SLOVENSKI STANDARD
SIST EN 13919:2003

01-november-2003

Preskušanje naravnega kamna – Ugotavljanje odpornosti proti staranju pod vplivom SO2 v prisotnosti vlage

Natural stone test methods - Determination of resistance to ageing by SO2 action in the presence of humidity

Prüfverfahren für Naturstein - Bestimmung der Beständigkeit gegen Alterung durch SO2 bei und Feuchteeinwirkung

Méthodes d'essai pour éléments en pierre naturelle - Détermination de la résistance au vieillissement accéléré au SO2 en présence d'humidité

Ta slovenski standard je istoveten z: **EN 13919:2002**

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73.020	Rudarstvo in kamnolomsko izkopavanje	Mining and quarrying
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EUROPEAN STANDARD

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English version

Natural stone test methods - Determination of resistance to ageing by SO_2 action in the presence of humidity

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This European Standard was approved by CEN on 5 August 2002.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

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Contents

Foreword

This document (EN 13919:2002) has been prepared by Technical Committee CEN/TC 246 “Natural Stones”, the secretariat of which his 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of an identical text or by endorsement, at the latest by June 2003, and conflicting national standards shall be withdrawn at the latest by June 2003.

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 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 crystallisation.*

EN 12372, *Natural stone test methods - Determination of flexural strength under concentrated load.*

EN 12407, *Natural stone test methods – Petrographic description.*

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 a dowel hole.*

prEN 13373, *Natural stone test methods - Determination of geometric characteristics on units.*

EN 13755, *Natural stone test methods - Determination of water absorption at atmospheric pressure.*

prEN 14066, *Natural stone test methods - Determination of thermal shock resistance.*

prEN 14158, *Natural stone test methods – Determination of rupture energy.*

prEN 14581, *Natural stone test methods - Determination of thermal dilatation coefficient.*

prEN 14579, *Natural stone test methods - Determination of sound - speed propagation.*

prEN 14157, *Natural stone test methods – Determination of the abrasion resistance.*

prEN 14205, *Natural stone test methods - Determination of Knoop hardness.*

prEN 14231, *Natural stone test methods - Determination of slip resistance by means of the pendulum tester.*

prEN 14580, *Natural stone test methods - Determination of static elastic modulus.*

prEN ....(WI 00246030), *Natural stone test methods - Determination of surface finishes (rugosity).*

prEN 14147, *Natural stone test methods - Determination of resistance to ageing by salt mist.*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

The European Standard specifies a method to assess the relative resistance of natural stones to damage by sulphur dioxide in the presence of humidity.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 12440, *Natural stone - Denomination criteria*

EN 12670, *Natural stone - Terminology*

3 Principle

The resistance of natural stone units to a combination of temperature, humidity and sulphur dioxide is determined by placing test specimens in two containers for 21 with two different sulphur dioxide concentrations. After this period, mass loss and alterations to the test specimens are determined.

4 Symbols

m_0 is the mass of the dry specimen before the test, in grams;

m_1 is the mass of the dry specimen after the test, in grams;

Δm is the change in mass, in percent.

5 Reagents and materials

5.1 Sulphurous acid: a solution that contains between a mass fraction of 5 % and 6 % of sulphur dioxide in water;

5.2 De-mineralised or de-ionised water;

5.3 Abrasive paste (6 µm to 15 µm);

5.4 For each 50 l of container volume:

- Solution A: Dilute (500 ± 10) ml of sulphurous acid (H_2SO_3) in (150 ± 10) ml of de-mineralised or de-ionised water;
- Solution B: Dilute (150 ± 10) ml of sulphurous acid (H_2SO_3) in (500 ± 10) ml of de-mineralised or de-ionised water.

The solution shall be renewed before each test.

6 Apparatus

6.1 Two air-tight acid resistant containers with an inner volume of (50 ± 5) l. The lid shall be pitched sufficiently to allow condensation to drain back into the container. It is possible to use a container with a different volume provided that the volumes of solutions A and B are adjusted accordingly.

6.2 Two frames constructed in acid resistant materials, capable of holding the test specimens vertically and at a distance of approximately 100 mm above the acid solution. It is important that the frames are designed in such a way as to allow the acidic vapour to move freely around the specimens.

6.3 A weighing machine with an error limit of 0,01 % of the mass to be weighed.

6.4 A ventilated oven capable of maintaining a temperature of (70 ± 5)°C.

7 Preparation of the specimens

7.1 Sampling

The sampling is not the responsibility of the test laboratory except where specially requested.

At least 7 specimens, which are considered representative of the body of stone being tested, shall be selected. One specimen is used as a control.

Any observed anisotropy shall be marked on all specimens by at least two parallel lines on the side of the specimen.

7.2 Size of specimens

The specimens shall be (120 mm x 60 mm x 10 mm) ± 2 mm. The specimens should be prepared so that the surfaces show no burrs and the edges are smooth and clean. This is to assist in the observation of the surface after testing.

7.3 Drying the specimens

The specimens are washed to remove any abrasive paste residue or debris and then dried at a temperature of (70 ± 5) °C to constant mass. This is assumed to have been attained when the difference between two weighings made at an interval of (24 ± 2) h is not greater than 0,1 % of the first of these two masses. The weight of the dry specimen is the initial value m_0.

8 Test procedure

Immerse the specimens in water at (20 ± 5) °C for 24 h. Then place three specimens in the container with solution A and the other three in the container with solution B.

The specimens are held vertically on a frame in the container approximately 100 mm above the acid solution. The temperature inside the container is kept at (20 ± 5) °C for the duration of the test.

After 21 days the specimens are removed from the containers, washed in de-ionised or de-mineralised water, and then dried again to constant mass (see 7.3). The weight of the dry specimen is the final value m_1.

Compare all test specimens with the reference specimen.

Record any visually observed alterations such as colour changes, splitting, flaking or erosion of the arises.

9 Expression of the results

9.1 Change in mass

The change in mass expressed as percentage for each specimen is calculated as follows:

$$\Delta m = \frac{(m_0 - m_1)}{m_0} \quad \text{x100}$$

9.2 Visual appearance

Record any changes in appearance – colour changes, spots, rust, swelling, cracking, surface deposition or surface flaking, etc.

10 Test report

The test report shall contain the following information:

a) unique identification number of the report;

b) the number, title and date of issue of this European standard;

c) the name and address of the test laboratory and the address where the test was carried out if different from the test laboratory;

d) the name and address of the client;

e) it is the responsibility of the client to supply the following information:

- the petrographic name of the natural stone in accordance with EN 12670;
- the commercial name of the natural stone in accordance with EN 12440;
- the country and region of extraction;
- the name of the supplier;
- the direction of any existing plane of anisotropy (if relevant to the test) to be clearly indicated on the sample or on each specimen by means of two parallel lines;
- the name of the person or organization which carried out the sampling;
- the surface finish of the specimens (if relevant to the test);

f) the date of delivery of the sample or of the specimens;

g) the date when the specimens were prepared (if relevant) and the date of testing;

h) the number of specimens in the sample;

i) the dimensions of the specimens;