भारतीय मानक ब्यूरो

(उपभोक्ता मामले, खाद्य एवं सार्वजनिक वितरण मंत्रालय, भारत सरकार)

BUREAU OF INDIAN STANDARDS

(Ministry of Consumer Affairs, Food & Public Distribution, Govt. of India)

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व्यापक परिचालन मसौदा

हमारा संदर्भ : सीईडी 20/टी-05 **09 जुलाई 2024**

तकनीकी समिति : लकड़ी और अन्य लिग्नोसेल्युलोसिक उत्पाद अनुभागीय समिति , सीईडी 20

प्राप्तकर्ता :

1. **सिविल अभियांत्रिकी विभाग परिषद, सीईडीसी के सभी सदस्य**
2. **लकड़ी और अन्य लिग्नोसेल्युलोसिक उत्पाद अनुभागीय समिति , सीईडी 20 के सभी सदस्य**
3. **रुचि रखने वाले अन्य निकाय।**

महोदय/महोदया,

निम्नलिखित मानक का मसौदा संलग्न है:

प्रलेख संख्या	शीर्षक
सीईडी 20(26115)WC	**प्लाईवुड के लिए सिंथेटिक रेज़िन चिपकने वाले (फेनोलिक, एमिनोप्लास्टिक और जैव सामग्री आधारित) – विशिष्टता** *(आई एस 848 का तीसरा पुनरीक्षण)* *(आई सी ए संख्या : 79.060.10; 83.180)*

कृपया इस मसौदे का अवलोकन करें और अपनी सम्मतियाँ यह बताते हुए भेजे कि यह मसौदा प्रकाशित हो तो इन पर अमल करने में आपको व्यवसाय अथवा कारोबार में क्या कठिनाइयां आ सकती हैं।

सम्मतियाँ भेजने की अंतिम तिथि: 09 सितम्बर 2024

सम्मति यदि कोई हो तो कृपया अधोहस्ताक्षरी को ई-मेल द्वारा ced20@bis.gov.in पर या उपरलिखित पते पर, संलग्न फोर्मेट में भेजें। सम्मतियाँ बीआईएस ई-गवर्नेंस पोर्टल, www.manakonline.in के माध्यम से ऑनलाइन भी भेजी जा सकती हैं।

यदि कोई सम्मति प्राप्त नहीं होती है अथवा सम्मति में केवल भाषा संबंधी त्रुटि हुई तो उपरोक्त प्रालेख को यथावत अंतिम रूप दे दिया जाएगा। यदि सम्मति तकनीकी प्रकृति की हुई तो विषय समिति के अध्यक्ष के परामर्श से अथवा उनकी इच्छा पर आगे की कार्यवाही के लिए विषय समिति को भेजे जाने के बाद प्रालेख को अंतिम रूप दे दिया जाएगा।

यह प्रालेख भारतीय मानक ब्यूरो की वेबसाइट www.bis.gov.in पर भी उपलब्ध हैं।

धन्यवाद।

भवदीय

ह/-

द्वैपायन भद्र

वैज्ञानिक ई एवं प्रमुख

सिविल अभियांत्रिकी विभाग

संलग्न: उपरलिखित

भारतीय मानक ब्यूरो
(उपभोक्ता मामले, खाद्य एवं सार्वजनिक वितरण मंत्रालय, भारत सरकार)
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WIDE CIRCULATION DRAFT

Our Reference: CED 20/T-05 **09 July 2024**

TECHNICAL COMMITTEE: WOOD AND OTHER LIGNOCELLULOSIC PRODUCTS SECTIONAL COMMITTEE, CED 20

ADDRESSED TO:

1. All Members of Civil Engineering Division Council, CEDC
2. All Members of Wood And Other Lignocellulosic Products Sectional Committee, CED 20 and its Subcommittees
3. All others interested.

Dear Sir/Madam,

Please find enclosed the following draft:

Doc No.	Title
CED 20(26115)WC	**SYNTHETIC RESIN ADHESIVES FOR PLYWOOD (PHENOLIC AMINOPLASTIC AND BIO MATERIALS BASED) — SPECIFICATION** (*Third Revision of IS 848*) (*ICS 79.060.10; 83.180*)

Kindly examine the attached draft and forward your views stating any difficulties which you are likely to experience in your business or profession, if this is finally adopted as National Standard.

Last Date for comments: 09 September 2024

Comments if any, may please be made in the enclosed format and emailed at ced20@bis.gov.in or sent at the above address. Additionally, comments may be sent online through the BIS e-governance portal, www.manakonline.in.

In case no comments are received or comments received are of editorial nature, kindly permit us to presume your approval for the above document as finalized. However, in case comments, technical in nature are received, then it may be finalized either in consultation with the Chairman, Sectional Committee or referred to the Sectional Committee for further necessary action if so desired by the Chairman, Sectional Committee.

The document is also hosted on BIS website www.bis.gov.in.

Thanking you,

Yours faithfully,
Sd/-
Dwaipayan Bhadra
Scientist 'E' & Head
Civil Engineering Department

Encl: As above

FORMAT FOR SENDING COMMENTS ON THE DOCUMENT

[Please use A4 size sheet of paper only and type within fields indicated. Comments on each clause/sub-clause/ table/figure, etc, be stated on a fresh row. Information/comments should include reasons for comments, technical references and suggestions for modified wordings of the clause. Comments through e-mail to **ced20@bis.gov.in** shall be appreciated.]

Doc. No.: CED 20(26115)WC

BIS Letter Ref: CED 20/T-05

Title: SYNTHETIC RESIN ADHESIVES FOR PLYWOOD (PHENOLIC, AMINOPLASTIC AND BIO MATERIALS BASED) — SPECIFICATION (*Third Revision of IS 848*) (*ICS 79.060.10; 83.180*)

Last date of comments: 09 September 2024

Name of the Commentator/ Organization: _____

Sl No.	Clause/ Para/ Table/ Figure No. commented	Type of Comment (General/ Technical/ Editorial)	Comments/ Modified Wordings	Justification of Proposed Change

NOTE- Kindly insert more rows as necessary for each clause/table, etc

BUREAU OF INDIAN STANDARDS

DRAFT FOR COMMENTS ONLY

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Draft Indian Standard

SYNTHETIC RESIN ADHESIVES FOR PLYWOOD (PHENOLIC, AMINOPLASTIC AND BIO MATERIALS BASED) — SPECIFICATION

(Third Revision of IS 848)
(ICS 79.060.10; 83.180)

Wood and Other Lignocellulosic Products Sectional Committee, CED 20

Last Date of comments – 09 September, 2024

FOREWORD

(*Formal clauses will be added later*)

Adhesives is one of the most important raw materials used in the plywood industry, 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 and subsequently revised in 1974 and 2006. In this revision, the bio adhesives and the additives required to minimize the formaldehyde emissions have been incorporated based on the studies carried out at Institute of Wood Science and Technology and found to be suitable for plywood made with forest grown as well as plantation timber, while meeting the end use requirements. There is no limitation on ply construction and the thickness of veneer to be used for making the specimens.

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: 2022 ‘Rules for rounding off numerical values (second revision)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Draft Indian Standard

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

(Third Revision of IS 848)
(ICS 79.060.10; 83.180)

1 SCOPE

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

2 REFERENCES

The standards listed below column 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 paroles 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***
IS 707 :1976	Glossary of terms applicable to timber technology and utilization (*second revision*)
IS 1734 (Part1): 1983	Methods of test tor plywood Determination of density and moisture content (*second revision*)
IS 1734 (Part 5): 1983	Test for adhesion of plies (s*econd revision*)

3 TERMINOLOGY

For the purpose of this standard, the definitions given in lS 707 and the following shall apply.

3.1 Assembly Time

3.1.1 *Open Assembly Time* – The time elapsing between the application of the adhesive and assembly of joint components.

3.1.2 *Closed Assembly Time* – The time elapsing between assembly of the joint components and the application of pressure and temperature

3.2 Adhesive

3.2.1 *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 certainty.

3.2.2 *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.

3.3 Extender – A substance added to the adhesive either to reduce the cost of gluing or to reduce penetration through the veneers or both.

3.4 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.
'

3.5 Fortifier – A substance used primarily to improve the water resistance and durability of hot setting resin such as melamine in Urea formaldehyde resin.

3.6 Scavengers – A substance incorporated to absorb or minimize the free formaldehyde in the Urea formaldehyde resin such as melamine, lignin etc.

3.7 Hardener (Catalyst) – A material added to resin to bring about or promote the curing of resin.

3.8 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.

3.9 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.

3.10 Spread of Adhesive – The area in m^2 of the surface of substrate covered by 1 kg of solid/liquid resin.

3.11 Synthetic Resin – Amorphous organic or bio 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.

3.12 Phenolic Synthetic Resin – A phenolic synthetic resin is derived from the reaction of phenol with an aldehyde.

3.13 Aminoplastic Synthetic Resin – An aminoplastic synthetic resin is derived from the reaction of urea, thio- urea, melamine or allied compounds or mixtures of these compounds with formaldehyde.

3.14 Bio Materials Based Synthetic Resin – A synthetic resin derived from the reaction of bio materials such as soya, lignin, cardanol and tannin with or without the presence of

phenol and aldehyde.

3.15 Synthetic Resin Adhesive – A composition, substantially consisting of a synthetic resin of either the phenolic or aminoplastic or bio materials based 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.

b) Film/Powder Resin Adhesives – The adhesives shall comply with the requirements specified in **7**, after these have been stored in accordance with the manufacturers written 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 for conformity	Recommended Use
(1)	(2)	(3)	(4)	(5)
i)	**BWP GRADE (Boiling Water Proof)**	Six cycles: Each cycle consisting of 8 h boiling in water and thereafter drying at 65 $\pm$ 2 ^{0}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	Adhesives of the type have been proved to make joints highly resistant to weather, cold and boiling water, steam and dry heat

			bond and not less than 50% for pass standard. For less than 50% wood failure, the specimen shall be considered as failed	
ii)	**BWR GRADE (Boiling Water Resistant)**	Three cycles : Each cycle consisting of 8 h boiling in water and thereafter drying at 65 $\pm$ 2 ^{0}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 GRADE (Moisture Resistant)**	Three cycles: Each cycle consisting of 3 h at 60 $\pm$ 2^0 C in water and thereafter drying at 65 $\pm$ 2 ^{0}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

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, scavenger 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, scavenger, 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) Clearing 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 andalso 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 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 (pH)

The pH of the adhesive, when set, shall be not less than 2.0. The pH 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). ln the event or 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'

9.2 BIS Certification Marking

The container may also be marked with the Standard Mark.

9.2.1 The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the Bureau of Indian Standards Act, 2016 and the Rules and Regulations framed there under, and the products may be marked with the Standard Mark.

ANNEX A
(*Clause* 7.2)
METHOD OF PREPARATION OF TEST PIECES

A-1 VENEERS FOR TEST PIECES – Veneers rotary cut or sliced from species actually used by the manufacturer or be supplied by the resin manufacturer along with the resin sample. Any ply construction with suitable face and core veneer thickness with the growth rings approximately parallel to the surface 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 (if required) . 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 and 12 ± 2.0 percent for a 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 any no of veneers as supplied or recommended by the resin manufacturer. Care should be taken while assembling the veneers to balance the construction from the central plane layer. The size of the board shall be such that all the pieces required for testing can be taken out of the same board leaving a margin of 25 mm on 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 x 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 pH (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 approx. 0.5 mm on a sheet of clean glass to cover an area approximately 150 mm x 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 10ml 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 pH 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 pH value determined by means of a suitable pH meter. The determination of pH value shall be repeated at intervals of 24 h until the difference between the consecutive readings is not more than 0.05 pH units. The last reading taken shall be regarded as the equilibrium film pH value for the adhesive.