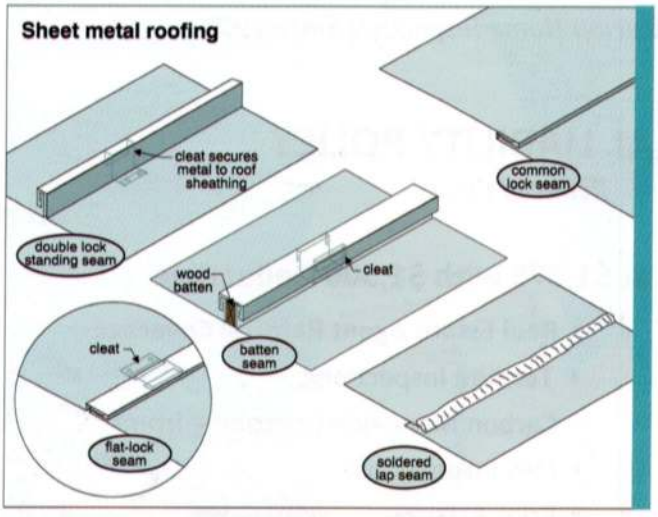

Metal Roofing

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In this article, we'll look at metal roofing, focusing on the following three topics:

- **the advantages and disadvantages of metal roofing**
- **different kinds of metal roofing**
- **what to look for when inspecting metal roofs**

Metal roofing may be made up of either shingles or panels. In this article, we will focus on panels, also known as sheet metal roofing.

ADVANTAGES

Metal roofs are lightweight and strong. Metal roofing lasts longer than many other roofing materials, including most asphalt shingles. Also, metal roofing is not brittle like concrete, clay or slate. Although metal roofing is more expensive than asphalt shingles, most metal roofs are less expensive than premium roofing products like slate or clay tile.

Metal can be used on sloped or flat roofs. (Note: Roofing professionals refer to flat roofs as low-slope roofs; this is because a metal roof should never be absolutely flat.) Metal roofing is noncombustible, which is an advantage over asphalt and wood roofing. The smooth surface of a metal roof sheds snow and ice well, certainly better than asphalt or wood roofs. Depending on the system, there may be many fewer joints in a metal roof than in other materials. Every joint is a potential leak.

DISADVANTAGES

Metal rusts (or corrodes), of course. Some metals rust more quickly than others. Many metal roofs have exposed fasteners (usually screws), and each fastener makes a hole in the roof, which becomes a potential leakage spot.

Metal also expands and contracts with changes in temperature, so allowances must be made for this. Metals like zinc and aluminum have high coefficients of thermal expansion — meaning they move a lot. As metal roofs move, fasteners may loosen and back out over time. Metal roof maintenance often includes retightening fasteners as needed.

SHEET METAL ROOFING

Sheet metal roofs can have many different looks, materials, profiles and installation methods.

Common Roofing Materials

Galvanized Steel and Galvalume

Galvanized steel is a commonly used metal roofing material because it is the least expensive type of metal roof. It is strong and resists denting. The steel is protected from corrosion by a layer of zinc or other material. Galvalume is a brand name of a zinc/aluminum alloy–protected steel. (If you are curious about the makeup of this product, the alloy is 55% aluminum and 45% zinc.)

Galvanized steel roofing can be painted on site, but it is typically prepainted at the factory. With zinc galvanizing, the thickness of the zinc coating varies. The more zinc, the better.

Aluminum

Aluminum stands up well to most environments. It is lightweight, but it is not particularly strong. Most aluminum roofing products are actually an alloy of aluminum. Other metals are mixed with aluminum to improve the strength of the material. Even with the use of alloys, aluminum roofs tend to have a high coefficient of expansion and contraction. Aluminum is more resistant to corrosion than galvanized steel or Galvalume.

Copper

Copper is historically the "Cadillac" of metal roofing. Copper roofs start out looking like the color of a penny, but over time, they may turn dark brown or green. Some copper roofs last more than 100 years, and copper is typically found on high-quality homes and commercial

buildings (government buildings, for example). Copper runoff will stain painted surfaces, and copper is corrosive to most other metals because of its galvanic action. Steel that comes in contact with a copper roof will corrode quickly.

Stainless Steel

Steel combined with other metals can form a high-quality, but very expensive, material. Stainless steel typically contains at least 10% chromium and often contains nickel and other metals. The grade of stainless steel, determined by the makeup of the alloy, affects the resistance to corrosion. Stainless steel does not need to be painted and retains its shiny appearance. This material is more commonly used on commercial buildings than on single-family homes.

Zinc

Zinc is a very expensive and long-lasting metal roofing material. It is relatively soft and tends to creep over time. It expands and contracts significantly with temperature changes, and consideration must be given to this expansion and contraction in the design and installation of zinc roofing. Zinc should be kept away from other metals because it will be the "sacrificial metal" in a galvanic action resulting from contact between dissimilar metals. Zinc roofs may be made of pure zinc or may be made of an alloy. Zinc and zinc alloys are not commonly used roofing materials in single-family homes.

Installation

Traditionally, sheet metal roofing is installed with the joints running vertically down the roof surface. In some cases, the panels run the entire height of the roof. Seams can be standing, flat or battened. Many raised-rib seams are simply overlapped. Butyl tape may be used at the overlap, but if it is used, it is not visible.

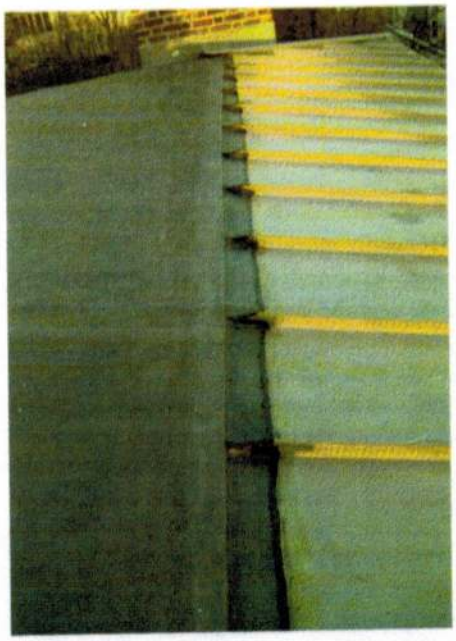
The field of the roof can be flat, ribbed, corrugated or a combination of these. Metal is stronger with more bends. Large flat panels (approaching 20 inches wide) may be subject to buckling caused by changes in temperature. Some people call this "oil canning," and although it may be a visual distraction, it is not a performance issue.

Fasteners

Metal roofs may be secured to the substrate with screws or clips. Nails are not typically used, although there are some systems that allow the use of nails. Where screws are exposed, neoprene washers are used to make the joint weather-tight. With ribbed roofing, screws are placed in the troughs rather than at the caps. There are many systems that have no exposed fasteners. A variety of clips and caps can be used.

Fastener spacing is determined by the manufacturer and depends on a number of variables. It is common to see fasteners spaced every 6 to 10 inches horizontally and every 24 to 32 inches vertically. More fasteners are used at eaves and gables to resist wind uplift.

Standing seam, low-slope metal roof



Sloped, standing seam metal roof connected to flat roof

Valley flashing on metal roof

Copper roof over a bay window

Prepainted metal roof panels

Oil canning on metal roof
Photo courtesy of John Stortz & Son

Be Careful With Your Description

Generally speaking, metal roofing is considered high quality. We suggest that you describe it as "a metal roof," rather than making a guess as to what kind of metal it is. Unless you're absolutely sure, you can get into trouble by inadvertently describing the metal inappropriately. Be aware that there are steel and aluminum roofs that are made to look like copper.

Be Careful When Walking on a Metal Roof

Metal roofs are slippery, especially when wet. Walking on roofs can damage them. Although you are less likely to damage a sheet metal roof by walking on it than you are when walking on a metal shingle roof, you should take care not to step on unsupported sections of metal. It is good practice to step on the fasteners, since they will be placed above a solid surface. Although we did not describe metal shingles in this article, please note that you can easily damage a metal shingle roof by walking on it, unless you know where to step.

CONDITIONS: WHAT TO WATCH FOR

Your inspection focus should be on the following list:

1. *Rust: Check along the edges where the metal has been cut.* Rust often starts there. Rusting shows up first as discoloration or small pinholes. These are sometimes difficult to see, especially from the ground. Rust on metal roofing is caused by exposure to the atmosphere and weather. Rusting may be more severe in areas close to saltwater. Rust may be visible, but it also can be concealed. Rust may first appear at field-cut edges where there is no corrosion-resistant coating.

2. *Fastener failure:* Watch for over-tightened fasteners in which the gasket is squeezed out beyond the fastener. Over-tightening can cause dimples in the roof surface where water may collect. Watch for under-tightened fasteners by trying to rotate the gasket. You should not be able to move it with your fingers. Fasteners also may become loose over time with thermal expansion and contraction of the roof panels.

3. *Missing fasteners:* Watch for inconsistencies in the fastener pattern that may indicate missing fasteners.

4. *Open or failed seams:* Caulking may suggest repairs to failed seams.

5. *Debris in seams:* Watch for hardened dirt forming mud-like deposits along seams. Water gets hung up in these areas, often resulting in leaks.

6. *Roof penetrations and changes in direction, material or both:* As with any roof, these are the vulnerable areas.

7. *Overhangs:* Depending on the manufacturer, overhangs should be roughly 1½ to 2½ inches at the eaves and gables.

A Word About Leaks

Leaks often occur around the fasteners. Check for rust around fasteners and watch for fasteners that are loose or have pulled through the panel. Fastener failures may be caused by poor installation, corrosion of the fasteners (note: corrosion can be accelerated if there is a dissimilar metal contact leading to galvanic action) or wind uplift forces that exceed the design. Watch for caulking or other sealants on the roof surface. This usually suggests poor installation, repair work or both.

Caulking over leaking fasteners
Photo courtesy of Sentry Roofing, Inc.

CONCLUSION

In this article, we introduced the basics about sheet metal roofing. Additional information regarding metal shingles, their conditions and strategies for inspection can be found in the ASHI@HOME Training Program. ■