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मानक

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“Step Out From the Old to the New”

IS 13958 (1994): Bamboo mat board for general purposes
-Specification [CED 20: Wood and other Lignocellulosic
products]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक

सामान्य कार्यों के लिए बाँस का चटाई बोर्ड - विशिष्ट

Indian Standard

BAMBOO MAT BOARD FOR GENERAL
PURPOSES — SPECIFICATION

UDC 677.545-419

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

April 1994

Price Group 3

AMENDMENT NO. 1 JANUARY 2005
TO
IS 13958 : 1994 BAMBOO MAT BOARD FOR
GENERAL PURPOSES — SPECIFICATION

(*Page 2, clause 6.2*) — Substitute the following for the existing:

6.2 Dimensions of bamboo mat boards shall be as follows:

2 400 mm × 1 200 mm	1 800 mm × 1 200 mm
2 100 mm × 1 200 mm	1 800 mm × 900 mm
2 100 mm × 900 mm	

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

(*Page 2, clause 9.3.1, fourth line*) — Insert 'not less than' between 'of' and '0.7 N/mm²'.

(*Page 2, clause 9.3.2, last line*) — Insert 'not less than' between 'of' and '0.5 N/mm²'.

(*Page 2, clause 9.3.3, fifth and sixth line*) — Insert 'not less than' between 'of' and '0.5 N/mm²'.

(*Page 3, clause 9.4.1, fourth and fifth line*) — Insert 'not less than' between 'of' and '4.5 N/mm²'.

(*Page 3, clause 9.4.2, eighth line*) — Insert 'not less than' between 'of' and '3.0 N/mm²'.

(*Page 3, clause 9.4.3, last line*) — Insert 'not less than' between 'of' and '3.0 N/mm²'.

(*Page 3, clause 9.4.3*) — Add the following new clause after 9.4.3:

9.5 Test for Modulus of Rupture (MOR) and Modulus of Elasticity (MOE)

Three test specimens for MOR and MOE from each sample of dimension as specified in IS 2380 (Part 4), when tested for modulus of rupture and modulus of elasticity in accordance with the method prescribed in IS 2380 (Part 4), the average and minimum individual values shall be not less than the values given below:

Amend No. 1 to IS 13958 : 1994

	<i>Average</i>	<i>Minimum Individual</i>
MOE (N/mm ²)	3 000	2 700
MOR (N/mm ²)	2 700	27

(*Page 3, Annex A*) — Add the following at the appropriate place:

IS 2380 (Part 4) : 1977 Method of test for wood particle boards and boards
from other lignocellulosic material : Part 4 :
Determination of static bending strength (modulus of
rupture and modulus of elasticity in bending) (*first
revision*)

(CED 20)

Reprography Unit, BIS, New Delhi, India

**AMENDMENT NO. 2 DECEMBER 2005
TO
IS 13958 : 1994 BAMBOO MAT BOARD FOR
GENERAL PURPOSES — SPECIFICATION**

*[Page 3, clause 9.5 (see also Amendment No. 1)] — Substitute '30' for
'2 700' for the Average value of MOR (N/mm²).*

(CED 20)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 3 DECEMBER 2008
TO
IS 13958 : 1994 BAMBOO MAT BOARD
FOR GENERAL PURPOSES — SPECIFICATION

(Second cover page, Foreword) — Insert the following after the second para as a separate para:

‘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 (MoEF), 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 28 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-Mark criteria is based on the Gazette Notification No. 170 dated 18 May 1996 for Wood Substitutes as Environment Friendly Products published in the Gazette of the Government of India.’

(Page 1, clause 4.1) — Insert the following at the end of the clause:

‘For Eco-Mark bamboo mats shall be made from bamboo from sources other than natural forests.’

(Page 3, clause 9.4.3) — Insert the following new clause at the end and renumber the subsequent clauses:

‘10 ADDITIONAL REQUIREMENTS FOR ECO-MARK

10.1 General Requirements

10.1.1 The bamboo mat boards shall conform to the requirements of quality specified in this standard.

10.1.2 The manufacturer shall produce to BIS environmental consent clearance

Amend No. 3 to IS 13958 : 1994

from the concerned 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) 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

The bamboo mat boards shall be made from bamboo from sources other than natural forests.

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

[Page 3, clause 10.1 (renumbered as 11.1)] — Insert the following matter under the clause:

'd) The criteria for which the bamboo mat board has been labelled as Eco-Mark'.

(CED 20)

FOREWORD

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

Bamboo mat board is made of two or more bamboo mats bonded with an adhesive. The mat used is made by weaving thin, uniform strips of bamboo. In the present scenario, where availability of conventional timber has been reduced to considerable extent, the bamboo mat board is expected to find extensive use in future. The product is now being produced and marketed in India. This standard has therefore, been formulated to guide the manufacturers and users of bamboo mat boards.

In the preparation of this standard, considerable assistance has been rendered by Indian Plywood Industries Research and Training Institute, Bangalore.

The composition of the technical committee responsible for the formulation of this standard is given at Annex C.

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 value should be the same as that of the specified value in this standard.

Indian Standard

BAMBOO MAT BOARD FOR GENERAL PURPOSES — SPECIFICATION

1 SCOPE

This standard covers the method of manufacture and the requirements of bamboo mat board used for general purposes.

2 REFERENCES

The Indian Standards listed in Annex A are necessary adjuncts to this standard.

3 TERMINOLOGY

3.1 For the purpose of this standard, the definitions given in IS 707 : 1976 and IS 6874 : 1973, and the following shall apply.

3.1.1 *Bamboo*

Bamboos are tall perennial grasses found in tropical and sub-tropical regions. They belong to the family Poaceae and subfamily Bambusoideae.

3.1.2 *Sliver*

Slivers are thin uniform strips of bamboo processed from bamboo culm.

3.1.3 *Mat*

Mat is a woven sheet using thin slivers.

3.1.4 *Interslivers*

The overlapping area of the slivers in the mat.

3.1.5 *Bamboo Mat Board*

A board made of two or more bamboo mats bonded with an adhesive.

3.1.6 *Discolouration (Sound)*

A change from the normal colour of the bamboo which does not impair the strength of bamboo mat board.

3.1.7 *Discolouration (Unsound)*

A change from the normal colour of the bamboo which may have some effect on the strength of bamboo mat board.

3.1.8 *Delamination*

Separation of mats through failure of glue.

4 MATERIALS

4.1 *Bamboo*

Any suitable species of bamboo may be used for making bamboo mat board.

4.2 *Adhesive*

Adhesive for bonding bamboo mat board shall be of phenolic type conforming to BWR type specified in IS 848 : 1974.

5 MANUFACTURE

5.1 *Bamboo Mats*

Bamboo mats required for the manufacture of bamboo mat board shall be woven from slivers of uniform thickness and width. Thickness of slivers shall not be less than 0.5 mm and width shall be in the range of 5 mm to 15 mm. Care shall be taken to exclude the slivers with epidermal layer.

5.1.1 *Prophylactic Treatment*

If transport or storage time of one month or more is inevitable, mats shall be given prophylactic treatment as per Group 9 in Table 2 of IS 401 : 1982.

5.2 *Application of Adhesive*

Bamboo mats shall be applied with the adhesive either by soaking or by spreading using mechanical spreader.

5.3 *Conditioning of Adhesive Coated Bamboo Mats*

Adhesive coated mats shall be allowed sufficient length of open assembly time and/or passed through a band dryer at elevated temperature in the range of 80°C to 90°C to bring down the moisture content of adhesive coated mats to 8 to 12 percent.

5.4 *Assembly*

Adhesive coated and conditioned mats shall be assembled between two aluminium caul plates whose surfaces are coated with releasing agent.

5.5 *Hot Pressing*

Assembly of the adhesive coated mats shall be hot pressed at not less than 140°C at a specific

pressure of 1.5 N/mm² to 2.0 N/mm². Hot pressing time shall depend on the thickness of the board.

5.6 Moisture Content of Bamboo Mat Board

After hot pressing the finished bamboo mat board shall be conditioned to a moisture content not less than 5 percent and not more than 15 percent.

5.7 Preservative Treatment

5.7.1 For bamboo mat board manufactured by applying the resin by soaking method, preservative treatment shall be done by incorporating the preservatives like boron (octaborate or tetraborate) into the resin before soaking the mats. The preservative becomes non-leachable during hot pressing.

5.7.2 For bamboo mat board manufactured by applying the resin by passing the mats through mechanical glue spreader, the manufactured boards shall be treated with non-leachable type preservatives such as Copper-Chrome-Arsenic (CCA), Copper-Chrome-Boron (CCB) or Acid-Copper-Chrome (ACC) as per 5.2.2.3 of IS 5539 : 1969.

6 DIMENSIONS AND TOLERANCES

6.1 The dimensions of bamboo mat board shall be quoted in the following order. The first dimension shall represent the length; the second dimension, the width; and the third dimension, the thickness.

6.2 The dimensions of bamboo mat boards shall be as given for plywood in IS 12049 : 1987.

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

6.3 Thickness of bamboo mat boards shall be specified depending upon the number of plies. The thickness shall be measured up to one decimal place of millimetre.

6.4 Tolerances

The following tolerances on the nominal sizes of finished boards shall be permissible:

<i>Dimension</i>	<i>Tolerance</i>
a) Length	+ 6 mm
	— 0 mm
b) Width	+ 3 mm
	— 0 mm
c) Thickness	
Less than 6 mm	± 10 percent
6 mm and above	± 5 percent
d) Squareness	0.2 percent
e) Edge straightness	0.2 percent

7 WORKMANSHIP AND FINISH

7.1 The bamboo mat boards shall be of uniform thickness within the tolerance limit specified in 6.4.

7.2 The faces of bamboo mat boards shall be reasonably smooth and uniform in colour.

8 SAMPLING

8.1 The method of drawing representative samples and the criteria for conformity shall be as prescribed in IS 7638 : 1986 for BWR grade plywood for general purposes (IS 303).

9 TESTS

9.1 Test Specimen

9.1.1 Specimens of size 50 mm × 50 mm in full thickness shall be cut from different positions of the board selected as per 8.1.

9.2 Specimens cut from boards shall be subjected to the tests for bond strength. Bond strength shall be deemed satisfactory if the requirement specified either in 9.3 or 9.4 is complied.

9.3 Internal Bond Strength Test

9.3.1 Internal Bond Strength in Dry State

Six test specimens prepared as per 9.1.1 when tested in accordance with the method described in IS 2380 (Part 5) : 1977, shall give an average and a minimum individual value of 0.7 N/mm² and 0.5 N/mm² respectively.

9.3.2 Internal Bond Strength in Wet State

Six test specimens prepared as per 9.1.1 shall be subjected to boiling in water for a period of 3 hours. Afterwards they shall be dried in ambient conditions till they attain a moisture content of 10 to 12 percent. The dried specimens when tested in accordance with the method described in IS 2380 (Part 5) : 1977 shall give an average and a minimum individual value of 0.5 N/mm² and 0.3 N/mm².

9.3.3 Mycological Test

Six test specimens prepared as per 9.1.1 shall be subjected to attack by micro-organism as per the method described in Annex B and then tested as per IS 2380 (Part 5) : 1977, shall give an average and a minimum individual value of 0.5 N/mm² and 0.3 N/mm² respectively.

9.4 Surface Strength Test (Alternative Test)

9.4.1 Surface Strength Test in Dry State

Six test specimens prepared as per 9.1.1 when tested in accordance with the method described

in IS 2380 (Part 22) : 1981 shall give an average and a minimum individual value of 4.5 N/mm² and 3.0 N/mm² respectively.

9.4.2 Surface Strength Test in Wet State

Six test specimens prepared as per 9.1.1 shall be subjected to boiling in water for 3 hours. Afterwards they shall be dried in ambient conditions till they attain a moisture content of 10 to 12 percent. The dried specimens when tested in accordance with the method described in IS 2380 (Part 22) : 1981 shall give an average and a minimum individual value of 3.0 N/mm² and 2.0 N/mm² respectively.

9.4.3 Mycological Test

Six test specimens prepared as per 9.1.1 shall be subjected to attack by micro-organisms as per the method described in Annex B and then tested as per IS 2380 (Part 22) : 1981 shall give an average and a minimum individual value of 3.0 N/mm² and 2.0 N/mm² respectively.

10 MARKING

10.1 Each bamboo mat board shall be legibly and indelibly marked or stamped with the following:

- Indication of the source of manufacture,
- Year of manufacture, and
- Batch No.

10.2 BIS Certification Marking

The bamboo mat board may also be marked with Standard Mark.

10.2.1 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.

10.3 All markings shall be done on the face of the board near one corner.

ANNEXE A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	Title	IS No.	Title
401 : 1982	Code of practice for preservation of timber (<i>third revision</i>)	2380 (Part 22) : 1981	Method of test for wood particle boards and boards from other lignocellulosic materials: Part 22 Determination of surface glueability test (<i>first revision</i>)
107 : 1976	Glossary of terms relating to timber technology and utilization (<i>second revision</i>)	5539 : 1969	Specification for preservative treated plywood
848 : 1974	Specification for synthetic resin adhesives for plywood (<i>pneumatic and aminoplastic</i>) (<i>first revision</i>)	6874 : 1973	Method of tests for round bamboos
2380 (Part 5) : 1977	Methods of test for wood particle boards and boards from other lignocellulosic materials: Part 5 Determination of tensile strength perpendicular to surface (<i>first revision</i>)	7638 : 1986	Methods of sampling for plywood, fibre hardboards, insulation boards and particle boards (<i>first revision</i>)
		12049 : 1987	Dimensions and tolerances relating to wood based panel materials

ANNEX B
(Clauses 9.3.3 and 9.4.3)

MYCOLOGICAL TEST

B-1 OBJECT

B-1.1 This test is intended to evaluate the resistance of glue line to attack by micro-organisms in addition to the durability of bamboo from which the board is manufactured.

B-2 PROCEDURE

B-2.1 A flat rectangular dish of enamelled iron, glass or porcelain (such as a photographic developing dish) of a minimum depth of 50 mm, shall be filled to a depth of about 25 mm with a layer of sawdust obtained from the sapwood of a perishable timber, like semul (*Bombax ceiba*) in its natural condition. The sawdust shall have previously been moistened with water containing 15 g of sucrose (normally sugar may be used; but if not available, 30 g of commercial malt extract may be substituted) to a litre of water so that it is saturated with moisture, but not so wet that free water is squeezed out of it by hand pressure. To attain this condition

with dry sawdust, it is usually necessary to add three times its mass of water.

B-2.2 The sawdust shall then be charged with the spores of commonly occurring wood destroying fungi and loosely compacted. The test specimens shall be pressed down into it so that their upper surfaces are level with the top of the sawdust layer.

B-2.3 The dish shall then be covered with a sheet of glass and the edges of the dish sealed against the glass with modelling clay or a similar suitable material so that the atmosphere round the test specimens shall remain saturated with water vapour.

B-2.4 The dish and the contents shall be maintained at a temperature of $27^{\circ} \pm 2^{\circ}\text{C}$ for a period of three weeks, after which the test pieces shall be removed, washed in water and allowed to dry to a moisture content of 10 to 12 percent in ambient conditions.

ANNEX C*(Foreword)***COMMITTEE COMPOSITION**

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National Buildings Organization, New Delhi

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South Indian Plywood Manufacturers' Association, Trivandrum

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Sitapur Plywood Manufacturers' Ltd, Sitapur

Director General, BIS (Ex-officio Member)

*Member Secretary***SHRI SANJAY PANT**

Assistant Director (Civ Engg), BIS

(Continued on page 6)

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Wood-Based Building Boards Subcommittee, CED '20 : 6

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Amendments Issued Since Publication

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