IS 15791 (2007): Museum plywood -Specifiction [CED 20: Wood and other Lignocellulosic products]

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संग्रहालय प्लाईवुड — विशिष्टि

Indian Standard

MUSEUM PLYWOOD — SPECIFICATION

ICS 79.060.10

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

December 2007

Price Group 2

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.

Plywood panels are commonly used in making display cases and storage cabinets in museums, art galleries and similar institutions. The objects housed are priceless and are reminiscent of our cultural past. It is imperative that the plywood panels used do not in any way cause damage to the invaluable artifacts, which are our cultural heritage. This standard has been formulated keeping in mind the above requirements for plywood for specific use in museum, art galleries and other similar institutions.

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

MUSEUM PLYWOOD — SPECIFICATION

1 SCOPE

This standard specifies the requirements of plywood, including that of materials and manufacture; suitable for making shelves, cupboards, cabinets, etc, in museums, art galleries and other similar institutions.

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 shall apply.

4 MATERIALS

4.1 Timber

The species of timbers to be used for the manufacture of face veneers, cores and cross bands shall be as specified in **3.1** of IS 710. Any species of timber other than the above may also be used with prior approval of the purchaser, if they possess comparative physical and mechanical properties. In selecting the species for the manufacture of plywood, it is recommended that as far as possible a single species of timber shall be used and where combinations of different species are used, care shall be taken to prevent incompatibility of the two species.

4.2 Adhesive

The adhesive used for bonding the veneers shall be phenol formaldehyde synthetic resin adhesive conforming to BWP grade of IS 848. Fillers may be used, if necessary.

5 MANUFACTURE

5.1 Veneers

Veneers used for the manufacture of plywood shall be either rotary cut or sliced. Veneers shall be sufficiently smooth to permit an even spread of the adhesive and shall be of AA or AB type of IS 303. Veneers may be treated with suitable preservatives and shall be dried to a moisture content not exceeding 8 percent.

5.2 Glueing

Glue shall be evenly spread and the glued veneers should be devoid of unglued or glue starved areas.

5.3 Assembly

Thickness of veneers, joints in veneers, grain direction and permissible defects shall be as specified in **7.2** of IS 303.

6 TREATMENT

6.1 Preservative Treatment

The plywood boards shall be given treatment with suitable preservatives as specified in IS 5539, under vacuum and pressure with adequate penetration. Preservative loading may be in the range of 6 to 8 kg/m^3.

6.2 Fire Retardant Treatment

The plywood boards shall be treated with fire retardant chemicals as specified in IS 5509.

7 DIMENSIONS AND TOLERANCES

7.1 The dimensions of the museum plywood shall be as follows:

2 400 mm × 1 200 mm	2 100 mm × 900 mm
2 100 mm × 1 200 mm	1 500 mm × 900 mm
1 800 mm × 1 200 mm	

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

7.2 Unless otherwise specified, thickness of plywood boards shall be as specified below. The thickness shall be measured up to one place of decimal.

Board	*Thickness*	*Board*	*Thickness*
3 ply	3, 4, 5, 6 mm	9 ply	12, 15, 16, 19 mm
5 ply	5, 6, 8, 9 mm	11 ply	19, 22, 25 mm
7 ply	9, 12, 15, 16 mm	Above 11 ply	As ordered

7.3 Tolerances

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

	Dimension	*Tolerance*
a)	Length	+ 6 mm – 0 mm
b)	Width	+ 3 mm – 0 mm
c)	Thickness:	
	1) Less than 6 mm	± 10 percent
	2) 6 mm and above	± 5 percent
d)	Squareness	0.2 percent or 2 mm in 1 000 mm
e)	Edge Straightness	0.2 percent or 2 mm in 1 000 mm

8 WORKMANSHIP AND FINISH

The workmanship and finish of the plywood shall be as specified in IS 303.

9 TESTS

9.1 Moisture Content

When tested in accordance with IS 1734 (Part 1), the moisture content of plywood shall not be less than 5 percent and not more than 15 percent.

9.2 Glue Adhesion

The plywood shall comply with the requirements of glue adhesion in dry state and water resistance test as specified in IS 710.

9.3 Fire Retardant Requirements

The plywood shall comply with the fire retardant requirements specified in IS 5509.

9.4 Formaldehyde Content

When tested in accordance with any of the method described in Annex B, the formaldehyde content in the plywood shall not be more than 0.5 mg/100 g.

10 SAMPLING

The method of drawing representative samples and the criteria for conformity shall be as specified in IS 7638 for BWR grade plywood for general purposes, IS 303.

11 MARKING

11.1 Each plywood shall be legibly and indelibly marked or stamped with the following:

a) Name of the manufacturer or trade-mark, if any;
b) Year of manufacture;
c) Thickness; and
d) Type of fire retardant treatment.

11.2 BIS Certification Marking

The product may also be marked with the Standard Mark.

11.2.1 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 the 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

IS No.	*Title*	*IS No.*	*Title*
303 : 1989	Plywood for general purposes— Specification (*third revision*)	1734 (Part 1) : 1983	Methods of test for plywood: Part 1 Determination of density and moisture content (*second revision*)
707 : 1976	Glossary of terms applicable to timber technology and utilization (*second revision*)	5509 : 2000	Fire retardant plywood — Specification (*second revision*)
710 : 1976	Specification for marine plywood (*first revision*)	5539 : 1969	Specification for preservative treated plywood
848 : 2006	Synthetic resin adhesives for plywood (phenol and amino plastic) — Specification (*second revision*)	7638 : 1999	Wood/lignocellulosic based panel products — Methods for sampling (*second revision*)

ANNEX B

(*Clause* 9.4)

FORMALDEHYDE EMISSION — MEASUREMENT BY DESICCATOR METHOD

B-1 Desiccator method is widely used for finding out emitted formaldehyde from a product source. In this method emitted formaldehyde is absorbed in distilled water and the absorbed formaldehyde content determined based on its specific reaction with chromotropic acid — sulphuric acid solution, with which it forms a purple monocationic chromegen. Absorbance value of the purple solution is read in a spectrophotometer. Using the absorbance value so obtained, formaldehyde concentration is determined from a calibration curve prepared from standard formaldehyde solution.

A modified method keeping in view the facilities normally available in the laboratory have also been developed. In this method, emitted formaldehyde from the source is absorbed in neutral sodium sulphite solution of known strength in which an indicator solution (Thymolphthalein) is present. Based on the specific reaction of sodium sulphite solution and formaldehyde in the presence of indicator, a characteristic blue colour is obtained. This solution is then titrated with standard acid solution to find out percentage of absorbed formaldehyde. As an alternate to the above method, the emitted formaldehyde is absorbed in distilled water from which the formaldehyde absorbed is evaluated using iodine and sodium hydroxide solutions, liberating excess iodine by adding sulphuric acid and titrating the solution with sodium thiosulphate.

B-2 PROCEDURES FOR DESICCATOR METHOD

B-2.1 Method 1

A clean desiccator shall be taken and grease applied to it to make it airtight. Excessive use of grease shall however be avoided.

For determining the emission of formaldehyde from panels, eight such samples shall be taken and kept in a petridish by arranging around a 200 ml inverted beaker as shown in Fig. 1. Over the inverted beaker a petridish containing neutral sodium sulphite solution (1 N solution) with one or two drops of thymolphalein indicator shall be placed. The whole arrangement shall then be concealed in a bigger sized beaker by keeping it in an inverted position and the lid of the desiccator closed and kept in a closed condition for 3 days. After the completion of 3 days, the petridish containing the neutral sodium sulphite solution with the indicator shall be taken out carefully from desiccator and its characteristics blue colour shall be observed. It shall then be titrated with standard acid for finding out the percentage of absorbed formaldehyde.

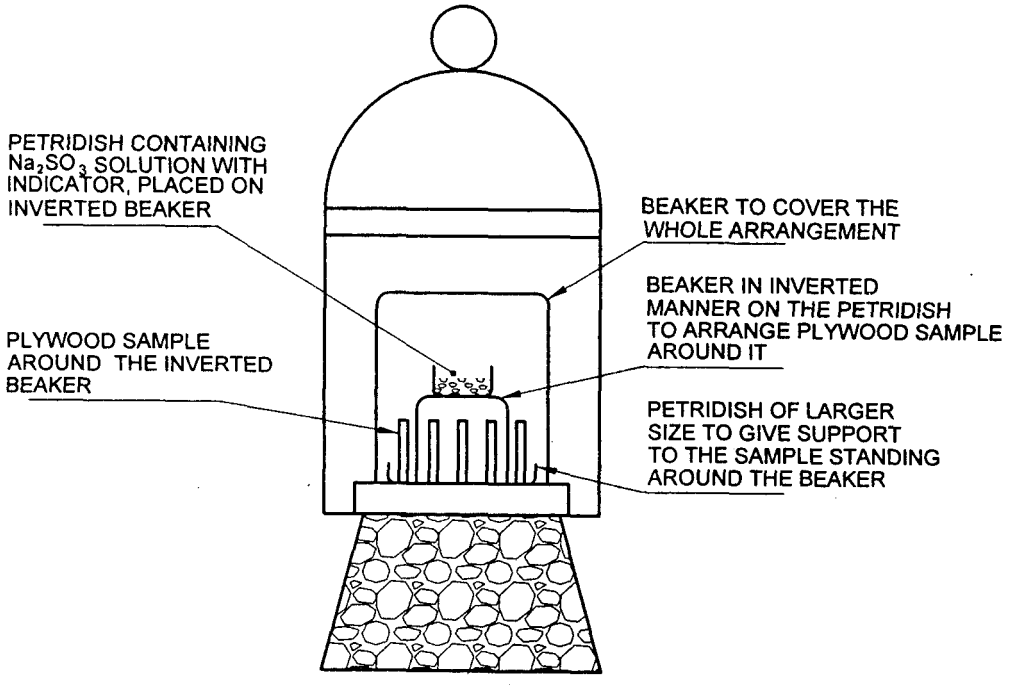

FIG. 1 DESSICATOR METHOD

The weight of the quantity of the sodium sulphite solution with indicator shall be determined. An increase in mass of the sample shall be observed. The difference in the initial mass of sodium sulphate solution with indicator and that after 3 days of stabilization time shall be taken as the mass of formaldehyde emitted. This mass of material shall be further titrated using standard hydrochloric acid solution of 1N using thymolpthalein as indicator. The volume rundown of hydrochloric acid shall be noted. The formaldehyde emitted from the sample shall be calculated as given below.

1 000 ml of 1N HCl = 30.03 g HCHO

$$\text{Formaldehyde content (as HCHO), percent by mass} = \frac{3.003 \times v \times N}{M}$$

where

v = volume of standard HCl required for titration, in ml;

N = normality of standard HCl used for titration; and

M = mass of the material taken for the test.

B-2.2 Method 2

A small sample of plywood shall be kept in a closed desiccator. A small beaker containing a known quantity (100 ml) of distilled water shall be placed inside the desiccator. The desiccator shall then be closed airtight for three days for the fomaldehyde to get absorbed in the distilled water.

The distilled water shall then be analyzed for the formaldehyde emitted from the plywood by adding 20 ml of 0.01 mol/l iodine solution and 2 ml of sodium hydroxide solution. The entire ingredients shall then be closed and kept in dark for 15 min. 4 ml of 1:1 sulphuric acid solution shall then be added. The liberation of excess iodine causes a brown colour to appear. This excess iodine shall be back titrated with 0.1 mol/l sodium thiosulphate solution in presence of starch indicator. The formaldehyde emitted shall then be calculated from the volume of sodium thiosulphate using the relation:

1 ml of 0.01 mol/l of thiosulphate solution corresponds to 0.15 mg formaldehyde.

x ml of thiosulphate solution corresponds to $(x) \times 0.15$ mg of formaldehyde.

Bureau of Indian Standards

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Review of Indian Standards

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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