Nederlandse norm

NEN-EN 16306

(en)

Natuursteen beproevingsmethoden - Bepaling van weerstand van marmer aan thermische- en vocht cycli

Natural stone test methods - Determination of resistance of marble to thermal and moisture cycles

Vervangt NEN-EN 16306:2011 Ontw.

ICS 73.020; 91.100.15

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Postbus 5059, 2600 GB Delft
Telefoon (015) 2 690 390, Fax (015) 2 690 190

Nederlands voorwoord

Voor de in deze norm vermelde normatieve verwijzingen bestaan in Nederland de volgende equivalenten:

vermelde norm	Nederlandse norm	titel
EN 12372	NEN-EN 12372	Beproevingsmethoden voor natuursteen - Bepaling van de buigsterkte bij geconcentreerde belasting
EN 12670:2001	NEN-EN 12670:2002	Natuursteen - Terminologie
EN 13161	NEN-EN 13161	Beproevingsmethoden voor natuursteen - Bepaling van de buigsterkte onder een constant moment
EN 14146	NEN-EN 14146	Beproevingsmethoden voor natuursteen - Bepaling van de dynamische elasticiteitsmodulus (door het meten van de resonantiefrequentie)
EN 14579	NEN-EN 14579	Beproevingsmethoden voor natuursteen - Bepaling van de voortplantingssnelheid van geluid
EN ISO 4892-1:2000	NEN-EN-ISO 4892-1:2000	Kunststoffen - Methoden om monsters aan laboratoriumlichtbronnen bloot te stellen - Deel 1: Algemene leidraad

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 16306

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ICS 73.020; 91.100.15

English Version

Natural stone test methods - Determination of resistance of marble to thermal and moisture cycles

Méthodes d'essai pour pierres naturelles - Détermination de la résistance du marbre aux cycles thermiques et d'humidité

Prüfverfahren für Naturstein - Bestimmungen der Beständigkeit von Marmor bei zyklischer Belastung mit Wärme und Feuchtigkeit

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Contents

Page

Foreword

This document (EN 16306:2013) 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of an identical text or by endorsement, at the latest by August 2013, and conflicting national standards shall be withdrawn at the latest by August 2013.

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1 Scope

This European Standard specifies a laboratory method for determining the resistance to thermal and moisture cycling of marble intended for cladding of building facades.

For scientific definition of marble, reference is made to EN 12670:2001, Terminology: 2.1.243 a.

NOTE Bowing and rapid strength loss is known to occur in some marbles when used as exterior claddings.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

EN 12670:2001, *Natural stone – Terminology*

EN 13161, *Natural stone test methods – Determination of flexural strength under constant moment*

EN 14146, *Natural stone test methods – Determination of the dynamic modulus of elasticity (by measuring the fundamental resonance frequency)*

EN 14579, *Natural stone test methods – Determination of sound speed propagation*

EN ISO 4892-1:2000, *Plastics - Methods of exposure to laboratory light sources - Part 1: General guidance (ISO 4892-1:1999)*

3 Terms and definitions

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

3.1
bowing
change in shape from flat and planar to a curved or dished shape in a convex or concave direction

Note 1 to entry: Other terms commonly used for the same phenomenon are dishing and warping. Convex bowing is quantified by positive values, concave bowing by negative values.

3.2
convex
centre part of the specimen is bowing upwards, away from the moist substratum

3.3
concave
centre part of the specimen is bowing downwards, against the moist substratum

4 Principle

Bowing is measured on test samples exposed to moisture from beneath and heating from above. The temperature interval is from 20°C to 80°C, one cycle completed each 24 h. The 80 ºC is measured on a black reference, placed on the surface of one specimen to control the climate of the chamber/bath.

The potential strength loss is measured according to EN 12372 or EN 13161 on reference and exposed specimens (Annex A).

5 Symbols

T temperature

H_0 initial height of the specimen at the measuring point [mm]

H difference between the initial height and the height after a given cycle [mm]

H_N the normalised height difference, related to L_N = 1 m [mm]

B H_N / L_N = the normalised bowing value [mm/m]

B_n bow values after n cycles [mm/m]

L distance between the supports under the specimen = 0,35 [m]

L_N normalised length = 1 [m]

6 Apparatus

6.1 A non-corrosive bath (Figure 1) of sufficient capacity to hold the required number of specimens. The container must be designed in a way that specimens receive continuous moisture from one side and are exposed to cyclic heating on the other side. The container shall be furnished with a device that ensures a constant water level during the cycling. Lying on the bottom of the container is a grating, which is covered by a sheet of heat stable filter cloth.

6.2 A non-corrosive grating that fits the length and width of the container and has a height of at least 1 cm. The function of the grating is to ensure a water reservoir beneath the filter cloth.

6.3 A soft, heat and dimension stable non-hygroscopic needle filter cloth of thickness approximately 5 mm and without any water soluble substances or chemicals. The cloth (e.g. polyester or PTFE (polytetrafluoroethylene) needle felt) is to be placed on top of the grating. The function of the cloth is to provide moisture and a uniform support to the specimen.

6.4 Heating panels of sufficient sizes/and numbers to cover the container. The panels must be capable of providing a uniform heat flow, heating the black reference from 20 °C to 80 °C at average rate of (0,30 ± 0,05) °C per minute. The maximum allowed temperature difference within the bath, during heating exposure, is 3 °C. Walls of insulating material should preferably be placed around the container (Figure 1) to avoid unwanted cooling or air circulation. Before the system is taken into use, trial measurements of the temperature shall be performed at nine surface points widely distributed within the heating frame (Figure 2). The temperature is measured on a uniform surface preferably with an infrared thermometer or a surface measuring thermometer. The temperature readings shall be taken on the surface of the black reference.

NOTE 1 The heating rate may be adjusted by changing the distance between the heating device and the samples, or by controlling the effect of the heater. The heating curve is displayed in Figure 5.

6.5 A black reference plate, according to EN ISO 4892-1:2000 (Figure 3), to establish the maximum surface temperature at 80°C. The black reference is connected by a thermocouple (cable type K), preferably to a high stability temperature and process controllers. A simple logger is also possible.

NOTE 2 The black reference is placed on the surface of the measured sample, preferably in the middle of the container. The temperature for the experimental exposure is programmed in advance. The heating elements are connected to the whole system and are controlled by the process controller. The temperature of the black reference is

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