

Timbers Used for Window Frames and Aluminium Window Reveals - A Review

by
Mick Hedley and Dave Page

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WINDOW REVEALS - A REVIEW**

by
Mick Hedley and Dave Page
Ensis

Rotorua, New Zealand

Report Prepared for:

Window Association of New Zealand Inc
PO Box 11-464 Manners Street,
WELLINGTON

Correspondence to:

Approved for Release

Unit Manager
Wood Processing and Products
Ensis
Private Bag 3020
ROTORUA

Unit Leader

M. E. Hedley

Date

5 November 2004

Phone: (07) 343-5899

Fax: (07) 343-5507

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TIMBERS USED FOR WINDOW FRAMES AND ALUMINIUM WINDOW REVEALS - A REVIEW

1. Natural Durability of Species Listed

We have added to/amended the list supplied.

Note that durability ratings are those in ground contact. It is generally accepted that for above ground durability, species can be assigned to the next highest class, i.e a species in Class 3 for in-ground durability would be Class 2 in above ground exposure. There are, no doubt, exceptions to this and one would be hard pressed to accept that all Class 4s in ground would be Class 3 above ground. However, some which have been tested (in Australia) and where this has been shown to be true include Victorian Ash (*Euc. regnans*) and Tasmanian Oak (*Euc. delegatensis*).

Some of the trade names e.g. Jarrah - Pacific, Matai - Pacific, include several species, which may have different durabilities. By and large, all species ranked Class 3 or better are suitable for both H3.1 (exposed outside) and H1.2 exposures. Those at the lower end of Class 3 would be suitable for internal use where a minimum of 15 years durability is required. Those ranked 3-4 would be marginal for achieving this durability expectation. Species rated Class 4 are not (with exceptions noted above) recommended for use untreated in any situations where there is a risk of excessive wetting.

2. Preservative Treatments

We have completed the table as best we can, although it needs a bit of interpretation.

Column headed "**Heart**"

A tick (✓) in a sub-column means it would be good for this minimum life; a cross (✗) means it is unlikely to last the distance; a cross/tick (✗/✓) is marginal for that life.

Column headed "**Sapwood Untreated**"

It is unlikely that the sapwood of many species would last 5 years if used in situations where they could get wet. Some, particularly those that resist wetting (e.g. Douglas-fir, Hemlock) might, but most wouldn't. However, it is the degree of exposure to high moisture contents which is difficult to quantify and each situation would have to be taken on its individual merits.

If an unequivocal determination is required, then 5 years should be taken as maximum for untreated sapwood.

Column headed "**Sapwood Treated**"

50 year Durability

Ticks mean this species sapwood could be treated to H3.2 specification (e.g with CCA). Most of the hardwoods and some of the softwoods come under this category. However, treatment of hardwoods to Hazard Classes other than H1.1 and H1.2 is not included in NZS 3640 and ability to be treated to the required specification would have to be demonstrated before it would be accepted in NZS 3640 and consequently in NZS 3602 or Building Code. Thus, while it is technically feasible to treat those hardwood species which have H3.2 against their names, it is probably not a realistic option at present.

15 year Durability

A tick in this column means that this species could be treated with LOSP to Hazard Class H 3.1 (6) or H1.2 (1,2). Again, there are practical limitations here, with only pine species being currently approved for LOSP treatment.

5 year Durability

This category may be irrelevant as all untreated sapwood has been given a 5 year durability. However, one interpretation would be that untreated sapwood would have a **maximum** of 5 years' durability, whereas treated sapwood would have a **minimum** of 5 years' durability. The only realistic option here is boron treatment for the vast majority of species listed and, probably, the only practical application method would be the TimberSaver® spray process.

However, when determining preservative treatment requirements for aluminium window reveals, it is important to review this in the context of development of Hazard Classes H3.1, H3.2 and H1.2 as a pragmatic response to some of the problems associated with leaky buildings.

Development of Hazard Class H3 (whether H3.1 or H3.2) and Hazard Class H1.2 treatments was conceptually quite different.

A general definition of H3 Hazard Class is:

"Exposed to the weather, above ground, subjected to periodic wetting."

Thus, timber in most H3 exposures **is expected to be** subjected to wetting (rain). Exceptions are those components which have additional protection from paint, but in these instances, the paint coat is usually exposed to rain wetting, unless protected by eaves etc.

The critical difference between H3.1 and H3.2 is that the former is for components with a required minimum life span of 15 years, whereas the latter is for components - generally structural - with a required minimum durability of 50 years. An exception to this rule is that some framing components are listed in NZS 3602:2003 (Table 1) as requiring H3.1 treatment. Generally, these are more critical components than those requiring the H1.2 level, or those with a supposed higher risk of inadvertent rain wetting.

A general definition of Hazard Class H1.2 is:

"Protected from the weather, above ground, but with a possibility of exposure to moisture and a risk of attaining a moisture content conducive to decay"

Thus, Hazard Level H1.2 was contrived as protection for framing components which **are not expected to be** exposed to wetting, but there may be a strong possibility of this occurring if the exterior building envelope leaks. In these circumstances, treatment is seen as temporary protection against decay until leaks are detected and rectified. In these situations, long term durability still relies on maintaining a moisture content below 18 %.

It is our opinion that aluminium widow reveals come, to a large extent, into this latter category. However, in most situations where they are used, it would be difficult to argue that the risk of wetting of internal window reveals is a new phenomenon and one only peculiar to "leaky building syndrome".

Rather, the risk, in most cases, should be regarded as an inherent risk irrespective of building designs and styles - a risk which has neither increased nor decreased with changes to building styles and building materials.

Thus, there is a strong case to support use of timber species used for aluminium window reveals to be continued in the manner which they have traditionally always been used.

However, since new timber species for window reveals are likely to be introduced over time, it would seem prudent for these untried species with known susceptibility to decay and any timbers which are predominantly sapwood, be preservative treated to the H1.2 level.

As noted above, options for H1.2 treatment of most species listed, or newly introduced species, are limited to boron, and there are some practical difficulties and limitations in undertaking this.

Critical list of species

In terms of volume, the most important species used for window reveals are:

- A. Pacific Rimu
- B. Radiata
- C. Macrocarpa
- D. Pacific Jarrah
- E. Kwila
- F. Island Kauri
- G. Tasmanian Oak
- H. Saligna
- I. Victorian Ash
- J. Silver Beech

Of these, A, C, E, G, H, I have sufficient heartwood durability for a minimum 15 year life, if used in either exterior or interior situations; D, F, J would be marginal for a 15 year durability, although, for interior reveals, this would be more likely than not. B would be unlikely to consistently give 15 years durability, even as interior reveals, unless further protected with paint or preservative treatment.

The sapwood of all will be treatable with boron to the H1.2 level (or, with TimberSaver®, to its Alternative Solution equivalent) to achieve a 15 year durability as internal window reveals.

Timbers used for Window frames and Exterior Reveals

As per the requirements of Table 1 B2/AS1

Alternative Solutions selection table

		Ticks indicate that the species meet the NZBC E2 Durability requirements as follows: 50 years if structural 15 years if external window/door joinery 5 years if internal window joinery Crosses indicate not the product is not suitable								
Common Name	Botanical Name	Heart			Sapwood Untreated			Sapwood Treated*		
								The number refer to the treatment notes below		
		50 yr	15 yr	5 yr	50 yr	15 yr	5 yr	50 yr	15 yr	5 yr
Ash - Victorian	Eucalyptus regnans	✗	✓	✓	✗	✗	✓	H3.2 ¹	✓ ² 1	✓ 1
	Eucalyptus delegatensis)	✗	✓	✓	✗	✗	✓	H3.2	✓ 1	✓ 1
Ash NZ Also known as Messmate	Eucalyptus obliqua	✗	✓	✓	✗	✗	✓	H3.2	✓ 1	✓ 1
Cedar - Western Red	Thuja plicata	✗	✓	✓	✗	✗	✓	✗	✓ 1	✓ 1
Cherry - American	Prunus serotina	✗	✓	✓	✗	✗	✓	H3.2	✓ 1	✓ 1
Douglas Fir Oregon – North American	Pseudotsuga menziesii	✗	✗/✓	✓	✗	✗	✓	✗	✓ 1	✓ 1
Fastigata	Eucalyptus fastigata	✗	✓	✓	✗	✗	✓	H3.2	✓ 1	✓ 1
Hemlock	Tsuga heterophylla	✗	✗	✓	✗	✗	✓	✗	✓ 1	✓ 1
	Abies amabilis	✗	✗	✓	✗	✗	✓	✗	✓ 1	✓ 1
Iroko Also known as African Teak	Chlorophora excelsa	✓	✓	✓	✗	✗	✓	✗	✓ 1	✓ 1
Jarrah	Eucalyptus marginata	✓	✓	✓	✗	✗	✓	H3.2	✓ 1	✓ 1
Jarrah - Pacific	Sapotaceae	✗	✗/✓	✓	✗	✗	✓	✗	✓ 1	✓ 1
Karri	Eucalyptus diversicolour	✓	✓	✓	✗	✗	✓	H3.2	✓ 1	✓ 1
Kauri – Island Also known as Fijian Kauri and Dakua makadre	Agathis vitiensis	✗	✗/✓	✓	✗	✗	✓	✗	✓ 1	✓ 1

Common Name	Botanical Name	Heart			Sapwood Untreated			Sapwood Treated*		
Kwila Also known as Ipil and Merbau	Intsia bijuga	✓	✓	✓	✗	✗	✓	✗	✓ 1	✓ 1
Lawson Cypress	Chamaecyparis lawsoniana	✗	✓	✓	✗	✗	✓	✗	✓ 1	✓ 1
Macrocarpa	Cupressus macrocarpa	✗	✓	✓	✗	✗	✓	✗	✓ 1	✓ 1
Matai – NZ	Prumnopitys taxifolia	✗	✓	✓	✗	✗	✓	✗	✓ 1	✓ 1
Matai - Pacific	Podocarpus Podocarpaceae	✗	✗/✓	✓	✗	✗	✓	✗	✓ 1	✓ 1
Mexican Cypress also known as Mexican Pine	Cypress lustianica	✗	✓	✓	✗	✗	✓	✗	✓ 1	✓ 1
Oak - American	Quercus alba	✗	✓	✓	✗	✗	✓	H3.2	✓ 1	✓ 1
Oak - Tasmanian Blackbutt	Eucalyptus delegatensis Eucalyptus pilularis	✗ ✗/✓	✓ ✓	✓ ✓	✗	✗	✓ ✓	H3.2 H3.2	✓ 1 ✓ 1	✓ 1 ✓ 1
Pine (Radiata)	Pinus radiata	✗	✗/✓	✓	✗	✗	✓	✓ ³ H3.2	✓ 2,6	✓ 1,2
South Island Red Beech	Nothofagus fusca	✓	✓	✓	✗	✗	✓	H3.2	✓ 1	✓ 1
Redwood	Sequoia sempervirens	✗	✓	✓	✗	✗	✓	✗	✓ 1	✓ 1
Rimu – New Zealand	Dacrydium cupressinum)	✗	✓	✓	✗	✗	✓	✗	✓ 1	✓ 1
Rimu - Pacific	Decussocarpus vitiensis Or Podocarp Brown Tedecussocarpus	✗	✓	✓	✗	✗	✓	✗	✓ 1	✓ 1
Saligna Also known as Sydney Blue Gum	Eucalyptus saligna	✗	✓	✓	✗	✗	✓	H3.2	✓ 1	✓ 1
Silver Beech	Nothofagus menziesii	✗	✗/✓	✓	✗	✗	✓	H3.2	✓ 1	✓ 1
Tawa	Beilschmiedia tawa	✗	✗	✓	✗	✗	✓	✗	✓ 1	✓ 1
Teak	Tectona grandis	✓	✓	✓	✗	✗	✓	✗	✓ 1	✓ 1
Vitex	Vitex cofassus	✓	✓	✓	✗	✗	✓	✗	✓ 1	✓ 1
Western Red Cedar	Thuja plicata	✗	✓	✓	✗	✗	✓	✗	✓ 1	✓ 1
Yaka	Dacrydium nidulum	✗	✓	✓	✗	✗	✓	✗	✓ 1	✓ 1

Notes:

- ¹ Technically feasible, but, except for pines, not included in NZS 3640
- ² Internal exposure, i.e. internal timber reveals
- ³ Only species in the table approved for this use

*** Treatment Notes**

The numbers beside the ticks in the treated sapwood columns indicate the type of timber treatment required to comply as per the table below:

Sapwood Timber Treatment Requirements	
Ref Nr.	Timber Treatment Type / Specification e.g. level of treatment to NZS 3640 to meet H 1.2
1	Boron
2	LOSP (IPBC, Tributyltin)
3	
4	
5	
	Timber Treatment Type / Specification e.g. level of treatment to NZS 3640 to meet H 3.1
6	LOSP (Tributyltin, Azoles)
7	
8	
9	
10	

Assessment of Timber Reveal Durability using BRANZ “Selecting Timber Guide”

Common Name	Botanical Name	Durability Notes form BRANZ “Selecting Timber” Published August 2004.	Density Kg/m3	Hardness Janka Method	Durability Class In Ground (See key below)
Ash - Victorian	Eucalyptus regnans	Non durable and resistant to treatment	680	4.9	4
	Eucalyptus delegatensis)	Heartwood low durability and hard to treat	620	4.9	4
Ash NZ Also known as Messmate	Eucalyptus obliqua	Moderately Durable	620-750	7.2	3
Cedar - Western Red	Thuja plicata				2-3
Cherry - American	Prunus serotina				3-4
Douglas Fir Oregon – North American	Pseudotsuga menziesii	Non Durable and hard to pressure treat.			3
Fastigata	Eucalyptus fastigata				3
Hemlock	Tsuga Heterrophylla Abies amabilis				4 4
Iroko Also known as African Teak	Chlorophora excelsa	Very Durable	640	5.6	1-2
Jarra	Eucalyptus marginata	Heartwood durable and resists treatment	820	8.5	2
Jarra - Pacific	Sapotaceae				1-2, 3-4 depends on species
Kauri – Island Also known as Fijian Kauri and Dakua makadre	Agathis vitiensis	Moderately durable, Can be treated with boron salts	545-550	4	3-4
Kwila Also known as Ipil and Merbau	Intsia bijuga and Intsia palembancia	Durable. Resists treatment	730-850	7.2-8.6 depending on origin	1-2
Lawson Cypress (Approved for use by NZS3602)	Chamaecyparis lawsoniana	Heartwood moderately durable. Takes Boron treatment, but not pressure treatment.	485	2.5	3

Common Name	Botanical Name	Durability Notes form BRANZ “Selecting Timber” Published August 2004.	Density Kg/m3	Hardness Janka Method	Durability Class In Ground (See key below)
Macrocarpa (Approved for use by NZS3602)	Cupressus macrocarpa	Heart moderately durable. Sapwood takes diffusion treatment (Boron H1?) Does not take pressure treatment	485	2.8	3
Matai - NZ	Prumnopitys taxifolia	Non durable. Difficult to pressure treat, susceptible to borer.	610	3.4	3
Matai - Pacific	Podocarpus Podocarpaceae				3-4 assuming it is Dakua salusalu
Mexican Cypress also known as Mexican Pine (Approved for use by NZS3602)	Cupressus lustianica	Heartwood moderately durable Does not pressure treat. Can be boron treated by diffusion	460	2.5	3
Oak - American	Quercus alba	Moderately durable – resistant to treatment	735	6	2
Oak - Tasmanian Also known as a group of timbers including Alpine Ash Blackbutt and Messmate	Eucalyptus delegatensis	Heartwood low durability and hard to treat	620	4.9	4
	Eucalyptus pilularis	Heartwood durable Difficult to treat	900	9.1	2
Pine (Radiata)	Pinus radiata	Non durable but readily accepts all levels of chemical treatment	450-550	3.3	4
South Island Red Beech	Nothofagus fusca	Heartwood durable. Sapwood difficult to treat with CCA.	740	5.2	2
Redwood (Approved for use by NZS3602)	Sequoia sempervirens	Heartwood moderately durable, sapwood non durable but can be treated	450	1.8	3
Rimu – New Zealand	Dacrydium cupressinum)	Heartwood Durable Sapwood non-durable Difficult to pressure treat	600	3.5	3

Common Name	Botanical Name	Durability Notes form BRANZ “Selecting Timber” Published August 2004.	Density Kg/m3	Hardness Janka Method	Durability Class In Ground (See key below)
Rimu - Pacific	Decussocarpus vitiensis Or Podocarp Brown Tedecussocarpus				3-4
Saligna Also known as Sydney Blue Gum	Eucalyptus saligna	Heartwood moderately durable	850-900	8.1	3
Silver Beech	Nothofagus menziesii	Non durable in ground. Resists borer. Heart resists CCA	450-650	4 varies with density	3
Tawa	Beilschmiedia tawa	Non durable, but accepts CCA and diffusion treatments (except for black heartwood) Susceptible to borer	722	7.1	4
Teak	Tectona grandis				1-2
Vitex	Vitex cofassus				1-2
Western Red Cedar (Approved for use by NZS3602)	Thuja plicata	Heart moderately durable, sapwood can be treated. NZ grown less durable.	360	1.5	2-3
Yaka	Dacrydium nidulum				3

Durability Ratings:

Class	Description	In-ground life expectancy (Years)
1	The heartwood of timbers of the highest durability	25 and up to 50
2	Heartwood of high natural durability	15 to 25
3	Heartwood of only moderate durability	5 to 15
4	Heartwood of low durability	Up to 5

All sapwood is rated 4

The test is 50x50 mm stakes driven into the ground. Durability for situations other than ground contact is adjusted according to the degree of exposure to moisture.