TREATMENT OF TIMBER

The combination of species and treatments used by OSA and its recommended installation practices has proven effective in providing landscaping that is durable and ages gracefully. By contrast, vague timber specifications such as "F14 hardwood treated to H5" provide no certainty of long term outcomes.

HARDWOOD

Preservation or Sapwood Stabilisation?

Sapwood is the only portion of hardwood that can be treated. OSA's timber bollards contains only a small amount of sapwood. The photo shows the typical area that can be treated in a batch of 200x100 timber. Treatment affects the shaded areas only and offers no chemical protection to the remaining timber. If the sapwood in this pack was not treated and completely decayed the bollard would still be within recognised structural limits. The treatment process on sawn timber bollards serves an important task of stabilising the above ground sapwood but it does not preserve the critical heartwood portion in the ground. Species selection, grade and correct installation is far more critical than treatment considerations.

Picture shows sapwood (highlighted in red) in un-treated bollards

A request for H5 treatment will do absolutely nothing worthwhile to the timber but may cause complications by introducing CCA timber. Ignoring the present perceived health risk, the CCA treated bollards may be difficult to dispose of at the end of their service life. Treatment will not compensate for inappropriate specification and installation

OSA takes care of this for you.

PINE

Correct treatment is critical

Unlike hardwood the chemical treatment of pine is critical. Pine has very poor natural durability (Durability 4 in ground) yet frequently preservation of sawn pine is inadequate. While pine rounds treat well and give a very effective envelope protection, with sawn sections a large portion can be left untreated because the heart of pine is virtually as untreatable as hardwood. The image shows the cross section of a 200x100 pine bollard incised to a depth of only 3mm instead of required 10mm. It has been sprayed with a chemical that shows the penetration of preservative.

To achieve the legal requirements for H4 treatment of pine in large section timbers require incising to a depth of 10mm. Steaming prior to treatment can improve penetration also. A single stage process should be avoided. Depending on availability OSA uses both materials.

Bollards are a grey area as to whether CCA can be used and frequently they are supplied CCA treated (particularly pine). OSA uses Tanalith E (no chrome or arsenic) with a wax additive to provide water repellancy to the pine.

Following is detailed information on timber treatment and maintenance which explains many of the misconceptions of timber treatment and has an important education value. Informed readers may wish to skip to *Maintenance of Exterior Timber.*

Note: Natural durability refers only to mature outer heartwood. Sapwood of all timber species is considered non-durable.

Class 1	timbers of the highest natural durability which may be expected to resist both decay and termite attack for at least 25 years and up to 50 years	*Grey Box* *Grey Ironbark* *Red Ironbark* *Yellow Box* *Yellow Gum* *Tallowwood*
Class 2	timbers of high natural durability which may be expected to have a life of about 15 to 25 years.	*Jarrah* *River Red Gum* *White Mahogany* *Yellow Stringybark* *Red Box* *Spotted Gum* *White Cypress Pine*
Class 3	timbers of moderate durability which may be expected to have a life of about 8 to 15 years	*Broad-leaved Peppermint* *Southern Blue Gum* *Sydney Blue Gum* *Brush Box* *Manna Gum* *Candle bark*
Class 4	timber of low durability which may last about 1 to 8 years. These timbers have about the same durability as untreated sapwood, which is generally regarded as Class 4, irrespective of species.	*Mountain Ash* *Douglas Fir (Oregon)* *Radiata Pine* *Western Red Cedar* *Hoop pine* *Slash Pine*

Importance of timber preservation

It must be accepted that wood is perishable hence; timber may suffer deterioration through the action of insects, fungi and marine boring organisms.

This deterioration however, can be reduced if conditions are made unsuitable for these destructive agents.
Timber can also be protected from attack by making the wood unpalatable to attacking organisms. Timber preservation uses chemicals which improve the natural durability of the sapwood, rendering it toxic and thus unpalatable to insects, fungi and marine borers.
The natural durability of timber is classified according to the resistance of the heartwood to deterioration. It has been found that the sapwood of all timbers is always non-durable and will rapidly deteriorate if not protected.

Natural durability

The heartwood of all timbers can be classified according to its natural durability (or resistance) against attack by wood destroying organisms such as termites, borers and decay fungi. The resistance is due to the presence of special tannins, oils, resins and extractives in the heartwood that repel or kill insects and decay. There are four classifications of natural durability with examples for each shown below.

Hazard	Durability	Sapwood	Heartwood
H1	1 and 2	100%	Penetration Not Required
	3 and 4		
H2	1 and 2	100%	Penetration Not Required
	3 and 4		5mm (<35) 8mm (>35) Envelope*
H3	1 and 2	100%	Penetration Not Required
	3 and 4		5mm (<35) 8mm (>35) Envelope*
H4	1 and 2	100%	Penetration Not Required
	3 and 4		10mm Envelope*
H5	1 and 2	100%	Penetration Not Required
	3 and 4		20mm Envelope*
H6	1 and 2	100%	Penetration Not Required
	3 and 4		20mm Envelope*

There are many different situations and applications in which timber can be used. The Australian Standard AS1604 (1997) has provided strict guidelines for the amount of chemical preservative required in the sapwood of timber in order for the wood to perform as we expect.

Hazard level and timber preservation specifications

The treatment of timber with preservatives is concerned mainly with the protection of sapwood. The amount of preservative required in the timber is expressed as its *Retention Level*

There are three legislated standards that specify the required minimum retention levels for specific hazards and end uses. The national standard is AS1604 (1997) while Queensland has the 'Timber Utilisation and Marketing Act' (TUMA) and New South Wales has the 'Timber Marketing Act' (TMA). Each standard uses the same terminology to describe the six main exposure and biological hazards, for example:

Hazard Level: Exposure & Biological Hazard AS1604 (2000)	Typical Use
H1- interior above ground, completely protected from weather and well ventilated. Beetles, borers only.	framing, flooring, furniture, interior joinery
H2 - interior above ground, partially protected from wetting. Termites, borers only.	framing, flooring
H3 - exterior above ground, subject to periodic wetting. Decay, termites and borers.	weatherboard, fascia, window joinery, exterior framing and decking
H4 - exterior in-ground, subject to severe wetting. Decay termites and borers.	fencing, greenhouses, pergolas and landscaping timbers
H5 - exterior in-ground, with or in fresh water. Decay, termites and borers.	retaining walls, piling, house stumps, building poles, cooling tower fill
H6 - SW and NW marine water exposure. Marine borers.	boat hulls, marine piles, jetty cross-bracing, landing steps

In any particular charge of treated timber there will be a range of preservative penetrations and retentions depending on the moisture content, sapwood:heartwood ratio, species, treatment schedule and inclusion of additives.
The table shows the treatment requirements considering natural durability.

Tanilith E (copperbased) preservatives

In response to increasing environmental pressure to find preservative formulations that have reduced reliance on non-biodegradable and heavy metal constituents, a number of copper-based preservatives have been developed such as Tanalith E (or Copper Azole). These preservatives have copper as a primary active constituent as well as an organic co-biocide such as Tebuconazole. Use of these products is limited in Australia to date but will increase in coming years. Their main advantage is the elimination of arsenic and chromium which is seen as an improvement for occupational health, environmental liability and disposal of wastes. OSA was the first company to treat with Tanalith E in Australia.