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Preskušanje naravnega kamna - Ugotavljanje občutljivosti za naključno obarvanje

Natural stone test methods - Determination of sensitivity to accidental staining

Prüfverfahren für Naturstein - Bestimmung der Empfindlichkeit gegen unbeabsichtigte Fleckenbildung

Méthodes d'essai pour pierres naturelles - Détermination de la sensibilité au tachage accidentel

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EUROPEAN STANDARD

EN 16301

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Natural stone test methods - Determination of sensitivity to accidental staining

Méthodes d'essai pour les pierres naturelles -
Détermination de la sensibilité au tachage accidentel

Prüfverfahren für Naturstein - Bestimmung der
Empfindlichkeit gegen unbeabsichtigte Fleckenbildung

This European Standard was approved by CEN on 15 February 2021.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 16301:2021) has been prepared by Technical Committee CEN/TC 246 “Natural stones”, the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2021, and conflicting national standards shall be withdrawn at the latest by September 2021.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 16301:2013.

The significant changes between this document and the previous edition are listed herewith:

— updating of subclause 5.3.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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EN 16301:2021 (E)**1 Scope**

This document specifies a method to assess the sensitivity of natural stones when exposed to accidental staining. It defines a procedure for the application of the stains as well as the cleaning and the assessment of the surface appearance after cleaning. It also covers the possibility to assess the efficiency of a chemical treatment.

Note that the method does not intend to present any de-staining technique.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 11664-2, *Colorimetry — Part 2: CIE standard illuminants (ISO 11664-2)*

EN ISO 11998, *Paints and varnishes — Determination of wet-scrub resistance and cleanability of coatings (ISO 11998)*

ISO 1065, *Non-ionic surface-active agents obtained from ethylene oxide and mixed non-ionic surface-active agents — Determination of cloud point*

3 Terms and definitions

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For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
<https://standards.iteh.ai/catalog/standards/sist/0d1eb216-27f6-4784-9b06-a177d646f104/sist-en-16301-2021>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1**surface finishing**

final surface texture applied to a stone during processing

3.2**matt finished surface**

surface treatment to produce a very flat, uniform, but not polished finish

Note 1 to entry: Matt finished surface can be obtained by means of a silicium carbide bonded polishing disk with grain size F 400 mesh.

3.3**chemical treatment**

application of chemical materials to the exposed face of a slab

3.3.1**surface coating**

chemical treatment whereby coating remains on the surface

3.3.2**impregnation**

protection of the surface of a stone by a pore-sealing product

3.4

staining agent

liquid used to produce stains on the surface of the stone

4 Principle

A defined set of staining agents is applied on a defined stone surface. The mode of application is specified. The specimens are conditioned and washed with a standardized cleaning machine. The stones are dried and the possible remainders of the stains are assessed by a visual observation.

5 Apparatus

5.1 Ventilated oven capable of maintaining a temperature of $(40 \pm 5) ^\circ\text{C}$ and $(70 \pm 5) ^\circ\text{C}$.

5.2 Pipette, 0,10 ml to 1,00 ml.

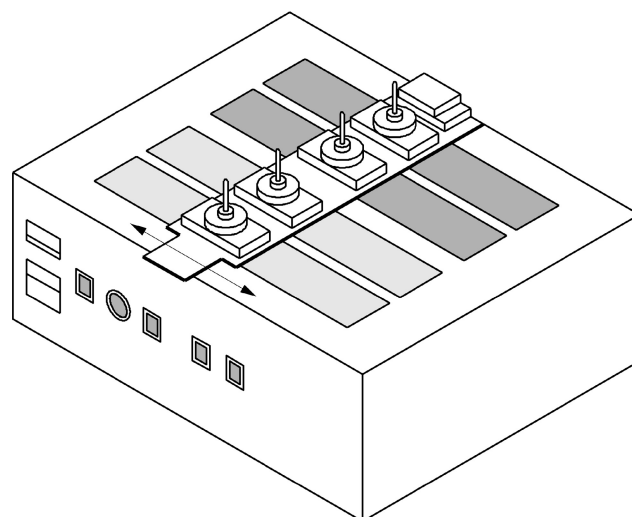
5.3 Wet Abrasion Scrub Tester, according to EN ISO 11998. The machine (Figure 1) works with a reciprocating transverse movement with a frequency of (37 ± 2) cycles per minute, and amplitude (stroke length) of approximately (300 ± 10) mm. The total weight of the scrubbing arm with dry cloth and its holder shall be (350 ± 10) g.

NOTE The equipment will take 350 mm long specimens but only with an amplitude / stroke length of 300 mm.

5.4 Mass to achieve the specified load on the scrubbing arm.



a)



b)

Key

- a) scrubbing arm with dry cloth and its holder
- b) the machine

Figure 1 — Example of washing apparatus for cleaning test

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5.5 Cleaning cloth

- a) Dimensions of the cloth 120 mm × 38 mm (may be different depending on the cleaning equipment).
- b) Thickness: $(2 \pm 0,5)$ mm.
- c) Area mass: (300 ± 50) g/m².
- d) A thinner cloth may be used in layers to achieve the above stated properties.
- e) At least 50 % viscose (regenerated cellulose fibres).
- f) At least 20 % cotton.

5.6 Holder for the cleaning cloth, e.g. wooden block (Figure 2). The scrubbing arm of the machine is equipped with e.g. a wooden block measuring 89 mm × 38 mm × 32 mm. The block holds a piece of cleaning cloth measuring 120 mm × 38 mm. The standard dimension of the scrubbing area of the brush in the standards mentioned above are $(90 \pm 0,5)$ mm × $(39 \pm 0,5)$ mm.

Dimensions in millimetres



Key

- 1 cloth

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Figure 2 — Cleaning cloth on wooden block

5.7 Camera, digital (a minimum of 2,5MPixels, uncompressed), for documentation of unstained and stained test specimens.

5.8 Daylight or illuminants D65 (6 500 K) according to EN ISO 11664-2.

5.9 Stand for repeatable photography conditions.

5.10 Cleaning solution pH-neutral, without abrasive, multipurpose cleaner, surfactant-based anionic type or a product based on the following composition:

- 12,5 % (m/m) of a sodium primary (C10-C14) polymer alkyl aryl sulphonate;
- 12,5 % (m/m) polyethylated derivatives of primary or secondary (C8-C16) alcohols with 5 to 15 ethoxylated groups having a cloud point of 25 °C to 75 °C in 1 % (m/m) aqueous solution (determination of cloud point is described in ISO 1065);
- 5,0 % (m/m) ethanol;
- 70 % (m/m) deionized or distilled water.

The cleaning agent shall be stored in a glass bottle in a cool dark place and should be used within 1 year of the day of preparation.

5.11 Hand spray pump for applying the cleaning solution.

5.12 Staining agents, the set of staining agents to be used for the test is defined in Annex A.

6 Preparation of specimens

6.1 Sampling

The method of sampling shall be stated in the test report and shall be chosen so that the samples are representative of the batch to be tested.

6.2 Test specimens

6.2.1 Surface finish

For identification test and comparison, the specimens shall have a “matt finished surface”.

NOTE Schist and slate are exceptions to this rule. They can be tested on natural cleft surface.

For “technological testing”, surfaces with a roughness $> 0,5$ mm are not suitable for testing due to the risk of damaging the apparatus.

6.2.2 Dimensions

One sample set consists of three test specimens sized, minimum 300 mm by 100 mm, and thickness as in use (maximum 30 mm). Alternative dimensions can be used if different cleaning equipment is used.

6.2.3 Testing environment (standards.iteh.ai)

The test specimens shall be placed in (23 ± 5) °C and (50 ± 5) % relative humidity during the entire stain exposure.

Daylight or artificial light D65 is used during the photography and the evaluation.

6.2.4 Pre-conditioning and treatment of the specimens

Marble and limestone shall be dried in (40 ± 5) °C for one week before the test. Other stone types shall be dried in (70 ± 5) °C for at least 24 h.

Commercially used stone products are sometimes impregnated in some way to make them easier to clean. The traditional treatment of carbonaceous stones is soft soap, which partially seals the pores and makes the surface a bit more hydrophobic. For standard test the stones shall be non-treated as a reference. If a carbonaceous stone type is tested, one set should also be treated with soft soap 2,5 vol. % solution in water, or similar which is recommended by the Stone Industry federations. The soap treatment is not mandatory, but highly recommended.

Instruction for the treatment with soft soap:

- the solution is sprayed on with a hand-pumped spray;
- after 3 h: The next layer is applied;
- after another 21 h: The excess shall be rinsed off under running water.

The test specimens are kept in (23 ± 5) °C and (50 ± 5) % relative humidity for a minimum 16 h before applying the staining agents.

If a chemical treatment (surface coating, impregnation, etc.) shall be tested, the procedure of applying this shall be documented and follow the manufacturer’s instruction.

7 Procedure

7.1 Documentation of the test specimens

A digital photographic record of the test specimens shall be made before stains are applied. Use daylight or artificial light D65. The photographs should be scaled.

7.2 Staining agents to be used in the standard test

The set of staining agents to be used for the test is defined in Annex A.

For specific uses, it is required to use also urine and blueberry soup (Annex A).

Other products can be used and prepared according to instructions by the manufacturer or commissioner.

7.3 Staining procedure

All samples have to be stained in the same way.

The stains shall have the same size and shape.

All staining shall be performed at $(23 \pm 5) ^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity. The samples shall remain in this atmosphere during the whole exposure time, usually 15 min and (48 ± 1) hours as a default value.

Other time schedules may be used provided that the commissioner asks for it.

The diameter of the stains shall be (35 ± 5) mm.

NOTE Most water-based stains, like Cola, wine and coffee have the same surface properties and a suitable stain volume is 0,70 ml. This volume is also sufficient for ketchup, which is spread out to the same size. A stain like oil has completely different surface properties and immediately floats out on most stone materials. To get a stain in the same size as for the water-based products a volume of 0,15 ml is suitable.

Surface treated samples may need the staining agent to be spread out to reach the optimal 35 mm diameter as in Figure 3.

Dimensions in millimetres

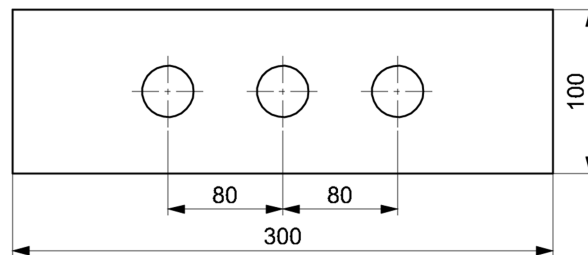


Figure 3 — Optimal specimen size and stain pattern