SRI LANKA STANDARD 935 : 1991

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SPECIFICATION FOR

SOLVENT CEMENT FOR POLYVINYL CHLORIDE (PVC) PIPES AND FITTINGS

SRI LANKA STANDARDS INSTITUTION

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SLS 935:1991

Gr. 7

SRI LANKA STANDARDS INSTITUTION
53, Dharmapala Mawatha,
Colombo 3,
Sri Lanka.

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

SRI LANKA STANDARD

SPECIFICATION FOR SOLVENT CEMENT FOR POLYVINYL CHLORIDE (PVC) PIPES AND FITTINGS

FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Sri Lanka Standards Institution on 1991 - 09 - 27, after the draft, finalized by the Drafting Committee on solvent cement, had been approved by the Chemicals Divisional Committee.

The solvent cement covered by this specification is used for jointing unplasticized Polyvinyl Chloride pipes and fittings.

For the purpose of deciding whether a particular requirement of this specification is complied with, the final value, observed or calculated, expressing the results 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 specification, the assistance derived from the publications of the British Standards Institution and the American Society for Testing and Materials is gratefully acknowledged.

1 SCOPE

1.1 This specification prescribes the requirements and methods of sampling and test for solvent cement to be used in jointing PVC pipes and fittings.

1.2 The solvent cement is recommended for use with PVC pipes and fittings defined in SLS 147 and SLS 659 : Part 1 to a maximum nominal pipe diameter of 150 mm.

1.3 This specification does not cover solvent cement for pipes which carry aggressive chemicals.

2 REFERENCES

CS 102 Presentation of numerical values.
SLS 147 Rigid unplasticized polyvinyl chloride pipes for potable cold water supplies.
SLS 428 Random sampling methods.
SLS 659 Unplasticized polyvinyl chloride pipe joints and fittings for potable cold water supplies
Part 1 : Socket fittings for solvent welding.

3 DEFINITIONS

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

3.1 **solvent cement** : An adhesive made by dissolving a plastic resin or compound in a suitable solvent or mixture of solvents.

3.2 **hydrostatic burst strength** : The property of a pipe to withstand internal pressure of specified magnitude under specified conditions.

4 REQUIREMENTS

4.1 Composition

The solvent cement shall consist of polymers, stabilizers (see Note) and a substantial proportion of solvents that will swell unplasticized PVC.

NOTE
Fillers may be incorporated.

4.2 Application properties

4.2.1 The solvent cement shall be free-flowing and shall not contain lumps, undissolved particles or any foreign matter that will adversely affect the joint strength. It shall be capable of easy application.

4.2.2 If water is being carried in the pipes, the solvent cements shall not impart any odour, taste or colour and any toxic constituent.

4.3 Bond strength (lap shear strength)

The minimum average bond strength of the solvent cement shall be as given in Table 1 when tested in accordance with the method described in **Appendix A.**

TABLE 1 - Requirement for bond strength

Curing time, hours	Bond strength, MPa, min.
2	1.5
16	2.8
72	5.5

4.4 Hydrostatic burst strength

The minimum average hydrostatic burst strength shall be 2.8 MPa after a curing period of 2 hours when tested in accordance with the method described in Appendix B.

4.5 Film properties

The film produced by the solvent cement shall satisfy the following requirements when tested in accordance with the method described in Appendix C.

(a) Even, continuous and free of lumps and foreign matter.
(b) Sufficiently flexible to be wrapped around a 25-mm diameter mandrel, without developing cracks or splits and thickness not less than 0.2 mm at any point.
(c) Without any flow or drip when held in a vertical position for 5 minutes.

4.6 Storage stability

The solvent cement shall comply with the requirements specified in 4.2 to 4.5 when stored in the original closed container according to the manufacturer's instructions for a minimum period of 12 months.

5 PACKAGING AND MARKING

5.1 Packaging

The solvent cement shall be packed in an impermeable, non-reactive, container fitted with a replaceable, air-tight lid. The lid may be of screw-capped type or of other suitable design. For pack sizes of 500 g and above, screw capped lids shall be used.

5.2 Marking

Each container shall be legibly and indelibly marked or labelled with the following information:

(a) Name of the product as " solvent cement";
(b) Name and address of the manufacturer including country of origin;
(c) Brand name/ trade mark, if any;
(d) Net content, in millilitres or in grams;
(e) Batch or code number;
(f) Date of manufacture and the shelf life;
(g) Directions for use, including information on the time period to be allowed between making the joint and application of any force on it; and
(h) The words " Replace lid immediately after use. Do not dilute".

NOTE

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

6 SAMPLING

6.1 Lot

In any consignment all containers of solvent cement 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 its conformity to the requirements of this specification.

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

TABLE 2 - Scale of sampling

No. of containers in the lot (1)	No. of containers to be selected (2)	Sub sample (3)
up to 300	10	3
301 to 1 200	15	5
1 201 to 3 200	20	7
3 201 to 10 000	25	9
10 001 and above	35	12

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 6.2.3 shall be inspected for packaging and marking requirements.

6.3.2 One container inspected as in 6.3.1 shall be tested for storage stability, if required.

6.3.3 A sub sample shall be selected as given in Column 3 of Table 2 from the containers selected as in 6.2.2. Each container of the sub sample shall be tested for requirements given in 4.2 to 4.5.

7 METHODS OF TEST

Tests shall be carried out in accordance with the methods given in Appendices A to C 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 packaging and marking requirements.

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

NOTE

This test shall be carried out only if requested.

8.3 Each container tested as in 6.3.3 satisfies the relevant requirements.

8.4 The value of the expression $\bar{x} - 1.1s$ calculated using the test results on 4.3, 4.4 and test result on the requirement 4.5 (b)is not less than the specified values of each requirement.

APPENDIX A

DETERMINATION OF BOND STRENGTH (LAP SHEAR STRENGTH)

A.1 APPARATUS

Universal testing machine (compression type), with a holding fixture as given in Fig. 1.

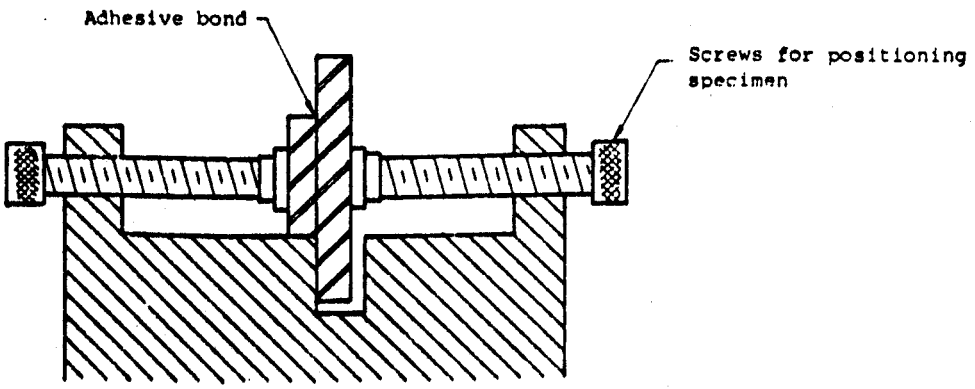


FIGURE 1 - Specimen holding device

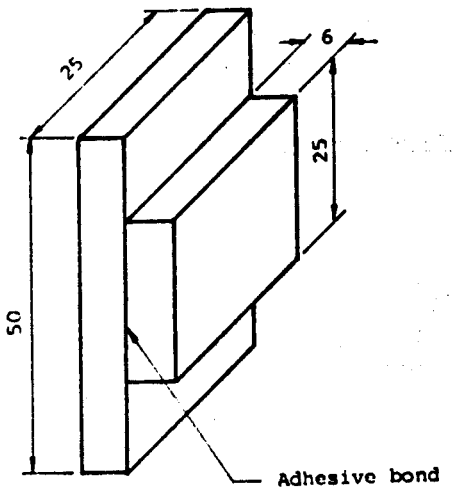
A.2 Material

Polyvinyl chloride (PVC) sheet, of approximately 6 mm thick and made from the grade complying with SLS 147.

A.3 Preparation of the test specimen

Cut two sections of approximately 25 mm x 25 mm and 25 mm x 50 mm from the PVC sheet (A.2).

NOTE
One section of each size is required for each test specimen (See Fig. 2).



All dimensions in millimetres

FIGURE 2 – Test specimen

Clean the surfaces to be pasted with a cloth dampened with methyl ethyl ketone or acetone. Apply a thin layer of solvent cement to the complete surface of 25 mm x 25 mm section and to the centre of 25 mm x 50 mm section using a 25-mm brush. Assemble the two sections immediately and rotate 25 mm x 25 mm section 180 ^{o} on the 25 mm x 50 mm section within 5 seconds, using light hand pressure. Place the assembled test specimen on a clean, horizontal surface using 25 mm x 50 mm section as the base. After 30 seconds place a 2- kg weight on the test specimen. Remove the weight after 3 minutes.

A.4 PROCEDURE

Condition the test specimen at room temperature for the specified time given in Table 1. Fix the test specimen in the holding fixture of the Universal testing machine as shown in Figure 1 and measure the tensile force required to separate the joint at a shear rate of 1.25 mm per minute.

A.5 CALCULATION

$$\text{Shear strength, MPa} = \frac{F}{A}$$

where,

F is the force, in MN, required to separate the joint; and
A is the area, in m^2, of the joint.

Express the result as average of five readings.

APPENDIX B
DETERMINATION OF HYDROSTATIC BURST STRENGTH

B.1 APPARATUS

Equipment which permits the application of controlled internal hydraulic pressure to the test specimen which is immersed in a thermostatically controlled water bath.

B.2 MATERIAL

B.2.1 PVC pipe , of Type 1000 and nominal diameter of 63 mm, complying with **SLS 147.**

B.2.2 Fitting socket, with a minimum socket depth of 38 mm and complying with **SLS 659 : Part 1.**

NOTE
The dimensions of the pipe and fitting socket should be such that the pipe will enter the socket from 1/3 to 2/3 of the full socket depth dry when assembled by hand.

B.3 PREPARATION OF THE TEST SPECIMEN

Cut the pipe (B.2.1) into approximately 150 mm lengths and join to the fitting socket with the solvent cement. The pipe must be completely fitted in the socket. Close the ends of the test specimen with suitable end closures for pressure testing.

B.4 PROCEDURE

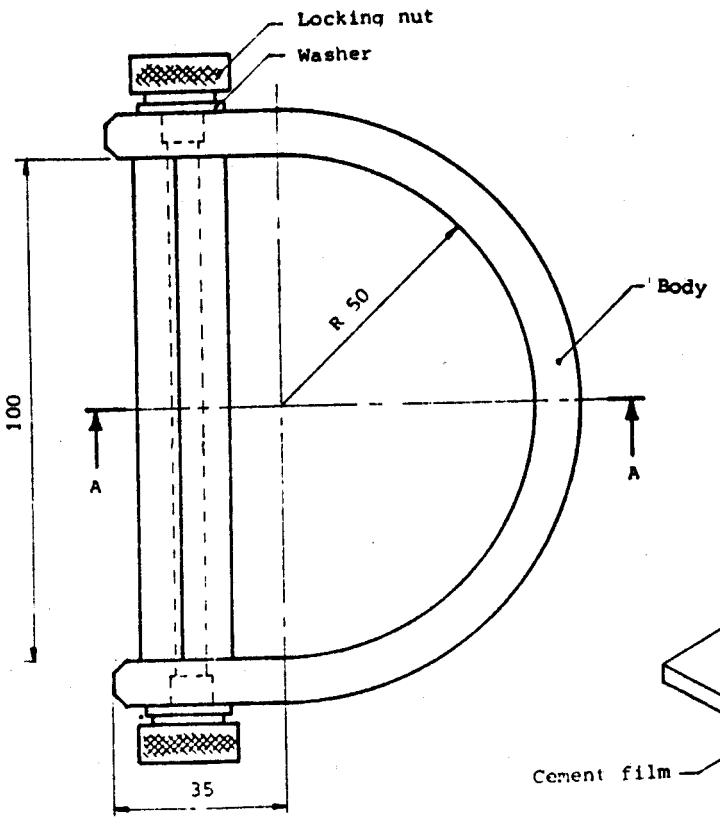
Condition the test specimen at room temperature for 2 hours. Immerse the test specimen in the water bath of the pressure testing machine (B.1) , which is thermostatically controlled at 29 $\pm$ 1 °C and start applying pressure. Increase the internal hydrostatic pressure at the rate of 1.4 MPa per minute (with a tolerance of $\pm$ 10 per cent). Note the pressure at which the failure occurs in the joint.

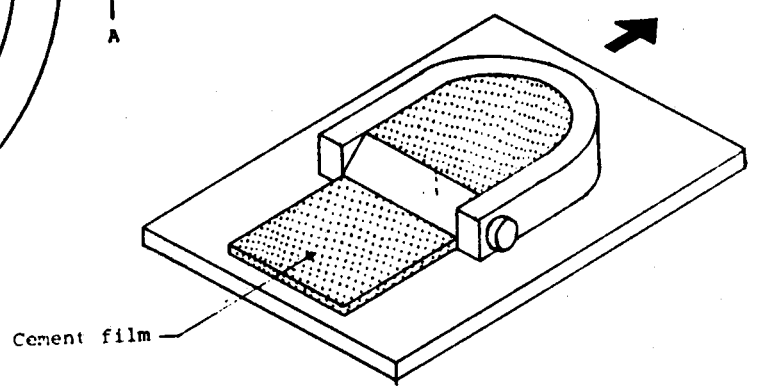
APPENDIX C
DETERMINATION OF FILM PROPERTIES (SAFFT TEST)

C.1 APPARATUS

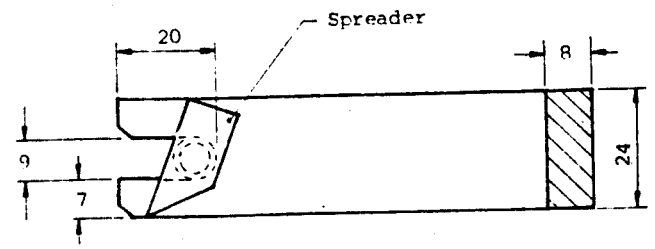
C.1.1 *Solvent cement spreader,* as shown in Figure 3 with the blade set to a clearance of 2.0 + 0.1 mm.

C.1.2 *Metal mandrel,* 25 + 0.1 mm in diameter.

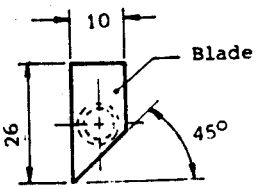




Method of application



Section A-A



Dimensions of the blade

All dimensions in millimetres

FIGURE 3 - Solvent cement spreader

C.2 PROCEDURE

C.2.1 Place the apparatus with the blade preset to the required clearance, on a horizontal sheet of glass or other suitable material.

C.2.2 Mix the solvent cement well and fill the D-shaped space of the spreader. Spread the cement immediately to produce a film of at least 100 mm square and leave to dry for 24 hours.

C.2.3 Repeat the above procedure using a flat sheet of unplasticized PVC in place of glass. Immeditely after forming the film hold the sheet in a vertical position for 5 minutes.

C.3 EVALUATION

C.3.1 After 24 hours examine the film formed in C.2.2 for continuity, lumps and foreign matter.

C.3.2 After 14 days remove the film formed in C.2.2 from the backing sheet and measure the thickness. Then wrap it around the mandrel (C.1.2) and examine for cracks or splits.

C.3.3 After 5 minutes examine the film formed in C.2.3 for flow or dripping.

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