

CHOOSING A METAL ROOF

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For years now, metal has been proclaimed throughout the industry as the most versatile roofing material available. Proponents sing the praises of metal: it's strong, long lasting, low-maintenance, recyclable, predictable and reliable. Metal roofing also lends itself well to many design elements currently used in today's architecture. Hips, valleys, slope changes, transitions and dormers are all available to the designer.

However, one should be very cautious when choosing a metal roof system. The designer must specify a panel that can be used in each of the design elements he intends to incorporate into the roof. These elements, coupled with the choice of roof slopes, trim details and how the panel is to be fastened to the substructure must be the controlling factors in choosing the proper roof panel.

Often this choice is based on secondary considerations such as panel rib height, spacing or shape. Sometimes, it is based on what was used on the last project; even though the designs are not similar. Choosing a roof panel based on the wrong criteria often leads to a misapplied roof, that leaks continually and leaves everyone involved with a bad impression of metal roofing.

Metal roofing manufacturers are ready and willing to discuss the application parameters for each of their products. However, it is good to have at least a general idea about the application parameters of some of the most common profiles. Metal roofing can be divided into many different classifications, but for our purposes, we will divide metal roofing into two categories: Through-Fastened and Standing Seam.

Through-Fastened

Through-fastened panels are available in many different widths, usually from two feet to three feet wide. They also come in various rib shapes, heights and

spacings. Typical gauges are 29 and 26, with 26 being the most common. However, they are also fabricated in 24 and 22 gauge. Because they are typically used on metal buildings, the most common paint finish is a silicon polyester, although a Kynar finish is available which is more commonly found on architectural standing seam panels.

Through-fastened panels come in two basic types: structural and non-structural. Structural panels are capable of spanning across purlins or other secondary framing members such as joists or beams. Non-structural panels must be installed over a solid deck.

Most through-fastened roofs, both structural and non-structural, have two advantages: (1) they are relatively inexpensive and (2) they are simple to install. Structural through-fastened panels have the additional advantage of providing diaphragm which is important in the wind bracing of metal buildings. Most through-fastened roofs also have two disadvantages: (1) the through fasteners can leak if they are not fully seated to the panel or if the purlin is missed and (2) through fasteners do not allow the roof to float during thermal movement. This can cause the roof panel to tear around the fasteners, causing leaks and possible roof blow off. For this reason, through-fastened roofs are usually limited to small and medium sized metal buildings. These panels are also used in residential applications. In both instances, the panel runs are limited to shorter lengths where thermal movement is typically not a problem.

Standing Seam

Although certain types of standing seam roofing have been used in Europe for centuries, modern standing seam roof systems (SSRS), invented to overcome the disadvantages of the through-fastened panel, have been around for less than 30 years. These roofs have exposed fasteners only at the eave and at specially designed end laps. The concealed clips installed at the panel seam typically allow the panel to float during thermal movement. These systems are normally manufactured in 24 gauge, though 22 gauge is also often used.

Many people like to classify SSRS as structural or architectural. This does not do justice to the wide variety of SSRS, as there are many architectural SSRS that are structural systems. By the same token, most any structural SSRS can be used in an architectural application. Because of this, SSRS are better classified as water shedding systems and water barrier systems. Within each of these two categories

there are many different seam types. The seam types do not affect the design of water shedding systems as much as it does the water barrier systems.

Water shedding panel systems are architectural SSRS and evolved from the old metal roof systems that have been used for centuries. As the name implies, these systems rely on gravity to shed the water from the roof before it can build up on the metal panels. The steeper the roof slope, the faster the water will run off. However, in certain instances, these roofs may allow water to infiltrate. As such, the following precautions must be taken: (1) They must be installed on a minimum roof pitch of 3 on 12 or greater. Panel manufacturers typically advertise the minimum recommended slope for each of their products. (2) They must be installed over a solid deck as they are not structural panels. (3) The deck must be covered with a moisture barrier or membrane. This is critical as the moisture barrier is the last line of defense if water gets under the metal roof panels. The industry standard has, for years, been #30 felt. This should be considered as the absolute minimum. A better solution, albeit a more expensive one, is to use a peel and stick membrane. These membranes are much more tear resistant and they will self seal to nails and screws. Be sure to check with the membrane manufacturer about ventilation requirements as these membranes can trap moisture in the attic space if it is not well ventilated. (4) Keep it simple as possible. Because these roofs only shed the water, the trim details are usually not as watertight as those used with water barrier systems. While valleys, hips and other architectural effects can certainly be utilized, they offer a much greater chance for water intrusion and should be very carefully designed.

Water barrier roof systems are structural SSRS. As the name implies, these panels can withstand temporary water immersion over the panel seams and end laps. These panels have factory applied mastic in the seams to insure weather integrity. End laps, when needed, are installed using high quality tape and/or bead sealant supplied by the manufacturer. The trim designs used with these systems are much more water resistant as well. These systems offer the following advantages: (1) Because they are structural, these systems require no deck. This is a tremendous savings on the in-place roof cost. (2) Many systems can be installed on roof slopes as low as 1 on 12. This allows greater design flexibility and can also save on the in-place roof cost. (3) Because they are the only thing between the interior of a building and the weather, these are the most tested metal roof systems available. Manufacturers spend a lot of time and money testing these systems for air and water intrusion, dead load, wind uplift and fire.

Water barrier SSRS may be further divided by seam type - trapezoidal and

vertical rib. Trapezoidal systems usually have a rib height of 3". The most common panel width is 24", although some manufacturers offer them in other widths as well. Trapezoidal systems have traditionally been thought of as commercial or industrial standing seam systems. They are used on warehouses, factories and buildings where the roof is not meant to be seen from the ground. Some designers have taken these systems and incorporated them into architectural applications with stunning results. A word of caution is advised here. Trapezoidal rib systems are much harder to seal at hips and valleys than are vertical rib system. The outside closures at the hip must be cut on a compound bevel with a trapezoidal system. At a valley, the panels are harder to seal as they require an inside closure; whereas the vertical rib panels do not. For these reasons, the vertical rib systems are often a better choice for architectural applications.

Vertical rib systems have traditionally been thought of as non-structural. However, there are now many vertical rib systems available that can span purlins or joists. These systems are available in a wide variety of panel widths, ranging from as little as 10" to as much as 18" wide. Rib heights vary from 1" to 3". Many of these panels are available with pencil ribs or striations to reduce oil-canning.

Vertical rib systems are usually easier to install than the trapezoidal panel systems. There are fewer parts to the typical vertical seam system than with trapezoidal seam systems. This translates into a simpler and quicker installation. Because there are no inside closures, valleys are much easier to seal and quicker to install. Hips are easier to seal because the outside closures can be cut quickly and simply from a stock length of zee closure. Because of these factors, vertical rib systems should be the system of choice on high end architectural roofs. If you ask just about any metal roof installer, he will tell you that he prefers the vertical rib system over the trapezoidal system in this application.

Why should we care what the roofer prefers to install? The more complicated a roof is to install, the greater the chance of leaks or other problems. When the wrong roof system is used in a given application, the installation process becomes much more complicated than necessary. For this reason, always give careful consideration to the type of roof system best suited to the application at hand before considering aesthetics. Once the proper roof type is chosen, there are plenty of choices that can be made concerning aesthetics.