



TECHNICAL INFORMATION

PLYWOOD

Plywood is a wood based panel product consisting of layers of veneers glued together, with the direction of the grain in adjacent layers at right angles. It is available in various species and qualities dependent upon the end use.

MDF

MDF is a wood based sheet material manufactured from wood fibres bonded together with a synthetic resin adhesive and suitable for a wide variety of interior uses. For more demanding situations MDF is also available in moisture resistant, flame retardant, high density and exterior grades.

OSB

OSB is an engineered wood product formed by layering strands of wood in specific orientations. It is compressed and bonded together using both wax and resin adhesives. There are two main types, OSB 2 for use in dry conditions and OSB 3 for structural use in humid conditions.

PARTICLE BOARD OR CHIPBOARD

Particle Board is an engineered wood product manufactured from wood chips, shavings and/or sawdust then pressed and bonded together with a synthetic resin. This product is mainly used as a carcassing material in the furniture trade or as a flooring product.

CONVERSION TABLES

We have included the following conversion tables to help our customers make calculations between imperial and metric equivalents.

MULTIPLY	BY	TO EQUAL
Inches	25.4	millimetres (mm)
	2.54	centimetres (cm)
Feet	30.48	centimetres (cm)
	0.3048	metres (m)
Yards	0.9144	metres (m)
Centimetres	0.3937	inches
Metres	3.2808	feet

EQUIVALENT PANEL SIZES	
1525 x 1525mm	5' x 5'
1981 x 762mm	6'6" x 2'6"
2135 x 915mm	7' x 3'
2440 x 1220mm	8' x 4'
2745 x 1220mm	9' x 4'
3050 x 1220mm	10' x 4'
3050 x 1525mm	10' x 5'
3660 x 1830mm	12' x 6'

THICKNESS EQUIVALENTS	
3.6mm/4mm	1/8"
5.5mm/6mm	1/4"
9mm	3/8"
12mm	1/2"
15mm	5/8"
18mm	3/4"
21mm/22mm	7/8"
24mm/25mm	1"
27mm	1 1/8"
30mm	1 1/4"
32mm	1 5/16"
35mm	1 3/8"
38mm	1 1/2"
45mm	1 3/4"
50mm	2"

PLYWOOD STANDARDS

EN 314-2: 1993 – Plywood — Bonding Quality, Requirements

EN 636: 2003 – Plywood — Specifications

There are only two material components in plywood: wood & glue. How these components interact will ultimately define how the plywood performs. These two standards provide a relatively straightforward way of classifying the outcome.

EN 314-2:1993 Plywood — Bonding Quality, classifies plywood by bonding quality only and gives rise to 3 bond classes dependent upon the intended end use. Bonding quality is determined by the adhesive type and core veneer quality (physical defects such as knot holes and splits).

(Bond) Class I: suitable for dry interior use only
(Bond) Class II: suitable for use in humid areas or exposure to occasional wetting
(Bond) Class III: suitable for unprotected exterior use or exposure to frequent wetting

Following exposure to a simulated hostile weather environment, accelerated in a laboratory, plywood is tested to destruction to assess how well the bond has survived the weathering process. Once bonding quality has been established to EN314, assessment to EN636 can begin.

EN 636: 2003, Plywood—Specifications, classifies plywood by taking into account the bond quality AND the biological durability* of the wood species used in the plywood:
(Specification) Class I: suitable for dry interior use only
(Specification) Class II: suitable for use in humid areas or exposure to occasional wetting
(Specification) Class III: suitable for unprotected exterior use or exposure to frequent wetting

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EN314 and EN636 are harmonised standards, so, to achieve EN636 Class II (frequently labelled EN636-2) the bonding quality, as a minimum, must be EN314 Class II. Some plywoods have a bonding quality of EN314 Class III but, because of limited biological durability of the timber species, can only achieve EN636-2. This is precisely the case with softwood plywood.

It is worth bearing in mind that, provided the EN314 bonding is Class III to start with, an otherwise EN636-2 plywood can be upgraded to EN636-3 by preservative treatment, to treatment class T3 (DD CEN/TS 1099:2007).

Most of the plywood sold in the UK will achieve EN314 Bond Class III yet, when assessed to EN636, will achieve EN636-2, because of limited biological durability of the wood. Exceptions to this might include Tropical Hardwood Throughout Plywood and Marine Grade Plywood, provided no sapwood is present. Sapwood is, however, difficult to eliminate.

* Biological Durability means: the natural capacity of the wood to resist the detrimental effects of fungal decay (rot) and beetle larvae (woodworm).

MARINE PLYWOOD TO BS1088: 2003

Marine Plywood should meet the requirements of BS 1088:2003 (Marine Plywood). BS 1088 comes in two parts, Part 1 (Requirements) and Part 2 (Determination of Bonding Quality Using Knife Test). The key requirements from part 1 of BS 1088 are highlighted below. However, this is no substitute for purchasing and using the full version of the standard.

Requirements of manufacture include classification according to panel type, Standard (S) and Lightweight (LW). Standard marine plywood has veneers possessing outstanding durability with respect to fungal decay and bonding quality making it suitable for marine construction while lightweight marine plywood is of veneers from timber species of lower density/durability than those in standard marine plywood while all other requirements remain the same.

Veneer Durability

Standard marine plywood as defined in BS 1088 should have outstanding resistance to bio-deterioration (durability) with time. The biological durability of marine plywood is expected to be greater than that of plywood of the same species that meets the requirements of BS EN 636-3. In this respect, Standard marine plywood should be made throughout of timbers having a durability rating of class 3, BS EN 350-2, or better and a nominal density of > 500kg/m³ and up to 5% sapwood per veneer is permitted.

Number and thickness of plies

According to BS 1088, Marine Plywood panels having a thickness of 6.5mm or less should have three or more plies. Panels having a thickness of greater than 6.5mm should have five or more plies. With 3-ply panels, the combined thickness of the two outer plies after sanding should be between 40% and 65% of the nominal unsanded thickness of the panel. With 5-ply panels, the combined thickness of the two outer plies after sanding, combined with those of the core and other inner plies with their grain direction parallel to the outer plies, should be between 40% and 65% of the nominal unsanded thickness of the panel. Additionally, for panels with nominal thicknesses of greater than 3.8mm, each outer ply should not be less than 1mm thick after sanding and each inner and core ply should not be more than 4.8mm thick.

Manufacturing Defects

In accordance with BS 1088, all marine panels should not contain any of the following manufacturing defects: open joints (e.g. core gaps, overlaps and pleats, blisters, hollows, bumps and imprints), roughness (other than that due to the irregular structure of the wood), sanding through, foreign particles, defects in the edges of panels (e.g. due to sanding, sawing, missing wood).

Bonding Quality

All marine plywood as defined in BS 1088 should have outstanding resistance to loss of bond strength with time. When tested in accordance with BS EN 314-1, the bonding quality should meet a minimum requirement of BS EN 314-2, Bonding Class 3.

Marking

Panels conforming to BS 1088 should be indelibly marked on the back or edge with the following information in the order shown:

- 1) The number and date of the British Standard "BS 1088-1:2003" and the word "MARINE"
- 2) The word "UNBALANCED" if panels are of unbalanced construction
- 3) The word "TREATED" if there has been any application of preservative treatment
- 4) The nominal panel thickness
- 5) The manufacturer's name or ID mark
- 6) The country of manufacture
- 7) The panel type (Standard (S) or Lightweight (LW))
- 8) The name of the timber species according to BS EN 350-2:1994

In addition, the documentation for each consignment of panels should include the marking information above and a list of all the species used in their construction and details of any preservative treatment which has been applied.



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USEFUL TIPS

The need for sealing both faces and edges of wood based panel products.

Many of the problems that can beset any woodbased panel products in situ could be avoided if the faces and edges were sealed against any moisture absorption before being installed. Water penetration can lead to the premature failure of any woodbased panel products. Water is absorbed much faster on the edges of an unprotected panel because most of the wood exposed can be end grain. The effect of water penetration through non protected edges/faces can lead to the following faults:

1. Edge swelling
2. Discolouration
3. Mould development
4. Staining
5. Delamination
6. Decay

It is important to remember that even where a fully exterior adhesive has been used in manufacture repeated wetting and drying of the board can give rise to splitting, cracking and delamination. When choosing a sealant the most important factor is that it is impervious to water.

Panel products for use in external conditions

Some woodbased panel products can be used in demanding exterior conditions. However, to be fully fit for purpose they must be correctly specified, installed and maintained. The term exterior use covers a wide range of situations from where the panels may be in contact with water to where the panels are only subject to occasional wetting. There are two important

concepts to consider when specifying a panel product for exterior use:

1. Service class
2. Hazard class

Service classes are used in structural design to define the environmental conditions in service which affect the mechanical performance of a panel under certain conditions.

Hazard classes deal with the risk of biological attack. Both of these classes are used to determine the suitability and correct treatment of a product for constructional purposes. The fact that a plywood may have been manufactured with an exterior glue does not mean or imply that it is suitable for long term exposure to exterior conditions. Most situations will require a durable veneer species along with an effective coating or preservative treatment.

Specifying panel products for structural use.

The most effective way of specifying a panel product for structural use is to require compliance with the harmonized standard BS EN 13986. Most panel products that are intended for structural use are internationally traded and therefore are likely to carry a CE mark. Products that meet the requirements of the structural standards should be marked FLOORS/ROOFS/WALLS. These panels should meet the requirements of BS EN 12871. For a plywood to be CE marked for Service Class 2 conditions it must comply with grade EN 636-2S.

PLYWOOD STANDARDS: USEFUL DEFINITIONS

Plywood is produced in accordance with national and European standards. These standards ensure an appropriate marketing of the plywood.

1. CLASSIFICATION AND SPECIFICATION STANDARDS FOR PLYWOOD

EN 313-1

Plywood - Classification and terminology - Part 1: Classification (June 1996)

EN 313-2

Plywood - Classification and terminology - Part 2: Terminology (May 1995). Revision published in 1999.

EN 322

Wood based panels - Determination of moisture content (June 1993). (Confirmed in November 1998).

EN 635-1

Plywood - Classification by surface appearance - Part 1: General (April 1995).

EN 635-2

Plywood - Classification by surface appearance - Part 2: Hardwood (July 1995).

EN 635-3

Plywood - Classification by surface appearance - Part 3: Softwood (July 1995).

ENV 635-4

Plywood - Classification by surface appearance - Part 4: Parameters of ability for finishing, Guideline (December 1996).

EN 635-5

Plywood - Classification by surface appearance - Part 5: Methods for measuring and expressing characteristics and defects (May 1999).

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EN 636

Plywood - Specifications (Published in 2003). *This European Standard specifies the requirements for plywood for general purposes or structural application in dry, humid or exterior conditions. It also gives a classification system based on bending properties.*

EN 12369-2

Wood-based panels - Characteristic values for structural design - Part 2: Plywood (2004).

ENV 14272

Plywood - Calculation method for the determination of some mechanical properties (2002).

2. TEST METHODS SPECIFIC TO PLYWOOD

EN 314-1

Plywood - Bonding quality - Part 1: Test methods (June 1993). Revision published in 2004.

EN 314-2

Plywood - Bonding quality - Part 2: Requirements (June 1993).

EN 315

Plywood - Tolerances for dimensions (June 1993). Revision published in 2000.

EN 1072

Plywood - Description of the bending properties for structural plywood. (November 1995).

ENV 1099

Plywood - Biological durability - Guidance for the assessment of plywood for use in different hazard classes (February 1998).

3. GENERAL STANDARDS APPLICABLE TO PLYWOOD

EN 322

Wood based panels - Determination of moisture content (June 1993). (Confirmed in November 1993).

EN 323

Wood based panels - Determination of density (June 1993) (Confirmed in 1998).

EN 310

Wood based panels - Determination of modulus of elasticity in bending and of bending strength (June 1993) (Confirmed in November 1998).

EN 324-1

Wood-based panels - Determination of dimensions of boards - Part 1: Determination of thickness, width and length (June 1993). (Confirmed in November 1998)

EN 324-2

Wood-based panels - Determination of dimensions of boards - Part 2: Determination of squareness and edge straightness (June 1993). (Confirmed in November 1998)

EN 717-1

Wood-based panels - Determination of formaldehyde release - Part 1: Formaldehyde release - Part 1: Formaldehyde emission by the chamber method (Published in 2004).

EN 717-2

Wood-based panels - Determination of formaldehyde release - Part 2: Formaldehyde release by the gas analysis method (April 1995). (Corrigendum published in 2002).

EN 717-3

Wood-based panels - Determination of formaldehyde release - Part 3: Formaldehyde release by the flask method (May 1996).

ENV 1156

Wood-based panels - Determination of duration of load and creep factors (May 1999).

EN 13986

Harmonized standard - Wood-based panels for use in construction - Characteristics, evaluation of conformity and marking. (2004)

EN 318

Wood-based panels - Determination of dimensional changes associated with changes in relative humidity. (Revision published in 2002).

EN 12871

Wood-based panels - Performance specifications and requirements for load bearing boards for use in floors, walls and roofs (Published in 2001).

ENV 12872

Wood-based panels - Guidance on the use of wood bearing boards in floors, walls and roofs (2000).

EN 13879

Wood-based panels - Determination of edgewise bending properties (2002).

EN 13810-1

Wood-based panels - Floating floors - Part 1: Performance specifications and requirements (2002).

DD CEN/TS 13810-2

Wood-based panels - Floating floors - Part 2: Test methods (Published in 2003).

Further standardisation at the global level is done within ISO (International Standard Organisation). These standards are in general equivalent to the corresponding European standards.