shingles is determined by the length and the grade. The exposure of a shake or shingle is that portion which is exposed to weather. So, if you look at a roof with 24-inch shakes installed and you can see 10 inches of the length of each shake, the exposure is 10 inches.

Both shakes and shingles have minimum slope requirements. According to the IRC, shakes should never be installed on roofs with slopes of less than 4:12. Shingles should never be installed on roofs with slopes of less than 3:12. But on roofs with slopes of

between 3:12 and 4:12, exposures should be reduced according to shingle length and grade.

WOOD SHINGLE WEATHER EXPOSURE AND ROOF SL

ROOFING MATERIAL	LENGTH (inches)	GRADE	EXPOSURE (in	
			3:12 pitch to < 4:12	4:1 or
Shingles of naturally durable wood	16	No. 1	3.75	
		No. 2	3.5	
		No. 3	3	
	18	No. 1	4.25	
		No. 2	4	
		No. 3	3.5	
	24	No. 1	5.75	
		No. 2	5.5	
		No. 3	5	

Although decreasing shake or shingle exposure is acceptable, the maximum exposure should never be exceeded. Excessive exposure lowers the roof's resistance to wind damage and distortion from weathering.

Staggered Butts

Wood roofs are sometimes installed with butts staggered up and down. The installation should never exceed the maximum-allowable exposure when this method is used.

Field Installation

Shakes

Field shakes and shingles are all those on a roof except those in the starter course along the lower roof edge and in the finish course at the roof peak.

Spacing Between Shakes and Shingles

Wood shakes and shingles swell when they get wet and shrink when they dry. Because of the structure and orientation of wood cells, there will be more dramatic movement across the width than in the length. For this reason, it's important to leave adequate space between shakes or shingles in the same course. Limitations on spacing may vary according to the AHJ in the area where the inspection is being performed. It's usually the CSSB or the IRC. Spacing between taper-sawn shakes that are pressure-treated with a preservative is ¼-inch to ⅜-inch.

Shakes

For spacing between shakes in the same course:

- the CSSB recommends ⅜-inch minimum and ⅝-inch maximum; and
- the IRC recommends ⅛-inch minimum and ⅝-inch maximum.

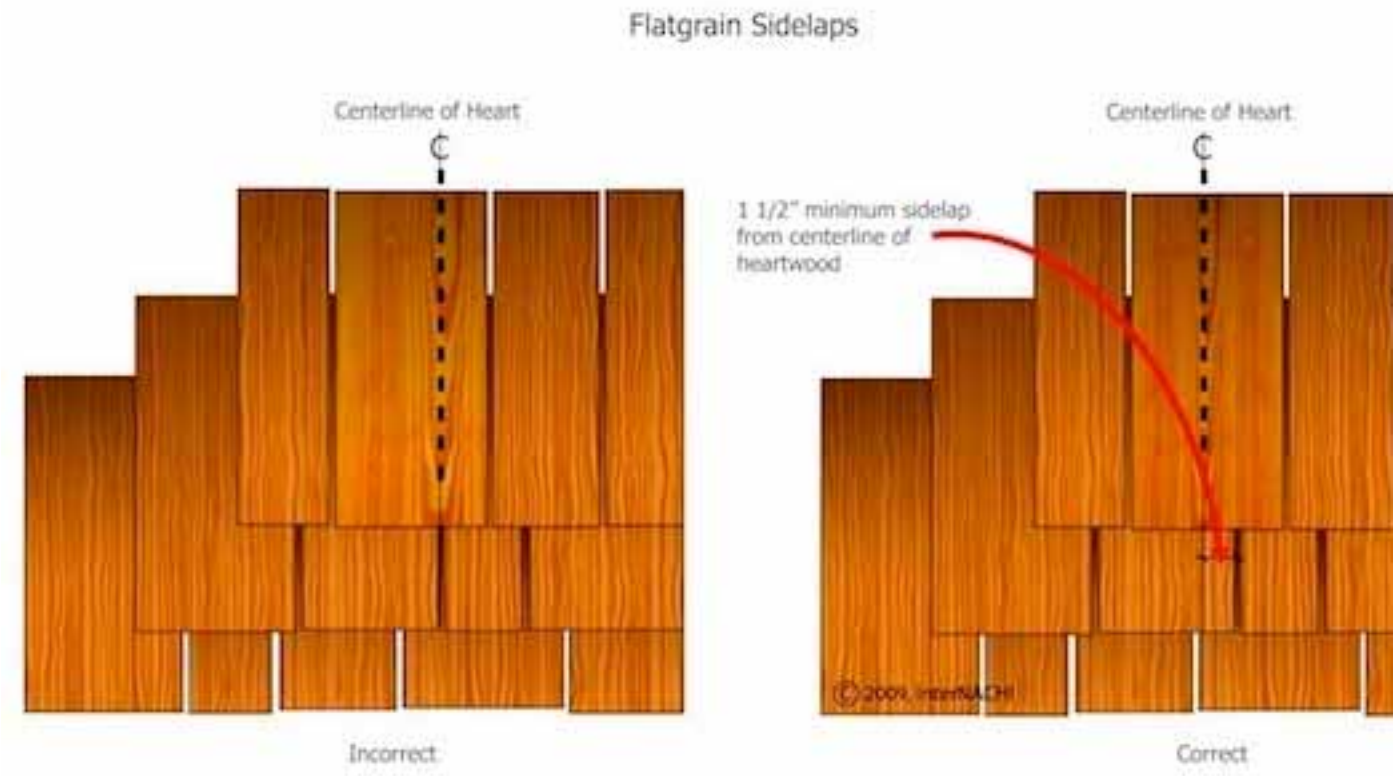
Shingles

Spacing between shingles in the same course should be ¼-inch to ⅜-inch. Flat-grain shingles wider than 8 inches should be split in two before installation. Modern building codes require that no two joints in any three adjacent courses be in alignment.

Vertical Joint Alignment

The distance separating vertical joints between shakes and shingles in adjacent courses is called the sidelap. The minimum sidelap for both shakes and shingles is 1½ inches. This means that you shouldn't see any shake or shingle joints in adjacent courses within 1½ inches of each other or within 1½ inches of a knot or similar defect.

On shingled roofs, knots and similar defects should be treated as the edge of a shingle and a 1½-inch sidelap should be maintained. This is because shingles are likely to split first at these defects.



When flat-grain shingles are used, joints should not align with the centerline of the heartwood because flat-grain shingles are prone to cracking along the heartwood's centerline.

Shingle Width

The minimum width for both shakes and shingles is 3 inches. The maximum width of flat-grain shingles is 8 inches.

Sidewall Installation

As with asphalt shingles, flashing at sidewalls should be stepped flashing, not continuous flashing.

Minimum Slope

Modern building codes require a minimum slope of 4:12 for shakes and 3:12 for shingles.

FASTENERS

Fastener Types

Correct Specifications

Shake or Shingle Type	Nail Type and Minimum Length
Shakes	**Type (in)**
18" Straight-Split	5d Box 1 3/4
18" and 24" Handsplit-and-Resawn	6d Box 2
24" Tapersplit	5d Box 1 3/4
18" and 24" Tapersawn	6d Box 2
Shingles	**Type (in)**
16" and 18" Shingles	3d Box 1 1/4
24" Shingles	4d Box 1 1/2

Both shakes and shingles should be installed with corrosion-resistant fasteners, such as aluminum, stainless steel or hot-dipped zinc-coated nails. Electro-galvanized, zinc-coated staples are available, but staples are not available hot-dipped.

The CSSB does not recommend the use of electro-galvanized fasteners. In coastal environments, electro-galvanized fasteners are a defective installation due to their excessively short service life.

Although staples have been widely used in the past, nails are the preferred fastener for both shakes and shingles. They should be long enough to penetrate the roof sheathing.

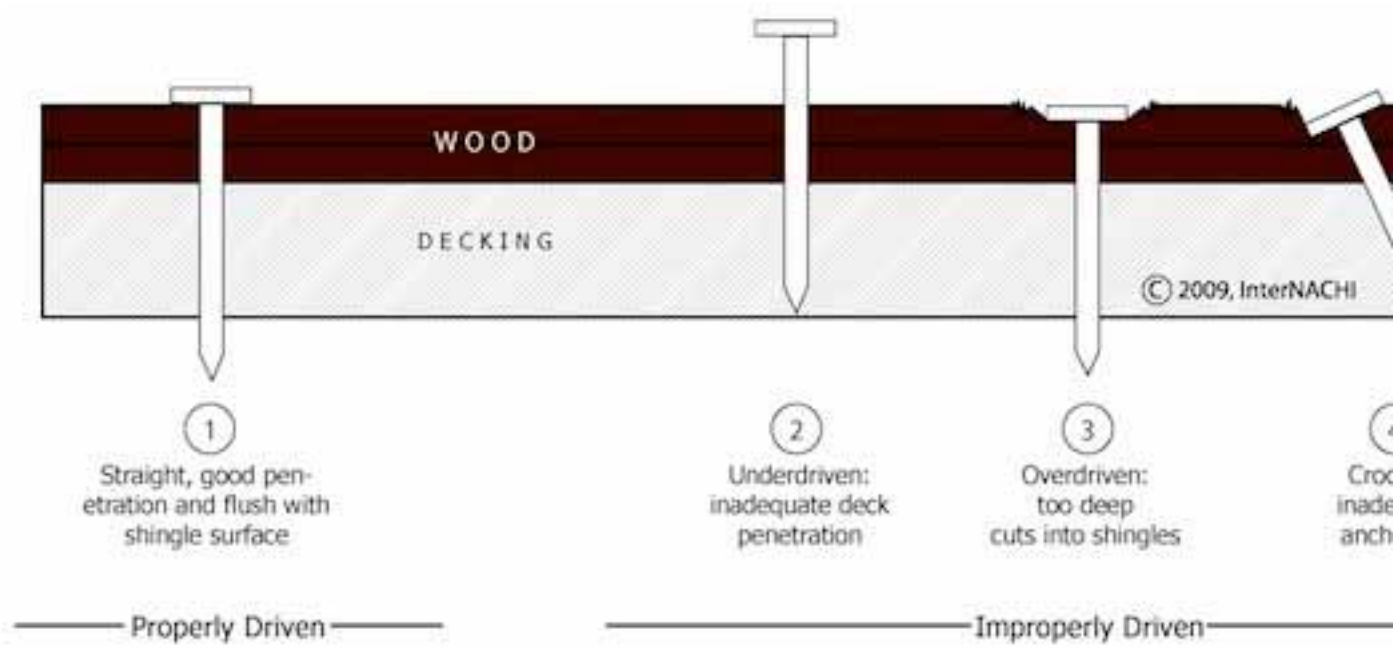
Some types of fasteners may not be of a material that is compatible for use with shakes or shingles that have been chemically pressure-treated. These roofs may require stainless steel fasteners. Confirmation would require checking with the manufacturer, and this lies beyond the scope of a general home inspection. However, if you know that pressure-treated products have been used, you should mention in your report that special fasteners are sometimes recommended by the manufacturer. Recommend confirmation by a qualified contractor, and disclaim responsibility for confirming the use of the proper fasteners.

Fastener Schedules

For both shakes and shingles, two fasteners only should be installed, each within 1 inch of the edge and approximately 1½ inches above the exposure line. Fasteners should never be visible or be exposed to weather.

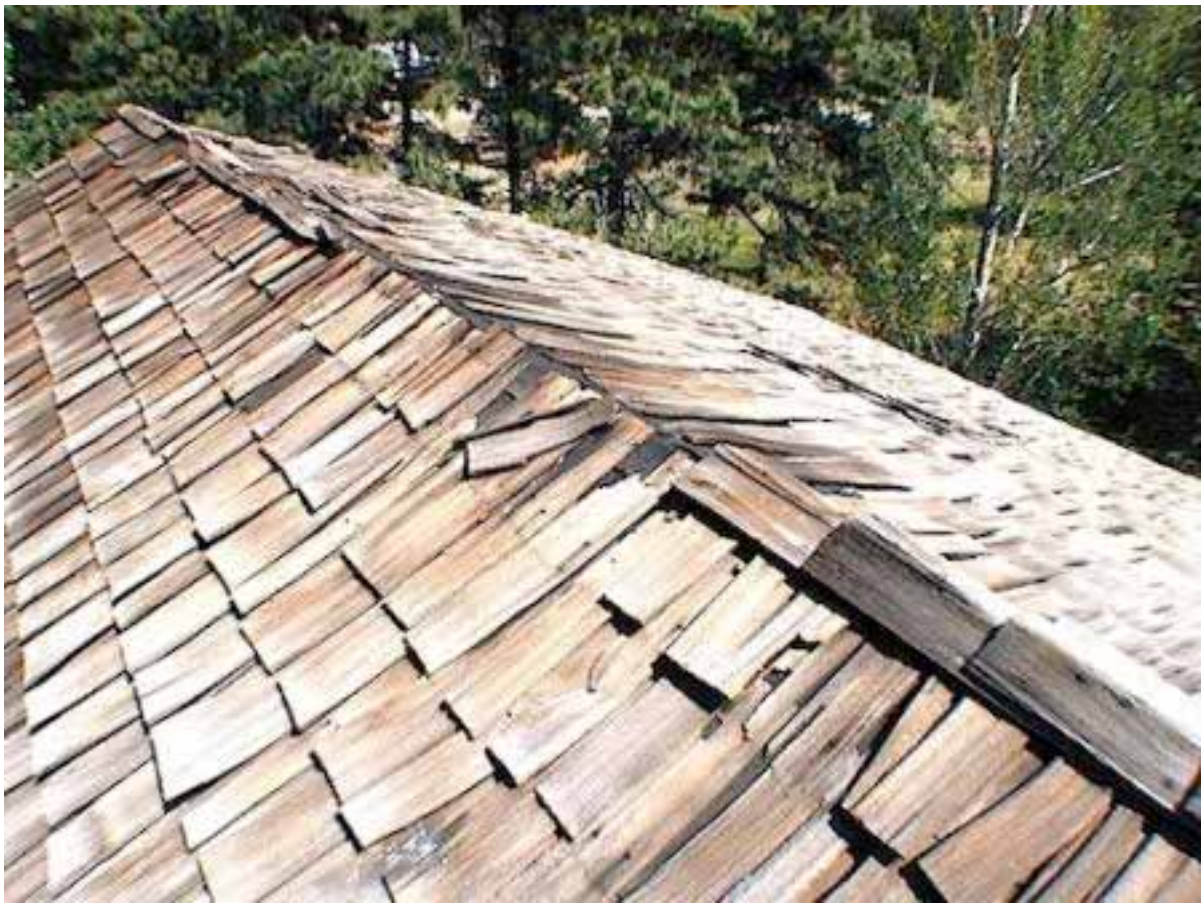
Fasteners placed too high or too close together may encourage distortion, such as curling and cupping. You don't want to see them in the exposure, although you will see roofs on which fasteners were installed near the butt of the shake or shingle in an effort to correct cupping or curling. This won't work for long. Over time, the fasteners will expand and contract with changes in temperature, and they will become loose and the shake or shingle will continue to distort.

Fastener-Related Defects



Fasteners should be driven only deep enough that the heads are flush with the surface of the shake or shingle. Over-driving the fastener will sink the head below the surface, reducing the effective thickness of the wood and, consequently, the resistance to uplift from wind. Driving the fastener at an angle can have the same effect. Under-driving the fastener will also reduce wind resistance, since the head will no longer be in contact with the wood.

Cap Shakes and Shingles



When cap shakes and shingles for ridge and hip caps have been stapled together, the staples will be exposed to weather and will fail before the staples used to fasten field shakes or shingles. Long-term expansion and contraction will cause the holes to enlarge and the shakes or shingles that form the caps will separate, exposing the underlying roof to weather and increasing the potential for leakage.

WOOD ROOF PROBLEMS

Weathering

Weathering is a general term used to describe slow deterioration from exposure to the elements, including UV radiation from sunlight, thermal cycling, moisture cycling, erosion from precipitation runoff, buffeting, and uplift from wind.

UV radiation from sunlight causes long-term deterioration of the surface of roofing materials. Newly installed cedar will turn brownish-grey.

Thermal cycling describes the cycles experienced by materials as they expand with heat and contract as they cool. Thermal cycling has little effect on shakes and shingles, but

can affect metal fasteners. Over time, thermal cycling will cause fasteners to loosen in their holes so that they'll pull out more easily, and the roofing they anchor will suffer reduced wind resistance.

Moisture cycling describes the cycles experienced by materials as they expand while absorbing moisture and shrink as they dry. If fasteners have been loosened by thermal cycling, damp, expanding shakes and shingles will grip the fastener and raise it slightly in its hole.

When the wood dries, it contracts and shrinks, leaving the fastener protruding above the surface. As time goes by, fasteners will continue to rise out of their holes. Moisture cycling also contributes to distortion, such as curling and cupping.

Moisture erosion is caused by runoff flowing down the roof. Flat-grain shakes and shingles are more likely to suffer from erosion, since they expose a greater proportion of sapwood, which is softer than heartwood. The extractives in heartwood also help resist erosion.

Runoff can eventually erode completely through weak, thin portions of shakes and shingles that have been degraded by the sun.

The area of wood just beneath the butts of shakes and shingles in courses above may suffer especially severe erosion. If wood is thin and UV radiation-damaged, erosion may wear completely through the shake or shingle, creating a hole that will typically have tapered or serrated edges. This exposes underlayment that can fail fairly quickly when exposed to UV radiation.

Extractive Bleeding

The stains below shingle butts in the photo above were caused by extractive bleeding. Extractives are chemical compounds in wood cells that help determine the wood's permeability to liquids. They also influence the wood's properties, such as color, density, hardness, compressive strength, and resistance to attack by insects and fungi.

Extractive bleeding can happen when tannins in wood are dissolved by moisture and then migrate to the surface as the wood dries. Rain will sometimes wash these stains away, but if left exposed to weather, the sun can cause polymerization, which will set the stain. Products containing oxalic acid seem to be the most effective at removing extractive-bleeding stains.

A tannin blocker may need to be applied to keep the stains from reappearing. Extractive bleeding is not a manufacturing or finish-coating defect, but is a natural phenomenon that occurs under some conditions. Tannin-blocking products help, but they may not totally prevent recurrence.

WOOD ROOF PROBLEMS (continued)

Rates of Weathering

The speed at which wood shakes and shingles weather depends on a home's:

- climate zone. Homes located in climate zones that experience severe weather conditions will weather faster than those in zones with mild weather;
- the roof slope orientation. Roof slopes that face south or that face the direction from which storms approach will weather faster than more protected slopes;
- the quality of the shakes or shingles; and
- the quality of the installation. Poorly installed roofs can experience a variety of problems, depending on the nature of the installation:
    - They may be slow to dry, which can encourage decay and distortion.
    - They may be prone to leakage due to inadequate sidelaps, excessive exposure, or poor fastener placement.
    - They may suffer reduced wind resistance due to inadequate fastening or excessive exposure.

Distortion

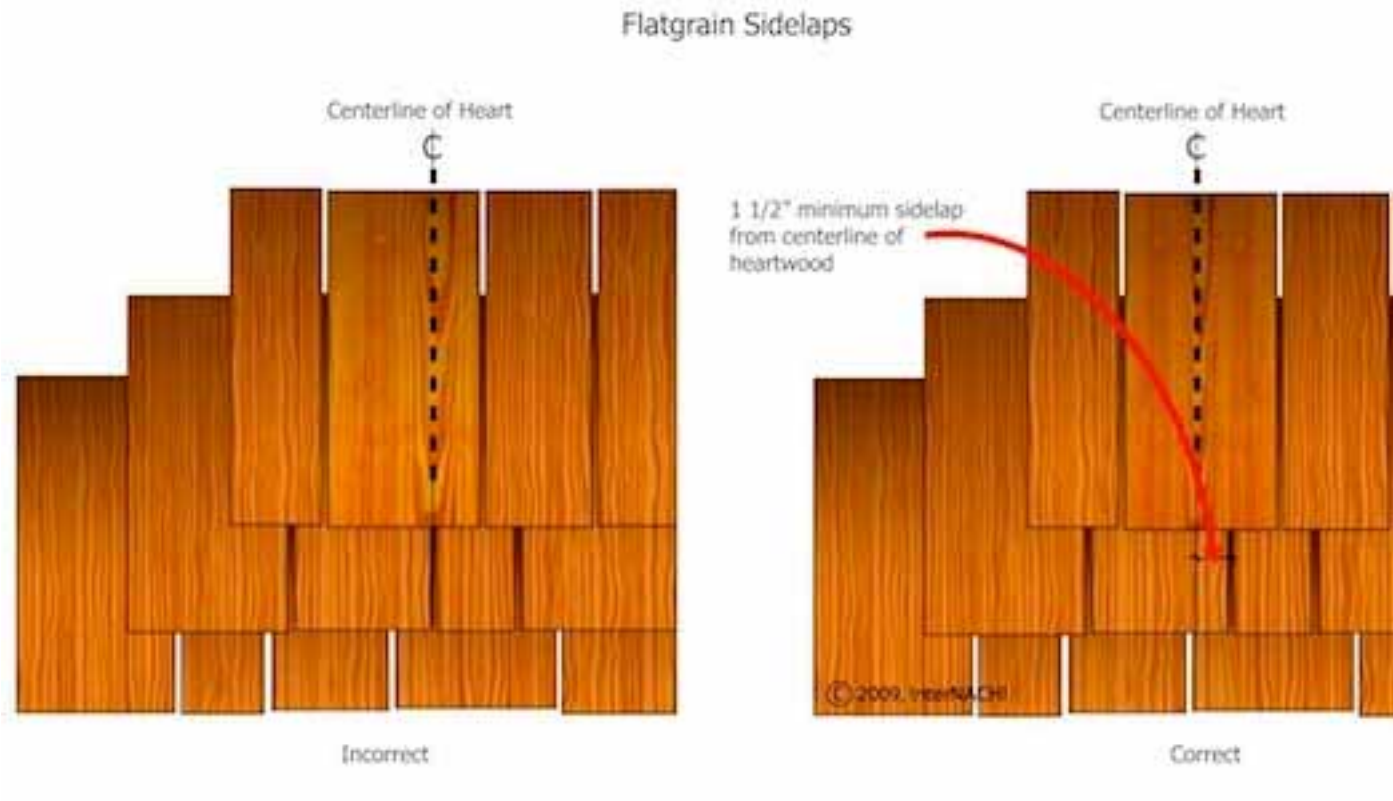
Distortion is a general term that includes cupping, which occurs across the width of the shake or shingle, and curling, which occurs along its length.

Cupping is caused by uneven moisture absorption and drying. As wood absorbs moisture, water fills the spaces between wood cells, causing the wood to swell. As wood dries, water leaves the spaces and the wood shrinks. The undersides of shakes and shingles often dry more slowly than the exposed faces. The exposed faces will shrink as they dry, but the undersides will remain in an expanded condition, since they're still full of water.

Curling is caused by natural stresses in the wood that are released when the shake or shingle is cut and are made worse by moisture cycling. Flat-grain shakes and shingles are more likely to distort than edge-grain and slash-grain.

Checks

Checks are cracks that don't extend through the shake or shingle. Cracks that do extend through are called splits. Checks are an aesthetic concern and don't affect performance.



Splitting

All grades and types of cedar shakes and shingles will crack and split naturally as they weather over time. Flat-grain shakes and shingles are more likely to split than edge-grain, especially along the center of the heartwood, which is why vertical joints should not align with the centerline of heartwood, but should be offset a minimum of 1½ inches.

Splits from weathering are typically wider at the base of the shingle; that is usually where they first develop. Splits that have been open and exposed to weather have rounded edges on the upper surface and are the same color inside the split as on the upper surface.

Newer splits from impact, such as hailstrikes or tree branches, or from footfall or mechanical damage, have sharp edges, and the interior of the split is typically orange. Over several months, the wood will turn grey from exposure to UV radiation and, to a lesser extent, oxidation.

The photo above shows a fresh split from footfall. You can see that it's orange and runs the length of the shake. The grey color and rounded edges near the butt indicate that the shake was already weakened by a partial split when it was stepped on.

The photo above shows damage from a low-angle hailstrike.

This photo shows a more direct hailstrike.

The photo above shows a shake roof at the end of its useful life. Widespread splitting has reduced sidelaps to less than 1½ inches over a large part of the roof.

Generally, after 10 years' exposure to weather, one-third of edge-grain and two-thirds of flat-grain shakes and shingles will have splits.

Splits are more difficult to see when wood is wet because, as wood absorbs moisture, it swells, which tends to close splits. For this reason, and because wet wood roofs are slippery and dangerous to walk, they should be inspected when they're dry.

Causes of Splitting

All shakes and shingles will eventually split. Splitting is part of the natural aging process.

Splits may start at fasteners. If more than two fasteners are installed, shakes and shingles may not be able to swell and shrink freely and may split as a result.

Splits caused by hail have an indentation along the split. If the shake or shingle was cupped at the time of impact, the impact may be to one side of the split, but this condition is relatively rare.

Splits caused by the weight of a person walking have no hail indentation and the split may be roughly uniform in width, as opposed to splits caused by weathering that are wider at the shingle butt, since weathering splits start at the butt.

Results of Splitting

If they extend the length of the shake or shingle and cause it to loosen, the shake or shingle may be more easily blown off or be displaced by someone walking on the roof.

If splits align with vertical joints or other splits in the course below, runoff will have an avenue to penetrate the roof.

If splits are wide enough to expose the felt interlayment to sunlight, UV radiation will deteriorate the felt, eventually allowing moisture to penetrate deeper into the roofing system.

Here, you can see the color difference between new and existing shakes. The new shakes will fade to match the existing shakes (typically, in less than a year), although home site conditions will affect that timeframe somewhat.

Prevailing winds at this home site blew toward the rake-end of this home. You can see that the shakes along the rake have been replaced, and so have the ridge cap shingles. New cap shingles have been overlapped correctly. This orientation reduces the chance of cap shingles being lifted by wind.

MECHANICAL DAMAGE

Workmen

A variety of different kinds of damage can be done by those working on a roof. The roof may be walked on for a variety of reasons, including for maintenance on the gutters, chimney and roof, and for work on other components, such as air-conditioning, electrical, HVAC and communications equipment. Splitting is the type of damage of main concern.

Chemical

Chemicals may be applied to a wood roof for a number of reasons. People may try to extend the life of the roof, make it more fire-resistant, and remove and prevent biological growth by applying a wide variety of chemicals, some of which are inappropriate and some of which are damaging to the roof.

ENVIRONMENTAL PROBLEMS

Biological Surface Growth

Various types of biological organisms will grow on wood roofs if conditions are right. These include moss, lichen and algae. Their presence on a roof indicates elevated moisture levels. Moss and algae, especially, will hold moisture against the roof, encouraging decay. Zinc or copper strips may be nailed across the roof near the ridge to help prevent algae growth. Copper is generally more effective and sometimes will kill existing algae. Moss has shallow roots and can be removed by scrubbing.

Stay off mossy wood roofs. Moss on wood is slippery!

Algae are more difficult to remove, and chemicals may be required to kill it. In your report's wording, you should recommend that "appropriate" chemicals be applied by a "qualified contractor." Using the wrong chemicals may discolor the roof or damage or kill landscaping. It may also put toxic chemicals into the soil around the home, which can be especially dangerous to children and pets.

Decay

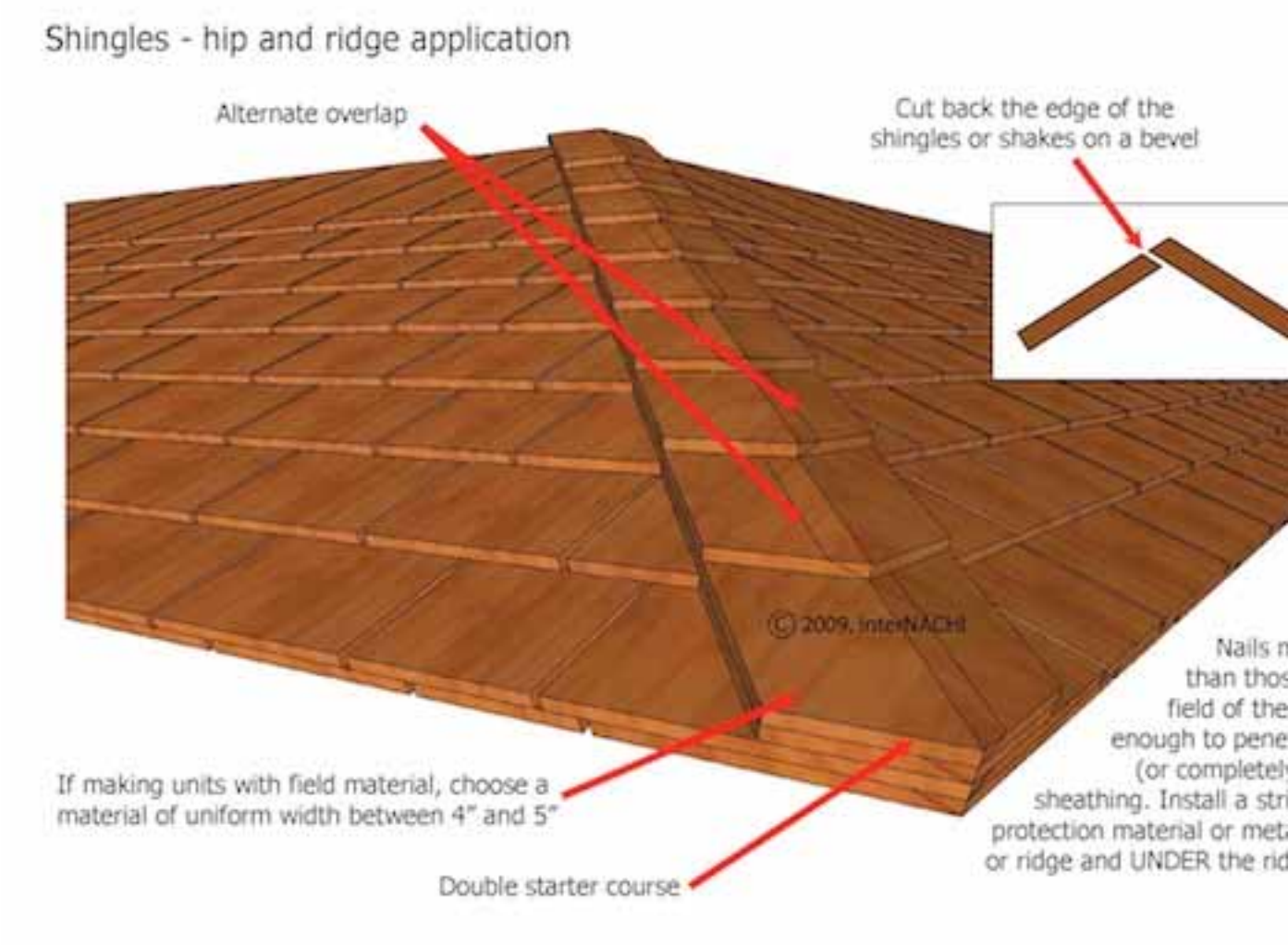
Wood decay, which is the same as wood rot, is caused by fungi. It often happens in shake and shingle butts first because butts are thicker and hold moisture longer. Because they may contain large numbers of fungi that can spread to and damage the surrounding roof, shakes and shingles with visible decay should be replaced. Heartwood contains extractives that make it more resistant to decay than sapwood. This means that edge-grain shakes and shingles resist decay better than flat-grain.

Decay may be caused by different conditions.

- In some climate zones, wood roofs should be installed over spaced sheathing. Solid sheathing may slow drying enough to allow decay to develop.
- Multiple layers of wood roofing may prevent the roof from drying adequately.
- Improper interlayment and underlayment practices and materials can also slow drying significantly.
- If attic or rafter bay ventilation is poor, the roof may dry too slowly because air movement cannot remove moist air from the attic or rafter bays.
- Shade from trees and mountainous terrain will slow the drying process.

- Debris accumulated on the roof will hold moisture against the wood and encourage decay.

Cap Shakes and Shingles



Cap shakes and shingles are butted together and fastened with nails or staples. Although butt laps should alternate as caps and are installed to help shed runoff properly, this is a quality issue, and it won't be what you'll find on the roof when inspecting most homes. Don't call it a defect if you don't find caps done this way.

Caps fail in several ways.

- Over time, thermal and moisture cycling will loosen the fasteners that hold caps together. The two halves will start to separate, opening an avenue for moisture intrusion. The same physical processes will loosen the fasteners anchoring the cap shakes and shingles to the roof, making them more vulnerable to uplift. Their position on the ridge and hips also increases the chance that they will be blown off.

- Installers often use the same fasteners for cap shakes and shingles that they use for field shakes. These fasten cap shakes only to underlying shakes, but not to the roof deck. This condition reduces the wind resistance of the caps. Pull lightly on caps to check the fastening.

- Ridge caps should be overlapped away from the prevailing winds. In the photo above, wind blows from the left toward the right. The ridge cap shakes are overlapped correctly. Overlapping caps in the wrong direction will result in failure happening sooner in areas subject to high winds.

For these reasons, caps shakes and shingles are typically the first components to suffer damage. Next are field shakes and shingles on the windward sides of the home, especially at the corners.

WOOD ROOF MAINTENANCE

Wood roofs should be maintained on a regular basis. Damaged or missing shakes or shingles should be replaced, and loose ones should be re-fastened. The roof and gutters should be cleaned, and tree branches should be trimmed back so that they don't overhang the roof. Overhanging branches will cause leaves to accumulate on the roof and in gutters.

In areas subject to ice dam formation, nylon stockings filled with snow-melt chemicals can be used to melt through the dam to allow roof drainage. As fasteners loosen over time, cap shingles for ridges and hips will often begin to separate and allow moisture intrusion. They may lose wind resistance. Look for problems in valleys, at roof penetrations, and along the lower roof edges.

Squirrels and raccoons may chew or tear wood roofing, especially at areas that are decayed. Shingles with this kind of damage should be replaced.

The life expectancy of a roof varies, depending on a variety of factors, including the following:

- climate zone and local environmental factors , such as salt air, heat, humidity, precipitation, and hail;
- the quality of the shake or shingle;
- the quality of the installation;
- the quality of the maintenance;
- the amount of foot traffic; and
- any overhanging tree branches.

In addition, the CSSB recommends that pressure-treated shakes and shingles be used in the following states:

- Alabama,
- Delaware,

- Florida,
- Georgia,
- Hawaii,
- Kentucky,
- Maryland,
- Mississippi,
- North Carolina,
- South Carolina,
- Virginia and
- West Virginia.

Pressure-treated shakes and shingles should also be used in the following counties of Texas:

- Angelina,
- Austin,
- Brazos,
- Chambers,
- Fort Bend,
- Galveston,
- Grimes,
- Hardin,
- Harris,
- Jasper,
- Jefferson,
- Liberty,
- Montgomery,
- Newton,
- Orange,
- Polk,
- Sabine,
- San Augustine,
- San Jacinto,
- Trinity,
- Tyler,
- Walker,
- Waller and
- Washington.

Wood Roof Repair Methods

Repairing damaged areas of wood roofs generally means replacing shakes or shingles.

Removing and replacing a shake or shingle is easy and takes less than five minutes.

Using a hammer, the shake is driven up far enough to pull the fasteners loose. The shake is then removed.

A new shake of the right size is inserted into place, and fasteners are installed beneath the butt of the overlying shake. If fasteners are angled up toward the peak, they'll help pull the shingle up the roof as they're driven, helping to hide the fasteners.

End of Useful Life

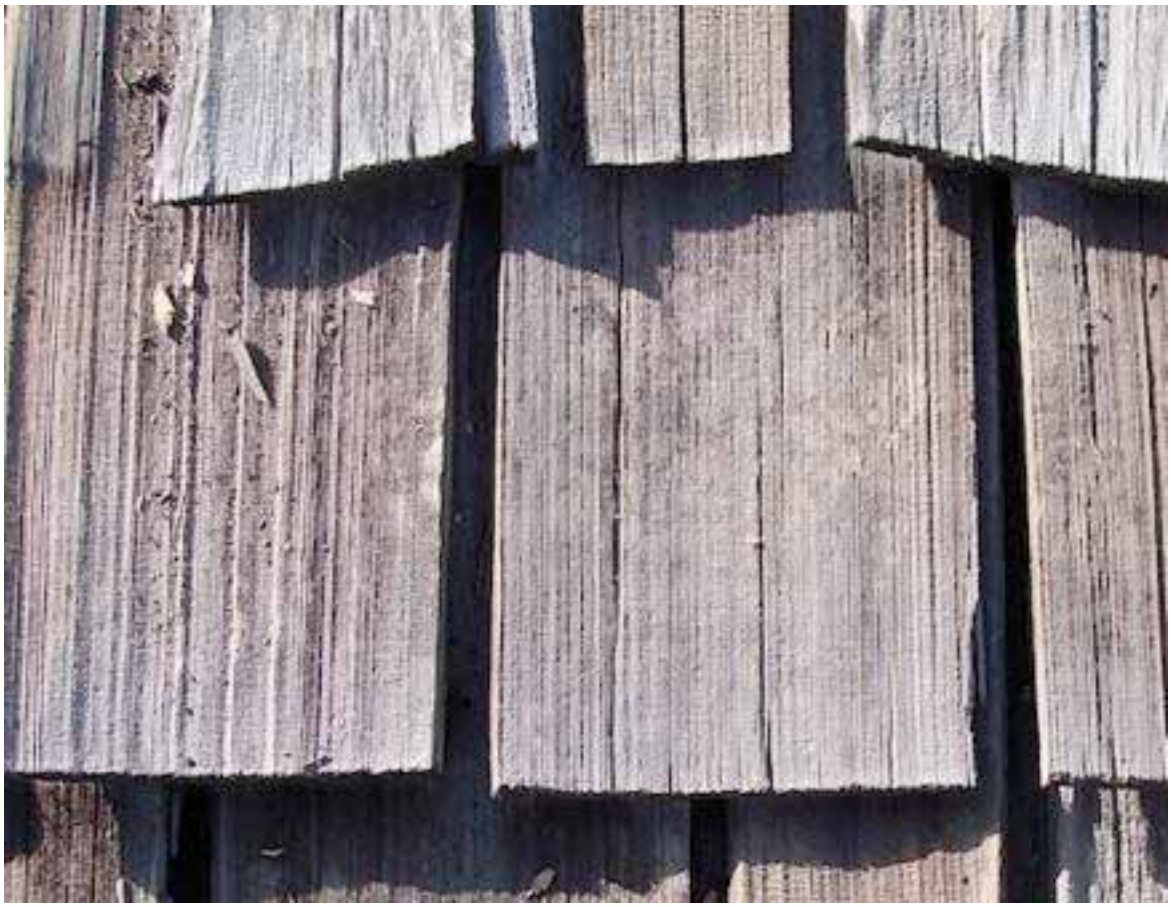
Once you understand the fundamentals of wood roofs, you'll develop an increasingly better sense of where a roof stands in its lifespan at the time of your inspection. Wood roofs may last anywhere from 20 to 60 years. Talking to contractors in your area will help you develop a realistic idea of how long wood roofs can be expected to last locally.

An important factor regarding the speed at which a wood roof ages has to do with a combination of the factors listed above. Roofs located in harsher climate zones and those whose home site conditions degrade wood roofs will require more diligent maintenance. The quality of the material and installation are important, too.

More important than estimating the remaining lifespan is being able to recognize when a roof is near or at the end of its useful life.

Here are some of the clues that a roof is nearing the end of its useful life. They apply mainly to field shakes and shingles over a significant portion of the roof.

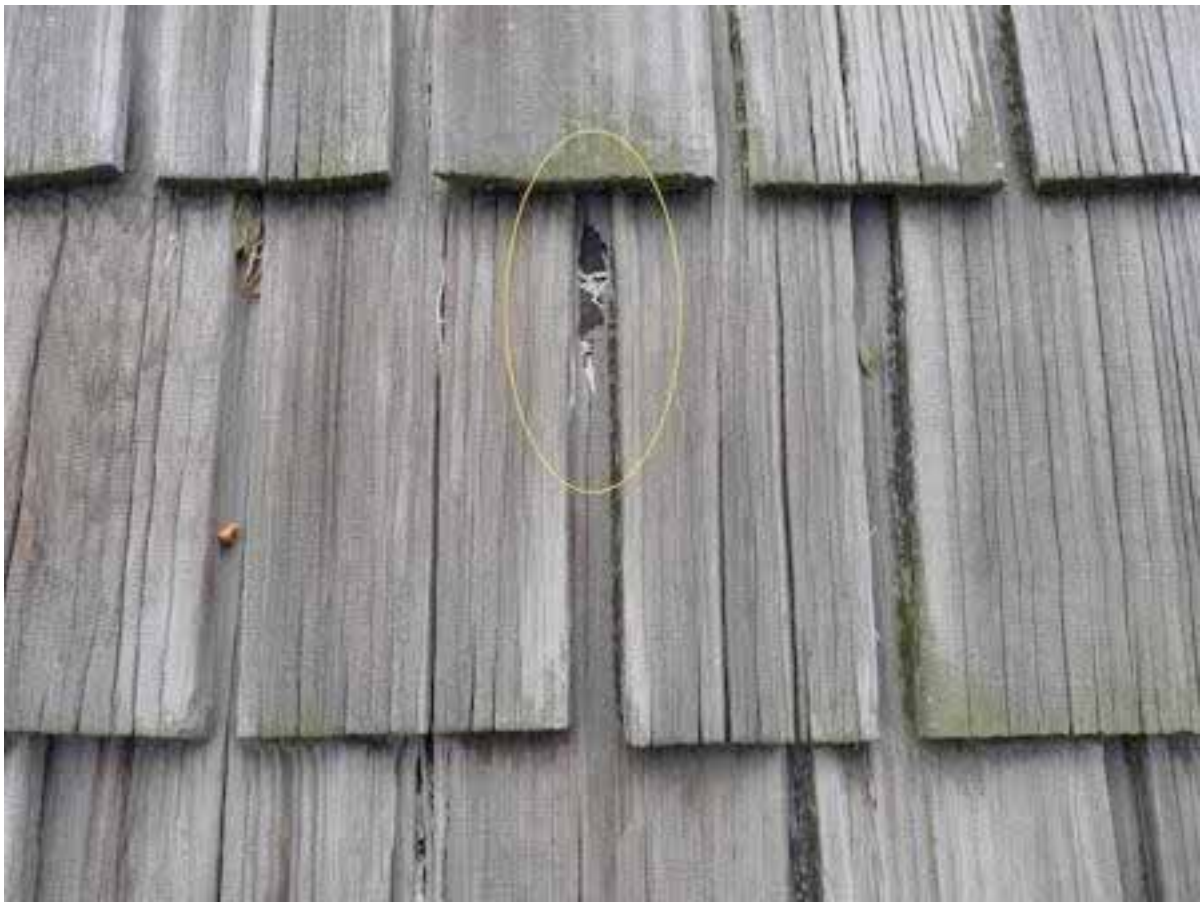
There are many loose, split or missing shakes or shingles.



Splits leave inadequate sidelaps.

The underlayment or roof deck is exposed.

Fasteners are exposed. It's not uncommon to see fasteners exposed, and this alone does not indicate failure, but it's one more clue when combined with other conditions of failure.



There are many areas where shakes or shingles are thin or eroded through.

Widespread distortion (cupping or curling) is seen across a significant portion of the roof.

Cupping or curling is typically not a reason to describe a roof as at or near the end of its useful life. The exception is if it's widespread and allowing moisture intrusion. The roof in the photo above indicates a cause for concern but the roof would not be recommended for repair unless there were signs of moisture intrusion.

The photo above shows a wood shingle roof that has been installed with interlayment that has reduced its ability to dry, resulting in excessive distortion, splitting and loss of shingles.

A large percentage of decay is typically found in butts.

Widespread damage is found, such as wind or hail damage.