www.strongtie.com

Pressure-Treated Wood FAQs

What is pressure treatment?

Pressure treatment is a process that forces chemical preservatives into the wood. Wood is placed inside a closed cylinder, then vacuum and pressure are applied to force the preservatives into the wood. The preservatives help protect the wood from attack by termites, other insects, and fungal decay.

What types of pressure treatments are used?

Waterborne, Creosote, and Oil-borne (penta) are the three broad classes of preservatives typically used when pressure-treating wood.

Wood treated with waterborne preservatives is typically used in residential, commercial and industrial building structures. Creosote is primarily used for treating railroad ties, guardrail posts, and timbers used in marine structures. Oil-borne (penta) is most often used for treating utility poles and cross arms.

Several typical waterborne preservatives used in building applications include: Chromated Copper Arsenate (CCA-C), Alkaline Copper Quat (ACQ-C, ACQ-D, ACQ-D Carbonate), Copper Azole (CBA-A & CA-B) and Sodium Borates (SBX/DOT).

These treatments are often referred to by trade names such as: Wolmanized Natural Select™ (Copper Azole), Preserve and NatureWood® (ACQ), and Advance Guard® (Borate). Each preservative usually has a number of variations available so care should be exercised when specifying treated wood.

Some different oil-borne preservatives that are used are Chlorpyrifos/IBPC, Copper Naphthenate and Pentachlorphenol. One advantage of these treatments is that they do not create swelling in the wood, but there is generally an added cost over water-borne treatments as well as availability in some regions.

What does retention level mean and what retention level should I use?

Retention level refers to the amount of preservative that remains in the wood after the treatment process is complete. It is measured on a weight basis and is typically expressed as pounds of preservative per cubic foot (pcf) of wood.

There are a number of typical retention levels available. Generally, the harsher the condition the wood is exposed to, the higher the retention level must be.

For Above Ground use / exposures the following retentions are typical: (i.e. wood not in contact with soil)

0.25 pcf for ACQ & CCA-C
0.20 pcf for CBA-A
0.10 pcf for CA-B

For Ground Contact use / exposures the following retentions are typical: (i.e. wood in contact with soil)

0.40 pcf for ACQ & CCA-C
0.41 pcf for CBA-A
0.21 pcf for CA-B

For wood with actual retention levels greater than 0.40 pcf for ACQ, 0.41 pcf for CBA-A, or 0.21 pcf for CA-B (Ground Contact), Stainless Steel connectors and fasteners are recommended. Verify actual retention level with the wood treater.

For retention levels at or below ground contact use, consult our Guidelines for Selecting the Proper Connector.

See treated wood industry web sites for other use/exposure categories and retention levels.

What types of wood can be pressure treated and what are the differences in corrosion rates?

Trees / logs from which commercial wood is cut have a number of different layers. The two primary layers are called heartwood and sapwood. Heartwood provides most of the "structural" strength to the living tree while the sapwood transports the sap from the base of the tree up to the leaves.

Wood preservatives penetrate sapwood easier than heartwood. As a result, wood species such as Southern Pine, which have a high percentage of sapwood, are predominately used in pressure treating.

Wood species such as Douglas Fir have more heartwood so modifications are typically required to the preservative to achieve adequate penetration and retention levels. The modification that is usually made is to change the "carrier" used in the preservatives. Often this carrier uses an ammonia base, which improves the penetration but also tends to increase the corrosivity of the preservative. (The carrier used to treat sapwood species usually has an amine base.) This increase in corrosivity may be short term or long term. Hybrid carriers, a mix of amine and ammonia bases, may also be used to treat heartwood species.

Incising (perforating the wood with small slits) may also be utilized to increase the penetration of preservative in heartwood species.

Tell me a little about CCA.

Chromated Copper Arsenate (CCA) has been used successfully for a number of decades for pressure treating wood. Several types of CCA have been used, however, CCA-C (type C) has been the predominant preservative used for wood likely to come in contact with the products Simpson manufactures.

Why was the use of CCA discontinued for residential and general consumer use?

In recent years pressure treated wood received negative publicity mainly focused on the use of arsenic in CCA. The increasing pressure to eliminate the use of CCA resulted in the treated wood products industry voluntarily transitioning from CCA to alternative preservative systems.

CCA is no longer being produced for residential or general consumer use.

What products are still manufactured using CCA?

CCA treated wood products are still produced for use in some industrial, highway, and agricultural applications. These uses will include wood used as poles, piles, guardrail posts, and wood used in saltwater marine exposures.

What products took the place of CCA-C?

A number of alternative preservatives are available. These include ACQ-C (Alkaline Copper Quat Type C), ACQ-D Carbonate (Alkaline Copper Quat Type D, Carbonate formulation), CBA-A and CA-B (Copper Azole Types A and B), as well as SBX/DOT (Sodium Borate) and Zinc Borate preservatives. As mentioned earlier, each preservative usually has a number of variations available so care should be exercised when specifying treated wood.

It is expected that the formulations used in these products will continue to undergo periodic modifications so once again, care should be exercised when specifying any treated wood.

Are these alternative products more corrosive than CCA-C?

Testing has indicated that Alkaline Copper Quat (ACQ-C, ACQ-D Carbonate), and Copper Azole (CBA-A and CA-B) are more corrosive to steel and some protective coatings applied over steel than Chromated Copper Arsenate (CCA-C). ACQ-C, ACQ-D Carbonate, CBA-A and CA-B have different corrosion rates. Contact the treated wood chemical supplier for more information and see the Preservative Treated Wood Technical Bulletin.

What metals and protective coatings does the Pressure Treated Wood Industry recommend for use with these newer products?

Hot-dip galvanized or stainless steel fasteners, anchors and hardware are recommended by the Pressure Treated Wood Industry for use with treated wood. This has been the position of this industry for years and their position has not changed with the transition to the alternative copper-based products. In the past this industry did not address the required levels of galvanizing, however most of those in the industry now provide information regarding the minimum level of galvanizing that should be used.

The thicker the galvanized coating the longer the expected service life of the fastener, connector, anchor, or other hardware will be.

Electroplated / electro galvanized and mechanically galvanized coatings should not be considered to be hot-dip galvanized. (Class 55, or higher, mechanical galvanizing provides galvanizing equivalent to the hot-dip galvanizing used on connectors and fasteners. Ref. ASTM B695 for additional information.)

It is also worth noting that the galvanized coating thickness varies depending on the galvanizing process used. Remember, the thicker the galvanized coating, the longer the expected service life of the steel will be.

Refer to the different chemical manufacturers and/or treaters as well for their recommendations. A list of trade names is included at the bottom of this page.

Are all stainless steels acceptable for use with pressure-treated wood?

All stainless steels may not be acceptable for use with pressure treated wood. Testing has shown that Types 304 and 316 stainless steels perform very well with CCA-C, ACQ-C, ACQ-D Carbonate, CBA-A, and CA-B treated woods.

What is hot-dip galvanizing?

Hot-dip galvanizing is a process of providing a protective coating (zinc) over bare steel. The bare steel is cleaned, pickled, fluxed, then dipped in a molten bath of zinc and allowed to cool prior to inspection and shipping. Additional information is available at www.galvinfo.com. Some anchors and fasteners can be hot-dip galvanized. Steel connectors can be hot-dip galvanized (See below: “What is the difference between

Simpson's Hot-Dip Galvanized (HDG) products and products that are hot-dip galvanized after fabrication?" for additional information.)

What is Mechanical Galvanizing?

Mechanical galvanizing is a process of providing a protective coating (zinc) over bare steel. The bare steel is cleaned and loaded into a tumbler containing non-metallic impact beads and zinc powder. As the tumbler is spun, the zinc powder mechanically adheres to the parts. The zinc coating has "good" durability, but has less abrasion resistance than hot-dip galvanized zinc coatings since it does not metalurgically bond with the steel. Some anchors and fasteners can be mechanically galvanized.

What is ZMAX?

ZMAX is a heavier / thicker coating than the standard hot-dip galvanized coating (galvanized per ASTM A653 with a class G185 coating). This thicker coating is available on select Simpson Strong-Tie connectors. Due to this increased galvanized thickness these connectors would be expected to have a longer service life than standard galvanized connectors. See Simpson Coatings Available for additional information.

What is the difference between Simpson's Hot-Dip Galvanized (HDG) products and products that are hot-dip galvanized after fabrication?

There are two processes used to hot-dip galvanize parts: (1) "continuous" hot-dip galvanizing ("Continuous HDG") and (2) "batch" or "post" hot-dip galvanizing ("Batch/Post HDG").

Continuous HDG is generally used to galvanize steel coils at various speeds (up to 600 feet per minute) on lighter gauge steels (galvanized per ASTM A653). Simpson uses this type of steel to fabricate most lighter gauge products.

Batch/Post HDG is generally used to galvanize heavier individual parts not capable of being fabricated from galvanized steel coils (galvanized per ASTM A123 for connectors and ASTM A153 for fasteners). After being fabricated, the parts are dipped into molten zinc for a longer period of time than Continuous HDG, usually resulting in a thicker coating and more protection against corrosion. Batch/Post HDG can be used on Simpson connectors, such as CC and CB column caps and bases and heavier gauge hangers(14 gauge and thicker).

What products does Simpson have available in stainless steel, ZMAX , and hot-dip galvanized after fabrication (Batch/Post HDG)?

Simpson has a broad selection of these products. Call factory for availability at 1-800-999-5099, view our updated list of corrosion-resistant products online, or download our flier F-3FINISHES.

What Simpson products should I use with the new alternative pressure-treated woods?

Stainless Steel is always the most effective solution to corrosion risk. However, it is also more expensive and sometimes more difficult to obtain. To best serve our customers, Simpson is evaluating the options to identify the safest and most cost-effective solutions. Based on our testing and experience there are some specific applications that are appropriate for ZMAX/HDG or G90 connectors (see Guidelines for Selecting the Proper Connector to select appropriate connector for your situation.) Click here for recommendations for Quik Drive fasteners.

See the Preservative Treated Wood Technical Bulletin.

What is a fastener?

When the term "fastener" is used it is typically referring to a nail, screw, bolt, or anchor.

What is a connector?

When the term “connector” is used it is typically referring to a manufactured device that is used to connect two or more wood members together, or to attach a wood member to concrete or concrete masonry. Fasteners are used in conjunction with the connector to effectively join the members.

Joist hangers, post bases, hurricane ties, and mudsill anchors are all examples of a connector.

Can I use galvanized fasteners with stainless steel connectors?

No. You should not use galvanized fasteners with stainless steel connectors. Stainless steel fasteners should be used with stainless steel connectors. Galvanizing (zinc) and stainless steel are considered to be dissimilar metals which can cause the zinc to corrode when placed in contact with the stainless steel. This would result in the galvanized fasteners losing their protective coating faster than expected.

Hot-dip galvanized and stainless steel components should not be placed in contact with each other.

What fasteners should I use with pressure-treated wood?

The Treated Wood Industry recommends the use of hot-dip galvanized or stainless steel fasteners for use with treated wood. (See above: "What metals and protective coatings does the Pressure Treated Wood Industry recommend for use with the "new generation / alternative" products?" for additional information.) You should not mix the use of hot-dip and stainless steel fasteners and connectors. Click here for recommendations for Quik Drive fasteners.

Hot-Dip Galvanized (HDG) fasteners must be used with ZMAX and HDG connectors. If hot-dip galvanized lag screws are used in connectors instead of the required galvanized Simpson Strong-Drive screws, contact Simpson for applicable load reductions.

Refer to the different chemical manufacturers and/or treaters as well for their recommendations. A list of trade names is included at the bottom of this page.

How long will my fasteners, connectors, and anchors last when used in pressure-treated wood?

Many environmental and other factors affect the service life of fasteners, connectors, and anchors. The test standards do not enable the test results to be translated into expected service life information. It is impossible to accurately predict the service life of any specific installation.

At the time of installation my pressure-treated wood was installed dry (moisture content less than 19%) and it was installed in a condition where it will remain dry throughout its service life. What connector coating finish or material should I use?

Simpson's standard G90 galvanized connectors may be used with the following wood treatments: ACQ-C, ACQ-D (Carbonate), CBA-A, CA-B, SBX/DOT, and Zinc Borate if the wood was installed dry and will remain dry throughout its service life. If the chemical retention level in the treated wood exceeds the Ground Contact level then Stainless Steel connectors are recommended. (Ground Contact level is: 0.40 pcf for ACQ, 0.41 pcf for CBA-A, and .21 pcf for CA-B). Verify the actual retention level with the wood treater. SBX/DOT and Zinc Borate treated woods are less corrosive than CCA-C treated wood -- as a result the retention level of these woods is not of much concern and standard G90 galvanized connectors can be used.

I have pressure-treated mudsills. Should I be using stainless steel anchor bolts? What about hot-dip

galvanized?

The mudsill is a location that is considered dry in comparison to a deck, for example. For wood that is installed and remains dry, the corrosion potential will be comparatively low. Regarding code issues, section R319.3 of the 2003 International Residential Code (IRC) addresses fasteners for pressure-, preservative-, and fire-retardant-treated wood; Bolts of ½" and greater do not need to be hot-dip galvanized steel, stainless steel, silicon bronze or copper.

What are these white deposits on my connectors and are they bad?

The white powdery substance which can form on the surface of a connector is commonly referred to as "white rust" or wet storage stain. This presence of this substance on the connector can vary from unsightly to problematic. Simpson connectors are coated with zinc to help protect against base metal corrosion (G90 has 0.90 oz/ft2 and G185 has 1.85 oz/ft2). The nature of zinc, as a metal, is that it is relatively reactive, insofar as oxide layers form on the surface, some of them quickly. The formation of these oxide layers is a byproduct of the environment in which the connector is placed. These oxide layers often are seen in the form of white deposits or white rust on the surface of the connector. White rust may be caused by closely packed, newly-galvanized products that are stored in damp or poorly ventilated conditions. If, after steel manufacturing, the steel is coiled while still wet, a zinc hydroxide layer will form that may prevent other protective oxide films from forming on the surface. The time of the year can also have an impact on "white rust" appearance. It is also possible that the surface irregularities associated with the thicker G185 coating might hold more moisture to the surface of the steel and show more white rust. The extent of film coverage is a factor of the exposure to moisture, the temperature during storage and the presence of accelerating corrodents. White rust can exist without contact with pressure treated wood, but the problem may be exacerbated by the chemicals in the wood.

It is possible that other white substances can develop on the surface of connectors. Some environments such as those with high chloride/salt content can form white deposits. Appearance aside, it is unlikely white rust has any negative impact on the protection that zinc provides.

For more information on this topic, refer the links below:
www.galvanizeit.org
www.galvinfo.com/index-3.html

What about applying a barrier or epoxy around the anchor bolts to prevent corrosion?

This is an application that Simpson cannot comment on, as it is unclear whether or not this is suitable.

What should I do if I have existing fasteners and connectors installed in contact with preservative treated wood that is not CCA-C?

If possible, you should verify the specific type of preservative treated wood you have - including the chemicals used, retention level and the wood species. Much of this information is often on a tag stapled to the end of the boards, or may be ink stamped on the boards.

You should also perform periodic inspection of your connectors, fasteners, and anchors to ensure their strength is not being adversely affected by corrosion. It may be necessary to have a local professional perform the inspections.

The treated wood industry has recommended the use of stainless steel and hot-dip galvanized (HDG) fasteners and connectors for years. Their recommendation is still the same for use with the "alternative" treatments that are replacing CCA-C. (See above: "What is the difference between Simpson's Hot-Dip Galvanized (HDG) products and products that are hot-dip galvanized after fabrication?" for an explanation on the different types of hot-dip galvanizing.)

If your fasteners, connectors, or other items in contact with the treated wood do not follow the treated wood industry recommendations and/or Simpson's recommendations then you should seriously consider replacing them. A local professional civil or structural engineer should be used to provide the necessary guidance when replacing these types of structural items.

What experience has Simpson had with the alternative treatments that are replacing CCA-C?

Simpson first became aware of some CCA-C alternatives being used when we received reports of increased connector and fastener corrosion when installed with some treated woods. These reports led us to explore the phenomena and expand our corrosion warning in our catalog to include specific language related to treated wood.

As time progressed and the public concern over the safety of CCA-C intensified, the treated wood industry decided to voluntarily phase out CCA-C.

Simpson has tested more than 1,800 samples of various combinations of steels, coatings, preservative treatments, wood species, and over 3,000 fasteners to try to better understand the issues. Using the American Wood-Preservers Association test standard E12-94 for many of these tests, our results indicate there are some significant differences between the corrosion rates of CCA-C and some of the “alternative” products. The E12-94 test standard is an accelerated test method. The test results may or may not have a relation to actual service life. It is worth noting that many variables can affect the test results, including the characteristics of the wood as well as a number of chemical additives that can be added to the treatments.

The connector industry's standard hot-dip galvanized specification of G60 has been used successfully with CCA for several decades. This level of galvanization now needs to be increased as a result of the use of newer "alternative" replacements for CCA-C. Generally, the thicker the hot-dip galvanized coating is, the longer the expected service life of the connector or fastener should be. We offer many products in ZMAX, hot-dip galvanized (HDG), mechanically galvanized and stainless steel for use with the treated woods of today. (ZMAX is our branded name for continuous hot-dip galvanized steel with a G185 specification that provides more than three times the zinc of the industry standard G60 galvanized coating.)

The suitability of fasteners and connectors is now not only dependant on the long list of environmental factors that always applied, but to a much greater extent than before, is also dependant on the base treating chemicals, additives, and wood species used. When anticipating the use of steel connectors and fasteners with treated lumber, users should consult our Preservative Treated Wood Technical Bulletin, the treated lumber chemical supplier, and the wood treater for specific recommendations.

Due to the many variables involved, many of which are controlled by the chemical supplier and the wood treater, Simpson cannot make an unqualified recommendation of any galvanized or other coating for use with treated wood. Additionally, because of the many variables involved, Simpson cannot provide estimates on service life of connectors, anchors or fasteners.

How often should I inspect the fasteners and connectors on my deck or other accessible exterior projects?

The rate of corrosion is dependent on many factors including environmental and project specific conditions. Your periodic inspections should be related to the severity of the exposure and other project-specific conditions.

How do I properly specify pressure treated wood?

At a minimum you should specify the wood species, the preservative, retention level and which options, if any, you require. (One option example would be to add a water repellant to the preservative being used.)

You should also talk with the treater to determine what "carrier / base", and what other additives are being used so you can assess the corrosive potential of the treated wood. Formulations with an ammonia carrier may be more corrosive than those with an amine carrier. See above, What types of wood can be pressure treated and what are the differences in corrosion rates? for more information.

Once you know the specific treatment parameters that are being used, then you need to ensure you have specified appropriate fasteners, connectors, and other hardware.

Can I use "barriers" between my Simpson connectors and pressure treated wood to prevent corrosion?

See our technical bulletin on the use of barriers, Barrier Membranes and Preservative Treated Wood.

What testing has Simpson performed?

See the Preservative Treated Wood Technical Bulletin and Barrier Membranes and Preservative Treated Wood Technical Bulletin.

What is the difference between Salt Spray corrosion testing and Treated Wood corrosion testing?

These two types of tests use entirely different test standards and test environments. Salt spray tests are intended to provide relative corrosion information of items exposed to exterior environments and use salt solutions along with elevated temperature to accelerate corrosion rates. Treated wood tests are intended to provide relative corrosion information of items in contact with preservative treated woods and typically use humidity and elevated temperature to accelerate corrosion rates. Neither test can be translated to determine the expected service life of a specific installation.

There is no apparent correlation between Salt Spray and Treated Wood corrosion tests. The fact that one item performs well in one of these two tests does not necessarily mean that it will perform well in the other test.

What information can Simpson Strong-Tie share about claims that some newer treated wood chemical formulations are less corrosive than some currently available products?

Simpson Strong-Tie periodically conducts testing of various preservative treated wood materials which come into contact with our structural connectors and fasteners. With these results, information is conveyed through catalogs, technical bulletins, fliers and training sessions. Simpson will continue to test materials until treated wood and potential corrosion problems are resolved. As always, users should educate themselves by consulting with the chemical manufacturer of the product and other sources about claims made about the viabilty of a particular product.

Starting in January 2007, Simpson Strong-Tie has begun testing Micronized Copper Quatenary (MCQ™ or MicroPro™) and will share those results as they become available.

Links to related sites

American Galvanizers Association
www.galvanizeit.org

American Wood-Preservers' Association
www.awpa.com

Arch Wood Protection, Inc.
www.wolmanizedwood.com

Chemical Specialties, Inc.
www.treatedwood.com

Forest Products Laboratory - U.S. Dept. of Agriculture
www.fpl.fs.fed.us

GalvInfo Center
www.galvinfo.com

J.H. Baxter
www.chemonite.com

Kop Coat-Trib II
http://kop-coat.com/

Osmose, Inc.
www.osmose.com

Southern Pine Council
www.southernpine.com

U.S. Borax Inc.
www.borax.com

Western Wood Preservers Institute
www.wwpinstitute.org

Wood Treatment Products, Inc.
www.eswoodtreatment.com

Note: Links to third party sites are provided as a convenience. Simpson Strong-Tie Co., Inc. does not review or control the linked sites and these links do not constitute any endorsement or assumption of responsibility for the contents of these sites.
