

Indian Standard
SPECIFICATION FOR
POLYVINYL ACETATE DISPERSION
BASED ADHESIVES FOR WOOD

(*First Revision*)

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INDIAN STANDARDS INSTITUTION
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NEW DELHI 110002

Indian Standard

SPECIFICATION FOR POLYVINYL ACETATE DISPERSION BASED ADHESIVES FOR WOOD

(First Revision)

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Indian Standard
SPECIFICATION FOR
POLYVINYL ACETATE DISPERSION
BASED ADHESIVES FOR WOOD

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 31 January 1979, after the draft finalized by the Wood Products Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Polyvinyl acetate and other polyvinyl acetate dispersion-based adhesives have come into considerable use in the industries based on timber, plywood and furniture. Such adhesives are coming to be widely used for joinery work, lipping work, core assembly of block boards, veneering of furniture, etc. There is insufficient information on the qualitative and strength requirements of these adhesives. This standard has, therefore, been prepared with a view to enable comparison of the performance of different types of adhesives of this category and with a view to assist the manufacturers and the users to specify certain basic requirements and characteristics.

0.3 The most commonly used polyvinyl adhesive for wood is polyvinyl acetate dispersions though other polyvinyl compounds modified and mixed adhesives are coming into vogue. This standard covers the adhesives based on polyvinyl polymers of wide range. When more information as to the composition of the various adhesives that prove satisfactory is available, individual standards based on the types and functions of the adhesive compounds will be formulated.

0.4 This standard was first published in 1968 and this is the first revision of the standard. In this revision, modifications have been made in the provisions relating to solid content, ash content, early strength development, etc. Viscosity requirements since covered in the earlier version have been omitted.

0.5 The preparation of the adhesive and its correct use are other important aspects. Therefore, for the information of the users, the manufacturer

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shall furnish all the relevant information for the use of these adhesives in the manner indicated in Appendix A.

0.6 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.

0.7 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*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers thermoplastic synthetic emulsion adhesives based on polyvinyl acetate dispersions for use as a general purpose adhesive in the wood, veneer and furniture industries.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 707-1976†, IS : 848-1974‡ and IS : 851-1978§ shall apply.

3. MATERIAL

3.1 The polyvinyl adhesives covered in this standard shall be based on polyvinyl acetate dispersions.

4. KEEPING QUALITIES

4.1 The adhesives shall comply with the requirements specified in 6 after the same has been stored in closed containers according to the manufacturer's instructions and up to the date recommended by the manufacturer.

5. SAMPLING

5.1 The sampling of polyvinyl acetate dispersion-based adhesives is very important. Most of the polyvinyl acetate dispersions tend to settle

*Rules for rounding off numerical values (*revised*).

†Glossary of terms applicable to timber technology and utilization (*second revision*).

‡Specification for synthetic resin adhesives for plywood (phenolic and aminoplastic (*first revision*)).

§Specification for synthetic resin adhesives for construction work in wood (*first revision*).

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to the bottom of the container and this separation increases with particle size. Before sampling, bulk material shall be stirred thoroughly to make it homogeneous.

5.1.1 Sampling shall be done as given in Appendix B.

5.1.2 Each sample shall comply with the requirements laid down in 6.

6. TEST REQUIREMENTS

6.0 The tests shall be carried out on each of the samples and the sample shall conform to the test requirements as given in 6.1 to 6.10.

6.1 Solid Content — The solid resin content of the adhesive shall not be less than 40 percent when tested in accordance with B-3.

6.2 Ash Content — The ash content of the adhesive shall not be more than 2 percent when tested in accordance with B-4.

6.3 pH Value — The pH value of the adhesive, when tested in accordance with B-5 shall be not less than 5 and shall be not more than 7.

6.4 Bulk Density — The mass per litre of the adhesive when tested in accordance with B-6 shall be not less than 0.9 kg.

6.5 Glue Joint Strength

6.5.1 Dry Strength — The average failing load of a set of ten test pieces prepared by the method specified in Appendix F of IS : 851-1978* conditioned approximately as specified in Appendix D of IS : 851-1978* and when tested at $27 \pm 2^\circ\text{C}$ and 65 percent relative humidity by method described in Appendix E of IS : 851-1978* shall not be less than 300 kg. The wood failure at the top joint shall not be less than 85 percent. For preparation of test pieces as required under Appendix F of IS : 851-1978* veneers of *Canarium* spp. (preferably *Canarium strictum*) with density ranging from 0.5 to 0.9 shall be taken.

6.5.2 Resistance to Micro-Organism, Mycological Tests — The purchaser may specify any resistance to micro-organism of the adhesive. A general guide for testing the resistance to micro-organism is given in Appendix H of IS : 851-1978*.

6.6 Early Strength Development — The average failing load of a set of six test pieces prepared by the method specified in Appendix F of

*Specification for synthetic resin adhesives for construction work in wood (first revision).

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IS : 851-1978* using wood test slips and glue at $27 \pm 2^{\circ}\text{C}$ and 65 percent relative humidity kept under pressure for two hours at $27 \pm 2^{\circ}\text{C}$ and 65 percent relative humidity as specified in Appendix D of IS : 851-1978* and tested immediately after release from clamps by the methods described in Appendix E of IS : 851-1978* shall not be less than 60 percent of the dry strength value of the product as determined under 6.5.1. For preparation of test pieces as required under Appendix F of IS : 851-1978* veneers of *Canarium* spp. (preferably *Canarium strictum*) with density ranging from 0.5 to 0.9 shall be taken.

6.7 Stability — The adhesive shall meet the requirements for solid content, pH, mass per litre and adhesive strength at all the time within the storage period of the adhesive as recommended by the manufacturer and at the specified upper limit of temperature. The manufacturer shall certify that the product has been tested and meets this requirement of stability.

6.8 Working Consistency — The adhesive shall be capable of being adjusted for its consistency by the addition of a small amount of water according to the instructions of the manufacturer for brush or roller application.

6.9 Temperature of Set — The average failing load of a set of six test pieces prepared by the method specified in Appendix F of IS : 851-1978* using wood test slips and glue kept under pressure, at not more than 90°C and released from clamps and freely exposed to the air at $27 \pm 2^{\circ}\text{C}$ for four days shall not be less than the value specified under 6.5.1. (The temperature at the time of gluing and pressing shall be controlled with an accuracy of $\pm 1^{\circ}\text{C}$.)

6.10 Resistance to Sustained Load — The mean failing time for a group of ten test specimens shall be determined in accordance with Appendix C. The average failing time for a sustained load of 25 kgf shall not be less than 7 days.

7. MARKING

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

- a) Manufacturer's name or trade-mark, if any;
- b) Description of material;
- c) Manufacturer's reference number;
- d) Batch number;

*Specification for synthetic resin adhesives for construction work in wood (*first revision*).

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- e) Date of manufacture and the last date recommended by the manufacturer (*see* 4.1);
- f) Reference to the manufacturer's instructions for use; and
- g) The words "To be Stored in a Cool Dry Place Until (a date to be specified by the manufacturer) ".

7.1.1 Each container may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

APPENDIX A

(*Clause 0.5*)

INFORMATION TO BE FURNISHED BY THE MANUFACTURER REGARDING THE USE OF ADHESIVES

A-1. INSTRUCTIONS REGARDING USE

A-1.1 The manufacturer shall furnish dated and written instructions detailing the manner in which the adhesive or recommended/combination of adhesive with any modifier or extender that will be necessary is to be used. These instructions shall cover in particular the following:

- a) Storage of adhesive in original sealed containers;
- b) Preparation for use of the adhesive, method of mixing or dilution, where necessary, type of mixtures and apparatus for use of adhesive and other necessary precautions for handling of the adhesive;
- c) Recommended control necessary during thinning, if wanted; and
- d) Complete recommended application procedure including surface cleaning procedure, the recommended film thickness range, spread desired number of coats, method of cleaning the equipment and recommended method of application in particular the following:

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- i) Range of moisture content of wood;
- ii) Preparation of wood surfaces;
- iii) Methods of application, such as single or double spread;
- iv) Normal amounts of spread for single glue line;
- v) Maximum and minimum open and closed assembly times;
- vi) Recommended range of pressures in kg/cm²;
- vii) Post-treatment of finished product;
- viii) Cleaning of containers and test;
- ix) Type of other materials that can be glued to wood or to each other and special precautions that may be necessary of temperature to which the adhesive in any glue line may be subjected and the minimum and maximum time for which pressure shall be maintained on unstressed joints at temperatures within the range;
- x) Setting time and setting conditions including recommended range;
- xi) Method of correcting viscosity of scum formation; and
- xii) Safety precautions for the workmen; if any.

APPENDIX B

(*Clauses 5.1.1, 6.1, 6.2, 6.3 and 6.4*)

METHODS OF SAMPLING AND TESTS FOR ADHESIVES

B-1. INSPECTION LOT

B-1.1 For the purpose of sampling a lot shall consist of material from the same batch or blending operation subjected to the same processing operations and conditions.

B-2. SAMPLING FOR INSPECTION

B-2.1 A representative sample shall be drawn and tested (*see 5*). In case of bulk containers, the size of the sample shall not be less than 0.5 litre from each lot. Sample shall be sent to the testing laboratory in fully sealed containers.

B-2.2 In case of small size containers these shall be first sampled according to the sampling scheme given below:

<i>Number of Containers</i>	<i>Number of Samples</i>
Up to 25	2
For every 25 extra	1 extra

B-2.3 The containers taken out as samples shall be opened and tested individually. The contents of the container shall be mixed by stirring before testing (*see also 5.1*). The sample shall be tested as quickly as possible after opening the container.

B-2.4 If the contents of the container are too small to carry out all the tests it would be permissible to bulk the contents of more than one container but mention of this shall be made in the test report.

B-3. TOTAL SOLIDS

B-3.1 One to two grams of sample shall be taken out of thoroughly mixed contents of a container and shall be accurately and quickly weighed in an open shallow weighing dish or watch-glass. This shall then be dried in a drying oven at a temperature of $105 \pm 2^\circ\text{C}$ for approximately 3 hours to a constant mass. The sample shall then be cooled in a desiccator and weighed. Total solid content shall then be calculated as follows:

$$\frac{\text{Total final mass of the dried sample} \times 100}{\text{Initial mass of the sample}} = \text{percentage solid}$$

B-4. ASH CONTENT

B-4.1 About 2 to 3 g of adhesive shall be accurately weighed in a platinum or silica crucible and incinerated and the percentage of ash content calculated. The ash content so determined will give an indication of any inorganic impurities added.

B-5. pH VALUE

B-5.1 The method for determining the pH value shall be by the electro-metric method given in 8 of IS: 3025-1964*.

B-6. MASS PER LITRE

B-6.1 The method of determining specific gravity and comparison with water at standard temperature conditions shall be as given in B-2.29 of IS: 1839-1961†.

*Methods of sampling and test (physical and chemical) for water used in industry.

†Specification for toluene, reagent grade.

APPENDIX C

(Clause 6.10)

DETERMINATION OF RESISTANCE TO SUSTAINED LOAD

C-1. SELECTION OF TEST SLIPS

C-1.1 Test slips, 3.0 ± 0.2 mm thick, shall be prepared from *Canarium* spp. (preferably *Canarium strictum*) of density ranging between 0.5 to 0.9. Both faces of the slip shall be planed properly.

C-1.2 The slips shall be flat, straight grained and free from all defects such as splits, knots, whirls, etc.

C-2. MOISTURE CONTENT

C-2.1 The moisture content of the slips at the time of gluing when determined according to C-2.1.1 shall be 12 ± 2.0 percent.

C-2.1.1 Representative samples shall be accurately weighed and then dried in an oven maintained at a temperature of $103 \pm 2^\circ\text{C}$ until approximately constant mass is obtained. 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 the subsequent weighings:

$$\text{Percentage of moisture} = \frac{M_1 - M_0}{M_0} \times 100$$

where

M_1 = initial mass of sample in g, and

M_0 = oven-dry mass of sample in g.

C-3. CONSTRUCTION OF TEST SPECIMENS

C-3.1 Test Slips — Each test specimen 115 ± 0.25 mm long and 25 ± 0.3 mm wide shall be prepared from three slips of *Canarium* spp. (preferably *Canarium strictum*), selected as described under C-1, joined together with the adhesive under test so as to produce a 12.5 ± 0.3 mm overlap joint as shown in Fig. 1.

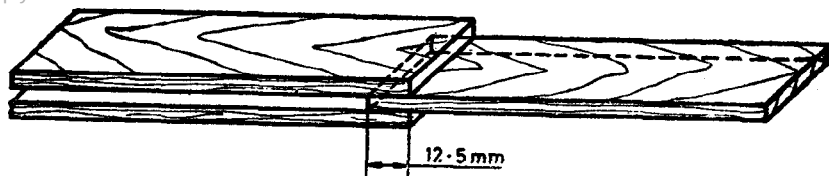


FIG. 1 TEST SPECIMEN WITH A DOUBLE LAP JOINT

C-4. PREPARATION OF THE ADHESIVE

C-4.1 The adhesive shall be prepared and used in accordance with the instructions provided by the manufacturer (see 6).

C-5. PREPARATION OF TEST SPECIMENS

C-5.1 The test specimens shall be prepared under ordinary room conditions, except where otherwise directed by the manufacturer. The adhesive shall be applied uniformly to one of the two faces forming a joint unless otherwise prescribed by the manufacturer. The slips forming a joint shall be placed in contact without rubbing, immediately the adhesive is applied unless after such period as may be prescribed by the manufacturer. When the test specimens have been prepared, they shall be placed immediately in a suitable clamp. Sufficient pressure shall be applied to ensure a good contact. The test specimens shall be allowed to remain in their clamps, in ordinary room conditions for not less than 8 hours unless otherwise instructed by the manufacturer.

C-6. CONDITIONING OF THE TEST SPECIMENS

C-6.1 The test specimens shall be released from their clamps and then be placed in a conditioning atmosphere of $25 \pm 1^\circ\text{C}$ temperature and 65 ± 2 percent relative humidity for not less than 4 days. The test pieces shall be left in the conditioning atmosphere until ready for test.

C-7. PROCEDURE

C-7.1 The test shall be carried out by the use of special jig as shown in Fig. 2. The test specimen prepared and conditioned as described above, shall be supported laterally by means of small packing pieces, between the frames of the jig as shown in Fig. 2. If necessary a small gauge shall be used to locate the joint correctly. The jig and test specimen shall be placed in the conditioning atmosphere.

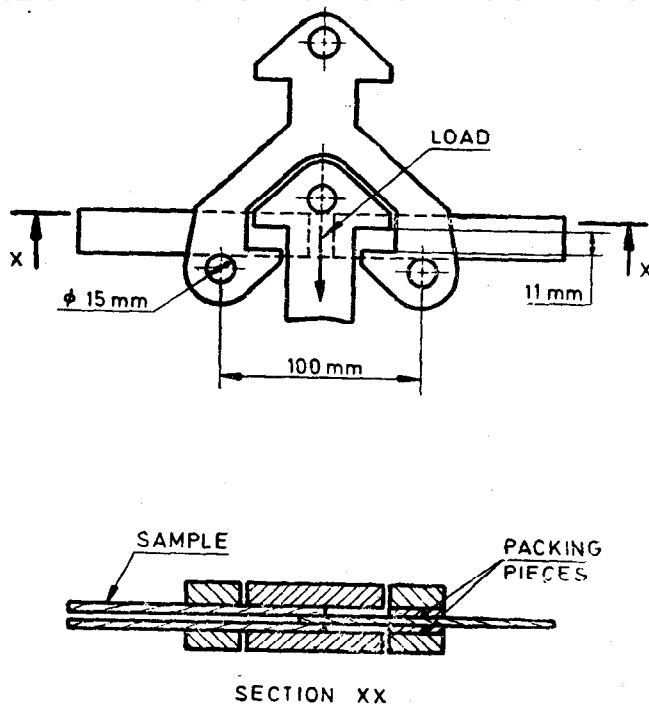


FIG. 2 JIG FOR LOADING A TEST SPECIMEN FOR STUDYING THE SUSTAINED LOAD BEHAVIOUR OF PVAC ADHESIVE JOINTS

C-7.2 The top frame shall be suspended from a suitable support and the load shall be applied to the bottom frame. The time taken for each joint to fail in creep under the action of the constant load shall be recorded with the help of automatic recording devices.

C-8. REPORTING OF TEST RESULTS

C-8.1 The mean failing time for the group of ten test specimens shall be reported. The average failure time for a sustained load of 25 kg shall not be less than 7 days (168 hours).

NOTE — In the absence of any automatic recording devices for recording time, no failure shall be observed before seven days for a load of 25 kg.



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TO

IS:4835-1979 SPECIFICATION FOR POLYVINYL ACETATE
DISPERSION BASED ADHESIVES FOR WOOD

(First Revision)

(Page 5, clause 6.5.2) - Delete.

(BDC 20)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 2 JULY 1992
TO
IS 4835 : 1979 SPECIFICATION FOR POLYVINYL
ACETATE DISPERSION BASED ADHESIVES FOR
WOOD

(*First Revision*)

(*Pages 5 and 6, clauses 6.5.1 and 6.6, last sentence*) — Substitute the following for the existing last sentence :

‘For preparation of test pieces as required under Appendix F of IS 851 : 1978*, veneers of *canarium* spp. or *vateria indica* or *shorea assamica* shall be taken.’

(*Page 10, clause C-1.1*) — Substitute the following for the existing clause :

‘C-1.1 Test slips, 3.0 ± 0.2 mm thick, shall be prepared from *canarium* spp. or *vateria indica* or *shorea assamica*. Both faces of the slips shall be planed properly’

(*Page 10, clause C-3.1*) — Substitute the following for the existing clause:

‘Each test specimen 115 ± 0.25 mm long and 25 ± 0.3 mm wide shall be prepared from three slips of *canarium* spp. or *vateria indica* or *shorea assamica*, selected as described under C-1, joined together with the adhesives under test so as to produce a 12.5 ± 0.3 mm overlap joint as shown in Fig. 1.’

(CED 20)