

Australian Standard®

AS 1012.9:2014

Methods of testing concrete

Method 9: Compressive strength tests— Concrete, mortar and grout specimens

1 SCOPE

This Standard sets out the method for determining the compressive strength of concrete test specimens prepared in accordance with the provisions of AS 1012.8.1, AS 1012.8.3, AS 1012.14 or AS 1012.19.

NOTE: This Standard may involve hazardous materials, operations, and equipment. The Standard does not purport to address all of the safety problems associated with its use. The user of this Standard should establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

1012	Methods of testing concrete
1012.1	Method 1: Sampling of fresh concrete
1012.8	Method 8: Method for making and curing concrete
1012.8.1	Method 8.1: Compression and indirect tensile test specimens
1012.8.3*	Method 8.3: Method for making and curing grout and mortar specimens
1012.14	Method 14: Method for securing and testing cores from hardened concrete for compressive strength
1012.19	Method 19: Accelerated curing of concrete compression test specimens (laboratory or field)—Hot water and warm water methods
2193	Methods for calibration and grading of force-measuring systems of testing machines
3972	Portland and blended cements
5100	Bridge design
5100.4	Part 4: Bearings and deck joints

3 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

3.1 Designer

The person, persons or organization responsible for the design of the structure.

3.2 Concrete supplier

The person, persons or organization responsible for the supply of the concrete mix.

* To be published.

4 ACCEPTANCE OF SPECIMENS

4.1 Moulded cylinder specimens

Moulded cylinder specimens shall be accepted for testing if they have been moulded in accordance with AS 1012.8.1 and are free from defects likely to affect their strength.

Where specimens liable to rejection are tested, all apparent defects shall be noted in accordance with Clauses 11 and 12 herein.

Uncapped specimens shall be liable to rejection if any of the following conditions exist:

- (a) Either end of a cylinder is convex by more than 5 mm.
- (b) Aggregate or other bulges protrude from either end by more than 5 mm.
- (c) Any edge is broken away in such a manner that the radial or vertical break is more than 10 mm from the edge line and the corresponding circumferential break, or sum of circumferential breaks, exceeds 10% of the circumference of the cylinder.
- (d) Small depressions or other irregularities are present which would cause filled sulphur mixture caps complying with Clause 6.2.1 to be more than 6 mm thick over more than approximately 25% of the surface, except that such specimens shall not be liable to rejection if they are to be capped in accordance with Clause 6.2.4(a).
- (e) Either end of a cylinder is not at right angles to the axis and the departure from squareness exceeds 2° (approximately 5 mm in 150 mm).
- (f) The diameter at any cross-section deviates from either end diameter by more than 2 mm.
- (g) The height is less than 1.95 times the diameter.
- (h) Any apparent defect is considered liable to affect the test results.

4.2 Cored specimens

The relevant criteria of AS 1012.14 shall be used to determine acceptability of cored specimens.

4.3 Cube specimens

The sides of the cube specimens which are to be loaded shall be at right angles and be flat to within 0.05 mm.

5 PREPARATION OF TEST SPECIMENS

Test specimens shall be prepared as follows:

- (a) If the surfaces of test specimens that are to be brought into contact with the platens of the testing machine are not plane within 0.05 mm they shall be either—
 - (i) capped (moulded cylinders or cores); or
 - (ii) ground plane within 0.05 mm. (See Appendix A).

The ends of the specimens that will be in contact with the platens shall be parallel within 2°.
- (b) An uncapped end of a cylinder specimen, which is to be placed in contact with the testing machine platen that is not spherically seated, or the surface of a cap similarly placed, shall not depart from perpendicularity to the axis of the specimen by more than 0.5° (approximately 3 mm in 300 mm).
- (c) Before capping, all loose particles and laitance shall be removed from the ends of the cylinder.

- (d) Specimens that are to be tested in the wet condition shall be kept moist during the time taken for inspection, measuring, capping and crushing. The maximum period of time a specimen is kept outside standard moist-curing conditions shall not exceed 2 h.
- (e) Cored specimens that are to be tested in the dry condition shall be tested within 2 h of removal from the conditioning environment.

6 CAPPING

6.1 General

Where capping is required, the specimens shall be tested using either—

- (a) a moulded capping, prepared in accordance with Clause 6.2; or
- (b) a restrained natural rubber capping system complying with the requirements of Clause 6.3, provided compressive strength is expected to be greater than 10 MPa and less than 80 MPa.

6.2 Moulded capping materials

6.2.1 General

Moulded caps shall be as thin as practicable, but not thicker than 6 mm. Only one layer of capping material shall be used on each surface requiring capping, but small depressions may be filled prior to capping. Moulded capped surfaces shall not depart from a plane by more than 0.05 mm.

6.2.2 Preparation of capping materials

Moulded capping materials shall consist of one of the following, subject to the limitations on use set out in Clause 6.4:

- (a) *Filled sulphur mixtures* Mixtures of sulphur and at least 10% by volume of fine filler material such as fly ash, finely ground silica or fire clay, or cement may be prepared. The sulphur mixture shall be used at a temperature that ensures a suitable viscosity for capping.
- (b) *Portland cement mortar* Mortar made from a mixture of one part of Portland cement and one part of fine sand, provided that the water-cement ratio does not exceed 0.35, may be prepared. The Portland cement shall be fresh, free from lumps, and shall comply with the requirements of AS 3972.

The sand-cement mixture shall be mixed with water to form a stiff paste which shall be allowed to stand for not less than 0.5 h and not more than 2 h before use, to minimize shrinkage of the cap.

- (c) *High-alumina cement mortar* Mortar made from one part of high-alumina cement and one part of fine sand, provided that the water-cement ratio does not exceed 0.35, may be prepared. The high-alumina cement shall be fresh and free from lumps.

The sand-cement mixture shall be mixed with water to form a stiff paste which shall be allowed to stand for not less than 0.5 h and not more than 2 h before use, to minimize shrinkage of the cap.

- (d) *Cement pastes* Portland cement or high-alumina cement paste or mixtures of these may be used to prepare caps if the cement used is fresh and free from lumps.

The cement shall be mixed with water to form a stiff paste and used within 2 h.

- (e) *Special gypsum plasters* Special high-strength gypsum plaster may be used to prepare a capping paste after being tested in the following manner: