IS : 1734 (Parts 1 to 20) - 1983
(Reaffirmed 2003)

Indian Standard
METHODS OF TEST FOR PLYWOOD
(Second Revision)

UDC 674-419.32

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

Price Group 13

Indian Standard

METHODS OF TEST FOR PLYWOOD

PART I DETERMINATION OF DENSITY AND MOISTURE CONTENT

(Second Revision)

UDC 674-419.32 : 531.754 + 543.812

1. SCOPE

1.1 This standard (Part 1) covers the method of test for the determination of density and moisture content of plywood by oven dry method.

2. OBJECT

2.1 The object of this test is to determine the density of plywood which is an indicator of the properties of timber species. The determination of moisture content is necessary since it has a bearing on several important mechanical properties of plywood.

3. TEST SPECIMEN

3.1 Each test specimen shall be of the full thickness of the material and 75 mm wide and 150 mm long. Smaller specimens may be used when deemed necessary. The dimensions of the test specimens shall be measured to an accuracy of not less than ± 0.3 percent.

4. APPARATUS

4.1 Oven — An oven that can be maintained at a temperature of 103 ± 2°C through the drying chamber for the time required to dry the specimen to constant mass. It may require forced air circulation to maintain uniform temperature. Oven shall be vented to allow the evaporated moisture to escape.

4.2 Balance — A balance to weigh a specimen within ± 0.2 percent. The accuracy and sensitivity of the weighing balance shall be checked frequently.

5. PROCEDURE

5.1 The test specimen shall be weighed. The specimen shall then be dried in an oven at a temperature of 103 ± 2°C until approximately constant mass is obtained. The specimen shall be weighed to an accuracy of not less than ± 0.2 percent.

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6. CALCULATION

6.1 The density shall be calculated as follows:

$$\text{Density, in g/cm}^3 = \frac{M_0}{Lwt}$$

where

M_0 = oven dry mass of specimen in g,
L = length of the specimen in cm,
w = width of the specimen in cm, and
t = thickness of the specimen in cm.

6.2 Moisture Content — The moisture content shall be calculated as follows:

$$\text{Moisture content, percent} = \frac{M_1 - M_0}{M_0} \times 100$$

where

M_1 = initial mass of specimen, and
M_0 = oven-dry mass of specimen.

7. PRECAUTIONS

7.1 Care shall be taken to prevent any change in moisture content between the cutting of the sample and first weighing and also between the removal from the oven and subsequent weighings. The specimen may be wrapped in an aluminium foil or polyethylene film to prevent moisture changes after cutting between consecutive weighings.

NOTE 1 — The moisture content and density, as determined by this method, are the average values for the entire specimen. In plywood made up of thin veneers, that is, less than 0.8 mm in thickness, the glue may constitute a significant part of the total mass and as a result the calculated density and moisture content may vary substantially from the true values for the veneers. In some instances, it may be desirable to take this into account.

NOTE 2 — The density so obtained is based on the volume at test and mass when oven-dry. If desired, the density may be obtained on an oven-dry mass and volume basis. In each instance, the basis of the density value with respect to volume and moisture conditions shall be stated.

8. REPORT

8.1 The density and moisture content of the specimen shall be reported.

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METHODS OF TEST FOR PLYWOOD

PART 4 DETERMINATION OF GLUE SHEAR STRENGTH

(Second Revision)

(Incorporating Amendment Nos. 1, 2 & 3)

UDC 674-419.32 : 668.3 : 620.176.2

1. SCOPE

1.1 This standard (Part 4) covers the method of test for the determination of glue shear strength of plywood.

2. OBJECT

2.1 This test is intended to estimate the tenacity with which the bonding material holds the veneers together.

3. TEST SPECIMEN

3.1 At least six specimens for each pair of glue lines shall be cut from the panel from different locations.

3.2 The test pieces from 3-ply plywood shall be prepared by making saw cuts (*see* Fig. 1). When the number of plies exceeds three, specimens shall be prepared to test all pairs of glue lines. Each test specimen shall be cut so that the grain direction of the ply between the glue lines under test is perpendicular to the length of the test specimen. Method of preparation of specimens for 7-ply plywood is shown in Fig. 1. The test specimens shall be prepared and saw cuts made to allow the examination of each and every pair of glue lines in the panel.

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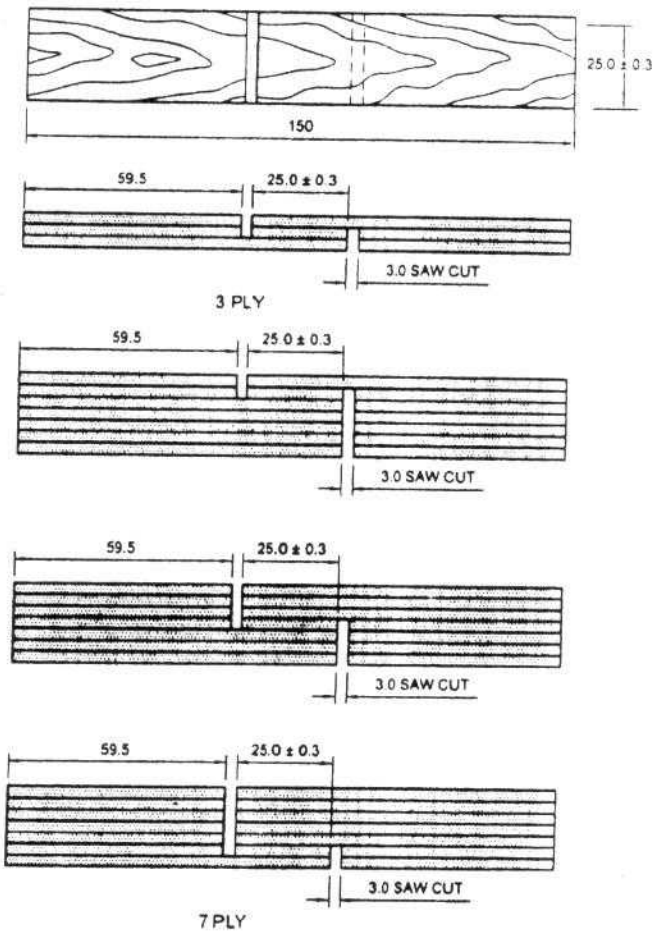
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002



All dimensions in millimetres.

FIG. 1 TEST SPECIMEN FOR GLUE ADHESION TEST

4. PROCEDURE

4.1 Each test specimen shall be gripped symmetrically at two ends in the jaws of a suitable testing machine, and shall be pulled apart. The distance between the notches on the test specimen and the end of the gripping jaws of the testing machine shall be between 10 mm and 20 mm. The pull should be, as far as possible, in the centre line of the central veneer. The grain of the centre ply shall be perpendicular to the direction of application of load. Measure the width of each specimen and distance between the notches to nearest 0.025 cm to determine the shear area.

4.2 During the test, the load shall be applied to the test specimens as uniformly as possible, and so adjusted as to increase at a rate lying in the range of 1 300 ± 500 N/min.

4.3 The maximum load at the time of complete failure of each specimen shall be recorded. Record shall also be made as to failure whether in wood or in glue by visual examination of the area under shear. In case of wood failure the percentage wood failure shall also be recorded.

NOTE — In case of dispute, measurement of wood failure shall be done with the help of a graphical mesh of area 25 × 25 mm printed on a transparent material placed on the sheared surface, the wood failure may be objectively and quantitatively estimated.

4.4 *Clause deleted*

5. REPORT

5.1 Failing load and percentage of wood failure of the tested specimens for each pair of glue lines determined in accordance with 4 shall be straight averaged and compare with values given in appropriate Indian Standard specification for plywood.

5.1.1 All the details shall be recorded under the following sub-heads:

a) Name of the manufacturer/source from whom the plywood is procured,

b) Type and grade of plywood,

c) Construction of plywood in terms of the ratio of thickness of individual plies,

d) Species of individual plies,

e) Adhesive used,

f) End use of plywood,

g) Specimen No./Reference,

h) Area of cross section of bonding surface under shear,

j) Average load for each and every pair of glue lines, and

k) Average percentage of wood failure for each and every pair of glue lines.