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

व्यापक परिचालन मसौदा

हमारा संदर्भः सीईडी 41/टी-17 **22 अगस्त 2024**

तकनीकी समिति: वॉटरप्रूफिंग और डैम्प-प्रूफिंग विषय समिति सीईडी 41

प्राप्तकर्ता :

क) सिविल इंजीनियरी विभाग परिषद्, सीईडीसी के सभी सदस्य
ख) सीईडी 41 के सभी सदस्य
ग) रूचि रखने वाले अन्य निकाय

प्रिय महोदय/महोदया,

निम्नलिखित भारतीय मानक का मसौदा संलग्न हैं:

प्रलेख संख्या	शीर्षक
सीईडी 41(26421)WC	**जल विकर्षक – विशिष्टि** **भाग 1 सिलिकॉन आधारित** **का भारतीय मानक मसौदा** [IS 12027 (भाग 1) का *पहला पुनरीक्षण*] ICS 91.120.30

कृपया इस मानक के मसौदे का अवलोकन करें और अपनी सम्मतियॉ यह बताते हुए भेजे कि यदि यह मानक के रूप में प्रकाशित हो तो इस पर अमल करने में आपके व्यवसाय अथवा कारोबार में क्या कठिनाइयाँ आ सकती हैं ।

सम्मतियाँ भेजने की अंतिम तिथि : **22 सितम्बर 2024**

सम्मति यदि कोई हो तो कृपया अधोहस्ताक्षरी को उपरिलिखित पते पर संलग्न फोर्मेट में भेजें या **manoj@bis.gov.in** पर ईमेल कर दें ।

यदि कोई सम्मति प्राप्त नही होती है अथवा सम्मति में केवल भाषा सम्बन्धी त्रुटि हुई तो उपरोक्त प्रलेख को यथावत अंतिम रूप दिया जाएगा। यदि सम्मित तकनीकी प्रकृति की हुई विषय समिति के अध्यक्ष के परामर्श से अथवा उनकी इच्छा पर आगे की कार्यवाही के लिए विषय समिति को भेजे जाने के बाद प्रलेख को अंतिम रूप दे दिया जाएगा ।

यह प्रलेख भारतीय मानक ब्यूरो की वैबसाइट **www.bis.gov.in** पर भी उपलब्ध हैं।

धन्यवाद ।

भवदीय,

(द्वैपायन भद्रा)
प्रमुख (सिविल इंजीनियरी)

संग्लन : उपरिलिखित

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

DRAFT IN WIDE CIRCULATION

Our Ref: CED 41/T-17 **27 August 2024**

Technical Committee: Waterproofing and Damp-Proofing Sectional Committee, CED 41

ADDRESSED TO:

a) All Members of Civil Engineering Division Council, CEDC
b) All Members of CED 41
c) All others interests.

Dear Sir/Madam,

Please find enclosed the following document:

Doc No.	Title
CED 41(26421)WC	**Draft Indian Standard** **Water Repellents – Specification** **Part 1 Silicone Based** [*First Revision* of IS 12027 (Part 1)] ICS 91.120.30

Kindly examine the draft standard and forward your views stating any difficulties, which you are likely to experience in your business or profession, if this is finally adopted as National Standard.

Last Date for comments**: 27 September 2024**

Comments if any, may please be made in the attached format and mailed to the undersigned at the above address or preferably through e-mail to manoj@bis.gov.in.

In case no comments are received or comments received are of editorial nature, you may kindly permit us to presume your approval for the above document as finalized. However, in case of comments of technical in nature are received then it may be finalized either in consultation with the Chairman, Sectional Committee or referred to the Sectional Committee for further necessary action if so desired by the Chairman, Sectional Committee.

The document is also hosted on BIS website **www.bis.gov.in.**

Thanking you,

Yours faithfully,

(**Dwaipayan Bhadra**)
Head (Civil Engineering)

Encl: As above

FORMAT FOR SENDING COMMENTS ON BIS DOCUMENTS

(Please use A-4 size sheet of paper only and type within fields indicated. Comments on each clause/sub-clause/table/fig etc. be started on a fresh box. Information in column 3 should include reasons for the comments and suggestions for modified working of the clauses when the existing text is found not acceptable. Adherence to this format facilitates Secretariat's work) {Please e-mail your comments to **manoj@bis.gov.in}.**

Doc. No.: **CED 41(26421)WC**

Title: **Draft Indian Standard Water Repellents – Specification**
Part 1 Silicone Based
[*First Revision* of IS 12027 (Part 1)] ICS 91.120.30

LAST DATE OF COMENT: **27/09/2024**

NAME OF THE COMMENTATOR/ORGANIZATION: _____

Sl. No.	Clause/Para/Table/ Figure No. Commented	Comments/Modified Wordings	Justification of the Proposed Change

BUREAU OF INDIAN STANDARDS

DRAFT FOR COMMENTS ONLY
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Draft Indian Standard

WATER REPELLENTS – SPECIFICATION
PART 1 SILICONE BASED

[*First Revision* of IS 12027 (Part 1)]
ICS 91.120.30

Waterproofing and Damp-Proofing Sectional Committee, CED 41	Last date of Comments **27 September 2024**

FOREWORD

(*Formal clauses will be added later*)

Water repellents are substances or treatments applied to materials to prevent the penetration and absorption of water. They work by creating a hydrophobic (water-repellent) barrier on or within the material, which helps protect it from water damage, such as staining, deterioration, and the growth of mold and mildew. Water repellents are commonly used on various building materials, textiles, and other surfaces that need protection from moisture.

Water repellents can be categorized on the basis of their chemical composition and raw materials in five category silicone based water repellents, silane based water repellents, fluoropolymer based water repellents, acrylic based water repellents and wax based water repellents, the most commonly used water repellents are silicone based water repellents and silane based water repellents.

Silicone based water repellents work by creating a flexible, hydrophobic layer on the surface that repels water while allowing moisture vapor to escape. This makes them highly effective at protecting a variety of surfaces from water damage while maintaining the material's breathability and appearance.

Silicone based water repellents when applied on a surface, upon drying makes the surface water repellent thus extend their life & protect them from spalling, cracking, formation of efflorescence or damages caused by absorption of water. Silicone based water repellents, which includes a variety of compounds such as siloxanes, silanes, silicone resins, and Siloxane-Silane blends etc, create a hydrophobic layer on the surface to preventing water penetration. Silicone based water repellents generally provides a barrier effect that reduces water absorption by creating a water-repellent surface.

The general life expectancy for Silicone based water repellents are 3 to 4 years for water mix and 5 to 9 years for solvent mix, subject to the climatic conditions.

The selection of water repellents depends on a variety of factors that influence the effectiveness, suitability, and longevity of the treatment, such as surface material composition and characteristics, environmental conditions, application method, performance requirements and aesthetic considerations etc.

This standard was first formulated in 1987. In this revision, to incorporate the latest advancement in the field of water repellents, the water repellents has been grouped into two parts. This standard (Part 1) covers specification for Silicone based water repellents. The other part in the series is:

Part 2 Silane based (*under preparation*)

This first revision of the standard incorporates modifications found necessary as a result of the experience gained with the use of the standard and to bring the standard in line with present good practices being followed in the country and abroad. The major modifications in this revision are as follows:

a) Silane based water repellents has been introduce as a separate part,
b) Classification of the standard has been updated as per current industrial practice,
c) Procedure for preparation of test sample has been improved,
d) Test of absorption of water has been improved as per latest practice,
e) Guideline has been provided for utilizing the different type of water repellents,
f) Reference has been updated, and
g) Marking clause has been updated

In the formulation of this standard, due weightage has been given to international coordination among the standards and practices in different countries in addition to relating it to the practices in the field in this country.

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 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Draft Indian Standard

WATER REPELLENTS – SPECIFICATION
PART 1 SILICONE BASED

(First Revision)

1 SCOPE

This standard specifies the requirements, testing methods, and guidelines for the use of silicone based water repellents intended for the use on masonry, stone, tiles, wood, and other surface to impart water repellency through creating a flexible, hydrophobic layer on the surface that repels water while allowing moisture vapor to escape.

2 REFERENCES

The standards given below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standard indicated below:

IS No.	*Title*
IS 1077 : 1992	Common burnt clay building bricks – Specification (*fifth revision*)
IS 1128 : 1974	Specification for limestone (slab and tiles) (*first revision*)
IS 3622 : 1977	Specification for sandstone (slabs and tiles) (*first revision*)
IS 13435 (Part 1) : 2021	Acrylic polymer based waterproofing materials – Method of tests: Part 1 Determination of solid content (*first revision*)

3 TERMINOLOGY

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

3.1 Aqueous Siliconate Solution – An aqueous solution of an alkali metal salt of silicone, the non-volatile content which consist mainly of silicone.

3.2 Silicone Formulation – A silicone solution in a voltaic solvent or an aqueous solution or emulsion, the non-volatile content of both consisting mainly of silicones.

3.3 Silicones – A material which contains silicon-oxygen-silicone links and also hydrocarbon groups attached directly to the silicon.

4 CLASSIFICATION

Silicone based water repellents broadly classified into two categories.

a) Type A **(**Water Mix), and
b) Type B (Solvent Mix).

4.1 Type A (Water Mix)

Type A water repellents are generally used for residential and indoor applications where ease of use, safety, and low environmental impact are priorities. They work well on concrete, masonry, and wood surfaces in less demanding environments. These repellents are diluted with water, which makes them less toxic and easier to clean up compared to solvent-based products.

Type A water repellent is based on silicone that is susceptible to hydrolysis. Hydrolysis occurs only after application to the substrate, which breaks the emulsion. Alcohol is released and the emulsion is converted into a silicon resin water repellent. Type A water repellent is diluted with water just before use, in a proportion prescribed by the manufacturer. Type A water repellents are useful in imparting water repellency to absorbent mineral surfaces, such as bricks, sand-lime bricks, plasters, porous stones, concrete and cast stone masonry etc.

4.2 Type B (Solvent Mix)

Type B water repellents are generally used for industrial, high-traffic, and exterior applications where maximum durability and deep penetration are required. They are effective for concrete, masonry, stone, and roofing materials exposed to severe conditions. These repellents are mixed with organic solvents, which allow them to penetrate more deeply and form a more durable water-repellent layer. They often have a stronger odor and require more careful handling.

Type B water repellents are based on silicone and are supplied pre diluted in organic solvents. They can be dissolved as per the manufacturer instruction. Generally the dilution to achieve reduction in 85 percent water absorption in 24 h. The diluted or as supplied the product can be applied on a surface till full saturation, these are suitable for application on all kinds of concrete, dense stones, natural and artificial stones, etc.

5 APPLICATION

5.1 The water repellent should be of such consistency that it can be readily applicable to surface by brushing or by spraying. When applied, it should not substantially change the dry appearance of the treated surface from that of the untreated surface, apart from the effect of any fugitive dye.

5.2 For Type A water repellents, this has to be applied on a saturated dry surface. After applying the coating, it may be left undisturbed for a minimum period of 2 h.

5.3 All Type B water repellents are applied to a substrate, which is clean and dry. Wet surfaces hinder the development of repellency on the surface. After application, the surface develops full water repellency in about 72 h. Within this period if, the surface is made wet by any means whether by sprinkling water or by rains effect of the treatment gets compromised. Hence, these treatment are best done on external surfaces during summers.

6 PERFORMANCE REQUIREMENTS

Silicone based water repellents shall comply with the test requirements specified in **6.1** to **6.5**. The Samples for testing shall be taken and prepared as per Annex A.

6.1 Water Repellency

Place the treated specimen as per Annex A on the level table with the treated face upward. Discharge three separate pools of 1 ml each of distilled or deionized water on the treated surface from a burette, the tip of which almost touches the surface. The water repellency shall be such that no pool of water shall he completely absorbed within 10 min.

6.2 Absorption of Water

The relative absorption of water through treated and untreated faces when determined by the method described in Annex B shall not be more than 10 percent.

6.3 Evaporation of Water

The evaporation ratio of water determined as per Annex C shall not be less than 10 percent.

6.4 Solid Content

Total solid content in water repellent shall not be less than 4 percent for Type A and 6 percent for Type B, when tested as per IS 13435 (Part 1).

7 PACKING AND MARKING

7.1 The package shall be securely closed and legibly and indelibly marked with the following information:

a) The type of repellent – Type A or Type B;
b) Name of the manufacturer;
c) Weight of the material in the package;
d) Recognized trade-mark, if any;
e) Batch number or Date, month and year of manufacture;
f) The appropriate flammability mark, if the flash-point is below 23 °C;
g) Shelf-life and storage requirements;

7.2 The materials, if in bulk, shall be packed in steel drums or HDPE drums. For Type B water repellents, other solvent resistant containers free from lead and lead-solder shall be used. For Type A materials, polyethylene containers may also be used.

7.3 The packages may also be marked with the Standard Mark.

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations made thereunder. The details of conditions under which a license for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A
(*Clauses* 6, 6.1, *and Annex B & C*)

PREPARATION OF TEST SPECIMEN

For carrying out the test, the samples of water repellent shall be sampled and prepared as follows:

A-1 After thorough shaking of the containers, approximately equal samples totalling not less than 600 g in weight, shall be taken at random. The samples shall be thoroughly mixed together and then divided into triplicate samples, each weighing not less than 200 g. These samples shall be placed in clean, dry, airtight containers of such size that they are nearly filled by the sample. Each container shall be sealed and marked with full details and the date of sampling.

A-2 CONTAINER USE FOR TESTING

A-2.1 For Type A water repellents glass, polyethylene, mild steel, stainless steel and other material resistant to caustic soda should be used.

A-2.2 For Type B water repellents solvent resistant containers shall be used.

A-3 Brick and slab specimen used for the testing shall confirm the following:

a) For Type A: Class A bricks with water absorption not more than 15 percent and shall not have crack wider then 0.15 mm, conforming to IS 1077 is use. The size of brick is 190 mm × 90 mm × 90 mm. 190 mm × 90 mm face shall be the test face.
b) For Type B: Lime stone slab as per IS 1128 or Sand stone slab as per IS 3622. The size of slab is 150 mm × 150 mm × 25 mm. 150 mm × 25 mm face shall be the test face.

A-4 Dilution of test solution shall be done as per **4.1** and **4.2** or as per manufacturer's instruction.

A-5 Dry the specimen of bricks or slab to the constant mass at 50 ± 2 °C so that they are free from moisture. Apply water repellent as per the manufacturer's instruction on the dry surface by brush and spray. Allow the specimen to dry for as per manufacturer's instruction at room temperature.

ANNEX B
(*Clause* 6.2)

METHOD OF MEASURING WATER ABSORPTION OF WATER

After preparation of sample as per Annex A, weight the treated specimen to the nearest of 1 g and record as W1. Then placed the specimen with treated surface downwards on an absorbent cotton pad in a water-filled tray. The level of water to be maintained at ± 3 mm of the treated face. Care should be taken to ensure that the specimens are not touch with any other objects. The tray to be covered with polythene sheets to cut down loss due to evaporation. Water level to be maintained from time to time. After 48 h, the specimen shall be removed from the water. To be wiped with tissue paper and weight and record as W2.

B-1 The specimen then shall be inverted & placed in the tray with the treated surface uppermost for 48 h and after removing water from the surface as mentioned above, the specimen weight again and record as W3.

B-1.1 The relative absorption shall be calculated according as given below:

$$\frac{W2 - W1}{W3 - W1} \times 100$$

ANNEX C
(*Clause* 6.3)

METHOD OF MEASURING EVAPORATION OF WATER THROUGH SURFACES

C-1 After preparation of sample as per Annex A, take the weight (W1) of dry sample. Place it in a tray on wire gauge or any other supporting medium with the test face upward & fill with clean water to a depth of 10 mm in tray. Remove the sample after 72 h and take a weight (W2), and cover the all face except test face, with the suitable weatherproof impermeable and rigid material such as glass. Water repellent is applied on the test face of one specimen and other specimen test face is kept untreated. Allow both the specimen to stand freely exposed with the test faces upwards in a well ventilated room for 7 days at room temperature and take a weight (W3) of untreated sample and weight (W4) of treated sample.

C-2 calculate the loss of weight from the treated sample (W2-W4) and untreated sample (W2-W3) then calculate the evaporation ratio in percentage as given below:

$$\frac{W2\text{-}W4}{W2\text{-}W3} \times 100$$