Outlast Timber Supplies
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CONTENTS

Outlast Timber
Durable Australian Hardwood

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There are various methods of grading timber and the particular cutting method (Eg; Quarter Sawn, Back Sawn, Radial Sawn) can also have an influence over the grading of timber, however the most common methods of grading being:

Visual Stress Grading

Visual grading relies on the ability of a visual inspection by a trained timber grader to visually identify any imperfections that may reduce the structural capacity of the timber.
Generally, visually graded timber will be at the lower end of the timber grading scale, and being in the 'F' structural grade range. The problem with this method is that a timber grader may miss structural deficient imperfections which may result in the timber being incorrectly graded.

This method of grading timber for structural use is conducted by visually inspecting a combination of the elements in the timber (Eg: Timber species, Unseasoned/Seasoned timber, knot size/location, machining hit/miss, checking, bow/cup/twisting) and cross referencing with the relevant Australian Standard.
These timbers are then rated to a '**F**' structural rating (F4, F5, F7, F8, F11, F14, F17, F22, F27, F34 and F43).
Timber that is structurally graded is marked with a specific colour after grading, which helps to visually identify the graded classification.

AS 1613:2005 Timber Colours For Marking F Grades
Table 1: Colours For Marking Timber Grades

COLOUR	COLOUR SPECIFICATION*	F-GRADE OF TIMBER
RED	R 13	F4
BLACK	-	F5
BLUE	B 41	F7
GREEN	G 31	F8
PURPLE	P 13	F11
ORANGE	X 13	F14
YELLOW	Y 13	F17
PINK	R 25	F22
TURQUOISE	T 15	F27
ROYAL BLUE	B 12	F34

- **AS 3818.1** Timber Heavy Structural Products - Visually Graded - Part 1 General Requirements
- **AS 3818.10** Timber Heavy Structural Visually Graded- Part 10 Building Poles
- **AS 2082** Timber - Hardwood - Visually Stress Graded for Structural Purposes
- **AS 2858** Timber - Softwood Visually Stress Graded for Structural Purposes

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Appearance Grading

This method of grading timber for appearance use is conducted by visually inspecting a combination of the elements in the timber (Eg: Timber species, Unseasoned/Seasoned timber, knot size/location, machining hit/miss, checking, bow/cup/twisting and other associated timber deficiencies) and cross referencing with the relevant Australian Standard.
Appearance graded timber is usually associated with products such as Flooring, Decking, Cladding and Joinery use timbers.

Common terms for Appearance Grading timber:

- **Select/Clear grade:** This is the best visual appearance grade and is virtually free from visual defects. This grade is used in furniture or where a feature may be made of an exposed timber.

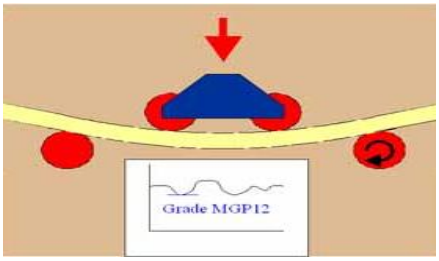
- **Standard grade:** This is the middle range grade and is used for various purposes such as decking, flooring or claddings.

- **Utility/Merchant grade:** This is a non-structural grade and is used for economy reasons where a structural or appearance grade is not required. This timber may contain knots, sapwood and colour variations.

- **AS 2796.1** Timber Hardwood Sawn and milled products - Part 1 Product Specification
- **AS 2796.2** Timber Hardwood Sawn and milled products - Part 2 Grade Description
- **AS 4785.1** Timber Softwood Sawn & Milled Products - Part 1 Product Specification
- **AS 4785.2** Timber Softwood Sawn & Milled Products - Part 2 Grade Description

Mechanical Grading Method

Mechanical Grading relies on timber being passed through a machine and stress placed on the timber in a downward action, the deflection of the timber is measured and therefore the timber grade determined on this amount of deflection.



The stress placed on the timber is usually on its Minor Axis.
Machine Graded timber is classified into further structural grade classifications.
These are ‘F’, ‘MG’ (Machine Graded, eg; MGP10).

The general timber grading classifications are:

Unseasoned timber:

- F5
- F7
- F8
- F11
- F14

Seasoned timber: (Kiln Dried)

- F5
- MGP10
- MGP12
- MGP15
- F17
- F27

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Machine Proof Grading

Machine proof grading begins with timber being sorted into ungraded groups.
Timber is then tested by applying a pre-determined weight load (Bending Load) known as the 'Proof Load'. As this 'Proof Load' is applied along the timber axis it is constantly stressed until it reaches the pre-determined stress grade limit.
The timber is graded according to its 'Proof Load' stress limits which are classified in:
AS 3519:2005 Timber - Machine proof grading.

In determining the Machine Proof Grading the timber is also classified according to its cross-sectional dimensions which give the timber its proof load.

MGP10, MGP12 and MGP 15 have their grading classification stamped along the length of the timber, instead of a colour as per the 'F' Grade timbers.

Differences between Mechanical grading and Machine Proof Grading:

Mechanical Grading	Machine Proof grading
Timber loaded about minor axis (on flat)	Timber loaded about major axis (on edge)
Small loads applied – timber is loaded at much less than design strength	High load applied – timber is loaded at loads near the design strength
Intention is to find poor pieces by measuring stiffness	Intention is to find poor pieces by breaking them
High speed operation – timber in the machine for typically 1 second	Low speed process – timber may take 15 to 20 seconds to pass through the machine

Electronic Microwave Timber Grading

Electronic Microwave Timber Grading is a newer concept of grading timber.
This method works by using microwave technology to view the inside structure of
Air dried timber that is up to 50mm in thickness.

The microwaves view and measure the occurrence of features such as knots, angle of grain, sapwood and immature wood.

The Electronic Microwave Timber Grading machine can view along a length of sawn timber at speeds of up to 15020 km an hour. This in turn will increase the output of timber from a mill, and increase the financial viability of the mill.

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Timber is also graded according to its chemical resistance or natural durability properties. This treated timber is classified into different Hazard exposure levels.

Chemical Resistance or Natural Durability Properties

Treated timber Hazard classifications:

H1 Hazard Level

- Exposure - inside above ground
  Conditions - completely protected from the weather, well ventilated and protected from termite
  Biological Hazard - insects other than termites (i.e. lyctid or anobiid).

H2 Hazard Level

- Exposure - inside above ground
  Conditions - protected from wetting, nil leaching
  Biological Hazard - borers and termites.

H3 Hazard Level

- Exposure - outside above ground
  Conditions - subject to periodic moderate wetting and leaching
- Biological Hazard - moderate decay, borers and termites.

H4 Hazard Level

- Exposure - outside in ground
  Conditions - subject to severe wetting and leaching
  Biological Hazard - severe decay, borers and termites.

H5 Hazard Level

- Exposure - outside in ground contact with or in fresh water
  Conditions - subject to extreme wetting and leaching and or where the critical use requires a higher level of protection
  Biological Hazard - very severe decay, borers and termites.

H6 Hazard Level

- Exposure - marine water
  Conditions - subject to prolonged immersion in sea water
  Biological Hazard - marine wood borers and decay.

Artificial Chemical Treatments

- **CCA:** Copper, Chromium and arsenate.
- **LOSP**: Light Organic Solvent-borne Preservative. Contains fungicides and insecticides along with Copper, Tin and Zinc.
- **ACQ**: Alkaline Copper Quaternary. Also contains fungicides and insecticides.
- **Copper Azole**: Copper, Boric acid and Tebuconazole
- **Synthetic Pyrethrins**: Contains synthetic pyrethrins and pyrethroids.
- **Creosote**: Creosote uses oil-borne preservatives, generally from coal tar.
- **Borates**: Disodium Octaborate Tetrahydrate.

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Natural Timber Durability Classifications

- **AS 5604:2005** Timber- Natural durability ratings.

Natural Durability - Probable Life Expectancy (AS 5604)

Class	Probable in-ground life expectancy (years)	Probable above-ground life expectancy (years)
1	Greater than 25	Greater than 40
2	15 to 25	15 to 40
3	5 to 15	7 to 15
4	0 to 5	0 to 7

Termite Resistance	**NR** (Not resistant)	**R** (Resistant)
Lyctid Resistance	**S** (Susceptible)	**NS** (Not Susceptible)

Common Name	Botanical Name	Lyctid Susceptibility	Termite Resistance	Natural Durability Class of Heartwood	
				In-Ground Contact	Outside Above-ground Contact
Mountain Ash	Eucalyptus Regnans	NS	NR	4	3
Silvertop Ash	Eucalyptus Sieberi	NS	NR	3	2
Blackbutt	Eucalyptus Pilularis	NS	R	2	1
Blackwood	Acacia Melanoxylon	S	_	3	3
Western Red Cedar	Eucalyptus Thuja Plicata	NS	R	3	2
Douglas Fir (Oregon)	Pseudotsuga Menziesii	NS	NR	4	4
Gum, Blue, Sydney	Eucalyptus Saligna	S	NR	3	2
Gum, Grey (Qld)	Eucalyptus Propinqua	NS	R	1	1
Gum, Grey, Mountain	Eucalyptus Cypellocarpa	S	NR	3	2
Gum, Red, Mountain	Eucalyptus Tereticornis	NS	R	1	1
Gum, Red, River	Eucalyptus Camaldunensis	S	R	2	1
Gum, Spotted	Corymbia maculata	NS	R	2	1
	Corymbia Citriodora	NS	R	2	1
	Eucalyptus Henri	NS	R	2	1
Ironbark, Red	Eucalyptus Sideroxylon	S	R	1	1
	Eucalyptus Fibrosa (Broad leafed)	NS	R	1	1
	Eucalyptus Crebra (Narrow Leafed)	NS	R	1	1
Ironbark, Grey	Eucalyptus Drepanophylla	NS	R	1	1
	Eucalyptus Paniculata	NS	R	1	1
	Eucalyptus Siderophloia	NS	R	1	1
Mahogany, Southern	Eucalyptus Botryoides	NS	R	3	2
Messmate	Eucalyptus Obliqua	NS	R	3	3
Pine, Radiata	Pinus Radiata	NS	NR	4	4
Pine, Cypress, White	Callitris Glucophylla	NS	R	2	1
Pine, Cypress, Monterey (Golden)	Cupressus Macrocarpa	Not Rated to AS5604 - No durability Given			
Stringybark, Yellow	Eucalyptus Muellerana	NS	R	3	2
Tallowwood	Eucalyptus Microcorys	S	R	1	1
Turpentine	Syncarpia Glomulifera	NS	R	2	1

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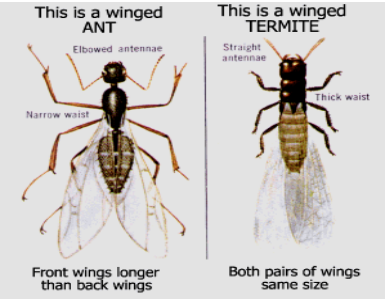
Biological Hazards To Timber

There are many different biological hazards to timber, however the most notable is the Termite.



Termites will consume the inner portion of timber as they do not like sunlight. As illustrated below Australia has very few areas that are not affected by termites and building with termite resistant materials should be carried out as a preventative to any construction works.

Although there are several hundred species of termite, the species 'Coptotermes' is the most common (Known as Subterranean). These termites live underground and will build chambers under the ground all the way to the food source.

There are four categories of termites that exist:

- Subterranean
- Damp wood
- Dry wood
- Harvester

Control Measures:

If termites are discovered, a professional pest control company should be employed to properly identify the species and to decide on a course of treatment.

Typical conventional treatments for existing constructions are:

- **Soil Barrier Termiticides:** This method relies on creating a chemical barrier in the soil that is toxic to termites contacting it.

- **Termite Baits:** This method uses bait technology which consists of wood or a cellulose substance which is preferred by termites. This substance is injected with a slow-acting toxic chemical. As the termite workers socialise in the colony they transfer the chemical by grooming each other which eventually reduces or eliminates the entire colony.

- **Physical Barriers:** This method uses a physical barrier that is installed to the building at the time of construction. This may include the use of stainless steel mesh, crushed granite and/or a chemical injected sealant. Ant caps can also be used as a means of visual detection of termites.

Termite resistance can also be partially achieved by designing and constructing the building in accordance with the Australian Standards and the National Construction Code.

Other methods of prevention include the use of timber with a chemical resistance. This can be achieved by either the use of naturally resistant timbers, or by timber which has an artificial chemical treatment.

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Common Insect Attack Species

There are number of other insects that attack timbers such as Lyctids and Anobiids. These insects are generally not a major problem in Australia as there are strict standards, guidelines and regulations which govern construction materials, methods and techniques.

Lyctids

Generally Lyctids (Also Known as the 'Powder Post Beetle') only consume the sapwood and not other parts of the timber. Through ensuring that all timber is a minimum of (Interior, above ground, Hazard level 2), (Exterior, above ground, Hazard level 3), (Exterior, in ground contact, Hazard level 4 & 5) chemical treatment, this will alleviate potential attacks by lyctids. Also ensuring that seasoned timber (Timber with a moisture content not less that 12%) is used, may reduce the risk of attack. Chemical treatment of Boron salts may be used to provide successful protection against attack by Lyctids.

Anobiids

Also Known as 'Carpet or Furniture Beetle', mainly attack softwood timbers, such as pine.

There are two main species of Anobiids:

- **Anobium punctatum** (Common furniture beetle)
- **Calymmaderus incisus** (Queensland pine beetle)

Anobiids prefer to consume sapwood to the heartwood of timber, they also mainly only consume softwood timbers. Anobiids can be controlled by removing any damaged timber and replacing it with resistant timbers or by using a timber that has a chemical treatment. Fumigation may also be used where there is already a presence of Anobiids. Good Sub-floor ventilation may also decrease the chance of attack.

Other forms of biological hazards can be; Fungal attack, Dry rot and Wet Rot.

- **Dry rot:** Dry rot forms when moisture content of timber is from 20-25%.
- **Wet rot:** Wet rot forms when moisture content of timber is from 25-35%.
- **Fungal attack:** Fungal attack occurs when there is a moisture content of above 80% in timber. A moisture content of below 20% makes the timber immune to attack from fungus.