

Australian Standard[®]

Ceramic tiles—Grouts and adhesives

Part 4: Test methods for grouts



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- Australian Ceramic Society
- Australian Chamber of Commerce and Industry
- Australian Industry Group
- Australian Stone Advisory Association
- Australian Tile Council
- Ceramic Tile Manufacturers Association of Australia
- CSIRO Manufacturing and Materials Technology
- Master Builders Australia
- Master Glazed Wall and Floor Tile Layers Association of SA
- Plastics and Chemicals Industries Association Incorporated
- Property Council of Australia
- Surface Coatings Association Australia
- TAFE NSW

Additional Interests:

- Mr Richard Bowman
-

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Ceramic tiles—Grouts and adhesives

Part 4: Test methods for grouts

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PREFACE

This Standard was prepared by the Standards Australia Committee BD-044, Fixing of Ceramic, Natural and Reconstituted Stone Tiles to supersede AS 4992.4—2004, *Ceramic tiles: Products for installation*, Part 3: Grouts: *Test methods*.

The objective of this Standard is to specify methods for determining characteristics for adhesives used in the installation of ceramic tiles.

The objective of this revision is to adopt the current edition of ISO 13007-4.

This Standard is identical with, and has been reproduced from, ISO 13007-4:2010, *Ceramic tiles—Grouts and adhesives*, Part 4: *Test methods for grouts*.

As this Standard is reproduced from an International Standard, the following applies:

- (a) Its number appears on the cover and title page while the International Standard number appears only on the cover.
- (b) In the source text ‘this International Standard’ should read ‘this Australian Standard’.
- (c) A full point substitutes for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to Australian Standards, as follows:

<i>Reference to International Standard</i>		<i>Australian Standard</i>	
ISO		AS ISO	
10545	Ceramic tiles	10545	Ceramic tiles
10545-6	Part 6: Determination of resistance to deep abrasion for unglazed tiles	10545.6	Part 6: Determination of resistance to deep abrasion for unglazed tiles
13007	Ceramic tiles—Grouts and adhesives	13007	Ceramic tiles—Grouts and adhesives
13007-2	Part 2: Test methods for adhesives	13007.2	Part 2: Test methods for adhesives

Only international references that have been adopted as Australian Standards have been listed.

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NOTES

AUSTRALIAN STANDARD

Ceramic tiles—Grouts and adhesives**Part 4:
Test methods for grouts****1 Scope**

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

- a) determination of flexural and compressive strength;
- b) determination of water absorption;
- c) determination of shrinkage;
- d) determination of resistance to abrasion;
- e) determination of transverse deformation;
- f) determination of chemical resistance.

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.

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

ISO 13007-2:2010, *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 $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity 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:

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

Sample conditioning time ^a	Allowed tolerance for testing ^b
24 h	±0,5 h
7 days	±3 h
14 days	±6 h
21 days	±9 h
28 days	±12 h
^a Testing shall be performed within the specified time window.	
^b Allowed tolerance in testing time for all samples requiring conditioning.	

3.3 Test materials

Condition all test materials, including water, for at least 24 h under standard conditions. The grout under test 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 liquid admix, or one or the other, required for preparing the grout shall be as stated by the manufacturer in mass fraction, 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 13007-2:2010, Figures 1 and 2) running at the slow 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;
- scrape down the paddle and pan within 1 min;
- 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 used, the manufacturer's instructions shall be followed.

3.5 Test report

3.5.1 General

The test report shall specify the following:

- a) reference to this part of ISO 13007, i.e. ISO 13007-4:2010;
- b) date of test;
- c) type of grout, commercial designation and manufacturer's name;
- d) source, date obtained and complete identification of test sample;
- e) handling and storage of samples before testing;
- f) test conditions;
- g) 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 test report shall specify the following:

- 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 Three gang moulds, used to prepare prismatic specimens $(40 \pm 0,1) \text{ mm} \times (40 \pm 0,1) \text{ mm} \times (160 \pm 0,4) \text{ mm}$, with ground surfaces, made of steel. Holes for fitting suitable pins (such as part number 62-L0009/1¹⁾ or equivalent) shall be pierced into the sides of the moulds corresponding to the ends of test specimens (see Figure A.1).

4.1.1.2 Jolting apparatus, or jolting table used for the settlement of $10 \text{ mm} \times 40 \text{ mm} \times 160 \text{ mm}$ grout specimen in accordance with Figure A.2.

1) Part number 62-L0009/1 is an example of a suitable product available commercially (from Invensys Controls S.R.L., Italy). This information is given for the convenience of users of this part of ISO 13007 and does not constitute an endorsement by ISO of this product.

4.1.1.3 Testing machine, of flexural strength type, 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, in accordance with Figure A.4, 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 may be used. Place the mould, suitably identified, on a horizontal base in standard conditions, $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity. 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.

4.1.3 Flexural strength under standard conditions

Keep the demoulded prism in standard conditions for 27 days 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. Centre the prism halves laterally to the platens of the machine within $\pm 0,5$ 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 $(2\,400 \pm 200)$ 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 days in standard conditions and then immerse in water for 21 days before carrying out 25 freeze-thaw cycles following the procedure given in ISO 13007-2:2010, 4.4.4.5. 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 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 using Equation (1):

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