

Australian Standard®

AS 1012.4.2:2014

Methods of testing concrete

Method 4.2: Determination of air content of freshly mixed concrete—Measuring reduction in air pressure in chamber above concrete

1 SCOPE

This Standard sets out the method for determining the air content of freshly mixed concrete from observations of the reduction in air pressure in a chamber above the concrete when the concrete is exposed to the air pressure (see Note 1). When performed for quality control purposes such as for plant production testing or for mixer uniformity tests, the apparent air content only may be sufficient. The air content shall be determined when specified.

The results obtained are dependent on the compaction method used. This Standard provides for compaction of the sample by rodding or by vibration or by using self compacting concrete (SCC) placed in the bowl.

NOTES:

- 1 This Standard is intended for use with concretes made with relatively dense natural aggregates for which the aggregate correction factor can be determined satisfactorily by the technique described in Clause 9. It is not recommended for use with concretes made with lightweight aggregates, or aggregates of high porosity (see AS 1012.4.3).
- 2 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

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| 1012 | Methods of testing concrete |
| 1012.1 | Method 1: Sampling of fresh concrete |
| 1012.2 | Method 2: Preparation of concrete mixes in the laboratory |
| 1012.4.1 | Method 4.1: Determination of air content of freshly mixed concrete—Measuring reduction in concrete volume with increased air pressure |
| 1012.4.3 | Method 4.3: Determination of air content of freshly mixed concrete—Measuring air volume when concrete is dispersed in water |

3 PRINCIPLE

The air content of freshly mixed concrete is measured by the reading shown on a pressure gauge calibrated to record the reduction in a predetermined test pressure applied to the concrete. The reduction in pressure is directly related to the air content of the concrete.

4 APPARATUS

4.1 Pressure-type air meter with pressure gauge to read air content

4.1.1 General

The air meter used shall comply with Clauses 4.1.2 and 4.1.3 and shall consist of a measuring bowl and pressure-tight cover assembly which is fitted with an air chamber and a pressure gauge calibrated to record the reduction in pressure directly as air content, as shown diagrammatically in Figure 1. (See Appendix A for calibration.)

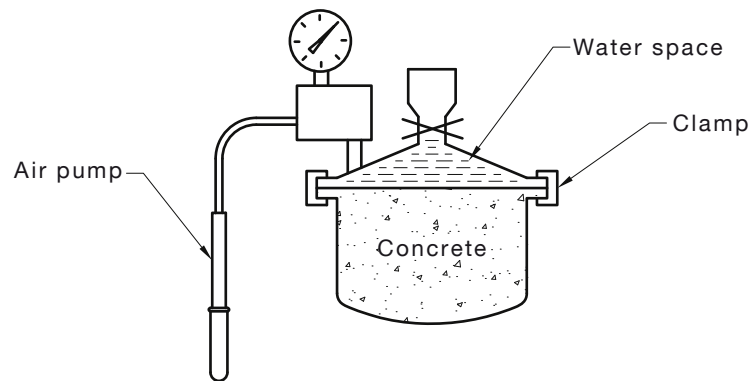


FIGURE 1 TYPICAL APPARATUS FOR MEASURING AIR CONTENT BY DROP IN GAUGE PRESSURE

4.1.2 Measuring bowl

The bowl shall comply with the requirements of AS 1012.4.1.

4.1.3 Cover assembly

The cover assembly shall be made from machined metal of thickness sufficiently rigid to withstand normal field use and such composition as not to react with cement paste.

The assembly shall have a flange and be fitted with a gasket and hooks or lugs to attach to the flange of the bowl to make a pressure-tight connection.

The cover assembly shall provide a small space above the level of the lower bowl, known as the water space, which in use shall be filled with water as a seal against the concrete in the bowl, and a larger air chamber above this which can be brought to a predetermined test pressure. The assembly shall be fitted with a suitable funnel and valves to permit the water space to be filled, and also valves to vent the air chamber and to connect it with the water chamber.

A suitable hand-pump shall be provided with the cover, either as an attachment or as an accessory.

The air chamber shall be fitted with a pressure gauge which shall be specially calibrated to record not only the air pressure but also the reduction in pressure, from the predetermined test pressure, reading directly as air content, percentage by volume of the concrete.

4.2 Other apparatus

The calibration cylinder, rod, mallet, vibrators (if required for compaction), strike-off bar, pouring vessel and scoop shall be in accordance with AS 1012.4.1.

5 SAMPLING

Concrete shall be sampled in accordance with AS 1012.4.1.

6 GENERAL PROCEDURE

The general and compaction procedure set out in AS 1012.4.1:2014, Clauses 6 and 7 respectively, shall be followed. The air content shall be determined in accordance with Clause 7 of this Standard.

7 PROCEDURE FOR DETERMINING AIR CONTENT

The air content of the concrete shall be determined in accordance with the following procedure:

- (a) On completion of compacting the concrete, meticulously wipe clean the flanges of the bowl and clamp the conical cover assembly in place so that a pressure-tight seal is obtained.
- (b) Completely fill with water the space above the concrete, care being taken to ensure that all air is removed from this space by the use of bleed valves and lightly tapping the apparatus or by the use of a syringe or other methods suitable for the particular apparatus in use.
- (c) Increase the pressure of air in the air chamber and adjust it so that it corresponds exactly to the predetermined test pressure. Quickly open the valve connecting the air chamber with the water chamber, smartly tap the side of the bowl for about 30 s, and observe the pressure gauge to check that it is steady.
- (d) Record the reading of the pressure gauge, as a direct reading of air content, as the apparent air content A_1 (first determination).
- (e) Repeat Steps (a) to (d) to determine the apparent air content, commencing by venting the air chamber and refilling the space (second determination). Average the two consecutive determinations of apparent air content to give the value A_1 used to calculate the air content, in accordance with Clause 8.

NOTE: The two consecutive values of A_1 should agree within 0.2%.

8 CALCULATION OF AIR CONTENT

When required, calculate the air content of the concrete as follows:

$$A = A_1 - G \quad \dots (1)$$

where

A = air content, percentage by volume of concrete

A_1 = apparent air content, percentage by volume of concrete (see Clause 7)

G = aggregate correction factor, percentage by volume of concrete (see Clause 9)