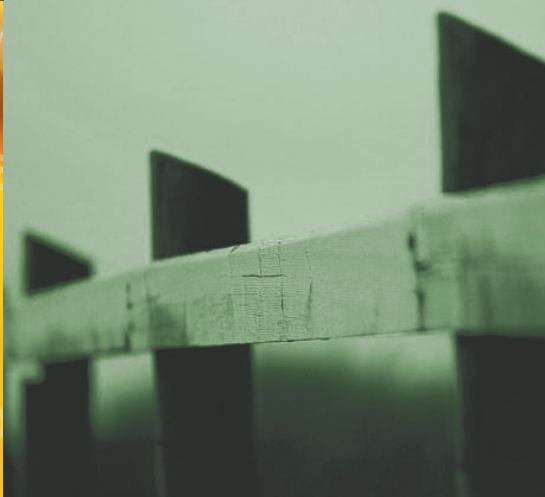
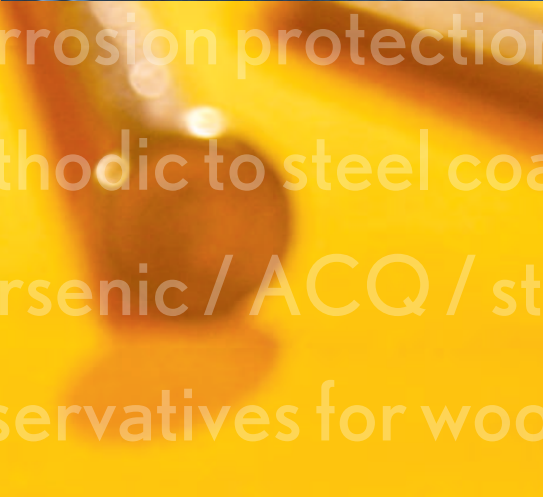
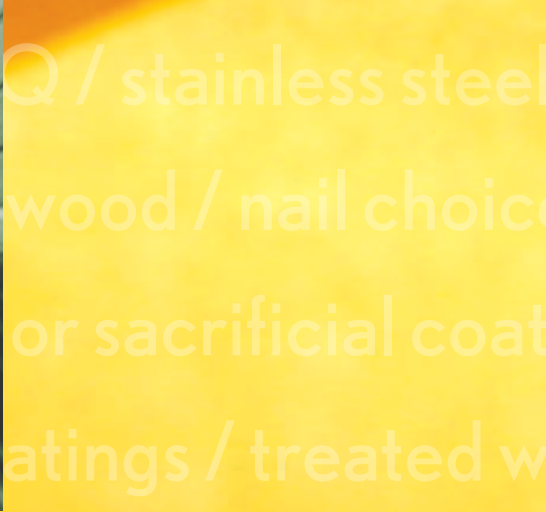




NAIL CHOICES FOR CORROSION PROTECTION



PROTECT YOURSELF AND YOUR FASTENERS

The Problem: CCA Arsenic Treated Lumber

Since the 1940's a number of chemicals were used to protect wood from biological decay by fungi and insects. Chromate Copper Arsenate (CCA) has been the industry standard preservative for wood used in leisure decks, fences, play-sets, picnic tables, patios and other exterior applications for decades.

Arsenic is a poisonous, naturally occurring element. For thousands of years humans have known that arsenic is deadly. Today we know arsenic isn't just poisonous in the short term; it causes cancer in the long term, which is why it has come under increasing scientific scrutiny and restriction.

Effective January 1, 2004, in response to EPA concerns about arsenic, the wood treatment industry will no longer manufacture CCA pressure-treated lumber. ACQ is the primary product slated to replace CCA.

The Fix: ACQ Treated Lumber

Lumber is now treated with ACQ, an environmentally advanced copper quat preservative system that is arsenic-free and chromium-free. ACQ based treated lumber is more corrosive to metal than historically used CCA pressure-treated lumber. When nails are exposed to ACQ, copper in solution is plated onto the surface of the nail and a galvanic reaction occurs which accelerates the corrosion rate of the nail. In addition, the organic compounds in ACQ attract water further increasing the corrosion rate.

What Does This Mean to Fasteners?

The wood treatment industry recognizes the corrosive nature of the preservative chemicals in relation to fastening systems and recommends that only stainless steel or hot-dip galvanized steel be used. In applications where ACQ or non-arsenate based treated wood material are required, stainless steel nails (grade 304 or 316) provide maximum corrosion resistance. In situations where less than maximum corrosion protection is required, hot-dip galvanized nails, produced to ASTM A153 Class D are recommended. In order to reduce the corrosion rate of fasteners in treated lumber, a water repellent applied during treatment or applied after installation can be used.



CORROSION PROTECTION FOR YOUR FASTENERS

Carbon Steel Nails can be divided into three groups based on the corrosion protection method of their coatings.

Anodic to Steel or Sacrificial Coatings

The heavier the coating, the better the protection. The coating provides a barrier between the steel and external elements. If the coating becomes damaged, sacrificial protection starts and any exposed steel will not corrode if a sufficient quantity of zinc is near the damaged area. The zinc will be consumed or sacrificed before the steel is attacked. Hot-Dip Galvanized nails are a prime example of this type of coating.

Cathodic to Steel Coatings

Nickel is a common example of this type of corrosion protection. When undamaged, it provides a barrier to the underlying steel with the excellent corrosion resistance of nickel in many environments. However, if the coating becomes damaged by either mechanical means or by weathering, a corrosive attack on the underlying steel will be assisted by the presence of the nickel. This is the opposite of the sacrificial nature of zinc coatings.

Barrier Coatings

This type of coating covers the underlying steel and serves as a shield between the steel and the environment. Barrier coatings work only when not damaged and in the case of nails, the ductility of barrier coating and adhesion to the steel is a concern, as the coatings are susceptible to chipping and flaking during handling, transportation and driving into wood.



COATING TYPES

Bright

Bright nails do not have a protective coating.

Vinyl Coated

Have a thin coating of vinyl on the surface of the nail. Provides a small amount of corrosion protection, however the primary purpose of the vinyl is to act as a lubricant during installation of the nail.

Phosphate Coated

Have a thin coating of zinc phosphate on the surface of the nail. Provides a small amount of corrosion protection, however the primary purpose of the coating is to provide additional pull out resistance to the nail.

Electro-Galvanized (Cosmetic Enhancement)

Are produced with a bright, shiny, electroplated zinc coating which is usually covered in a microscopic chromate coating. Typically, the coating is extremely thin providing minimal corrosion protection and serves mainly to enhance product cosmetic appearance.

Mechanically Galvanized (Sacrificial Corrosion protection)

Have a smooth appearance and are produced by peening zinc powder onto the surface of the nail by tumbling the nails, mixed with zinc powder and beads, in a drum at room temperature. Adhesion between the zinc and the steel is relatively low and the coating is prone to flaking upon mechanical impact. In addition, the coating is relatively porous and brittle when compared to hot-dip galvanized nails. Mechanically galvanized nails can be used for outdoor applications but there is a high chance of zinc flaking. This coating is not recommended for use with treated wood. ASTM B695 is the reference standard for this coating.

Hot-Dip Galvanized (Sacrificial Corrosion Protection)

A heavy coating is produced by immersing nails in molten zinc, which creates a strong bond between the coating and the steel through a metallurgical reaction. The zinc provides dual protection by serving as both a barrier coating and sacrificial coating. If the coating becomes damaged, the sacrificial nature of the zinc protects the underlying steel. ASTM A153 Class D is the reference standard for hot-dip galvanized nails. The coating requirement is a minimum of 1.0 oz sq ft of ZN coating weight. Hot-dip galvanized nails are recommended for use where high corrosion resistance is required such as outdoor exposure and for use with pressure treated wood (CCA and ACQ). Hot-dip galvanized nails are the only carbon steel fasteners recognized by building codes for treated wood applications.

Organic and Inorganic Non-Metallic Coatings (Barrier Type Corrosion Protection)

These coatings are generally applied by spraying or dipping the nails in solution and then removing the nails which are allowed to cure. The most common of these coatings contain various proportions of metal flakes (usually Zinc and Aluminum) dispersed in a resin. The coatings only protect the nail by isolating steel from contact with corrosive agents, but do not provide sacrificial protection. When the coating is damaged, corrosion will immediately attack the exposed steel. Non-metallic coatings are not recommended for use with treated wood.

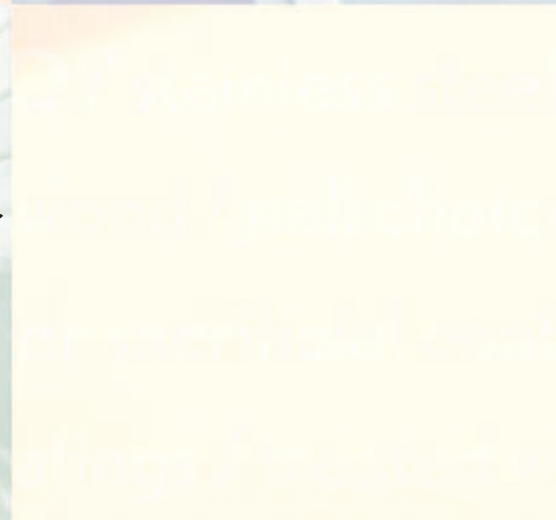
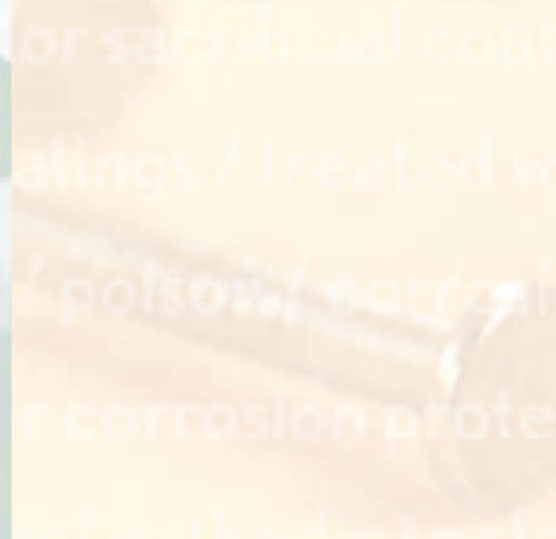
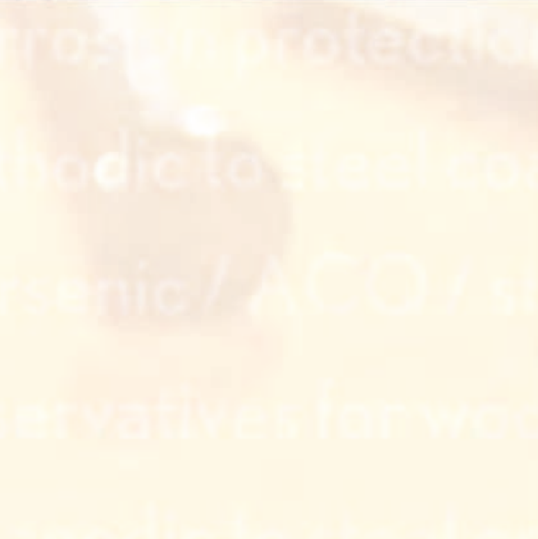
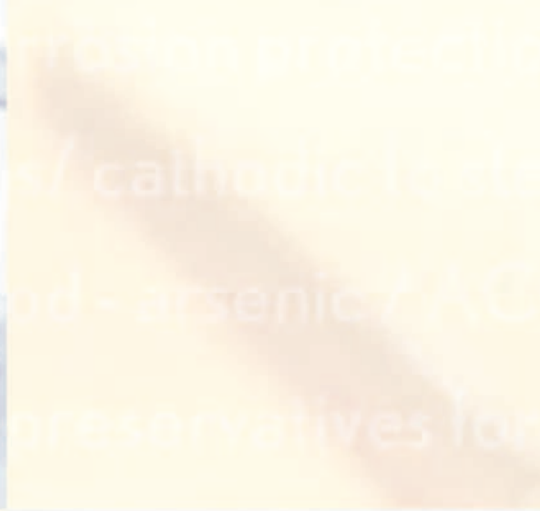
Metallic Coatings Other Than Zinc

Insufficient testing has been done to allow any recommendation of these coatings for use with treated wood.

Stainless Steel

Stainless Steel provides the most effective protection against corrosion. Stainless Steel fasteners must be used with Stainless Steel hangers and connection systems.





www.treeisland.com



www.halsteel.com

TREE ISLAND STEEL
www.treeisland.com

Printed in Canada