

Australian Standard[®]

AS 1012.4.3:2014

Methods of testing concrete

Method 4.3: Determination of air content of freshly mixed concrete—Measuring air volume when concrete is dispersed in water

1 SCOPE

This Standard sets out the method for determining the air content of freshly mixed concrete using the volumetric method.

This Standard is suitable for concrete made with any type of aggregate, whether it be dense, cellular or lightweight.

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) (see Note 2) placed in the bowl.

NOTES:

- 1 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 Self compacting concrete (SCC) is concrete that is able to flow and consolidate under its own weight, completely fill the formwork or bore hole even in the presence of dense reinforcement, whilst maintaining homogeneity and without the need for additional compaction. SCC is also known as self-consolidating concrete or super-workable concrete.

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 |

3 PRINCIPLE

The air content of freshly mixed concrete is determined by measuring the volume of water required to fill the air voids in the concrete.

4 APPARATUS

4.1 Volumetric air meter

4.1.1 General

The air meter used shall comply with Clauses 4.1.2 and 4.1.3 and shall consist of a bowl and a top section, as shown in Figure 1. (See Appendix A for calibration.)

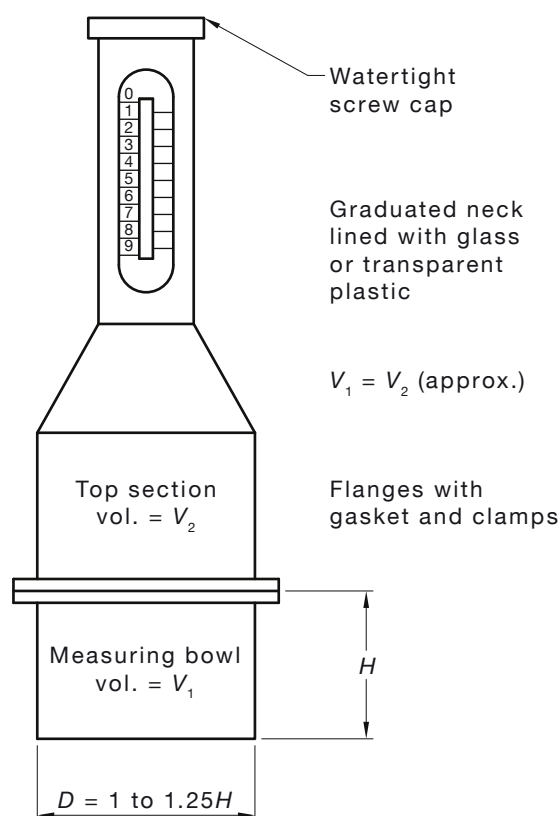


FIGURE 1 APPARATUS FOR MEASURING AIR CONTENT OF FRESH CONCRETE BY VOLUMETRIC METHOD

4.1.2 Measuring bowl

The bowl of the air meter shall be made from machined metal and shall have a flange at or near the top surface. The metal used shall be of such thickness as to be sufficiently rigid to withstand normal field use and of such composition as not to react with cement paste.

The bowl diameter shall be equal to 1 to 1.25 times the height of the bowl.

For testing concrete with aggregates of nominal maximum size not exceeding 20 mm the capacity of the bowl shall be not less than 2 L.

For testing concrete with larger aggregates, a larger air meter shall be used; e.g. for concrete with 75 mm maximum nominal size aggregate, a bowl capacity not less than 10 L shall be used.

4.1.3 Top section

The top section of the air meter shall be constructed of machined metal of thickness sufficiently rigid to withstand normal field use and of such composition as not to react with cement paste. The capacity of the top section shall be approximately the same as the bowl. It shall have a flange and be fitted with a flexible gasket and hooks or lugs to attach to the flange of the bowl to make a watertight connection.

The top section shall be equipped with a glass-lined or transparent plastics neck, graduated downwards from 0% to at least 9% of the volume of the bowl in increments not greater than 0.5%. The upper end of the neck shall be threaded and fitted with a screw cap having a gasket to make a watertight seal.

4.2 Funnel

The funnel shall be constructed from metal and shall have a spout of such a diameter and length that will permit it to be inserted through the neck of the top section and will allow it to be extended to a point just above the bottom of the top section. The discharge end of the spout shall be so constructed that when water is added to the air meter there will be a minimum disturbance of the concrete.

4.3 Measuring cup

The measuring cup shall be constructed from metal and shall have a capacity equal to precisely 1.0% of the volume of the bowl of the air meter.

4.4 Syringe

The syringe shall be a rubber bulb type, having a capacity at least equal to the measuring cup.

4.5 Other apparatus

The rod, mallet, vibrator (if required for compaction), strike-off bar, pouring vessel and scoop shall be as specified in 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 described 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.

NOTE: Care should be taken in the use of an immersion vibrator within a small measuring bowl.

7 PROCEDURE FOR DETERMINING AIR CONTENT

7.1 Adding water

On completion of compacting the concrete, and after cleaning the flange of the bowl, the procedure shall be as follows:

- (a) Clamp the top section of the air meter into position on the bowl.
- (b) Insert the funnel and add water until it appears in the neck.
- (c) Remove the funnel and adjust the water level using the rubber syringe until the bottom of the meniscus is level with the zero mark of the graduated scale.
- (d) Attach and tighten the screw cap.

7.2 Agitating and rolling

The procedure shall be as follows:

- (a) Invert the air meter and agitate so that the concrete settles free from the base and becomes dispersed in the water.
- (b) Roll and rock the meter, with the neck elevated, so that the displaced air rises from the settling concrete.