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**Lepila in fugirne malte za ploščice - 3. del: Ugotavljanje upogibne in tlačne trdnosti**

Grouts for tiles - Part 3: Determination of flexural and compressive strength

Klebstoffe und Fugenmörtel für Fliesen und Platten - Teil 3: Bestimmung der Biege- und Druckfestigkeit

Mortiers de joints pour carrelages - Partie 3: Détermination de la résistance a la flexion et a la compression

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**SIST EN 12808-3:2002****en**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 12808-3**

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## Grouts for tiles - Part 3: Determination of flexural and compressive strength

Mortiers de joints pour carrelages - Partie 3: Détermination de la résistance à la flexion et à la compression

Klebstoffe und Fugenmörtel für Fliesen und Platten - Teil 3: Bestimmung der Biege- und Druckfestigkeit

This European Standard was approved by CEN on 3 November 2001.

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 Management Centre 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 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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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## Foreword

This European Standard has been prepared by Technical Committee CEN /TC 67 "Ceramic tiles", 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of an identical text or by endorsement, at the latest by June 2002, and conflicting national standards shall be withdrawn at the latest by June 2002.

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.

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**EN 12808-3:2001 (E)****1 Scope**

This European Standard applies to all ceramic tile grouts for internal and external tile installations on walls and floors.

This standard describes the test method to be used to determine the compressive and flexural strength of ceramic tile grouts.

This European Standard does not contain performance requirements or recommendations for the design and installation of ceramic tiles.

NOTE Ceramic tile grouts can also be used for other types of tiles (natural and agglomerated stones, etc. ), where these do not adversely affect the stones.

**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 1066, *Adhesives – Sampling*.

EN 1067, *Adhesives - Examination and preparation of samples for testing*.

EN 196-1:1994, *Method of testing cement - Determination of strength*.

EN 1348:1997, *Adhesives for tiles - Determination of tensile adhesion strength for cementitious adhesives*.

**3 Sampling**

Take a sample of at least 2 kg of the product to be tested in accordance with EN 1066 and EN 1067.

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**4 Test conditions**

Standard conditions shall be  $(23 \pm 2)$  °C and  $(50 \pm 5)$  % R.H. and a circulation of air in the working area less than 0,2 m/s.

**5 Test materials**

Condition all test materials for at least 24 hours under standard conditions.

**6 Apparatus**

**6.1** Three-gang mould shall consist of three horizontal compartments so that three prismatic specimens 40 mm x 40 mm x 160 mm can be prepared simultaneously. (See EN 196-1:1994, 4.5)

**6.2** Jolting apparatus or jolting table used for the compaction of 40 mm x 40 mm x 160 mm grout specimen; shall comply with 4.6 of EN 196-1:1994.

**6.3** Flexural strength testing machine shall be capable of applying the load with suitable capacity and sensitivity for the test. The machine shall be provided with a flexure device in accordance with 4.7 of EN 196-1:1994. (See Figure 1)

**6.4** Compressive strength testing machine shall comply with 4.8 of EN 196-1:1994. The test requires the use of a jig (in accordance with 4.9 of EN 196-1:1994) to be incorporated in the lower platen; the upper platen receives the load from the machine through an intermediate spherical seating. (See Figure 2)

## 7 Procedure

### 7.1 Mixing of grouts

The amount of water and/or liquid admix required for preparing the cementitious grout shall be as stated by the manufacturer in parts by weight, i.e. liquid to dry powder.

Prepare at least 2 kg of the grout in a mixer of the type described in 4.4 of EN 196-1:1994, using the slow speed settings, (140 ± 5) rpm rotation and (62 ± 5) rpm planetary movement.

- Carry out the following procedure :
  - pour the liquid into the pan
  - scatter the dry powder over the liquid
  - mix for 30 s
  - take out the mixing paddle
  - scrape down the paddle and pan within 1 min
  - replace the paddle and mix for 1 min

Let the grout mature if and as specified in the manufacturer's instructions, and then mix for a further 15 s.

In the case of reaction resin grouts follow the manufacturer's instructions.

### 7.2 Preparation of test specimens

Mould the specimens immediately after the preparation of the grout, with the mould firmly clamped to the jolting table.

Introduce, using a suitable scoop, the first of two layers of grout into each of the compartments, directly from the mixing bowl. Spread the layer uniformly, then compact using 60 jolts.

Introduce the second layer of grout, level and compact with a further 60 jolts.

Lift the mould gently from the jolting table, strike off excess of material and smooth the surface with a flat trowel. Wipe off the grout left on the perimeter of the mould.

Cover the mould with a plate glass sheet according to EN 196-1:1994.

Place the mould, suitably identified, on a horizontal base in standard conditions, (23 ± 2) °C and (50 ± 5) % R.H.

After 24 hours carefully remove the specimen from the mould.

Keep the demoulded prism in standard conditions for 27 days, leaving a clearance of at least 25 mm on all sides.

Prepare three specimens for each grout.

### 7.3 Flexural strength under standard conditions

After conditioning has been completed place the prism in the testing machine (6.3) with one side face on the supporting rollers and with the longitudinal axis normal to the support.

Apply the load vertically in accordance with the procedure described in 9.2 of EN 196-1:1994.

Keep the prism halves in standard conditions until tested in compression.

### 7.4 Compressive strength under standard conditions

Test the prism halves broken in flexion, by means of the equipment specified in 6.4 and following the procedure described in 9.3 of EN 196-1:1994.

### 7.5 Flexural and compressive strength after freeze-thaw cycles

Prepare the test units in accordance with 7.2.

Condition the test units for 6 days in standard conditions and then immerse in water for 21 days before carrying out 25 freeze-thaw cycles, in accordance with the procedure described in EN 1348:1997, 8.5.

**EN 12808-3:2001 (E)**

For each freeze-thaw cycle:

- remove the test units from the water and lower the temperature to  $(-15 \pm 3)^\circ\text{C}$  within 2 hours  $\pm$  20 min;
- maintain the test units at  $(-15 \pm 3)^\circ\text{C}$  for 2 hours  $\pm$  20 min;
- immerse in water at  $(20 \pm 3)^\circ\text{C}$  and raise the temperature to  $(15 \pm 3)^\circ\text{C}$  for 2 hours  $\pm$  20 minutes.

Repeat the cycle 25 times.

Condition the test units for 3 days in standard conditions after the last cycle and prior to test examine them and record a brief description of surface appearance of the specimen. Determine the flexural strength in accordance with 7.3 and the compressive strength in accordance with 7.4.

**8 Evaluation of results****8.1 Flexural strength**

The flexural strength ( $R_f$ ) is calculated from:

$$R_f = \frac{1,5 F_f L}{b^3} \text{ N/mm}^2$$

where:  $b$  is the length of the side of the square section of the prism (mm);  
 $F_f$  is the load applied to the middle of the prism at fracture (N);  
 $L$  is the distance between the supports (mm).

Calculate the mean of the three determinations to the nearest 0,1 N/mm<sup>2</sup>.

**8.2 Compressive strength**

The compressive strength ( $R_c$ ) is calculated from:

$$R_c = \frac{F_c}{1600} \text{ N/mm}^2$$

where:  $F_c$  is the maximum load at fracture (N);  
 1600 = 40 mm x 40 mm is the area of the platens or auxiliary plates (mm<sup>2</sup>).

Calculate the mean of the six results obtained from the test to the nearest 0,1 N/mm<sup>2</sup>.

**9 Test report**

The test report shall provide the following information:

- a) number, title and issue of this European Standard;
- b) the place and date of sampling;
- c) type of grout, commercial designation and manufacturer name;
- d) identification of the test sample;
- e) handling and storage of samples before testing;
- f) test conditions;
- g) date of testing;
- h) amount of water or liquid used for preparing the grout;



