

Australian Standard[®]

AS 1012.5:2014

Methods of testing concrete

Method 5: Determination of mass per unit volume of freshly mixed concrete

1 SCOPE

This Standard sets out the method for determining the mass per unit volume of freshly mixed concrete that is in the plastic state.

The Standard provides for the compacting of the sample either by rodding or by vibration.

NOTES:

- 1 The result obtained may be dependent on the compaction method used.
- 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 |
| 1012.3.1 | Method 3.1: Determination of properties related to the consistency of concrete—Slump test |
| 1012.4.1 | Method 4.1: Determination of air content of freshly mixed concrete—Measuring reduction in concrete volume with increased air pressure |
| 1012.8.1 | Method 8.1: Method for making and curing concrete—Compression and indirect tensile test specimens |

3 DEFINITION

For the purpose of this Standard the definition below applies.

3.1 Self compacting concrete (SCC)

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' and 'super-workable concrete'.

4 APPARATUS

4.1 Measure

4.1.1 General

The measure shall be made of metal not less than 3 mm thick, and shall be watertight and sufficiently rigid to maintain its shape with rough usage. The inside surface shall be smooth and free from corrosion and the rim of the measure shall be machined to a plane surface perpendicular to the axis of the cylinder. The measure shall be provided with carrying handles.

The diameter of the measure shall be between 0.75 and 1.25 times the height.

For testing concrete with aggregates of nominal size not exceeding 40 mm, the capacity of the bowl shall be not less than 5 L.

For testing concrete with larger aggregate, a larger bowl shall be used (e.g. for concrete with maximum 75 mm nominal size aggregate), a measure of capacity not less than 10 L shall be used.

4.1.2 Calibration

The measure shall be calibrated at a known temperature by determining the mass in kilograms of water required to precisely fill it. Filling shall be achieved by sliding the flat glass cover plate over the overfilled measure such that no air is trapped under the cover. The capacity of the measure shall be obtained by dividing the mass of water so determined by the unit mass of water at that temperature (e.g. 997.5 kg/m³ at 23°C).

4.2 Balance

A balance capable of weighing to an accuracy of 0.1% in the operating range shall be used.

4.3 Rod

The rod used for the compacting of concrete shall comply with the relevant requirements of AS 1012.3.1.

4.4 Mallet

The mallet used in conjunction with the rod for the compacting of concrete shall comply with the relevant requirements of AS 1012.4.1.

4.5 Scoop

A scoop, shovel or other receptacle used for sampling concrete, with a capacity of not less than 1 L.

4.6 Glass cover plate

A flat glass cover plate shall be used.

4.7 Vibrators

Internal vibrators used for the compacting of concrete shall have a frequency of vibration of at least 115 Hz. The outside diameter of the vibrating element inserted into the concrete shall be not more than 20% of the least dimension of the measure, but shall be at least 15 mm.

External vibrators used for the compacting of concrete shall have a frequency of vibration of at least 50 Hz. Provision shall be made for clamping the measure securely to the vibrator.

5 SAMPLING

5.1 Field sampling

For concrete sampled in the field, the test sample shall be obtained in accordance with the requirements of AS 1012.1.

5.2 Laboratory sampling

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

6 GENERAL PROCEDURE

The general procedure shall be carried out as follows:

- Take the test sample of concrete as quickly as possible to the place selected for the test.
- Give the test sample a minimum of mixing to offset any segregation which may have occurred during transportation.
- For concrete sampled in the field, commence the test immediately following the completion of mixing the test sample. For concrete prepared in the laboratory, commence the test in accordance with AS 1012.2.
- Determine the mass of the measure with the glass cover plate.
- Place and fully compact the concrete in the measure by one of the methods described in Clause 7 without causing segregation or excessive laitance. Compact no slump concrete only by the vibration method.
- Determine the mass of concrete in accordance with Clause 8.
- Complete the procedure with minimum delay.

7 COMPACTION PROCEDURES

7.1 Compaction by hand

Compaction by hand shall be carried out as follows:

- Fill the measure in three approximately equal layers with the scoop. As each scoopful of concrete is being placed into the measure, move the scoop around the top edge of the measure as the concrete slides out, to ensure symmetrical distribution of the concrete within the measure.
- Fully compact each layer by rodding. Rod the bottom layer throughout its depth. For each upper layer, just penetrate into the underlying layer with at least the first 10 strokes.

NOTE: The minimum number of strokes per layer required to compact average concretes with different consistencies is set out as a guide for 250 mm diameter measures in Table 1. For slumps of less than 40 mm, refer to AS 1012.8.1.

TABLE 1
MINIMUM NUMBER OF STROKES PER LAYER FOR VARYING SLUMPS

Slump mm	Minimum number of strokes per layer		
	150 mm diameter bowl	200 mm diameter bowl	250 mm diameter bowl
Over 75	40	45	70
55–75	40	55	85
40–50	40	65	100