IS 13957 (1994): Metal faced plywood -Specification [CED 20: Wood and other Lignocellulosic products]

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IS 13957 : 1994
Reaffirmed 2009

भारतीय मानक

धातु फलकदार प्लाईवुड - विशिष्टि

Indian Standard

METAL FACED PLYWOOD — SPECIFICATION

UDC 674-419·32: 669-419·3

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

February 1994

Price Group 3

AMENDMENT NO. 1 NOVEMBER 2008
TO
IS 13957 : 1994 METAL FACED PLYWOOD — SPECIFICATION

(*Page* 2, *clause* 6.1) — Substitute the following for the existing clause:

'6.1 The dimensions of plywood boards shall be as follows:

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

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

(*Page* 2, *clause* 6.3) — Substitute the following for the existing clause:

'6.3 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 per 1 000 mm
e)	Straightness	0.2 percent or 2 mm per 1 000 mm

NOTE – Edge straightness and squareness shall be tested as per Annex B.'

(*Page* 3, *Annex* A) — Insert the following as a new annex after Annex A:

'ANNEX B
(*Clause* 6.3)

METHOD OF TEST FOR EDGE STRAIGHTNESS AND SQUARENESS

B-1 PROCEDURE FOR EDGE STRAIGHTNESS

B-1.1 The straightness of the edges and ends of plywood shall be verified against a straight edge not less than the full length of the plywood. If the edge on the end of the plywood 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.

B-2 PROCEDURE FOR SQUARENESS

B-2.1 The squareness of plywood shall be checked with a set square of arms 500 mm long, by applying one arm of the square to the plywood. The maximum width of the gap shall be recorded.'

(CED 20)

Reprography Unit, BIS, New Delhi, India

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.

Metal faced plywood is the composite product obtained by bonding galvanized iron sheet or aluminium sheet to plywood on one side or both sides. In the present scenario where timber has become extremely scarce material, the use of metal face plywood would be able to provide building boards of adequate strength by economizing the use of timber. This standard has, therefore, been formulated to guide the manufacturers and users of metal faced plywood.

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 B.

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

METAL FACED PLYWOOD — SPECIFICATION

1 SCOPE

This Standard covers manufacture and requirements of metal faced plywood composite. The scope is limited to the use of galvanized iron sheet or aluminium sheet only, as metal sheet.

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 following definitions shall apply and for definitions other than those given below reference shall be made to IS 707 : 1976.

3.1.1 *Composite*

A product obtained by bonding galvanized iron sheet or aluminium sheet to plywood on one side or both sides.

3.1.2 *Plywood*

A board formed by gluing three or more layers of veneers with a suitable adhesive with grain of adjacent veneers running at right angles.

3.1.3 *Synthetic Resin Adhesive — Phenolic*

Resin derived from the reaction of phenol with an aldehyde.

3.1.4 *Polyvinyl Acetal Resin*

Resin derived from the reaction of polyvinyl alcohol with formaldehyde or butyraldehyde.

3.1.5 *Spread of Adhesive*

The area of surface covered by 1 kg of adhesive.

3.1.6 *Open Assembly Time*

The time interval between the application of the adhesive and assembly of components.

3.1.7 *Degreasing*

Removal of grease, oil or any such contamination from the surface of metal sheets.

3.1.8 *Acid Pickling*

Removal of zinc coating from the galvanized iron sheet and oxide layer from the aluminium sheet.

4 MATERIALS

4.1 Plywood

Plywood used for the manufacture of metal faced plywood shall be BWR grade conforming to IS 303 : 1989.

4.2 Galvanised Iron Sheets

Galvanised iron sheet used for the manufacture of metal faced plywood shall conform to IS 277 : 1985.

4.3 Aluminium Sheet

Aluminium sheet used for the manufacture of metal faced plywood shall conform to IS 737 : 1986.

4.4 Adhesive

4.4.1 *Phenol Formaldehyde (PF) Resin*

Phenol formaldehyde resol resin shall be used for bonding galvanized sheet or aluminium sheet with plywood.

4.4.2 *Polyvinyl Acetal Resin*

Polyvinyl formal or polyvinyl butyral resin shall be used in combination with phenol formaldehyde resol resin.

5 MANUFACTURE

5.1 Surface Preparation

5.1.1 *Degreasing*

The metal sheet surface shall be completely freed from greasy/oily materials by cleaning with detergent powder and washing with running water followed by drying in dust free atmosphere.

5.1.2 *Acid Pickling*

5.1.2.1 *Galvanized iron (GI) sheet*

The surface of the GI sheet to be bonded with plywood shall be acid pickled to remove the zinc layer completely from the surface to be bonded with plywood, alternatively sheets galvanized on one side, taking care that ungalvanized side is rust free, shall be used. Acid pickled sheet shall be washed in running water followed by washing with detergent powder and finally washing with running water to make the surface free from residual acid.

5.1.2.2 *Aluminium sheet*

The surface of the aluminium sheet to be bonded with plywood shall be acid pickled to remove the oxide film, if any, on the surface. Acid pickled sheet shall be washed in running water followed by washing with detergent powder and finally washing with running water to make the surface free from residual acid.

5.1.3 *Surface Preparation of Plywood*

Blow off dust and splinters from the sanded surface of plywood to be bonded with metal sheet. Dry the plywood to a moisture content of 4 to 6 percent or use freshly made plywood panels.

5.2 Adhesive Application

Apply the PF resin on to the cleaned metal surface and plywood. Sprinkle polyvinyl acetal powder resin of size 425-850 microns conforming to IS 460 (Part 1) : 1985 on the phenol formaldehyde resin coated surface of both metal sheet and plywood. The quantity of polyvinyl acetal resin shall be between 1·5 to 2 times of the solid PF resin that is spread. Allow an open assembly time of about 24 hours.

5.3 Preparation of the Composite

Metal sheets and plywood are assembled and hot pressed at a temperature of 145°C to 150°C for 30 minutes. The pressure applied shall be 1·4 N/mm^2 to 1·6 N/mm^2. The composite is removed from the hot press after cooling the composite to room temperature.

6 DIMENSIONS AND TOLERANCES

6.1 The dimensions of metal faced plywood 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.

6.2 Thickness of metal faced plywood boards shall be as given in Table 1.

Table 1 Thickness of Metal Faced Plywood

Board	Thickness mm
(1)	(2)
3 Ply	3, 4, 5, 6
5 Ply	5, 6, 8, 9
7 Ply	9, 12, 15, 16
9 Ply	12, 15, 16, 19
11 Ply	19, 22, 25
Above 11 Ply	As ordered

6.3 Tolerances

The tolerances on the nominal sizes of finished boards shall be as specified in IS 12049 : 1987.

7 WORKMANSHIP AND FINISH

The metal faced plywood boards shall be of uniform thickness within the tolerance limits specified in **6.3**.

8 SAMPLING

The method of drawing representative samples and criteria for conformity shall be as prescribed in IS 7638 : 1975 for BWR grade plywood for general purposes (IS 303).

9 TESTS

9.1 Test Specimen

Specimens of size 150 mm square in full thickness shall be cut from different positions of the board.

9.2 Specimens cut from boards selected under 8 shall be subjected to the test for bond quality in accordance with **9.3**. Bond quality shall be deemed satisfactory if the requirement specified under **9.3.1** is complied.

9.3 Bond Quality Test

Six test specimens prepared as per **9.1** shall be immersed in a pan of boiling water for 4 hours and then dried in a thermostatic oven at a temperature of 60±2°C for 20 hours. The cycle shall be repeated three times. At the end of three cycles the specimens shall be examined for delamination. Glue lines in all the four exposed edges of the composite on both faces of the specimen and the glue lines between the plywood faces and the metal sheet shall be examined for delamination.

9.3.1 A specimen shall be considered to have passed the test if:

a) no visible delamination has occurred in the glue lines of plywood and if no visible delamination has occurred between the plywood faces and the metal sheet, and

b) on forcible separation using a suitable lever, wood fibres are found adhered to the metal sheet uniformly over the entire surface.

9.4 If required by the purchaser the following additional tests may be carried out, the requirements being as agreed to between the purchaser and the supplier:

a) Modulus of elasticity

b) Modulus of rupture

c) Core shear stress

d) Facing stress

10 MARKING

10.1 Each metal faced plywood board shall be legibly and indelibly marked or stamped with the following:

a) Indication of the source of manufacture,

b) Year of manufacture,

c) Batch No., and

d) Type of metal sheet used.

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

10.2 BIS Certification Marking

The metal faced plywood sheet may also be marked with the 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 a 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

IS No.	*Title*	*IS No.*	*Title*
277 : 1992	Specification for galvanized steelsheet (plain and corrugated) (*fifth revision*)	737 : 1986	Specification for wrought aluminium and aluminium alloy sheet and strip for general engineering purposes (*third revision*)
303 : 1989	Specification for plywood for general purposes (*third revision*)	7638 : 186	Methods of sampling for plywood, fibre hardboards, insulation boards and particle boards (*first revision*)
460 (Part 1) : 1985	Specification for test sieves: Part 1 Wire cloth test sieves (*third revision*)	12049 : 1987	Dimensions and tolerances relating to wood based panel materials
707 : 1976	Glossary of terms applicable to timber technology and utilization (*second revision*)		

ANNEX B

(*Foreword*)

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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 Handbook' and 'Standards Monthly Additions'.

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