Treated Wood

Treated Wood/Products and Applications

Treated Wood/Field Treatment

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WHAT IS PRESERVATIVE TREATMENT AND HOW DOES IT WORK?

Preservative treatment is the application of chemicals to wood to make the wood unattractive to organisms that like to eat it. These chemicals essentially make the wood inedible for fungi and insects that can destroy wood.

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HOW WELL DOES TREATED WOOD WORK?

Treated wood can last virtually as long as you want it to, given the correct specification, quality control and installation. For example, service lives of over 60 years have been documented for treated fence posts in ground contact. However, as with any product, incorrect specification, inadequate quality control or major errors in installation can result in service lives less than expected.

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HOW ARE PRESERVATIVE CHEMICALS APPLIED TO WOOD?

Wood products for construction are typically treated in a factory, using a pressure process. The product is loaded into a vessel, then the vessel is filled with a water solution containing the preservative chemicals. The vessel is pressurized to force the solution into the wood. Most dimension lumber can be treated this way, as well as plywood and Parallam. Other composite products are hard to pressure-treat, for example, OSB, LVL and glulam. OSB, however, can be preservative-treated during production. Preservative chemicals are added to the mix of wood flakes and resin prior to pressing into boards.

Preservatives can also be applied in the field, when a piece of treated lumber is cut. A cut end of treated lumber must be brushed with or dipped into a chemical, as this cut exposes untreated wood. The chemicals in treated wood, even though they have been applied under pressure, don’t penetrate the wood all the way to the core.

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WHAT CHEMICALS ARE USED FOR FACTORY TREATMENT OF WOOD?

Chromated copper arsenate (CCA) for years was the most commonly used chemical to give wood decay resistance, for wood intended for use in construction. Other preservatives used are amine copper quat (ACQ), copper boron azole, copper azole (CA), acid copper chromate and copper citrate. An alternate category of chemicals are borate-based. Sodium borate and zinc borate are two available compounds. CCA, ACQ,CA and sodium borate are applied by pressure treatment. Zinc borate is used to treat OSB during production of the boards.

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WHAT ARE THE KEY DIFFERENCES BETWEEN COPPER-BASED PRESERVATIVES AND BORATE?

Copper-based preservatives and borate are both effective at protecting wood from decay under the right circumstances, however they are very different chemicals. A copper-based preservative chemically bonds to the wood; in other words, it is "fixed" in the wood and cannot diffuse throughout the piece nor can it wash out. This means copper-based treated wood can be used outdoors or even submerged in water. Borate, on the other hand, is diffusible; in other words, it doesn't lock on to the wood like copper-based preservatives. The advantage of diffusion is borate's ability to keep moving deeper into the wood after pressure treatment. The disadvantage is that

borate can leach out of treated wood that is continuously exposed to liquid water. Sodium borate is quite diffusible and zinc borate less so, however neither is recommended for outdoor use. A simple rule of thumb: use copper-based preservatives outside the moisture barrier (the building paper or housewrap), and use borate inside the barrier.

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HAS CCA BEEN BANNED?

No. But the availability of CCA-treated wood has changed due to recent action in both the United States and Canada by manufacturers of the preservative. The U.S. Environmental Protection Agency (EPA) announced on February 12, 2002 "a voluntary decision by industry to move consumer use of treated lumber products away from CCA pressure-treated wood by December 31, 2003, in favour of new alternative wood preservatives. By January 2004, CCA will no longer be available to treat wood intended for most residential settings." "Although the Agency has not concluded that there is unreasonable risk to the public from these products, we do believe that any reduction in exposure to arsenic is desirable."

On April 3, 2002, Health Canada's Pest Management Regulatory Agency (PMRA) completed its review of alternative preservative products to facilitate a similar voluntary action in Canada. Please note that individual jurisdictions in both countries may take local action that could affect the timing of the transition within their own boundaries.

For more information on activities in the U.S., click here for a link to all EPA recent documents on CCA, including consumer Q&A and the status of EPA's on-going risk assessment study.

For information on the status of CCA in Canada, go to the PMRA web site and see the "What's New" section or search "CCA".

Canadian consumers may also wish to visit the web site of Wood Preservation Canada at http://www.woodpreservation.ca/ for Q&A and more information on preservative products.

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WHAT ARE THE ALTERNATIVES TO CCA?

Amine copper quat (ACQ) and copper azole (CA) are the two most widely used wood preservatives most that replace CCA for non-industrial applications since 2004.

Currently, treated wood consumers in the U.S. may find wood treated with ACQ (types B and D) and with copper azole. Two other chemicals, acid copper chromate and copper citrate, are also available for treating wood, but are much less often used. A new version of ACQ (type C) as well as copper azole type B have been approved for use in the U.S..

Product choice is more limited in Canada, but this will change. The preservatives ACQ (types B and C) and copper azole (type B) are approved for use in Canada.

Currently ACQ and CA-treated wood is commercially available and other products may be on the Canadian market shortly. It is also possible that Canadian regulators will approve other preservatives currently available in the U.S., allowing for more product choice in Canada in the next few years.
Wood products treated with borates are available in both countries. However this is not an equivalent to CCA, as borate-treated wood may not be used outdoors exposed to rainwater (borate preservatives do not bond to wood as well as CCA, which means the preservative can eventually wash out and thus leave the wood unprotected). Borate-treated wood is well-suited to applications that are protected from exposure, like sill plates.

There are CCA alternatives that do not involve the use of treated wood. One option is the use of naturally durable wood species such as western red cedar, yellow cypress, eastern white cedar and redwood. These are attractive options, but availability and cost can be an issue. Another option is to choose a non-wood material. However, alternatives to wood can be more costly, less workable, weaker, and may have durability problems of their own.

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HOW DO NATURALLY DURABLE WOOD SPECIES COMPARE TO TREATED WOOD?

The heartwood of naturally durable species such as western red cedar, yellow cypress and white cedar will all resist decay to some degree, but it is variable. The amount and type of natural fungi-toxic chemicals deposited in the heartwood determine how durable the wood is. The sapwood of all species is considered non-durable. Heartwood of second growth may be less durable than the best of the old growth but probably less variable. Wood that has been treated to CSA standards will deliver more reliable durability performance on average than a naturally durable species.

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WHAT TYPES OF WOOD PRODUCTS ARE AVAILABLE WITH FACTORY TREATMENT?

Dimension lumber and plywood are available treated with CCA or borate. OSB treated with borate and CCA-treated Parallam are also available. Glulam can be effectively treated with oil-based preservatives, but these are not suitable for use in buildings. Glulam and LVL are very difficult to pressure-treat, however, it may be possible to treat these products with borate during production as with borate-treated OSB currently available commercially. These manufacturing processes are under development at Forintek.

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WHEN SHOULD TREATED WOOD BE SPECIFIED?

Treated wood is necessary if the wood is expected to stay wet for extended periods of time or is contact with the ground. Guidelines to define "extended periods" are under development at Forintek. Treated wood is also recommended if wood is used in an area of termite or wood-boring beetle activity.

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SHOULD PRESSURE-TREATED LUMBER AND PLYWOOD BE DRIED PRIOR TO INSTALLATION?

Yes. As with all construction wood, both treated wood and plywood should be dried to a moisture content of 19% or less prior to installation in a building to ensure dimensional stability. Drying is less important when CCA-treated wood is to be used outdoors.

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IS KILN DRYING OR AIR DRYING RECOMMENDED FOR CCA AND BORATE-TREATED WOOD?

For decay resistance, it doesn't matter. However, kiln drying tends to reduce warping, as it is a more controlled form of drying.

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WHAT IS INCISING AND WHEN IS IT REQUIRED?

Incising is the process of cutting many small slits into the surface of a piece of wood in order to increase the amount of preservative taken up by the wood during treatment. Some wood species are particularly hard to treat, and incising is necessary to meet the penetration requirements in CSA standards. Non-incised CCA-treated wood will have a shorter service life than incised CCA-treated wood, but the difference may not be noticeable in the short term (under 20 years) in relatively low decay hazards such as decking. For wood in critical structural applications under conditions conducive to decay, incising could make the difference between 4 and >40 years service. Incising is not necessary with borate-treatment, because borate diffuses to achieve the required penetration. With borate-treated wood, there in no difference in performance between non-incised and incised, provided the target chemical content is achieved. There is a strength-loss penalty for incising, which is addressed during structural design.

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WHAT'S THE DIFFERENCE BETWEEN GREEN AND BROWN TREATED WOOD?

If you are shopping for treated lumber at a do-it-yourself retail centre, you may be confused by the choices and store staffers may not know much more than you do. Whether the treated wood on display is green, brown, or bears a brand name, it's all

been treated with a copper-based preservative. The brown products have merely been coloured to mask the greenish tone of the preservative. This colouring is not permanent and may fade away, leaving you with wood that looks the same as the green version at the store. Note that the green tone of treated wood will fade as the wood ages, without any effect on the wood protection.

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WHAT ARE FIELD-APPLIED PRESERVATIVES AND WHAT TYPES ARE AVAILABLE?

Field preservatives are chemicals that are applied to cut pieces of treated wood at the construction site, and they should be purchased along with treated wood as they will inevitably be required. Field preservatives must be applied when treated lumber is cut in the field, as the cut will expose untreated wood at the core of the piece. Most field preservatives come in a liquid form and can be separated into two groups: organic solvent and water-soluble. The organic solvent preservatives are typically used for field-treating cut ends of pressure treated wood. There are two available chemicals in this category: copper naphthenate and zinc naphthenate. Of the two, copper naphthenate is more effective and can be used in all applications. Copper naphthenate is green. Zinc naphthenate is somewhat less effective, so its use is restricted to above-ground applications only; it should not be used on wood that will be in ground contact. Zinc naphthenate is available either colourless or colour-matched to the greenish tone of treated wood.

The water-soluble field-cut preservatives are borate-based and thus are typically used for field-treating cut ends of borate-treated wood. If the wood is not at a moisture content of at least 35%, a solution containing propylene glycol must be selected to assist the borate's diffusion through the piece. In addition to treating field cuts, the borate-glycol preservatives are also useful for protecting sound wood left in place when adjacent rotted wood has been removed, as this wood (which may have once been quite wet due to building envelope leaks) will have likely dried out during the repair process. Some non-liquid field preservatives are also available, in paste or solid form (rods). These generally contain borate or fluoride and are inserted into drilled holes in the piece. Use these products in large dimension or painted wood members that are expected to stay above 35% moisture content for an extended period.

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HOW ARE PRESERVATIVES APPLIED IN THE FIELD?

Liquid preservatives can be brushed on the cut end, or the end can be dipped into them. Spraying is not recommended. If dipping is used, a minimum of three minutes immersion is recommended. If brushing, use two coats. Only the cut end need be dipped or brushed. Workers should wear proper protective gear (rubber gloves and eye protection) when using these preservatives, primarily because of the organic solvent. Borate rods and pastes are inserted into pre-drilled holes and plugged tightly with a piece of dowel, a plastic plug or some other suitable material to keep water out of the hole.

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CAN I JUST FIELD-TREAT LUMBER IN PLACE OF USING PRESSURE-TREATED LUMBER?

Generally no, you will obtain nowhere near the same level of durability. Lumber must be pressure-treated to obtain the proper penetration depth and chemical level for adequate long-term protection of the lumber. Field treatment with organic solvent-based preservatives works acceptably well on lumber ends but not on the flat surfaces. This is because end-grain of lumber absorbs preservative up to 100 times more than the flat surface.

Penetration of organic solvent-based field cut preservatives into the flat surface of the lumber is minimal, typically 1mm. With proper pre-conditioning and incising of the lumber, preservatives applied by pressure treatment can penetrate from 5 mm to the full cross section, depending on species and preservative chemical, among other factors. It would also probably not be cost-effective to attempt substitution of pressure-treated lumber with field treating. It would take a lot of chemical and a lot of labour, for an end product that will not perform adequately and may need replacing far sooner than expected.

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HOW WET MUST WOOD BE FOR BORATE TO DIFFUSE THROUGHOUT THE PIECE?

Wood needs to be at a moisture content of at least 27% for effective diffusion of borate, although this moisture content will only allow a slow migration (it will move at a rate of up to 1mm/week, dependant on temperature). Faster diffusion happens when the moisture content is higher. For example, at moisture contents of 40% or so, the chemical will migrate at a rate of up to 3mm/week, dependant on temperature.

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HOW WET DOES BORATE-TREATED WOOD NEED TO BE BEFORE BORATE WILL LEACH OUT?

Borate will leach out only while wood is exposed to flowing liquid water and the moisture content is above fibre saturation (averages around 27% moisture content, although this number varies depending on wood species). This can occur when the wood has extended contact with rainwater or very heavy condensation. Moist air, even at 100% relative humidity, does not cause loss of borate.

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WHEN BORATE-TREATED WOOD IS EXPOSED TO WATER, HOW LONG WILL IT TAKE BEFORE TOO MUCH CHEMICAL LEACHES OUT?

Short exposures to rain during transportation, storage and construction pose no problem. Even fully exposed to rain in a wet place such as Vancouver, it takes a year or more before levels of borate in normal treated wood drop below the amount that controls decay.

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WHAT TYPE OF NAILS SHOULD BE USED WITH TREATED WOOD?

Only hot-dipped galvanised or stainless steel nails should be used with CCA, CA or ACQ-treated wood. If CCA, CA or ACQ is specified, extended periods of wetting are presumably anticipated, and common nails corrode in wood under moist conditions. Electroplated galvanising is not thick enough to resist the corrosion effects under moist conditions.

Stainless steel should be used in areas near salt water. With borates, electroplated galvanised nails may prove adequate, because borates are corrosion inhibitors and borate-treated wood is presumably not going to be exposed to extensive liquid water. Further research is needed on the compatibility of fasteners with borate-treated wood. It's possible that ordinary nails can be used with borate-treated wood, however the research to prove this has not yet been performed.

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CAN SCREWS BE USED IN TREATED WOOD?

Screws cannot be hot-dipped galvanised but are generally available in stainless steel. There are other types of coated deck screws on the market for decking.

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ARE THERE ANY CONCERNS WITH PAINTING TREATED WOOD?

No. The finishing properties of wood treated with waterborne preservatives such as CCA or borate depend primarily on the wood properties, not the preservative treatment. However, you'll get more life out of your wood finishes, and especially stains, when you're using CCA-treated wood. CCA-treated wood contains chromium, which is known to decrease the effects of weathering. The effects of the newer preservatives (CA and ACQ) are unclear.

For any wood product, sanded or rough-sawn surfaces are recommended for best paint adhesion and stain absorption. In addition, all wood should be dry before painting. Because pressure-treated wood absorbs water during the treating process and may be at a high moisture content when shipped to lumber yards, the lumber must be dried to 19% moisture content or less prior to painting/finishing.

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