

Mad about metal

A look at steep-slope metal shingle and shingle panel products

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Steep-slope metal roofing arguably is one of the fastest-growing segments of the roofing market, especially in the residential arena. Homeowners are looking to metal roof covering products for aesthetics and long-term service life.

As with all roof coverings, metal roof systems used for steep-slope applications must comply with applicable building codes. Many areas in the U.S. have adopted the *International Building Code* (IBC). Following are details regarding the installation, types and properties of metal shingles and shingle panels.

Definition

The 2006 edition of IBC divides metal roofing into two categories—metal roof panels and metal roof shingles. A metal roof panel is an interlocking metal sheet with a minimum installed weather exposure of 3 square feet; a metal roof shingle has weather exposure of less than 3 square feet.

NRCA further divides metal roof shingles into two groups—metal shingles and shingle panels. A metal shingle is formed to represent an individual asphalt shingle, tile, slate

or wood shake/shingle configuration, and a shingle panel is designed to form a block of multiple shingles. Metal shingles and shingle panels also can be formed in various other shapes and a single course or multiple courses. Most of these metal roof shingles are press-formed during the manufacturing process to achieve individual shapes.

Because these products are intended for steep-slope applications, they are considered water-shedding roof systems designed to shed water rapidly over panel surfaces. They are not considered or intended to be watertight. To shed water rapidly, a roof must have a slope of 3-in-12 (14 degrees) or greater. For installations at lower slopes, enhanced underlayments are necessary and climatic conditions must be considered carefully, particularly the amount of expected ice, snow and debris accumulation.

Metal types and finishes

A wide variety of metals and metal alloys are available for fabrication of metal shingles and shingle panels. They can be divided into two main types: those that are naturally

Simulated shingle		
Manufacturer	Product	Product details
Atas International Inc., Allentown, Pa.	Advanta® Shingle	12- by 36-inch embossed dimensional shingle; available with Kynar 500® and Hylar 5000® finishes
Berridge Manufacturing Co., Houston	Berridge Classic and Victorian shingles	9- by 12-inch metal shingle with classic or Victorian designs
Conklin Metal Industries, Atlanta	Conklin Stamped Diamond Pattern Metal Shingles	10- by 14-inch metal shingles with a stamped diamond pattern; available in copper, tern-coated stainless steel and galvanized steel
Excalibur Stainless Shingles, Albion, Pa.	Excalibur Stainless Shingles	Stainless-steel shingle panels in three-tab and architectural (laminate) configurations
Millennium Tiles™ LLC, Elkhorn, Wis.	Stainless Steel Tiles and Panels	Individual stainless-steel 9- by 15-inch shingles and half-sized “accent” shingles
Paradigm Shingles Inc., Milton, Vt.	Bennington Shingle and Bermuda Shingle	Copper shingle panel products; Bennington Shingle has vertical embossments 12 inches on center and Bermuda Shingle has no embossments
Zappone™ Manufacturing Co., Spokane, Wash.	Zappone Copper Shingle	15- by 9½-inch copper shingle unit with a concealed nailing flange

Examples of some available simulated shingles

weathering, meaning their metallic surfaces possess or develop a layer of protection upon exposure to the elements, and those that require a factory-applied protective layer.

The most prevalent types of naturally weathering metals used for metal shingles or shingle panels are aluminum, copper, stainless steel and zinc.

Metallic-coated carbon steel, such as Galvalume® and galvanized steel, also are used for metal shingles and shingle panels. These materials require a protective layer, such as a coating. Paint systems are the most common type of coating and generally are factory-applied. A majority of manufacturers use factory-applied paint systems that are baked-on fluoropolymers, high-quality coatings known by the registered trade names Kynar 500® and Hylar 5000.®

In addition, metal shingles and shingle panels may be coated with epoxy and ceramic granules or crushed stone chips to protect a roof and achieve aesthetic qualities.

Installation considerations

Metal shingle and shingle panel roof systems must be installed over continuous

or closely spaced wood decks, wood-furring strips or metal or wood purlins using a batten or counterbatten system.

NRCA recommends an underlayment and slip sheet for metal shingle and shingle panel roof systems. An underlayment serves as a secondary barrier against water penetration. NRCA recommends a single layer of underlayment consisting of No. 30 asphalt-saturated, nonperforated felt or synthetic underlayment for roof slopes 4-in-12 (18 degrees) or greater. A double layer of underlayment is recommended for slopes of 3-in-12 to 4-in-12 (14 degrees to 18 degrees).

A slip sheet is a layer of smooth building paper, such as rosin-sized sheathing paper or unsaturated building paper. Its purpose is to protect the underlayment from the constant movement of metal shingles and shingle panels from expansion and contraction. A slip sheet also prevents metal from sticking to the primary underlayment.

In addition, an ice-dam protection membrane at downslope perimeters, transitions, valleys and around penetrations is recommended in cold regions and where required by local building codes.

Metal shingles and shingle panels generally are interlocked and overlapped and may be installed with clips or directly fastened to a substrate/roof deck. There are various methods of securement for metal shingles and metal panel roof systems. The appropriate type of fasteners for the substrate and fastener spacing are important for proper installation. Fasteners must be compatible with the base metal of a metal shingle or shingle panel to prevent galvanic corrosion. For example, only copper or stainless-steel fasteners should be used with copper shingles. Additionally, the service life of a fastener should be equal to or greater than the expected service life of the secured metal.

Wind clips or storm anchors also may be used to secure or fasten the butt or downslope edge of individual metal shingles or shingle panels in high-wind regions. Wind clips are made of steel or copper wire and sometimes are fabricated with an elongated shaft and disc base.

As with most steep-slope roof systems, metal shingle and shingle panel roof systems use sheet metal for perimeter flashings, valleys and associated flashings. Hip and ridge pieces generally are

Simulated wood shake/shingle		
Manufacturer	Product	Product details
Berridge Manufacturing Co., Houston	Rustic Shake shingle panel	1-inch butt shake texture
Gerard Roofing Technologies, Brea, Calif.	Gerard Shake Panel and Canyon Shake Panel	Steel shingle panel with the appearance of rough hewn wood shake; coated with Zinalume® and ceramic-fired stones
Metro Roof Products, Oceanside, Calif.	Shake II	16¼- by 52-inch steel shingle panel that looks like cedar wood shingles

A few examples of simulated shakes and shingles

fabricated from the same material used for metal shingles and shingle panels. Manufacturers' specific requirements for sheet-metal flashing details vary depending on configuration and application requirements.

Characteristics

Fire, hail and wind resistance are building code-mandated requirements that must be considered when selecting a roof covering. Weight, maintenance and sustainability also are important considerations.

All metal shingles and shingle panels, regardless of metal type, are exempt from fire-resistance testing and by default receive an Underwriters Laboratories (UL) Inc. Class B fire-resistance

rating. Ferrous and copper shingles and sheets receive a UL Class A rating without testing; other metal types need to be tested to receive a UL Class A fire-resistance rating. These fire-resistance ratings assume metal shingles and shingle panel roof coverings meet the minimum thickness requirements provided in IBC.

In areas where wildfires are a concern, building departments prohibit the use of wood roof coverings. Building owners who want the aesthetics of wood shakes or wood shingles can install metal shingle panels with those profiles. However, building owners should be aware the exterior fire classification might be lower in some re-cover situations.

Some metal shingle or shingle panel manufacturers have tested their products for hail resistance in accordance with UL 2218, "Standard for Impact Resistance of Prepared Roof Coverings." For this test, steel balls of varying sizes are dropped to simulate hailstones falling at peak velocity. Roofing materials then are classified as "Class 1" through "Class 4" with Class 4 representing the highest impact-resistant materials. The diameter of the steel ball increases with each classification level increase. An example of a Class 4 hail rating is Vail Titan Select by Custom-Bilt Metals, Chino, Calif.

For a roofing material to "pass" each classification level in UL 2218 means it has no visual evidence of tearing, fracturing, cracking, splitting, rupturing, crazing or other evidence of opening. Typically, metal will not crack on impact but will dent or deform. Although a Class 4 impact-resistant metal shingle or shingle panel roof covering may be able to shed water, it may be aesthetically unpleasing after impact.

Keep in mind softer metals like aluminum, copper and zinc are more susceptible to dents from large hail than equally thick steel-based metal roof products. Increasing impact resistance typically correlates to increased base metal thickness.

An additional impact test, FM 4473, "Test Protocol for Impact Resistance Testing of Rigid Roofing Materials by Impacting with Freezer Ice Balls," exists for steep-slope products. However, this test only is for rigid materials, such as slate and clay tile, and metal effectively is omitted from the scope.

To provide wind-resistant ratings for metal shingle and shingle panel roof systems, a majority of metal shingle products have been tested per UL 1897, "Standard for Uplift Tests on Roof Covering Systems" or UL 997, "Standard for Wind Resistance of Prepared Roof Coverings." Several manufacturers offer transferable wind warranties. For example, DECRA Roofing Systems, Corona, Calif., tested its stone-coated steel

Simulated slate		
Manufacturer	Product	Product details
Dura-Loc Roofing Systems, Courtland, Ontario, Canada	Shadowline	Historical appearance of Victorian slate
Future Roof Systems, Delta, British Columbia	Future Slate	Manufactured to match the random contours of natural slate
Interlock® Roofing Ltd., Delta, British Columbia	Interlock Slate	Has the appearance of traditional slate; overlapping and fastened panels
TAMKO® Building Products Inc., Joplin, Mo.	Metalworks Stonecrest Slate Steel Shingles	Steel shingle replicates the random finish of natural slate; coating system has Kynar 500® and Hylar 5000®

These are some metal products that resemble slate.

shingle panel products for uplift resistance. Its Shingle, Shingle Plus, Shake and Tile shingle panels are marketed with a 120-mph wind warranty. Courtland, Ontario, Canada-based Dura-Loc Roofing System's Signature Series also has a 120-mph wind warranty. The Signature Series includes shake, tile and slate profiles.

An advantage of metal is its light weight. Generally, slate, concrete tiles and clay tiles can weigh 500 pounds per square to 1,900 pounds per square (100 square feet), and asphalt shingles can weigh about 200 pounds per square to 480 pounds per square. Metal roof systems commonly weigh 100 pounds per square to 200 pounds per square. A building owner with an existing structure that cannot support a heavy roof covering still can get the aesthetics of a clay/concrete tile or slate roof with a metal shingle or shingle panel system. Also, many metal roof systems are light enough to be installed over existing roof systems.

The amount of required maintenance for metal shingle and shingle panel roof systems is comparable to most other steep-slope roof systems. However, in areas where algae growth is a problem, metal roof coverings with smooth finishes may be viable alternatives to asphalt shingles and wood shakes/shingles.

For building owners who want to use green building products, many metal roof coverings contain post-industry recycled content and are 100 percent recyclable. In addition, there are metal systems that can be installed directly over existing roof systems, eliminating (or at least deferring) the removal and disposal of construction materials in landfills.

Metal shingles and shingle panels can be finished with reflective coatings, which will reduce temperatures in roof assemblies and attics. In high solar load climates, such as in Phoenix or Miami, this can mean potential savings in cooling costs.

Metal shingle and shingle panel manufacturers now are providing products with reflectivity and emissivity ratings

Simulated tile		
Manufacturer	Product	Product details
Berridge Manufacturing Co., Houston	Spanish Tile	Prefinished; can be installed on either a continuous roof deck or open framing
DECRA Roofing Products, Corona, Calif.	DECRA Tile	Stone-coated steel simulated tile; panel is 14½ inches by 52 inches
Metro Roof Products, Oceanside, Calif.	Metro Tile-II and Metro Tile-Roman shingle panels	Galvalume® steel coated with a stone granule coating

Some examples of simulated tile

Other		
Manufacturer	Product	Product details
Atas International Inc., Allentown, Pa.	CastleTop	15¼- by 15¼-inch diamond-shaped metal shingle; available in zinc, aluminum or copper
Hans Liebscher Custom Copper Works and Sheet Metal Inc., San Marcos, Calif.	Copper Roof Shingle	Available in brass or polished copper; feather-shaped shingle that gives fish-scale appearance; suitable for a cone-shaped or curved roof
Modi Systems Inc., Hackensack, N.J.	Prestige Traditional	Traditional copper shingle has a rounded profile and a fish-scale appearance when installed
RHEINZINK® America Inc., Cambridge, Mass.	Interlocking Diamond Tile	Diamond-shaped zinc shingle

Other metal products available for steep-slope roof systems


that meet the U.S. Environmental Protection Agency and U.S. Department of Energy's ENERGY STAR® program requirements.

What's available

The accompanying charts provide a sampling of metal shingle and shingle panel products divided into five categories. NRCA gathered information from the NRCA 2005-06 Steep-slope Roofing Materials Guide, Metal Roofing Alliance and manufacturers' Web sites.

Please note inclusion or omission of a manufacturer's products or recommendations in this article does not imply endorsement by NRCA. In addition, NRCA

does not possess or maintain any information about these products' performance records. The purpose of this article is to present available product types (with appropriate examples).

When researching this article, we discovered there is an abundance of manufacturers who offer a wide variety of steep-slope metal roof coverings. Roofing professionals and homeowners are encouraged to research and investigate metal shingle and shingle panel options for their specific roofing projects. 

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