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IS 12054 (1987): Code of practice for application of silicone based water repellents [CED 41: Waterproofing and Damp-Proofing]



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Indian Standard

CODE OF PRACTICE FOR
APPLICATION OF SILICONE-BASED
WATER REPELLENTS

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

CODE OF PRACTICE FOR APPLICATION OF SILICONE-BASED WATER REPELLENTS

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Indian Standard

**CODE OF PRACTICE FOR
APPLICATION OF SILICONE-BASED
WATER REPELLENTS**

0. F O R E W O R D

0.1 This Indian Standard was adopted by the Bureau of Indian Standards on 15 May 1987, after the draft finalized by the Water-proofing and Damp-proofing Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Application of the appropriate class of water repellent to all exterior surfaces free from cracks wider than 0.1 mm above ground level provides protection against absorption of water, salt and dirt. Applied over cement based paints, the repellent preserves the colour brightness and appearance. Used as primers for oil-based and other types of paints, the repellents minimize peeling and blistering caused by the damp and salt from the masonry walls. The repellent should be applied on complete masonry rather than to individual units, in order to avoid inadvertent treatment of bedding faces which would detrimentally affect mortar bonding. This also ensures that faces of mortar joints are treated for water repellency. Normally, the repellent does not appreciably alter the dry appearance of the surface. Under many weathering conditions, silicone treated surfaces remain cleaner than untreated surfaces. Application of water repellent on exposed brickwork surfaces will reduce the appearance of efflorescence of soluble sulphates. The effective life of the treatment will depend on the surface, its conditions at the time of treatment and the exposure. Rain penetration will be prevented or used for a period of years, though immediate surface repellency may be lost within a few months.

0.2.1 The silicone-based water repellents used for application should conform to the requirements laid down in IS : 12027-1987*.

1. SCOPE

1.1 This standard lays down the procedure to be adopted in the preparation of surfaces to be treated with silicone-based repellent, preparation and application of the water repellents.

*Specification for silicone-based water repellents.

2. NECESSARY INFORMATION

2.1 For efficient planning and execution of the application of water repellent, detailed information with regard to the following shall be taken into account:

- a) Type of concrete, masonry or plaster surfaces to be applied with the water repellent, type and nature of previous treatment, if any.
- b) The extent to which the surface will be exposed, whether dry or raining.
- c) In the case of new plaster surfaces, the difference of completion of the plaster work should be ascertained in order to allow sufficient time for curing of the surface before silicone water repellents are applied.

2.2 Arrangement shall also be made for proper exchange of information between those engaged in the application of repellent and those whose work will affect or will be affected.

3. MATERIALS

3.1 Silicone-based water repellents shall satisfy the requirements laid down in IS : 12027-1987*.

3.1.1 Three classes of water repellents are in use as given below:

- a) *Class A* — Silicone solvent solution for clay brickwork, hydraulic cement-based materials, natural and cast stone masonry of a predominantly siliceous nature.
- b) *Class B* — Silicone solvent solution for natural and cast stone masonry of predominantly calcareous nature and calcium silicate brickwork.
- c) *Class C* — Aqueous solution of sodium methyl siliconate for clay brickwork, natural and cast stone masonry of a predominantly calcareous nature.

NOTE 1 — Some silicone masonry water repellent may meet to test requirements of both Class A and B, and may be marked accordingly.

NOTE 2 — Where the type of surface to be treated cannot be classified, Class B repellent should be used.

*Specification for silicone-based water repellents.

3.2 Preparation of Water Repellent

3.2.1 From Class A and Class B Materials — Water repellents may be prepared by diluting Class A or B materials with mineral spirit or xylene. The mineral spirit should conform to the specification given below:

Minimum flash-point	:	27°C
Boiling rang	:	135 to 185°C
Minimum kauri-butanol value	:	34

Though these classes of materials are effective at 3 percent solids concentration, for best results the water repellent should contain a minimum of 5 percent solids.

3.2.2 From Class C Materials — Class C material may be diluted with water to a concentration of 3 percent solids just prior to the application. Using concentration higher than 3 percent solids may cause a white precipitate of sodium carbonate formulation as the water evaporates. The water should be free from wetting agent and presence of too much soluble salts and carbon dioxide is undesirable.

4. TEST FOR SELECTION OF SUITABLE CLASS OF REPELLENTS

4.1 The water-repellent effect on masonry materials by different class of water repellents may be examined by a simple water absorption test. The test shall be conducted in the laboratory as given in **4.1.1** and **4.1.2**.

4.1.1 Dry masonry specimen (5 cm cube) may be immersed for 5 seconds in a 5 percent solids solution of Class A or B materials or 3 percent solids solution for class C materials.

4.1.2 Treated specimen should then be allowed to air-dry for at least 24 hours, weighed and placed in a pan containing a constant level of 6.5 ± 1 mm of water. After immerison in the pan of water for 24 hours, specimen should be removed, wiped free of surface moisture with blotting paper or filter paper and reweighed. Absorption of water by the treated masonry specimen should not exceed 3 percent.

4.1.3 For the purpose of selection of suitable class of water repellent, masonry specimen having equal dimensions should be used for treatment with various repellent.

5. PREPARATION OF SURFACES TO BE TREATED WITH SILICONE-BASED WATER REPELLENTS

5.1 Cracks wider than haircracks (0.1 mm) and defective mortar joints should be repaired. Surfaces must be clean and dry at the time of treatment. When the surfaces are dirty, they should be thoroughly cleaned with water. Detergents or wetting agents shall not be used.

5.2 The surfaces of the wall must be allowed to dry prior to the application of the water repellent. In places where drying is difficult, Class C materials shall be used either as a full treatment or as a treatment prior to the use of Class A or B materials.

5.3 Organisms, such as lichens or algae should be removed by wire-brushing but the process will be easier if the organisms are first destroyed with a suitable fungicide and allowed to dry.

5.4 Efflorescence, if visible, shall be washed with 5 to 10 percent muriatic acid (HCl) solution and then rinsing it with clear water. Sometimes the efflorescence may reappear in certain places as soon as the surface is dry after washing. In such places, silicone water repellent shall be applied and allowed to cure for 24 hours, and the surface shall again be washed with muriatic acid (HCl) and rinsed with water. The entire masonry surface may then be treated with water repellent after the surface has dried thoroughly.

5.5 The masonry, concrete, cement plaster and cement-based painted surfaces should be allowed to cure for at least 21 days before silicone water repellents are applied.

5.6 In the case of surfaces painted with cement-based paint, after 21 days curing, the surface may be tested by application of the water repellent on a small area. If the water repellency is not developed within 24 hours, the cement paint should be cured for a longer period before treating the entire surface.

6. APPLICATION OF THE REPELLENT

6.1 Normally, it is sufficient to apply a single generous or flood coat by brush or spray. The material should be applied liberally so that it runs freely down the surface to about 15 cm below the point of application.

6.2 When spraying, the solution should not be atomized or misted, but flowed on in a solid stream by maintaining the nozzle pressure as low as 0.35 kg/cm² (0.035 MPa) or even less. The spray-gun should be held

at a distance just enough to eliminate foaming on the masonry surface. If allowed to foam, some visible marks may appear after application.

6.3 Warning — A mask should not be worn by the operator as it contains to prolong annihilation of solvent vapour. In confined spaces, airline respirators should be worn by the operator.

INTERNATIONAL SYSTEM OF UNITS (SINUITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane Angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	$1 \text{ N} = 1 \text{ kg.m/s}^2$
Energy	joule	J	$1 \text{ J} = 1 \text{ N.m}$
Power	watt	W	$1 \text{ W} = 1 \text{ J/s}$
Flux	weber	Wb	$1 \text{ Wb} = 1 \text{ V.s}$
Flux density	tesla	T	$1 \text{ T} = 1 \text{ Wb/m}^2$
Frequency	hertz	Hz	$1 \text{ Hz} = 1 \text{ c/s (s}^{-1}\text{)}$
Electric conductance	siemens	S	$1 \text{ S} = 1 \text{ A/V}$
Electromotive force	volt	V	$1 \text{ V} = 1 \text{ W/A}$
Pressure, stress	pascal	Pa	$1 \text{ Pa} = 1 \text{ N/m}^2$