

Treated Glulam in Residential and Light Commercial Construction

January 1, 2008

What Is Pressure Treatment?

Pressure treatment is a process that forces chemical preservatives into wood. Wood products are placed inside a closed cylinder then a combination of vacuum and pressure is applied to force the preservatives deep into the wood fiber. This process protects the wood from attack by termites, other insects, and fungal decay. Most untreated wood will decompose when four conditions required for decay and insect attack occur:

1. high moisture content (above 19%)
2. a favorable temperature (between 32 and 100 degrees F°)
3. oxygen
4. food source (wood fiber)

If any one of these conditions is removed, infestation and decomposition cannot occur. Eliminating wood fiber as a food source by pressure treating wood products is an easy solution. Research shows that wood can be expected to last for many decades when properly treated and installed for its intended use.

Building Code Requirements

Specific code requirements for pressure-treated wood are detailed in your local building code. Generally, building codes require preservative-treated or naturally durable wood for protection in the following applications:

- Wood in contact with the ground or fresh water
- Wood used above ground in contact with concrete or masonry. Example: Sill plates on a concrete slab
- Wood used above ground where specified distances from exposed earth are not met. Example: Floor assembly when wood joists are closer than 18 inches to exposed earth, or wood girders closer than 12 inches
- Wood providing structural support and exposed to the weather. Example: Balcony joists without adequate protection to prevent moisture or water accumulation on the surface or at joints between members
- Wood floor framing in areas where hazard of termite damage is known to be very heavy, unless provided with approved methods of termite protection.
- Wood used below the Design Flood Elevation (DFE)
- When used in locations where drying in service cannot readily occur, codes require that pressure-treated wood have a moisture content of 19 percent or less before covering or enclosure.

Pressure Treatment Categories

Pressure treated wood falls into three broad classes consisting of waterborne, oil-borne and creosote.

Waterborne

Waterborne preservatives as their name implies, utilize water as the carrier for the chemical. Rosboro does **not** recommend waterborne treatments for glulam. Glulams are manufactured from kiln-dried lumber and waterborne treatments would cause the beam to take on a high moisture content resulting in dimensional changes such as warping, twisting, excessive checking, splitting, and raise of grain, resulting in an unacceptable finished appearance.

Several typical waterborne preservatives used in building applications include: Chromated Copper Arsenate (CCA-C), Alkaline Copper Quat (ACQ-C, ACQ-D, ACQ-D Carbonate), Micronized Copper Quat (MCQ), 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), MicroPro™, Smart Sense™ (MCQ), and Advance Guard® (Borate). Each preservative usually has a number of variations available so care should be exercised when specifying treated wood.

Oil-Borne

Copper Naphthenate and Pentachlorophenol are some of the most common oil-borne preservatives that are readily available throughout the US. One advantage of these treatments is that they do not create swelling, checking and splitting in the wood however, there is generally an added cost compared to water-borne treatments.

Permapost Hi-Clear II – and Permethrin

Permapost HI-Clear II provides protection for wood intended to be used for above ground interior and exterior applications. Permapost HI-Clear II is a two-component mineral spirits-based wood preservative system containing Permethrin (insecticide that is effective against the Formosan Termite). HI-Clear II is a clear treatment designed for high value architectural and engineered wood products including Molding, Millwork, Plywood, Laminated Beams, Lumber, and Timbers. Common glulam applications include; decks, porches, trellises and balconies.

Rosboro Hi-Clear II Treated Glulam should be specified with a retention level of .055 combined pfc.

Permapost K-520 – Copper Naphthenate

Permapost K-520 is an oil-soluble copper naphthenate based wood preservative that is low in toxicity and can be employed with a high degree of safety. It provides an ideal fungicide and insecticide for the long-term preservation of wood products in both ground contact and above ground uses. K-520 is effective against the Dampwood termite, Drywood termite and subterranean termites including *Coptotermes Formosanus*. The treated wood is clean, non-corrosive to fasteners, water repellent, with a color range from chocolate-brown to dark green.

Rosboro K-520 Treated Glulam should be specified with a retention level of .060 pfc.

Pentachlorophenol

Pentachlorophenol is most common oil-borne preservative that is often used for treating utility poles, bridge components, cross arms and other industrial products. Pentachlorophenol is seldom specified for residential construction due to its restriction to exterior use only. Penta as it is commonly called protects against decay fungi and insects. There are two types of Pentachlorophenol treatments available:

Type A

Utilizes petroleum distillates and tends to give wood a dark appearance.

Type C

Utilizes light hydrocarbon solvent (mineral spirits), and typically leaves a natural wood appearance.

Creosote

Creosote is a coal tar product containing a multitude of chemical compounds toxic to decay fungi, insects and most wood destroying marine organisms. It has a dark, oily surface appearance which generally cannot be stained or painted and possesses a strong odor. Creosote is primarily used for treating railroad ties, guardrail posts, and timbers used in marine structures.

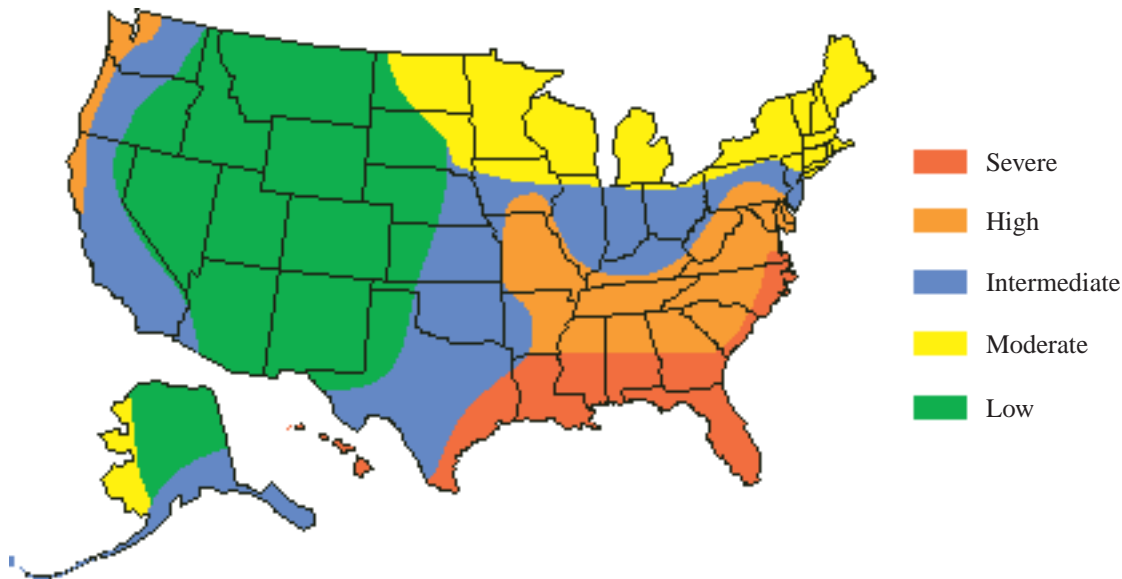
Treatment Comparison Table

Feature	High Clear II	Copper Naphthenate	Waterborne
Color	none	dark green or brown	Light green or grey-brown
Decay Resistance	high with low chemical loading	high with high chemical loading	high
Termite Resistance	resists insect attack and protects against the Formosan termite	resists insect attack	resists insect attack
Odor	slight at time of manufacture	lingering naphtha odor	low
Reaction to Fasteners	none	slight	high
Interior Use	approved	not allowed	approved
Exterior Use	approved	approved	approved
Paint	oil based paint	dark color hard to cover – use stain blocking primer	dark color hard to cover
Stain	oil based stain	dark colored heavy body stains	Dark color heavy body stains
Mammalian Toxicity	very low	low	low
Fresh Water Immersion	not approved	allowed	allowed
Salt Water Immersion	not approved	not approved	only at very high retentions
Ground Contact	not approved	approved	approved

Preservative Penetration and Retention

Penetration is the measure of how deeply the preservative penetrates the cross section of the timber. 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. Generally, the harsher the condition the wood is exposed to, the higher the retention level must be. Retention and penetration requirements vary by species and treatment.

There are major regional differences in the potential for deterioration of wood as shown in the Deterioration Zone map. In some cases multiple retentions are shown in the AWPAs Standard, so users may address variances in potential deterioration in their area. The higher retention levels should be specified when poles are installed in the higher deterioration zones, as shown in the following map.



Deterioration Zones from AWPAs Standards

What Species of Wood Can Be Pressure Treated

Trees / logs 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.

Southern Pine has a high percentage of sapwood and readily accepts treatment.

Douglas Fir has more heartwood so modifications are typically required to achieve adequate penetration and retention levels. Incising (perforating the wood with small slits) may also be utilized to increase the penetration of preservative in heartwood species such as Douglas Fir.

Field Treatment

It is strongly recommended that all fabrication, trimming and boring of glulam be performed prior to pressure treating. All field cuts, holes or beam damage that occurs after treatment must be field treated to protect the exposed wood material. Application of a copper naphthenate solution is specified in accordance with AWPA Standard M4. Copper naphthenate is currently available under the following brand names:

- Behr #90 Dock and Post Preservative
- WM Barr Kleen Strip Coppo-W Exterior Wood Preservative
- Green's CopperGreen
- Jasco Termin-8
- Cuprinol Green #10
- Waterborne versions are available also. Brand names are as indicated below:
- Dap Below Ground Wood Preservative
- Henry Shakeguard (cedar color added)
- Henry Greenguard (standard green tint)
- Fields ATCO Shakelast (cedar color added)
- Fields ATCO Woodlast (standard green tint)

Dap products are available nationwide as are WM Barr Kleen Strip, Cuprinol and Behr products. Green's, Jasco, Henry and Fields are primarily available on the West Coast.

Fasteners and Connectors

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.

DO 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.

Hi-Clear II

Non-corrosive when in contact with mild or stainless steel fasteners.

K-520 Copper Naphthenate

Copper Naphthenate treated wood is clean and non-corrosive to fasteners.

Hardware Used With Waterborne Copper-Based Preservatives

Copper-based formulations may be used in interior or exterior applications and include the traditional Chromated Copper Arsenate (CCA) and new products such as Copper Azole (CA) or Copper Quat (ACQ or Micronized Copper). CA and ACQ have shown an 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.

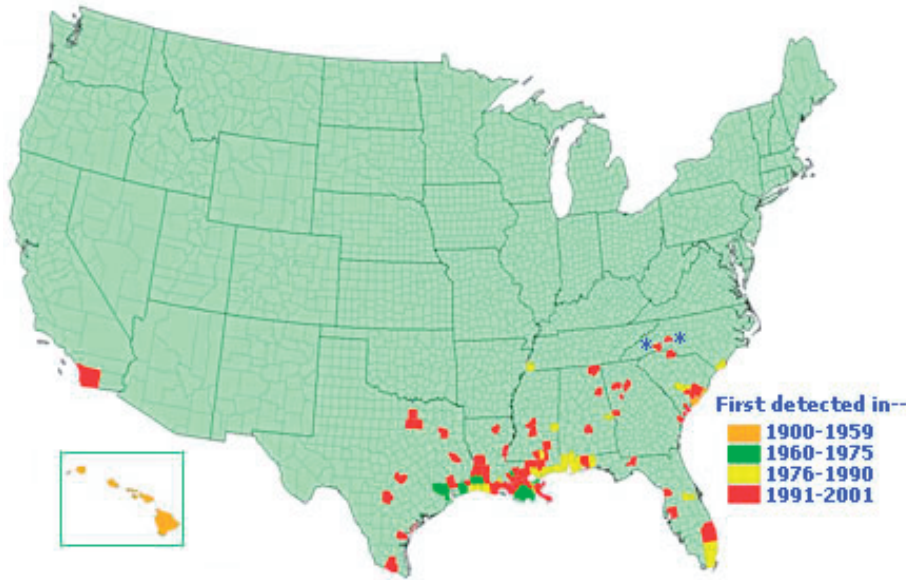
Severe Applications

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.

Formosan Termite

The Formosan subterranean termite is one of some 2,400 known termite species in the world. Originally a native of mainland China, the Formosan termite is believed to have been introduced to the continental United States by the military in packing crates shipped from the Pacific after World War II into New Orleans and a handful of other Southern ports. Today, Formosan termites can now be found in 8 Southern states as well as California and Hawaii. This “super termite” as it has been called, is in fact the most pervasive, aggressive, and destructive breed of termite in the world.



Environmental

- Rosboro’s pressure-treated wood is safe and environmentally friendly when properly treated, handled, and installed:
- Proper handling and use of treated wood poses no increased risk to human or animal health.
- Wood preservatives do not aggressively leach into the ground or waterways, drinking water supplies, or adversely affect marine life.
- Wood products last much longer with pressure treatment, which helps conserve a valuable, renewable natural resource — our trees.
- Alternative products such as plastic composites, require more energy to produce, and may also be aesthetically unacceptable to consumers.

AWPA

AWPA is the principal standards-writing body for wood preservation in the United States. The AWPA *Book of Standards* provides guidance on preservatives, wood use and exposure conditions, treatment process, testing, quality control and inspection. Manufacturers submit product data to AWPA for peer review and acceptance in the Standard. Manufacturers may also submit data to the ICC for review, and receive an ICC Evaluation Service Report (ESR) for code approval. Quality marked pressure-treated wood must reference the ESR report number and identify the code approved inspection agency.

Helpful Links:

- www.rosboro.com
- www.permapost.com
- www.wwpinstitute.org
- www.southernpine.com
- www.strongtie.com

Rosboro Technical Help Line: 1-877-457-4139