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ROOFING FOR HISTORIC BUILDINGS

Metals

Metals are useful both as the roof surface itself, and as important components such as flashings, valleys and gutters on roofs of other materials. The malleability of metal allows it to be formed and joined making it useful for weatherproofing the junctures and angles on roofs. These same properties also make it suitable for roofing curved and irregular surfaces and for roofing where the pitch is too low for simple overlapping material to provide waterproofing.



This advertisement from an 1888 publication of house designs, **Homes of Today**, offered stamped shingles in four materials. [click image for larger view]

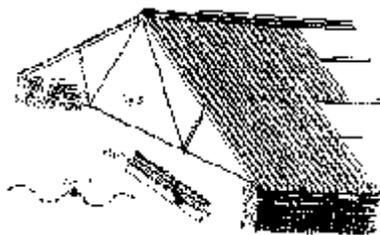
Metals are applied to roofs as shingles and as pre-formed and site-formed sheets. The first metal shingles were small flat rectangles; surviving examples from 1819 at the University of Virginia in Charlottesville were interlocked at the sides with folded edges and simply lapped at top and bottom. Not until the 1870s was mass production applied to metal shingles. Stamping sheets of metal was an innovation that added rigidity to a thin material and facilitated interlocking edges, reducing needed lap and preventing wind lift. Patterns were frequently patented and were produced in iron, tinplate, galvanized steel or copper.

Sheets of iron were first pre-formed by corrugation in England in 1828. American manufacturers were producing corrugated roofing from both plain and galvanized iron by mid-19th century. Corrugation added stiffness, making the material self-supporting over

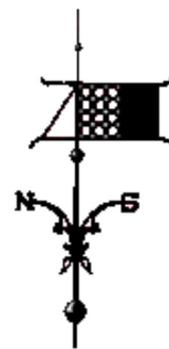


As with other roofing materials, the earliest uses of metals for American roofing employed imported products. Lead, copper and tin plate most often came from Great Britain, while the first zinc came from Belgium. As mines and mills opened in the United States, domestic production replaced imports. In the case of tin, the success of domestic production depended on the advantage of a tariff on imported tinplate imposed by the McKinley Bill of 1890.

Several factors contributed to the popularity of metal roofing throughout much of the 19th and early 20th centuries—it was lighter than slate or tile, it offered more fire protection than wood, and most metals were less expensive than slate or tile.



The corrugated sheets of "Patent Galvanized Iron" produced by Marshall Lefferts & Brother are shown in their 1854 catalog, where it is pointed out that the supporting framing may be one-fourth as heavy as would be required for slate. [click image for larger view]



Aluminum

The small amount of aluminum manufactured before the turn of the century limited its application as a building material. Its early use in 1890 on the roof of Philadelphia's City Hall combined it with copper, and it quickly failed. By the 1920s the material was better understood, and Alcoa was marketing both rolled aluminum sheets and an interlocking shingle for roofing in natural and painted finishes. Difficult to solder, aluminum roofing relied on mechanical joints and pitch to shed water.

Copper

The New York City Hall (1764) was a notable early use of copper for roofing. Though copper roofs were installed on many important buildings in the early 1800s, it was infrequently used until the latter 19th century, when the Lake Superior mines opened in Michigan's Upper Peninsula. Even then copper was more often used for flashings, gutters and downspouts than for roofing. Copper has always been an expensive choice for roofing, but it is easily worked, does not need a coating and weathers attractively. These factors all contribute to copper's use most often and to greatest advantage on the ornamental roofs of major public buildings.

longer spans and eliminating the need for sheathing or closely-spaced framing. Thus, corrugated iron was well suited for inexpensive, quickly assembled buildings, making it a common material for the construction that accompanied the California Gold Rush. Later in the century, manufacturers offered flat sheets with edges pre-formed for standing seams or in a V shape as economical alternatives to onsite fabrication.

Unlike the simple lapped installation used for corrugated or V-edge sheets, most site-formed metal roofing utilizes various folded, interlocking joints to create a weatherproof covering. Metals that can be fused (lead) or soldered (tin, terne, zinc, copper) can have sealed joints, thus removing slope as a factor in the water-shedding performance of the assembly. Solder was usually applied to seal interlocked seams that had been folded flat. Flat seams joined small sheets of metal to cover curved shapes or very low-sloped roofs. They were also used to create long strips of a metal such as tinplate, which was only available as small sheets. When the long strips were laid parallel to the slope of a roof (minimum 2 in 12 slope), the long edges could be joined without solder if the joints were raised above the rest of the roof surface as a rib. Usually the adjacent edges were folded over each other creating a standing seam. Many metals were used for this common roof. Variations on the system formed the seam over battens or used separate cap pieces to join the bent edge flanges. Although requiring slightly more material, a standing seam better accommodates the expansion and contraction of metal than does a flat seam roof.



Copper was put to effective use on the roof of the 1913 Handley Library in Winchester, Virginia. (NPS photo) [click image for larger view]

metals continued. . .



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