

DIFFUSION OF REMEDIAL PRESERVATIVES IN WOODEN POLES (PC-T18)

The Diffusion Process

In the field of wood preservation the use of the diffusion or osmosis process to deliver fungicides to stop rot has been known for many years. This dynamic process relies on a high concentration of water-soluble active ingredients, known as the solute, moving through a membrane (the cellular structure of the wood) to a lower concentration within the timber. The process relies on the presence of a suitable solvent i.e. water being present on both sides of the membrane. Some compounds contain active ingredients, which diffuse better than others due to their chemical structure i.e. the elements, size and electron charge. Two of the most proven diffusible compounds are salts containing either water-soluble Boron or Fluoride. It is important that diffusible preservative compounds contain more than one active ingredient so that they can effectively combat the wide spectrum of fungi and termites that attack timber. Commercially the diffusion process has been most effectively developed to remedially treat timber structures in situ. The process relies on a concentrated amount of diffusible compound being applied to areas of wood, which are capable of maintaining moisture levels over 20%. The critical zone for decay in wooden poles is the zone from groundline to 500mm below. The timber within this zone usually contains enough oxygen and water for decay to become established. It is therefore the zone within which diffusible wood preservatives are most effective. Antiquated remedial treatments relied on chemical barriers to protect the critical zone. Treatments containing creosote or copper naphthenate were applied to this zone in the hope that they would stop any decay fungi or spores from entering the timber from the surrounding environment. While limited success could sometimes be achieved on new poles this process relied on fungal spores being absent from the wood cells and that the cracks and checks that commonly occur in the pole never breached the outer chemical barrier to provide entry points for fungi. Field tests have shown that barrier treatments are very ineffective when applied to poles that have been in the ground for any length of time. Invariably these poles have been colonized by fungi and the wood behind the chemical barrier just rots away. The only way to effectively treat and sterilize the timber is via diffusible wood preservatives, which move deep into the wood cells colonized by fungi.

Diffusion of Preschem Products

Preschem has used the well-established knowledge of how and why diffusion works to develop and patent unique remedial treatments as groundline maintenance products. Polesaver Rods are solid like sticks containing high concentrations of Boron and Fluoride, which are inserted via holes, drilled into poles, they treat timber against internal decay. Bioguard contains the same actives found in Polesaver Rods but in the form of a bandage, which is wrapped around the pole below groundline and is used to treat external decay. Polesaver Rods and Bioguard Bandage both rely on moisture in the timber to be activated. The amount of chemical reservoir remaining in the bandage or the Polesaver treatment holes depends on the amount of moisture in the pole.

If little or no moisture is present, diffusion won't take place, however, the treatment remains intact until the timber becomes wet enough (i.e. over 20% for decay to take place, at which time the treatment becomes activated). When Polesaver or Bioguard reservoir becomes exhausted, it means that high concentrations of Boron and Fluoride have moved deeper into the timber. The moisture present in the timber, the faster and deeper the active ingredients diffuse and the quicker the chemical reservoir becomes depleted.

The basis of diffusible remedial timber treatments is to get the active ingredients into the timber cells where they can sterilise any active decay and protect the timber from further decay. Numerous field trials around Australia have shown that the time taken for the chemical reservoir to completely dissolve from Polesaver Rods and Bioguard treatments varies significantly from 6 months to 3 years, depending on how much moisture is present in the poles. Chemical analysis of samples taken from these poles have shown that even when no chemical reservoir remained, fungi toxic amounts were still present in the timber for a further a 2-3 years. Of active ingredients required to kill active fungi in wood fungi toxic concentrations are levels. Lower amounts required to prevent decay from becoming re-established. Fungi static concentrations. These trials and commercial usage of both these products have proven that both treatments are effective in diffusing into the groundline portion of poles, sterilising the timber and preventing further attack for 3-4 years, regardless of rainfall, soil type, etc. In fact, Preschem believes that further monitoring of treated poles may prove that they protection period may be significantly longer. It takes up to 10 years for class 1 and 2 poles to become colonized by decay fungi to an extent whereby they start to affect the poles strength. When these poles are treated with Polesaver or Bioguard the treatments can completely eliminate decay fungi in the poles, thereby reinstating the poles as if it was new. If no more treatments are applied it may take an additional 10 years before decay fungi can re-colonize the timber to an extent where they can affect the poles strength again. Only time will tell.