

Australian Standard®

AS 1012.3.1:2014

Methods of testing concrete

Method 3.1: Determination of properties related to the consistency of concrete—Slump test

1 SCOPE

This Standard sets out the method for determining the slump of concrete, when the nominal size of aggregate does not exceed 40 mm.

NOTE: This Standard may involve hazardous materials, operations, and equipment. This Standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this Standard to 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

1012.2 Method 2: Preparation of concrete mixes in the laboratory

3 PRINCIPLE

This Standard describes the procedure of filling a slump cone with fresh concrete in layers, rodding each layer and then removing the support given to the concrete by the slump cone.

The vertical subsidence of the concrete that occurs, when the slump cone is raised, is termed the 'slump' of the concrete.

It is considered that the slump of fresh concrete will not vary between individual batches of concrete, if the characteristics and proportions of the ingredients used to make the concrete do not vary from batch to batch of the concrete made.

4 APPARATUS

4.1 Mould

The mould shall be a hollow frustum of a cone made of non-reactive rigid material at least 1.5 mm thick which will hold its shape and the internal surface shall be smooth. The bottom and the top of the mould shall be open and at right-angles to the axis of the cone. The mould shall be provided with a means of holding in place during filling and lifting the cone when filled. The internal dimensions of the mould shall be as follows:

- (a) Bottom diameter 200 ± 5 mm.
- (b) Top diameter 100 ± 5 mm.
- (c) Vertical height 300 ± 5 mm.

NOTES:

- 1 A suitable mould is illustrated in Figure 1.
- 2 A typical modified slump cone is illustrated in Figure 2.
- 3 The lifting and holding down attachments to the mould preferably should be welded. If rivets are used in the construction of the mould, they have to be countersunk flush on the inside of the cone.

4.2 Rod

The rod used for compacting concrete in the mould shall be a metal rod of 16 ± 1 mm in diameter, a length of 600 ± 10 mm and having at least one end tapered for a distance of approximately 25 mm to a spherical shape having a radius of approximately 5 mm.

NOTE: The rod may be extended with a handle of conduit made of plastics, provided that the overall length does not exceed 1000 mm.

4.3 Scoop

The scoop shall be made from non-absorbent material not readily attacked by cement paste, of capacity not less than 1 L and suitable for taking increments of the concrete.

4.4 Base plate

The base plate shall be of smooth, rigid, non-absorbent material, e.g. metal plate of a minimum 3.0 mm thickness.

4.5 Ruler

An appropriate steel ruler is required.

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 PROCEDURE

The procedure shall be as follows:

- (a) 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.
- (b) Ensure that the internal surface of the mould is clean and free from set concrete.
- (c) Moisten the internal surface of the mould and the base plate by wiping with a damp cloth immediately before commencing each test.
- (d) Place the mould on a smooth, horizontal surface such as a carefully levelled base plate, which is free from vibration or shock. Hold the mould firmly on the base plate and ensure it remains in place during the rodding of the concrete.

NOTE: The tray of a stationary, vibration free vehicle is suitable for placing the carefully levelled base plate during testing.

- (e) Ensure that the procedure from the start of filling to the removal of the mould [Steps (f) to (j)] is carried out without interruption and is completed within an elapsed time of 3 min.

- (f) Fill the mould in three layers each approximately one-third of the height of the mould, taking care that the volume of the top layer is sufficient to more than fill the mould after rodding. As each scoopful of concrete is being placed, move the scoop around the top edge of the mould as the concrete slides from it, to ensure symmetrical distribution of the concrete within the mould. The addition of the concrete for the top layer shall be carried out so as not to compact the concrete of the top layer.

NOTE: A detachable conical collar may be used to facilitate filling the mould. The collar should not penetrate the mould by more than 10 mm.

- (g) Rod each layer with 25 strokes of the rounded end of the rod. Distribute the strokes in a uniform manner over the cross-section of the mould. For the bottom layer this will necessitate inclining the rod slightly and placing half the strokes near the perimeter. Rod the bottom layer throughout its depth. Rod the second layer and the top layer throughout their depth, so that the strokes just penetrate into the underlying layer.

NOTE: Avoid excessive contact with the plate when rodding.

- (h) During the filling and rodding operation for the top layer, heap the concrete above the mould before the rodding is started. If the rodding operation results in subsidence of the concrete below the top edge of the mould, add more concrete to keep an excess of concrete above the top of the mould.
- (i) After the top layer has been rodded, strike off the surface of the concrete by using a screeding and rolling motion of the rod so that the mould is filled exactly. Quickly remove surplus material from around the base of the mould, avoiding any movement or vibration of the mould. Maintain a firm downward pressure at all times until the mould is removed. Immediately remove the mould from the concrete by raising it slowly and carefully in a vertical direction, allowing the concrete to subside. Complete the operation of raising the mould through its own height in 3 ± 1 s without causing any lateral or torsional displacement of the concrete.
- (j) Immediately measure the slump by determining the difference between the height of the mould (300 mm) and the average height of the top surface of the concrete.

7 MEASUREMENT OF SLUMP

The slump shall be measured—

- (a) to the nearest 5 mm for slumps of 100 mm and less; and
- (b) to the nearest 10 mm for slumps greater than 100 mm.

If a test specimen collapses laterally or shears, the test shall be repeated with another part of the sample. If in the repeat test the test specimen collapses laterally or shears, the slump shall not be measured. The lateral collapse or shear of any specimen shall be recorded. See Figure 3 for examples of collapse and shear slumps.

NOTE: Some indication of the cohesiveness and workability of the concrete can be obtained if, after the slump measurement has been completed, the side of the test specimen is tapped gently with the tamping rod. A well-proportioned concrete which has an appreciable slump will gradually slump further. Badly proportioned concrete is likely to fall apart.

8 RECORDS

The following information shall be recorded:

- (a) Identification of the concrete.
- (b) Job site or laboratory where tested.
- (c) Date and time of test.
- (d) Slump.