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Adhesives for tiles - Determination of open time

Colles à carrelage - Détermination du temps ouvert

Mörtel und Klebstoffe für Fliesen und Platten - Bestimmung der offenen Zeit

This European Standard was approved by CEN on 21 January 2007.

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Foreword

This document (EN 1346:2007) 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of an identical text or by endorsement, at the latest by February 2008, and conflicting national standards shall be withdrawn at the latest by February 2008.

This document supersedes EN 1346:1996.

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

1 Scope

This European Standard specifies the test method for the determination of the open time of ceramic tile adhesives.

This European Standard is applicable to all ceramic tile adhesives for internal or external tile installations on walls and floors.

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

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

2 Normative references

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

EN 196-1:2005, *Methods of testing cement — Part 1: Determination of strength*

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

EN 1323, *Adhesives for tiles — Concrete slabs for tests*

EN 12004, *Adhesives for tiles — Requirements, evaluation of conformity, classification and designation*

EN 14411, *Ceramic tiles — Definitions, classification, characteristics and marking*

EN ISO 15605, *Adhesives — Sampling (ISO 15605:2000)*

3 Sampling

Take a 2 kg sample of the adhesive in accordance with EN ISO 15605 and EN 1067.

4 Test conditions

Standard conditions shall be (23 ± 2) °C and (50 ± 5) % relative humidity and the air speed in the testing area less than 0,2 m/s.

5 Test materials

5.1 General

Condition all test materials (adhesive etc.) for at least 24 h under standard conditions. The adhesive to be tested shall be within its shelf life, where this is specified.

5.2 Ceramic tiles

The tiles shall be checked prior to conditioning to ensure that they are new, clean and dry.

The tiles used for this method shall be of the following type:

type P1: glazed porous body tile complying with EN 14411, group BIII, of water absorption (15 ± 3) % by mass, with a thickness in the range 7 mm to 10 mm and a profile back pattern less than 0,25 mm deep, cut to facial dimensions of (50 ± 1) mm \times (50 ± 1) mm.

5.3 Concrete slab

The concrete slab shall comply with EN 1323.

6 Apparatus

6.1 Notched trowel

A notched trowel having 6 mm \times 6 mm notches at 12 mm centres.

6.2 Weight

A mass capable of exerting a force of $(20 \pm 0,05)$ N, with a cross-sectional area of less than 50 mm \times 50 mm.

6.3 Pull-head plates

Square metallic plates, with dimensions of (50 ± 1) mm \times (50 ± 1) mm and a minimum thickness of 10 mm with a suitable fitting for connection to the test machine.

6.4 Test machine

A test machine for direct pull tensile force test and with suitable capacity and sensitivity for the test. The machine shall be capable of applying the load to the pull-head plate at the rate of (250 ± 50) N/s through a suitable fitting that does not exert any bending force.

7 Mixing of adhesive

The amount of water and/or liquid admix required for preparing the adhesive shall be as stated by the adhesive manufacturer in parts by mass, i.e. liquid to dry powder (if a range of values is given, the average shall be used).

Prepare a minimum quantity of 2 kg of the adhesive in a mixer of the type described in 4.4 of EN 196-1:2005, using the speed settings (140 ± 5) r/min and (62 ± 5) r/min 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;

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- scrape down the paddle and pan within 1 min;
- replace the paddle and mix for 1 min.

Let the adhesive mature in accordance with the adhesive manufacturer's instructions and then mix for a further 15 s.

In the case of ready-to-use dispersion adhesives or reaction resin adhesives, the manufacturer's instructions shall be followed.

8 Procedure

Apply a thin layer of the adhesive, mixed in accordance with Clause 7, to the concrete slab with a straight edge trowel. Then apply a thicker layer and comb with the notched trowel (6.1).

Hold the trowel at an angle of approximately 60° to the substrate at a right angle to one edge of the slab and drawn across the slab parallel to that edge (in a straight line).

After 5 min, 10 min, 20 min and 30 min place at least ten test tiles of type P1, 50 mm apart, on the adhesive and load each tile with $(20 \pm 0,05)$ N for 30 s.

After 27 days storage under standard conditions, bond the pull-head plates (6.3) to the tiles with a suitable high strength adhesive (e.g. epoxide adhesive).

After a further 24 h storage under standard conditions determine the tensile adhesion strength of the adhesive by applying a force increasing at a constant rate of (250 ± 50) N/s.

9 Evaluation and expression of results

The individual tensile adhesion strengths are quoted to the nearest 0,1 N/mm² using the following equation:

$$A_s = L / A$$

where

A_s is the individual tensile adhesion strength in N/mm²;

L is the total tensile load in N;

A is the bonding area in mm² (2 500 mm²).

The tensile adhesion strength for each time interval is determined as follows:

- determine the mean of the ten values;
- discard the values falling outside the range of ± 20 % of the mean value;
- if five or more values remain, determine the new mean;
- if less than five values remain repeat the test;
- determine the mode of failure of the test units according to EN 12004 as the predominant mode.

The open time in minutes, is the maximum time interval at which the adhesive meets the tensile adhesion strength requirement defined in EN 12004.

10 Test report

The test report shall provide the following information:

- a) number and year of issue of this European Standard, i.e. EN 1346:2007;
- b) place and date of sampling;
- c) type of adhesive, commercial designation and manufacturer;
- d) identification of 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 adhesive;
- i) test results (individual and mean values and the mode of failure);
- j) open time in minutes;
- k) any other factor that could have influenced the result.