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IS 15877 (2010): Coir Faced Block Boards -Specification
[CED 20: Wood and other Lignocellulosic products]



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“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक
कॉयर फेस ब्लॉक बोर्ड — विशिष्टि

Indian Standard
COIR FACED BLOCK BOARDS — SPECIFICATION

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.

Coir faced blockboard is a recently developed product in the panel industry. It finds use in bus bodies, furniture making, partitioning, paneling, etc. Coir faced blockboard is manufactured from coir and jute fibres combined with synthetic resin or other suitable binder. The panels are manufactured by the application of heat and pressure by a process in which the inter fibre bond is substantially created by the added binder. Other materials may also be added during manufacturing to improve specific properties. This indigenous technology utilized to manufacture coir faced blockboard is an improvization of that used by the existing blockboard industry and has been developed by Central Institute of Coir Technology, Bangalore, a research institute of Coir Board (Govt of India).

In the formulation of this standard, due weightage has been given to practices prevailing and the climatic conditions in the country.

A scheme of labelling environment friendly products to be known as ECO-Mark has been introduced at the instance of the Ministry of Environment and Forests (MEF), Government of India. The ECO-Mark shall be administered by the Bureau of Indian Standards (BIS) under the *BIS Act*, 1986 as per the Resolution No. 71 dated 21 February 1991 and Resolution No.425 dated 20 October 1992 published in the Gazette of the Government of India. For a product to be eligible for ECO-Mark, it shall also carry the Standard Mark of the BIS besides meeting additional environment friendly requirements. For this purpose, the Standard Mark of BIS would be a single mark being a combination of the ISI Mark and the ECO logo. Requirements to be satisfied for a product to qualify for the BIS Standard Mark for eco-friendliness will be optional. Manufacturing units will be free to opt for ISI Mark alone also.

The ECO criteria are based on the Gazette Notification No.170 dated May 16, 1996 for Wood Substitutes as Environment Friendly Products published in the Gazette of Government of India. The manufacturer shall provide documentary evidence by way of certificate or declaration to this effect to Bureau of Indian Standards while applying for ECO mark.

The composition of the Committee responsible for the formulation of the standard is given in Annex K.

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 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off values should be the same as that of the specified value in this standard.

Indian Standard

COIR FACED BLOCK BOARDS — SPECIFICATION

1 SCOPE

This standard covers the essential requirements of commercial and decorative coir faced blockboards meant both for interior and exterior uses.

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 in Annex A.

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 707 and the following shall apply.

3.1 Coir Faced Blockboard — These are boards having a core and border strips made up of wood, the core strip each not exceeding 30 mm in width and the border strips of minimum 45 mm in width which may or may not be glued together. The core is glued between two or more outer surface layers formed with coir and finer fibres like jute with paper. The core strips can be made of compressed coir strips also, of width not exceeding 80 mm.

4 GRADES AND TYPES

4.1 Coir faced blockboards shall be of the following two grades:

- a) *BWP Grade* — Such coir faced blockboard, that are likely to be exposed to high humidity and meant for exterior use.
- b) *MR Grade* — Such coir faced blockboard are meant for interior use in furniture, partitions, etc.

4.2 Each of the grades specified in **4.1** shall be of the following two types:

- a) *Decorative Type* — These are coir faced blockboards with oriented surface finish made by coir and fine fibres like jute with paper, surfaces on both sides for use in high class furniture, paneling, interior decoration, partitions, etc.

- b) *Commercial Type* — These are coir faced blockboards of commercial type with random surface finish made by coir and fine fibres like jute with paper, on both surface for use in ordinary furniture, tabletops, partitions and paneling to be painted over, flooring and seats of bus bodies, railway carriages, etc.

4.3 The grades and types of coir faced blockboards shall be designated by the symbols given below:

<i>Grade and Type</i>	<i>Symbol</i>
BWP grade, decorative type	BWP-DEC
BWP grade, commercial type	BWP-COM
MR grade, decorative type	MR-DEC
MR grade, commercial type	MR-COM

5 MATERIALS

5.1 Coir

Coir fibre layer used in the manufacture of coir faced blockboards shall be uniform with a minimum mass of 600 g/m².

5.2 Jute/Other Fine Fibres

Jute fibre layer or any other finer fiber used in the manufacture of coir faced blockboards shall be uniform with a minimum mass of 40 g/m².

5.3 Paper

Paper used in the manufacture of coir faced blockboards shall be uniform with a minimum mass of 40 g/m².

5.4 Adhesive

The adhesives used for bonding purposes shall be of BWP type conforming to IS 848 for BWP grade blockboards. For MR grade blockboards, the adhesives shall be of MR type conforming to IS 848.

5.5 Timber

Any suitable species of timber may be used for manufacture coir faced blockboard. A list of species for manufacture of coir faced blockboard is given in Annex B for guidance.

For ECO-Mark only species of wood from sources other than natural forests such as wood from rubber, cashew, industrial and social forestry plantations, etc,

and from shade trees from tea and coffee estates, shall be used for the manufacture of the blockboards.

6 MANUFACTURE

6.1 Preservative Treatment

Species of timber marked with (*) in Annex B and sapwood of all species, and all non-durable species shall be treated as mentioned in IS 401. Trimmed and cut ends of a finished blockboard shall be given a protective treatment.

6.2 Core

Coir faced blockboards shall be manufactured using wooden strips or compressed coir strips as the core.

Compressed coir strips when used shall be of density between 300 and 800 kg/cm³, depending on the grade of coir faced blockboards. The width of each compressed coir strip shall not exceed 80 mm. The coir strip shall be supported with a strip of wooden core.

The wooden strips when used for core and for border shall be cut out from timber seasoned to moisture content not exceeding 12 percent in accordance with IS 1141. The width of each core strip of wood shall not exceed 30 mm and the border strip shall be a minimum of 45 mm wide. These strips may consist of pieces of small lengths placed end to end where the end joints shall be staggered. In any one blockboard, the core strips shall be of one species of timber only.

6.3 Crossbands and Faces

6.3.1 Veneers for Crossbands

Veneer used for crossbands shall be either rotary cut or sliced and shall be reasonably smooth. Crossbands shall be not less than 1.0 mm but not more than 3.0 mm in thickness.

6.3.2 Faces

Faces shall be made from coir manufactured by mechanical process as per IS 9308 (Part 2) or IS 9308 (Part 3) and processed through needled felt plant (non-woven system) to make a uniform mat in different densities according to the requirement. To give smooth surfaces, finer fibres like jute are carded and spread to give a uniform layer on suitable carrier like paper, if necessary. These fibre mats thus produced are impregnated with resin and wax, if required.

6.4 The impregnated fibre mats with veneer as crossbands along with core are pressed into panels by passing into pressing machines under controlled temperature and pressure.

6.5 The construction shall be well balanced around the central line.

6.6 Permissible defects shall be as specified in IS 14842.

7 DIMENSIONS AND TOLERANCES

7.1 Thickness

The thickness of coir faced blockboards shall be 12, 15, 19, 20, 25, 30, 32, 35, 40, 45 or 50 mm.

7.2 Sizes

Coir faced blockboards shall be of sizes as specified below:

<i>Length</i>	<i>Width</i>
mm	mm
2440	1220
2140	1220
2140	920
1830	1220
1830	920

NOTE — Any other dimension (length, breadth and thickness) as agreed to between the manufacturer and the purchaser may be used.

7.3 Tolerance

Tolerances on nominal size of finished boards shall be as given below:

<i>Dimension</i>	<i>Tolerance</i>
Length	+6 -0 mm
Width	+3 -0 mm
Thickness	± 5 percent
Variation in thickness of a board	Not more than 0.5 mm
Edge straightness, <i>Max</i>	2 mm per 1 000 mm or 0.2 percent
Squareness, <i>Max</i>	2 mm per 1 000 mm or 0.2 percent

NOTE — Edge straightness and squareness shall be checked in accordance with the method described in Annex C.

8 SAMPLING AND INSPECTION

8.1.1 Lot

In any consignment, all coir faced blockboards of the same grade, type and thickness and manufactured under similar conditions shall be grouped together to constitute a lot.

8.1.1.1 The conformity of a lot to the requirements of this standard shall be ascertained on the basis of tests on coir faced blockboards selected from it.

8.1.2 The method of drawing representative samples shall be as prescribed in IS 7638.

8.1.3 Defects

All coir faced blockboards selected as in 8.1.2 shall be inspected visually for surface defects (see 6.6) and if one or more blockboards are found unsatisfactory, the lot shall be declared as unacceptable.

8.1.4 Length and Width

All coir faced blockboards selected as in 8.1.2 shall have length and width as specified in 7.1 and 7.2, within the tolerances specified in 7.3. The edge straightness and squareness of the blockboards when tested in accordance with the method described in Annex C, shall meet the requirements specified in 7.3.

8.1.5 Thickness

All coir faced blockboards selected as in 8.1.2 shall have its mean thickness and variation in thickness in each board as specified in 7.1 and 7.3 when tested by the method described in Annex C.

8.2 Test Specimens and Number of Tests

8.2.1 The selected coir faced blockboards as in 8.1.2 shall be taken up for cutting of test specimens for further testing.

8.2.2 From each of the coir faced blockboards selected, following test specimens shall be cut from the portion 150 mm away from the edges:

- a) Six test specimens of size 200 mm × 12 mm for the test mentioned in 9.2.1;
- b) Three test specimens of size 200 mm × 100 mm for the test mentioned in 9.2.2;
- c) Three test specimens of size 200 mm × 100 mm for the test mentioned in 9.2.3;
- d) Three test specimens of size 150 mm × 100 mm for the test mentioned in 9.2.4;
- e) Three test specimens of size (50 mm + 20 d) length and 75 mm width in full thickness of board for the test mentioned in 9.2.5; d being the nominal thickness of the specimen in mm; and
- f) One test specimen of size 200 mm × 100 mm for the test mentioned in 9.2.6.

8.2.3 The test specimens so obtained shall be conditioned in accordance with 9.1 and the thickness of each specimen shall be measured by the method given in Annex C and the mean of all such measurements calculated. The test specimens shall then be tested for the corresponding tests.

8.3 Criteria for Conformity

A lot shall be considered as conforming to the

requirements of this standard, if the requirements mentioned in 9.2.1 to 9.2.6 are all satisfied.

9 TESTS

9.1 Preparation and Conditioning of Test Specimens

The required test specimens shall be cut to the specified size as given in 8.2.2. Each test specimen shall be rectangular with all edges cut square to the surface. Before any tests are made, the prepared test pieces shall be suitably conditioned.

NOTE — Exposure for 24 h to the air of a well-ventilated room will often suffice but when a greater degree of accuracy is required, the test piece shall be exposed to an atmosphere maintained at a temperature of $27 \pm 2^\circ\text{C}$ and at a relative humidity of 65 ± 5 percent until they are substantially constant in mass.

9.2 Coir faced blockboards shall be subjected to the following tests and shall satisfy the requirements specified under each test.

9.2.1 Dimensional Changes Caused by Humidity

When tested according to Annex D, the dimensions shall not change by more than ± 1 mm at relative humidities of 90 percent and 40 percent when compared to the dimensions of the specimens conditioned at 65 percent relative humidity. There shall be no delamination at the extreme ranges of humidity and the changes in local planeness measured as d/L shall be as follows:

$$d/L < 1/150$$

where

d = vertical gap between any two points, and

L = horizontal distance between these points.

9.2.2 Resistance to Water

When tested according to the methods specified in 9.2.2.1 and 9.2.2.2, the coir faced blockboards shall satisfy the requirements given therein.

9.2.2.1 Test specimens from BWP Grade coir faced blockboards, after soaking in boiling water for 72 h and tested as in Annex E shall comply with the requirements of 9.2.3.

9.2.2.2 Test specimens from MR Grade coir faced blockboards, after soaking of test pieces for 3 h in water at a temperature of $60 \pm 2^\circ\text{C}$ and tested as in Annex E shall comply with the requirements of 9.2.3.

9.2.3 Adhesion of Plies

The adhesion of plies shall be tested as in Annex F and the fractured surface of the specimen shall show adherent fibres of a 'pass standard'.

9.2.4 Mycological Test

Specimens of MR Grade coir faced blockboard, when tested according to Annex G, shall show no visible signs of separation at the edges.

9.2.5 Modulus of Rupture and Modulus of Elasticity

BWP Grade and MR Grade coir faced blockboards, when tested according to the method given in Annex H, shall have an average and minimum individual value of modulus of rupture and modulus of elasticity as given below:

	<i>BWP Grade</i>	<i>MR Grade</i>
Modulus of rupture, N/mm ² :		
a) Average	32	28
b) Minimum individual	28	25
Modulus of elasticity, N/mm ² :		
a) Average	4 000	3 500
b) Minimum individual	3 500	3 000

9.2.6 Spot Test

When tested according to the method given in Annex J, the preservative treatment at any given place after cutting across the entire cross-sectional area of the width of the coir faced blockboard shall show through and through penetration of preservative chemical.

10 ADDITIONAL REQUIREMENT FOR ECO-MARK

10.1 General Requirement

10.1.1 Coir faced blockboards shall conform to the requirements of quality and performance as specified in this standard.

10.1.2 The manufacturer shall produce to BIS, environmental consent clearance from State Pollution Control Board, as per the provisions of *Water (Prevention and Control of Pollution) Act, 1974* and

Air (Prevention and Control of Pollution) Act, 1981 and *Water (Prevention and Control of Pollution) Cess Act, 1977*, along with the authorization, if required under the *Environment (Protection) Act, 1986* while applying for ECO-Mark, appropriate with enforced rules and regulations of forest department.

10.2 Specific Requirements

Coir faced blockboards shall conform to the specific requirements given for ECO-Mark under relevant clause of the standard.

NOTE — The manufacturer shall provide documentary evidence by way of certificate or declaration to the Bureau of Indian Standards while applying for ECO-Mark.

10.2.1 The product or product packaging shall display in brief the criteria based on which the product has been labelled environment friendly.

11 MARKING

Each coir faced blockboard shall be legibly and indelibly marked on any of its edges with the following:

- a) Indication of the source of manufacture,
- b) Grade and type of blockboard,
- c) Size (length, width and thickness),
- d) Batch number and year of manufacture, and
- e) Criteria for which the blockboard have been labeled as ECO-Mark.

11.1 BIS Certification Marking

The product may also be marked with the Standard Mark.

11.1.1 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A
(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
401 : 2001	Preservation of timber — Code of practice (<i>fourth revision</i>)	1141 : 1993	Code of practice for seasoning of timber (<i>first revision</i>)
707 : 1976	Glossary of terms applicable to timber technology and utilization (<i>second revision</i>)	7638 : 1999	Wood/lignocellulosic based panel products — Methods of sampling (<i>second revision</i>)
848 : 2006	Synthetic resin adhesives for plywood (phenolic and amino plastics) — Specification (<i>second revision</i>)	9308 (Parts 2 and 3): 1987 14842 : 2000	Specification for mechanically extracted coir fibres (<i>first revision</i>) Coir veneer board for general purposes — Specification

ANNEX B

(Clauses 5.5 and 6.1)

TIMBER FOR COIR FACED BLOCKBOARDS

<i>Standard Trade Name</i>	<i>Botanical Name</i>	<i>Abbreviation</i>
Aini	<i>Artocarpus hirsutus</i>	AIN
Alder*	<i>Alnus</i> spp.	ALD
Amari	<i>Amoora</i> spp.	AMA
Arjun	<i>Terminalia arjuna</i>	ARJ
Bahera*	<i>Terminalia bellerica</i>	BAH
Benteak	<i>Lagerstroemia lanceolata</i>	BEN
Birch	<i>Betula</i> spp.	BIR
Bonsum	<i>Phoebe</i> spp.	BON
Carallia (Maniawga)*	<i>Carallia brachiata</i> (Syn. <i>Integerrima</i>)	CAR
Champ	<i>Michelia</i> spp.	CHM
Chaplash	<i>Artocarpus chaplasha</i>	CHP
Chikrassy	<i>Chukrasia velutina</i> (Syn. <i>C. tabularis</i>)	CHI
Chilauni*	<i>Schima wallichii</i>	CHL
Chir	<i>Pinus roxburghii</i> (Syn. <i>P. longifolia</i>)	CHR
Cinnamon	<i>Cinnamomum</i> spp.	CIN
Deodar	<i>Cedrus deodara</i>	DEO
Devdam	<i>Dysoxylum binectariferum</i>	DEV
Dillenia	<i>Dillenia</i> spp.	DIL
Dipika (Lapse)	<i>Mansonia dipikae</i>	DIP
Debbaru (Nedunar)	<i>Polyalthia</i> spp.	DEB
Enboy	<i>Diospyros</i> spp. (other than <i>D. Diospyros marmorata</i>)	EBO

Standard Trade Name	Botanical Name	Abbreviation
Fir	<i>Abies</i> spp.	FIR
Gamari	<i>Gmelina arborea</i>	GAM
Gandelipoma	<i>Dysoxylum hamiltonii</i>	GEN
Gokul*	<i>Ailanthus integrifolia</i> (Syn. <i>A. grandis</i>)	GOK
Gurjan	<i>Dipterocarpus</i> spp. (other than <i>D. macrocarpus</i>)	GUR
Haldu	<i>Adina cordifolia</i>	HAL
Hathipalia	<i>Pterospermum acerifolium</i>	HAT
Hollock	<i>Terminalia myriocarpa</i>	HOL
Hollong	<i>Dipterocarpus macrocarpus</i>	HON
Jaman*	<i>Syzygium</i> spp.	JAM
Jhingan*	<i>Lannea coromandelica</i> (Syn. <i>Lannea grancis</i>)	JHI
Kail	<i>Pinus wallichiana</i> (Syn. <i>P. excelsa</i>)	KAL
Kanju	<i>Holoptelea integrifolia</i>	KAN
Karani*	<i>Cullenia rosayroana</i> (Syn. <i>C. excelsa</i>)	KAR
Kathal	<i>Artocarpus heterophyllus</i> (Syn. <i>A. integrifolius</i>)	KAT
Kindal	<i>Terminalia paniculata</i>	KIN
Kokko	<i>Albizia lebbek</i>	KOK
Lakooch	<i>Artocarpus lakoocha</i>	LAK
Lampati*	<i>Duabanga grandiflora</i> (Syn. <i>D. sonneratioides</i>)	LAP
Laurel	<i>Terminalia alata</i> (Syn. <i>T. coriacea</i> , <i>T. crenulata</i>)	LAU
Machilus*	<i>Machilus</i> spp.	MAC
Mahogany	<i>Swietenia</i> spp.	MAG
Maina*	<i>Teterameles nudiflora</i>	MAI
Makai	<i>Shorea assamica</i>	MAK
Mango*	<i>Mangifera</i> spp.	MAN
Maple	<i>Acer</i> spp.	MAP
Mullilam	<i>Zanthoxylum rhetsa</i> (Syn. <i>Fagara budrunge</i> , <i>Z. bundarunga</i> ; <i>Z. limonella</i>)	MUI
Mundani*	<i>Acrocarpus fraxinifolius</i>	MUN
Pali	<i>Palaquium ellipticum</i>	PAL
Piney*	<i>Kingiodendron pinnatum</i> (Syn. <i>Hardwickia pinnata</i>)	PIN
Poon	<i>Calopyllum</i> spp.	POO
Pussur	<i>Xylocarpus</i> spp.	PUS
Pyinma	<i>Lagerstroemia hypoleuca</i>	PYI
Red Bombwe	<i>Planchonia valida</i> (Syn. <i>P. andamanica</i>)	RBO
Red Dhup*	<i>Parishia insignis</i>	RDH
Rosewood	<i>Dalbergia latifolia</i>	ROS
Silver Oak	<i>Grevillea robusta</i>	SOA
Sissoo	<i>Dalbergia sissoo</i>	SIS
Spruce*	<i>Picea smithiana</i> (Syn. <i>P. morinda</i>)	SPR
Teak	<i>Tectona grandis</i>	TEA
Toon	<i>Toona ciliata</i> (Syn. <i>Cendrela toona</i>)	TOO
Vatice*	<i>Vatica</i> spp.	VAT
Vellapine*	<i>Vateria indica</i>	VEL
Walnut	<i>Juglans regia</i>	WAL
White Bombwe	<i>Terminalia procera</i>	WBO
White Cedar	<i>Dysoxylum malabaricum</i>	WCE
White Chuglam	<i>Terminalia bialata</i>	WCH
White Dhup	<i>Canarium</i> spp.	WDH

ANNEX C*(Clauses 7.3, 8.1.4, 8.1.5 and 8.2.3)***METHOD OF TEST FOR THICKNESS, VARIATION IN THICKNESS, EDGE STRAIGHTNESS AND SQUARENESS****C-1 TEST FOR THICKNESS AND VARIATION IN THICKNESS****C-1.1 Procedure**

C-1.1.1 Each board shall be tested for thickness.

C-1.1.1.1 Thickness

The thickness shall be measured in millimetres to an accuracy of ± 0.02 mm. Six readings shall be taken approximately 20 mm inside the edges of the test pieces, namely, at four corners, and at midpoints of the long edges.

C-1.2 Reporting of Test Results

The mean thickness of each of the test pieces shall be reported.

C-2 TEST FOR EDGE STRAIGHTNESS AND SQUARENESS**C-2.1 Procedure for Edge Straightness**

C-2.1.1 The straightness of the edges and ends of veneered particle board shall be verified against a straight edge not less than the full length of the veneered particle board. If the edge on the end of the veneered particle board is convex, it shall be held against the straight edge in such a way as to give approximately equal gap at each end. The largest gap between the straight edge and the edge shall be measured to the nearest millimetre and recorded.

C-2.2 Procedure for Squareness

The squareness of veneered particle board shall be checked with a square with arms 500 mm long, by applying one arm of the square to the veneered particle board. The maximum width of the gap shall be recorded.

ANNEX D*(Clause 9.2.1)***TEST FOR DETERMINING DIMENSIONAL CHANGES CAUSED BY HUMIDITY****D-1 PROCEDURE**

D-1.1 The test specimens shall be conditioned in an atmosphere maintained at $27 \pm 2^\circ\text{C}$ and at 65 ± 5 percent relative humidity to constant mass. The length of each test specimen shall be measured to an accuracy of ± 0.5 mm making use of a jig which permits the test piece to be pressed against a flat plate to eliminate the effect of any warping that may have occurred. The thickness of each test specimen shall be measured, to an accuracy of 0.02 mm at three marked points, one at each end and one at the mid-point of its length.

D-1.2 Half the number of these test specimens shall then be placed in an atmosphere maintained at 90 ± 5 percent and the other half in 40 ± 5 percent relative humidity, at $27 \pm 2^\circ\text{C}$ and they shall be weighed and

measured from time to time at such intervals as may be required until constant mass and dimensions are obtained.

D-2 REPORTING OF TEST RESULTS

The differences in length and thickness as compared with those of the conditioned test specimen shall be reported for each test specimen at each relative humidity.

NOTE — If a controlled humidity chamber is not available, the required atmospheres may be obtained approximately by using an airtight vessel containing moist salts as follows:

- a) 90 percent relative humidity : Sodium carbonate
- b) 65 percent relative humidity : Ammonium nitrate
- c) 40 percent relative humidity : Magnesium chloride

ANNEX E

(Clauses 9.2.2.1 and 9.2.2.2)

TEST FOR DETERMINING RESISTANCE TO WATER

E-1 PROCEDURE

E-1.1 For testing of BWP Grade coir faced blockboards, test specimens shall be submerged in a pan of cold-water care being taken that the pieces do not touch the bottom of the pan. Water shall then be brought to the boiling temperature and maintained at this temperature for 72 h. The test specimens shall then be removed from the boiling water and plunged immediately into cold water. The 72 h period may be reckoned as an aggregate of shorter periods of boiling, the test specimen being left in cold water between such periods when the water is not boiling.

E-1.2 For testing of MR Grade coir faced blockboards, the test specimens shall be submerged in a pan of cold water, care being taken to see that they do not touch the bottom of the pan. Water shall then be brought to the temperature of $60 \pm 2^\circ\text{C}$ and maintained at this temperature for 3 h. The test specimens shall then be removed from the hot water and plunged immediately into cold water.

E-2 REPORTING OF TEST RESULTS

The specimen shall comply with the requirements of **9.2.3**. The results shall be reported as 'pass standard', 'excellent' or 'poor' accordingly.

ANNEX F

(Clause 9.2.3)

TEST FOR ADHESION OF PLIES

F-1 APPARATUS

F-1.1 The type of knife required to be used in the test may be made from a file. The cutting edge should be kept chisel sharp.

F-1.2 The test shall be carried out on a stout table to which is screwed a wooden batten against which the edge of the test specimen is placed.

F-2 PROCEDURE

F-2.1 The knife is inserted with its cutting edge parallel to the grain of the outer layer and worked into, or if possible, along a glue line and pierced upward. A hard and dense species requires considerable force to affect entry and to pierce the veneer. In a soft species, the knife tends to follow any easy course through the wood and in this case, it is essential that the knife be firmly guided along the glue line.

F-2.2 The bond is judged by the relative amounts of

wood fibre left on the core veneer, and the area pierced off. The grading is assessed chiefly on the appearance of the break but is a concomitant requirement that the force shall be needed to effect separation.

F-2.3 The bond is excellent when it is difficult to find the glue line and impossible to keep the tool within it for more than 6 mm without cutting into adjacent wood. On piercing upwards, the veneer usually breaks off over width only slightly greater than that of the tool.

F-2.4 The bond is poor when the knife meets little opposition into the glue line and pierce results in the easy removal of almost all the veneers from one side of the test specimen. The separated veneers are usually almost free from adherent fibre.

F-3 REPORTING OF TEST RESULTS

The results shall be reported as 'pass standard', 'excellent' or 'poor'. Coir faced block boards designated as poor shall be declared as unsatisfactory.

F-4 TEST FOR GLUE ADHESION BETWEEN CORE AND ADJOINING VENEERS

F-4.1 To test the glue adhesion between the core and the adjoining veneers, the qualitative test as given in **F-4.1.1** may be used.

F-4.1.1 The central core strips shall be forcibly separated from its adjacent veneers by a chisel inserted in the bond line and affecting the separation in the direction of the core strips. The capacity of the bond should be judged by the relative amount of wood fibres left by the veneer and the core strips. Force shall be needed to effect the

separation. The grading should be assessed on the basis of the appearance of the failure. The bond should be considered excellent when it is difficult to find the glue line clearly for more than 10 mm length along the battens and on its entire width without torn fibres appearing on the area of separation. The bond should be considered as poor when the chisel meets little opposition in the glue line and if there is an easy separation between the core strips and the veneers. If the glue adhesion between battens of the core in a blockboard in which the core strips are bonded is to be tested, a similar procedure and criteria may be followed.

ANNEX G

(Clause 9.2.4)

MYCOLOGICAL TEST

G-1 PROCEDURE

G-1.1 A flat rectangular dish of enamelled iron, glass or porcelain (such as a photographic developing dish) shall be filled to a depth not less than 25 mm with a layer of sawdust obtained from a non-durable timber like Semul (*Salamalia malabarica*), in its natural condition. The sawdust shall have previously been moistened with water containing 14 g per litre of sucrose (normally cane sugar would be used but if not available, 30 g of commercial malt extract may be substituted) so that it is saturated with moisture, but not so wet that free water can be squeezed out it by hand pressure. To attain this condition with dry sawdust, it is usually necessary to add water three times its mass.

G-1.2 The sawdust shall then be charged with spores of commonly occurring Indian fungi, loosely

compacted and test specimens then pressed down into it so that their upper surfaces are in level with the top of the sawdust layer.

G-1.3 The dish shall then be covered with a sheet of glass and the edges of the dish sealed against glass with a strip of material, such as modeling wax, so that the atmosphere round the test specimens shall remain saturated with water vapour.

G-1.4 The dish and contents shall be maintained at $27 \pm 2^\circ\text{C}$ for a period of 3 weeks, after which the rest specimens shall be removed, washed in cold water until cool and whilst still water soaked, shall be checked for compliance with the requirements of **9.2.4**.

G-2 REPORTING OF TEST RESULTS

The test results shall be reported as conforming to the standard or otherwise.

ANNEX H

(Clause 9.2.5)

TEST FOR MODULUS OF RUPTURE AND MODULUS OF ELASTICITY

H-1 PROCEDURE

The span shall be 20 times the nominal depth. The load shall be applied through appropriate loading block for centre loading with a continuous motion of the movable head. The testing machine shall move at a constant rate of 5 mm/min throughout the test till a failure is indicated.

H-2 REPORTING OF TEST RESULTS

Data for load deflection curves may be taken to determine the modulus of rupture and modulus of elasticity using the formulae given below. Deflection readings shall be recorded to the nearest 0.02 mm. Increments of load shall be so chosen that not less than 12 and preferably 15 or more readings of load and deflections are taken to the proportional limit.

$$\text{Modulus of rupture, N/mm}^2 = \frac{3WL}{2bd^2}$$

where

- W = failing load, in N;
- L = span, in mm;
- b = width of specimen, in mm; and
- d = thickness of specimen, in mm.

$$\text{Modulus of elasticity, N/mm}^2 = \frac{PL^3}{4bd^3\Delta}$$

where

- P = load, in N, at proportional limit which shall be taken as the point in load-deflection curve above which the graph deviates from the straight line;
- L = span, in mm;
- b = width of the specimen, in mm;
- d = thickness of the specimen, in mm; and
- Δ = deflection at proportional limit (which is corresponding to P in the load-deflection graph), in mm.

ANNEX J

(Clause 9.2.6)

METHOD FOR THE DETERMINATION OF PENETRATION AND IDENTIFICATION OF PRESERVATIVE BY SPOT TEST

J-1 GENERAL

Preservative treatment is carried out in timber used for core of the blockboards as per IS 401. Preservatives used are generally water soluble leachable preservatives like boric acid or borax. Water soluble fixed type preservatives like copper-chrome-arsenic, acid-cupric-chromate, borated-copper-chrome or ammoniacal-copper-arsenite are also used.

Method for the determination of penetration of copper-chrome-arsenic composition and acid-cupric-chromate and ammoniacal-copper-arsenite composition are given below. Definite colour reactions are not given by other common preservatives.

J-2 COPPER-CHROME-ARSENIC COMPOSITION, ACID-CUPRIC-CHROMATE COMPOSITION, BORATED-COPPER-CHROME COMPOSITION AND AMMONIACAL-COPPER-ARSENITE COMPOSITION

J-2.1 Detection for Copper

J-2.1.1 Dissolve 0.5 g chrome Azurol-S, 5.0 g of sodium acetate in 80 ml water and dilute to 100 ml.

J-2.1.2 Spray or brush the solution over split or cross-section or boring/bore dust with a fine spray on the cut surface of treated wood. A deep blue colour shows the presence of copper.

J-2.2 Detection for Chromium

J-2.2.1 Dissolve 0.5 g diphenyl carbazide in 50 ml isopropyl alcohol and 50 ml of distilled water.

J-2.2.2 Spray or brush the solution on the boring/bore dust or cross-section of treated wood. Portions containing chromium will develop a purple colour, while unpenetrated/untreated portion will remain as such.

J-2.3 Detection of Arsenic**J-2.3.1 Solution 1**

3.5 g ammonium molybdate dissolved in 90 ml distilled water followed by 9 ml concentrated nitric acid.

J-2.3.2 Solution 2

0.7 g benzidine dihydrochloride dissolved in 10 ml concentrated acetic acid and diluted to 100 ml by adding 90 ml distilled water.

J-2.3.3 Solution 3

30 g stannous chloride dissolved in 100 ml 1:1 hydrochloric acid in distilled water.

Solution 1 may be prepared fresh for each day testing. Solution 2 and Solution 3 may be stored in clean glass stoppered brown glass bottles for one week.

J-2.3.4 Apply Solution 1 to the boring or cross section ensuring that entire wood surface is saturated. After 2 min, excess solution is shaken off and allowed to dry for about 1 min. Solution 2 is next applied in the same way as Solution 1. After 2 min, the excess solution is shaken off and surface is allowed to dry for 1 min. Solution 3 is last applied by pouring over cross-section or boring, beginning at untreated part. The entire wood surface will immediately turn bluish.

J-3 METHOD FOR DETECTION OF BORON IN BORAX: BORIC ACID, CCB, BCCA**J-3.1 Solution 1**

Extract 10 g turmeric powder with 90 g ethyl alcohol. Decant or filter to obtain clear solution.

J-3.2 Solution 2

20 ml of concentrated hydrochloric acid diluted to 100 ml with ethyl alcohol and then saturated with salicylic acid (about 13 g per 100 ml).

J-3.3 Solution 1 is applied on the dry cut surface of wood or cross-section by spraying or with a dropper and surface is allowed to dry for a few minutes. Solution 2 is then applied in a similar manner to the areas that have been coloured yellow by the application of Solution 1. The colour changes shall be observed carefully. Areas having presence of boron turn red.

ANNEX K*(Foreword)***COMMITTEE COMPOSITION**

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Building Materials & Technology Promotion Council, New Delhi	SHRI J. K. PRASAD SHRI A. K. TIWARI (<i>Alternate</i>)
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