

Australian Standard™

**Chemical admixtures for concrete,
mortar and grout**

**Part 2: Methods of sampling and testing
admixtures for concrete, mortar and
grout**



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Concrete Institute of Australia
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Australian Standard™

Chemical admixtures for concrete, mortar and grout

Part 2: Methods of sampling and testing admixtures for concrete, mortar and grout

First published as AS 2072—1977 and AS 2073—1977.
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PREFACE

This Standard was prepared by the Standards Australia Committee BD-033, Chemical Admixtures for Concrete, to supersede AS 2072—1977, *Methods for the sampling of expanding admixtures for concrete, mortar and grout*, and AS 2073—1977, *Methods for the testing of expanding admixtures for concrete, mortar and grout*.

The objective of this Standard is to provide users and specifiers of chemical admixtures with procedures for sampling and testing of concrete, mortar and grout mixes, containing admixtures, including expanding admixtures.

This Standard incorporates the following major changes to AS 2072—1977 and AS 2073—1977:

- (a) The requirements for sampling of the admixtures have been expanded and updated.
- (b) A list of tests that may be required to be performed together with the reference method for each of these tests are included.
- (c) Additional tests have been included for dimensional change, consistency by use of a flow trough and early volume change.

The term ‘normative’ has been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard.

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STANDARDS AUSTRALIA

Australian Standard

Chemical admixtures for concrete, mortar and grout

Part 2: Methods of sampling and testing admixtures for concrete, mortar and grout

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard sets out procedures for sampling admixtures for packaged concrete, mortar and grouts and testing concrete, mortar and grout mixes containing admixtures.

This Standard applies to those admixtures intended for use in concrete, mortar and grout and for—

- (a) the evaluation of the performance of those admixtures for concrete, mortar and grout; and
- (b) sampling and testing concrete, mortar and grout mixes containing those admixtures.

This Standard does not apply to those admixtures specified in AS 1478.1.

1.2 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
1012.2	Method 2: Preparation of concrete mixes in the laboratory
1012.3	Method 3: Determination of properties related to the consistency of concrete
1012.3.1	Method 3.1: Slump test
1012.3.2	Method 3.2: Compacting factor test
1012.3.3	Method 3.3: Vebe test
1012.3.4	Method 3.4: Compactibility index
1012.4	Method 4: Determination of air content of freshly mixed concrete
1012.4.1	Method 4.1: Measuring reduction in concrete volume with increased air pressure
1012.4.2	Method 4.2: Measuring reduction in air pressure in chamber above concrete
1012.4.3	Method 4.3: Measuring air volume when concrete dispersed in water
1012.5	Method 5: Determination of mass per unit volume of freshly mixed concrete
1012.8	Method 8: Method of making and curing concrete
1012.8.1	Method 8.1: Compression and indirect tensile test specimens
1012.9	Method 9: Determination of the compressive strength of concrete specimens

AS	
1012.13	Method 13: Determination of the drying shrinkage of concrete for samples prepared in the field or in the laboratory
1012.18	Method 18: Determination of setting time of fresh concrete, mortar and grout by penetration resistance
1478	Chemical admixtures for concrete, mortar and grout
1478.1	Part 1: Admixtures for concrete
2350	Methods of testing portland and blended cements
2350.12	Method 12: Preparation of a standard mortar and moulding of specimens
2758	Aggregates and rock for engineering purposes
2758.1	Part 1: Concrete aggregates
3972	Portland and blended cements
AS/NZS	
2350	Methods of testing portland and blended cements
2350.11	Method 11: Compressive strength
ASTM	
C150	Standard Specification for Portland Cement
C1090	Standard Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic-Cement Grout
C230/C230M	Standard Specification for Flow Table for Use in Tests of Hydraulic Cement

1.3 DEFINITIONS

1.3.1 Composite sample

A sample obtained by combining a minimum of three grab samples.

1.3.2 Grab sample

A sample obtained in one operation.

1.3.3 Lot

A quantity of admixture or admixture mixed in concrete, mortar or grout produced under essentially uniform conditions.

S E C T I O N 2 S A M P L I N G

2.1 SAMPLE SIZE

The sample size shall be governed by the type of product, whether it is supplied alone or premixed with other materials, and by the tests to be performed.

Minimum size of samples shall be as follows:

- (a) Admixtures alone 0.5 L.
- (b) In dry premixed concrete mortar or grout containing admixture 2.0 L.

NOTE: Care should be taken to avoid loss of fine material.

For mixed material sampled in the field, the test sample shall be obtained in accordance with AS 1012.1.

For mixed material made in the laboratory, the test sample shall be prepared in accordance with AS 1012.2.

2.2 GRAB SAMPLES

Grab samples of an admixture or of an admixture mixed in concrete, mortar or grout shall be taken from well-distributed locations within the lot. If the material is stored in bags or drums, grab samples shall be taken from a bag or drum selected at random from the lot. For packaged concrete, mortar and grouts, grab samples shall be full bags.

NOTE: Sufficient sample should be obtained to permit repeat testing. This may require duplication in the case of packaged products.

2.3 PACKAGING OF SAMPLES

Samples (both grab and composite) shall be kept in impermeable, clean, airtight containers, which are resistant to attack by the samples, until the samples are tested.

2.4 COMPOSITE SAMPLES

A composite sample representing a lot submitted for testing shall be prepared by thoroughly mixing equal amounts of all grab samples.

2.5 ACCEPTANCE TESTING SAMPLE

A sample used for acceptance testing shall be a composite sample. Samples shall be positively identified.

2.6 LABELLING OF SAMPLES

The sample shall be clearly marked with the following information:

- (a) Supplier or manufacturer.
- (b) Product identification.
- (c) Type of material, if applicable.
- (d) Date and time of sampling.
- (e) Place of sampling.
- (f) Number and size of grab samples.
- (g) Quantity represented.

- (h) Location of sampling point.
- (i) Remarks on sample condition.
- (j) Sampling Officer.
- (k) Any hazard warnings associated with the admixture or the mixed product.

SECTION 3 MATERIALS

3.1 MATERIALS FOR GENERAL ACCEPTANCE TESTS

3.1.1 General

For general acceptance tests for admixtures, the cement, aggregates and water selected for use shall be typical of commercially available and commercially used materials. If any material is unsuitable for use in concrete, mortar and grout, it shall be rejected for use in evaluation tests of admixtures. Any material that interferes with the normal performance of an admixture shall also be rejected from evaluation tests.

NOTE: Manufacturer's recommendations should be followed in the use of the admixtures for tests.

3.1.2 Cement

Cement used for tests shall comply with the appropriate requirements of AS 3972.

3.1.3 Aggregate

Aggregates used for tests shall comply with the appropriate requirements of AS 2758.1.

3.1.4 Water

For general acceptance testing, only potable water shall be added.

3.1.5 Premixed materials

Manufacturer's specifications shall be followed in the use of pre-mixed materials for tests.

3.2 MATERIALS AND MIXES FOR TESTS FOR SPECIFIC USES

3.2.1 Admixtures

For the testing of an admixture for use in specific work, the cement, aggregates and water shall be representative of those proposed for use in the work. The admixture shall be added in the same manner, at the same dose rate, and at the same time, during the batching and mixing operations, as specified by the manufacturer for the specific job.

3.2.2 Pre-mixed materials

For the testing of a premixed material for use in specific work, where water is normally the only material to be added, the premixed material shall be mixed using suitable quantities, as specified by the manufacturer for the specific work. Water used for mixing shall be the same as proposed for use in the work.

3.2.3 Mixing procedure

Where the mixing procedure is not specified in detail by the manufacturer, it shall be the same as that described in the relevant clauses of this Standard and, where appropriate, the cement, aggregates and water shall be representative of those proposed for use in the work.

SECTION 4 TESTING

4.1 GENERAL

Depending on the work requirements, the purchaser may require some or all of the tests specified in this Standard.

At least two separate batches of concrete, mortar or grout containing the admixture under test shall be prepared.

At least two specimens from each batch shall be tested at the age(s) of the specified nominated strength. Testing at other ages may use a reduced number of test specimens. Where other than strength tests are required, the number of specimens prepared from each batch shall be as set out in the appropriate clauses of this Standard.

NOTES:

- 1 Control batches without admixture may be required.
- 2 The limits of test requirements have not been specified because of the wide range of uses and methods of application of the admixtures and wide range of values of properties required for different jobs.

Testing shall be as given in Table 4.1.

TABLE 4.1
SPECIFIED TESTS

Test	Reference test method
Compressive strength	Appendix A
Dimensional change	Appendix B
Consistency (see Clause 4.1.2):	
Flow table (stiff grout and mixed material)	ASTM C230/C230M (see Note)
Flow cone (fluid to flowable grouts)	Appendix C
Flow trough (flowable grouts)	Appendix D
Early volume change	Appendix E
Air content	Clause 4.1.3
Density	Clause 4.1.4
Time of setting	AS 1012.18

NOTE: A non-motorized flow table may be used as long as it can be shown that the results obtained by the use of the non-motorized flow table are not significantly different than those obtained by the use of the motorized flow table.

4.1.1 Mixing

Mixing shall be in accordance with a standard method appropriate to the materials being mixed. Any deviations from the procedure, such as to provide for special requirements of an admixture, shall be recorded and reported.

4.1.2 Consistency

The method for determining consistency will depend on the composition and intended use of the mixture.

4.1.2.1 Mixture with aggregate greater than 7 mm

Consistency of mixtures with aggregate greater than 7 mm shall be determined by slump cone (see AS 1012.3.1).

4.1.2.2 Mixtures with 7 mm maximum aggregate

Consistency of mixtures with 7 mm maximum aggregate shall be as given in Table 4.1.2.2.

TABLE 4.1.2.2
CONSISTENCY OF MIXTURES WITH
7 mm MAXIMUM AGGREGATE

Consistency	Range	Procedure
Stiff	<100% flow	Flow table, 5 drops in 3 s
Plastic	100—125% flow	Flow table, 5 drops in 3 s
Flowable	>30 s	Flow cone
	400—600 mm	Flow trough
Fluid	10—30 s	Flow cone

4.1.3 Air content

The test procedure shall be in accordance with AS 1012.4.1, AS 1012.4.2 and AS 1012.4.3.

The apparatus described in AS 1012.4.3 provides for air contents of up to 9%. Many grouts and mixed materials will contain higher air contents. For mixtures known to have very high air contents, a rigid volumetric bowl (see Note) shall be secured within the air meter bowl to contain the sample. Air content shall be calculated as follows:

$$\text{Air content} = \text{indicated air content} \times \frac{\text{large air bowl volume}}{\text{volume of smaller bowl}}$$

NOTE: A tall form stainless steel beaker may be suitable.

4.1.4 Density

The procedure specified in AS 1012.5 is appropriate; however, for mixtures that do not contain coarse aggregate, the minimum size for the measure shall be 1 L and carrying handles shall not be required.

4.2 RECORDS

The following, concerning the materials used in the tests, shall be recorded, as appropriate:

(a) Admixture:

- (i) Brand, name of manufacturer, lot number and type of admixture.
- (ii) Manufacturer's specified dose rate and actual dose rate used in tests.
- (iii) Sample size, grab or composite, and quantity represented by the sample.

Whether the admixture contains significant chloride ion and, if so, the chloride ion content of the admixture as supplied. For the purpose of this Clause, an admixture shall be considered not to contain significant chlorides if the chloride ion content is not greater than 1.5 g chloride ion per litre of admixture, provided the admixture is used at a rate not greater than 2 L/m³ mixed material or grout.

NOTE: Methods of determining chloride ion content in admixture are given in AS 1478.1.

(b) *Cement:*

- (i) Brand and name of manufacturer.
- (ii) Sulphuric anhydride (SO_3) content.
- (iii) Fineness index.
- (iv) Sodium oxide (Na_2O) and potassium oxide (K_2O) content.

(c) *Aggregates:*

- (i) Geological description of the aggregates and whether crushed or otherwise.
- (ii) Test data showing compliance with specification requirements.
- (iii) Moisture condition at time of mixing.

NOTES:

- 1 The properties of cement and aggregates used for test mixes may be recorded separately.
- 2 Only such details as are applicable need be recorded.

(d) *Pre-packaged products:*

- (i) Identification of product.
- (ii) Identification of manufacturer.
- (iii) Batch number.
- (iv) Use by date.

(e) *Identification of test mixes, test methods and test specimens:*

- (i) Detailed data on the mix materials and proportions, the amount of admixture used and the mixing procedure. If an admixture mixed in concrete, mortar or grout is tested, the amount of water added shall be recorded.
- (ii) Test methods used and details of tests such as—
 - (A) whether tested in the laboratory or in the field;
 - (B) date and time of testing;
 - (C) ambient temperature and relative humidity;
 - (D) mix temperature;
 - (E) specimen dimensions;
 - (F) whether compacted by vibration or by hand;
 - (G) if compacted by hand, the number of strokes per layer and number of layers; and
 - (H) name of the test operator.

(f) *Test results* The individual and average test results.

In addition to the requirements of this Clause, the requirements of Paragraph A4.5, Appendix A, shall also be met.