

“NATURALLY PERFECT™ PRODUCTS”

BORACOL WOOD PRESERVATIVES AND IMPEL (BORON) RODS

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Premature decay of untreated wood, periodically or permanently exposed to increased moisture content (over 25%), reached serious proportions in Canada in recent years. As a result, requirements for reliable fungistatic treatments have been progressively introduced. The most acceptable pre-treatment and remedial treatment for rot and insect attack was found in the application of Boron based wood preservatives.

Apart from their proven efficiency, the borate formulations are accepted worldwide as environmentally safe wood preservatives, having a very low human and mammalian toxicity. Their lethal dosage on rabbits (LD50) has been found to be 2000 to 2500 mg per one kilo of a rabbit body. The (LD50) dosage means that rabbits (having, for example, a body weight of 1 kg) must consume 2000mg of the product, to reach the rate of at least 50% rabbit mortality. For comparison, pentachlorophenol has an LD50 of 125 mg/kg.

Boracol wood preservatives are based on inorganic Boron (disodium octaborate tetrahydrate), which has the ability to diffuse in moist wood (12% moisture content or greater), has a very low vapor pressure and the ability to progressively penetrate the wood even several years after application. Throughout this period, whenever and wherever a determined concentration of Boron is found in wood, the organisms capable of degrading wood have no chance to survive or establish the infection. The only condition for proper performance is that the treated wood should not be exposed to direct contact with water (for example wood in ground contact or occasional heavy rain over construction wood). If water has access to wood, it will make it possible for Boron to “travel the opposite way” by leaching process. Therefore, a post-treatment application of the wood surfaces is recommended by applying a proven wood stain, water repellent or paint system, preventing the leaching of Boron, or covering

the lumber to create a barrier for keeping water away.

Boracol products are the most famous Boron based wood preservatives that have been used in Canada over the past decade with great success. They are clear, colorless and odorless solutions of active ingredient (Boron), dissolved in environmentally acceptable propylene glycol. This “special solvent carrier” assists distribution of boron into the drier section of the timber, even into heartwood. The products are applied to wood surfaces by brush, dipping or spray equipment. Within the first 24 to 48 hours, the product will penetrate 3-5 mm deep into wood of \geq 12% moisture content and will establish a reserve of over concentrated Boron. From this, further penetration/diffusion will take place depending on moisture content.

Boracol preservatives will form a wet-appearing film on wood surfaces as soon as the products are applied. The film will stay on wood for a period necessary for the solvent (non-evaporative but penetrating propylene glycol) to penetrate the wood surface, bringing the Boron compound deeper in the wood. During this period, the treated wood surfaces should be protected from contact with water. It is advised to clean the wood before treatment. Vacuum cleaning, power washing or compressed air are good ways to remove dirt. If treated wood is intended for subsequent paint or stain application, allow at least seven days for wet film of Boracol to completely penetrate and disappear from the surface. If a slight film or crystal like particles are visible, the surface should be wiped off with a damp cloth. Slight sanding (80 grit) can be very helpful to remove boron crystals and improve adhesion of the coating. Subsequent coating or covering of the treated wood, is particularly important when wood is exposed to contact with rain or condensed water that stays trapped in the wood for a longer period of time (for example, balconies).

The Sansin Corporation is offering four different boron based wood preservatives:

BORACOL 20-2:

Canada is known for a high level of air humidity, which increases the average moisture content in wood. This makes it possible for most wood rot fungi to grow on untreated wood. BORACOL 20-2 contains increased levels of Boron compound and is widely used in Canada to prevent fungal or insect contamination. Due to increased fungicidal concentration, this product is also used for remedial treatments of decay pockets in construction wood.

BORACOL 20-2 BD:

An extra mouldicidal additive is added to this boron based wood preservative to increase preventive action against mould attack on wet surfaces. The product is designed for use as a surface treatment in-situ building material to prevent decay, fungi and insects from establishing their colonies in wood, and has increased effect in preventing mould development on wet wood surfaces as well as on any other absorbent material.

BORACOL 10-2BD:

This product is similar to Boracol 20-2BD. It contains reduced amount of the boron compound and increased amount of a mouldicidal additive. It is effective in preventing decay, fungi and insects from establishing their colonies in wood, and is highly effective in preventing mould development on wet wood surfaces or any other absorbent material.

IMPEL (BORON) RODS:

Boron is molded into glass like rods that are inserted into pre-drilled holes. This product is known as fungi killer and wood preserver and is particularly used in wood exposed to increased risk of fungal attack. Once in place, the rods remain inactive until moisture in the wood increases. Then the rods dissolve slowly and the moisture stream carries the fungicide along the wood fiber paths to saturate the surrounding (or rotting) areas (Figure 1). When wood dries, the fungicide remains in place ready to reactivate when moisture reoccurs.

PENETRATION VERSUS MOISTURE CONTENT

When a Boron wood preservative is applied on the wood surface, a layer of concentrated Boron based wood preservative is established. Due to diffusion forces, the product is slowly penetrating into the wood depths. The velocity of the penetration depends on several factors, the moisture content in the wood being of highest importance.

Outer wood layers generally have a lower moisture content than the central portions, taking up to a few days for the concentrated product to fully penetrate. When the surface moisture content of wood is 25% or more the Boracol wood preservative penetrates into the wood faster (one to two days) than with a moisture content below 25% (four to five days). Higher moisture contents are not recommended due to dimensional changes of wood in construction and possible mildew development prior to the treatment. However, even if the wood moisture content is extremely low (e.g. 12%), the product will still penetrate into the wood due to the non-drying solvent incorporated into the Boracol formulation. More time is needed for penetration of Boracol products into wood with lower moisture content.

Spraying or misting of dry wood with water prior to Boracol treatment has been tried in order to raise its moisture content. To the best of our knowledge, this method did not give spectacular results, mainly because water was evaporating more rapidly than penetrating across the wood grain. Apart from this, some coniferous species, such as spruce, close its border pits as soon as the moisture content drops below 30% and do not absorb any liquid. However, spruce will absorb Boracol because Boracol penetrates due to the chemical diffusion process.

When applied to wood with a low moisture content, Boracol wood preservatives tend to settle on the wood surfaces forming glass like crystals. Even though the crystals are formed, there is no need for concern on "wasting the material", as the quality of the treatment is not affected. The crystals may stay on the wood surface for months or years before they disappear. In fact, the crystals act similar to the Impel Rods (glass like rods) and dissolve and reactivate as soon as increased moisture brings the wood into decay hazard.

APPLICATION METHODS

The viscosity of the product has been adapted for most application methods.

Brush Application:

This method requires some shear force to be applied in order to evenly spread the

product over a range of different surface profiles. Brushing method gives best results if applied before wood components are assembled.

Dipping

This method requires a non-corrosive dipping tank and an additional support surface inclined at an angle to allow draining of wood preservative and its return to the tank. The advantage of this method is that all the surfaces are fully treated including splits and cracks.

Spraying:

Different spray applicators can be used for spray application. Viscosity of the product can be adapted by adding up to 5% water.

Injection Method:

This method is used to increase the quantity of Boron in wood that is exposed to high-risk biological attack (locations where condensed water may be trapped for a longer period). Syringe type injector can be used to fill cracks and gaps or pre-drilled holes.

Insertion Method:

This method is used only when dealing with IMPEL RODS. Pre-drilled holes are filled with a Boracol product which is allowed to diffuse prior to inserting Impel rod and sealing hole. (Figure 1).

RECOGNITION OF TREATED WOOD

Boracol wood preservatives are colorless liquid substances and the treated surfaces cannot be differentiated from untreated ones. To help differentiation, P-320 die additive has been developed by The Sansin Corporation. Forty grams (40Gr.) of the P-320 additive is blended into one gallon of Boracol (10 grams per liter). The die additive will enhance the natural color of wood for at least a few weeks, so the treated surfaces will be easily distinguished.

LEACHING OF BORON OUT OF WOOD

Borates are water borne wood preservatives that remain water soluble in the wood. If seriously exposed to direct rainfall or water exposure, they can be leached out of wood.

The SANSIN RESEARCH CENTER has been investigating possibilities of reducing leaching of borates from wood. The research has led to the development of a water-repellent coating (BORLOX[®]), which showed the best results among other products tested by an independent institution.

The performance of the Boracol treatment will be enhanced by applying BORLOX[®].

More comprehensive data on BORACOL wood preservatives (Properties, Technical Data, Application, Coverage and Material Safety Data Sheets) are available from The SANSIN CORPORATION.

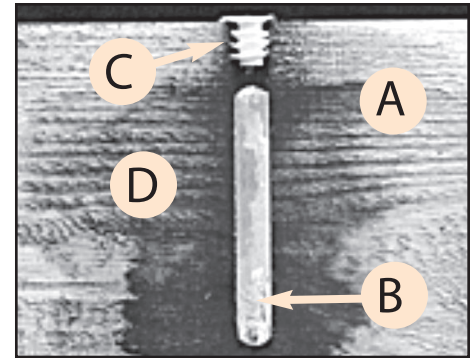


Figure 1: This surface (A) was cut open to check the distribution of boron in wet wood. The red stained area (D) represents Boron that was released from the rod (B). The hole is sealed with plug (C). Red color (which is normally not visible) was induced by applying a boron reacting agent to the wood. Photo: SASCO PRODUCTS LTD.

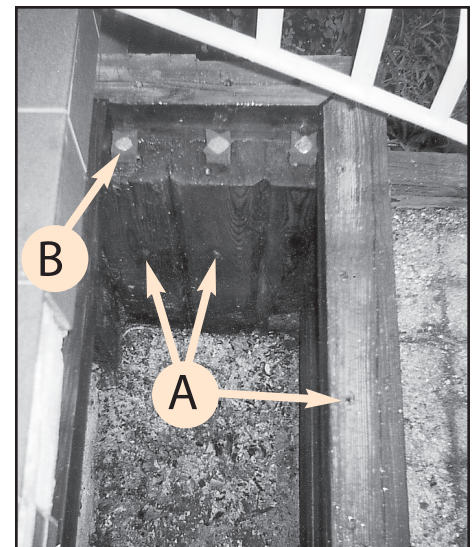


Figure 2: TO REPLACE OR TO REHABILITATE? REMEDY IS AVAILABLE!

This main entrance stair supporting structure was made of pressure treated wood, but the newly opened surfaces were not protected during installation. A Few years later, the central portions started rotting and ants used rotten wood for nesting, and feeding on fungal mycelium but the ants were found everywhere in the house. Remedial treatment consisted of brush-applying BORACOL 20-2 and inserting IMPEL RODS in pre-drilled holes (A). Ant baits (B) were placed to the main paths to kill the ant colony. Photo: The SANSIN CORPORATION.