

Vervangt NEN-EN 14579:2002 Ontw.

Nederlandse norm

NEN-EN 14579 (en)

Beproevingmethoden voor natuursteen -
Bepaling van de voortplantingssnelheid van
geluid

Natural stone test methods - Determination of sound speed
propagation

ICS 73.020; 91.100.15

november 2004

Als Nederlandse norm is aanvaard:
 - EN 14579:2004, IDT

Voorbeeld
 Preview

Normcommissie 353 099 "Verzameling geregistreerde onderwerpen"

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ICS 73.020; 91.100.15

English version

Natural stone test methods - Determination of sound speed propagation

Méthodes d'essai pour pierres naturelles - Détermination de la vitesse de propagation du son

Prüfverfahren für Naturstein - Bestimmung der Geschwindigkeit der Schallausbreitung

This European Standard was approved by CEN on 23 August 2004.

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Foreword

This document (EN 14579:2004) 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of an identical text or by endorsement, at the latest by April 2005, and conflicting national standards shall be withdrawn at the latest by April 2005.

This standard is one of the series for tests on natural stone.

Test methods for natural stone consist of the following parts:

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 examination*

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 14147, *Natural stone test methods – Determination of resistance to ageing by salt mist*

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 14157:2004, *Natural stone test methods – Determination of abrasion resistance*

EN 14158:2004, *Natural stone test methods – Determination of rupture energy*

EN 14579:2004, *Natural stone test methods – Determination of sound speed propagation*

prEN 14580:2002, *Natural stone test methods – Determination of the static elastic modulus*

prEN 14581:2002, *Natural stone test methods – Determination of linear thermal expansion coefficient*

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1 Scope

This document specifies a method for the determination of the velocity of propagation of pulses of ultrasonic longitudinal waves in natural stone, both in laboratory and in situ.

2 Principle

A pulse of longitudinal vibrations is produced by an electro-acoustical transducer held in contact with one surface of the stone under test. After traversing a known path length in the stone, the pulse of vibrations is converted into an electrical signal by a second transducer and electronic timing circuits enable the transit time of the pulse to be measured.

3 Symbols and abbreviations

V pulse velocity, in km/s

L path length, in mm

T time taken by the pulse to transverse the length, in μs

4 Apparatus

4.1 General

4.1.1 The apparatus consists essentially of an electrical pulse generator, a pair of transducers, an amplifier and an electronic timing device for measuring the time interval elapsing between the onset of a pulse generated at the transmitting transducer and the onset of its arrival at the receiving transducer.

4.1.2 Two forms of electronic timing apparatus are available:

- a) an oscilloscope on which the first front of the pulse is displayed in relation to a suitable time scale;
- b) an interval timer with a direct reading digital display.

NOTE An oscilloscope provides the facility for examining the wave form, which can be advantageous in complex situations.

4.2 Performance requirements

The apparatus shall comply with the following performance requirements:

- to measure transit times in the calibration bar to an accuracy of $\pm 0,1 \mu\text{s}$;
- to ensure a sharp pulse onset, that is the electronic excitation pulse applied to the transmitting transducer shall have a rise time of not greater than one-quarter of its natural period;
- the pulse repetition frequency shall be low enough to ensure that the onset of the received signal is free from interference by reverberations.

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