



Post Frame Construction and Best Practices

Corrosion – What is it and why care?

NFBA Technical and Research Committee

The NFBA's T&R Committee brings you Post-frame Construction's best practices and technical information in this concise bulletin format.

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INTRODUCTION

Galvanic corrosion or electrolytic corrosion is a very rapid corrosion that can occur when two different metals are in contact with each other in the presence of water. Sometime the appearance looks like rusting and other times like heavy streaking that appears on the wood members directly supporting the metal. What is actually happening is that the metals are corroding, or aging, at a much faster pace than would normally be expected for materials in "normal" exposure.

DISCUSSION

One of the most common "problem metals" for galvanic corrosion is copper. While copper itself is a very long lasting and useful metal material, when in direct contact with other metals such as steel, zinc, or aluminum corrosion happens at a very accelerated rate. In some cases, even with the copper isolated from other metals with plastic shims or other sheet materials like felt paper, the water runoff from the copper material contains enough residue to corrode other nearby metals, such as steel roofing, prematurely.

However, concern over corrosion is not limited to metal-to-metal contact or the runoff from one metal directly onto another metal. Depending on the type of metal used and the finish applied to that metal, simple materials such as the graphite found in pencil markings can have a serious impact on the metal, particularly if the metal is aluminum. It is common to find construction and erection notes jotted down on aluminum roofing and siding as a permanent reminder of this effect many years after the building is complete.

The last major concern to discuss here is when there is contact between fire-retardant or preservative treated lumber and metal roofing or siding. Many of the chemicals used in treating wood have a high concentration of copper and other corrosive elements. In wet situations, wood treatments can become waterborne and deposit on metal siding and roofing. This situation is even worsened because, being porous, wood holds moisture in place against the metal.

While these conditions are a concern for the metal roofing and siding in post frame construction, there are relatively simple steps that can be taken to minimize chemical corrosion.



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1. Make sure that different metals are not in direct contact with each other or that water runoff from one metal is not deposited on another metal.
2. When different metals are used and must be next to each other, separate dissimilar metals with a barrier. Bituminous membranes or a coating of sufficient thickness will work well in this application. The membrane can often be hidden from view between the metals, yet the barrier avoids direct contact of the dissimilar metals.
3. Do not use treated wood blocking to separate metals in applications where water or moisture can wet the wood. The chemicals used in the treatment of the wood may leach out and remain trapped in a wet condition next to the metal which will accelerate corrosion.
4. Take care in the types of fasteners used when connecting metal to either metal or wood. Different metal fasteners, such as a galvanized (zinc coated) fastener, holding on aluminum or stainless steel metal parts can lead to rapid corrosion. The following table from the Post Frame Building Design Manual provides a general overview.

Panel/Trim Surface Material	Fastener Metal					
	Electro-Plated Screws (a)	Hot-Dip Galvanized Nails (b)	Zinc Capped Screws (c)	Aluminum	Copper	Stainless Steel
Zinc (Galvanized)	Yes	Yes	Yes	No	No	No
Aluminum-Zinc Alloy (e.g. Galvalume)	No	Yes	Yes	No	No	No
Aluminum	No	No	No	Yes	No	No
Copper	No	No	No	No	Yes	Yes ^(d)
Stainless Steel	No	No	No	No	No	Yes

- (a) Screws with an electrodeposited coating of zinc applied in accordance with ASTM B633.
- (b) Nails with a zinc coating that meets or exceed ASTM A153 Class D thickness specifications.
- (c) ASTM B633 electroplated screws with a special zinc or zinc-aluminum alloy cap.
- (d) Austenitic stainless steels (302/304, 303, 305) may increase the corrosion of copper whereas martensitic stainless steel (410) fasteners will not.



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DISCUSSION

While no one can predict all of the different types of exposure a building will experience over a lifetime, there are certain precautions that can be taken during construction to avoid premature corrosion. The steps included in this overview should provide a minimum level of safety against corrosion in post frame construction.

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