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Indian Standard

SPECIFICATION FOR TWO-PART POLYSULPHIDE-BASED SEALANTS

PART 2 METHODS OF TESTS

(First Reprint DECEMBER 1997)

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Indian Standard

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PART 2 METHODS OF TESTS

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(*Continued on page* 2)

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Indian Standard

SPECIFICATION FOR TWO-PART POLYSULPHIDE-BASED SEALANTS

PART 2 METHODS OF TESTS

0. FOREWORD

0.1 This Indian Standard (Part 2) was adopted by the Bureau of Indian Standards on 7 September 1987, after the draft finalized by the Building Construction Practices Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Two-part polysulphide-based sealant consists of two components, essentially a component containing polysulphide polymer and a separate component containing the curing agent, which are mixed together before application and cure at ambient temperature to form a rubber like solid..

0.3 This standard is based on BS 4254 : 1983 'Specification for two-part polysulphide-based sealants'. The products are intended for use in normal atmospheric environments in general building applications. For use in areas where the variations in temperature and humidity are large and/or the resilience of the joint is required to be lesser than one-quarter of its width as well as for special performance like a basement wall subjected to significant water pressure, the ability of the product to perform in such a situation and in case of potable water storage environment, its effect on the contained liquid will need to be ascertained before use. For this purpose, it may also necessitate special performance considerations and tests specific to the particular requirement.

0.4 This standard is being formulated in two parts as follows:

Part 1 General requirements, and

Part 2 Methods of tests

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1. SCOPE

1.1 This standard (Part 2) covers methods of tests for two grades of two-part polysulphide-based sealants for use in general building application.

namely, pouring grade and gun grade. The tests on following properties have been covered in this standard:

a) Rheological properties,

b) Plastic deformation,

c) Adhesion and tensile modulus,

d) Application life,

e) Adhesion in peel,

f) Loss of mass after heat ageing, and

g) Staining.

2. TEST FOR RHEOLOGICAL PROPERTIES

2.1 Apparatus

2.1.1 Four open ended aluminium channels of rectangular cross-section with internal dimensions 200 mm long, 25 mm wide and 12 mm deep, and with a transverse V-notch 0·5 mm wide and 1·0 mm deep at mid-point of exposed face of each side wall, are used for testing of gun grade sealants.

2.1.2 Channel with inside dimensions 20 mm wide by 12 mm deep by 150 mm long, closed at both ends is used for pouring grade sealants.

2.1.3 *Enclosures* — One maintained at 27 ± 2°C and 65 ± 5 percent relative humidity (r.h.). Two enclosures maintained at 5 ± 2°C and 35 ± 2°C each with a rail for suspending the channel.

2.1.4 *Containers* — One cylindrical container 65 mm in diameter and approximately 50 mm high, and other containers for stirring the components and sealants.

2.1.5 *Accessories* — Like power stirrer or spatula and pallet knife.

2.2 Testing of Pouring Grade Sealants

2.2.1 *Conditioning and Mixing* — Condition suitable quantities of base component and curing component in closed containers for at least 16 h in an enclosure at 5 ± 2°C. Condition the metal channel in the same enclosure for not less than 1 h. Mix appropriate amounts of the conditioned components in a clear cylindrical container, either by hand for 10 min, using a spatula or by using a power stirrer until uniform mixing is achieved, the speed of rotation being such that the minimum amount of air is entrained in the mixed sealant. Store the mixed sealant in the enclosure for 30 min.

2.2.2 *Procedure* — Pour the mixed sealant into the conditioned channel, held horizontally in the enclosure at 5 ± 2°C. Maintain at this temperature for 24 h, then examine the sealant.

2.3 Testing of Gun Grade Sealant

2.3.1 *Conditioning and Mixing* — Condition suitable quantities of base components and curing component in closed container for at least 16 h in an enclosure at 27 ± 2°C and 65 ± 5 percent r.h. Condition the channels at 27 ± 2°C for not less than 1 h. Mix appropriate amounts of the conditioned components in a clean cylindrical container, either by hand for 10 min using a spatula or by using a powered stirrer until uniform mixing is achieved, the speed of rotation being such that the minimum amount of air is entrained in the mixed sealant.

2.3.2 *Procedure*

2.3.2.1 *Immediately after mixing* — Fill the sealant into the conditioned channels immediately after mixing and strike off the surplus with the smallest possible number of strokes of a pallet knife. Carry out the tests given in (a) and (b) below with two separate conditioned channels, in the enclosures, maintained at 5 ± 2°C and 35 ± 2°C, respectively. Proceed as follows:

a) *Testing with the channel held vertically* — Draw a knife blade along the two V-notches in the aluminium channel, producing a transverse mark across the face of the sealant, and immediately suspend the channel in the test enclosure with its longitudinal axis vertical for 24 h or other specified period. Measure the slump to the nearest millimetre by measuring the vertical distance between the V-notches on the sides of the aluminium channel and the lowest point to which the transverse mark on the surface of the specimen has slumped.

b) *Testing with the channel held horizontally* — Place the channel with its longitudinal axis horizontal and its open side vertical in the test enclosure for 24 h or other specified period. Measure the amount in millimetres by which the sealant protrudes in front of its original profile.

2.3.2.2 *1 h after mixing* — Repeat the procedure given in **2.3.2.1** one hour after mixing.

2.4 Reporting

a) *For the vertical channels*:

1) the slump value, to the nearest millimetre, that is, the vertical distance by which the reference mark on the sealant has slumped; and

2) whether any sealant has become detached or has slipped from the channel.

b) *For the horizontal channels* — The distance, to the nearest millimetre, by which the sealant has protruded in front of its original profile.

3. TEST FOR PLASTIC DEFORMATION

3.1 Apparatus

3.1.1 *Ventilated Oven with Fan*

3.1.2 *Tensile Testing Machine* — capable of holding the specimen aligned whilst maintaining the rate of separation at 5 to 6 mm/min and capable of recording the force required to extend the specimen.

3.2 Test Procedure — Prepare three test assemblies using aluminium surfaces as described in **4.2, 4.3** and **4.4**. After the seven-day cure period, place the test assemblies in an oven at 50 ± 2°C for three days. Remove the assemblies from the oven and condition them for not less than 16 h at 27±2°C. Place each assembly in the jaws of a tensile testing machine and pull apart at the rate of 5 to 6 mm/min until extended to a total width of 30 mm. Hold the assemblies in the testing machine at this extension for 5 min. Immediately remove and allow to recover for 1 h at 27±2°C without compression by placing edgewise on a glass surface with the long axis of the test specimen perpendicular to this surface.

3.3 Calculate the plastic deformation D (in percent) using the following formula:

$$D = \frac{W_{ar} - W_i}{W_e - W_i} \times 100$$

where

W_{ar} = width after recovery in mm,

W_i = initial width in mm, and

W_e = width extended in mm.

3.4 Test Report — The plastic deformation (in percent) as calculated in **3.3** shall be recorded.

4. TEST FOR ADHESION AND TENSILE MODULUS

4.1 Apparatus

4.1.1 Two enclosures, both maintained at 27 ± 2°C with one at 50 ± 5 percent r.h. and the other at 65 ± 5 percent r.h.

4.1.2 Ventilated oven with fan, controlled at 70 ± 2°C or 110 ± 2°C.

4.1.3 Tensile testing machine, capable of a jaw separation rate of 5 to 6 mm/min and capable of recording the force required to extend the specimen.

4.1.4 Softwood spacer bars, wrapped with release paper or treated with recommended release agent, either :

a) 12 Numbers, 12 mm × 13 mm × 50 mm (*see* Fig. 1A), or
b) 6 Numbers, 12 mm × 38 mm × 50 mm (*see* Fig. 1D), or
c) 6 Numbers, 12 mm × 19 mm × 50 mm (*see* Fig. 1E).

4.1.5 Power stirrer or spatula.

4.1.6 Feeler gauge of thickness 0·025 mm, width 2 mm, graduated in 1 mm increments.

4.2 Test Surfaces

4.2.1 *Aluminium* — Each aluminium test surface shall consist of untreated aluminium alloy of grade 64430 WP as specified in IS : 736-1974*.

4.2.2 *Glass* — Each glass test surface shall consist of clear float glass, either in the form of plates of sufficient thickness to withstand deformation under testing or in the form of thin plates securely bonded to the faces of a rigid substrate.

4.2.3 *Portland Cement Mortar* — Each cement mortar test surface shall consist of a block of not less than 12 mm nominal thickness, stored for 24 h in an enclosure at 27 ± 2°C and 65 ± 5 percent r.h. Prepare the cement mortar blocks as follows:

a) Mix one part by dry mass of ordinary portland cement complying with IS : 269-1976† with 1½ parts by dry mass of sand complying with IS : 650-1966‡ and add water to give a water to cement ratio of 0·35 to 0·40. The grain size of the sand shall be such that 100 percent by mass shall pass through a 850-μm test sieve, and not more than 10 percent by mass shall pass through a 600-μm test sieve. The sieves shall comply with IS : 460 (Part 1)-1985§. Ensure that the sand is thoroughly washed and dried before use.

*Specification for wrought aluminium and aluminium alloys, plate (for general engineering purposes) (*second revision*).
†Specification for ordinary and low heat Portland cement (*third revision*).
‡Specification for standard sand for testing of cement (*first revision*).
§Specification for test sieves: Part 1 Wire cloth test sieves (*third revision*).

b) Transfer the mortar immediately to rigid plastic moulds in about four layers, each being thoroughly compacted on a suitable vibrating table.

c) Cure the blocks in the moulds for 24 h in an atmosphere of not less than 90 percent r.h.

d) Remove the blocks from the moulds and cure for a total period of 28 days keeping them completely submerged in water at room temperature.

e) Dry the blocks at a temperature of 110°C in an oven for at least 12 h and store in the enclosure for at least 28 days at 27 ± 2°C and 65 percent r.h.

If blocks are not required for immediate use and are subsequently stored under alternative or uncontrolled conditions, store them for at least a further seven days at 27 ± 2°C and 65 percent r.h. before use.

4.3 Cleaning of Test Surfaces — Before constructing the test assemblies, clean the test surfaces as follows:

a) *Clear Float Glass, Aluminium* — Remove major contamination by cleaning with water, detergent solution or solvents. Clean the surface with methylethyl ketone or similar solvent. Wash with dilute detergent solution and rinse with distilled or deionized water. Rinse in industrial methylated spirits and air dry.

b) *Mortar* — Remove loose dust using a clean stiff bristle brush. If it is found, after the preparation of the block, that the surface has any cavity greater than 2 mm diameter, reject the block.

Where appropriate, prime the surface. Apply primer only over the area to which the sealant is intended to adhere.

4.4 Preparation of Test Assemblies — Condition the components of the sealant in closed containers for 16 h at 27 ± 2°C. Mix together suitable quantities of the components in a clean cylindrical container, either by hand for 10 min using a spatula or by using a power stirrer until uniform mixing is achieved, the speed of rotation being such that the minimum amount of air is entrained in the mixed sealant.

Prepare three test assemblies each consisting of a 12 × 12 × 50 mm bead of sealant held between parallel test surfaces, using spacer bars.

Carefully fill the channels, formed by the spacer bars and test surfaces, with sealant, taking care to prevent voids and occlusion of bubbles. Typical assemblies are shown in Fig. 1. If Type 2 or Type 3 assemblies

are used, tool the open surfaces to obtain a rectangular head of sealant 12 × 12 × 50 mm.

Cure the test assemblies for seven days in the enclosure at 27 ± 2°C and 65 ± 5 percent r.h. Hold the assemblies securely to prevent movement during the cure period.

4.5 Positioning of Test Assemblies — Use the tensile testing machine for all tests except the test described in **4.6.5**. Position the test assembly in the tensile testing machine ensuring that the jaws provide a direct pull (*see* Fig. 1).

NOTE — When it is required to maintain the test assembly in tension, a simple method of achieving this is to insert suitably dimensioned spacer bars before releasing the tensile testing machine.

For the test described in **4.6.5**, use a device such as that shown in Fig. 2. Obtain the specified rate of separation by periodically adjusting the bolts. All clamping bolts on this machine shall have milled heads. Care should be taken when tightening the clamping bolts when using glass or other brittle materials. Suitable packing material between the bolt and the test assembly is permitted.

4.6 Test Procedures

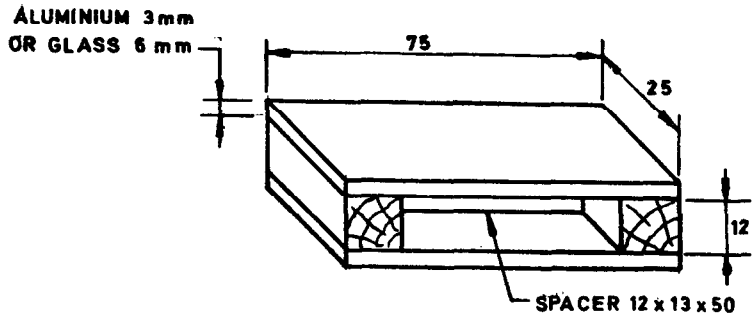
4.6.1 *General* — Immediately after the seven-day cure period (*see* **4.4**) carry out each of the tests given in **4.6.2** to **4.6.6**. Immediately before testing, remove the spacer bars and scribe the specimens with a sharp knife or marking pencil or use masking tape along the lines where the sealant is in contact with the test surface, in order to define the original bonded area.

4.6.2 *Before Ageing Test* — Subject test assemblies for each of the test surfaces to strain, extending the assembly at the rate of 5 to 6 mm/min until extended to a total width of 30 mm.

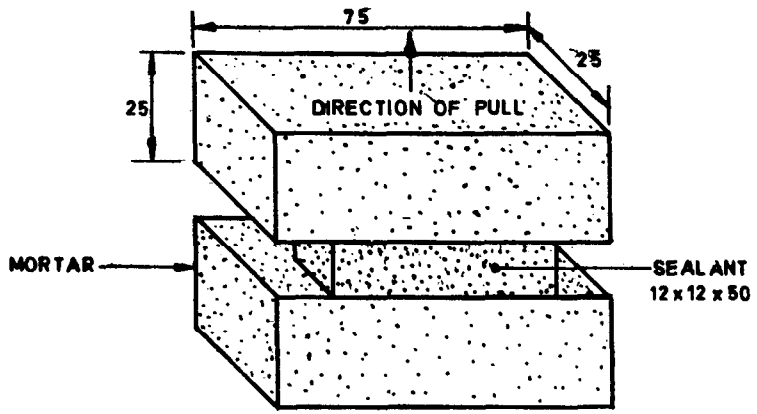
Record the force required to produce the extension in each test assembly.

After insertion of spacer bars, take the assembly from the tensile testing machine and hold at this extension for 24 h at a temperature of 27 ± 2°C. Still holding the extension, record the total area (length × depth) of any failure of adhesion and cohesion for each test assembly. Measure the depth of any crack with the feeler gauge.

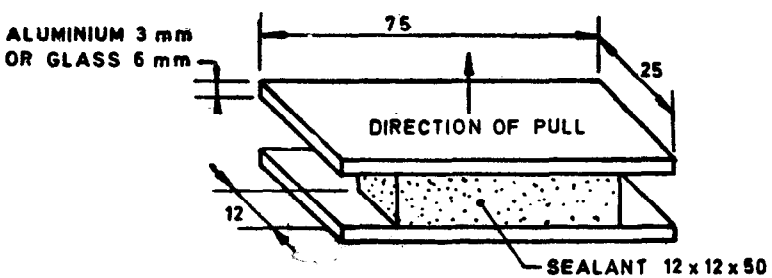
4.6.3 *After Water Immersion Test* — Totally immerse test assemblies for each of the test surfaces in distilled water, on end, for seven days at 27 ± 2°C. Then condition the assemblies for not less than 4 h at 27 ± 2°C. Then proceed as described in **4.6.2**.



1A Type 1 Assembly : Prepared Surfaces before Placement of Sealant

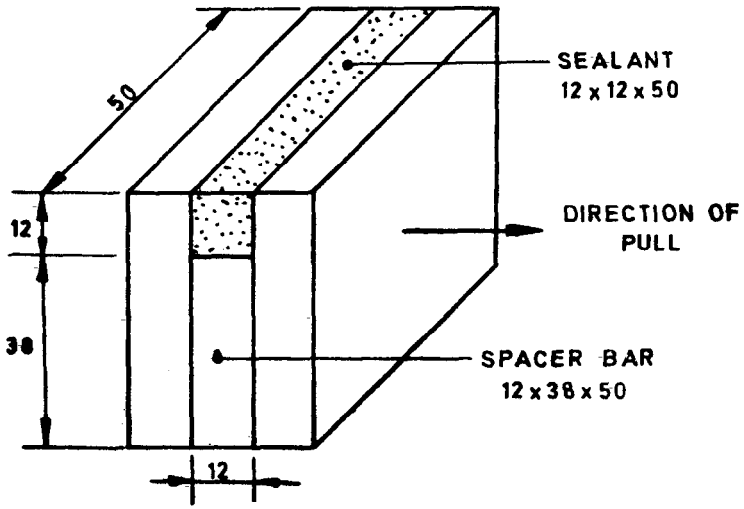


1B Type 1 Assembly : Mortar Test Assembly

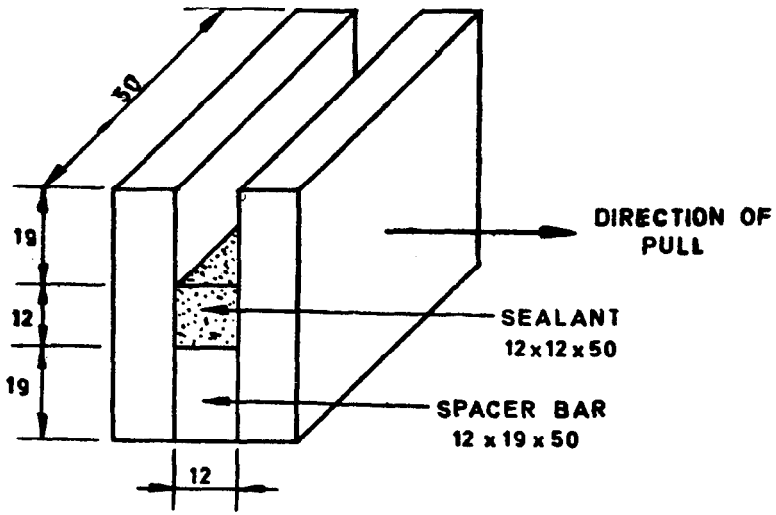


1C Type 1 Assembly : Aluminium and Glass Test Surface
All dimensions in millimetres.

FIG. 1 TYPICAL ASSEMBLIES USED IN ADHESION AND TENSILE MODULUS TEST — *Contd*



1D Type 2 Assembly



1E Type 3 Assembly
All dimensions in millimetres.

FIG. 1 TYPICAL ASSEMBLIES USED IN ADHESION AND TENSILE MODULUS TEST

4.6.4 *After Heat Ageing Test* — Heat-age test assemblies for each of the test surfaces, on end, for seven days in a ventilated hot-air oven at 70 ± 2°C. Then condition the assemblies for not less than 4 h at 27 ± 2°C.

Proceed as described in **4.6.2** except that the maximum extension shall be 24 mm.

4.6.5 *After Cycles of Extension at — 15°C and Compression at 27°C Test*— Place the test assemblies for each of the test surfaces in a suitable device such as that shown in Fig. 2, for separating the parallel test surfaces by increments of 0·8 ± 0·1 mm.

Place these devices and the contained test assemblies in a cold box maintained at −15 ± 2°C for not less than 4 h.

Extend the test assemblies, still at −15 ± 2°C, by increments of 0·8 ± 0·1 mm every 3 min until the sealant has been extended to a total width of 24 mm. Maintain the assemblies at this extension at a temperature of −15 ± 2°C for 16 h. Still holding the extension, record the total area (length × depth) of any failure of adhesion and cohesion for each test assembly. Measure the depth of any crack using the feeler gauge. Remove the assemblies from the cold box and allow to stand, with all tensile stress removed, at 27 ± 2°C for 4 h. At the end of this time, compress the test assemblies at the constant rate of 5 to 6 mm/min until they regain their original thickness, and then allow to relax for an additional 16 h at 27 ± 2°C, thus completing one test cycle. Subject each test assembly to three such cycles.

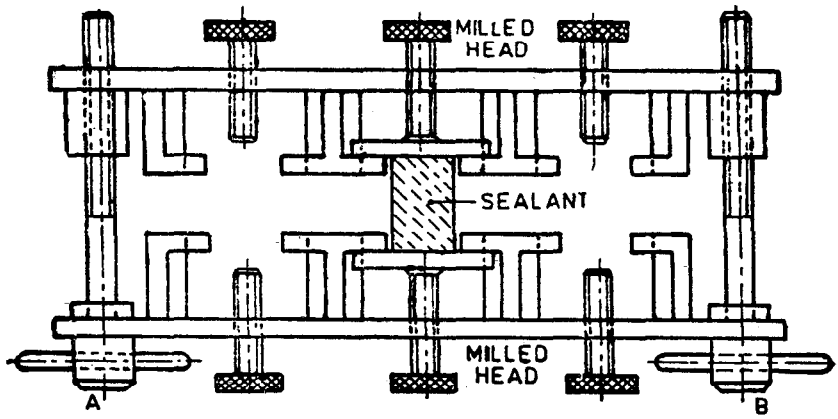


FIG. 2 TYPICAL ASSEMBLY HOLDING DEVICE FOR CYCLIC ADHESION TEST

4.6.6 *After Sun Lamp Exposer Through Glass Test* — Use three test assemblies, each consisting of one glass and one aluminium surface. Place each assembly on end and expose the glass side to radiation from a sun lamp (300 W, 240 V, 50 cycles). No lamp shall be used for more than 200 h for testing. Provide ventilation so that the air temperature at the surface of the test specimen does not exceed 50°C during the exposure period.

Expose to radiation for 96 h at a distance of 300 mm from the surface of the lamp and normal to the axis through the centre of the lamp. At the end of the exposure period, completely immerse the test assemblies in distilled water for 96 h at 27 ± 2°C. Proceed as described in **4.6.2**, except that the maximum extension shall be 24 mm.

4.7 Test Report — For each test, the following details shall be recorded:

a) The force required to produce the extension in each test assembly,

b) The total area (length × depth) of any failure of adhesion and cohesion for each test assembly, and

c) The depth (in mm) of any crack.

5. TEST FOR APPLICATION LIFE

5.1 Apparatus

5.1.1 Cylindrical container, 65 mm in diameter and approximately 50 mm high.

5.1.2 Containers, for storing components and sealants.

5.1.3 Enclosure maintained at 27 ± 2°C and 65 ± 5 percent r.h.

5.1.4 Power stirrer or spatula for mixing.

5.1.5 *Spatula*

5.2 Test Surface — The aluminium alloy test surface shall be mill finished of grade 64430 WP of IS : 736-1974*.

5.3 Conditioning and Mixing — Condition suitable quantities of base component and curing component in closed containers, together with a clean cylindrical container, for at least 16 h in the enclosure. Thoroughly mix together an appropriate amount of the base and the curing component in cylindrical container at 27 ± 2°C, either by hand for 10 min, using a spatula or by using a power stirrer until uniform mixing is achieved. It is

*Specification for wrought aluminium and aluminium alloys, plate (for general engineering purposes) (*second revision*).

essential to disperse the curing component evenly throughout the base component. Take particular care to keep the amount of air entrapped in the mixture to a minimum.

5.4 Cleaning of Test Surface — Clean the aluminium test surface as described in **4.3**.

5.5 Procedure — Store the mixed sample uncovered in the humidity cabinet. No less than 30 min before the expected expiry time of the application life, and thereafter at 10 min intervals, perform tests to check that the sample is capable of being applied by a spatula without difficulty on to a smooth clean aluminium surface.

5.6 Test Report — The application life shall be recorded as the total time between the completion of mixing and the last test at which the sealant is easily applied and readily adheres to the aluminium surfaces.

6. TEST FOR ADHESION IN PEEL

6.1 Apparatus

6.1.1 *Testing Machine* — with tension grips capable of pulling at a rate of separation of 50 ± 5 mm/min with a dial or chart calibrated to record the force.

6.1.2 *Paper Masking Tape* — 25 mm wide.

6.1.3 *Two-Metal Spacer Bars* — at least 125 mm long × 1·5 mm × 1·5 mm.

6.1.4 *Thin Flexible Backing Material* — 225 × 75 mm to which the compound will adhere throughout the test and which requires a force appreciably less than 25 N to be pulled back at an angle of 180° (for example, cloth, brass screen, unsized cotton duck fabric, open weave glass cloth).

6.1.5 *Twelve millimetre Diameter Rod* — steel or glass, 150 mm long.

6.1.6 *Enclosure* — maintained at 27 ± 2°C and 65 ± 5 percent r.h.

6.1.7 *Spatula*

6.2 Test Surfaces

6.2.1 *Aluminium* — Two pieces of untreated aluminium alloy, approximately 125 × 75 mm, not less than 3·15 mm thick, of Grade 64430 WP of IS : 736-1974*.

*Specification for wrought aluminium and aluminium alloys, plate (for general engineering purposes) (*second revision*).

6.2.2 *Glass* — Two pieces of clear float glass, 125 × 75 mm, not less than 6 mm thick.

6.2.3 *Portland Cement Mortar* — Two blocks of cement mortar, approximately 125 × 75 × 25 mm prepared as described in **4.2.3.**

6.3 Cleaning of Test Surfaces — Before constructing the test assemblies, clean the test surfaces as described in **4.3.** Where appropriate, prime the surface.

6.4 Preparation of Test Assemblies

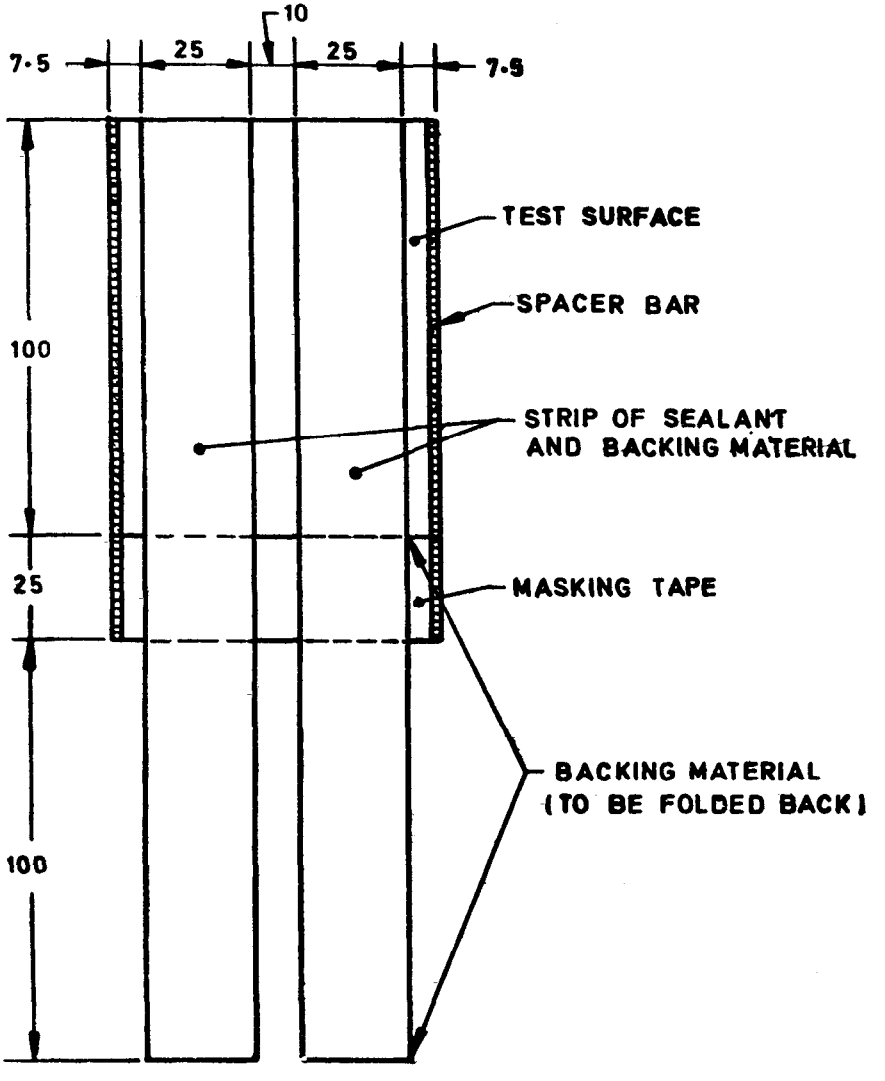
6.4.1 Prepare six test assemblies; two for each test surface, as described in **6.4.2** to **6.4.4.**

6.4.2 Place a strip of 25 mm paper masking tape across the width of a test surface along and parallel to the lower edge of the plate, leaving an area of 100 × 75 mm exposed (*see* Fig. 3).

6.4.3 Condition not more than 200 g of the base component and curing component at 27 ± 2°C in closed containers for a period of 16 to 24 h. After this period, spread a portion of the properly mixed sealant on the surface of the plate to a minimum thickness of 2 mm over the area from the top edge of the plate to the bottom of the masking tape and the entire width of the plate (that is, 125 × 75 mm). Insert the spacer bars on the long edge of the plate (*see* Fig. 3). Then smear the backing material with the mixed sealant at one end over an area of 125 × 75 mm and force the sealant into the backing material using a spatula. Lay the impregnated material over the sealant on the test surface, taking care that the minimum amount of air is entrapped. Roll the backing material with the rod to obtain a thickness of sealant of 1·5 mm between the backing material and the test surface.

6.4.4 Cure the assembly in an enclosure at 27 ± 2°C and 65 ± 5 percent r.h. for two days, then coat the backing material with a layer, 1 mm thick or less, of the freshly mixed sealant to protect it from moisture and to minimize adhesion failure after water immersion. Allow the assembly to cure at 27 ± 2°C and 65 ± 5 percent r.h. for a further five days, making a total of seven days in all.

6.4.5 Cut through the backing material to the test surface along its whole length with a sharp knife or razor blade, leaving strips of sealant and backing material 25 mm wide separated by a space approximately 10 mm wide (*see* Fig. 3). Immerse the assembly in distilled or deionized water at 27 ± 2°C for seven days.



All dimensions in millimetres.

FIG. 3 DIAGRAM SHOWING ARRANGEMENT OF TEST STRIPS FOR THE ADHESION IN PEEL TEST

6.5 Procedure

6.5.1 Immediately after removing the assembly from the water, wipe it dry and release the portion of the backing material covering the masking tape. Fold back the two strips of backing material at an angle of 180° and place the specimen in the testing machine.

6.5.2 Pull one strip of backing material at a rate of separation of 50 mm/min for 1 min. After a reasonably steady value has been obtained on the testing machine, record the peel strength in newtons shown on the dial or recording chart. Measure the area over which the sealant has failed in adhesion to the test surface.

If the backing material peels from the sealant during the test, disregard the result and repeat the test.

6.5.3 Repeat **6.4.1** to **6.5.2** for the remaining assemblies.

6.6 Test Report — The average peel strength in newtons for each test surface and the area over which the sealant has failed in adhesion for each strip of backing material shall be recorded.

7. TEST FOR LOSS OF MASS AFTER HEAT AGEING

7.1 Apparatus

7.1.1 Air circulating oven, controlled at 70 $\pm$ 2°C.

7.1.2 Balance to weigh 20 g to an accuracy of 0·01 g.

7.1.3 Three metal dishes, with approximate internal dimensions of 45 mm diameter and 6 mm depth.

7.1.4 *Metal Spatula*

7.2 Test Procedures

7.2.1 Condition the sealant in a closed container at 27 $\pm$2°C for at least 16 h. Clean three metal dishes with methylethyl ketone, dry and measure the mass of each dish, m_1 in g.

7.2.2 Fill each dish with sealant and strike off flat with a spatula to the level of the open rim and immediately measure the mass m_2 in g. Calculate the original mass, m_0, of sealant using the following formula:

$$m_0 = m_2 - m_1$$

7.2.3 Allow the three specimens to cure for seven days at 27 $\pm$ 2°C and 65 $\pm$ 5 percent r.h. and place them in the oven for 14 days at 70 $\pm$ 2°C. Following this ageing period, allow each specimen to cool for 2 h at

standard laboratory conditions and measure the mass, m_3 in g. Calculate the final mass, m_f, using the following formula:

$$m_f = m_3 - m_1$$

7.3 Expression of Results — For each specimen, calculate the loss of mass (in percent) which is given by the following formula:

$$\frac{m_0 - m_f}{m_0} \times 100$$

7.4 Test Report — The following details shall be recorded:

a) Loss of mass as a percentage of the original mass for each specimen, and

b) Average loss of mass for the three specimens (in percent).

8. TEST FOR STAINING

8.1 Apparatus

8.1.1 Split ring mould, 12 mm in depth and 76 mm in diameter standing on a smooth glass plate.

8.1.2 Cylindrical mandrel of polyethylene or similar material.

8.1.3 Enclosure, maintained at 27 ± 2°C and 65 ± 5 percent r.h.

8.2 Preparation of Mortar Block

8.2.1 Prepare a mortar mix consisting of:

a) one part by mass of white Portland cement complying with the requirements of IS : 269-1976*,

b) 0·2 parts by mass of high calcium hydrated lime complying with IS : 712-1984†, and

c) 3·5 parts by mass of white sand complying with IS : 650-1976‡.

8.2.2 Mix the cement, lime and sand dry with a trowel on a non-absorbent, non-metallic surface until the mixture is uniform. Add water and mix thoroughly. Use just sufficient water to form a smooth paste. Cast the mortar mix in a split ring mould standing on a smooth glass plate. Form a central smooth bore cylindrical hole, about 20 mm diameter

*Specification for ordinary and low heat Portland cement (*third revision*).
†Specification for building limes (*third revision*).
‡Specification for standard sand for testing of cement (*first revision*).

by standing in the centre of the ring, a 20 mm cylindrical mandrel of polyethylene or similar material to which the mortar will not adhere.

Allow the mortar to set for 3·5 ± 0·5 h at 27 ± 2°C in moist air under a damp cloth. After setting, remove the central mandrel.

8.3 Procedure

8.3.1 If necessary, use a primer to coat half the area of the upper surface of the mortar block and half the inner surface of the central hole.

8.3.2 Apply sufficient compound to the mortar block by first filling the hole completely, then spreading the remainder evenly over the whole of the top surface to a thickness between 6 and 10 mm.

8.3.3 Store the assembly for 24 h in an enclosure maintained at 27 ± 2°C and 65 ± 5 percent r.h. Remove the assembly from the enclosure and inspect for staining.

8.3.4 Completely immerse the specimen in 400 ml of fresh distilled water at room temperature for 1 min and return it to the enclosure.

8.3.5 Repeat **8.3.3** and **8.3.4** 13 times within 21 days at interval not less than 24 h. The first appearance of discoloration which is most likely to be visible on the uncoated smooth undersurface of the mortar around the interface with the compound in the central hole, shall be taken as evidence of staining.

8.4 Test Report — The following details shall be recorded:

a) Whether or not staining occurs and, if so, whether adjacent to a primed surface or to an unprimed surface; and

b) Where applicable, the batch number and the expiry date of the primer.

(*Continued from page 2*)

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