



## TIMBER PRESERVATIVES

Preservatives are chemical formulations that, correctly applied, prevent or slow down deterioration of timber and thereby help preserve the original characteristics of the timber, particularly in respect of strength, cross-sectional dimensions, freedom from distortion, and smoothness of surface. Preservatives differ from many other coatings (such as decking oils) in that they are not intended to beautify the timber; they are strictly functional. Protected from fungi and insects, timber will last for thousands of years.

### FUNGI

Fungi exist as microscopic spores that are distributed by wind, water and direct contact. Timber with a moisture content consistently over about 20% is a viable habitat for fungal spores. End grain of timber, being particularly prone to absorb water, is often the area first invaded. Once in the timber, the fungus will grow microscopic strands called hyphae that extend into the timber like tendrils (called mycelium). The hyphae are used for food gathering and for reproduction.

Fungi that consume the lignin and cellulose in the wood leave the wood white. Fungi that consume primarily cellulose in the wood leave the wood brown. Fungi leave the wood weakened and structurally unsound.

Fungi need a food supply, moisture (over 20%), oxygen and warmth (4C to 60C) to thrive. Elimination of just one of these elements will prevent attack. The food supply can be rendered toxic to the fungal organism, denying it food. Timber can be kept dry, denying the fungal organism essential water. It is not practical to try to control oxygen and temperature in the field. Effective preservatives, then, are formulations that are toxic to fungi and impart water-repellence to the wood.

### INSECTS

Termites in southern Australia – south of the Tropic of Capricorn – are subterranean only. Main species are *Coptotermes acinaciformis* and *Coptotermes frenchi*. They live in the soil and move through it to travel to food sources. They do not fly and invade houses, although there is a popular misunderstanding that they do. A termite colony is a highly organized social structure comprising workers (90%), soldiers, alates and the egg-laying queen. Workers have strong jaws and eat the wood. Alates are breeding males and females that periodically fly from the nest, shed their wings, and attempt to start their own colony. Few survive this ordeal.

Borers are of three main types: *Ambrosia*, *Lyctus* and *Anobium*.

**Ambrosia** borers target freshly felled trees, bore a hole directly into the timber, sow special fungal spores as a food source, and cannot live if the fungus dies. The fungus dies when the timber is dried, and the insect dies too. No special treatment is required to deal with this insect as its life is inevitably extinguished anyway.

Structural threat: Nil

Identification: black stained pinholes about 2mm in diameter.

**Lyctus brunneus** targets the sapwood of some hardwoods - sapwoods high in starch. It requires pores in the timber to lay its eggs; softwoods do not have pores and therefore cannot be attacked. The insect will eat all of the sapwood in many cases, but will not eat the heartwood. Structural timbers are graded with the sapwood in mind. *Lyctus*-susceptible sapwood species (such as Messmate) are only permitted to have a small amount of sapwood in the structural section and it is assumed, in grading, that this sapwood will be consumed. Given this, signs of *Lyctus* in framing for example are of no consequence and can be ignored. If a structural member is significantly affected, the solution is to replace it with new *Lyctus*-resistant timber.

Structural threat: Low

Identification: pinholes about 2mm diameter and a very fine talcum-like powder.

**Anobium punctatum** targets the sapwood and heartwood of softwoods; hardwoods are rarely attacked. It is usually brought into the home in old furniture. Because it can eat the entire piece, *Anobium* is a potential structural, furniture and flooring menace and does need to be controlled.

Structural threat: for softwoods only.

Identification: pinholes about 2mm diameter and a coarse, gritty powder.

There are two main types of preservatives: pressure impregnated, and surface-applied. These are preventative designed to prevent attack. Also available are separate treatments to kill fungi and insects in timber that has already been attacked.

*Beautiful, Renewable, Timber*

Hours of Business

Monday to Friday 9.00am—5.00pm

Saturday 9.00am—5.00pm

Sunday Closed



## PRESSURE IMPREGNATED PRESERVATIVES

Pressure impregnation of timber is the most durable method of applying preservatives to timber. Such preservatives are chemically bonded into the timber cells. Surface applied preservatives, by contrast, will weather away over time and need regular re-application to provide continuing protection. Australian Standard AS1604 sets out six hazard levels for timber. The main levels are:

- H2 (protected from weather, borers and termites only); pine house framing
- H3 (termites, borers and fungi, outdoor above ground); pergola beams, decking
- H4 (termites, borers and fungi, outdoor in-ground); non-critical structural – fence posts
- H5 (termites, borers and fungi, outdoor in-ground); critical structural - house stumps

The higher the hazard number, the greater the retained loading of preservative in terms of kilograms per cubic metre of timber. Timber treated to the standard is marked with a paper label or stamp showing the mill code, preservative code and hazard level. The standard requires that complying timber be re-dried after treatment to 8% to 15% moisture content. The standard is not mandatory.

**The preservatives themselves are only a means to achieving an end – the correct level of hazard protection for the intended use.** The critical issue therefore is the Hazard Level, not the preservative type. There are four common types or preservatives used in construction timbers.

Copper Chrome Arsenic or CCA: A water-borne preservative. Copper acts as the fungicide and arsenic as the insecticide. The chromium is to chemically “fix” these active preservatives in the timber so that they are not lost in weathering or leaching. Pale green timber that stays pale green. Commonly used for fence posts, palings, rails, deck bearers and joists, stumps, pergola beams and rafters, and retaining walls. Available in H3 to H6. Treatment does not impart water repellency. Stainable, paintable.

Alkaline Copper Quaternary or ACQ: A water-borne preservative. Copper acts as the fungicide and insecticide, and ammonium compounds enhance fungicidal qualities. Pale green timber that turns brown under sunlight. Does not contain arsenic. Available in H3 to H5. Treatment does not impart water repellency. An alternative to CCA. Stainable, paintable.

Copper Azole or CA: A water-borne preservative. Copper acts as the fungicide and azole as the insecticide. Pale green timber that weathers to honey brown. Does not contain arsenic. Available in H3 to H4. Treatment does not impart water repellency. An alternative to CCA. Stainable, paintable.

Light Organic Solvent Preservative or LOSP: A solvent-borne preservative. Essentially organic fungicides and insecticides in a highly volatile hydrocarbon solvent base. Advantage is that timber so treated does not expand, contract or distort. The volatile solvent carrier simply evaporates leaving the preservatives in the timber. Treated timber retains its natural colour. Does not contain arsenic. Commonly used for window frames, railings, balusters, turned verandah posts and treated exterior plywood. Usually only used for H2 and H3. Some treatments do impart water repellency; check with supplier. Stainable, paintable.

## SURFACE-APPLIED PRESERVATIVES

Surface-applied preservatives are an effective means of providing greatly extended outdoor service life to timbers not normally considered durable. Natural (un-treated) timbers are categorized into four classes for durability purposes. Ratings are based upon observed resistance to fungi, termites and borers.

|         |   |
|---------|---|
| Class 1 | Extremely durable. Expected life of heartwood in-ground more than 25 years. |
| Class 2 | Durable. Expected life of heartwood in-ground 15 to 25 years.               |
| Class 3 | Moderately durable. Expected life of heartwood in-ground 8 to 15 years.     |
| Class 4 | Non-durable. Expected life of heartwood in-ground less than 5 years.        |

Unfortunately, many of the most durable timbers are not ideal for structural use, being dense, heavy, scarce, expensive and rarely available in a specific stress grade. Conversely, many of the non-durable timbers are excellent for structural use, being light, readily available (usually plantation grown), inexpensive and almost always available in a range of stress grades. Again unfortunately, very few of these excellent structural timbers are able to be pressure treated with preservatives; their cell structure prevents effective deposition of the preservative chemicals. Oregon, Victorian Ash and Messmate are impossible to pressure treat effectively. Pinus radiata, by contrast, is able to be treated quite readily and is therefore the most commonly available treated timber for home construction.



Surface-applied preservatives and non-durable structural timbers are an excellent combination in home construction, so long as access to the structure is unobstructed and **it will be possible to re-apply the preservative at regular intervals in the future**. Some surface-applied preservatives are fungicidal, some fungicidal and insecticidal, and some provide water repellency as well. Check the product specification to make sure that the product will do the job you require. Set out below are descriptions of the main surface-applied preservative types.

### **COPPER NAPHTHENATE OIL**

For above-ground use only; not effective on timber below ground as cannot recoat. Protects against fungi and some borers, but not against termites. Prevents decay but will not kill fungi if already in the timber. The mineral oil base acts as the carrier for the copper, facilitates absorption by the timber, and provides excellent water repellency. Applied as two flood coats by brush, roller, spray or dipping. Good for structural timbers such as deck bearers, deck joists, rail-to-post joints in fencing, wholly exposed beams; also for cladding and decking boards. Strong green colour on application but changes to brown in several weeks. Can be painted over with an oil-based primer and alkyd enamel topcoats (but not acrylics) after first allowing the preservative oil to dry for four weeks. Turps clean-up.  
**Brands: PRESICHEM TIMBER PRESERVER; PROTIM CN OIL; CELLAVIT GREEN; TWA WOODCARE HEAVY OIL PRESERVATIVE**

### **COPPER NAPHTHENATE EMULSION**

For below-ground use and above-ground use. Protects against fungi and borers but not termites. Prevents decay but will not kill fungi if already in the timber. Contains oil for water repellency. Good for posts and poles in-ground, and all above-ground structural timber. Supplied as a gel in 300 gramme cartridge and in cans. Brush-on or inject into pre-drilled holes in the timber. Good for injecting into posts and poles at ground level to provide internal protection against decay. Cannot be painted over. Treated timber turns dark brown. Quite durable; re-apply after five years. Not suitable for areas of human contact.  
**Brands: PROTIM CN EMULSION; TWA WOODCARE WOODTREAT**

### **CREOSOTE**

For above-ground use. Creosote oil is obtained from the distillation of coal tar. Strongly fungicidal and insecticidal. Brushed on, does not penetrate far into the wood; prone to weathering as a result and needs frequent re-application to be effective. Oily, smelly and ruins clothes on contact when wet. Cannot be painted over as bleeds through the paint film. A primitive preservative now out of favour.

### **CREOSOTE EMULSION**

For above-ground use. An improved version of creosote oil. Protects against fungi, borers and termites. Prevents decay but will not kill fungi if already in the timber. Much less odour than plain creosote but similar preservative effectiveness. Once dry, coated timber can be handled. Works best on round poles and rough sawn timber; poor absorption on dressed timbers. Useless for below-ground preservation of posts and poles if just brushed on. Need large amounts puddled around the post into the soil to be effective; even then not as effective, against fungi below-ground, as Copper Napthenate Emulsion. Cannot be painted over as bleeds through the paint film. Quite durable; re-apply after three years.

### **LIGHT ORGANIC SOLVENT PRESERVATIVE**

For above ground use only. Zinc naphthenate and permethrin in a hydrocarbon solvent base. Protects against fungi, borers and termites. Spreads easily and is absorbed by dry timber readily. Apply two flood-brush coats with 24 hours to dry. Only apply AFTER all sawing, planing, notching and drilling etc. is finished. Coat every nook and cranny; use a toothbrush for bolt holes. Works best on rough sawn timber; poor absorption on dressed timbers. Dries clear. Does not contain oil and will weather away if not over coated. Can be painted over with Protim "Raincoat", or with an oil-based primer followed by either acrylic or alkyd enamel topcoats. Over coating will seal in the preservative and prevent weathering, ensuring permanent protection. Good for use on Oregon, Victorian Ash and glulam in weather-exposed conditions such as carport beams. Turps clean-up.  
**Brands: PROTIM XJ CLEAR; CELLAVIT**

#### Hours of Business

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## **FUNGI AND INSECT KILLERS, FOR TIMBER ALREADY ATTACKED**

Most preservatives perform the role of preventing attack by fungi and insects and are of little use in killing pre-existing infestations. There are two products that will kill pre-existing infestations; these have a preventative function to a degree, but because they only kill fungi and insects in a localized area of the timber, they are not used for general first-line defence.

### **INJECTABLE GEL**

This is supplied in a cartridge for use in a standard sealant gun. Based on boron and fluorine compounds. Strongly fungicidal and insecticidal. Applied by drilling holes in the affected timber and injecting the gel into the holes, then plugging the holes with dowels. The preservative diffuses through the timber whenever the timber has a moisture content greater than about 20%, following the moisture relentlessly. The fungal hyphae also follow the moisture. The gel wins! Excellent for combating decay in larger sections of timber such as deck bearers, joists, and posts in-ground at ground level. Does not adversely affect paintability of the timber, but corrosive to bare steel fasteners. Check and replenish reservoir holes every three years.

Brands: **TWA WOODCARE NO ROT GEL**

### **SOLID STICK**

Supplied in packs of 20 sticks with dowel plugs to match. Each stick is 30mm long and 10mm in diameter. Based on boron and fluorine compounds. Strongly fungicidal and insecticidal. Applied by drilling 40mm deep holes and inserting a stick in each hole, then plugging with dowels supplied. Preservative sticks expand on contact with moisture in the wood, then diffuse through the wood following the moisture. Excellent for combating decay in window frames and smaller sections of timber, and for stumps and fence posts at ground level. Maximum diffusion reach 100mm radius around the stick. Does not affect paintability but corrosive to bare steel fasteners. Check and replenish holes every three years.

Brands: **PRESCHEM NO-ROT STICKS; TWA WOODCARE NO ROT RODS**

### **PAINT ON.**

Brands: Protim D-Mould Water based Mouldicide which is environmentally safe.

### **WATER REPELLENTS**

Pressure treated and naturally durable timbers may only need a water repellent rather than a fungicide and insecticide. A water repellent will help prevent rapid moisture absorption and loss, and thereby prevent cracking, checking and warping. Some water repellents also contain a mouldicide to prevent blackening of the timber surface.

Brands: **CELLAVIT INDUSTRIAL CLEAR; PROTIM RAINCOAT (in clear and colours); CELLAVIT GENERAL PURPOSE CLEAR (contains a fungicide as well); TWA WOODCARE CLEAR WATER REPELLENT CUTEK**

## **RE-TREATMENT FOR CUT PRESSURE-TREATED TIMBER**

Cutting or drilling pressure treated timber may expose untreated heartwood. Treating the cut areas with a brush-on preservative will restore in large measure, the preservative characteristics at those points.

Brands: **PROTIM RESEAL; PROTIM XJ; TWA WOODCARE ENSEAL CLEAR FOR H2 & H3 TREATED TIMBER; TWA WOODCARE ECOSEAL GREEN FOR H3 & H4 TREATED TIMBER; TWA WOODCARE RE-TREAT for endsealing & retreatment of CCA/ACQ/ Tanilith treated pine after cutting or machining; TWA WOODCARE CLEARWOOD PRESERVATIVE for endsealing LOSP TREATED TIMBER and outdoor joinery.**

### References:

Product literature from Osmose, Preschem Pty Ltd, Thomson White Australia and Mabon's Timber Protection Pty Ltd.

"The commercial timbers of NSW and their uses", by Keith Bootle

"Wood in Australia" by Keith Bootle

"Treated Pine – a technical guide", by Pine Australia

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