SRI LANKA STANDARD 869 : 1989

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SPECIFICATION FOR

POLYVINYL ACETATE (PVA) BASED ADHESIVES

SRI LANKA STANDARDS INSTITUTION

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SLS 869:1989

Gr.6

SRI LANKA STANDARDS INSTITUTION
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Colombo 3,
Sri Lanka.

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SRI LANKA STANDARDS INSTITUTION

Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

This standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD

SPECIFICATION FOR POLYVINYL ACETATE (PVA) BASED ADHESIVES

FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Sri Lanka Standards Institution on 1989-12-14, after the draft, finalized by the Drafting Committee on Paints and Varnishes, had been approved by the Chemicals Divisional Committee.

Provision has been made in this specification for working consistency of the product and packaging to be as agreed to between the purchaser and the supplier.

All standard values given in this specification are in SI units.

For the purpose of deciding whether a particular requirement of this specification is complied with, the final value, observed or calculated, expressing the result of a test or an analysis shall be rounded off in accordance with CS 102. The number of significant places retained in the rounded off value shall be the same as that of the specified value in this specification.

In the preparation of this standard, assistance derived from the relevant publications of the British Standards Institution, the Bureau of Indian Standards and the American Society for Testing and Materials is gratefully acknowledged.

1 SCOPE

This specification prescribes the requirements, methods of sampling and test, for thermoplastic synthetic emulsion adhesives based on polyvinyl acetate (PVA) dispersions for use as a general purpose adhesive and bonding agent.

2 REFERENCES

CS 102 Presentation of numerical values.
SLS 428 Random sampling methods.
SLS 489 Glossary of terms for paints.
SLS 535 Tests for paints
Part 1 : Tests on liquid paints (excluding chemicals tests).
SLS 538 Synthetic emulsion resin binders for paints.
SLS 660 General purpose adhesives.

3 DEFINITIONS

For the purpose of this specification the following definitions shall apply:

3.1 **adhesive** : A substance capable of holding material together by surface attachment.

3.2 **thermoplastic** : Having the property of being softened by heating and hardened by cooling.

3.3 **bond strength** : The unit load applied to tension, compression, flexure, peel, impact, cleavage or shear, required to break an adhesive assembly with failure occuring in or near the plane or the bond.

4 REQUIREMENTS

4.1 Appearance

The adhesive shall be a homogeneous, white liquid.

4.2 Consistency

The adhesive shall be uniform, smooth and free from coarse particles. It shall be of a consistency for brushing or rolling application and shall have a viscosity within the range specified by the supplier. Where a different working consistency is desired, the adhesive shall be capable of being adjusted for its viscosity by the addition of a small amount of water according to the instructions of the manufacturer.

4.3 Storage stability

The adhesive shall comply with the requirements specified in 4.4 and Table 1 after storage in the original closed containers according to the manufacturer's instructions.

4.4 Resistance to mould growth

When tested and examined as prescribed in SLS 660 the adhesive shall show no evidence of growth of mould, separation of layers or sedimentation.

4.5 Other requirements

The adhesive shall also comply with the requirements given in Table 1 when tested according to the relevant methods given in Column 4 of the table.

TABLE 1 - Requirements for PVA based adhesives

Sl.No. (1)	Characteristic (2)	Requirement (3)	Method of test (4)
i)	Solid content, per cent by mass, min.	45	SLS 538
ii)	pH value	4 to 7	SLS 538
iii)	Bulk density, kg/l, min.	1.0	SLS 535:Part 1
iv)	Free monomer content, per cent by mass, max.	0.5	Appendix A
v)	Freedom from staining	Not darker than the standard	Appendix B
vi)	Stability at 37 °C	To satisfy the test	Appendix C
vii)	Breaking load, (Glue joint strength) N, min.	2 000	Appendix D
viii)	Resistance to sustained loading	To satisfy the test	Appendix E

5 PACKAGING AND MARKING

5.1 The adhesive shall be packed in suitable containers as agreed to between the purchaser and the supplier.

5.2 Each container shall be marked legibly and indelibly with the following;

a) Name of the product;
b) Name and address of the manufacturer and country of origin;
c) Registered, trade mark, if any;
d) Net mass, in grams;
e) Date of manufacture;
f) Batch or code number;
g) Approximate covering area ; and
h) Directions for storage and use.

NOTE

Attention is drawn to the certification facilities offered by the Sri Lanka Standards Institution. See the inside back cover of this specification.

6 SAMPLING

6.1 Lot

In any consignment all containers of the same size and belonging to one batch of manufacture or supply shall constitute a lot.

6.2 **Scale of sampling**

6.2.1 Samples shall be tested from each lot for ascertaining conformity of the lot to the requirements of this specification.

6.2.2 The number of containers to be selected from a lot shall be in accordance with Table 2.

TABLE 2 - Scale of sampling

Number of containers in the lot (1)	Number of containers to be selected (2)
Up to 100	10
101 to 500	12
501 to 1 500	14
1 501 to 3 500	16
3 501 and above	20

6.2.3 The containers shall be selected at random. In order to ensure randomness of selection, tables of random numbers as given in SLS 428 shall be used.

6.3 **Number of tests**

6.3.1 Each container selected as in 6.2.2 shall be inspected for packaging and marking requirements.

6.3.2 Each container selected as in 6.2.2 shall be examined for requirements given in 4.1 and 4.2.

6.3.3 The sample selected as in 6.2.2 shall be divided into two sub samples of equal size and approximately equal quantity of material shall be drawn from each of the containers of one sub sample thus obtained and mixed to form a composite sample of about 250 g. The composite sample thus obtained shall be tested for the requirements given in 4.4 and 4.5.

6.3.4 Approximately equal quantity of material shall be drawn from each of the containers of the remaining sub sample after they have been stored as in 4.3 and mixed to form a composite sample of about 250 g. The composite sample thus obtained shall be tested for the requirements given in 4.4 and 4.5.

7 METHODS OF TEST

The tests shall be carried out according to the methods prescribed in SLS 535 : Part 1, SLS 538 and Appendices A to E of this specification.

8 CRITERIA FOR CONFORMITY

A lot shall be declared as conforming to the requirements of this specification if the following conditions are satisfied:

8.1 Each container inspected as in 6.3.1 satisfies the relevant requirements.

8.2 Each container examined as in 6.3.2 satisfies the relevant requirements.

8.3 The test results on the composite sample when tested as in 6.3.3 satisfies the relevant requirements.

8.4 The test results on the composite sample when tested as in 6.3.4 satisfies the relevant requirements.

APPENDIX A
DETERMINATION OF FREE MONOMER CONTENT

A.1 REAGENTS

A.1.1 *Bromine in water, approximate concentration 0.025 mol/l*

Dissolve 60 g of potassium bromide in approximately 20 ml water and pour into a 2 litre graduated flask. Add 3.8 ml bromine (see Note) into the flask. Mix and make upto about 1 litre.

NOTE

The transfer of bromine must be carried out in fume cupboard.

A.1.2 *Sodium thiosulfate solution,* c ($Na_2S_2O_3$) = 0.1 mol/l.

A.1.3 *Aqueous starch indicator solution,* (0.5 per cent m/m).

A.1.4 *Potassium iodide,* (15 per cent m/m).

A.2 STANDARDIZATION OF BROMINE SOLUTION

Add 10 ml of 15 per cent potassium iodide reagent to 20 ml of the bromine solution, swirl and titrate the iodine with 0.1 mol/l sodium thiosulfate. Just before the disappearance of the yellow colour due to iodine, add 1 ml to 2 ml of starch indicator solution and continue the titration until the blue colour disappears.

NOTE

This standardization should be carried out prior to each determination as bromine solution deteriorates on standing.

A.3 PROCEDURE

Weigh to the nearest 0.01 g about 10 g of the material, into a 250-ml conical flask. Add 50 ml water and swirl to mix. Titrate with standard bromine solution to the first colour change.

A.4 CALCULATION

$$\text{Free vinyl acetate, per cent by mass} = \frac{V \times c \times 0.045 \times 100}{m}$$

where,

V is the volume, in ml, of bromine solution;
c is the concentration, in mol/l, of bromine solution; and
m is the mass, in g, of the test portion.

APPENDIX B
DETERMINATION OF FREEDOM FROM STAINING

B.1 REAGENTS

Only analytical grade reagents shall be used for analysis. Distilled water or water of equivalent purity shall be used.

B.1.1 *Ammonium ferric sulfate solution (Iron content = 25 mg/kg)*. Weigh out 0.216 g of ammonium ferric sulfate, dissolve in water, add 2 to 3 drops of concentrated nitric acid and dilute to 1000 ml with water.

B.1.2 *Tannic acid*, 5 per cent m/m solution in water, prepared on the day on which the tests are to be carried out.

B.2 PROCEDURE

Prepare test papers by soaking filter papers in the tannic acid solution and allowing to dry. It is essential that the test papers are prepared on the day on which the tests are to be carried out.

Place three separate drops of the ammonium ferric sulfate solution, well spaced, on the test paper so as to obtain three separate standard stains. By means of a glass rod, smear alongside each standard stain a drop of the adhesive to be tested. Compare the intensity of the stain produced by the adhesive with that of the adjacent standard stain under ordinary sunlight.

Report the stain produced by the adhesive as lighter or darker than the standard stain.

APPENDIX C
DETERMINATION OF STABILITY AT 37 °C

C.1 PROCEDURE

Take 25 ml of the material in a petri dish of 100-mm in diameter, cover the dish and keep it in an incubator maintained at 37 ± 1 °C for 14 days.

The material is considered to have passed the test if there is no fungus growth, separation of layers or sedimentation.

APPENDIX D
DETERMINATION OF BOND STRENGTH (DRY STRENGTH)

D.1 APPARATUS

Suitable tensile tester.

D.2 PREPARATION OF TEST PIECE

Test slips shall be prepared from Ginisapu or other suitable wood. Growth rings may be at any angle and both surfaces shall be planed. The slips shall be flat and free from any irregularity. The test slips shall be 115 mm long, 25 mm wide and 4 mm thick.

D.3 CONDITIONING OF THE TEST PIECE

Condition the test piece for 7 days at 30 ± 2 °C and 65 ± 2 per cent relative humidity.

D.4 PROCEDURE

Fix the test piece between the jaws of the tensile tester and pull at a constant predetermined crosshead speed of 10 mm/min till the sample breaks. Record the breaking load.

APPENDIX E
DETERMINATION OF RESISTANCE TO SUSTAINED LOADING

E.1 APPARATUS

E.1.1 *Durable jig*, made from 1/2 inch plywood, as shown in Figure 1.

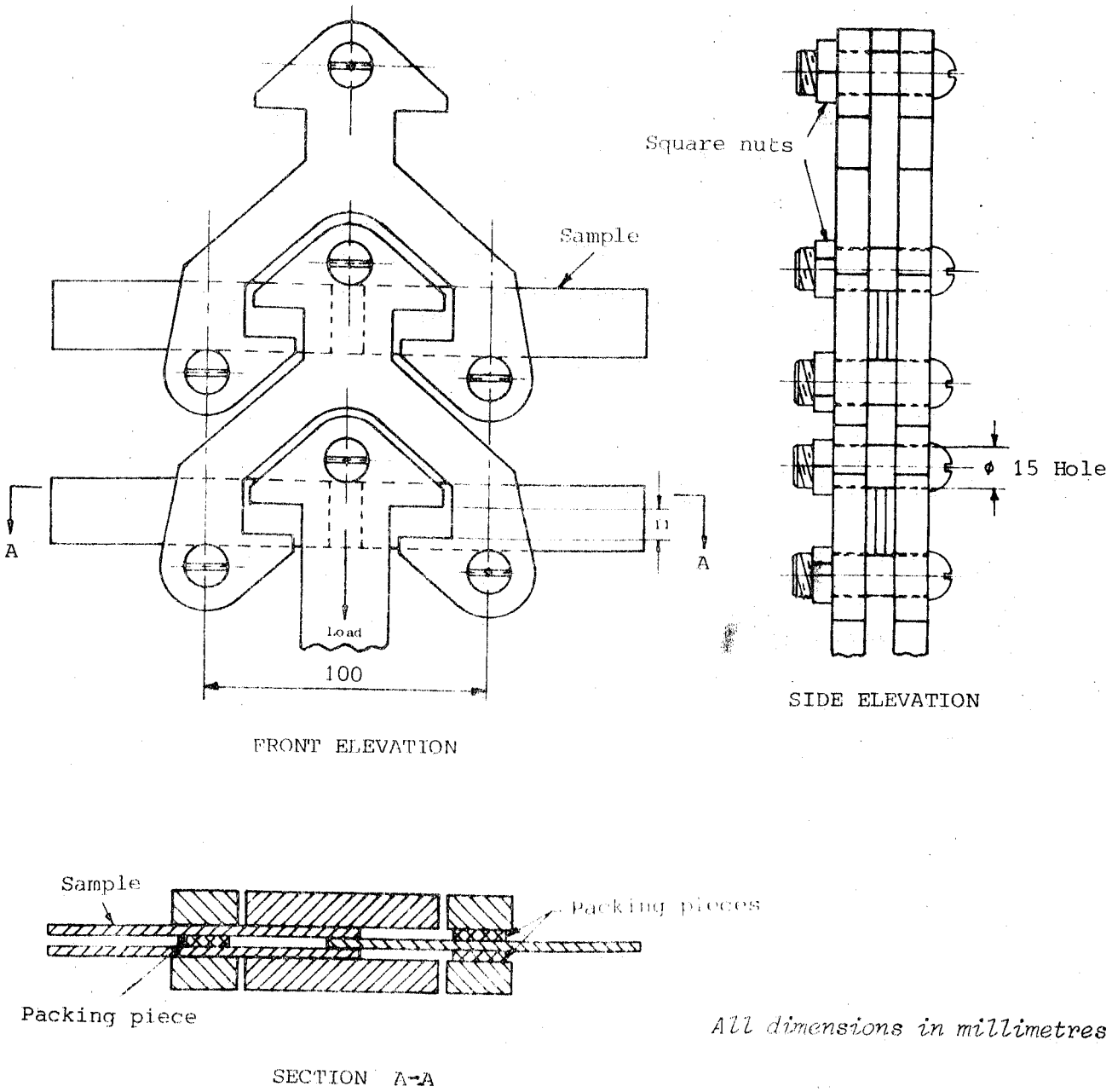

FIGURE 1 - Jig for assessing the resistance to a sustained load.

E.2 PROCEDURE

Support the test piece laterally (conditioned in accordance with D.3 of Appendix D) by means of small packing pieces, between the frames of the jigs, as shown in Figure 1. Suspend the top frame from a suitable support, apply a load of 25 kg to the bottom frame and note the time taken before each joint falls.

The material is considered to have passed the test if the adhesive resists a load of 25 kg for not less than 7 days.

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SRI LANKA STANDARDS INSTITUTION

The Sri Lanka Standards Institution (SLSI) is the National Standards Organization of Sri Lanka established under the Sri Lanka Standards Institution Act No. 6 of 1984 which repealed and replaced the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Science & Technology.

The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

The Institution is financed by Government grants, and by the income from the sale of its publications and other services offered for Industry and Business Sector. Financial and administrative control is vested in a Council appointed in accordance with the provisions of the Act.

The development and formulation of National Standards is carried out by Technical Experts and representatives of other interest groups, assisted by the permanent officers of the Institution. These Technical Committees are appointed under the purview of the Sectoral Committees which in turn are appointed by the Council. The Sectoral Committees give the final Technical approval for the Draft National Standards prior to the approval by the Council of the SLSI.

All members of the Technical and Sectoral Committees render their services in an honorary capacity. In this process the Institution endeavours to ensure adequate representation of all view points.

In the International field the Institution represents Sri Lanka in the International Organization for Standardization (ISO), and participates in such fields of standardization as are of special interest to Sri Lanka.

Printed at the Sri Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.

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The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI *which includes surveillance inspection of the factory, testing of both factory and market samples.*

Further particulars of the terms and conditions of the permit may be obtained from the Sri *Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.*

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