

SLOVENSKI STANDARD
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Preskušanje naravnega kamna - Ugotavljanje občutljivosti pri spremembi videza, nastalega pri termičnih ciklih

Natural stone test methods - Determination of sensitivity to changes in appearance produced by thermal cycles

Prüfverfahren für Naturwerkstein - Bestimmung der Empfindlichkeit gegen Änderungen des äußeren Erscheinungsbildes durch thermische Zyklen

Méthodes d'essai pour pierres naturelles - Détermination de la sensibilité aux changements d'aspect induits par des cycles thermiques

<http://standards.iteh.ai/catalog/standards/sist/1c5697ba-4c2f-4a8b-4a04185c08311/sist-en-16140-2019>

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ICS:

91.100.15	Mineralni materiali in izdelki	Mineral materials and products
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English Version

**Natural stone test methods - Determination of sensitivity
to changes in appearance produced by thermal cycles**

Méthodes d'essai pour pierres naturelles -
Détermination de la sensibilité aux changements
d'aspect induits par des cycles thermiques

Prüfverfahren für Naturwerkstein - Bestimmung der
Empfindlichkeit gegen Änderungen des äußeren
Erscheinungsbildes durch thermische Zyklen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 246.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (prEN 16140:2017) has been prepared by Technical Committee CEN/TC 246 “Natural stones”, the secretariat of which is held by UNI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 16140:2011.

This draft standard is one of the series of draft standards for tests on natural stone. Test methods for natural stone consist of the following standards:

- EN 1925, *Natural stone test methods - Determination of water absorption coefficient by capillarity*;
- EN 1926, *Natural stone test methods - Determination of uniaxial compressive strength*;
- EN 1936, *Natural stone test methods - Determination of real density and apparent density, and of total and open porosity*;
- EN 12370, *Natural stone test methods - Determination of resistance to salt crystallization*;
- EN 12371, *Natural stone test methods - Determination of frost resistance*;
- EN 12372, *Natural stone test methods - Determination of flexural strength under concentrated load*;
- EN 12407, *Natural stone test methods - Petrographic examination*;
- EN 12440, *Natural stone - Denomination criteria*;
- EN 12670, *Natural stone – Terminology*;
- EN 13161, *Natural stone test methods - Determination of flexural strength under constant moment*;
- EN 13364, *Natural stone test methods - Determination of the breaking load at dowel hole*;
- EN 13373, *Natural stone test methods - Determination of geometric characteristics on units*;
- EN 13755, *Natural stone test methods - Determination of water absorption at atmospheric pressure*;
- EN 13919, *Natural stone test methods - Determination of resistance to ageing by SO₂ action in the presence of humidity*;
- EN 14066, *Natural stone test methods - Determination of resistance to ageing by thermal shock*;
- EN 14146, *Natural stone test methods - Determination of the dynamic modulus of elasticity (by measuring the fundamental resonance frequency)*;
- EN 14147, *Natural stone test methods - Determination of resistance to ageing by salt mist*;
- EN 14157, *Natural stone test methods - Determination of the abrasion resistance*;
- EN 14158, *Natural stone test methods - Determination of rupture energy*;

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- EN 14205, *Natural stone test methods - Determination of Knoop hardness;*
- EN 14231, *Natural stone test methods - Determination of the slip resistance by means of the pendulum tester;*
- EN 14579, *Natural stone test methods - Determination of sound speed propagation;*
- EN 14580, *Natural stone test methods - Determination of static elastic modulus;*
- EN 14581, *Natural stone test methods - Determination of linear thermal expansion coefficient;*
- EN 16301, *Natural stone test methods - Determination of sensitivity to accidental staining.*

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1 Scope

This European Standard specifies a method to assess possible alterations of natural stones (mainly visible sensitivity to oxidation processes) under the effect of sudden changes in temperature (thermal shock).

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)*

3 Terms and Definitions

No terms and definitions are listed in this document.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

4 Symbols and Abbreviations

e Thickness of the test specimens, in mm.

5 Principle

The specimens are subjected to successive cycles, each formed by drying at $(70 \pm 5) ^\circ\text{C}$ followed by immediate immersion in water at $(20 \pm 5) ^\circ\text{C}$.

6 Apparatus

- 6.1 **A ventilated oven** capable of maintaining a temperature of $(70 \pm 5) ^\circ\text{C}$.
- 6.2 **A covered tank with a flat base**, comprising small non-oxidising and non-absorbent supports for the specimens.
- 6.3 **A digital camera of a minimum 2.5 MPixels, uncompressed or a scanner**, with a sufficient resolution.
- 6.4 **A daylight or illuminants D65 (6500K)** according to EN ISO 11664-2.
- 6.5 **A magnifying glass** of at least five increases.

7 Preparation of specimens

7.1 Sampling

Irrelevant

The sampling is not the responsibility of the test laboratory except where specially requested. At least seven specimens shall be selected from a homogeneous batch. One of these specimens is used as reference specimen and is not subjected to any tests.

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The samples shall be representative of the stone and avoid irrelevant particularities.

7.2 Test specimens**7.2.1 Surface finish**

As a standard reference (identification test) surface finish of the faces of the specimens shall be sawn.

In case of necessity as required for application (technological test), other surface finishes (e.g. honed, polished, flamed, sandblasted, splitting) may be tested.

7.2.2 Dimensions

As a standard reference (identification test) the test specimens shall be $(200 \times 200) \text{ mm} \pm 10 \text{ mm} \times e$.

In case of necessity as required for application (technological test), other dimensions may be used. In this case, test specimens may be final products or sawn from final products.

8 Test procedure**8.1 Control measurements before cycling**

The standardized surfaces of dried specimens are submitted to a thorough visual inspection, with the aid of a magnifying glass of at least five increases. All relevant features of its texture and also all visual and structural alterations of each specimen shall be noted, such as cracks, holes, swelling, spots, oxidations, or presence of metallic minerals or other sensitive minerals (e.g. biotite, hornblendes, etc.). A photographic (or scanner) record of all specimens to be tested shall be made. Daylight or artificial light D65 is used during the photography and the evaluation.

8.2 Description of the cycles

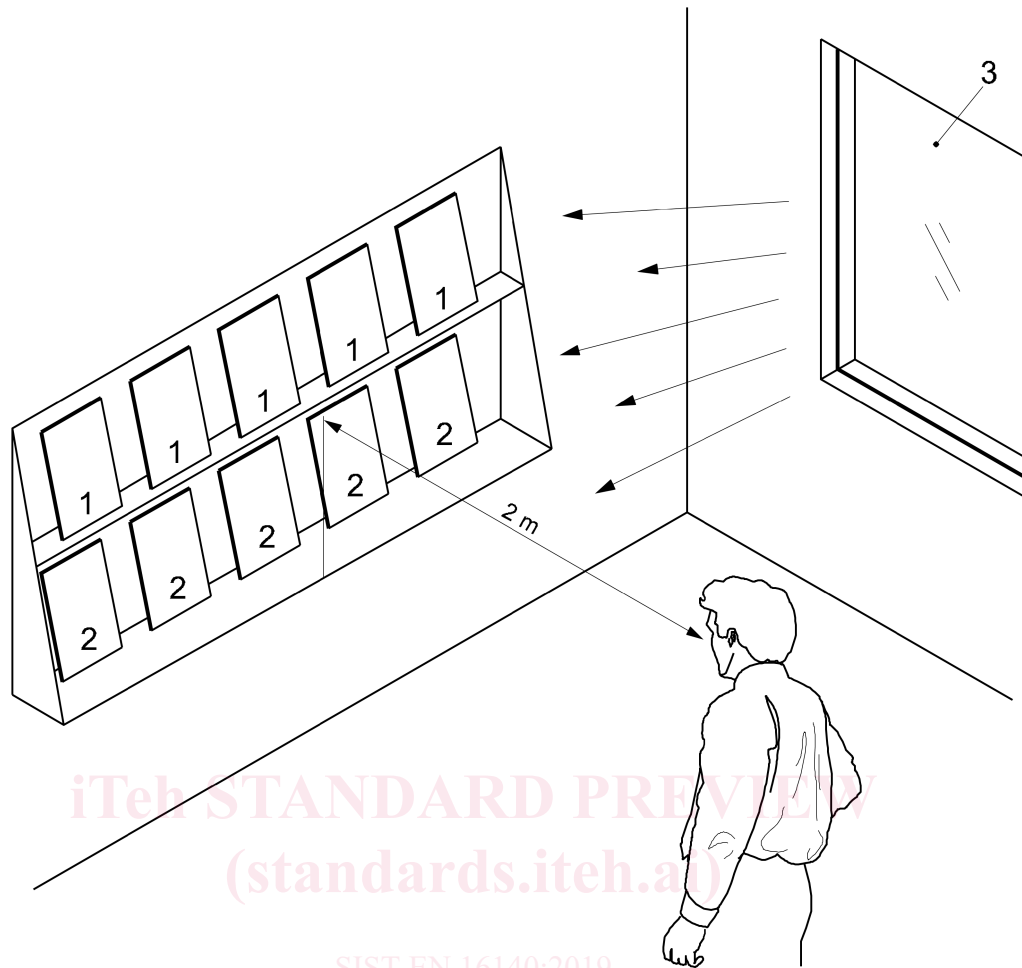
As a standard reference (identification test) the specimens are subjected to changes of temperature according to the following procedure: $(18 \pm 1) \text{ h}$ in a ventilated oven at $(70 \pm 5) ^\circ\text{C}$, immediately followed by $(6 \pm 0,5) \text{ h}$ of complete submersion in distilled or demineralized water, whose temperature before the immersion of the specimens is $(20 \pm 5) ^\circ\text{C}$.

Both in the oven and in the water container, the specimens are placed in vertical position on the supports at a distance of at least 50 mm from one another and from the wall. In the water container, the specimens are placed on supports located at the bottom of the container which has been filled with water to such a height that its level above the specimens is $(60 \pm 10) \text{ mm}$. The procedure described above constitutes one cycle. If the test is to be interrupted at any time, other than for testing, then the specimens are to be immersed in water at $(20 \pm 5) ^\circ\text{C}$. The test consists in a total of 20 cycles.

8.3 Control measurements after cycling

After the 20th cycle, the standardized surfaces of the specimens are visually inspected and compared general aspect or colour with the reference specimen. All alterations are noted. A photographic (or scanner) record shall be made, which includes both tested specimens and reference specimen placed next to one another.

The observation shall be carried out by placing the reference sample against the production samples and viewing them at a distance of about two metres under normal daylight conditions and recording any visible differences in the characteristics of the stones (see Figure 1).



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- 1 reference sample
- 2 production sample
- 3 daylight

Figure 1 — Comparison between tested sample and reference sample

Only noticeable changes visible are to be taken into account if they reach more than 1 % of the surface of the specimen. If visible changes are typical or accepted for the tested stone and as its technical performances are not adversely affected, they are permitted.

The concentration of any observed change shall be accurately identified expressed: mean dimension/diameter of the occurrence, percentage of the affected surface. The percentage shall be given according to Figure 2.

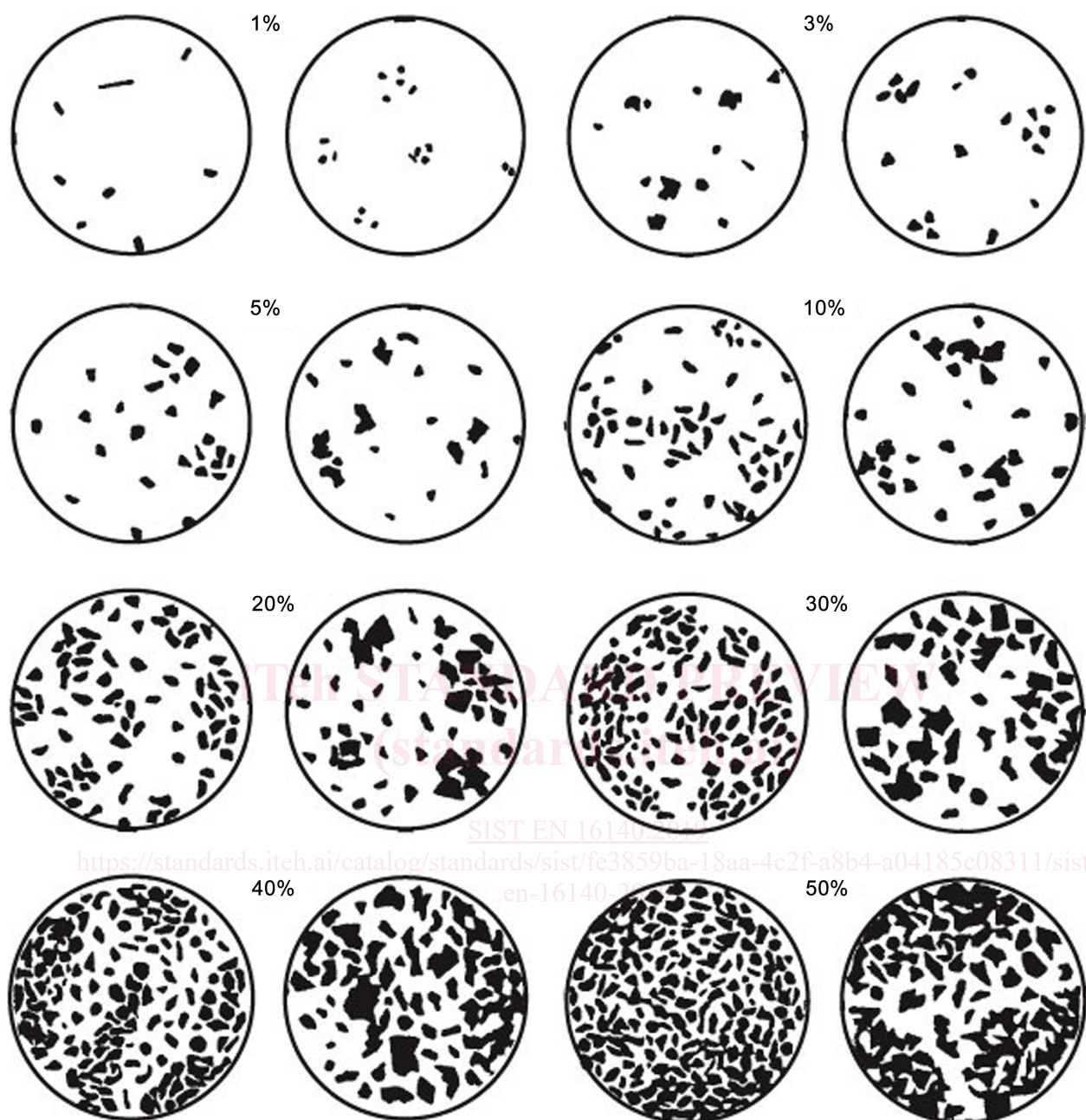


Figure 2 — Repartition of elements on natural stone surface in percentage (Terry, R.D. and Chilingar, G.V., 1955)¹⁾

- All changes of aspects shall be reported.
- Changes might be of two types:
- (i) clearly finite spots or mineral changes with or without spread of the colour within the stone;

¹⁾ Terry, R.D. & Chilingar G.V., 1955, "Concerning Some Additional Aids in Studying Sedimentary Formations" by M.S. Shuetsov. Journal of Sedimentary Petrology, v. 25, p. 229-234)