

Fastener Selection Guidelines

Profiled metal roof or wall panels rely upon mechanical fasteners to secure the components to a structure. It is very important to select the correct type of fastener for metal construction in order to ensure a strong and weather-tight attachment.

Fasteners are either primary or secondary in nature. Primary fasteners are used to transfer loads on a building. These can be dead, design, imposed and wind loads. They rely on their structural performance. Where they are used externally they must provide a weather-tight seal under all load conditions. They are also required to be coated or colored in some way to match the material they are securing.

These types of fasteners may be either "self-drilling," "self-tapping," or both. Self drilling (SD) screws have a drill point in the tip of the fastener. Self tapping (ST) screws do not have a drill point but they tap their own threads into the attachment material. For example, type A, B or AB screws are self-tapping. The fasteners commonly used for attaching to light gage framing are self-drilling: self tapping screws (SDST). These threaded fasteners have the ability to drill their own hole and form their own internal mating threads. Another type of tapping screw can be "self piercing" which has the ability to pierce metallic material 33 mils or less in thickness and tap their own mating threads when driven. Self-piercing tapping screws have a sharp point angle not more than 30-degrees.

Secondary fasteners must maintain a secure attachment. They can be used to provide lateral resistance such as part of a diaphragm. They are typically used for stitching of side-wall laps or securing flashing or other components to sheeting. These types of fasteners are often used with sealants or washers to draw the joint tight. Secondary fasteners must also be coated or colored to match the surrounding material. Examples of these types of fasteners may be self drilling or self tapping screws, or rivet type products.

Durability

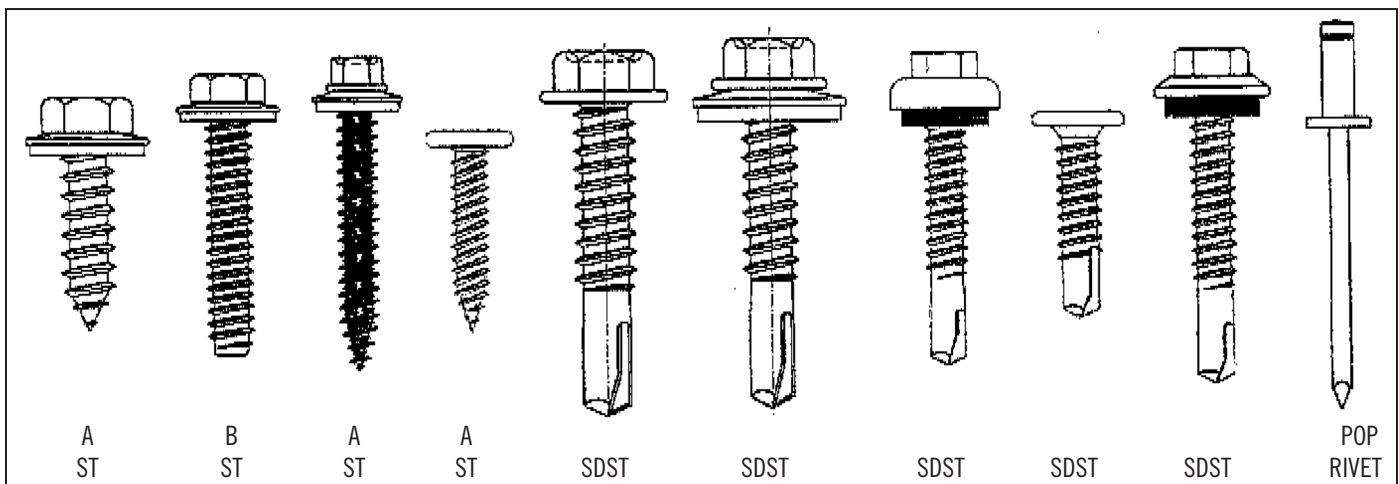
Any type of fastener must be designed to be as durable as the metal wall or roof cladding system itself. Fasteners are available in a variety of substrates and materials with different levels of corrosion resistance and/or durability when exposed to the harsh conditions of weather for years. The metal roof or wall panel manufacturers can provide specific recommendations for selecting fasteners for their systems.

Compatibility

A potential risk to the integrity and aesthetics of a building exists when the wrong type of fastener is used with a metal roof or wall cladding system. Under certain conditions premature corrosion of the metal panel and/or the fastener may occur. This is often a result of dissimilar corrosion between the different materials that are in contact with each other. When selecting fasteners, the relative surface areas of the contact points need to be considered, as well as the moisture content of the environment.

To prevent dissimilar corrosion at the connection point, fasteners should be made of the same material as the roof or wall systems whenever possible. At the very least, the fastener should display equivalent corrosion resistance to the material being fastened into. As an example, the use of galvanized steel fasteners with aluminum metal wall cladding systems is not recommended.

To assist designers and installers with the selection of proper fastener types, the following table was developed by the Metal Construction Association to serve as a guideline for compatibility with different types of materials.



TECHNICAL BULLETIN

Compatibility of Fasteners with Metal Roof and Wall Panels

Recommended Fastener Guide⁽¹⁾

Metal Roof or Wall Cladding Material	Fastener Material								
	Zinc Plated Steel Screws ²	Organic Coated Steel Screws ²	Hot-Dip Galvanized Steel Nails ³ and Screws	Zinc-Alloy Head Steel Screws	Stainless Capped Head Steel Screws	Aluminum	Copper and Copper Alloys	300 Series Stainless Steel	400 Series Stainless Steel
Unpainted Galvanized Steel	Yes ⁴	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Painted Galvanized Steel	Yes ⁴	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Unpainted Galvalume Steel	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Painted Galvalume Steel	Yes ⁴	Yes	Yes	Yes	Yes	Yes	No	Yes ⁴	Yes ⁴
Aluminum	No	No	No	No	No	Yes	No	Yes	No
Copper & Copper Alloys	No	No	No	No	No	No	Yes	Yes ⁴	Yes ⁴
Stainless Steel	No	No	No	Yes	Yes	No	No	Yes	Yes
Zinc alloy	No	No	No	No	No	No	No	Yes	Yes

Note 1: Cautionary Guideline: This table serves as a guideline for the selection of fasteners used with metal roofing. The performance of compatible fasteners shown in this table matches the expected life of the metal roof or wall cladding materials. However, in highly corrosive environments such as heavy industrial, coastal marine, high airborne pollutants or salt spray, preservative treated lumber or fire-retardant lumber, the compatibility of certain fasteners with metal roofing or wall cladding materials may be affected. In those types of applications, the manufacturers of the fastener and metal panel will have specific and unique recommendations.

In addition, in the event that certain coating barriers are damaged or scratched through to the substrate there is increased potential for premature corrosion. Care should be taken during installation and during routine maintenance of the panels in order to protect the integrity of the coatings used for metal panels.

Note 2: Screws should be plated/coated per ASTM F1941

Note 3: Nails should be galvanized per ASTM A153

Note 4: Not recommended for coastal and heavy industrial environments

Note 5: Commercial availability of threaded aluminum fasteners is very limited due to their lower torsional, tensile, and shear properties.

Special Note: Preservative-Treated Lumber Applications

ACQ, Penta, CA or CBA preservative-treated lumber can be incompatible with certain types of fasteners. In those cases where any type of metal roof or wall cladding materials are being attached to preservative treated lumber, the following fasteners are not compatible: zinc plated screws, zinc-alloy headed screws, stainless capped screws, aluminum, copper and copper alloy. When attaching metal panels to those types

of preservative-treated lumber, a moisture barrier should be used between the lumber and the panel material. Metal panel fasteners that are compatible with preservative-treated lumber are stainless steel fasteners, or hot dip galvanized nails manufactured to ASTM A153 class D or heavier. Other types of fasteners coated with proprietary anti-corrosive technologies are also available for use with preservative-treated lumber. In addition, zinc-plated screws can be used in CCA and MCQ pressure-treated lumber.