



Wood Treatment Type Selection Guidance for Ministry Bridge Engineers

This document provides general guidance that should be considered by the ministry bridge engineer prior to ordering treated wood.

Approved Wood Treatment Types for FSR Timber Deck Bridge Components

The ministry’s new [Pressure Treated Wood Standard for Timber Deck Bridge Components](#) currently identifies four types of preservatives that may be used with the bridge components, wood species, and Use Category combinations specified in the ministry’s [Bridge Timbers and Lumber Material Standard](#). As shown in Table 1 below, the allowable waterborne preservatives are chromated copper arsenate Type C (CCA) and ammoniacal copper zinc arsenate (ACZA), and the allowable oilborne preservatives are creosote (CR) and pentachlorophenol in type A oil (PCP-A), subject to consideration of site and project specific factors discussed herein.

The allowable wood species for treatment includes Coastal Douglas-fir and Hem-Fir North, as specified for particular bridge components in the ministry’s [Bridge Timbers and Lumber Material Standard](#). The new [Pressure Treated Wood Standard for Timber Deck Bridge Components](#) maintains the requirement for CCA treated Coastal Douglas-fir to be treated using only the ministry’s CCA process specification, but opens the door for Coastal Douglas-fir to be treated with AZCA, CR and PCP-A to meet or exceed CAN/CSA 080 Series “Wood Preservation.” Hem-Fir North may be treated with any of the four types of allowable preservatives to meet or exceed CAN/CSA 080 Series “Wood Preservation.”

Table 1 Wood Preservative Treatment Types

Allowable Preservative Treatment Types		Allowable Wood Species for Treatment	Required Treatment Standard	Bridge Components, Wood Species, and Use Category Combinations
Oilborne Preservatives	Creosote (CR)	<ul style="list-style-type: none"> Coastal D-Fir Hem-Fir North ¹ 	Meet or exceed CAN/CSA 080 Series “Wood Preservation” ² in effect and applicable at the time of treatment	See Table 1 or 2 (as applicable) of Bridge Timbers and Lumber Material Standard
	Pentachlorophenol in type A oil (PCP-A)			
Waterborne Preservatives	Chromated copper arsenate, Type C (CCA)	<ul style="list-style-type: none"> Coastal D-Fir 	Apply FLNR’s process specification for CCA treatment called, Interim Process Specification for CCA Treatment of Coastal Douglas-fir Wood	
		<ul style="list-style-type: none"> Hem-Fir North 	Meet or exceed CAN/CSA 080 Series “Wood Preservation” in effect and applicable at the time of treatment	
	Ammoniacal copper zinc arsenate (ACZA)	<ul style="list-style-type: none"> Coastal D-Fir Hem-Fir North 	Meet or exceed CAN/CSA 080 Series “Wood Preservation” in effect and applicable at the time of treatment	

¹ Hem-Fir North is a Canadian subset of Hem-fir that includes Western Hemlock and Pacific silver (amabilis) fir.

² Allowable species must be treated in full accordance with CAN/CSA 080 Series of Standards (includes CSA 080.0, 080.1, 080.2, 080.3, 080.4 and 080.5), including minimum penetration and retention requirements, in accordance with the specified **Use Category** number for specific bridge components and exposures. This will normally be UC4.1 or UC4.2 considered as “Wood for Highway Construction” as per Tables 1 and 2 of the ministry’s [Bridge Timbers and Lumber Material Standard](#). For specific one-off projects, it may be required to treat wood materials to UCSA (marine exposure) where wood materials can be exposed to salt and brackish water to the extent that marine borers can attack them.

Table 2 below lists typical forestry bridge components (and some occasionally utilized components), together with the allowable preservative type that can be used for the particular bridge component, subject to site and project specific factors. Table 2 shows the allowable preservative type for each bridge component, where “n/a” indicates “not allowed.” It shows that creosote (**CR**) and pentachlorophenol (**PCP-A**) are comparable oilborne preservatives, and chromated copper arsenate Type C (**CCA**) and ammoniacal copper zinc arsenate (**ACZA**) are comparable waterborne preservatives.

Table 2 – Allowable Preservative type for FSR Bridge Components in Typical Use Situations

Bridge Component	Allowable Preservative Type Subject to Site and Project Specific Factors			
	Oilborne		Waterborne	
	CR	PCP-A	CCA ⁴	ACZA ⁴
Timber pedestrian handrail	n/a ¹	n/a ¹	Yes	Yes
Timber guardrail ('curbs'), riser blocks and brackets	Yes	Yes	Yes	Yes
Timber deck running ('wear') planks	n/a ²	n/a ²	n/a ²	n/a ²
Timber sub-deck planks	Yes	Yes	Yes	Yes
Timber cross-ties	Yes	Yes	Yes	Yes
Timber stringers	Yes	Yes	Yes	Yes
Timber bearing sill	Yes	Yes	Yes	Yes
Ballast wall timber planks (bulkheads)	Yes	Yes	Yes	Yes
Painted components	n/a ³	n/a ³	Yes	Yes

¹ Oil type preservatives should not be used in situations that involve frequent human contact

² Timber deck running ('wear') planks are not treated since they frequently wear out from vehicle abrasion prior to rot deterioration.

³ Paint does not adhere to oil-type treatments.

⁴ To provide corrosion resistance, connectors and fasteners used with CCA and ACZA treated wood should be galvanized in accordance with the specifications on the design drawings.

General Considerations for Choosing an Appropriate Wood Preservative

Helpful Guidance

To help guide their choice of an appropriate wood preservative, ministry bridge engineers should consult the ["Best Management Practices: For the use of treated wood in aquatic and wetland environments"](http://www.fs.fed.us/t-d/pubs/htmlpubs/html06772809/page02.htm) (**Best Management Practices**), the publication by the USDA Forest Service called "Preservative-Treated-Wood-and-Alternative Products in the Forest Service" <http://www.fs.fed.us/t-d/pubs/htmlpubs/html06772809/page02.htm>, and Canada Plan Service publication called "Wood Preservatives" <http://www.cps.gov.on.ca/english/plans/E9000/9401/M-9401L.pdf>.

Additionally, the Ministry of Transportation and Infrastructure and Ministry of Forests, Lands and Natural Resource Operations (FLNR) have jointly published a document in September 2013 called, [Guidelines for Use of Treated Wood In and Around Aquatic Environments and Disposal of Treated Wood \(the Guidelines\)](#). Ministry bridge engineers working with treated wood or acquiring treated wood for bridge structures are encouraged to be familiar with the Guidelines as they articulate the regulatory framework for use of wood preservatives and provide general guidance for:

- selecting the type of wood preservative treatment based on application and risk assessment, and
- determining suitability of treatment type use based on risk, treatment standards, and treated wood disposal.

Note: A risk assessment of the type mentioned in the Guidelines *is not required* for treated bridge components listed in Table 2 above as those components are not immersed in water.

Waterborne preservatives

- Waterborne preservatives such as chromated copper arsenate Type C (CCA) and ammoniacal copper zinc arsenate (ACZA) can be used in most environments consistent with the guidance supplied in the Guidelines referenced above. Waterborne-treated woods are clean, oil-free, odourless, and can be readily painted, which makes them an accepted choice for many applications.
- Waterborne preservatives can increase the likelihood of corrosion when metals contact treated wood used in wet locations. Connectors and fasteners used with CCA and ACZA treated wood must be made from hot-dipped galvanized steel in accordance with the specifications on bridge design drawings.

Oilborne preservatives

- Oilborne preservatives such as creosote (CR) and pentachlorophenol in type A oil (PCP-A) are acceptable treatment types for the common bridge components specified in Tables 1 and 2 of the ministry's [Bridge Timbers and Lumber Material Standard](#).
- Creosote is very irritating to the skin, and creosote treated wood often is not the first choice for applications where there is a high probability of human contact. For example, if timber pedestrian handrails will be installed on a forestry bridge, the use of CR or PCP-A is not acceptable because of their petroleum base. This restriction is consistent with the guidance supplied in the Guidelines referenced above.
- "With heated solutions and lengthy pressure periods, creosote can penetrate wood that is fairly difficult to treat. Creosote is suitable for treatment of glue-laminated members" (USDA Forest Service).
- Oilborne preservatives should not be used if the timber components will be painted as paint does not adhere to oil-type treatments.
- The use of oilborne preservatives in aquatic environments must consider any local environment agency approvals or concerns, and site environmental sensitivity.

Pressure Treated Wood Life Expectancy

"It is not possible to evaluate a preservative's long-term efficacy in all types of exposure environments and there is no set formula for predicting exactly how long a wood preservative will perform in a specific application. This is especially true for aboveground applications [e.g., forestry bridges over water] because preservatives are tested most extensively in ground contact" (USDA Forest Service).

Untreated wood in contact with the ground lasts only 3 to 12 years, whereas species like Douglas fir may possibly last 20 to 30 years when factory pressure-treated, depending on application and environmental factors. Without much data available, there is debate as to the differences in treated wood life expectancy between the various types of preservatives and applications. Currently, there is no available published literature to support the conjecture that oilborne treated woods have a longer life expectancy than waterborne treated woods, as there are many factors that can determine the longevity of treated wood.

Handling of Treated Wood

The best protection from any exposure to wood treating chemicals is offered by following personal hygiene and safety precautions. See the Pest Management Regulatory Agency (PMRA) approved Consumer Product Safety information and "Consumer Safety Information Sheets" available at <http://www.hc-sc.gc.ca/cps-spc/pubs/pest/decisions/rvd2011-06/index-eng.php> and <http://www.ptw-safetyinfo.ca/> or, for ACZA at http://www.wwpinstitute.org/general_information.html.