



भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG, NEW DELHI 110002

व्यापक परिचालन मसौदा

हमारा संदर्भ: सीईडी 41/टी-18

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 है:

प्रलेख संख्या	शीर्षक
सीईडी 41(26419)WC	जल विकर्षक का अनुप्रयोग - रीति संहिता का भारतीय मानक मसौदा (IS 12054 का पहला पुनरीक्षण) ICS 91.120.30

कृपया इस मानक के मसौदे का अवलोकन करें और अपनी सम्मतियाँ 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 : **27 सितम्बर 2024**

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

यदि कोई सम्मति प्राप्त नहीं 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 वेबसाइट www.bis.gov.in पर भी उपलब्ध है।

धन्यवाद।

भवदीय,

(द्वैपायन भद्रा)
प्रमुख (सिविल इंजीनियरी)

संगलन : 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-18

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(26419)WC	Draft Indian Standard Application of Water Repellents – Code of Practice <i>(First Revision of IS 12054) ICS 91.120.30</i>

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(26419)WC

Title: Draft Indian Standard Application of Water Repellents – Code of Practice
(First Revision of IS 12054) ICS 91.120.30

LAST DATE OF COMMENT: 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

(Not to be reproduced without the permission of BIS or used as an Indian Standard)

Draft Indian Standard

APPLICATION OF WATER REPELLENTS – CODE OF PRACTICE

(First Revision of IS 12054)

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)

The fundamental purpose of water repellents is to create a hydrophobic barrier on a surface, preventing liquid water from penetrating while allowing vapor to escape. This is crucial for porous materials such as concrete, brick, and natural stone, where trapped moisture can lead to long-term issues such as corrosion, efflorescence, biological growth, structural degradation and other moisture-related problems. Water repellents prevent these issues by minimizing water absorption while maintaining the breathability of the material.

There are two primary types of water repellents is available first one is work through breathable film-forming and next one by penetrating. Film-forming repellents such as silicone based water repellents, create a visible barrier on the surface, often providing a glossy finish and excellent water resistance. However, they can be prone to cracking, peeling, or discoloration over time. On the other hand, penetrating water repellents, such as silanes based water repellents, are more commonly used in construction. These products penetrate deep into the substrate, forming a molecular barrier that repels water while maintaining the material's natural appearance and breathability.

The application of water repellents requires careful consideration of several factors, including the material's porosity, environmental exposure, and the desired aesthetic outcome. Proper surface preparation and application methods are critical to ensuring the effectiveness of the treatment.

Water repellents when 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 water repellents minimize peeling and blistering caused by the damp and salt from the masonry walls. The repellent should he applied on complete surface rather than to individual units, in order to avoid inadvertent treatment of bedding faces which would detrimentally affect mortar bonding.

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.

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) The scope has been elaborated and Silane based water repellents has been included,
- b) Necessary information of surfaces to be treated has been introduce with the elaborate procedure,
- c) Selection of water repellents through its inherent characteristic has been introduce,
- d) New section has been added for selection of water repellent on the basis of field test, and
- e) Safety precautions procedure has been elaborated.

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***APPLICATION OF WATER REPELLENTS – CODE OF PRACTICE***(First Revision)***1 SCOPE**

This standard lays down the guidelines for selection of water repellents, preparation of surfaces to be treated, preparation of water repellents solution before use and the procedure to apply.

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:

<i>IS No.</i>	<i>Title</i>
IS 12027 (Part 1) : xxxx	Water repellents – Specification: Part 1 Silicone based (<i>under preparation</i>)
IS 12027 (Part 2) : xxxx	Water repellents – Specification: Part 2 Silane based (<i>under preparation</i>)

3 MATERIALS

Water repellents shall satisfy the requirements laid down in IS 12027 (Part 1) and IS 12027 (Part 2).

4 NECESSARY INFORMATION OF SURFACES TO BE TREATED

Before applying the water repellents, following information about the surface to be treated shall be required for effective treatment:

4.1 Surface Material Type

Identify the material of the surface (e.g., concrete, brick, natural stone, masonry, tiles, wood, etc.). Different materials have different porosity levels and absorption characteristics. Highly porous materials will absorb more water repellent than denser surfaces.

4.2 Surface Condition

Assess the surface contamination condition such as dirt, dust, grease, mold, algae, and efflorescence. Evaluate the moisture content of the surface as the surface should be dry and free from contamination before application.

4.3 Surface Damage or Defects

Inspect the surface for any cracks, holes, or joints that need to be repaired before application. Water repellents will not be effective on cracked surfaces unless properly sealed beforehand. Water repellents can be applied to surface generally free from cracks exceeding 0.10 mm in width. Surface should also free from any type of degradation, such as spalling, scaling, or flaking

4.4 Surface Previous Treatments

Determine the type and nature of previous treatment, whether the surface has been previously treated with any Water Repellents, sealants, paints, or coatings. Some older coatings can interfere with the penetration of water repellents and may need to be removed before application.

4.5 Surface Exposure

Consider the surface's exposure condition to environmental factors such as rain, standing water, sunlight, moisture, salt concentration, . Surfaces exposed to harsh conditions may require more durable water repellents.

5 SELECTION OF WATER REPELLENTS

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. a brief guideline for selection of suitable water repellents is given below:

5.1 Silicone Based Water Repellents

5.1.1 Silicone based water repellents are typically used for dense surfaces like stone, tiles, wood, masonry etc.

5.1.2 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.

5.1.3 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.

5.2 Silane Based Water Repellents

5.2.1 silane based water repellents are preferred for more porous materials such as concrete.

5.2.2 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.

5.2.3 The general life expectancy for Silane based water repellents are 10 years or more, subject to the climatic conditions.

5.3 Concentration

Concentration of the active ingredient (silane or silicone) is appropriate for the intended application. Higher concentrations are needed for very porous surfaces, while lower concentrations may suffice for denser substrates.

5.4 Selection of Mixing Medium (Water Mix or Solvent Mix)

Water mix water repellents are generally used for residential and indoor applications where ease of use, environmental safety, and maintaining the surface's appearance are important.

Solvent mix 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.

6 FIELD TEST FOR SELECTION OF WATER REPELLENTS

Following field test are useful for selection of water repellents for the specific surface in view of the surface's characteristics and the environmental conditions:

6.1 Water Absorption Test

This test helps determine the surface's porosity and absorption rate. Apply a controlled amount of water to the surface by using a pipette or small container. Measure the time it takes for the surface to absorb the water completely. If the surface absorb water fast it mean that surface is highly porous and use of silane based water repellents is recommended, as they penetrate deeper into the material. If the surface absorb water slowly it mean that surface is dense and use of silicone based water repellents is recommended, as they form a protective barrier on the surface.

6.2 Water Droplet Test

This test checks the surface's natural hydrophobic properties and can help determine the existing condition of the surface. Place a few droplets of water on different areas of the surface and observe whether the water beads up or spreads out. If the water beads up it mean that the surface may already have some water-repellent properties, either due to previous treatments or the natural characteristics of the material. In this case silicone based water repellent may be more suitable. If the water spreads out it means the surface is highly absorptive and may require a penetrating silane based water repellent.

6.3 Penetration Depth Test

This test is crucial for evaluating the depth of penetration of water repellent, especially on porous surfaces. Apply a small amount of the selected water repellent to a test area. After curing as per manufacturer's instructions, cut a cross-section of the treated material and measure the penetration

depth using visual or microscopic examination. If shallow penetration is observed it means that a more deeply penetrating product is needed for better protection.

6.4 Visual Change Test

Some water repellents may cause the surface to darken or change in appearance. This test helps determine the aesthetic impact of the water repellent. Apply a small amount of water repellent to the surface. Allow it to cure according to the manufacturer's instructions. If no visible change is observed, the water repellent is suitable for surfaces.

7 Preparation of Water Repellent

Some water repellents come ready to use and do not require mixing or dilution. In such cases, gently stir the product to ensure homonymous consistency. Some of the water repellents required dilution and mixing with the specific media before use. The following general guidelines is use for preparing water repellent products before use:

7.1 Always follow the specific manufacturer's instructions on preparation, including dilution ratios, mixing requirements, and storage conditions. These may vary significantly between manufacture to manufacture.

7.2 Use suitable clean and contaminants free containers and measuring equipment for preparation.

7.3 Use a mechanical stirrer or mixing paddle to ensure the water repellent is evenly mixed. Avoid overmixing, as this can cause the product to break down or foam.

7.4 Solvent mix water repellents may be prepared by diluting with the following solvent:

- a) Thinner, general purpose, for synthetic paints and varnishes as per IS 14314
- b) Petroleum hydrocarbon solvents as per IS 1745
- c) p-xylene as per IS 17370 : 2023.

7.5 Water mix water repellents may be diluted with water as per IS 1069.

8 PREPARATION OF SURFACES TO BE TREATED

Proper surface preparation is crucial to ensure that water repellents work effectively to the substrate and deliver long-lasting protection. The following guidelines should follow for preparation of surface before application:

8.1 Clean the surface thoroughly to remove dirt, dust, grease, biological growth, and any previous coatings. Cleaning should be done with the water, use of detergents or wetting agents shall be avoided. 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.

8.2 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 h, and the surface shall again be washed with muriatic acid (HCl) and rinsed with water. The entire surface may then be treated with water repellent after the surface has dried thoroughly.

8.3 Repair any defects, including cracks and damaged areas, and ensure the surface is sound and even.

8.4 Ensure the surface is dry and within the optimal temperature range for application. The surfaces must be allowed to dry prior to the application of the water repellent. In places where drying is difficult, water mix water repellent shall be used either as a full treatment or as a treatment prior to the use of solvent mix water repellent.

8.5 Perform a test patch to ensure compatibility between the surface and the water repellent. This test will help to understand the absorption rate of the surface, effect of current environment (temperature, humidity etc.) and the product's impact on appearance.

8.6 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 h, the cement paint should be cured for a longer period before treating the entire surface.

9 APPLICATION OF THE REPELIENT

The general guidelines for application of water repellents to the surface is as follow:

9.1 Equipment such as rollers or brushes are suitable for small areas, edges, and detailed work. Use a medium-to-soft bristle brush or a roller with a low nap for even application.

9.2 Spray such as pump sprayers, low-pressure spray and airless sprayers is ideal for large areas and vertical surfaces. The ideal nozzle pressure as flow is 0.035 MPa or even less. Maintain a consistent distance of about 150-300 mm from the surface and use a similar spray pattern for the entire surface.

9.3 Generally, it is sufficient to apply a single coat on dense surface. For highly porous surfaces, two coats is required. The second coat should be applied wet-on-wet, meaning the second coat is applied before the first coat fully dries.

10 SAFETY PRECAUTIONS

10.1 Proper Personal Protective Equipment (PPE) such as gloves, goggles, and protective clothing should be Wear during application. If using solvent-based repellents are use respiratory protection is also necessary.

10.2 Ventilation

Ensure adequate ventilation, especially when working indoors or with solvent-based products, to prevent inhalation of fumes.

10.3 Fire Safety

Be cautious with flammable solvent mix water repellents, keep them away from heat sources and open flames.