

The International Residential Code (R319.3) and the International Building Code (2304.9.5) have similar requirements for fasteners used with treated wood. The IRC states, "Fasteners for pressure-preservative and fire-retardant-treated wood shall be of hot-dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper. The coating weights for zinc-coated fasteners shall be in accordance with ASTM A153. Exceptions: 1. One-half inch (12.7mm) diameter or greater steel bolts. 2. Fasteners other than nails and timber rivets shall be permitted to be of mechanically deposited zinc-coated steel with coating weights in accordance with ASTM B695, Class 55, minimum."

The codes do not discriminate between types of preservatives and do not take into account exposure conditions, nor do they contain provisions for other hardware such as connectors or flashing. Therefore, clarification is helpful to assist the specifier.

The potential for corrosion of hardware in contact with treated wood occurs when metals in the preservative (such as copper) are different from the metals in the hardware (the iron in steel, or aluminum). In a wet environment these dissimilar metals create a small electrical current that triggers a chemical reaction resulting in galvanic corrosion.

To select proper hardware, the specifier should first consider the end-use application and exposure conditions. In damp or wet exposure, hardware in contact with pressure-treated wood must be corrosion resistant. Hardware includes fasteners (e.g. nails, screws, and bolts) and all connectors (e.g. joist hangers, straps, hinges, post anchors, and truss plates).

Regardless of exposure condition, fasteners and connectors should be specified in compliance with the hardware manufacturer's recommendations and the building codes for their intended use.

### **COPPER-BASED PRESERVATIVES**

Copper-based formulations may be used in interior or exterior applications and include the traditional Chromated Copper Arsenate (CCA) and advanced products such as Copper Azole (CA) or Copper Quat (ACQ or Micronized Copper). CA and ACQ have shown a slight increase in corrosion rates on mild steel compared to CCA and Micronized Copper.

In damp or wet environments hot-dip galvanized or stainless steel hardware is strongly recommended in contact with copper-based preservative treated wood. Hot-dip galvanized *fasteners* should meet ASTM A153. Hot-dip galvanized *connectors* should meet ASTM A653, Class G185 sheet with 1.85 ounces of zinc coating per square foot minimum.

Type 304 or 316 stainless steel is recommended for maximum corrosion resistance in more severe exterior applications, such as swimming pools or within five miles of salt water. Stainless steel fasteners are generally required for below-grade applications such as Permanent Wood Foundations. Stainless steel is also a recommended option when CA or Copper Quat formulations are specified at retention levels greater than required for Ground Contact.

Standard carbon-steel, aluminum, or electroplated products must not be installed in direct contact with CA or ACQ treated wood. However, aluminum products may be placed in direct contact with Micronized Copper treated wood when used in interior applications, or exterior applications above ground.<sup>1</sup> Electroplated galvanized metal products generally have a thinner layer of protection compared to hot-dip galvanized and are typically not accepted by the building codes for use in exterior applications. Fasteners and connectors used



together must be of the same metallic composition to avoid galvanic corrosion (e.g. use hot-dip nails with hot-dip joist hangers).

When aluminum or electroplated hardware must be used in proximity to CA or ACQ treated wood, spacers or physical barriers can protect products such as flashing or termite shields. Barriers should be non-conductive and remain durable for the intended service life of the application. Suitable barriers may include heavy plastic sheeting, rubber, vinyl, or a high quality, non-permeable

tar bitumen or epoxy.

Hardware coated with proprietary anti-corrosion technologies is also available. Consult individual hardware manufacturers for specifics regarding their performance.

### **NON-COPPER PRESERVATIVES**

Non-copper based preservatives include traditional borates for use in interior applications and new carbon-based formulations marketed for outdoor use. These preservatives are less corrosive than their copper-based counterparts, but exposure conditions must always be a primary consideration.

Borate preserved wood (Inorganic Boron – SBX) is limited to Above Ground interior use in dry or damp applications, continuously protected from weather. According to specifications from preservative suppliers, borates are non-corrosive.<sup>2</sup> The same code approved hardware used for untreated wood may be used for borate treated wood in weather protected applications.

Arch Wood Protection, Inc. advises, "Borate treated wood has been found to be no more corrosive than untreated wood; therefore, code compliant hardware is adequate." Viance says borate treated wood "can be assembled using standard fastener systems typically used in general wood construction." U.S. Borax affirms, "No special fasteners are required." Osmose, Inc. reports, "The corrosion rates are not increased when [borate] treated wood products are used as recommended."

New carbon-based preservatives are formulated for Above Ground exterior use. Like borates, they are no more corrosive to hardware than untreated wood, but end-use and exposure is the key to proper specification. For example, wood decking treated with a carbon-based preservative will still be exposed to all weather cycles including prolonged wetting.

(1) Per independent corrosion testing conducted for Osmose, Inc. (2) Borate treated wood guidance from Arch Wood Protection, Inc. (Sillbor®), Viance (Timbersaver® PT), U.S. Borax, Inc., and Osmose, Inc. (Advance Guard®) per National Evaluation Report, NER 648.

**NOTE:** This advisory provides a summary of recommendations from a variety of sources. The Southern Pine Council (SPC) does not guarantee the performance of products used in conformance with these recommendations, and does not endorse any type of wood preservative, fastener, or connector. The SPC does not attest to the validity of methodologies used to conduct corrosion tests and does not attest to the validity of the test conclusions upon which these recommendations are based.

### **ADHESIVES**

A construction adhesive formulated for treated wood may be used for extra holding power at structural joints and under horizontal decking. These adhesives are not a replacement for nails, screws, or bolts. When selecting any adhesive with treated lumber, be sure the product's label reads "for use with treated lumber." Follow the manufacturer's instructions carefully.