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मानक

IS 15512 (2004): Selection and Use of Various Types of Medium Density Fibre Boards - Code of Practice [CED 20:

Wood and other Lignocellulosic products]

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## भारतीय मानक

# विभिन्न प्रकार के मध्यम घनत्व वाले रेशा बोर्डों का चयन और प्रयोग — रीति संहिता

## Indian Standard

## SELECTION AND USE OF VARIOUS TYPES OF MEDIUM DENSITY FIBRE BOARDS — CODE OF PRACTICE

ICS 79.060.20

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BUREAU OF INDIAN STANDARDS MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG NEW DELHI 110002

## FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Wood and Other Lignocellulosic Products Sectional Committee had been approved by the Civil Engineering Division Council.

This Code provides detailed guidelines for use of medium density fibre boards. The Code may be used in conjunction with IS 12406 'Medium density fibre boards for general purposes — Specification' and IS 14587 'Prelaminated medium density fibre board — Specification'.

Medium density fibre board is a latest development in the wood panel industry. During past few years medium density fibre boards have become one of the major products of growing importance to furniture industry. In view of its construction and properties different than that of wood especially considering carpentry work, the need to formulate a comprehensive Code of practice for proper guidance to industry and consumer was felt.

In formulation of this standard, due weightage has been given to standards and practices prevailing in different countries and also to the customs in the country.

The composition of Committee responsible for the formulation of this standard is given at Annex B.

## Indian Standard

## SELECTION AND USE OF VARIOUS TYPES OF MEDIUM DENSITY FIBRE BOARDS — CODE OF PRACTICE

## **1 SCOPE**

This Code covers the selection and installation of MDF panels, which are used in residential buildings, schools, hospitals and other non-residential buildings, for furniture and interior decoration works. This Code does not cover industrial applications and fireproof applications.

## **2 REFERENCES**

The standards listed in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated.

#### **3 TERMINOLOGY**

For the purpose of definitions, reference may be made to in IS 707, IS 12406 and IS 14587.

## **4 GRADE AND GRADE SELECTION**

## 4.1 General

Generally, type of application, climatic condition, hazard class, architectural consideration and cost determine the type/grade of the MDF to be used.

## 4.2 Grades

Grades and types available are listed in Table 1.

#### 4.3 Grade Selection

The grade of the panel to be used is selected from the available list as per 4.2 depending upon the requirement. Medium density fibre boards are recommended for use in interior dry locations. Grade I boards may be used in Hazard Class  $1^{11}$  and Hazard Class  $2^{21}$ , whereas Grade II boards may be used in Hazard Class  $1^{11}$  only. For interior humid locations Grade I prelaminated MDF or Grade I MDF board with proper painting and edge sealing may be used. For shelves prelaminated MDF board may also be used.

## **5 THICKNESS SELECTION**

5.1 The selection of the grade and thickness of MDF for a particular application depends upon the expected load on the shelf and the geometry of the shelf itself. Required thickness can be calculated using the formula given below (for simply supported shelf).

$$t = \left[\frac{5 WL^3 \times 9.81}{32 Ebd}\right]^{1/3}$$

where

t = shelf thickness, mm;

W = total load (uniformly distributed), kg;

L = distance between two supports, mm;

E =modulus of elasticity, N/mm<sup>2</sup>;

b = shelf width, mm; and

d =centre deflection, mm.

**5.2** MDF shelves which have been surfaced by direct painting or the application of thin decorative laminates, creep effects occurring during long-term loading could result in an increase of above referred deflections by up to 50 percent. Considerable lower initial deflection and less creep would be expected when using MDF panels surfaced on both faces with decorative plastic laminates.

## 6 ADHESIVES

As MDF is manufactured from reconstituted wood fibres, all of the adhesives that perform satisfactorily on wood substrate may perform equally well on MDF. Normal carpentry adhesives as used in other panels may also be used on MDF. When bonding MDF to other materials the choice of a specific type of adhesive should be determined mainly by the surface characteristics of the other materials. Other factors affecting choice include the method of applying the adhesive, by hand, glue roller or by spray and flammability regulations and pressing conditions, whether by hand or in a press at room or elevated temperature.

<sup>&</sup>lt;sup>1)</sup>Hazard Class 1 — Environment with relative humidity less than or equal to  $70_{\rm P}$  = 0.1 so that equilibrium moisture content of MDF will not be more than 15 percent.

<sup>&</sup>lt;sup>2)</sup>Hazard Class 2 — Environment with relative humidity more than 70 percent so that equilibrium moisture content of MDF will not be more than 20 percent.

SI	Type of Board	Grade/Type (Designation)				Indian Standard
NO.				<b>^</b>		
i)	MDF Board for general purpose	Grade I	(SBG I)	Grade II	(SBG II)	IS 12406
ii)	Prelaminated MDF boards	Grade I:		Grade II:		IS 14587
		Type I	(PLMDF-11)	Type I	(PLMDF-21)	
		Type II	(PLMDF-12)	Type II	(PLMDF-22)	
		Type III	(PLMDF-13)	Type III	(PLMDF-23)	
		Type IV	(PLMDF-14)	Type IV	(PLMDF-24)	

 Table 1 Grades and Types of Medium Density Fibre Boards
 (Clause 4.2)

## 7 HARDWARE

**7.1** Hardware like screws, nails, hinges, tower bolts, locks, etc, and other fixtures may be used on MDF like used in other panels. Generally these fixture provided should not only be functional but aesthetically good-looking also. Surface mounted hinges like spring-loaded, flap hinges should be preferred.

## 7.2 Screws

a) Use fully threaded parallel shank screws as per IS 7170 as shown in Fig. 1. Screws with cross recessed head as per IS 7478 may also be used.

Selection of screws may be done with the help of Table 2.

 Table 2 Thickness of Boards and Screw Size
 (Clause 7.2)

SI	Thickness of Board mm	Screw Size				
INO.		ST 2.9	ST 3.5	ST 4.2	ST 4.8	
(1)	(2)	(3)	(4)	(5)	(6)	
i)	6		_	_	_	
ii)	8	$\checkmark$	—	—	_	
iii)	10	$\checkmark$	—	_	_	
iv)	12	$\checkmark$	$\checkmark$	_	_	
v)	15	$\checkmark$	$\checkmark$			
vi)	18 to 40	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	



FIG. 1 FULLY THREADED PARALLEL SHANK SCREWS

b) Screw length should normally be equal to: Thickness + 1.5 thickness of the surface as shown in Fig 2.





c) Drill pilot hole before fixing screws as shown in Fig. 3, size of pilot hole for respective screw thickness can be derived from Table 3.

## Table 3 Screw Size and Size of Pilot Hole(Clause 7.2)

SI	Screw	Pilot Hole	Depth of Pilot
No.	Size θ mm	Diameter	Hole
(1)	(2)	(3)	(4)
i)	ST 2.9	2.0	Depth $(D)$ of the pilot hole
ii)	ST 3.5	2.5	should be slightly beyond the
iii)	ST 4.2	3.0	full depth of screw
iv)	ST 4.8	3.5	(Approximately 2 - 3 mm)



FIG. 3 PILOT HOLE FOR FIXING SCREW

d) Distance of screws from corner should be 75 mm for edge and 25 mm for face as shown in Fig. 4. Screwing on the edges of MDF board below 12 mm thickness is not recommended.



FIG. 4 DISTANCE OF SCREWS FROM CORNER

e) If screws are to be repeatedly removed and fixed use plastic or metal sleeves as shown in Fig. 5.



FIG. 5 SLEEVE FOR REPEATED SCREW FIXING AND REMOVAL

f) Hammering and over tightening of screws should be avoided (see Fig. 6).



FIG. 6 HAMMERING AND OVERTIGHTENING NOT RECOMMENDED

### 7.3 Nails

Nailing is not recommended into MDF, however nailing may be used for typical applications like setting of adhesive while jointing, attachment of fabric for upholstery, fixing of decorative trims to MDF panels. Shank diameter of the nails should not be more than 1.40 mm under any circumstances. While nailing into surface the distance of nailing should be 25 mm minimum from corner or edges. When nailing into the edges the minimum distance from corner should be 75 mm. Spacing of individual nails should be minimum 150 mm.

### 8 HANDLING AND STORAGE

Following procedures are recommended for handling and storing:

- a) MDF sheets should preferably be stored horizontally and lifted clear of the floor using dry bearers as supports. Polyethylene sheets should be used for damp floors to prevent moisture from rising to panels.
- b) Where individual bearers are used they should be of equal thickness and placed at not more than 800 mm centre to centre for boards of 15 mm thickness and upwards subject to minimum 3 bearers. Closer spacing, for instance 50 times of board thickness is recommended for thinner boards.
- c) The bearers supporting successive layers should be in vertical alignment.
- d) Stacks of boards should have flush sides to minimize damage to protruding edge or over hanging corner. Maximum allowable overhang during stacking should not be more than 100 mm as shown in Fig. 7.
- e) Storage area should be well ventilated and the conditions should be reasonably dry. An average relative humidity of 50 percent will maintain board moisture content within range 7 to 9 percent.
- f) If extreme damp or dry exposure conditions are expected in transit or warehousing each pallet load should be wrapped in plastic sheet.
- g) Use of top and bottom cover of 18 mm or more thickness scrap boards is recommended, while stacking to eliminate any unbalancing effect or any short-term change in environment conditions.

## **9 WORKING ON MDF PANELS**

## 9.1 Sawing MDF

MDF can be cut successfully with handsaws without splintering or break out of the core fibres. As the wood raw materials for MDF are relatively free from grit or other abrasive materials, cutter wear is not likely to be a problem when sawing MDF.

#### 9.1.1 Using Handsaw

When using handsaw following points are to be kept in mind:

- a) Keep low angle for cutting (see Fig. 8).
- b) Use fine toothed saw about 10 teeth per 25 mm to avoid chipping (see Fig. 9).



RECOMMENDED



NOT RECOMMENDED



NOT RECOMMENDED







For cutting prelaminated MDF board, mark an approximate 0.2 mm line with a sharp chisel, so that the groove thus cut is deep enough to ensure that laminate film/paper of the board is completely cut into parts to avoid any chip off of film/paper at the surface.

#### 9.1.2 Using Machine Saw

The resin binder does make MDF slightly more abrasive than commonly used hardwoods. Carbide



FIG. 9 FINE TOOTHED SAW

tipped machine saws (*see* Fig. 10) is therefore recommended for most production work. When large volumes are to be cut, the use of polycrystalline diamond (PCD) tipped saws should be considered to take advantage of their substantially longer cutting life. The running speed (rpm) of saw is calculated as follows:

$$rpm = \frac{Rim Speed \times 60}{Saw Diameter \times 3.14}$$



FIG. 10 MACHINE SAW

where

Rim Speed in m/s, and Saw Diameter in m.

## 9.2 Profiling MDF

One of the main advantages of MDF is the ease of shaping panels and moulding edges, ready for finishing to a high appearance standard with minimum sanding and filling. A typical profiling of MDF is shown in Fig. 11. All sharp edges may be rounded off.



FIG. 11 PROFILING MDF

NOTES

- 1 Use tungsten carbide tools.
- 2 Minimum cutter speed should be kept at 3 600 rpm.
- 3 Cutter angles normally should be in the following range: Cutting angle : 10° to 20° Clearance angle : 20° to 22°

## 9.3 Types of Joinery

Following are the types of joinery commonly used in MDF.

## 9.3.1 Dowel Joint

Joint with dowels or screw pegs placed in corresponding holes made on the two joining faces (see Fig. 12).



FIG. 12 DOWEL JOINT

## 9.3.2 Dovetail

Joint of two MDF board, in such a way that the notch made on one are fitted exactly into projections of corresponding size and shape made in the other (*see* Fig. 13). Such joints resist withdrawal except in the direction in which it was assembled.



FIG. 13 DOVETAIL JOINT

## 9.3.3 Spline

Joint in which two pieces of MDF board are jointed end to end, with half of the dowel thrust in each piece (see Fig. 14).

## 9.3.4 Finger

Joint formed by series of tenons engaged in corresponding slots in MDF board (see Fig. 15).



FIG. 14 SPLINE JOINT



FIG. 15 FINGER JOINT

## **9.3.5** Half Lap

Joint with MDF board cut to half section up to a certain length at one end in both pieces, which are lapped on one another and joined (*see* Fig. 16).



FIG. 16 HALF LAP JOINT

## 9.3.6 Mitre Joint

Joint between two members at an angle in which the jointing surfaces are cut to corresponding edges at the intersection and jointed with dowel (*see* Fig. 17).





## **10 SURFACE FINISHES**

The surface finishing is required to achieve the desired functional requirement, aesthetic considerations and colour scheme. Laminates, veneers, paints and polishes are commonly used for decorative finishes. These are normally applied on the exposed surfaces of the panel. The unexposed surface must be polyurethane primered or painted or polished including all the edges. Number of coats shall be as per the recommendation of the panel manufacturers. Decorative veneers require polishing or waxing.

## 10.1 Laminating/Veneering

Whenever the board is to be laminated/veneered with decorative laminate, the construction must be balanced at the other unexposed surface.

- a) The unexposed surface must be applied with two coats of polyurethane primer.
- b) The surface is first cleaned of dust and dirt and then the PVAC adhesive is applied on the surface. The laminate is then put on the surface and pressure is applied to the tune of 2 kg/cm<sup>2</sup> to 3 kg/cm<sup>2</sup> so that no air void remains between laminate and MDF surface. After this the surface is left for 4-6 h for drying/setting of adhesive before use. Normally edges are bound together with the help of nails and adhesive tapes to prevent removal of laminate from MDF surface while drying.

## 10.2 Painting/Polishing/Waxing, etc

The finishing is done to protect the MDF surface from weather and provide decoration. All the edges exposed to atmosphere should be sealed. Sealing may be done by using suitable putty, paint, lipping or edge band. The finishing by painting/polishing require mainly following steps.

#### 10.2.1 Preparation of Base/Application of Base Coat

- a) Sanding of surface to make surface smoother and to remove the dust particles/oil stains or any other foreign particles. The sand paper to be used should not be less than 120 grit.
- b) Application of putty over a coat of primer is required to fill depressions and holes so that the surface is even and smooth.
- c) Over and above one or two coats of paint/polish/varnish of required shade and colour should be applied as per requirement.

## 10.2.2 Application of Finishing Coat

Two coats of suitable and desired paint of polish shall be given as a finishing coat on either side of the furniture panels. Such a finish shall be given to all the members which are exposed and balance coat should be given to all unexposed areas. For detailed methods of working, user manuals of respective manufacturers can be referred.

Reference may also be made to IS 2338 (Part 1) and IS 2338 (Part 2) for finishing of wood and wood based materials.

## ANNEX A

## (Clause 2)

## LIST OF REFERRED INDIAN STANDARDS

IS No.	Title	IS No.	Title
707 : 1976	Glossary of terms applicable to tim- ber technology and utilization		tapping screws (common head style) (first revision)
	(second revision)	7478 : 1985	Dimensions for cross recesses (first
2338	Code of practice for finishing of		revision)
	wood and wood based materials:	12406 : 2003	Medium density fibre boards for
Part 1 : 1967	Operations and workmanship		general purposes — Specification
Part 2 : 1967	Schedules		(first revision)
7170 : 1989	Slotted countersunk (flat) head	14587 : 1998	Specification for prelaminated medium density fibre board

Organization

## ANNEX B

## (Foreword)

## COMMITTEE COMPOSITION

Wood and Other Lignocellulosic Products Sectional Committee, CED 20

All India Agro-Board Association, Pune Building Materials & Technology Promotion Council, New Delhi Central Building Research Institute, Roorkee Central Public Works Department, New Delhi Civil Aviation Department (Technical Centre), New Delhi Coir Board, Bangalore Council of Architecture, New Delhi Directorate General of Supplies & Disposals, Hyderabad Directorate of Standardization, New Delhi Engineer-in-Chief's Branch, New Delhi Federation of Indian Plywood & Panel Industry, New Delhi Forest Research Institute, Dehra Dun Indian Academy of Wood Science, Dehra Dun

Indian Plywood Industries Research and Training Institute, Bangalore

Indian Plywood Industries Research & Training Institute, Bangalore

Institute of Wood Science & Technology, Bangalore Jolly Board, Mumbai

Kutty Flush Door & Furniture Co Pvt Limited, Chennai Mangalam Timber Products Limited, Bangalore

Ministry of Defence (DGQA), Kanpur

Ministry of Defence (R & D), New Delhi Ministry of Railways, Lucknow

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Novopan India Limited, Hyderabad

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The South Indian Plywood Manufacturers Association, Chennai The Western India Plywood Limited, Cannanore Timpack Pvt Limited, Byrnihat In personal capacity, (H.No. 12, HIG, 1st Stage, K.H.B. Colony,

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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## **Amendments Issued Since Publication**

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