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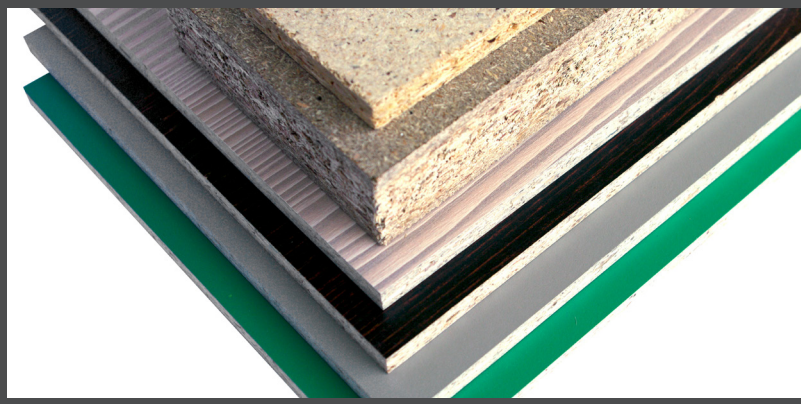
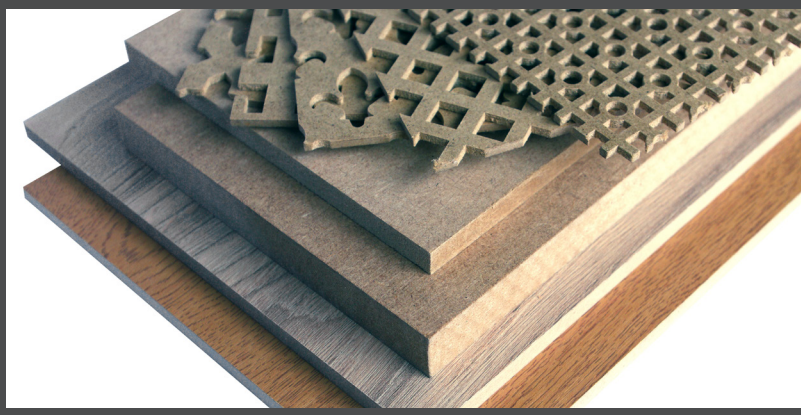
Panel Guide

Version 4







Annex 2F: Wet process fibreboards

Description

A wood fibre board (fibreboard) is defined as a panel material with a nominal thickness of 1.5mm or greater, manufactured from lignocellulose fibres with application of heat and/or pressure. This generic product type 'fibreboards' can be classified according to the production process and in this regard there are two classifications:

- Wet process fibreboards
- Dry process fibreboards (MDF).

Dry process fibreboard (MDF) is described separately in *Annex 2E* of PanelGuide.

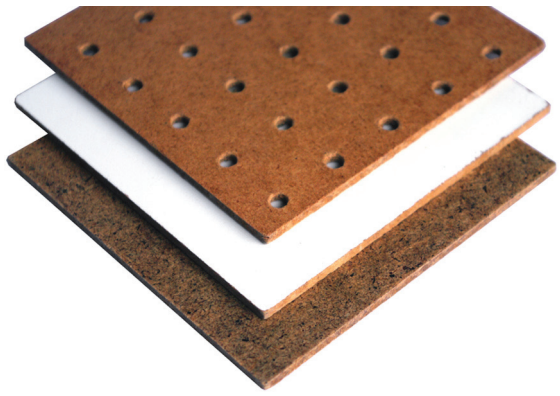


Figure A2.7: Hardboard

Figure A2.8: Mediumboard

Figure A2.9: Softboard

Wet process fibreboards can be classified according to their density:

- Hardboards $\geq 900\,kg/m^3$
- Medium boards* $\geq 400\,kg/m^3$ to $< 900\,kg/m^3$
- Softboards $\geq 230\,kg/m^3$ to $< 400\,kg/m^3$

*Mediumboard (which should not be confused with Medium Density Fibreboard – MDF) can be sub-divided into:

- Low density mediumboard $400\,kg/m^3$ to $< 560\,kg/m^3$
- High density mediumboard $560\,kg/m^3$ to $< 900\,kg/m^3$

Composition and manufacture

Wet process fibreboards can be made using either softwood or temperate hardwood species (or both) (some low density mediumboards are made from recycled paper fibre). Wood chips are thermally softened in water and then mechanically refined into fibres. The wet fibres are formed into a mat which is either rolled (softboards), or rolled and then pressed, at a high temperature to the desired thickness. The primary bond is generally derived from the felting together of the fibres and their inherent adhesive properties, although in some instances a synthetic adhesive may be added to the fibres. Other additives such as wax, bitumen emulsion, natural oil or fire retardant chemicals may also be added.

The differentiating feature between a wet process and dry process fibreboard is that wet process fibreboards have a fibre moisture content of more than 20% at the forming stage whereas dry process fibreboards have a fibre moisture content of less than 20% at the forming stage and they are produced with the addition of a synthetic resin binder.

There is currently no UK production of wet process fibreboards.

Appearance

Hardboard

Surface appearance of hardboards is usually smooth on one side and a fine mesh pattern on the reverse. Duo faced hardboards (smooth both sides) are also available. The colour of panels ranges from light gold to dark brown. Special panels are available including painted, plastic faced, printed with wood grain, embossed/textured (plain, primed or pre-decorated) and perforated. Enhanced strength and durability characteristics may be imparted by impregnation with hot oil or resin and subsequent heat curing; these panels are usually referred to as tempered hardboard.

Mediumboard

The surface texture is usually smooth on one side with a fine mesh pattern on the reverse. High density mediumboard usually has a hard, shiny surface whereas low density mediumboards have a matt surface. Colour ranges from mid grey to dark brown.

Softboard

The surface texture for unfaced natural panels is open and fibrous. Paper-faced or fine pulp overlaid softboards have smooth or lightly dimpled faces, or a slight mesh pattern on one or both sides. The colour of most panels is various shades of light brown, others are cream or off-white. Some panels are covered with a white primer or bleached pulp for painting. Softboards with enhanced durability and moisture resistance are produced. Currently these enhanced properties are imparted by impregnating the fibres with a bitumen emulsion; a spray coating on one or both surfaces may also be applied. The same characteristics can be imparted with the inclusion of phenolic resins. Typical bitumen impregnated panels are dark brown to black in colour.

Density, mass and panel size

Panel density and the panel mass varies according to the product, being affected by the timber species and the process used in manufacture.

- Softboard – densities range typically from 230 kg/m^3 to 400 kg/m^3. A 2400mm × 1200mm × 13mm panel will weigh approximately 10kg.
- Mediumboard – low density: densities vary typically from 400 kg/m^3 to 560 kg/m^3. A 2400mm × 1200mm × 6.4mm panel will weigh approximately 10kg.
- Mediumboard – high density: densities vary typically from 560 kg/m^3 to 900 kg/m^3. A 2400mm × 1200mm × 6.4mm panel will weigh approximately 15kg.
- Hardboard – densities vary typically from 900 kg/m^3 to 1100 kg/m^3. A 2400mm × 1200mm × 3.2mm panel will weigh approximately 9kg.

Panel sizes

Typical panel sizes are shown in *Table A2.29*.

Other sizes are available or can be produced to order.

Table A2.29: Wet process fibreboard panel sizes

Panel type	Thickness range mm	Typical sizes mm
Hardboard	1.2 to 9.5	1220 × length up to 3660
Mediumboard	6.0 to 12.0	1220 × lengths up to 3660
Softboard	8.0 to 25.0	600 to 1220 × lengths up to 3660

Applications

Wet process fibreboards find use in a wide range of construction and furniture related applications.

Hardboards

Hardboards are used in furniture as drawer bottoms and unit backs, as door facings, caravan interiors and floor coverings, as well as in shopfitting and display work. Standard hardboard is generally not recommended for exterior use or for use in areas subject to direct wetting or high humidity conditions.

Enhanced performance hardboards can be used for applications where higher strength properties and resistance to abrasion above that of standard hardboard is required. These panels find applications as components within structural members such as custom-made beams, exterior applications such as soffits and signage, and for uses in packaging, agriculture and flooring overlays.

Mediumboards

Low density mediumboards have particular application as pinboard and as components of partitioning systems. They can also be found in shopfitting and display applications and as a floor underlay material. High density mediumboards have been used as wall and ceiling lining panels and as a sheathing material in timber frame construction; however, their use today in UK construction is limited.

Softboards

Like mediumboards, the range of applications for softboards today has diminished; however, they do find application as pinboard, underlay materials and as an acoustic absorbent. Impregnated softboards have been used as a sheathing material in timber frame construction and as a protective overlay in some forms of flat roofing. In pitched roof construction in Scotland, impregnated softboards are used as a sarking material and heavily impregnated brands find application as joint fillers.

Specification

Wet process

Fibreboards manufactured in Europe must now be specified in accordance with European Standards. The UK versions of these are *BS EN 622* Parts 1 to 4. As explained in PanelGuide *Section 2*, fibreboards used in construction must comply, (by law) with the requirements of the Construction Products Regulations (CPR) by compliance with the harmonised European standard for wood-based panels (*BS EN 13986*).

This standard calls up the following parts, relating to wet process fibreboards:

- *BS EN 622-1 Fibreboards. Specifications. General requirements*[1]
- *BS EN 622-2 Fibreboards. Specifications. Requirements for hardboards*[2]
- *BS EN 622-3 Fibreboards. Specifications. Requirements for medium boards*[3]
- *BS EN 622-4 Fibreboards. Specifications. Requirements for softboards*[4]

Selection of a grade of panel is dependent upon the ambient climatic conditions together with the level of loading that is anticipated (see *Table A2.30*).

Guidance on the selection of different grades of fibreboard is given in tabular format in PanelGuide *Sections 2.4 to 2.14*; additional selection guidance is given in *DD CEN/*

Table A2.30: Types and grades of wet process wood fibreboard

Panel type	Grade	References
Softboard		
General purpose (for use in dry conditions)	SB	
General purpose (for use in humid conditions)	SB.H	
General purpose (for use in exterior conditions)	SB.E	BS EN 622-4
Load bearing (for use in dry conditions)	SB.LS	
Load bearing (for use in humid conditions)	SB.HLS[a]	
Low density mediumboard		
General purpose (for use in dry conditions)	MBL	
General purpose (for use in humid conditions)	MBL.H	BS EN 622-3
General purpose (for use in exterior conditions)	MBL.E	
High density mediumboard		
General purpose (for use in dry conditions)	MBH	
General purpose (for use in humid conditions)	MBH.H	
General purpose (for use in exterior conditions)	MBH.E	
Load bearing (for use in dry conditions)	MBH.LA1	BS EN 622-3
Heavy duty load bearing (for use in dry conditions)	MBH.LA2	
Load bearing (for use in humid conditions)	MBH.HLS1[a]	
Heavy duty load bearing (for use in humid conditions)	MBH.HLS2[a]	
Hardboard		
General purpose (for use in dry conditions)	HB	
General purpose (for use in humid conditions)	HB.H	
General purpose (for use in exterior conditions)	HB.E	BS EN 622-2
Load bearing (for use in dry conditions)	HB.LA	
Load bearing (for use in humid conditions)	HB.HLA1	
Heavy duty load bearing (for use in humid conditions)	HB.HLA2	

[a] These panels are restricted under humid conditions to instantaneous or short periods of loading

TS 12872. The requirements specified in *BS EN 622* are not specific to any particular application.

Physical properties

Climate

Like other wood-based panel products, fibreboards are hygroscopic and their dimensions change in response to changes in humidity. Typically a 1% change in moisture content results in an equivalent change of 0.4mm per metre in length and width of the panel. As a guide, wood fibreboard can be expected to attain the following moisture content under the conditions specified in *Table A2.31*.

Table A2.31: Expected moisture content of wood fibreboard

Relative humidity at 20ºC	Approximate equilibrium moisture content
30%	5%
65%	8%
85%	12%

Biological attack

Fibreboards will not normally be attacked by wood-boring insects in a temperate climate. Panels intended for internal uses are susceptible to fungal attack under prolonged wet conditions. Some types of hardboard and bitumen impregnated softboard (>25% impregnation) have been shown to have improved durability against wet rot fungi, over standard grades.

General guidance on the use of preservative treatments for panel products can be found from the WPA Manual *Industrial wood preservation specification and practice. Commodity Specification C11*. This guidance assists with making the right choice of preservatives for the end use and the panel product to be treated, as not all panel products need to be treated for particular end uses or are indeed suitable for some treatments. It also stresses that the preservative and/or the panel manufacturer should be consulted before any treatment is carried out as treatment may alter the physical and/or visual properties of the panel product.

Water vapour permeability

The value of water vapour resistance factor (μ) for fibreboards varies according to density (*Table A2.32*). Water vapour resistance factors are given as dry cup and wet cup values according to *BS EN ISO 12572*.

Table A2.32: Water vapour resistance factor (μ) for fibreboards
The values given are extracted from *BS EN 13986*

Wood-based panel	Density kg/m³	Vapour resistance factor	
		Wet cup μ	Dry cup μ
Fibreboard BS EN 622	250	2	5
	400	5	10
	600	12	20
	800	20	30

Table A2.33: Thermal conductivity (λ) of fibreboards
The values given are extracted from *BS EN 13986*

Wood-based panel	Density kg/m³	Thermal conductivity λ W/(m.k)
Fibreboard BS EN 622	250	0.05
	400	0.07
	600	0.10
	800	0.14

Thermal conductivity

The thermal conductivity of fibreboards (*λ*) varies depending on density (*Table A2.33*).

Reaction to fire

Under the Euroclass system for characterising the reaction to fire performance of materials, the deemed to satisfy ratings shown in *Table A2.34* are given in *European Commission Decision 2007/348/EC*.

If the manufactured product does not satisfy any of these minimum requirements and a reaction to fire claim is to be made in a DoP for CE marking purposes, then it must be tested and classified according to *BS EN 13501-1*. However if no claim is made in the DoP for CE marking purposes it is still possible to use the British standard system to make a separate claim.

Further information on the reaction to fire testing in both the BS and EN systems is provided in PanelGuide *Section 2.2.3*.

Storage and handling

Fibreboards should be stored flat and dry, off the ground, with all four edges flush. Storage in an enclosed building is preferable and external storage should be avoided. Stacking on edge should also be avoided wherever possible. Panels should be stacked on a close-boarded or slatted pallet, or if this is not possible on battens at no more than 600mm centres. The battens should all be of equal thickness and should be vertically aligned with any others in the same stack, in order to avoid distortion of the panels.

Panels should be protected by a waterproof covering during transport and the edges properly covered. Edges should also be protected against damage by lashings or other banding, this is particularly important for soft-boards. All panels should be installed at a moisture content as close as possible to that which they will attain in service in order to minimise any movement problems.

Once on site, it is preferable for individual panels to be 'stickered' before installation in order to allow air to circulate and to allow the panels to attain a moisture content as close as possible to the final in-service moisture content. Further guidance on storage and handling can be found in PanelGuide *Section 4*.

Working with fibreboards

Fibreboards can be sawn, routed, spindled or drilled. Satisfactory results can be achieved using hand tools,

Table A2.34: Reaction to fire classification without further testing of fibreboard

Product	EN Product standard	End use condition[6]	Minimum density (kg/m³)	Minimum thickness (mm)	Class [7] (excluding floorings)	Class [8] (floorings)
Fibreboard, hard[1]	BS EN 622-2	Without an air gap behind the panel	900	6	D-s2,d0	D_{fl}-s1
Fibreboard, hard[3]	BS EN 622-2	With a closed air gap not more than 22mm behind the wood-based panel	900	6	D-s2,d2	-
Fibreboard, hard & medium[1],[2],[5]	BS EN 622-2 BS EN 622-3	Without an air gap behind the wood-based panel	600	9	D-s2,d0	D_{fl}-s1
Fibreboard, hard & medium [3],[5]	BS EN 622-2 BS EN 622-3	With a closed or an open air gap not more than 22mm behind the wood-based panel	600	9	D-s2,d2	-
Fibreboard, medium[4],[5]	BS EN 622-3	With a closed air gap behind the wood-based panel	600	15	D-s2,d0	D_{fl}-s1
Fibreboard, medium[4],[5]	BS EN 622-3	With an open air gap behind the wood-based panel	600	18	D-s2,d0	D_{fl}-s1
Fibreboard, hard[5]	BS EN 622-2	Any	900	3	E	E_{fl}
Fibreboard, medium[5]	BS EN 622-3	Any	400	9	E	E_{fl}
Fibreboard, soft	BS EN 622-4	Any	250	9	E	E_{fl}

[1] Mounted without an air gap directly against class A1 or A2-s1, d0 products with minimum density 10 kg/m³ or at least class D-s2, d2 products with minimum density 400 kg/m³
[2] A substrate of cellulose insulation material of at least class E may be included if mounted directly against the wood-based panel, but not for floorings
[3] Mounted with an air gap behind. The reverse face of the cavity shall be at least class A2-s1, d0 products with minimum density 10 kg/m³
[4] Mounted with an air gap behind. The reverse face of the cavity shall be at least class D-s2, d2 products with minimum density 400 kg/m³
[5] Veneered phenol- and melamine-faced panels are included for class excl. floorings
[6] A vapour barrier with a thickness up to 0,4mm and a mass up to 200 g/m² can be mounted in between the wood-based panel and a substrate if there are no air gaps in between
[7] Class as provided for in Table 1 of the Annex to Decision 2000/147/EC
[8] Class as provided for in Table 2 of the Annex to Decision 2000/147/EC
NOTE: The classes given in this table are for unjointed panels, T&G jointed panels installed according to *DD CEN/TS 12872* and fully supported joints installed according to *DD CEN/TS 12872*

but quicker and more consistent results can be achieved using either portable or fixed power tools.

When cutting wood-based panels it is important to pay attention to normal good practice, sharp cutters, adequate support close to saws and cutters, elimination of machine vibration and correct allowance for saw kerf.

The quality of cut is dependent on the cutter type, tool and material speed and also on the material type and density. Tools must be kept sharp, as dull cutters will cause edges to 'bell'.

Fibreboards can be drilled using all types of wood-working drill bits.

Fixing fibreboards

Hardboards and mediumboards can be fixed with panel pins, nails, staples, and screws; the type used will depend upon the end use. Screws through thinner hard-boards should have cups if 'pull through' is a possibility. Hardboard and mediumboard can be bonded with most types of woodworking adhesives. Fixings into hardboard and mediumboard should generally use cavity fittings.

Softboards can be fixed with nails, staples and screws; the type used will depend upon the end use. Nails with large heads are recommended and screws should be fitted with cups. Softboard can be bonded with most types of woodworking adhesive and with bitumen adhesives for applications such as roofing. Due to their low density, softboards will not hold fixings satisfactorily when these are loaded. An appropriate type of cavity fixing which will spread the load should be considered.

Finishing

Fibreboard (except bitumen impregnated fibreboards) provides a suitable substrate for paints, stains, varnishes and textured coverings. Lining materials such as wallpaper, hessian and other fabrics can also be applied, providing an appropriate adhesive is used.

Hardboards and mediumboards can be veneered and laminated with high and low pressure laminates, paper and PVC foils.

Some brands of fibreboard are available pre-decorated.

Surface coatings

Mediumboard and hardboard can be painted with conventional oil-based and water-based paints, applied by spray, brush or roller. Matt, satin or gloss finishes can be obtained. Little preparation of the surface should be required; dust and grease should be removed from the panel, if necessary using white spirit.

Panels should have a primer or sealer coat applied, this can be proprietary hardboard sealer or a coat of emulsion paint. Some types of oil-treated hardboard, which contain natural or added oils, require priming with an aluminium primer or multi-purpose primer.

If panel edges will be visible after completion it may be necessary to seal these with hardboard sealer or with a wood or cellulose filler prior to the application of finish.

Softboard can be painted with conventional oil-based and water-based paints, applied by spray, brush or roller. Matt or satin finishes can be obtained. Panels should be brushed free of dust before decoration commences. No rubbing down of the surface should be required.

Natural and ivory faced panels should have a primer or sealer coat applied, a 50/50 mix of emulsion paint and water is suitable for this purpose. White primed soft-boards can be painted without using a sealer coat.

If further coating is applied, an alkali resisting primer is required and the panel or paint manufacturer's advice should be sought.

If panel edges will be visible after completion it may be necessary to fill these with a wood or cellulose filler prior to the application of finish.

Textured coatings can also be applied, care is needed in detailing panel joints which should be either scrimmed and filled or featured by leaving small gaps between adjacent panels.

Coating manufacturers' recommendations regarding priming of panels should be closely followed. After joint treatment, the paint is applied and textured (stippled, combed etc). The edges are normally finished by using a small brush to produce a plain margin.

Table A2.35: Fibreboards – common hazards and methods of control

Activity	Hazard	Control
Manual handling (in full panel form)	Large panel sizes present a risk of strain or crush injuries if not handled correctly	• Store carefully in uniform stacks on a flat level base • Use mechanical handling equipment • Adopt correct manual handling procedures
Carpentry work Activities likely to produce high dust levels include: • Sanding by machine and hand • Sawing, routing and turning • Hand assembling machined or sanded components	• Wood dust in general (including dust from fibreboards) has health risks – it may cause dermatitis and allergic respiratory effects • Wood dust is flammable	• Off site: preparation under exhaust ventilated plant • On site: enclosure and exhaust ventilation • Dust extraction on portable tools • Good ventilation • Respiratory protection equipment (RPE) Note: Any health hazards arising from the use of fibreboard at work can and should be controlled by compliance with the requirements of the Control of Substances Hazardous to Health (COSHH) Regulations 2002

Further details concerning cutting, fixing and finishing are given in PanelGuide *Section 4*.

Health and safety

In common with other wood products, fibreboards are safe when they are handled and used correctly.

When cutting or machining fibreboards, wood dust is produced and as this can be hazardous, measures must be taken to control the dust. This is normally carried out with the use of a suitable personal dust mask or by dust extraction systems in a workshop environment.

Dust from cutting operations can be controlled by complying with the Control of Substances Hazardous to Health (COSHH) Regulations 2002. Under these Regulations, wood dust has a Workplace Exposure Limit (WEL) of 5 mg/m^2, which is appropriate to wood dust from the machining of fibreboards. Exposure must be reduced as far as possible below this limit.

The formaldehyde potential of wet process fibreboards can be considered to be extremely low and may be considered to be within the lowest class specified in European Standards without testing.

As with all wood-based panels, there may be handling hazards and COSHH Regulation 6 requires an assessment to be made, and recorded of health risks associated with wood dust and handling. Common risks and control measures are shown in *Table A2.35*.

References

1 BS EN 622-1. Fibreboards. Specifications. General requirements, BSI

2 BS EN 622-2. Fibreboards. Specifications. Requirements for hardboards, BSI

3 BS EN 622-3. Fibreboards. Specifications. Requirements for medium boards, BSI

4 BS EN 622-4 Fibreboards. Specifications. Requirements for softboards, BSI

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