



**TIMBER  
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# Timber Panels

Ideal for large-scale construction, timber panels are easily workable, available in a range of sizes and lengths, and can incorporate different treatments, such as moisture and fire resistance.



# Timber Panels

Timber-based panels are versatile products, widely used in construction for variety of applications, including structural and non-structural uses in dry, humid, or exterior conditions.

## Plywood

Plywood is a timber-based panel made by bonding together a number of thin layers of veneers with adhesive under pressure. The grain of adjacent veneers is orientated at right angles to each other. Panels are pressed using heated platens, which apply pressure until the adhesive cures.

The types of bonds used are based on whether the plywood is for use in dry, humid or exterior conditions.



**IMAGE:** Plywood

### BS EN 314-2 Plywood bonding quality

**requirements** defines three classes on the basis of test requirements that the plywood bond must meet:

Class	Use
1 - Dry conditions	Interior, dry uses
2 - Humid conditions	Protected external applications and damp internal uses (with limited exposure to moisture during construction)
3 - Exterior conditions	Exposure to weather over sustained periods or continuous exposure to relatively high humidity

Plywood panels are also required to comply with one of the three performance classes within

**BS EN 636 Plywood - specifications** for use in construction, or with **BS 1088 Marine plywood - requirements** for marine conditions.

Class	Resin Type	Applications
1 - Dry conditions	Urea formaldehyde	Warm roofs, intermediate floors, internal timber frame, and partition walls
2 - Humid conditions	Melamine urea formaldehyde	Cold roofs, ground floors and external timber frame walls
3 - Exterior conditions	Phenol formaldehyde	Fully exposed service conditions
4 - Marine conditions	Phenol formaldehyde	Boats, docks, kitchens and bathrooms, exterior furniture

- **Softwood ply**

Plywood made from softwood such as Spruce (*Picea spp.*) gives a strong but lightweight utility panel. It is used in a wide range of construction applications, including roofs, floors, walls, fencing, and hoardings. If used for external applications, all faces and edges should be sealed before use. Softwood ply is available in 12mm and 18mm thicknesses.

- **Hardwood ply**

Used in internal and external joinery, shelving, sheds and structural applications, hardwood ply gives an excellent substrate for painting, lacquering, or staining. Available in 3.6mm, 5.5mm, 9mm, 12mm, 15mm, 18mm, and 25mm thicknesses.

- **Marine ply**

Although made with a Class 3 resin bond, marine plywood is made to a far tighter tolerance and timber durability for use in marine environments.

There are generally two types available:

- **Lloyds approved** - for use in marine craft and underwritten by Lloyds of London
- **“Made in accordance”** - compliant with BS 1088 standard, but not necessarily for use in marine craft.

Decorative veneered plywood can be categorised across five veneer grades, based primarily on the finished product appearance:

- **AA grade**

Premium face grade, used for architectural panelling and interior projects, as well as high-end furniture. AA grade veneers are also used when appearance continuity on several panels is required.

- **A grade**

The veneer still has good structure and some small variations in colour but retains an attractive appearance.

- **B grade**

Some variation in colour and knots.

- **C grade**

Increased natural characteristics and unlimited colour.

- **D/E grade**

Where a more rustic appearance is desired, or the surface is hidden, the D/E is often suitable. There is unlimited colour variation.

## Particleboards

Referred to in the UK as chipboard, particleboard panels are manufactured under heat and pressure from particles of timber (such as flakes, chips, shavings, and sawdust) and/or other lignocellulosic material in particle form (flax shives, hemp shives, bagasse fragments, and straw) with the addition of polymeric adhesive.

Boards are available from 2.5mm to 50mm in thickness. A proportion of recycled material can be incorporated within the panel during manufacture, which is then bonded with synthetic resin systems. Indeed, the particleboard industry in the UK dates from the 1940s and originated in a time of austerity with the purpose of utilising waste timber. Over 70% of UK particleboard now uses recycled timber.



**IMAGE:** Particleboard

Panel density (and therefore panel mass) varies depending upon the product, being affected by the timber species and the process used in manufacture. Typical densities are 600 kg/m<sup>3</sup> to 680 kg/m<sup>3</sup>.

Panel sizes commonly available are:

- 1830mm × 1200mm
- 2440mm × 1220mm
- 2750mm × 1220mm
- 3050mm × 1220mm
- 3660mm × 1220mm

### BS EN 312 Particleboards - specifications

categorises seven designations for particleboard uses:

Class	Use
P1	General purpose boards for use in dry conditions
P2	Interior fitments (including furniture) for use in dry conditions
P3	Non-load-bearing boards for use in humid conditions
P4	Load-bearing boards for use in dry conditions
P5	Load-bearing boards for use in humid conditions
P6	Heavy duty load-bearing boards for use in dry conditions
P7	Heavy duty load-bearing boards for use in humid conditions

Panels with moisture resistance are not waterproof; although particleboard can be advertised with the term ‘moisture resistant’, this applies to the adhesive binder which (within limits defined by **BS EN 312**) will not break down in the presence of moisture. Physical wetting of all types of particleboard should be avoided.

## Oriented Strand Board (OSB)

Invented in 1963 in California by Armin Elmendorf, OSB is manufactured with wooden strands or flakes bonded together with synthetic resin adhesive.

OSB comprises external and internal layers. The strands on the surface layers of the panel are typically orientated in the long panel direction, whilst the strands in inner layers are orientated randomly. This multilayer make-up, cross-orientation of flakes plus resin adhesive results in a strong, stiff, and water-resistant panel.

**BS EN 12369-1:2001 Wood-based panels - Characteristic values for structural design** details OSB characteristic values:

Class	Use
OSB/1	General purpose boards for use in dry conditions
OSB/2	Also known as Sterling board, ideal for structural applications in dry load-bearing conditions such as roofing, flooring, walls, and pallets
OSB/3	Load-bearing boards for use in humid conditions, used in applications such as roofing, wall sheathing, flooring, and hoardings
OSB/4	Heavy-duty load-bearing OSB for harsh and humid conditions, used as a structural panel in applications such as flooring, I-joint flanges, and structural elements

OSB is also used as an alternative to softwood plywood since it offers the same performance but is less expensive than plywood. OSB is commonly used as sheathing materials on floors, ceilings and walls.

OSB ranges in thickness from 9mm to 18mm.



**IMAGE:** Oriented strand board (OSB)

## Fibreboards

Panels manufactured from wood fibres or other plant-based fibres that have been pressed and bonded together using heat and pressure.

There are two manufacturing processes:

- **Wet process:** Steamed wood is reduced to fibres to which water is added to form a slurry. This wet mass is then formed and subjected to heated pressing, during which most of the water is removed and bonding of the fibres occurs thanks to natural lignin adhesive present in the wood. Depending on the amount of pressure applied during production, the resulting products can be classified as softboards, medium boards or hardboards.
- **Dry process:** The wet fibres are dried and an adhesive is added. The resulting panel is called medium density fibreboard (MDF).

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Although some fibreboard grades can be used for load-bearing situations, in most cases this panel type is not intended for structural applications. Typical applications include internal wall linings, roofing overlays, roof sarking, architectural mouldings, and window boards.



**IMAGE:** Medium density fibreboard (MDF)

**BS EN 622 Fibreboards. Specifications** provides requirements for hardboards, medium boards (MDF) and softboards. Moisture content must be between 4% and 9% (11% for MDF).

- Hardboards are smooth on one side and have a fine mesh pattern on the other, with a density exceeding  $900\text{kg/m}^3$ . It is used for structural and non-structural applications.
- Low-density medium boards ( $400\text{kg/m}^3 < 560\text{kg/m}^3$ ) are often used as floor underlay, while high density medium boards ( $> 560\text{kg/m}^3$ ) are suitable as sheathing material in timber frame construction, as well as wall and ceiling lining panels.
- Softboards ( $< 400\text{kg/m}^3$ ) have an open fibrous surface and are ideal for use as underlay or acoustic absorbers

MDF is heavily used in the furniture industry as its two smooth surfaces are easy to cut, profile, and paint. For pieces that will be visible, a veneer of timber is often glued onto fibreboard to give it the appearance of conventional wood.