

Facts About Plywood

AUS_TIM
SUSTAINABLE TIMBER SOLUTIONS



Plywood and LVL Standards

EWPAAs members manufacture standardised plywood and LVL products to the following Australian and New Zealand Standards under the EWPAAs products certification scheme:

- **AS/NZS 2269:** 2008 Plywood – Structural
- **AS/NZS 2270:** 2006 Plywood and Blockboard for Interior Use
- **AS/NZS 2271:** 2004 Plywood and Blockboard for Exterior Use
- **AS/NZS 2272:** 2006 Plywood – Marine
- **AS/NZS 4357:** 2005 Structural Laminated Veneer Lumber
- **AS 6669:** 2007 Plywood Formwork

Plywood Dimensions & Specification

Plywood Panels – Standard Dimensions

Plywood is available in several lengths and widths and a wide range of thicknesses. However, the standard plywood panel dimensions are:

Length:

2400mm

Width:

1200mm

A range of standard plywood panel thicknesses are available including 3,4,4.5,6,7,9,12,15,16,17,19,20,21,25 and 32mm.





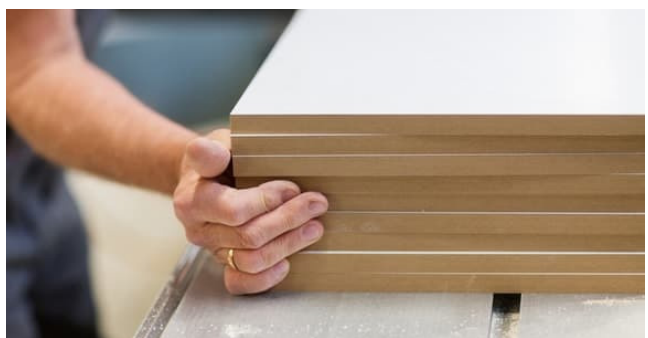
Specifying Plywood

When specifying plywood the following information should be supplied:

- 1 The number of panels
- 2 X thickness (mm) X width(mm)
- 3 The plywood type and standard
- 4 The stress grade and ID code (*for structural plywood*)
- 5 The face and back grades and the glue bond type
- 6 EWPAAs products certification stamp
- 7 Preservative treatment level if required

For example, a typical specification for structural plywood flooring with tongue and grooved edges might be:

20 sheet	2400 x 1200 x 17 mm
T&G	Structural plywood to AS/NZS 2269
F11(17-24-7)	CD – A bond
EWPAAs Product Certified	



Gluelines

There are four types of glue bonds used to manufacture plywood. The bond types are A, B, C and D, in decreasing order of durability under conditions of full weather exposure.

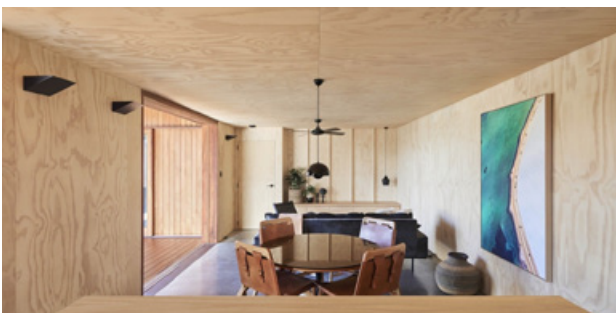
Type A bond is produced from phenol formaldehyde (PF) resin, which sets permanently under controlled heat and pressure. It forms a permanent bond that will not deteriorate under wet conditions, heat or cold. It is readily recognisable by its black colour. Type A bond is used to manufacture LVL, Marine, Exterior and Structural plywood.

Type B bond is produced from melamine fortified urea formaldehyde resin (MUF) which sets under controlled heat and pressure. Type B bond is included in the exterior plywood standard and is suitable for applications involving concrete formwork plywood is stamped with the EWPA Approved B bond stamp.

Type C and D bonds are both interior bonds produced from urea formaldehyde resin, (UF) which sets under controlled heat and pressure. The glueline is light coloured. C and D Bonds should not be recommended for any purpose where exterior use or use under wet or damp conditions are involved, in structural applications or long-term load bearing conditions. (Type A bonded plywood should be used for areas of doubtful moisture conditions, such as areas around sinks, vanity units and laundry tubs).

The formaldehyde adhesives used in plywood manufacture are thermosetting and will not re-plasticise under reheating as do thermoplastic adhesives such as elastomeric wallboard adhesives and PVA.

Formaldehyde emission from most plywood products is at or below the stringent E1 requirement of 0.1 ppm accepted internationally. Phenolic Type A bonds have particularly low formaldehyde emission, of between 0.00 to 0.03 ppm, corresponding to E0 (which is 0.05ppm), exterior plywood used under conditions of long-term full exposure or under wet or damp conditions.

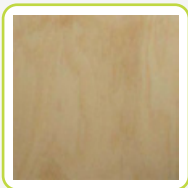




Veneer Quality

How is Plywood graded?

Plywood is graded based on the characteristics of face and back veneers and is categorised into the following grades which are defined in the joint Australian and New Zealand standards: (AS/NZS 2269, AS/NZS 2270, AS/NZS 2271 and AS/NZS 2272).



A = High grade minimal defects typically suitable for clear finish

Species: Hoop Pine

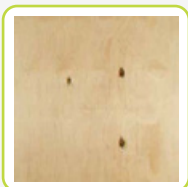
Products: Marine Ply, Exterior Ply & Interior Ply.



B = Suitable for high quality paint finish, not generally suitable for clear finishing

Species: Hoop Pine & Radiata Pine

Products: Structural Plywood & Door skins.



C = Non-Appearance grade veneer with a solid surface. All open defects such as knot holes or splits are filled. Plywood with a quality C face is designed specifically for applications requiring a solid non-decorative surface.

Species: Hoop Pine & Radiata Pine

Products: Structural Plywood, Braceply, T&G Flooring Plywood



D = Unsanded, non-appearance grade with permitted open imperfections. Limited numbers of knots and knot holes up to 75 mm wide are permitted in Veneer Quality D. It is designed specifically for structural applications where decorative appearance is not a requirement

Species: Hoop Pine & Radiata Pine

Products: Structural Plywood, Braceply, T&G Flooring Plywood



Types of Plywood

Exterior Plywood

Exterior Plywood manufactured to AS/NZS 2271 is intended for use in non structural, exterior application where a high-quality aesthetic finish is required. Typical applications include exterior door skins, hoarding, signs and non structural claddings. Regularly used in interior applications due to its greater availability.

Exterior plywood to AS/NZS 2271 may possess either a permanent Type A bond or a less durable Type B bond melamine urea formaldehyde bond. Type A bonded exterior plywood must be specified for applications involving long-term full exposure. Type B bonded plywood can be specified for semi-exposed applications or when the maximum exposure time totals less than two years.

All permanently exposed Type A bonded exterior plywood should be treated against fungal attack and the surface should be finished with paint or water repellents to minimise mechanical surface checking.

Exterior plywoods are non structural and must not be used in structural applications. No stress grades can be applied to exterior plywood.



Exterior plywood has face grades of AC which the A face is designed for clear finishing.

For assured performance Exterior plywood should be branded with the “approved exterior EWPAAs plywood” stamp.

Austim Product Range

Austral AC Exterior Hoop Pine Ply

Standard:

Structural plywood to AS/NZS 2269

Bond:

A Bond

Grade:

A Face / C Back

Stress Grade:

Non-structural

Certification:

PEFC

Thickness (mm)	Length (mm)	Width (mm)
3.0	2400	1200
4.0	2400	1200
5.0	2400	1200
*6.5	2400	1200
*9.5	2400	1200
*12.5	2400	1200
16	2400	1200
*19	2400	1200
*25	2400	1200
32	2400	1200

- NOTE:**
- **Denotes stocked line, other thicknesses available upon request*
 - *2700 x 1200 sheets are made to order upon request*





Interior Plywood

Interior Plywoods manufactured to AS/NZS 2270 are intended for use in non structural interior application where a high-quality aesthetic finish is required. Typical applications include internal wall panelling furniture and fitments, interior door skins and ceiling linings. Interior plywood must not be used in exposed, wet or damp conditions.

Interior plywood to AS/NZS 2270 may have either a type C or type D bond. Both bonds are not durable under full exposure to weather or to wet or damp environments. These bonds are, however, durable under fully protected interior non structural environments.

Type D bonded interior plywood is satisfactory for interior applications under normal conditions of humidity. Type C bonded plywood should be used in high humidity interior environments which may occur locally in areas such as bathrooms or generally in the tropics.

Interior plywoods are non structural and must not be used in structural applications. No stress grades can be applied to interior plywood.



Interior plywood can have face grades of AC or BB. A grade faces are designed for clear finishing while a B grade face is designed for painting.

For assured performance Interior plywood should be branded with the “approved interior EWPA plywood” stamp.

Austim Product Range

Austral AC Interior Hoop Pine Ply

Standard:	AS/NZS2270
Bond:	C Bond
Grade:	A Face / C Back
Stress Grade:	Non-structural
Certification:	PEFC

Thickness (mm)	Length (mm)	Width (mm)
3.0	2400	1200
4.0	2400	1200
5.0	2400	1200
*6.5	2400	1200
*9.5	2400	1200
*12.5	2400	1200
16	2400	1200
*19	2400	1200
*25	2400	1200
32	2400	1200

- NOTE:**
- **Denotes stocked line, other thicknesses available upon request*
 - *2700 x 1200 sheets are made to order upon request*





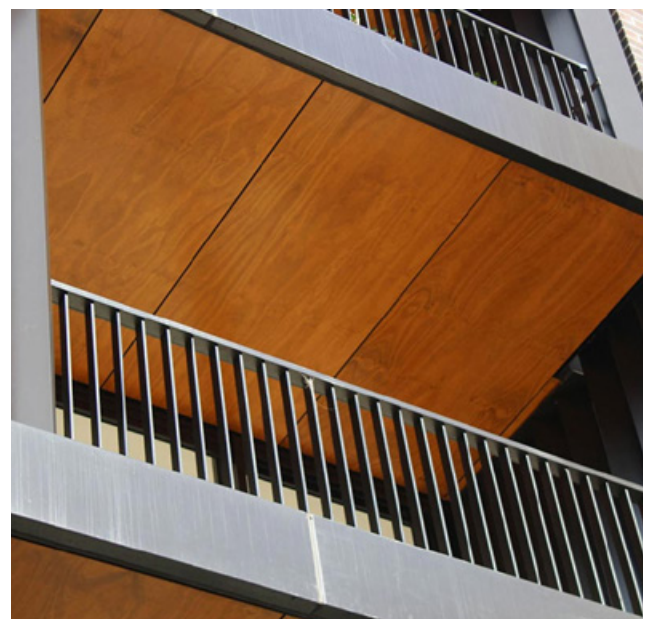
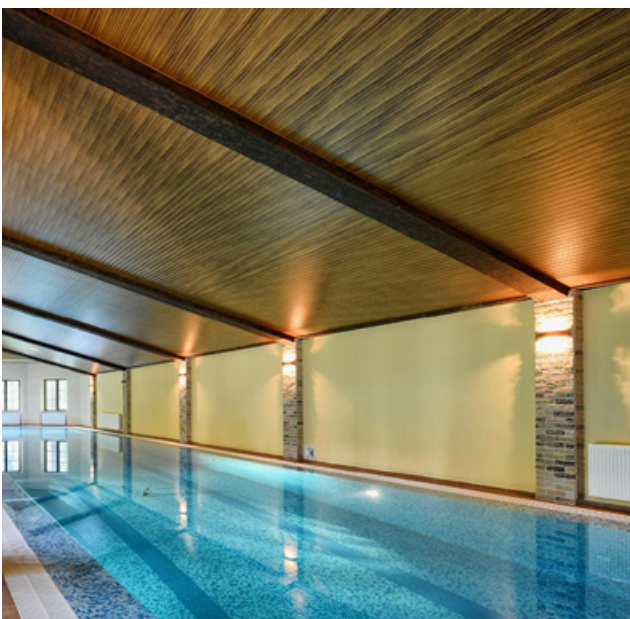
Marine Plywood

Marine plywood manufactured to AS/NZS 2272 Plywood – Marine is a purpose built structural plywood, intended for use in hulls of boats and other marine applications. It has a permanent Type A Phenolic bond and is manufactured from selected species based on density, bending strength, impact resistance and surface finishing characteristics.

Marine plywood to AS/NZS 2272 is made from selected species and therefore has known and consistent structural properties. The assigned stress grade of plywood manufactured to AS/NZS 2272 is F14. None of the marine species are naturally durable.

Marine plywood to AS/NZS 2272 has two A grade faces and a Type A bond. In the Australian / New Zealand Standards grading system it therefore has a grading of AA-A bond

Note that marine plywood manufactured to BS 1088, as imported into Australia, does not have predictable structural performance and must not be substituted for AS/NZS 2272 marine plywood. For assured performance marine plywood should be branded with the 'EWPA Tested' marine plywood stamp.



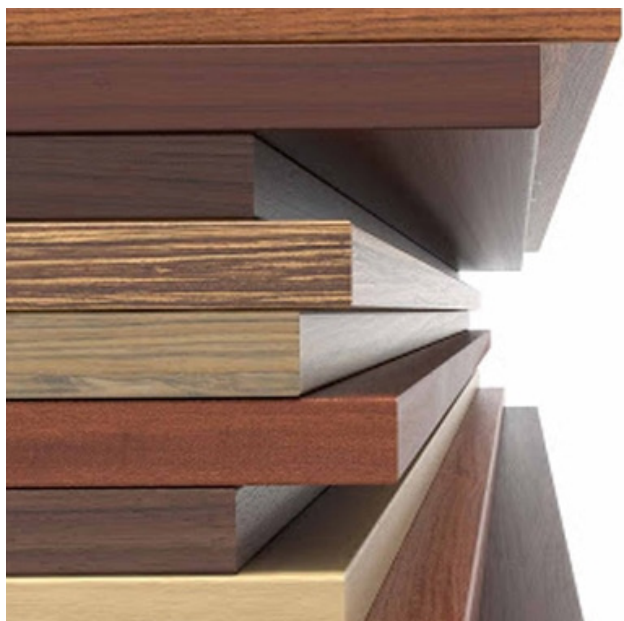
Austim Product Range

Austral AA Hoop Pine Marine Ply

Standard:	AS/NZS2272
Bond:	A Bond
Grade:	A Face / C Back
Stress Grade:	F17
Certification:	PEFC

Thickness (mm)	Length (mm)	Width (mm)
4.0	2400	1200
*6.5	2400	1200
*9.5	2400	1200
*12.5	2400	1200
16	2400	1200
*19	2400	1200
25	2400	1200
32	2400	1200

- NOTE:**
- *Denotes stocked line, other thicknesses available upon request
 - 2700 x 1200 sheets are made to order upon request
 - British Standard BS1088 available upon request





Structural Plywood

Structural Plywood is a versatile substrate which can be used for exterior and interior applications where aesthetic appearance is not critical and is commonly referred to as CD Structural. Structural grade plywood that is required to provide a high-quality paint finish is referred to as BB Structural.

Manufactured to AS/NZS 2269 Structural plywood is suitable for use in all permanent structural applications. It has a permanent Type A bond which is distinctly dark in colour and is durable and permanent under conditions of full weather exposure, long-term stress, and combinations of exposure and stress.

Structural plywood is manufactured from a range of softwood and hardwood timber species. These timber species may not be durable when used in weather exposed situations. In exposed applications, structural plywood must be preservative treated to ensure it lasts its full service life and it should also be surface finished to minimise checking.



Austim can supply Structural plywood in the following stress grades F8, F11, F14 & F17, untreated or treated. H2 glue line, H3 Envelope or H3 Veneer treated Structural plywoods are available upon request.

Austim Product Range

BD Structural Radiata Pine Plywood

Standard:	AS/NZS2269
Bond:	A Bond
Grade:	B Face / D Back
Stress Grade:	F8
Certification:	FSC

Thickness (mm)	Length (mm)	Width (mm)
*7	2400	1200
*9	2400	1200
*12	2400	1200
15	2400	1200
17	2400	1200
*18	2400	1200
19	2400	1200
25	2400	1200

- NOTE:**
- *Denotes stocked line
 - Treated plywood available upon request

Austim Product Range

Austral BB Structural Hoop Pine Ply

Standard:	AS/NZS2269
Bond:	AS/NZS2269
Grade:	B Face / B Back
Stress Grade:	F17
Certification:	PEFC

Thickness (mm)	Length (mm)	Width (mm)
*6.5	2400	1200
*9.5	2400	1200
*12.5	2400	1200
16	2400	1200
*19	2400	1200
*25	2400	1200
32	2400	1200

- NOTE:**
- *Denotes stocked line, other thicknesses available upon request
 - 2700 x 1200 sheets are made to order upon request

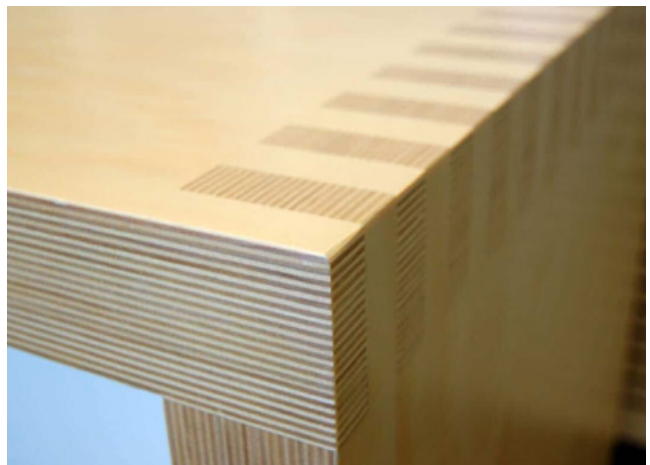
Interior Finishing



EWPAAs Tested and approved plywoods A and B quality face veneers, appropriately sanded, have a surface designed to provide a satisfactory substrate for high quality finishing with interior finishes, stains and paints. The A quality face is suitable for clear finishing. The B quality face veneer is suitable for painting. Under normal protected interior applications type D or C bonded plywood will give long-term durability and preservative treatment is not necessary.

Before finishing ensure the plywood is dry (below 12-15% moisture content) and the surface to be painted is clean, smooth and wax free.

Clear finishing, French polishing, staining and painting of plywood with a wide range of materials are readily achievable for interior applications. The best advice is to follow the paint manufacturer's directions.



The use of high gloss finishes and paints tends to highlight naturally occurring and manufacturing characteristics of plywood such as beat marks from sanding, knots and open defects in underlay veneers, grain variation and patches, and is therefore not usually recommended. Stain and matt finishes and paints give a high quality aesthetically pleasing surface and are recommended.

Single pack polyurethane clear in a satin or matt finish is recommended for most interior plywood surfaces such as wall panelling, furniture and fitments. A high gloss finish may be used on tabletops, however, naturally occurring and manufacturing characteristics may be highlighted as noted above. This finish is extremely durable in a fully protected interior environment and is resistant to heat, alcohol and household chemicals.



A recommended procedure for applying a single pack polyurethane satin or matt finish is:

- Sand the plywood with very fine sandpaper. Sand in the direction of the grain never across it.
- Apply one coat of the polyurethane satin or matt finish by brush, not roller. Do not brush vigorously as this will cause bubbles. Simply lay the finish on the plywood surface.
- Allow the finish to dry thoroughly. Ensure at least the minimum time recommended by the finish manufacturer has elapsed.
- Rub down the surface with steel wool to remove the nibs
- Apply a second coat of finish.

An extremely high-quality finish can be achieved with this method.

Two pack polyurethanes, which are normally high gloss, produce an exceptionally hard, durable coating for interior plywood surfaces where extreme resistance to abrasion or chemical action is required. Applications such as laboratory bench tops, school decks and decorative flooring require this type of hard wearing finish.

There are newly developed clear finishes formulated on acrylic polymer systems. They are fast drying and should not be rubbed down between coats. They are non-yellowing due to the inclusion of ultraviolet filters but are intended for interior use only and should not be used on areas subjected to direct heat or extreme wear such as floors and bench tops. These finishes have the advantage that brushes and equipment can be cleaned using water.

Oil-based stains stains are pigmented wood stains designed to give an even toning of all timbers including species such as plantation pines with unevenly porous surfaces which give patchy results with dye type systems. The traditional spirit-based stains used by craftsmen for many years are deeply penetrating stains for use on darker species and

Tasmanian Oak. Oil-based stains are recommended for the amateur. Both these stains require a top coat of clear finish.

A wide range of wood grain fillers and sanding sealers are available to assist in attaining a high-quality finish on decorative plywood. Paint and finish manufacturer's literature is readily available and should be consulted.

Clear finishes on light coloured plywoods tend to yellow with age.

Yellowing can be minimised by a number of methods.

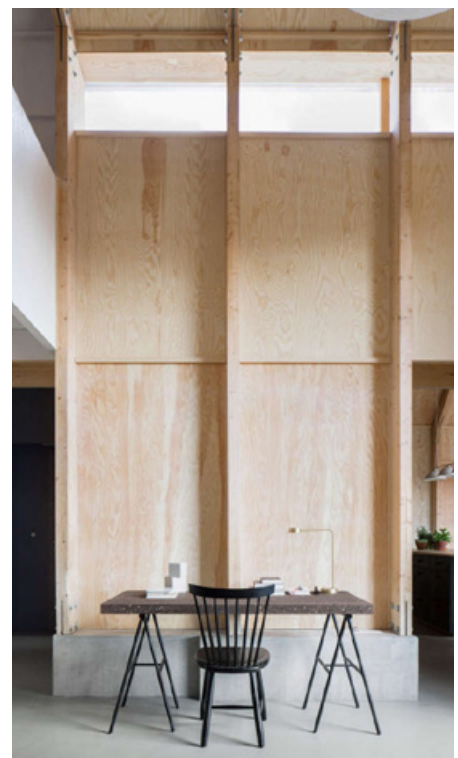
- Use modern formulations of finish which incorporate ultraviolet filters, e.g. Single pack polyurethanes, sometimes called "pine finish" and acrylic based formulations are readily commercially available.
- Surfaces such as Victorian ash and Tasmanian oak can be bleached prior to the application of a finish containing ultraviolet filters.
- Small portions of white pigment can be added to clear finishes which act as ultraviolet absorbers.

It is extremely good practice to experiment with samples to establish the final colour when staining or clear finishing plywood.

Exterior Finishing

All fully exposed plywood must be surface finished to prevent mechanical surface breakdown, known as surface checking or crazing, caused by the absorption and desorption of moisture through the surface veneer.

In addition, it must be stressed that all plywood used in externally exposed conditions must be Type A bonded and preservative treated to ensure long-term durability and performance



The plywood surface may be finished by:

- Painting
- Coating with water repellents or
- Overlaying with medium density phenolic impregnated papers

Plywood with an A or B grade face veneer quality and appropriately sanded have a surface designed to provide a suitable substrate for a high-quality paint or stain finish. Plywood with C or D quality face veneer is not designed to provide a high-quality paint substrate.

Plywood cladding products are also available with a machined or textured face which provides an excellent surface for paint or stain adhesion as well as disguising any surface

Generally, sanded or textured surfaces, clear of defects, are the most suitable for painting. Jointed surfaces do not provide paint problems, but patches and plugs which tend to move independently can cause a paint failure. veneer.



The EWPA has shown through full exterior exposure trials that 100% acrylic latex paint systems perform best on plywood.

The satisfactory acrylic latex paint system for plywood comprises:

- One coat of 100% acrylic stain blocking primer
- Two coats of acrylic latex exterior topcoat.

Rigid paint systems

Rigid paint systems including oil-based and alkyd-enamel paint systems are not recommended for use on plywood in weather exposed applications. Rigid paint systems form a hard brittle coat that is prone to checking from any movement of the plywood due to moisture or temperature. Rigid paint systems can, however, be used on medium density overlay plywood.

Light paint colours are recommended in performance to darker colours. In humid areas where mould may grow on the paint surface, the use of a mouldicide in the paint is strongly recommended.





The acrylic latex paint system is compatible with most current plywood preservative treatments. Any CCA deposits (a green to white powder) on the surface of CCA treated plywood should be cleaned by scrubbing and hosing. Allow to air dry before painting.

LOSP treated plywood should be allowed sufficient time to air before painting, to allow solvent to evaporate. A week is normally sufficient or as specified by the manufacturer. (Until there is no greasy feel).

As preservative treatment formulations change, the compatibility of the paint system should always be checked with the treated plywood supplier. For example, some new formulations of CCA and LOSP contain waxes and water repellents which are incompatible with acrylic paints.

If a natural look is desired, exterior water-repellent stains are recommended. Two products which have given good trial results under fully exposed conditions are Celtite exterior water-repellent stains and Cuprinol water repellent. Both products are compatible with preservative treated plywood.

It is seldom wise to recommend clear finishes in exposed conditions if a lasting finish is required. Even the most modern acrylic clear finishes will not stand up to sun and weather without constant and excessive maintenance.

Medium density overlaid plywood may be painted with a range of oil and water-based paint systems. Rigid oil-based paint systems can be used on overlaid plywood because the overlay acts to prevent surface checking of the plywood face veneer. The following systems have proven to be satisfactory:

- Oil based
 - 1 coat alkyd primer
 - 1 coat oil-based undercoat
 - 2 coats oil-based exterior gloss
- Oil/water based
 - 1 coat alkyd primer
 - 2 coats acrylic topcoat
- The full acrylic paint system is also satisfactory for use with medium density overlaid plywood.
- Other rigid exterior paint systems such as pigmented epoxies.

Edge sealing

Although not a mandatory requirement for exterior exposed plywood panels, edge sealing is considered good practice as it minimises moisture uptake through the panel end grain which in turn reduces both localised swelling and the tendency to surface check at edges.

Sealing the back side or unexposed surface of exposed plywood on an immovable frame is unnecessary from a stability viewpoint. The practice of water sealing plywood backs was recommended to prevent water penetration, however, it was found in fact to increase the incidence of fungal attack by trapping moisture in the panel. Fungal attack in exterior exposed plywood is controlled by using preservative treated plywood.

In some applications such as garage door, it is good practice to seal both surfaces.

Paint Quality

Always use top-quality paints. Quality is more important than cost, because cost of application and maintenance are much higher with inferior quality paints. When painting plywood for exterior, paints are applied according to the paint manufacturer's directions.

Preservative Treatment

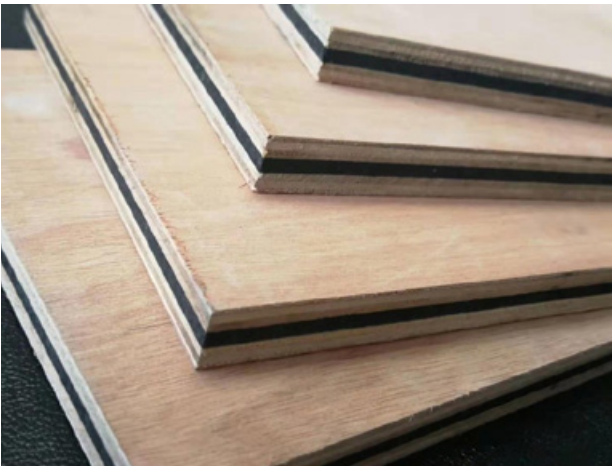
All timber products, including plywood and LVL, may be subject to decay and/or termite attack under certain conditions. For example, if the moisture content is high enough, the area confined and unventilated and the temperature conducive, fungi can cause decay in most timber species. Direct contact with the ground is extremely conducive to both decay conditions and termite attack. Correct preservative treatment against fungal attack (rot) is essential for all plywood and LVL products, either painted or unpainted, that are permanently exposed to the weather.



Infestation with termites is usually not a problem for plywood and LVL provided the application does not involve ground contact and other good building practices have been correctly implemented through appropriate design and construction practices as well as ongoing inspection and maintenance.

There are several methods of treating plywood and LVL

- A.** Impregnation of veneers, prior to manufacture .
- B.** Pressure treating of the manufactured plywood
- C.** Preservation treating surfaces after manufacture

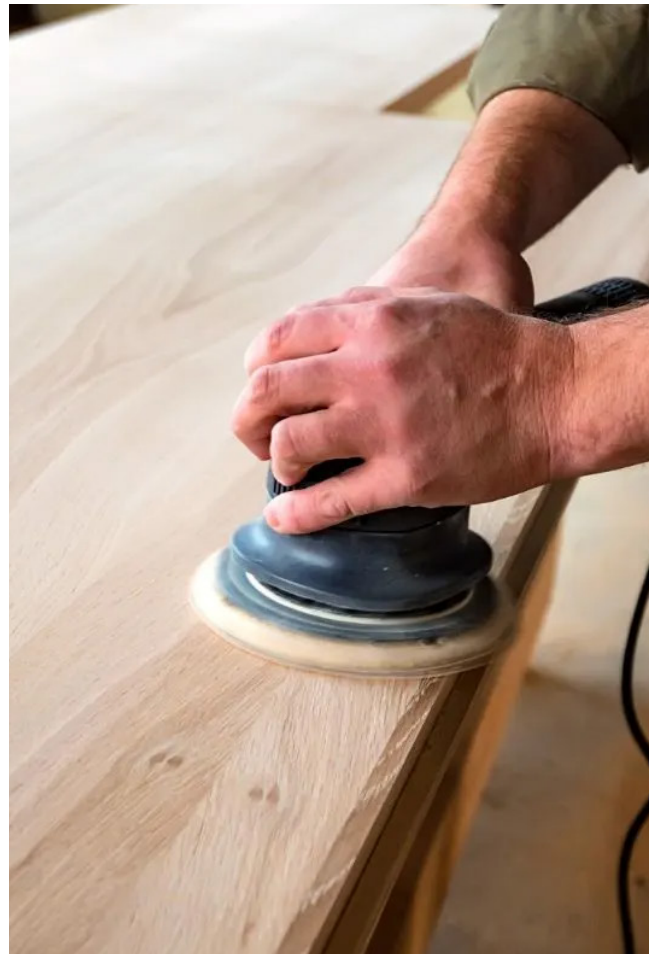


A range of preservative treatments are available including copper chrome arsenate (CCA), light organic solvent preservatives (LOSP's), and the veneer treatments, Ruply and Ammoniacal Copper Quaternary Compounds (ACQ).

Plywood with a Type A bond used as exterior cladding must be treated against fungal and insect attack. The preservation treatment should be a minimum of hazard level H3 "outdoors above ground" as defined by AS/NZS 1604.3.

Pressure treatments of the manufactured plywood are envelope type treatments, that is, the outer veneers, edges and ends of the sheet are preservative treated. However, the preservative may not have penetrated through the glue lines to the middle veneers of the plywood. If the plywood is cut, then localised paint on preservative treatment is required for the cut edge.

Veneer preservative treatments treat each individual veneer prior to assembly of the product and no further treatment should be required if this type of preservative treated product is cut.



Preservative treating plywood or LVL after manufacture or surface treating with “brush on” preservatives should be done, if possible, only after machining, sawing and boring of the plywood or LVL has been completed.

It is difficult to bond some preservation treated plywood particularly with phenolic or resorcinol adhesives.

Preservative treated plywood and LVL is suitable for painting provided manufactures recommendations are followed and the surface to be painted is dry and free of excess solvent or salts.

Fasteners used with preservative treated plywood should be hot dipped galvanised or have equivalent corrosion protection. Stainless fasteners may be required for severe exposure applications.

