

IMPEL[®] (BORON) RODS II

WOOD UTILITY POLES COVERING ALSO CROSS ARMS, SPAR ARMS, BRIDGE SUPPORTS, FOOTINGS FOR BRIDGES AND HOUSES, LANDSCAPING TIES, HISTORIC SITES, ETC.

All utilities face the costly replacement of decay-damaged wood poles that fall below the strength requirements of the National Electrical Safety Code. Other poles must be replaced due to insect or mechanical damage.

Supplemental pole treatments have proved to be effective in extending the service life and reducing expensive replacements of wood poles. Most utilities have recognized the need for an ongoing pole inspection and maintenance program. Preventive and remedial treatments offer substantial economic benefits, wood resource conservation, reduced owner liability, and a safer pole plant as well as less cost for disposal of poles taken down, etc.

This IMPEL[®] (BORON) ROD II Product Information Sheet explains how decay-damaging conditions occur, and how to spot, prevent and treat them ... before expensive pole replacement is required.

WOOD DECAY IN POLES

Wood poles are exposed to severe environments, and although pressure-treated, decay and insects can still find their way into unprotected areas, above and below the ground. Seasoning checks above ground can expose unprotected heartwood and vulnerable sapwood where original treatment was inhibited by insufficient drying of the wood. And field drilling by utility, telephone, and cable personnel can also allow fungus spores to reach the unprotected interior of the poles.

The most critical area for decay to occur, however, is the **groundline** zone. From about 15cm above the ground to about 45cm below, conditions are ideal for decay and insect attack. Decay needs adequate moisture, food, oxygen, and temperature in order to thrive and destroy wood. Once decay has begun, it offers a natural environment for many wood destroying insects. Also carpenter ants may enter the poles.

THE IMPEL[®] (BORON) RODS II SYSTEM

IMPEL[®] (BORON) RODS II are an environmentally responsible, cost effective Pest Control Products Act approved decay protection and prevention system for wood poles, etc. They have an appearance similar to glass rods and are available in convenient sizes for wood pole protection and for protection of other wood substrates.

IMPEL[®] (BORON) RODS II are moulded from fused, water-diffusible borates, which are highly effective and well established wood preservatives. They are internationally recognized as effective in controlling fungal decay, termites, carpenter ants, various beetles, and many other wood-boring insects. Borates are "user friendly" and more environmentally responsible than more toxic alternative treatments. They are highly toxic to fungal decay and to many insects at concentrations that are not poisonous to humans or other mammals if handled as required on labels.

IMPEL[®] (BORON) RODS II are placed in holes drilled in wood at specific locations and depend upon moisture to work. The rods are positioned so that moisture distributes the desired loadings throughout the target area. For remedial treatments of existing decay 6kg of Boric Acid Equivalent (BAE) per cubic metre of wood is recommended. For preventive treatments 2kg BAE per cubic metre should be sufficient.

The rate of application for IMPEL[®] (BORON) RODS II is 6.0 ounces of Boric Acid Equivalent per cubic foot of wood equals to 6kg/m³ of wood. The IMPEL[®] (BORON) RODS II contain Anhydrous Boric Acid equals to 1.45 ounces of Boric Acid per ounce of rods equals to 1.45g of Boric Acid per gram of rod. The following table shows the Boric Acid Equivalent for each size of IMPEL[®] (BORON) RODS II.

| Dimensions (mm) | Net weight of 1 Rod (Grams) | Corresponding weight of Boric Acid per Rod |
|-----------------|-----------------------------|--------------------------------------------|
| 12 x 100 | 24.0 | 38.8 |
| 18 x 75 | 41.0 | 59.5 |

As the wood's moisture content rises to 25-30% (the same level where decay begins to thrive), IMPEL® (BORON) RODS II begin to diffuse. During time, IMPEL® (BORON) RODS II strong preservative is distributed throughout both heartwood and sapwood by moisture as it naturally spreads through the wood. At recommended levels, IMPEL® (BORON) RODS II will control existing decay and prevent its future growth.

Inspection and maintenance crews, or utility personnel can easily and safely apply IMPEL® (BORON) RODS II. And since borates are not "restricted use" pesticides, no special licensing or certification is normally required for applicators in most provinces. IMPEL® (BORON) RODS II may even be used in residential areas where other highly toxic alternatives may be restricted.

THREE EASY STEPS

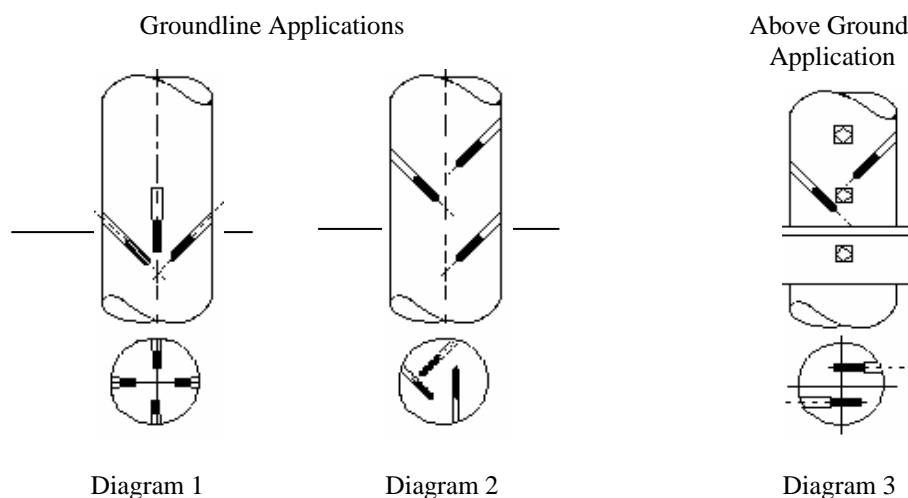
Illustrations of how IMPEL® (BORON) RODS II can be positioned in various wood pole applications are shown in Diagrams 1 - 3. Essentially, there are three easy steps for installation.

1. Drill appropriate sized holes to accommodate the predetermined number of IMPEL® (BORON) RODS II required. The hole has to be slightly larger than the rod to be used.
2. Insert the suitable size and number of IMPEL® (BORON) RODS II into the holes; and,
3. Seal the holes with a treated wooden dowel or a suitable plastic plug.

Use caution not to cause unacceptable structural damage to the wood. If the pole (or other wood structures) is condemned, do not treat with IMPEL® (BORON) RODS II.

A variety of drilling patterns can be used in groundline applications. Generally, IMPEL® (BORON) RODS II are inserted on groundline through a series of 3 or 4 holes drilled at equal distances horizontally and angled down to 15 to 60 degrees (see diagram 1). For smaller poles, two holes may be appropriate for adequate loadings.

IMPEL® (BORON) RODS II can also be inserted through a series of holes drilled in an upward spiral pattern (see diagram 2). Both patterns offer a convenient system that requires no costly groundline excavation.



IMPEL® (BORON) RODS II APPLICATIONS AND USES

Use caution not to cause unacceptable structural damage to the wood. If the pole is condemned, do not treat with IMPEL® (BORON) RODS II.

IMPEL® (BORON) RODS II are intended for the internal treatment of wood poles in both above ground and groundline application. They are ideal for both preventive and remedial treatments of standing poles. Even new poles benefit when applied prior to installation.

Where above ground moisture contents are sufficient for diffusion, IMPEL® (BORON) RODS II will eradicate existing decay and prevent future growth. IMPEL® (BORON) RODS II inserted above field-drilled bolt holes will protect the areas exposed to fungi during drilling. And where decay pockets are detected, IMPEL® (BORON) RODS II are a convenient, easy remedy (see diagram 3). The distance between the IMPEL® (BORON) RODS II should be maximum 20 - 25cm in the zone to be protected.

Recommended quantities of IMPEL® (BORON) RODS II for groundline treatments for various pole sizes can be found in Table 1. If not listed, use the amount of the most appropriate size rods necessary to obtain the desired retention (i.e. - 6kg BAE (remedial) or 2kg BAE (preventative) per cubic metre of wood).

THE DURABILITY OF IMPEL® (BORON) RODS II

IMPEL® (BORON) RODS II will significantly extend the service life of standing poles. The solid, highly concentrated form of boron offers a system that out performs many liquid water soluble preservatives, which tend to more rapidly leach from wood in high-exposure applications. The advantage of IMPEL® (BORON) RODS II is that they dissolve very slowly over time.

Table 1: Recommended Number of IMPEL® (BORON) RODS II per Size for Groundline* Treatments

| Pole Dia. @Groundline (cm) | Pole Circum. @Groundline (cm) | Volume (m ³) | Remedial Treatments (6kg BAE/m ³) | Preventative Treatments (2kg BAE/m ³) |
|----------------------------------|-------------------------------------|-----------------------------|-----------------------------------------------------|---------------------------------------------------------|
| | | | 12mmx100mm Rods 35g BAE/rod | 12mmx100mm Rods 35g BAE/rod |
| 20 | 63 - 70 | 0.020 | 4 | 2 |
| 23 | 71 - 77 | 0.025 | 5 | 2 |
| 25 | 78 - 87 | 0.031 | 6 | 2 |
| 28 | 88 - 94 | 0.037 | 7 | 3 |
| 30 | 95 - 102 | 0.044 | 8 | 3 |
| 33 | 103 - 110 | 0.052 | 9 | 3 |
| 36 | 111 - 117 | 0.061 | 11 | 4 |
| 38 | 118 - 125 | 0.069 | 12 | 4 |
| 41 | 126 - 133 | 0.079 | 14 | 5 |
| 43 | 134 - 143 | 0.089 | 16 | 6 |
| 46 | 144 - 150 | 0.100 | 18 | 6 |
| 48 | 151 - 158 | 0.112 | 20 | 7 |
| 51 | 159 - 166 | 0.123 | NR | 8 |
| 53 | 167 - 174 | 0.136 | NR | 8 |
| 56 | 175 - 181 | 0.150 | NR | 9 |
| 58 | 182 - 188 | 0.163 | NR | 10 |
| 61 | 189 - 198 | 0.178 | NR | 11 |

* GROUNDLINE ZONE = The 60cm zone from 15cm above ground to 45cm below

NOTE: A minimum of 2 rods is recommended even on smaller poles for adequate preservative distribution.
NR = Not recommended. (Ask for technical advice e.g. another rod size may be used).

In creosote and penta-treated poles, the oil-saturated sapwood shell provides a very effective moisture barrier that limits boron loss from internally positioned IMPEL® (BORON) RODS II. In the 8th year of testing, creosoted poles in England had retained excellent boron distribution from IMPEL® (BORON) RODS II groundline treatment. There was no reason to suspect significant boron depletion for years to come.

SAFETY ASPECTS

Borates are recognized as being one of the safest known chemical groups available for wood preservation today. Due to their low toxicity and high effectiveness, borates are fast becoming the preservative of choice over highly toxic alternatives in certain applications. In addition, the unique feature of IMPEL® (BORON) RODS II offers a borate preservative which cannot be spilled or splashed onto susceptible skin or into the environment.

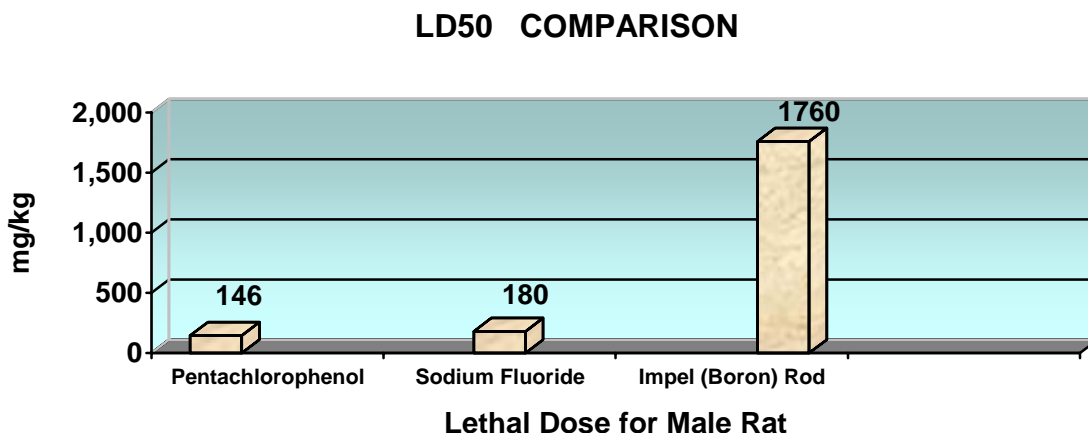
Table 2 illustrates the low toxicity of IMPEL® (BORON) RODS II when compared to two highly toxic supplemental pole treatment preservatives. The comparison is based on the standard LD₅₀ (Lethal Dosage) toxicity rating and shows that IMPEL® (BORON) RODS II have about one tenth of the mammalian toxicity of the two other chemicals.

For detailed safety and handling information, see the IMPEL® (BORON) RODS II Material Safety Data Sheet and product label.

IMPEL® (BORON) RODS II is registered under the Pest Control Product Act in Canada Reg. No. 23398.

Table 2

IMPEL® (BORON) RODS II have low mammalian toxicity compared to most other wood preservatives.



ORDERING IMPEL® (BORON) RODS II

IMPEL® (BORON) RODS II may be ordered directly through Sasco Products Limited. Please call for a quote, at :

Sasco Products Limited

31 Ilsley Avenue, Dartmouth, Nova Scotia B3B 1L5
Tel: (902) 468-2126 Fax: (902) 468-2642 www.sasco.ca

IMPEL[®] (BORON) RODS II

TECHNICAL INFORMATION

CHEMICAL AND PHYSICAL DATA

Active 100% Anhydrous Disodium Octaborate ($\text{Na}_2\text{B}_8\text{O}_{13}$)
Equivalents.....18% Sodium Oxide (Na_2O) 82% Boric Oxide (B_2O_3)
Specific Gravity2.2g/cc at 20° C
Appearance.....Cylindrical, glass-like rods. Colourless to opaque.
Odour None
Melting Point..... >1000° C
Solubility..... in H_2O 100% by weight

FIRE AND EXPLOSION DATA

None. IMPEL[®] (BORON) RODS II do not alter combustibility or ignition point of wood.
Flashpoint.....None

HEALTH HAZARD DATA

Skin Contact.....Not an irritant
Eye Contact.....May be slightly irritating; reversible.
Ingestion.....Nausea, vomiting
LD₅₀ Oral - 1760 mg/kg (rat)
Dermal..... - >2g/kg (rabbit)

CORROSION/COMPATIBILITY DATA

Corrosion.....None
CompatibilityDoes not affect glass, textiles, plastics, rubber, putty, paint, most metals, or sealants
Surface Treatment.....No effect on existing surface treatments

Storage Store in dry conditions at all times. IMPEL[®] (BORON) RODS II are highly water soluble. Always store pesticides safely and out of the reach of children, and out of contact with food.

REFERENCES

BORAX CONSOLIDATED LIMITED (1977) TIMBER

BCL Technical Data Sheet T-1

CARTWRIGHT, K.ST.G. and FINDLAY, W.P.K. (1958)

Decay of Timber and its Prevention, HH.M.S.O. London (2nd Ed)

DICKER, P.E. DICKINSON, D.J. EDLUND, M.L. and HENNINGSSON, B. (1983)

Borate Diffusion Techniques for the in-situ Treatment of Joinery. B.W.P.A. Annual Convention. p.73-81.

DICKINSON, D.J., MORRIS, P.I., and CALVER, B.

Boron as a Preservative Against Internal Decay.

Distribution Developments, March 1989. p.9-14.

DICKINSON, D. MORRIS, P.I. and CALVER, B. (1988)

The Secondary Treatment of Creosoted Electricity Poles with Fused Boron rods.

The International Research Group on Wood Preservation. Doc. No. IRG/WP/3485

DIROL, D. and GUDER, J. (1989)

Diffusion of Fused Borate Rods in Top Ends of Poles.

The International Research Group on Wood Preservation. Doc. No. IRG/WP/3518

FRIIS-HANSEN, HENNING (1987)

A Suggestion for the Improvement of the Chemical Protection of Wooden Poles.

The International Research Group on Wood Preservation. Doc. No. IRG/WP/3445

HENNINGSSON, B., FRIIS-HANSEN, H., KAARIK, A. and EDLUND, M.L. (1986)

Remedial groundline treatment of CCA poles in service. Results of chemical and microbiological analyses 6 months after treatment. International Research Group on Wood Preservation. Doc. No. IRG/WP/3388

HENNINGSSON, B., FRIIS-HANSEN, H., KAARIK, A. and EDLUND, M.L. (1988)

Remedial groundline treatment of CCA poles in service. A progress report after 28 months' testing. International Research Group on Wood Preservation. Doc. No. IRG/WP/3481

HENNINGSSON, B., FRIIS-HANSEN, H., KAARIK, A. and EDLUND, M.L. (1988)

Remedial groundline treatment of CCA poles in service. A final report after 60 months' testing. International Research Group on Wood Preservation. Doc. No. IRG/WP/3534

HENNINGSSON, B., FRIIS-HANSEN, H., KAARIK, A. and EDLUND, M.L. (1989)

The Effect of Remedial Treatment of Poles.

International Conference on Wood Poles & Piles.

MORRIS, P.I., DICKINSON, D.J. and CALVER, B.

Biological control of internal decay in Scots pine poles: A seven year experiment. The International Research Group on Wood Preservation. Doc. No. IRG/WP/1529-92