IS 3478 (1966): Specification for High Density Wood Particle Boards [CED 20: Wood and other Lignocellulosic products]

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Indian Standard

(Reaffirmed 2003)

SPECIFICATION FOR HIGH DENSITY WOOD PARTICLE BOARDS

(First Reprint JULY 1983)

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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Indian Standard

SPECIFICATION FOR HIGH DENSITY WOOD PARTICLE BOARDS

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Indian Standard

SPECIFICATION FOR HIGH DENSITY WOOD PARTICLE BOARDS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 15 March 1966, after the draft finalized by the Wood Products Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 The particle board industry in this country is developing fast, and along with the other types of low density and medium density particle boards, high density particle boards are also increasingly in demand, and their production is on the increase. High density particle boards are used for specialized tools (such as for press tools, for jigs and other fixtures, rubber press dies, forming and drawing tools, and piercing and blanking tools) in the aircraft, automobile and general engineering industries. This standard is intended to guide the developing industry in the production of high density particle boards.

0.3 There are three kinds of particle boards based on density classification : medium density particle boards having a specific gravity of 0·5 to 0·9, covered in IS : 3087-1965*, low-density particle boards having specific gravity of 0·4, covered in IS : 3129-1965†; and high-density particle boards, covered in this standard having specific gravity over 0·9.

0.4 The physical requirements for high density wood particle boards specified in Table 1 of this standard does not include the requirements in regard to swelling. These requirements for the various types and grades of particle boards are under investigation by the Committee responsible for the preparation of this standard and will be included when the results of the investigation become available.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960‡. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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*Specification for wood particle boards (medium density) for general purposes.

†Specification for particle boards for insulation purposes.

‡Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard covers the requirements of high density wood particle boards in flat sheet or moulded forms.

2. TERMINOLOGY

2.1 For the purpose of this standard, definitions given in IS : 707-1958* and IS : 3087-1965† shall apply.

3. TYPES AND GRADES

3.1 High density wood particle boards shall be of two types depending on the type of synthetic resin used for manufacture, and each type shall be of two grades depending on the extent of resin content as shown below:

	Type of Resin	*Grade*
Type 1	BWR	Grade A Grade B
Type 2	WWR or CWR	Grade A Grade B

3.2 Each type and grade may be supplied in flat sheet form or in moulded form as required by the purchaser.

4. MATERIALS

4.1 Any suitable species of timber may be used.

4.2 Adhesive — The adhesive used for bonding high density particle board shall be as specified in **3.1** for various types.

NOTE 1 — In Grade A particle board the resin binder which is of the order of 20 to 50 percent in addition to serving for binding of particles also acts as impregnants into the particles to modify its properties and thus increase its resistance to water, moisture, weather and facilitates high compression.

NOTE 2 — In Grade B the resin binder which is of the order of 8 to 12 percent, joins the chips without any appreciable impregnation of the same.

4.2.1 The purchaser may specify any particular resin in the type and any particular resin content range depending on his special requirement.

4.3 Sizing Material — Any suitable sizing material, for example, paraffin wax dissolved in mineral spirit or emulsified with water or melted, shall be used as sizing material up to a maximum of one percent.

*Glossary of terms applicable to timber, plywood and joinery.

†Specification for wood particle boards (medium density) for general purposes.

5. MANUFACTURE

5.1 High density wood particle boards shall be manufactured by converting the specified timbers into suitable wood particles; seasoning the same to a moisture content not exceeding 8 percent (generally 3 to 5 percent); blending thoroughly with the requisite quantity of the specified adhesive and sizing material and then felting into the required thickness and form and pressing in a hot press under high pressure usually of the order of 1 kg/mm^2 to 2 kg/mm^2 under controlled conditions of heat, pressure and pressing time.

5.2 In moulded particle boards the resin mixed chips shall be pressed in suitable moulds to the required shape under controlled conditions of heat, pressure and pressing time.

6. DIMENSIONS AND TOLERANCES

6.1 The preferred sizes of high density wood particle boards in flat panels shall be as below:

Length : 180, 150, 120, 100, 90, 60 and 45 cm

Width : 150, 120, 100, 90 and 45 cm

6.2 Thickness — The preferred thicknesses of high density wood particle boards shall be as follows (*see* Note):

50, 45, 40, 35, 30, 25, 22, 20, 16, 12, 9, 6 and 4 mm

NOTE — Thickness of 19 mm and 13 mm are being currently manufactured and it is expected that the industry will changeover to the preferred thickness in about two years.

6.3 Tolerances

6.3.1 In flat panels tolerances in length and width shall be ±6 mm. Tolerance in thickness shall be ±2·5 percent for boards above 25 mm thick and ±5 percent for boards up to 25 mm in thickness.

6.3.1.1 The lengths of the 2 diagonals of a wood particle board rectangular panel shall not differ by more than 2·5 mm per metre length of the diagonal.

6.3.1.2 The edges of the board shall be straight with a tolerance of 3 mm.

6.3.2 *Moulded Panels* — The dimensions, thickness and tolerances, of moulded high density particle board shall be in accordance with the drawing provided by the purchaser.

7. PHYSICAL REQUIREMENTS

7.1 General — High density wood particle board shall be of uniform thickness and density throughout the length and width of the board in case of flat panels. Sanding when given shall be uniform on both the surfaces.

7.2 The physical requirements for high density wood particle boards both in flat panel and moulded form shall be as specified in Table 1.

8. SAMPLING

8.1 Scale of Sampling — The number of particle boards to be selected from a lot shall be in accordance with Table 2 (*see* P 8).

8.1.1 The particle boards shall be selected at random. In order to ensure randomness of selection, all the particle boards in the lot may be arranged in a serial order and every rth particle board may be selected till the required number is obtained, r being the integral part of N/n where N is the lot size and n is the sample size.

8.2 Test Specimens and Number of Tests — The length, width, thickness and the diagonals of panels of the particle boards selected as in **8.1** shall be measured before cutting the particle boards for taking test specimens. The straightness of edge shall also be measured. The shape, dimensions and tolerances of moulds panels shall be checked with the drawings.

8.2.1 From each of the high density wood particle boards selected, test specimens shall be cut to obtain test pieces as below. The method of preparation and conditioning of test specimens shall be as specified in **3** of IS : 2380-1963*.

8.2.2 *Density* — One test specimen from each sample, in full thickness of material, and 7·5 cm wide and 15 cm long shall be tested for density.

8.2.3 *Moisture Content* — One test specimen from each sample in full thickness of material and 7·5 cm wide and 15 cm long shall be tested for moisture content.

8.2.4 *Water Absorption* — One test specimen from each sample of size 30 cm × 30 cm, and full thickness of board from each sample shall be tested for water absorption.

8.2.5 *Modulus of Rupture* — One test specimen from each sample to conform to dimensions as specified in **7.1** of IS : 2380-1963* shall be tested for modulus of rupture.

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*Methods of test for wood particle boards and boards from other lignocellulosic materials.

TABLE 1 PHYSICAL REQUIREMENTS FOR HIGH-DENSITY WOOD PARTICLE BOARDS

(*Clauses* 7.2 *and* 9.2)

Type	Grade	Density	Moisture Content	Minimum Modulus of Rupture	Minimum Tensile Strength	Water Absorption after 24h Maximum Immersion	Resistance to Boiling Water after 3 h Immersion
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		g/cm³	percent	kg/cm²	kg/cm²	percent	
Type 1	Grade A	1·2	3 to 7	450	350	10	Shall not show any sign of delamination
	Grade B	0·9 *Min*	5 to 16	400	300	25	
Type 2	Grade A	1·2	5 to 10	300	225	15	Not specified
	Grade B	0·9 *Min*	5 to 16	250	200	25	
Test According to		Clause 6 of IS : 2380-1963*	Clause 5 of IS : 2380-1963*	Clause 7 of IS : 2380-1963*	Clause 9 of IS : 2380-1963*	Clause 14 of IS : 2380-1963*	9.3
Maximum Permissible Variation in Individual Specimen from the Mean		*Max* ± 10 percent	*Max* ± 2 percent	—	—	—	—

*Methods of test for wood particle boards and boards from other lignocellulosic materials.

TABLE 2 NUMBER OF PARTICLE BOARDS TO BE SELECTED

Lot Size	Number of Particle Boards to be Selected
N	*n*
Up to 50	2
51 ,, 100	3
101 ,, 200	4
201 ,, 300	5
301 ,, 500	7
501 and above	10

8.2.6 *Tensile Strength* — One test specimen for each direction from each sample to conform to dimensions as specified in **9.1** of IS : 2380-1963* shall be tested for tensile strength.

8.2.7 *Boiling Water Resistance* — One test specimen size 30 cm × 30 cm and full thickness of the board from each sample shall be tested for resistance to boiling water.

8.3 In case of moulded boards, the sizes and shape of sample may be altered as be deemed necessary.

8.4 Criteria for Conformity

8.4.1 The lot shall be considered as conforming to the requirements of this specification if the samples and test specimens pass the conditions prescribed in **9.**

8.4.2 If any sample fails to conform to the requirements, further samples shall be considered to pass if these samples conform to the requirements prescribed.

9. TESTING

9.1 Accuracy of Dimensions of Boards — In flat boards, the accuracy of dimensions shall be measured as specified in **4** of IS : 2380-1963*. All the sample boards selected in accordance with **8.1** shall be measured for straightness of edges, squareness of boards, lengths, widths and thicknesses. The mean dimension, that is, length, width and thickness, shall be as ordered or within the tolerances specified under **6.3.** The boards shall be rectangular so that the two diagonals of the board shall not differ from each other by more than tolerances specified under **6.3.** The edges shall be straight within the limit specified under **6.3.**

*Methods of test for wood particle boards and boards from other lignocellulosic materials.

9.1.1 Moulded boards shall be checked for dimensions with the drawings, including tolerances, provided by the purchaser.

9.2 The specimens shall be tested in accordance with the methods of tests given in Table 1 and shall conform to the requirements given in Table 1.

9.3 Boiling Water Resistance Test — The specimen as prepared under **8.2.7** shall be immersed in boiling water for three hours. It shall show no sign of delamination.

10. MARKING

10.1 Each particle board shall be legibly marked on any of its edges with the following:

a) Name of the manufacturer or trade-mark, if any

b) Type and grade of particle board.

10.1.1 Each particle board may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act, and the Rules and Regulations made thereunder. Presence of this mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard, under a well-defined system of inspection, testing and quality control during production. This system, which is devised and supervised by ISI and operated by the producer, has the further safeguard that the products as actually marketed are continuously checked by ISI for conformity to the standard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

INDIAN STANDARDS INSTITUTION

The Indian Standards Institution (ISI), which started functioning in 1947, is the national standards organization for India. Its principal object is to prepare standards on national and international basis and promote their general adoption.

The overall control of ISI, which is run and financed jointly as a non-profit making body by the Central Government and private enterprise, is exercised by a General Council, composed of representatives of Central and State Governments; leading trade, scientific and technological organizations; and subscribing members. The Minister of Industry is the ex-officio President of ISI.

The present technical activity of ISI is carried out through its Division Councils for Agricultural and Food Products; Chemical; Civil Engineering; Consumer Products; Electrotechnical; Mechanical Engineering; Structural and Metals; and Textile. All technical work relating to the formulation and revision of standards is done by committees appointed by and under the direction of their respective Division Councils. These committees consist of experts drawn from manufacturing units, technical institutions, purchase organizations and other concerned bodies.

To make available benefits of Indian Standards to the common man, ISI has introduced its Certification Marks Scheme under the *Indian Standards Institution (Certification Marks) Act, 1952*, as amended by the *Amendment Act, 1961*. According to this Act, quality goods conforming to Indian Standards can carry the ISI Certification Mark. This Mark is a third-party guarantee of quality of marked goods. Licences to use the ISI Certification Mark are granted to manufacturers using reliable methods of quality control and providing facilities for inspection by ISI staff.

In the international field, ISI represents India on the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). ISO and IEC respectively link 51 and 38 countries, and function through 113 and 56 technical committees; ISI participates in 78 technical committees of ISO and all the technical committees of IEC. The committees and subcommittees of IEC and ISO for which ISI holds the secretariat deal with: Electric Fans, Lac, Mica, Pictorial Markings for Handling of Goods, Liquid Flow Measurements in Open Channels, Procedures for Inter-conversion of Values, Spices and Condiments, and Stimulants.

AMENDMENT NO. 1 JUNE 1992
TO
IS 3478 : 1966 SPECIFICATION FOR HIGH DENSITY WOOD PARTICLE BOARDS

(*Page* 3, *clause* **0.3**) —Substitute 'IS 3087 : 1985' *for* 'IS: 3087 - 1965' and 'IS 3129 : 1985' *for* 'IS : 3129 - 1965'.

(*Page* 3, *foot-notes marked with* '*' *and* '†' *marks*) — Substitute the following for the existing foot-notes:

'*Specification for wood particle boards (medium density) for general purposes (*first revision*).

†Specification for low density particle boards (*first revision*).'

(*Page* 4, *clause* **2.1**) — Substitute 'IS 707 : 1976' *for* 'IS : 707 - 1958' and 'IS 3087 : 1985' *for* 'IS : 3087 - 1965'.

(*Page* 4, *clause* **3.1**, *last line*) — Substitute 'MR' *for* 'WWR or CWR'.

(*Page* 4, *foot-notes*) — Substitute the following for the existing foot-notes:

'*Glossary of terms applicable to timber technology and utilization (*first revision*)

†Specification for wood particle boards (medium density) for general purposes (*first revision*).'

(*Page* 6, *clause* **8.2.1** *and Page* 8, *clauses* **8.2.6** *and* **9.1**) — Substitute 'IS 2380 : 1977' *for* 'IS : 2380 - 1963'.

(*Pages* 6 *and* 8, *foot-note*) — Substitute the following for the existing foot-note:

'*Methods of test for wood partile boards and boards from other lignocellulosic materials (*first revision*).'

(CED 20)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 2 JANUARY 2005
TO
IS 3478 : 1966 SPECIFICATION FOR HIGH DENSITY WOOD PARTICLE BOARDS

(*Cover page, pages* 1 *and* 3) — Substitute the following for the existing title:

'SPECIFICATION FOR PARTICLE BOARDS OF WOOD AND OTHER LIGNOCELLULOSIC MATERIALS (HIGH DENSITY) FOR GENERAL PURPOSES'

(*Page* 4, *clause* **1.1**) — Substitute 'particle boards of wood and other lignocellulosic materials' *for* 'wood particle boards'.

(CED 20)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 3 SEPTEMBER 2005
TO
IS 3478 : 1966 SPECIFICATION FOR HIGH DENSITY WOOD PARTICLE BOARDS

(*Page* 5, *clause* **6**) — Substitute the following for the existing:

'**6 DIMENSIONS AND TOLERANCES**

6.1 The dimensions of high density particle boards shall be as follows:

Length in mm : 2 400, 2 100, 1 800, 1 500, 1 200, 1 000, 900, 600 and 450

Width in mm : 1 500, 1 200, 1 000, 900, 600, and 450

NOTE — Any other dimension as agreed to between the manufacturer and the purchaser may also be used.

6.2 Thickness

The thickness of high density particle boards shall be 4 mm, 6 mm, 9 mm, 12 mm, 15 mm, 20 mm, 25 mm, 30 mm, 35 mm, 40 mm and 50 mm.

6.3 Tolerances

The tolerances on the nominal sizes of finished boards shall be as follows:

Dimensions	*Tolerances*
Length	+ 6 mm − 0 mm
Width	+ 3 mm − 0 mm
Thickness:	
i) Less than 6 mm	±10 percent
ii) 6 mm and above	±5 percent
Edge straightness	2 mm per 1 000 mm or 0.2 percent
Squareness	2 mm per 1 000 mm or 0.2 percent'

(*Page* 6, *clause* **8.2.5**) — Substitute '*Modulus of Elasticity and Modulus of Rupture*' for the existing title and 'modulus of elasticity and modulus of rupture' *for* 'modulus of rupture' in the last line.

(*Page* 7, *Table* 1) — Substitute the following for the existing table:

Table 1 Physical Requirements for High Density Wood Particle Boards
(*Clauses* **7.2** *and* **9.2**)

Type	Grade	Density	Moisture Ccontent	Modulus of Rupture		Modulus of Elasticity		Minimum Tensile Strength	Water Absorption After 24 h Maximum Immersion	Resistance to Boiling Water After 3 h Immersion
(1)	(2)	(3)	(4)	(5)		(6)		(7)	(8)	(9)
		g/cm²	percent	N/mm²		N/mm²		N/mm²	percent	
				Avj	*Min*	Avj	*Min*			
Type 1	Grade A	1.2	3 to 7	45.0	38.0	4 500	4 050	35.0	10	Shall not show any sign of delamination
	Grade B	0.9 *Min*	5 to 16	40.0	34.0	4 000	3 600	30.0	25	
Type 2	Grade A	1.2	5 to 10	30.0	25.0	3 000	2 700	22.5	15	Not specified
	Grade B	0.9 *Min*	5 to 16	25.0	21.0	2 500	2 250	20.0	25	
Test According to		IS 2380 (Part 3) : 1977*	IS 2380 (Part 3) : 1977*	IS 2380 (Part 4) : 1977*		IS 2380 (Part 4) : 1977*		IS 2380 (Part 5) : 1977*	IS 2380 (Part 16) : 1977*	9.3
Maximum Permissible Variation in Individual Specimens From the Mean			*Max* ±10 percent	*Max* ± 2 percent		–		–	–	–

*Method of test for wood particle boards and boards from other lignocellulosic materials.

(CED 20)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 4 JUNE 2006
TO
IS 3478 : 1966 SPECIFICATION FOR HIGH DENSITY WOOD PARTICLE BOARDS

[*Page* 7, *Table* 1 (*see also Amendment No.* 3)] — Substitute 'g/cm^3' *for* 'g/cm^2' under col 3 of the table.

(CED 20)

Reprography Unit, BIS, New Delhi, India