IS 848 (2006): Specification for Synthetic Resin Adhesives for Plywood (Phenolic And Aminoplastic) - [CED 20: Wood and other Lignocellulosic products]

BLANK PAGE

भारतीय मानक

प्लाईवुड के लिए संश्लिष्ट रेज़िन आसंजक (फिनालिक एवं एमीनोप्लास्टिक) — विशिष्टि

(दूसरा पुनरीक्षण)

Indian Standard

SYNTHETIC RESIN ADHESIVES FOR PLYWOOD (PHENOLIC AND AMINOPLASTIC) — SPECIFICATION

(Second Revision)

ICS 790.060.10; 83.180

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

July 2006

Price Group 3

AMENDMENT NO. 1 AUGUST 2007
TO
IS 848 : 2006 SYNTHETIC RESIN ADHESIVES FOR PLYWOOD (PHENOLIC AND AMINOPLASTIC) — SPECIFICATION

(Second Revision)

(*Page* 2, *Table* 1) — Insert the following Note at the end of the table

NOTE – The cycles of drying or soaking can be made up of a number of shorter periods of drying or soaking. In such instances the specimen shall be kept in air at 27 ± 2°C in between the shorter periods constituting the drying cycle and be kept submerged in water at 27 ± 2°C in between the shorter periods constituting the soaking cycle

(CFD 20)

Reprography Unit BIS New Delhi India

AMENDMENT NO. 2 NOVEMBER 2011
TO
IS 848 : 2006 SYNTHETIC RESIN ADHESIVES FOR PLYWOOD (PHENOLIC AND AMINOPLASTIC) – SPECIFICATION

(Second Revision)

(*Page* 2, *clause* **5**) — Substitute the following for the existing:

'**5 QUALITY OF RESIN ADHESIVES**

The resin adhesives shall conform to the following, as applicable:

a) *Liquid Resin Adhesives* — The adhesives shall comply with the requirements specified in **7**, when the resin and hardener have been stored in closed containers under conditions as specified by the resin/adhesive manufacturer and the adhesive is tested within the shelf life.

b) *Film/Powder Resin Adhesives* — The adhesives shall comply with the requirements specified in **7**, when these have been stored in closed packaging/containers under conditions as specified by the adhesive manufacturer and the adhesive is tested within the shelf life.'

(CED 20)

Reprography Unit, BIS, New Delhi, India

FOREWORD

This Indian Standard (Second Revision) 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.

Adhesives form one of the most important raw materials used in the plywood industry and woodworking and joinery industry. The selection of the adhesives and their proper uses are important factors controlling the quality of the plywood or the joinery work produced. There has been enormous improvement in the quality of indigenous raw materials for adhesives.

This standard was first published in 1957. The first revision was issued in 1974 based on experience gained in the manufacture and use of synthetic resin adhesives. In the present revision, the test methods have been modified to assess the performance of the adhesive for manufacture of various grades of plywood. The test methods are based on the studies carried out at Indian Plywood Industries Research and Training Institute and found to be suitable for plywood made with forest grown as well as plantation timber, while meeting the end use requirements.

In the formulation of this standard, due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country.

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

SYNTHETIC RESIN ADHESIVES FOR PLYWOOD (PHENOLIC AND AMINOPLASTIC) — SPECIFICATION

(Second Revision)

1 SCOPE

This standard prescribes the requirements for phenolic and aminoplastic synthetic resin adhesives used in the plywood industry, covering liquid, powder and film adhesives

2 REFERENCES

The standards listed below co[illegible] 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 below

IS No	*Title*
707 1976	Glossary of terms applicable to timber technology and utilization (*second revision*)
1734 (Part 1) 1983	Methods of test for plywood Determination of density and moisture content (*second revision*)
(Part 5) 1983	Test for adhesion of plies (*second revision*)

3 TERMINOLOGY

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

3.1.1 *Assembly Time*

3.1.1.1 *Open assembly time* — The time elapsing between the application of the adhesive and assembly of joint components

3.1.1.2 *Closed assembly time* — The time elapsing between assembly of the joint components and the application of pressure and temperature

3.1.2 *Adhesive*

3.1.2.1 *Closed contact adhesive* — A non-gap-filling adhesive suitable for use only in those joints where the surfaces to be joined may be brought into close contact by means of adequate pressure and where glue line exceeding 0 12 mm may be avoided with certainity

3.1.2.2 *Gap filling adhesive* — An adhesive suitable for use in those joints where the surfaces to be joined may or may not be in close or continuous contact owing either to impossibility of applying adequate pressure or to slight inaccuracies in machining

3.1.3 *Extender* — A substance added to the adhesive either to reduce the cost of gluing or to reduce penetration through the veneers or both

3.1.4 *Filler* — An inert substance, such as wood flour or metal oxide added to alter the characteristics of the resin, for example to reduce brittleness of the synthetic resin or to inhibit excess penetration of the resin into veneer or wood The term 'filler' is sometimes synonymously used with 'extender'

3.1.5 *Fortifier* — A substance used primarily to improve the water resistance and durability of hot setting resins

3.1.6 *Hardener (Catalyst)* — A material added to resin to bring about or promote the curing of resin

3.1.7 *Pot Life* — The time between the mixing of the constituent parts of an adhesive and its reaching the age when it is no longer usable

3.1.8 *Shelf Life* — The period up to which adhesive or adhesive components may be stored without affecting their suitability for use in accordance with the standard

3.1.9 *Spread of Adhesive* — The area in m^2 of the surface of substrate covered by 1 kg of solid/liquid resin

3.1.10 *Synthetic Resin* — Amorphous organic materials produced by the polymerization or condensation of one, two or less frequently three relatively simple compounds The term is also applied now-a-days to chemically modified natural resins The properties of synthetic resins can vary widely depending upon their basic raw materials,

proportions and conditions of manufacture. All synthetic resins are classified broadly as thermosetting or thermoplastic.

3.1.11 *Phenolic Synthetic Resin* — A phenolic synthetic resin is derived from the reaction of phenol with an aldehyde.

3.1.12 *Aminoplastic Synthetic Resin* — An aminoplastic synthetic resin is derived from the reaction of urea, thiourea, melamine or allied compounds or mixtures of these compounds with formaldehyde.

3.1.13 *Synthetic Resin Adhesive* — A composition, substantially consisting of a synthetic resin of either the phenolic or aminoplastic type including any hardening agent, fortifier, filler or extender, which may be required to be added before use according to the manufacturer's instructions.

4 TYPES

Depending upon their degree of resistance, synthetic resin adhesives for plywood shall be of the three types as specified in Table 1. The characteristics of each type shall be as given in Table 1. For the guidance of users in selecting the grade of resin adhesive satisfying the requirements for practical work, recommended use of each type is also indicated in Table 1.

5 KEEPING QUALITIES

The keeping qualities of resin adhesives shall be as follows:

a) *Liquid Resin Adhesives* — The adhesives shall comply with the requirements specified in 7, after the resin and hardener have been stored in the original closed containers according to the manufacturer's instructions up to the date recommended by the manufacturer.

Table 1 Characteristics of Different Types of Synthetic Resin Adhesives
(*Clauses* 4 *and* 7.3.2)

Sl No.	Type	Cyclic Test	Criteria of Conformity	Recommended Use
(1)	(2)	(3)	(4)	(5)
i)	BWP (Boiling Water Proof)	Six cycles, each cycle consisting of 8 h boiling in water and thereafter drying at 65 ± 2°C for 16 h	No separation of plies at the edges and/or surface at the end of six cycles On forcible separation of plies with knife, wood failure shall be predominant and shall be more than 75% for excellent bond and not less than 50% for pass standard For less than 50% wood failure, the specimen shall be considered as failed	Adhesives of the type have been proved to make joints highly resistant to weather, cold and boiling water, steam and dry heat
ii)	BWR (Boiling Water Resistant)	Three cycles, each cycle consisting of 8 h boiling in water and thereafter drying at 65 ± 2°C for 16 h	No separation of plies at the edges and/or surface at the end of three cycles On forcible separation of plies with knife, wood failure shall be predominant and shall be more than 75% for excellent bond and not less than 50% for pass standard For less than 50% wood failure, the specimen shall be considered as failed	Joints made of this type of adhesives will survive exposure to weather for only a few years They will withstand cold water indefinitely and boiling water for a limited period
iii)	MR (Moisture Resistant)	Three cycles, each cycle consisting of 3 h at 60 ± 2°C in water and thereafter drying at 65 ± 2°C for 8 h	No separation of plies at the edges and/or surface at the end of three cycles On forcible separation of plies with knife, wood failure shall be predominant and shall be more than 75% for excellent bond and not less than 50% for pass standard For less than 50% wood failure, the specimen shall be considered as failed	Joints made with these adhesives withstand cold water for a long period and hot water for a limited time, but fail in boiling water

b) *Film/Powder Resin Adhesives* — The adhesives shall comply with the requirements specified in 7, after these have been stored in accordance with the manufacturer's written instructions up to the date recommended by the manufacturer.

6 INSTRUCTIONS FOR USE

6.1 The manufacturer shall furnish written instructions detailing the manner in which each resin or recommended combination of resin(s), hardener(s), filler, fortifier and extender shall be used. The instructions shall give information in the manner indicated under **6.2** and **6.3**, as applicable.

6.2 Shelf-Life of Adhesive or Adhesive Components

The manufacturer shall specify the shelf-life of the adhesive or adhesive components.

6.3 Preparation for Use

The preparation of resin, hardener, fortifier, filler and extender, methods of mixing, recommended types of mixing, apparatus and necessary precautions of any kind shall be stated.

6.4 Usable Life of Mixed Adhesive or Pot Life

The maximum time shall be stated during which the adhesive maintained at temperatures of 15°C, 20°C, 25°C, 30°C, 40°C and 45°C would remain fit for use so as to comply with the requirements of this standard.

6.5 Applications

Guidance on the following points shall be given:

a) Range of moisture content of wood, at the time of gluing;

b) Preparation of wood surfaces;

c) Method(s) of application, such as single or double spread;

d) Normal amounts of spread for single glue line;

e) Maximum and minimum open and closed assembly times;

f) Recommended range of temperature in °C and specific pressure in kg/cm²;

g) Recommended pressing time for given thickness in minutes;

h) Post treatment of finished products;

j) Cleaning of containers; and

k) Tests.

6.6 Setting Times and Conditions

The recommended range of temperature to which the adhesives in any glue line may be subjected and also the minimum and maximum time for which pressure shall be maintained on flat panels at temperatures within the range shall be stated.

7 TESTS

7.1 Sampling

A representative sample shall be drawn from each batch of adhesive. Such sample shall in each case be tested separately and not be bulked with other samples or otherwise averaged.

7.2 Preparation of Test Pieces

The test pieces shall be prepared according to the instructions given in Annex A. Veneers used for the preparation of test pieces shall comply with the requirements specified in **A-1**.

7.3 Cyclic Test

7.3.1 Test specimens shall be prepared in accordance with **7.2**.

7.3.2 Test specimens have to be tested as per the schedule given in Table 1, under cyclic test for BWP, BWR or MR types.

7.3.3 After cyclic test in accordance with **7.3.2**, each specimen shall be further examined/tested in manner specified in **7.3.3.1** and **7.3.3.2**.

7.3.3.1 Visual examination shall be carried out at the edge/surface of the specimen to find out whether any delamination/separation of plies have taken place.

7.3.3.2 Forcible separation of plies shall be carried out by the knife test method described in IS 1734 (Part 5).

7.3.4 *Criteria of Conformity*

The specimens, when tested in the manner specified in **7.3.2** and **7.3.3** shall conform to the criteria of conformity given in Table 1.

7.4 Acidity and Alkalinity (*p*H)

The *p*H of the adhesive, when set, shall be not less than 2.0. The *p*H shall be determined by the method described in Annex B.

8 RETEST

In the event of failure to comply with any of the requirements specified under **7.3** to **7.4**, the batch of material concerned shall be retested in respect of such requirement(s). In the event of failure of retest, the batch shall be rejected.

9 MARKING

9.1 Each container shall be legibly and indelibly marked with the following:

a) Manufacturer's name or distinguishing mark,

b) Description of material,

c) Batch number,

d) Date of manufacture,

e) The date beyond which the adhesive components shall not be used when stored under conditions recommended by the manufacturer,

f) Reference to the manufacturer's instructions for use, and

g) The words 'To be stored in a cool dry place'.

9.1.1 *BIS Certification Marking*

Each container may also be marked with the Standard Mark.

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

ANNEX A
(*Clause* 7.2)

METHOD OF PREPARATION OF TEST PIECES

A-1 VENEERS FOR TEST PIECES

A-1.1 Veneers shall be rotary cut from species actually used by the manufacturer or be supplied by the resin manufacturer alongwith the resin sample. 1.6 mm thick veneer with the growth rings approximately parallel to the face shall be used.

A-1.2 The veneers shall be smooth cut on both faces, straight grained and free from all defects, at least over the area that will form the middle common length of the test pieces and may be lightly sanded. Elsewhere the occurrence of slight defects, such as small uplifts, small live knots and distorted grain may be disregarded. The moisture content of the veneers when determined by the method described in IS 1734 (Part 1) shall be 6.0 ± 2.0 percent for aminoplastic resin when used in liquid adhesive form and 12.0 ± 2.0 percent for powder/film adhesive, as may be recommended by the manufacturer.

A-2 PREPARATION OF ADHESIVE

The adhesive shall be prepared and used according to the instructions supplied by the manufacturer.

A-3 CONSTRUCTION OF TEST BOARDS

The test boards shall be constructed by bonding together three veneers of 1.6 mm thick as supplied or recommended by the resin manufacturer. The size of the board shall be such that all the test pieces required for testing can be taken out of the same board leaving a margin of 25 mm on the four edges. The grain of the core veneer shall be at right angle to that of the two face veneers. The prepared adhesive may be applied to both sides of the core or to the inner surface of each face veneer or as directed by the manufacturer of the resin, but care shall be taken in all cases to ensure that the adhesive is uniformly spread and the surfaces completely coated. The veneers shall then be assembled and loaded onto a flat platen press within the time specified in the manufacturer's instructions. The pressing conditions shall be as recommended by the resin manufacturer. Film glues shall be employed by simple inter-leaving and in accordance with the manufacturer's instructions.

A-4 CONDITIONING OF TEST BOARDS

Immediately after removal from the press, the boards shall be given a special treatment if stipulated by the manufacturer. The boards shall then be exposed at prevailing laboratory atmospheric conditions in a manner to ensure a free circulation of air around them for six to nine days, or for such time as the manufacturer may direct.

A-5 PREPARATION OF TEST PIECES

After conditioning of the test boards, six test specimens of size 125 mm × 125 mm having full thickness of the board shall be prepared from two boards made as above taking three test specimens from each board.

ANNEX B
(*Clause* 7.4)

DETERMINATION OF *p*H (HYDROGEN ION CONCENTRATION) VALUE OF LIQUID OR POWDERED RESIN ADHESIVES

B-1 DETAILS

At least 100 g of the adhesive shall be prepared according to the resin manufacturer's instructions. If water is to be used in the mixing, only distilled water shall be used. The adhesive shall be stirred thoroughly. After stirring, about 20 ml of the mixed adhesive shall be spread in a thin, even coat of 0.5 mm on a sheet of clean glass to cover an area approximately 150 mm × 250 mm. The adhesive shall be cured at the temperature and the length of time recommended for gluing by the manufacturer, after which the cured film shall be peeled from the glass and ground in a clean mill or mortar to a fineness so as to pass 450 micron IS sieve. Immediately, after grinding, 2.0 g of the ground particles, accurately weighed, shall be placed in a clean vial or small heat-resisting glass flask and 10 ml of freshly boiled, cooled distilled water shall be added and thoroughly stirred. The glass container shall be kept stoppered at all the times except when *p*H determinations are being made. The mixture shall be allowed to stand for 72 h at room temperature after which time the mixture shall be stirred and the *p*H value determined by means of a suitable *p*H meter. The determination of *p*H value shall be repeated at intervals of 24 h until the difference between the consecutive readings is not more than 0.05 *p*H units. The last reading taken shall be regarded as the equilibrium film *p*H value for the adhesive.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act,* 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

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'.

This Indian Standard has been developed from Doc : No. CED 20 (7335).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002
Telephones : 2323 01 31, 2323 33 75, 2323 94 02

Telegrams : Manaksanstha
(Common to all offices)

Regional Offices :		Telephone
Central	: Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110 002	2323 76 17 2323 38 41
Eastern	: 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi KOLKATA 700 054	2337 84 99, 2337 85 61 2337 86 26, 2337 91 20
Northern	: SCO 335-336, Sector 34-A, CHANDIGARH 160 022	260 38 43 260 92 85
Southern	: C.I.T. Campus, IV Cross Road, CHENNAI 600 113	2254 12 16, 2254 14 42 2254 25 19, 2254 23 15
Western	: Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400 093	2832 92 95, 2832 78 58 2832 78 91, 2832 78 92

Branches : AHMEDABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. LUCKNOW. NAGPUR. NALAGARH. PATNA. PUNE. RAJKOT. THIRUVANANTHAPURAM. VISAKHAPATNAM.

Printed at Prabhat Offset Press, New Delhi-2