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Choosing Roofing

Up in the air about using asphalt, wood, slate, tile or metal to keep out the rain? There are lots of choices, and they all have advantages

by Jefferson Kolle

A lot of roofing materials try to look like something else. When they first came out, asphalt shingles were touted as looking like slate. Today, there are metal roofs that are supposed to look like tile, and there are fiber-cement roofs that are supposed to look like wood shingles.

Whether you're looking for a roof that looks like something else or a roof that looks like what it is—wood roofs really do look like wood—there are a lot of materials on the market, and they all have their benefits. Material costs and installation costs of some roofing materials are higher than others, but the payback is in their longevity or in their aesthetic appeal. What follows is a survey of the most common roofing materials available for steep-roof residential construction (anything greater than a 3-in-12 pitch).

The standard unit of measurement for roofing materials is the square. A square is 100 square feet of roofing. Manufacturers refer to their products on a per-square basis—cost per square, weight per square, etc. This article will use the same nomenclature.

Asphalt roofing is inexpensive and can be installed quickly—One story has it that the three-tab asphalt strip shingle, with its two grooves dividing the exposed face of the shingle into three sections, was invented by Fred Overbury in 1915 when he pulled a cardboard divider out of an egg crate and was struck with a brilliant idea. Before Overbury's invention asphalt shingles were made as individual pieces and were installed one at a time. The strip shingle revolutionized the asphalt-roofing industry.

Today, asphalt shingles cover more residential roofs than any other material. Every year, 100 million squares of asphalt shingles are installed in the United States. That's more than 358 square miles, about the *size* of Lake Tahoe.

Asphalt shingles' popularity is due to several factors. They're fire-resistant, and choices of color and textures are numerous. They're relatively inexpensive both to purchase and to install; an experienced roofer can install 10 to 20 squares a day, depending on the intricacies of the roof.

On a sunny summer day, a black asphalt roof can reach a temperature of 150°F. As the temperature rises, asphalt shingles become soft and pliable. A sudden thunderstorm can cause the temperature of that soft, pliable roof to drop to around 60°F. That's called thermal cycling. If the asphalt shingles on the roof are going to continue to shed water, their reaction to thermal cycling has to be minimal. Of course they will shrink when the temperature drops. But they can't curl, and they can't lift off the shingle below.

All asphalt shingles share common construction: A reinforcing mat is impregnated with asphalt. Twenty-five years ago, fiberglass mats were introduced to replace the earlier organic-fiber mats. Although organic-fiber mat shingles still are recommended for areas with extreme winds, early blow-off problems with fiberglass-mat shingles have been eliminated so that, today, fiberglass-mat shingles are the most common type sold.

Each year 100 million squares of asphalt shingles are used in the U.S. That's an area about the size of Lake Tahoe.

Filler materials, most commonly ground limestone, help stabilize the shingle's asphalt—technically a liquid—by stiffening it and keeping it from flowing. The fillers' inertness adds to the fire retardancy of the shingles, and they increase resistance to cupping during thermal cycling.

Asphalt degrades in sunlight; it loses its suppleness, dries out and cracks. To combat that problem, asphalt shingles have a surface coating of granulated minerals pressed into the part of the shingle exposed to the sun. Eventually, when the mineral granules wear off a shingle, through abrasion or erosion, the shingle degrades quickly. The granules are what give a shingle its color. Colors from bright greens to blues, yellows and reds are available as well as blacks, whites and a variety of subdued earth tones.

Architectural shingles are thicker than three-tabs—About the time fiberglass reinforcing mats were introduced, manufacturers came out with what are known as architectural or laminated shingles. Unlike three-tab shingles with cutout grooves, architectural shingles typically are solid across their length. Multiple, overlapping layers are laminated to form a heavier shingle with a more textured appearance.

Some architectural-shingle manufacturers use different colored mineral granules on the multiple layers to form the illusion of the cast shadowlines (top left photo, facing page) one might see on a wood-shake or slate roof. From the sidewalk, at dusk, in the fog, one might think a cedar-colored architectural-grade asphalt-shingle roof was wood. Other than that, they aren't convincing. The slate imitators also are unconvincing.

Most three-tab shingles weigh around 240 lb. per square, but some architectural shingles can weigh as much as 100 lb. more per square. Three-tab shingles come with a 15-year to 20-year warranty, but, because there is more material in the architectural shingles, they come with a longer warranty, typically 30 to 40 years (bottom photo, facing page). Architectural shingles are sold at a premium. In Newtown, Connecticut, for instance, three-tab shingles sell for $24 per square; architectural shingles cost $52 per square.

There's a common thought that a heavier shingle is a better shingle. But according to a paper sponsored by the National Roofing Contractors Association, "shingle testing and observations from field performance have frequently shown that weight alone is not a sufficient indicator of shingle quality..." Rather, "the quality of the individual components of the composite structure—the reinforcement [mat], the asphalt and the filler—are much better indicators of shingle performance." According to W. Kent Blanchard, one of the authors of the report, there is no easy way for a consumer to get an indication of the quality

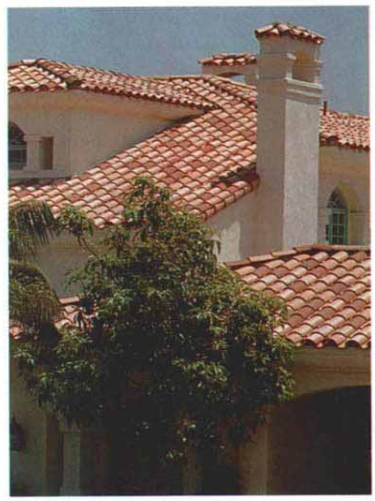
Architectural asphalt shingles try to look like wood. Different colored surface granules and overlapping layers on thick architectural shingles attempt to mimic the textures of a wood-shingle roof. Photo courtesy of Certainteed Corporation.

The look of real wood shingles. The natural beauty of a wood roof palliates its high cost. These pressure-treated red-cedar shingles are warranted for 30 years against fungal decay. Photo courtesy of The Cedar Shake and Shingle Bureau.

Architectural shingles cost more but last longer. Architectural asphalt shingles cost twice as much as three-tab shingles. The advantages are a longer warranty and the expectation of a longer life. Photo courtesy of Certainteed Corporation.

Clean keyways add life to wood roofs. Power washing, broom sweeping or rinsing with a hose will clean rot-causing debris from between shingles. Periodic treatments with wood preservative will help extend the roofs life. Photo courtesy of The Cedar Shake and Shingle Bureau.

Metal that tries to look like tile. Painted-metal panels weigh only 125 lbs. per square. Their eaves-to-ridge length makes for fast installation. Photo courtesy of Met-Tile Inc.



The look of a real tile roof. The color of clay-barrel tiles won't fade in the sun. Photo courtesy of M.C.A. Inc.

Aluminum shingles are light. Coated aluminum shingles weigh only 50 lbs. per square. Touted as looking like wood, their textured appearance is unique. Photo courtesy of Alcoa Building Products.

of a shingle's components, but he said to make sure any fiberglass-mat shingle you purchase has passed ASTM standard D6432, a measurement of tear strength. According to an article in the September 1992 issue of *Roofer Magazine,* "High tear strength is a good indicator of shingle toughness and resistance to cracking."

Wood roofing is beautiful—Regardless of manufacturers' attempts to simulate the appearance of wood shingles, nothing really looks like a wood roof except the real thing (top right photo, p. 47). Although wood roofs are expensive to purchase and to install, many people think their aesthetic value outweighs their high cost.

Wood roofs are composed of either shingles or shakes, and, although both are wedge-shaped in section and often are confused for one another, there are basic differences that set them apart. Put simply, a shingle's tapered shape is attained by sawing, and a shake's is split, or rived, from logs. Shakes are thicker at the butt, or bottom, than shingles, and the striations that result from splitting along the length of the grain give shakes a more rustic and textured appearance than sawn shingles.

Wood roofs are not only expensive to purchase—a square of top-quality shakes can cost more than $150—they also are labor intensive to install. Because wood shakes and shingles are nailed onto a roof one at a time, it takes a while to cover a roof with wood. A fast shingler on a section of roof without any time-consuming obstructions to roof around can put on 2 or 3 squares per eight-hour day.

Preparation of the deck before roofing can begin also takes a while. Good practice dictates laying shingles or shakes over skip sheathing, solid boards nailed with spaces between the rows, rather than over plywood or a similar solid decking. Skip sheathing is preferable for a wood roof because the air spaces between boards allow the wood roofing to dry from both sides, thus contributing to the roofing's longevity.

Maintaining a wood roof—Except for certain metal roofs that can be repainted, wood is one of the few roofing materials that can be maintained. And, in fact, it is recommended that wood-roof maintenance will protect an expensive investment. Brian Buchanan is a wood technologist in Lufkin, Texas. He has written a treatise called *Evaluating Various Preservative Treatments and Treating Methods for Western Red Cedar Shingles.* Buchanan told me that the most important practice toward promoting a wood roof's longevity is to keep the keyways between shingles clear of debris (top photo, left). When the keyways get clogged—with leaves, conifer needles, dead birds, whatever—fungus starts its eventual course toward rot. Power washing, sweeping with a broom and even simple washing with a garden hose cleans out keyways. Keep in mind that a wet wood roof is a slippery wood roof.

Liquid preservatives for wood roofs vary in their effectiveness. The best contain copper naphthenate. While some might consider the green color of products containing this compound to be unsightly, there are pigmented versions that

simulate cedar's reddish-brown color. A quick read of a can's label can tell you if the product contains copper naphthenate. A free copy of Buchanan's pamphlet is available from the Texas Forest Service (409-639-8180).

Western red cedar covers more roofs than any other species. Alaskan yellow cedar shingles are available as are ones made of Eastern white cedar. And, recently, the Southern Pine Marketing Council (504-443-4464) has begun touting pressure-treated Southern pine shakes.

Wood roofs and fire—Red-cedar shingles that have been impregnated with a fire retardant are given a Class B fire rating (Class A is the most fire resistant). A Class A roof can be had using wood, according to The Cedar Shake and Shingle Bureau, but you have to install the fire-resistant shingle over a sandwich of two layers of sheathing with a layer of ½-in. gypsum board between.

Fire retardants work well; the wood won't burn after it is treated. The problem comes from the treated wood's exposure to weather. Rain soaks the wood roof, and, when the sun comes out and dries the wood, the retardants are drawn to the surface. Subsequent rains wash the retardant off the wood. The process is repeated over the years, and, when all the retardant leaches out of the wood, your roof is covered with kindling.

But The Cedar Shake and Shingle Bureau has another view of the situation. Don Meucci, a spokesman at the bureau, said that tests done of fire-treated wood shingles taken from a roof 16 years after installation passed the same stringent tests that new shingles must undergo today.

But communities across the country from Los Angeles, California, to Newcastle, New Hampshire, have banned wood roofs, even those treated with fire retardants, because of their flammability. Of course, if a fire starts in your kitchen, no roof is going to keep your house from burning. The problem with wood roofs is twofold: Sparks landing on a wood roof can cause it to burn, and when the wood roof catches fire, the wood can send off flying brands, bits of burning material that leave the roof with the smoke column and then fall to the ground, still glowing hot, ready to start the next fire.

If you're considering a wood roof, talk to The Cedar Shake and Shingle Bureau (206453-1323), your building department or your local fire chief.

Metal roofs aren't just for barns anymore— My first memory of metal roofing is not a pleasant one. My brothers and I were on my grandfather's farm, and we discovered that the big barn was full of bats. One of us had the brilliant idea to rid the barn of the flying rodents with bow and arrows. We didn't hit any bats, but we did puncture the roof three or four times. My grandfather saw the arrows sticking though the galvanized sheets of roofing. He was not pleased.

Metal roofing is no longer relegated just to farm buildings, and it is available in styles and colors other than the rusting galvanized tin seen everywhere from Walker Evans' early photographs of sharecroppers' houses in Tennessee to my grandfather's barn in southern New Jersey. Improvements in both metal-coating processes

COMPARISON OF ROOFING MATERIALS

	Asphalt	Wood	Metal	Tile	Slate
Cost/square	$25-$56	$150-$200	$35-$250	$120-$1,000	$350-$700
Installation* cost/square	$65-$125	$130-$160	$35-$400	$100-$300	$250-$450
Approx.** life span/yrs.	15-20	10-40	15-40+	20+	30-100
Weight in lb.	225-385	300-400	50-270	375-1,100	500-1,000
Fire rating	A	B***	A	A	A

*Installation costs vary enormously due to many factors such as local labor rates, time of year, complexity of a house's roof geometry height of a roof from the ground and complexity of a roofing material's profile

**Roofing materials' life spans are courtesy of the American Society of Home Inspectors.

***Wood shingles and shakes treated with a fire retardant are given a Class B fire rating Untreated shakes and shingles have no fire rating A Class A roof is attainable with wood roofing, but a special installation procedure involving a sheathing sandwich made of plywood and gypsum board is necessary

Standing seam can look great on a home. The vertical ribs of a standing-seam roof give the metal panels rigidity. The slick surfaces shed water and snow quickly. Because of this, gutters should be sized accordingly or, if possible, eliminated. Photo courtesy of Bethlehem Steel.

Slate roofs can last indefinitely. The fasteners and flashing will wear out before the roof slates will. Because of slate's long life, there is a thriving market in used slate. Photo by Terry Smiley.

and in waterproof fasteners have made metal roofing suitable for residential use. According to Sig Hall, an estimator for Bryant Universal, the largest roofing contractor in the United States, metal roofs are being put on homes in a number that is increasing faster than any other material.

Metal roofs have been around for a long time. First fashioned on site by hand and later manufactured in sheets installed in long sections, metal roofing is available in patterns other than standing seams or sine-wave corrugations. Some manufacturers make panels that are supposed to simulate clay tiles (center left photo, p. 48).

A variety of metals is used for roofing—everything from copper to stainless steel to aluminum to alloys and coatings and compounds of each. Painted finishes are available in a range of colors as wide as what is offered on today's cars. Most manufacturers will blend custom colors if you're really picky and can't find something in their stock palette. Because of its thinness, metal roofing is the lightest of all roofing material. There are coated aluminum shingles that weigh only 50 lbs. per square (bottom photo, p. 48). Because metal roofs are so light, the metal-roofing industry touts metal as an excellent choice for reroofing. Depending on the application—some materials might require the addition of furring strips or standoffs—a metal roof can go over an existing asphalt or wood roof.

The metal-roofing folks also harp on their product's ecological benefits. Because no tearoff is required, no shingles, asphalt or wood, go into landfills. Another benefit to the environment is that metal roofing is the only completely recyclable product. When a metal roof does wear out, and most metal roof are expected to last 50 years, it can be recycled into new roofing. And there's a good chance that the metal roof you put on your house used to be a beer can.

Some manufacturers make metal shingles, but most metal roofing comes in panels that go on quickly. Because of the long eaves-to-ridge panels that are available—some manufacturers have shipped panels 80-ft. long—a lot of square footage gets covered at a time. Depending on the complexity of a roof's geometry and the complexity of the profile of the metal roofing being used, an experienced installer can lay down between 3 and 30 squares in a day.

The cost of a metal roof depends on the kind of metal used, the thickness of the material and the finish. According to Rob Haddock, the director of the Metal Roof Advisory Group, the least-expensive metal roof—galvanized tin sheets—can be purchased and installed for as little as $60 per square, while handcrafted copper on a complex roof could cost as much as $1,500 per square. In an article in *Contractors Roofing and Building Insulation Guide,* Haddock wrote that "metal roofing is the lowest cost, highest cost and everything-in-between roofing material."

Standing-seam roofs are the most popular profile (photo, p. 49); they have a vertical seam that stands proud of a flat panel. Panels are joined together at the edge seams either by a crimping of the seams or by a cap that covers them. A standing-seam panel can be formed either at the factory or on site by a portable roll-forming machine that bends a coil of metal.

If you live in snow country, keep in mind that metal roofs, especially eaves-to-ridge panels, shed snow quickly, kind of like sledding in reverse. Snow cover on a metal roof will have a tendency to let go: That is, it will slide off the roof all at once, like a miniature avalanche. It might be a good idea to keep your foundation plantings 3 ft. or 4 ft. away from the house if you don't want to lose that prize pyracantha to snow damage. Slick metal roofs also shed rain faster than some other, more textured roofing materials. Because of this, gutters need to be sized accordingly or, if possible, eliminated.

Tile roofing—Most people think of tile roofs as indigenous to Florida and the Southwestern part of the United States and as appropriate only to Spanish-style or Mediterranean-style houses. But tile roofs are popular in Europe. And in Japan, tile's popularity rivals that of asphalt in this country. In Japan there are 500 companies making roofing tiles. In this country there are five.

Tile roofs have a textured look. Flat tiles are available, but the soft undulations of a barrel-tile roof or the crested-wave appearance of a Japanese tile roof are markedly more textural than the appearance of most other roofing materials, which aside from the slight deviation of course lines or seams, are planar in appearance.

Whereas most other roofing materials are classified by the dominant material in their composition—wood, asphalt, metal—roof tiles are referred to as such because of the process of their manufacture. Like interior house tiles, roof tiles are made of a soft, plastic material—either clay, concrete or fiber cement—that is molded or extruded and then hardened into a brittle, inert state either by heat or by chemical reaction.

Because of its inertness, tile won't bum. You'd have the same difficulty getting a roof tile to bum as you would if you tried to ignite a concrete block or a clay flowerpot. All roof tiles have a Class A fire rating. After the 1992 fires in southern California, some of the only houses left standing had tile roofs. No house is immune from fire, but sparks on a tile roof won't cause immolation.

The question of weight always arises when people talk about tile roofs. There are glazed-clay tiles that weigh more than 1,100 lb. per square, but keep this in mind: Three layers of asphalt shingles (an original and two reroofs) can weigh about 900 lb. And all new-house roofs are engineered to carry three asphalt roofs. On the other hand, there are lightweight concrete tiles that weigh as little as 375 lb. per square. If you are considering a tile roof and if you have any questions about your house's ability to withstand the weight, talk to an engineer. He can assuage your doubts or, possibly, suggest some roof reinforcement that might not be as expensive as you think.

Are roof tiles expensive? Well, how much does a new car cost? Both questions need qualification before an accurate answer can be given. According to Stu Matthews, owner of Northern Roof Tile Sales in Ontario, Canada, the price of a roof tile is not an accurate indication of its quality. The quality of barrel tile costing $600 per square is similar to tiles with the same profile that cost $120 per square.

If price does not indicate quality, what does affect the price of tile? Matthews said there are sev-

eral things that affect cost. As in most commodities, a manufacturer's production volume affects the price at which it can offer its goods. A company with automated manufacturing procedures, making 150 million tiles per year, can sell its tiles for a lot less than a manufacturer making 1/10 that number.

What else affects cost? There's a British saying: "You can tell a person's wealth by the size of the tiles on his roof." Contrary to the popular notion that bigger is always better and more expensive, in the case of roof tiles the opposite is true. On a per-square basis, smaller tiles cost more to purchase and to install. The smaller the tile, the more tiles there are per square, and, because tiles are installed one at a time, smaller tiles are labor intensive to put on a roof. The most expensive tile that Matthews sells is handmade, and there are 500 tiles per square. They sell for about $1,000 per square. As a point of comparison, there are terra-cotta roof tiles, available in California where they are made, that have 75 tiles per square and cost about $75 per square.

Because roof tiles are heavy and because there are a limited number of manufacturers in this country, shipping costs to a job site *can* have a huge effect on the cost of a tile roof. For instance, the same $75-per-square tile mentioned above could double in price by the time it reaches a job in Massachusetts.

Clay, concrete or fiber cement?—Unlike interior tiles, which are made, for the most part, of a natural ceramic material such as clay or porcelain, roof tiles can be made of concrete or fiber cement. All materials have distinct advantages.

Clay was the first material used for roof tiles, and, in this country, it is still the most popular (center right photo, p. 48). Terra-cotta tiles are flower-pot color and commonly are used on a roof in their natural color. Terra-cotta can be colored by different methods. Engobe is a process in which a colored wash is put on tiles. When raw tiles are fired in the kiln, they take on the color of the wash. Engobe-fired tiles are limited to muted earth tones. Glazing is another process altogether. After an initial firing, tiles are coated with a glaze and fired again. Bright, primary colors are standard offerings from manufacturers that sell glazed tiles, and a lot of companies make custom colors on request. Also, clay tiles won't fade in the sun like concrete tiles.

A final note on ceramic tiles: Celadon (P. O. Box 309, New Lexington, Ohio 43764-0309; 800-235-7528) is an interlocking ceramic tile that looks like slate (bottom photo), but not in the way that some asphalt shingles are supposed to look like wood. Rather, these ceramic tiles have, to my eye, a genuine slate appearance.

Concrete tiles are less expensive than real clay tiles; some cost as little as. $50 per square. They are available in profiles that simulate clay-roof tiles. Imitations of slate, wood shakes and wood shingles are all available in concrete. Concrete tiles are heavy—around 900 lbs. per square—but Westile (8311 W. Carder Court, Littleton, Colo. 80125; 800433-8453) makes a concrete tile with the paradoxical name FeatherStone that weighs 660 lb. per square.

One is slate, the other is molded clay. The photo at the top is of a real slate roof, and the photo on the bottom is of a Celadon clay-tile roof. Or is it the other way around? Top photo by Terry Smiley; bottom photo courtesy of Certainteed Corporation.

Concrete can be colored, but air pollution fades colored concrete. Matthews recommended using concrete tiles that have the color mixed through the concrete, rather than ones that have a wash of pigment applied to the surface.

Fiber-cement tiles have been around for a long time. Unfortunately, the fiber in fiber-cement tiles used to be asbestos. Manufacturers are vague about what replaced asbestos in fiber-cement tiles, but the new ones contain no asbestos. Fiber-cement roofing tiles are a lot lighter than either concrete or clay tiles. Cembrit (170 Ambassador Drive, Mississauga, Ont. L5T 2H9; 905-564-3110) makes a roof-tile panel that weighs only 350 lb. per square and comes with a 30-year guarantee. Fiber-cement tiles cost between $225 and $275 per square, and they are made to imitate clay tiles, slates, wood shakes and wood shingles.

With the ban on wood roofs in many parts of the country, fiber-cement roof tiles that imitate wood roofs are catching on (instead of catching fire). The Clarke Group (P. O. Box 1094, Sumas, Wash. 98295; 800-347-3373), which touts itself as "the world's largest manufacturer and treater of cedar shakes and shingles," recently has come out with a fiber-cement roofing product that imitates wood shakes and shingles. The name of the product? FireFree.

In areas outside Florida and the Southwest, tiles are beginning to become popular. If a roofer tries to convince you that you don't want a tile roof, ask him how many he's installed. Chances are, his experience is limited. Some tiles are more difficult to install than others, but the hardest roof you'll ever tile will be the first one. Depending on the tile—the installation of some are more labor-intensive than others—an experienced roofer should be able to put on between 2 and 3 squares per day. Tile manufacturers are excellent at disseminating installation literature.

Slate roofing can last hundreds of years—In London, there's a building called Westminster Hall that was finished at the turn of the 10th century. They put a new roof on the place in the 13th century, and a smart contractor chose slate. The same roof is still on the building.

Roof slates should never wear out (photo, facing page). Given that the material is already a couple of million years old, expecting it to last another hundred years or so on your roof isn't really asking a lot. What do fail are the fasteners that hold the slates to the roof and the flashing at junctures such as valleys and around chimneys.

Because of its longevity, slate is the only roofing material that sometimes can be purchased used. Slates carefully are removed from a roof, the cracked or damaged ones are culled out, and the remaining slate can be reinstalled on another building. Can you imagine putting used asphalt or used wood shakes on a roof?

Slate is expensive. A square of slates can cost between $350-$700. Add to that the expense of installation, between $250 and $450 per square, according to Terry Smiley, a slate roofer in Denver, Colorado, and you've got an expensive roof. But divide the per-square price by 100 years, and it doesn't seem so expensive.

A slate roof might not be as heavy as you think. Depending on the slate's thickness-3/16 in. is the industry standard (top photo)—a slate roof can weigh between 650 lb. and 1,000 lb. per square.

Care must be taken when nailing slates on a roof. Sort of the Goldilocks syndrome: not too hard, not too soft. Slates have to be nailed just right. Nailing a slate too tightly will cause it to crack when the slate expands and contracts. And nailing a slate too loosely can cause the slate above to crack. Bill Markcrow at Vermont Structural Slate in Fair Haven, Vermont, favors slate hangers. Hangers have been around for a hundred years, but they had fallen from popularity. Markcrow thinks slate hangers are foolproof. They have a hook on one end and a nail on the other. Using them is easy; you still have to nail the slates around the perimeter of the roof, but, for the rest, you just nail on the hangers and place the slates on the hook. The hangers are made of stainless steel, and you can get them painted black. Markcrow says the hangers are visible hooked under the bottom of the slate, but "from 8m away, they disappear."

It's not likely that you'll be able to go to your local roofing-supply store and take home enough slates to roof your house. Slate will have to be ordered from a quarry that will cut it from the ground and then fabricate the material into roof slates. Expect a month or so between the time you place an order and get delivery. But in the larger time frame of a slate roof's life, what's another month? □

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