BS ISO 13007-4:2013

BSI Standards Publication

Ceramic tiles — Grouts and adhesives

Part 4: Test methods for grouts

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National foreword

This British Standard is the UK implementation of ISO 13007-4:2013. It supersedes BS ISO 13007-4:2010 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/539, Ceramic tiles and other rigid tiling.

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

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Ceramic tiles — Grouts and adhesives —

Part 4:
Test methods for grouts

Carreaux céramiques — Mortiers de joints et colles —

Partie 4: Méthodes d'essai pour les mortiers de joints

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. www.iso.org/patents

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

The committee responsible for this document is ISO/TC 189, *Ceramic tile*.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: http://www.iso.org/iso/home/standards_development/resources-for-technical-work/foreword.htm

This third edition cancels and replaces the second edition (ISO 13007-4:2010), of which it constitutes a minor revision.

ISO 13007 consists of the following parts, under the general title *Ceramic tiles — Grouts and adhesives*:

— *Part 1: Terms, definitions and specifications for adhesives*

— *Part 2: Test methods for adhesives*

— *Part 3: Terms, definitions and specifications for grouts*

— *Part 4: Test methods for grouts*

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Ceramic tiles — Grouts and adhesives —

Part 4: Test methods for grouts

1 Scope

This part of ISO 13007 describes methods for determining characteristics for grouts used in the installation of ceramic tiles. The following test methods are described:

— determination of flexural and compressive strength (4.1);

— determination of water absorption (4.2);

— determination of shrinkage (4.3);

— determination of resistance to abrasion (4.4);

— determination of transverse deformation (4.5);

— determination of chemical resistance (4.6).

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.

ISO 10545-6, *Ceramic tiles — Part 6: Determination of resistance to deep abrasion for unglazed tiles*

ISO 13007-2, *Ceramic tiles — Grouts and adhesives — Part 2: Test methods for adhesives*

3 General test conditions and procedures

3.1 Sampling

A representative sample of at least 2 kg shall be used.

3.2 Test conditions

Standard conditions shall be (23 ± 2) °C and (50 ± 5) % relative humidity (RH) and a circulation of air in the testing area less than 0,2 m/s. Other test conditions may be specified in Clause 4. The tolerance in the time of conditioning for all test specimens shall be as follows in Table 1.

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Table 1 — Allowed tolerance window for testing time for all samples after conditioning

Sample conditioning time	Allowed tolerance for testing
24 h	±0,5 h
7 d	±3 h
14 d	±6 h
21 d	±9 h
28 d	±12 h

3.3 Test materials

Condition all test materials including water for at least 24 h under standard conditions. The grout to be tested shall be within its shelf life, where this is specified.

3.4 Mixing procedures

3.4.1 Cementitious grouts (CG)

The amount of water and/or liquid admix required for preparing the grout shall be as stated by the manufacturer in parts by weight, i.e. liquid to dry powder (in the case where a range of values is given, the average shall be used). Prepare a minimum quantity of 2 kg of the powder and the necessary liquid using a mixer of the planetary type (see ISO 13007-2, Figure 1 and Figure 2) running at the slow speed settings (140 ± 5) rotation per min and (62 ± 5) rotation per min planetary movement.

Carry out the following procedure.

1) Pour the liquid into the pan.

2) Scatter the dry powder over the liquid.

3) Mix for 30 s.

4) Take out the mixing paddle.

5) Scrape down the paddle and pan within 1 min.

6) replace the paddle and mix for 1 min

If required by the grout manufacturer's instructions, let the grout mature as specified and then mix for an additional 15 s.

3.4.2 Reaction resin grouts (RG)

Where reaction resin grouts are to be used, the manufacturer's instructions shall be followed.

3.5 Test report

3.5.1 General

The information listed below shall be provided:

a) a reference to this part of ISO 13007 (ISO 13007-4:2013);

b) the date of test;

c) the type of grout, commercial designation and manufacturer's name;

d) the source, date obtained, and complete identification of test sample;

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e) the handling and storage of samples before testing;

f) the test conditions;

g) the amount of water or liquid used for preparing grout;

h) any other factor that could have affected the result.

3.5.2 Test results

The information listed below shall be provided:

a) Flexural and compressive strength

b) Water absorption

c) Shrinkage

d) Abrasion

4 Test methods

4.1 Determination of flexural and compressive strength

Flexural and compressive strength shall be tested following the general test conditions and procedures given in Clause 3 and the specific instructions which follow.

4.1.1 Apparatus

4.1.1.1 Gang mould, three gang moulds used to prepare prismatic specimens (40 ± 0,1) mm × (40 ± 0,1) mm × (160 ± 0,4) mm, with ground surfaces, made of steel. [See Figure A.1 a)]

4.1.1.2 Jolting apparatus, or jolting table used for the settlement of 10 mm × 40 mm × 160 mm grout specimen in accordance with Figure A.2.

4.1.1.3 Testing machine, 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 Figure A.3.

4.1.1.4 Testing jig, the test requires the use of a jig in accordance with Figure A.4 to be incorporated in the lower platen; the upper platen receives the load from the compressive strength testing machine through an intermediate spherical seating.

4.1.2 Preparation of test units

Mould the specimens immediately after the mixing 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. Place a 210 mm × 185 mm plate glass sheet of 6 mm thickness on the mould. A plate of steel or other impermeable material of similar size can be used. Place the mould, suitably identified, on a horizontal base in standard conditions, (23 ± 2) °C and (50 ± 5) % RH. After 24 h, carefully remove the specimen from the mould. Prepare three specimens for each grout. For fast-setting grout, demould the specimen immediately before the test.

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4.1.3 Flexural strength under standard conditions

Keep the demoulded prism in standard conditions for 27 d leaving a clearance between prisms of at least 25 mm. After conditioning has been completed, place the prism in the testing machine (4.1.1.3) with one side face on the supporting rollers and with the longitudinal axis normal to the support. Apply the load vertically by means of the loading roller to the opposite side face of the prism and increase it smoothly at the rate of (50 ± 10) N/s until fracture. Keep the prism halves in standard conditions until tested in compression.

4.1.4 Compressive strength under standard conditions

Test the prism halves broken in flexion, by means of the equipment specified in 4.1.1.4. Center the prism halves laterally to the platens of the machine within ±0,5 mm, and longitudinally such that the end face of the prism overhangs the platens or auxiliary plates by about 10 mm. Increase the load smoothly at the rate of (2400 ± 200) N/s over the entire load application until fracture.

4.1.5 Flexural and compressive strength after freeze-thaw cycles

Prepare the test units in accordance with 4.1.2. Condition the test units for 6 d in standard conditions and then immerse in water for 21 d before carrying out 25 freeze-thaw cycles following the procedure given in ISO 13007-2, 4.4.4.5. Condition the test units for 3 d 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 4.1.3 and the compressive strength in accordance with 4.1.4.

4.1.6 Evaluation of results

4.1.6.1 Flexural strength

The flexural strength (R_f) is calculated from:

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

where

b is the length of the side of the square section of the prism, in mm;

F_f is the load applied to the middle of the prism at fracture, in N;

L is the distance between the supports, in mm.

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

4.1.6.2 Compressive strength

The compressive strength (R_c) is calculated from:

$$R_c = \frac{F_c}{1\,600}\ \text{N/mm}^2 \qquad (2)$$

where

F_c is the maximum load at fracture, in N;

1 600 = 40 mm × 40 mm is the area of the platens or auxiliary plates, in mm^2.

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

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