

Natural stone test methods — Determination of flexural strength under concentrated load

The European Standard EN 12372:1999 has the status of a
British Standard

ICS 91.100.15

National foreword

This British Standard is the English language version of EN 12372:1999, including Corrigendum December 2002.

The UK participation in its preparation was entrusted to Technical Committee B/545, Natural stone, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 12, an inside back cover and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

This British Standard, having been prepared under the direction of the Sector Committee for Building and Civil Engineering, was published under the authority of the Standards Committee and comes into effect on 15 September 1999

© BSI 5 September 2003

ISBN 0 580 32289 0

Amendments issued since publication

Amd. No.	Date	Comments
14509 Corrigendum No. 1	5 September 2003	Correction to equation in A.2

English version

Natural stone test methods — Determination of flexural strength under concentrated load

Méthodes d'essai pour pierres naturelles —
Détermination de la résistance à la flexion sous
charge centrée

Prüfverfahren für Naturstein —
Bestimmung der Biegefestigkeit unter
Mittellinienlast

This European Standard was approved by CEN on 12 January 1999.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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 Central Secretariat 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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

This European Standard 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 1999, and conflicting national standards shall be withdrawn at the latest by September 1999.

This standard is one of the series of standards 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 crystallization.*

prEN 12371, *Natural stone test methods — Determination of frost resistance.*

prEN 12407, *Natural stone test methods — Petrographic description.*

prEN 13161, *Natural stone test methods — Determination of flexural strength (under constant moment).*

prEN 13364, *Natural stone test methods — Determination of the breaking load at a dowel hole.*

prEN(WI 00246011), *Natural stone test methods — Determination of thermal dilatation coefficient.*

prEN(WI 00246012), *Natural stone test methods — Determination of sound-speed propagation.*

prEN(WI 00246014), *Natural stone test methods — Determination of abrasion resistance.*

prEN(WI 00246015), *Natural stone test methods — Determination of Knoop hardness.*

prEN(WI 00246016), *Natural stone test methods — Determination of thermal shock resistance.*

prEN(WI 00246017), *Natural stone test methods — Determination of slip coefficient.*

prEN(WI 00246018), *Natural stone test methods — Determination of static elastic modulus.*

prEN(WI 00246019), *Natural stone test methods — Determination of rupture energy.*

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

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

prEN(WI 00246032), *Natural stone test methods — Determination of resistance to ageing by salt mist.*

prEN(WI 00246033), *Natural stone test methods — Determination of resistance to ageing by humidity, temperature, SO₂ action.*

prEN(WI 00246035), *Natural stone test methods — Determination of dynamic elastic modulus (by fundamental resonance frequency).*

prEN(WI 00246036), *Natural stone test methods — Determination of water absorption at atmospheric pressure.*

It is intended that other prENs should call up this EN 12372 as the basis of evaluation of conformity. (Nevertheless it is not intended that all natural stones products should be subjected regularly to all the listed tests. Specifications in other standards should call up only relevant test methods).

This European Standard has an Annex A (normative).

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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Contents

	Page
Foreword	2
1 Scope	3
2 Normative references	3
3 Principle	3
4 Symbols	3
5 Apparatus	3
6 Preparation of the specimens	4
7 Test procedure	4
8 Expression of the results	5
9 Test report	5
Annex A (normative) Statistical evaluation of the test results	10

1 Scope

This European Standard specifies a test method for determination of flexural strength under a concentrated load for natural stone. Both an identification and a technological product testing procedure are included.

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 revision 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.

prEN 12390, *Testing concrete — Determination of compressive strength — Specification for compression testing machines*.

prEN 12670, *Natural stones — Terminology*.

prEN 12359:1996, *Testing concrete — Determination of flexural strength of test specimens*.

prEN 12440, *Denomination of natural stone*.

3 Principle

The principle of this method is to place a specimen on two rollers and to progressively load the specimen in the middle. The breaking load is measured and the flexural strength calculated.

4 Symbols

R_{tf}	flexural strength, in megapascals;
F	breaking load, in newtons;
l	distance between the supporting rollers, in millimetres;
b	width of the specimen adjacent to the plane of fracture, in millimetres;
h	thickness of the specimen adjacent to the plane of fracture, in millimetres;
L	total length of the specimen, in millimetres.

5 Apparatus

5.1 A *balance*, capable of weighing the specimen with a precision of 0,01 % of the mass of the specimen.

5.2 A *ventilated oven*, capable of maintaining a temperature of $(70 \pm 5) ^\circ\text{C}$.

5.3 A *linear measuring device*, with an accuracy of 0,05 mm.

5.4 A *testing machine of appropriate force*, in accordance with prEN 12390 and calibrated according to this standard.

5.5 A *device for applying loads on the specimen by a centre-point load*, in accordance with Annex A of prEN 12359:1996. It consists of two lower rollers (supporting rollers) and one upper roller (load-applying roller) which shall be centred exactly in the middle between the two supporting rollers (see Figure 1). The distance between the two supporting rollers shall be reported as requested in 6.2.2.

5.6 A *room*, which can be maintained at a temperature of $(20 \pm 5) ^\circ\text{C}$.