

Wood Preservative Treatment
Structural Glue-Laminated
Timbers and Arches

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Background:

Applying a preservative to Glulam Wood Timbers and Arches is critical to their longevity and integrity in applications that encourage wood deterioration. Fungi, termites, and numerous micro-organisms can all use wood as a food source in the presence of warm temperatures, abundant moisture, and oxygen. Preservative treatment removes wood as a food source and stops the deterioration process. However, it is important that proper consideration be given to all preservative treated wood applications, such that all current regulations and standards are followed.

Types of Treatment:

The most effective preservative treatments are those that can utilize pressure-treatment cylinders, which force the treatment into the wood cells. Southern Pine (SYP), in particular, responds very well to preservative, pressure-treatment.

Numerous treatments exist. Generally, there are three carriers of treatment into wood:

1. Water Borne – both copper and non-copper based, waterborne preservatives are common, leave little residue, are odorless, are paintable, and can be effective in a wide variety of applications. With respect to Glulams, CCA-treated Southern Pine remains the most popular Glulam treatment option and is one of the few treatments that can be applied prior to the gluing and manufacture of Glulam Timbers and Arches, which maximizes the coverage and effectiveness of the treatment.
2. Creosote – a highly restricted treatment generally consisting of creosote/coal tar variations, typically only used in highway bridge construction, railroad timbers, and utility poles. Treatment of Glulam Timbers and Arches must occur after gluing.
3. Oilborne – highly effective in exterior applications, particularly where application and maintenance of wood stains and sealers is not feasible on a regular basis. Oilborne preservatives such as Penta and Copper Napthenate are commonly used in utility poles, highway and bridge construction, and some other exterior applications. These preservatives have a fairly strong odor and leave an oily residue on the surface of the wood. Oilborne preservatives tend to discourage the cracking and checking of wood which is a significant benefit, but their application is restricted to avoid consumer use. They must be applied to the Glulam Timber or Arch after the gluing process.

Glulam Treatment Options:

1. Waterborne Treatments
 - A. CCA (0.60pcf retention, UC4B, 4C; 0.40pcf retention, UC4A)
 - i. Wood is treated prior to gluing
 - a. Most commonly used Glulam treatment option (Southern Yellow Pine)
 - b. Excellent treatment penetration (SYP)
 - c. Proven performance history (SYP)

- ii. Availability
 - a. Available in SYP
 - b. Douglas Fir will require incising to allow treatment penetration. Douglas Fir cell structure is difficult to treat. Architectural grade not possible due to appearance of incising. Generally not suggested.
 - iii. Use (see AWPA guidelines)
 - a. For ground contact and structural components
 - b. Limited use in residential structures
 - c. Typical in Glulam beams and posts, bridge timbers, in-ground foundations and structural components, and glulam arches.
 - iv. Appearance (greenish finished color)
 - a. Paintable
 - b. Stainable
 - c. Stains will appear darker vs. untreated lumber
- B. MCA, PTI, EL2, CA-C, ACQ (various retention levels – see AWPA)
- i. Most of these treatments have been used to replace CCA in consumer and residential applications.
 - ii. Availability
 - a. All commonly available in SYP dimensional lumber and timbers.
 - b. Not yet certified for gluing after treatment in Glulam Timbers & Arches.
 - c. Should the application request one of these treatments, alternative currently would be to treat Glulam after gluing and manufacture.
Note that treatment after gluing may not be acceptable per AWPA standards for all treatments – see AWPA guidelines.
 - iii. Use (see AWPA guidelines)
 - a. These treatments are typical in consumer and residential applications above ground or in ground contact. Limited use in critical structural applications.
 - b. Select hardware and connectors with care to insure compatibility with treatment.
 - iv. Appearance
 - a. Paintable
 - b. Stainable
 - c. Clean, attractive appearance
2. Creosote Treatments (12pcf retention, UC4B, 4C)
- i. Time-tested treatment (since 1888) for utility poles, highway construction, bridge construction, and railroad timbers and ties. Creosote can be used with SYP as well as some hardwoods such as red maple.
 - a. Wood must be treated after gluing.
 - ii. Availability
 - a. Needs to be ordered in large quantities.
 - b. SYP is common, but other wood species are possible (see AWPA guideline)
 - iii. Use (see AWPA guidelines)
 - a. Highly restricted application/end use
 - b. Most common applications are government projects.
 - iv. Appearance (Dark Brown to Black appearance)
 - a. Finished product will have an odor, and will have a residue on the wood surface.

3. Oilborne Treatments

- A. Pentachlorophenol (Penta Type A – Heavy Oil) (0.60pcf retention, UC4A, 4B, 4C)
 - i. Wood is treated after gluing and manufacture.
 - a. Suitable for ground-contact type applications
 - b. Very effective at discouraging wood cracking and checking (due to oil)
 - ii. Availability
 - a. SYP is most common, but some other species are possible, including some hardwoods.
 - iii. Use (see AWPA guidelines)
 - a. Very limited interior use, including even agricultural applications
 - b. Ground contact and structural applications are common
 - c. Should not be used where human contact is likely
 - d. Typical applications include utility poles, bridge construction, foundation pilings, and other exterior structural components
 - iv. Appearance (brown color)
 - a. Oily finish – can be difficult to stain or paint
 - b. Strong odor

- B. Pentachlorophenol (Penta Type C – Light Oil) (0.30pcf retention, UC1, 2, 3A, 3B)
 - i. Wood is treated after gluing and manufacture.
 - a. Suitable for above-ground exterior applications
 - b. Very limited in residential construction
 - c. Very effective at discouraging wood cracking and checking (due to oil)
 - ii. Availability
 - a. SYP is most common. Not typical in other species
 - iii. Use (see AWPA guidelines)
 - a. May be used on some recreational structures where occasional human contact can occur – but, a sealer is required.
 - b. Bridge handrails are typical example
 - iv. Appearance (light brown finished color)
 - a. Can be painted or stained
 - b. Minor odor and slightly oily finish

- C. Copper Naphthemate (CuNap) (0.040pcf retention, UC1, 2, 3A, 3B and 0.075pcf retention, UC4B, UC4C)
 - i. Wood is treated after gluing and manufacture
 - a. Time-tested treatment (since the early 1900's) for ground contact, fresh water contact or above ground.
 - b. Small quantities of CuNap can be purchased at retail hardware stores and lumber yards. Field treatment is somewhat effective.
 - c. CuNap, with certain carriers, can penetrate wood that is difficult to treat.
 - d. CuNap is typically no more corrosive to metal fasteners and connectors than untreated wood, depending on the solvent/carrier used.
 - ii. Availability
 - a. SYP and some other softwood species. Not typical with hardwoods except for railroad tie applications.
 - iii. Use (see AWPA guidelines)
 - a. Typical uses include utility poles, glulam beams
 - b. Used to field treat cuts and holes as per AWPA-M4

- iv. Appearance (bright green finished color)
 - a. Odor tends to dissipate over time.
 - b. After allowed to weather, can be painted or stained(limited)
- D. Oxine Copper (Copper 8 Quinolinolate) (0.020pcf retention, UC1, 3, 3A, 3B)
 - i. Wood is treated after gluing and manufacture
 - a. Effective against some fungi and mold.
 - b. Can penetrate difficult to treat species, including Douglas Fir.
 - c. Copper 8 is typically no more corrosive to metal fasteners and connectors than untreated wood (solvent based carrier only).
 - d. Can be used as a field treatment for cuts and holes.
 - ii. Availability
 - a. SYP and some other softwood species.
 - b. Can't use heat to increase penetration.
 - c. Limited pressure treatment availability – West Coast
 - iii. Use (see AWPA guidelines)
 - a. Used to treat SYP glulam beams for above ground applications only.
 - b. Used to field treat cuts and holes per AWPA-M4
 - c. Typical uses include timber bridges and railings.
 - iv. Appearance (greenish brown finished color)
 - a. Almost odorless
 - b. Limited stain and paint capability – better after weathering
- 4. Naturally Resistant Wood Species (No preservative treatment)
 - A. Alaskan Yellow Cedar (AYC)
 - i. Naturally acidic composition of wood, combined with other factors, gives AYC a natural resistance to deterioration influences.
 - ii. Uses are increasing as AYC becomes a more widely accepted Glulam material, but should be restricted to above ground applications such as under roof pavilion posts.
 - iii. Outstanding appearance, and can accept paint and stain.
 - iv. Increasing availability and cost has significantly improved.
 - B. Douglas Fir
 - i. Somewhat closed cell structure limits moisture movement into and out of the wood.
 - ii. Better tolerance to exterior exposure than SYP.
 - iii. Should be limited to under roof exterior applications.
 - C. Southern Pine (SYP)
 - i. Untreated SYP has limited application in exterior applications.
 - ii. Should be limited to under roof situations, which further minimize the direct exposure to weather (rain, snow) and sun exposure.

Final Note: All untreated and treated Glulam products should be monitored and maintained to maximize longevity and to maintain product integrity, particularly those products used in exterior applications and other applications that encourage wood cracking, checking and deterioration.