



PLYWOOD TRAINING MANUAL



A close-up photograph of several sheets of light-colored plywood stacked on top of each other. The sheets are slightly offset, showing the layered structure of the material. The lighting is warm and even, highlighting the natural wood grain and the smooth surface of the veneer.

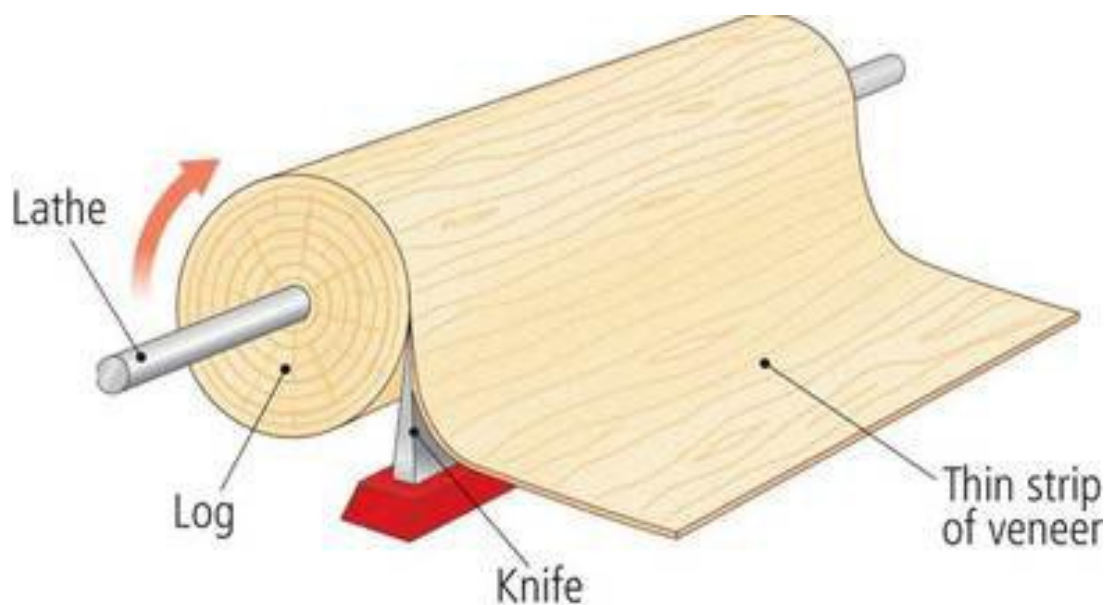
PLYWOOD CONSTRUCTION

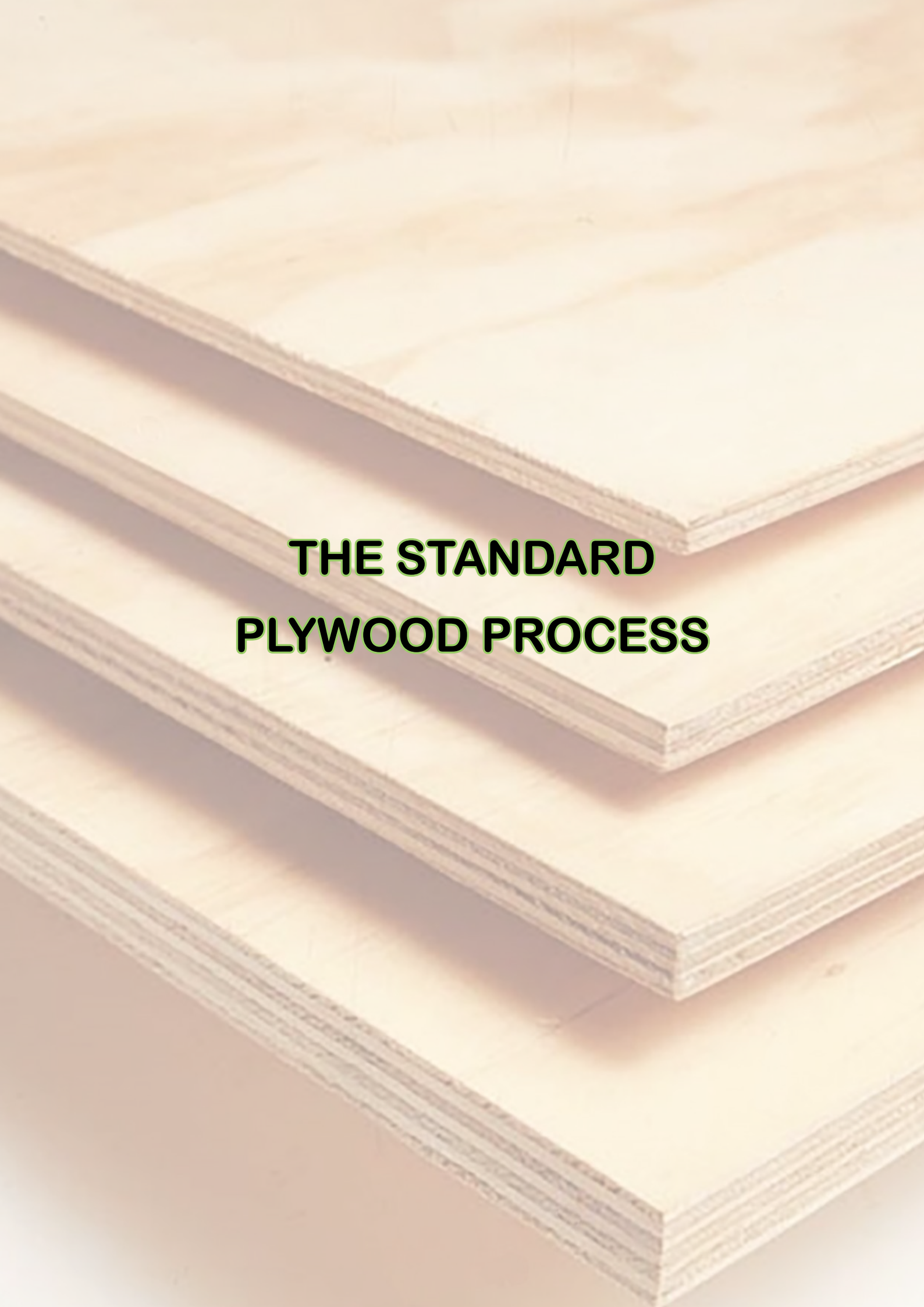
WHAT IS PLYWOOD?

Plywood is an engineered wood product which is manufactured from thin layers or “plies” of wood veneer that are glued together. Adjacent layers have their wood grain rotated up to 90 degrees to one another to form solid panels of various thicknesses and grades, that have specific structural and performance attributes.

HOW IS PLYWOOD MADE?

After log selection, the logs are cut to billet lengths of 2.6m and 1.3m which are peeled into veneer sheets on a rotary lathe, which are subsequently dried and graded. These veneers are then glued and pressed together in different grade combinations to form various plywood product ranges. From pressing the plywood, it is then trimmed, defects puttied, sanded, graded and packed for shipping.



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THE STANDARD PLYWOOD PROCESS

Standard Plywood Process

PEELING



Logs are peeled on a lathe to very thin sheets which are then docked to the required lengths, these are called veneers. Common veneer thicknesses for plywood production are 1.5, 2.4 and 3.0mm thickness. Logs (billets) are peeled down to an average 12cm core which is then used in other products.

DRYING



Individual (cut to length) veneers, are then passed through a multi-level dryer to dry the veneers to a specific moisture content of less than 12%. Variations to the speed and temperature of the drying process, are made depending on the thickness or species to be dried to ensure the correct moisture content.

GRADING



Dried veneers are graded depending on the various characteristics of each veneer such as splits, knots, colour etc. These characteristics will determine whether it will be used as a face, back or core veneer.

GLUING



Combinations of the timber veneers are assembled in the required sequence, in order to make the desired product with alternating layers spread with a glue suitable for the application. For “A” bonded product, this is a phenolic based glue system.

Standard Plywood Process (cont)

PRESSING - Cold



The layed up panels are then sent to the Cold Press after the glue spreader, where they are pressed at 120 - 140bar for approximately 10 minutes and once released, are moved to the hot press

PRESSING - Hot



Panels are then pressed in a hot press at a temperature of approximately 140 degrees C and pressure of 12cm², for between 10 and 30 minutes, which allows the glue to cure and achieve the desired glue bond.

TRIMMING



Pressed panels are then allowed to cool and stabilize for 24 hours before being trimmed to the required sheet size, the most common size being 2400mm x 1200mm.

SANDING



Depending on the final product requirements, trimmed panels are then sanded on one or both sides to achieve the required face finish.

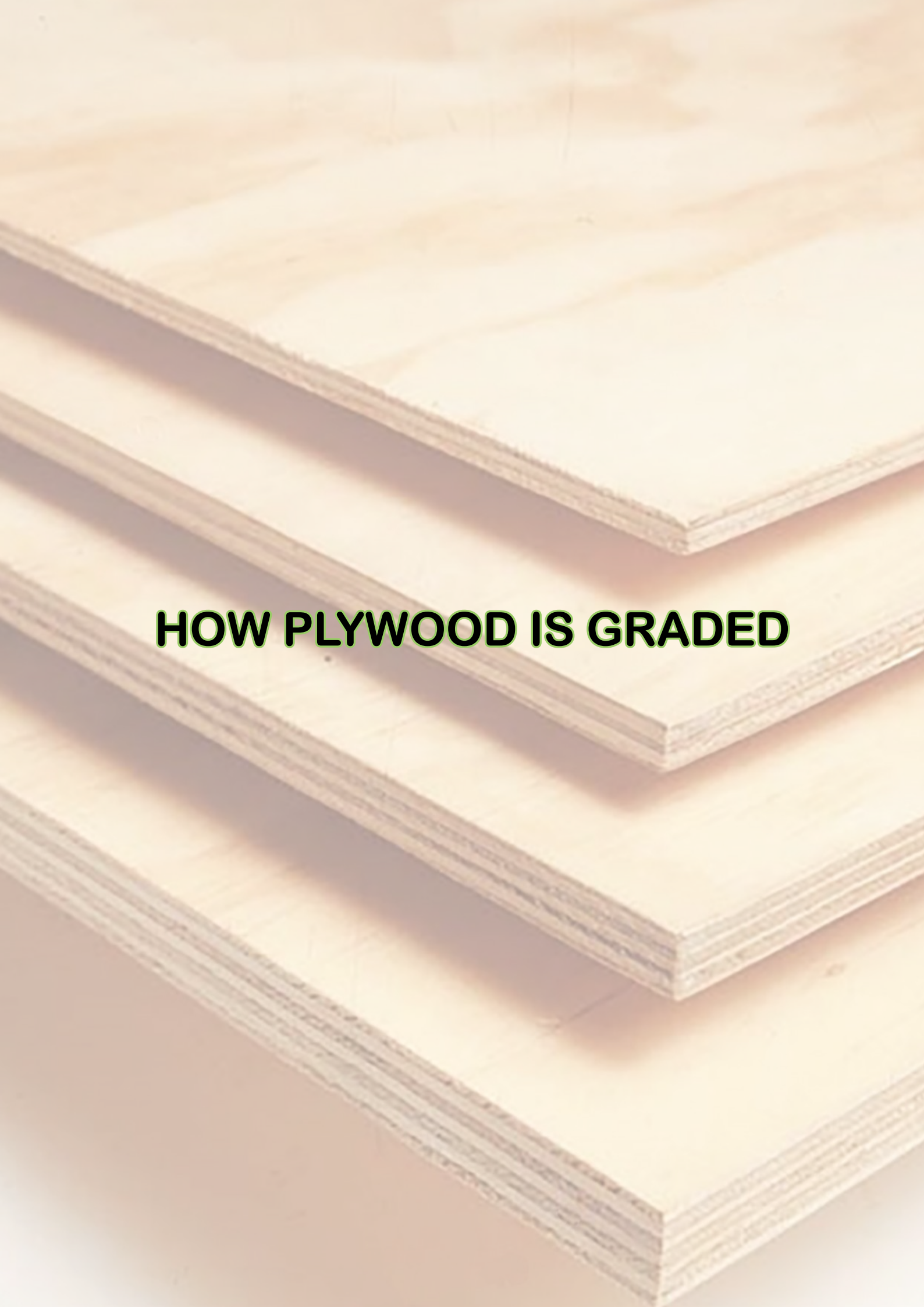
FINAL GRADE



Sanded sheets are further graded to ensure grade conformity and packed, strapped and labelled ready for dispatch.

VARIATIONS

Specific variations in the standard plywood process allow PNGFP to manufacture a range of specialty products, such as DuraPly, Barrier Board and Bridge Decking. All have ACQ treated veneers. PrufPly has certain additives to the glue that assist in the prevention of termite and insect attack.



HOW PLYWOOD IS GRADED

How is Plywood graded?

How is Plywood graded?

Plywood is graded based on the characteristics of face and back veneers and are 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
- B** = Suitable for high quality paint finish
- C** = General purpose plywood with puttied imperfections (knots/splits)
- D** = Back and core veneer with unfilled knots and splits which is not sanded
- E** = Many imperfections, usually associated with very low grade or reject panels

A GRADE

High quality appearance grade veneer suitable for a clear finish



Permitted Imperfections

- Filled holes: ≤ 6 mm across grain. Max 4/sheet
- Knots: ≤ 4 mm across grain. Max 4/sheet
- Pin knots: ≤ 2 mm across grain
- Filled splits: ≤ 3 mm across grain. Max 2/sheet
- Roughness: slight within area of imperfection
- Discolouration: slight natural discolouration

B GRADE

Appearance grade suitable for high quality paint finishes



Permitted Imperfections

- Filled holes: ≤ 20 mm across grain over 500mm².
- Knots 1: ≤ 25 mm across grain: no limit
- Knots 2: >25 mm <40 mm. Max 4/sheet
- Filled splits: ≤ 3 mm across grain: no limit*
- Glue bleed through: no limit
- Roughness: slight within area of imperfection
- Discolouration: no limit

C GRADE

General purpose grade with a sanded solid surface suitable for non-decorative applications.



Permitted Imperfections

- Filled holes: ≤ 50 mm across grain: no limit
- Knots (sound): ≤ 50 mm across grain: no limit
- Splits 1: ≤ 9 mm across grain and ≤ 600 mm long*
- Glue bleed through: no limit
- Roughness: slight within area of imperfection
- Discolouration: no limit

How is Plywood graded? (cont)

D GRADE

Unsanded non appearance grade with permitted open imperfections such as knots and splits.



Permitted Imperfections

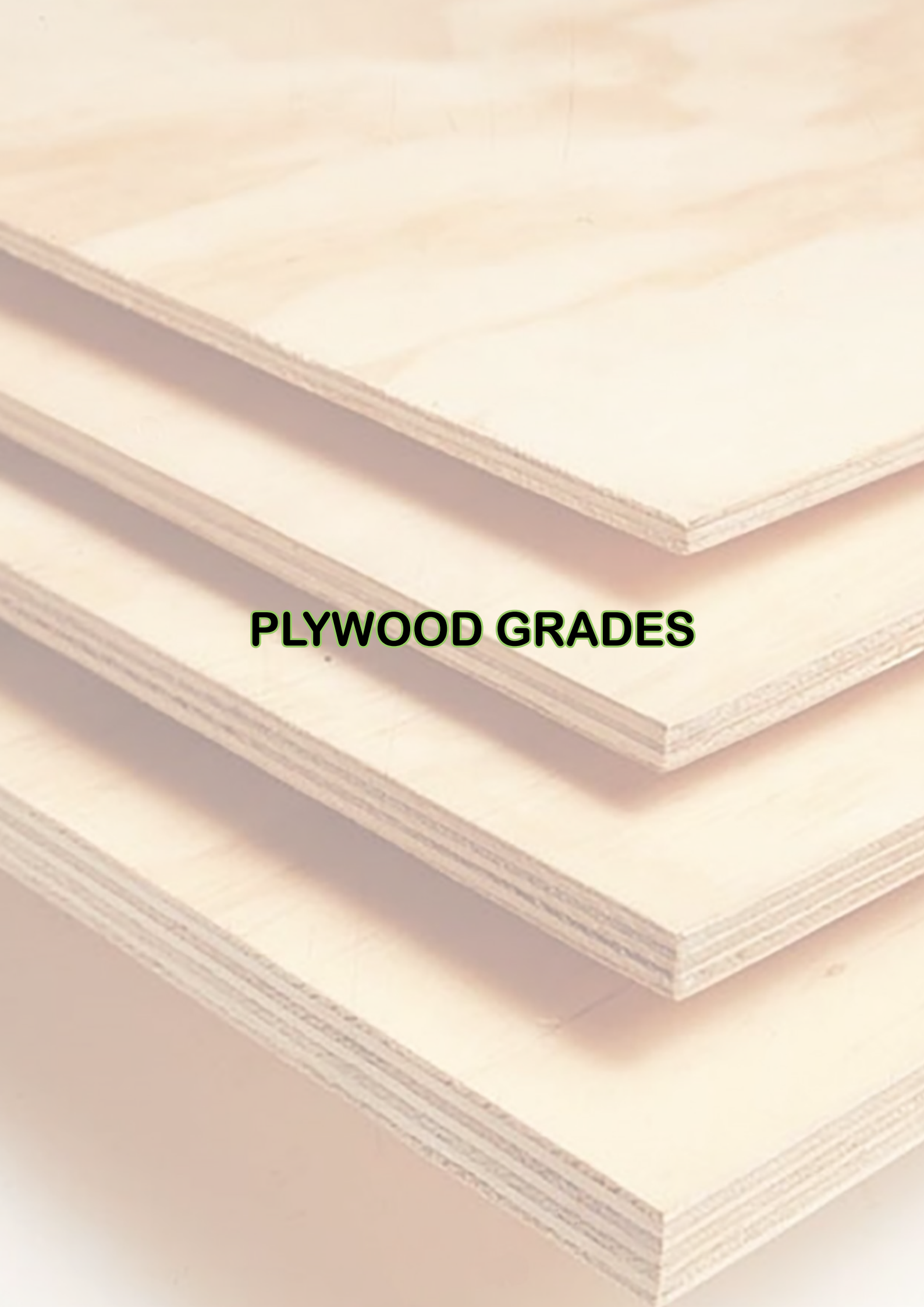
- Filled holes: $\leq 75\text{mm}$ across grain: no limit
- Knots: $\leq$ no limit
- Splits 1: $\leq 15\text{mm}$ across grain and $\leq$ half a sheet long*
- Splits 2: $\leq 25\text{mm}$ across grain and $\leq$ a third of a sheet long*
- Glue bleed through: no limit
- Roughness: associated with an area of imperfection
- Discolouration: no limit

E GRADE

Non-structural, non-appearance grade with no manufacturing standard. Ideal for packing applications



* Refer AS/NZS 2269 for more information.



PLYWOOD GRADES

Plywood Grades

Shown below are the basic specification and general uses for the various grades of plywood produced and sold by PNGFP.

ECONOPLY

Low grade general purpose non-structural plywood which is ideally suited to packaging.

D Face



D Back



Face/back grade: D/D

Sheet sizes: 2400mm x 1200mm

Sheet Thickness: 4, 7, 9, 12, 15, 17mm

COMMONPLY

General purpose non-structural plywood that is most commonly used for internal lining of walls and ceilings.

C Face



D Back



Face/back grade: C/D

Sheet sizes: 2400mm x 1200mm

Sheet Thickness: 4, 7, 9, 12, 15, 17mm

PRUFPLY

Interior plywood most suited to high quality wall and ceiling linings with added protection against insect attack.

B Face



D Back



Face/back grade: B/D

Sheet sizes: 2400mm x 1200mm

Sheet Thickness: 4, 7, 9, 12, 15, 17mm

Treatment Hazard Class: H2

Treatment Standard: AS/NZS 1604.3

Bond: A

Manufacturing Standard: AS/NZS2269

Plywood Grades (cont)

EXTERIOR PLY

High quality appearance grade plywood sheeting for walls and ceilings. The product name is derived from the glue bond between the sheets of veneer, A Bond. The panel is untreated and hence is unsuitable for exposed outdoor application. This application requires an H3 ACQ veneer treated panel.

A Face



D Back



B Face



B Back



B Face



C Back



Face/back grades: A/D, B/B, B/C,

Sheet sizes: 2400mm x 1200mm

Sheet Thickness: 4, 7, 9, 12, 15, 17mm

Bond: A

Manufacturing Standard: AS/NZS2269

STRUCTURAL PLY - Untreated or CCA H3

Structural Ply is a general purpose structural plywood designed for most internal structural applications such as shelving, flooring etc. The C Grade Face is filled and sanded.

C Face



D Back



D Face



D Back



Face/back grades: C/D, D/D

Sheet sizes: 2400mm x 1200mm

Sheet Thickness: 4, 7, 9, 12, 15, 19, 21, 25mm

Bond: A

Manufacturing Standard: AS/NZS2269

Plywood Grades (cont)

DURAPLY

DuraPly is a preservative treated all purpose heavy duty plywood sheeting for structural applications in harsh environments. DuraPly is treated with Alkaline Copper Quaternary using the veneer treatment method where 100% of the veneers are treated prior to gluing into plywood. This gives protection from rot and termites.

C Face



D Back



D Face



D Back



Face/back grades: C/D - D/D

Sheet sizes: 2400mm x 1200mm

Sheet Thickness: 9, 12, 15, 17, 25, 27, 33mm

Treatment Hazard Class: H3 for above ground applications
or H4 for applications with ground contact

Treatment Standard: AS/NZS 1604.3

Bond: A

Manufacturing Standard: AS/NZS2269

MARINE PLY

Marine Ply is a purpose built structural plywood intended for use in the hull of boats or other marine applications. It also featured in historic aircraft construction. It has a Type A phenolic bond and is manufactured from approved marine grade species based on density, bending strength, impact resistance and surface finishing characteristics.

A Face



A Back



Face/back grades: A/A - O/O

Sheet sizes: 2400mm x 1200mm

Sheet Thickness: 7, 10, 13, 16, 18mm

Bond: A

Manufacturing Standard: AS/NZS2272

Plywood Grades (cont)

CORECLAD

CoreClad exterior plywood cladding provides striking external appearance for the sides of buildings. Coreclad is protected from rotting and termites by H3 veneer treating for outdoor above ground use. The 100% veneer treated sheets are bonded with a Type A Phenolic glue, often referred to as “Structural Bond” or “Marine Bond”, which has to withstand a 72 hour boil test. NiuClad has band sawn face finish and ship lapped edges for easy installation and ensuring complete weather protection.

B Face



D Back



Face/back grades: B/D

Sheet sizes: 2400mm x 1200mm

Sheet Thickness: 12mm

Treatment Hazard Class: H3

Treatment Standard: AS/NZS1604.3

Bond: A

Manufacturing Standard: AS/NZS2269

DURAFLOOR

DuraFloor is a preservative treated heavy duty plywood flooring for structural applications within harsh environments. DuraFloor is treated with Alkaline Copper Quaternary to Hazard class H3 for above ground application using the veneer treatment method where 100% of the veneers are treated prior to gluing into plywood, giving protection from rot and termites.

C Face



D Back



Face/back grades: C/D

Sheet sizes: 2400mm x 1200mm

Sheet Thickness: 15, 17, 19, 21, 25 mm

Treatment Hazard Class: H3

Treatment Standard: AS/NZS 1604.3

Bond: A

Manufacturing Standard: AS/NZS2269

Plywood Grades (cont)

NIUFORM

NiuForm is a general purpose Formply that when used in conjunction with good concreting practices can achieve a Class 3 off form finish. NiuForm is coated both sides with a phenolic overlay to both faces, that will give multiple uses when recommended construction practices are used.

Sheet sizes:

1800mm x 1200mm

2400mm x 1200mm

Sheet Thickness: 17 mm**Construction Code:** 17-15-7**Facebook Grade:** Phenolic overlay coated**Bond:** A**Manufacturing Standard:** AS6669**Stress Grade:** F14

UTILITY PLY

Utility Ply is a general purpose low grade non structural panel for wall or ceiling linings for low cost construction.

D Face**D Back****Sheet sizes:**

2400mm x 1200mm

Sheet Thickness: 4 mm

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PLYWOOD TREATMENT METHODS

Plywood Treatment Methods

ACQ - Full Veneer Treatment

PNGFP ACQ treated plywood is manufactured by the Veneer treatment method where each veneer is treated prior to the veneer drying process and subsequent manufacture into plywood. This method ensures complete surface dryness of the treated panel and complete (100%) penetration to ensure maximum protection against rotting and insect attack. The treated veneers are then bonded with a permanent phenolic resin which is often referred to as A bond or Marine A or Structural bond.

CCA - Envelope Treatment

CCA employs an envelope treatment where untreated plywood is pressure impregnated with the preservation treatment chemical in a treatment cylinder. At the end of this process the plywood is saturated with moisture contents in excess of 50%. In order to ensure dimensional stability for the intended application, the plywood needs to be air dried down to a moisture content of approximately 15%. The air drying process consists of separating adjacent sheets of plywood with sticks of timber placed across the sheet and evenly spaced along the sheet. These sticks separate the sheets and allow airflow between the sheets which is necessary for the drying process. The “sticks” however tend to leave cosmetic marks on the sheet due to the drying process which does not affect the structural performance of the plywood or the efficacy of the treatment process.



PLYWOOD BOND TYPES

Plywood Bond Types

There are two bond types used in PNGFP products, a Structural or Marine bond, referred to as A Bond or an internal D Bond which have their respective performance characteristics defined in the Australia New Zealand standards for resins AS/NZS 2754

A Bond

A bonds use durable adhesive systems that can be utilised in exposed applications and will not creep. These systems can also be used for internal applications where the presence of a dark glue line will not detract from the aesthetic appeal.

The A bond adhesives are based on phenol formaldehyde resins or resorcinol formaldehyde resins which are cured under heat and pressure in the manufacture of plywood; once cured these bonds are permanent and reliable.

Key characteristics

- A Bond** • Permanent • Structural
- Resistant to creep • Dark colour
 - Low formaldehyde emission (E0)

D Bond

D bond adhesives are utilised in plywood intended for interior applications where panels are not exposed to repeated wetting and drying cycles and are not used in structural applications.

Urea formaldehyde or extended phenolic resins are often used for this application as they have a light brown or clear glue line.

Key characteristics

D Bond

- Non-structural
- Medium level of formaldehyde emission (E3)
- Light brown or clear colour

PLYWOOD CRATE VOLUMES IN SHEETS

Domestic Ply builds

Thickness mm	Sheets
4	202
6	135
9	90
12	65
15	55
17	48
19	43
21	39
24	34
25	32
27	30
30	27
33	25

Export Ply builds

Thickness mm	Sheets
4	202
6	135
9	90
12	75
15	60
17	54
19	48
21	44
24	37
25	35
27	33
30	30
33	28

Domestic FormPly

Thickness mm	Sheets
17	50

Export FormPly

Thickness mm	Sheets
12	75
17	50

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PLYWOOD APPLICATIONS

Plywood Bond Types



Flooring



Furniture



Walls & Ceiling



NiuClad



Bridges - NiuBridge



Structural Ply



Sound Barriers



Timber Hoarding



Boat building



Cupboards



NiuForm

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PLYWOOD CERTIFICATIONS

Certification



Engineered Wood Products Association of Australasia



PNGFP are certified by the Engineered Wood Products Association of Australasia (EWPA) Joint Accreditation System of Australia and New Zealand (JAS-ANZ) accredited quality control program to Australian and New Zealand standards AS/NZS 2269, AS/NZS 2270, AS/NZS 2271, AS/NZS 2272 and AS6669.

The EWPA's certification scheme is a "Type 5", one of the most rigorous in the JAS-ANZ system which includes:-

- Ongoing regular inspection
- Testing of product in the factory and in the market
- Auditing of the manufacturing process and management systems



CHAIN OF CUSTODY

In addition, the PEFC Chain of Custody certification demonstrates a commitment to sustainable forest management that is unique in PNG.

SEEDLINGS



GROWTH PHASE



HARVEST



MANUFACTURE



REPLANT



FINISHED PRODUCT

PNGF
Engineered Wood Products

**SUSTAINABLE
FORESTRY**

A close-up photograph of several sheets of light-colored plywood stacked on top of each other. The sheets are slightly offset, showing the layered edges. The wood grain is visible on the top surfaces. The lighting is warm and even.

PLYWOOD SAFETY

PNGFP Plywood is safe and has been tested to meet stringent EWPAA certifications for workplace health and safety. Not all plywood meets this standard.

Working safely with

TREATED PLYWOOD

WEAR



Gloves



Goggles



Mask

DON'T



Cook it



Burn it



Use it for animal litter

DO



Wash
Seperately



Dispose waste in
approved land fill

So why choose PNGFP Plywood?

PNGFP PLYWOOD	IMPORTED PLYWOOD
Available ex stock	Purchase in advance 3 month lead time
Credit terms available	Payment up front
Certified product	Generally non certified
Technical back up	No back up guarantee
Customer service	No guaranteed responsibility
Sustainable resource	No traceability
High density veneers	Low density core, ultra thin face veneer

Where can I get PNGFP Plywood?

Available at all local suppliers of quality ply and treated pine products throughout Papua New Guinea.



For further information contact PNGFP

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