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-52 **27 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(26422)WC	**जल विकर्षक – विशिष्टि** **भाग 2 सिलेन आधारित** **का भारतीय मानक मसौदा** [IS 12027 (भाग 2)] 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-52 **22 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 (26422)WC	**Draft Indian Standard** **Water Repellents – Specification** **Part 2 Silane Based** [IS 12027 (Part 2)] 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 (26422)WC**

Title: **Draft Indian Standard Water Repellents – Specification**
Part 2 Silane Based
[IS 12027 (Part 2)] ICS 91.120.30

LAST DATE OF COMENT: **22/09/2024**

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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WATER REPELLENTS – SPECIFICATION
PART 2 SILANE BASED

[IS 12027 (Part 2)]
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.

Silane-based water repellents work by penetrating deeply into porous materials and chemically bonding with the surface to form a hydrophobic barrier. This barrier effectively repels water while allowing moisture vapor to escape, thereby reducing water absorption and preventing damage without altering the material's appearance.

Silane based water repellents, when applied on a siliceous surface, upon drying, makes the surface water repellent. Being Nano in nature they are able to penetrate in the micro cracks of the surfaces and stop the water ingress by simple saturation by roller brush. Silane based water repellents which is primarily Composed of silane and poly siloxanes compounds such as polydimethyl siloxane, dimethyl dichlrosilane, trichlorosilane, tetra methyl silane etc, penetrates deeply into the substrate and reacts with the material to form a hydrophobic barrier within the pores. Thus Silane based water repellents maintain the aesthetics of the exposed brickwork and stone works enhancing their life. It also helps in protecting the exposed treated surfaces from becoming black because of growth of algae and mildew and drying with time.

The general life expectancy for Silane based water repellents are 10 years or more, subject to the climatic conditions. As a general guideline, silane based water repellents best suted for the porous surfaces such as concrete. However, other material may also utilized this if they have sufficient porosity such as porous stone or masonry and other porous surface.

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.

The standard on Silicone based Water Repellents IS 12027 was first published in 1987. In this revision, the Water Repellents has been grouped into two parts. This standard (Part 2) covers specification for Silane based Water Repellents. The other part in the series is:

Part 1 Silicone based (*under preparation*)

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 2 SILANE BASED

1 SCOPE

This standard specifies the requirements, testing methods, and guidelines for the use of silane based water repellents intended for the use on porous materials specially on concrete, to impart water repellence through penetrating deeply into porous materials and chemically bonding with the surface to form a hydrophobic barrier, while allowing moisture vapour to escape.

NOTE – Other material may also utilized this if they have sufficient porosity such as porous stone or masonry and other porous surface.

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 12027 (Part 1): xxxx	Water repellents – Specification: Part 1 Silicone based (*under preparation*)
IS 13435 (Part 1): 2021	Acrylic based polymer waterproofing materials - Methods of test: Part 3 Determination of capillary water take-up
IS 17863 (Part 3): 2022 /ISO 4892-3:2016	Plastics methods of exposure to laboratory light sources: Part 3 Fluorescent UV lamps

3 TERMINOLOGY

For this standard, the following definitions shall apply:

3.1 Silane Formulation – A silane solution in a voltaic solvent or an aqueous solution or emulsion, the non-volatile content of both consisting mainly of silanes.

3.2 Silanes – A material, which contains silicon connected with alkoxy group and also organic hydrocarbon groups attached directly to the silicon atom.

4 CLASSIFICATION

Silane 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, environmental safety, and maintaining the surface's appearance are important. They work effectively on concrete, masonry, and stone surfaces in less demanding environments. Type A water repellent is based on silane 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.

4.2 Type B (Solvent Mix)

Type B water repellents are generally used for industrial, high-traffic, and exterior applications where deep penetration, high durability, and long-term protection are required. They are effective on concrete, masonry and stone exposed to severe weather conditions and heavy use. Type B water repellents are based on silane 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.

5 APPLICATION

Silane based water repellents are applied on a surface, which is clean and dry. Wet surfaces will reduce the absorption and lead to poor development of repellency on the surface. After applying the silane solution, it may be left undisturbed for a minimum period of 24 h or till fully dried. The surface can be checked for repellency at that stage.

6 PERFORMANCE REQUIREMENT

Silane 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

Water absorption of test specimen prepared as per Annex A, with coating of silane based water repellent after 48 h immersion in water. The difference of mass of coated cube, before and after immersion, it shall not be more than 0.5 percent.

6.3 Evaporation of Water

The evaporation ratio of water determined as per Annex C of IS 12027 (Part 1) shall not be less than 10 percent.

6.4 Ultraviolet (UV) Radiation

When sample is expose to the ultraviolet radiation in fluorescent UV lamps as per IS 17863 (Part 3)/ISO 4892-3 for 1 000 h. The sample shall not change the colour and the treated sample shall

maintain at least 80 percent of its initial water repellency after exposure to UV light for 1 000 h when tested as per **6.1.**

6.5 Solid Content

Total solid content in silane based water repellent shall not be less than 8 percent, 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* 6.2)

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 Specimen used for the testing shall be 150 mm cube of M 25 grade concrete as per IS 456.

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 concrete cube 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.