

## Australian Standard®

AS 1289.6.1.1:2014

**Methods of testing soils for engineering purposes****Method 6.1.1: Soil strength and consolidation tests—Determination of the California Bearing Ratio of a soil—Standard laboratory method for a remoulded specimen**

## PREFACE

This Standard was prepared by the Standards Australia Committee CE-009, Testing of Soil for Engineering Purposes, as part of its ongoing program to revise the AS 1289 series on the testing of soils, to supersede AS 1289.6.1.1—1998.

*This Standard incorporates Amendment No. 1 (April 2017). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.*

In order to improve the reproducibility of the test, this edition includes specific provisions for the control of moisture at compaction. The water content is required to be within 0.5% of the target moisture content before curing, and minimum curing times are specified. The method of compaction has also been more strictly defined, as has the adjustment of the load-penetration curves.

NOTE: For further information on the differences between this and the previous edition with respect to improving the reproducibility of the test, see Appendix B.

The terms ‘normative’ and ‘informative’ have 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, whereas an ‘informative’ appendix is only for information and guidance.

## METHOD

**1 SCOPE**

This Standard sets out a method for determining the California Bearing Ratio (CBR) of a soil when compacted and tested in the laboratory. The CBR value is measured on the fraction of material passing the 19 mm sieve.

## NOTES:

- 1 Where there is a significant amount of material retained on the 19 mm sieve, the strength of the soil may be much greater than indicated by the results of this test and this may need to be taken into account in design or in selection of suitable materials for construction.
- 2 Guidance on improving the reproducibility of the test is provided in Appendix B.

## 2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

A1 | **‘Text deleted’**

1289 Methods of testing soils for engineering purposes

1289.1.1 Method 1.1: Sampling and preparation of soils—Preparation of disturbed soil samples for testing

1289.2.1.1 Method 2.1.1: Soil moisture content tests—Determination of the moisture content of a soil—Oven drying method (standard method)

1289.2.1.2 Method 2.1.2: Soil moisture content tests—Determination of the moisture content of a soil—Sand bath method (subsidiary method)

1289.2.1.4 Method 2.1.4: Soil moisture content tests—Determination of the moisture content of a soil—Microwave-oven drying method (subsidiary method)

1289.2.1.5 Method 2.1.5: Soil moisture content tests—Determination of the moisture content of a soil—Infrared lights method (subsidiary method)

1289.2.1.6 Method 2.1.6: Soil moisture content tests—Determination of the moisture content of a soil—Hotplate drying method (subsidiary method)

A1 | 1289.3.1.1 Method 3.1.1: Soil classification tests—Determination of the liquid limit of a soil—Four point Casagrande method

1289.3.1.2 Method 3.1.2: Soil classification tests—Determination of the liquid limit of a soil—One point Casagrande method (subsidiary method)

1289.3.9.1 Method 3.9.1: Soil classification tests—Determination of the cone liquid limit of a soil

1289.3.9.2 Method 3.9.2: Soil classification tests—Determination of the cone liquid limit of a soil—One point method

1289.5.1.1 Method 5.1.1: Soil compaction and density tests—Determination of the dry density/moisture content relation of a soil using standard compactive effort

1289.5.2.1 Method 5.2.1: Soil compaction and density tests—Determination of the dry density/moisture content relation of a soil using modified compactive effort

2103 Dial gauges and dial test indicators (metric series)

2193 Calibration and classification of force-measuring systems

A1 | ISO

3310 Test sieves—Technical requirements and testing (series)

## 3 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

### 3.1 Laboratory density ratio

The ratio of the dry density of the specimen to the maximum dry density of the material as determined on material prepared in accordance with Clause 5(a), as applicable, expressed as a percentage.

### 3.2 Laboratory moisture ratio

The ratio of the moisture content of the specimen to the optimum moisture content of the material as determined on material prepared in accordance with Clause 5(a), as applicable, expressed as a percentage.

#### 4 APPARATUS

The following apparatus shall be used:

- (a) Steel penetration piston with a  $49.6 \pm 0.1$  mm diameter over the length of penetration and at least 150 mm long. The length of the piston will depend upon the number of surcharges and the depth of penetration required.
- (b) Loading machine—
  - (i) capable of forcing the penetration piston into the specimen at a uniform (not pulsating) rate of  $1.0 \pm 0.2$  mm/min during the complete test; and
  - (ii) equipped with a force-measuring device meeting the accuracy and repeatability requirements of AS 2193 Grade C testing machines for the range of forces used in the test. The force-measuring device shall be capable of indicating seating loads of 50 N and 250 N.

NOTE: The indicator points of the force-measuring device at the seating loads need not necessarily meet the Grade C requirements of AS 2193 but should be displayed as definite numbers or marks.

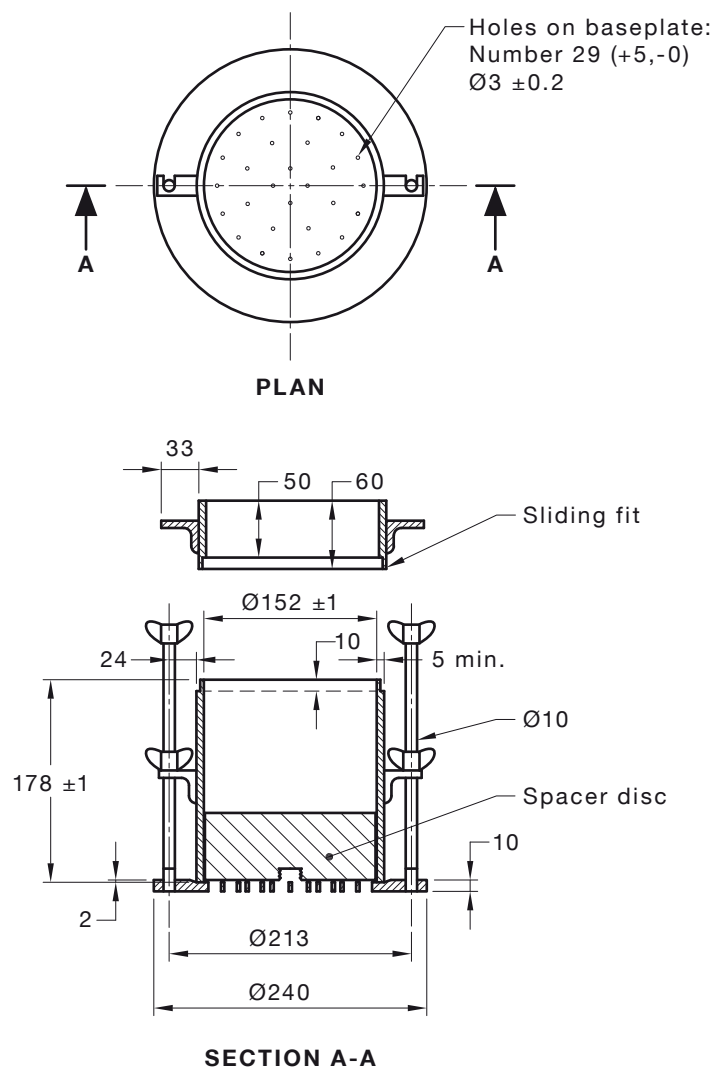
- (c) Cylindrical metal mould (see Figure 1) of known volume, with an internal diameter of  $152 \pm 1$  mm, height of  $178 \pm 1$  mm and wall thickness of at least 5 mm, provided with a metal extension collar and a perforated metal baseplate.
- (d) Metal spacer disc (see Figure 2) of  $150.0 \pm 0.5$  mm diameter and  $61.00 \pm 0.25$  mm high, fitted with a removable handle for lifting the disc from the mould.
- (e) Compaction apparatus, including the compaction block, complying with the requirements of AS 1289.5.1.1 or AS 1289.5.2.1, as applicable [see Clause 6(f)].
- (f) Metal stem and perforated plate with a mass of  $1000 \pm 25$  g (see Figure 3).
- (g) Metal surcharges, each surcharge having a mass of  $2250 \pm 25$  g, a diameter of  $150.0 \pm 0.5$  mm and a centre hole of  $55 \pm 1$  mm diameter (see Figure 4). At least one surcharge shall be annular; the others may be annular or slotted.

NOTE: Surcharges with multiples of the individual surcharge mass may be used.

- (h) Displacement-measuring device for measuring the swell of specimens, if required, graduated to 0.01 mm and meeting the accuracy and repeatability requirements of AS 2103.
- (i) Displacement-measuring device for measuring the expected range of travel, capable of measuring every 0.5 mm to an accuracy of 0.1 mm.
- (j) Sieve, 19 mm and, if required, a 4.75 mm sieve, complying with ISO 3310 (series).
- (k) Balance of sufficient capacity and limit of performance not exceeding  $\pm 5$  g.
- (l) Jack, lever, frame or other suitable device which shall be used for extruding specimens from the cylinder (optional).
- (m) Metal tripod, if swell is to be measured, to support the dial gauge or displacement-measuring device for measuring the amount of swell during soaking (see Figure 5).
- (n) Setting piece, if swell is to be measured and the tripod or displacement-measuring device is removed from the mould during the test, to set the reading on the dial gauge or measuring device attached to the metal tripod prior to each reading in the swell test.
- (o) Water tank or container capable of maintaining water at a level above the mould during soaking, with a grid under the mould to permit the ingress of water through the base of the mould.

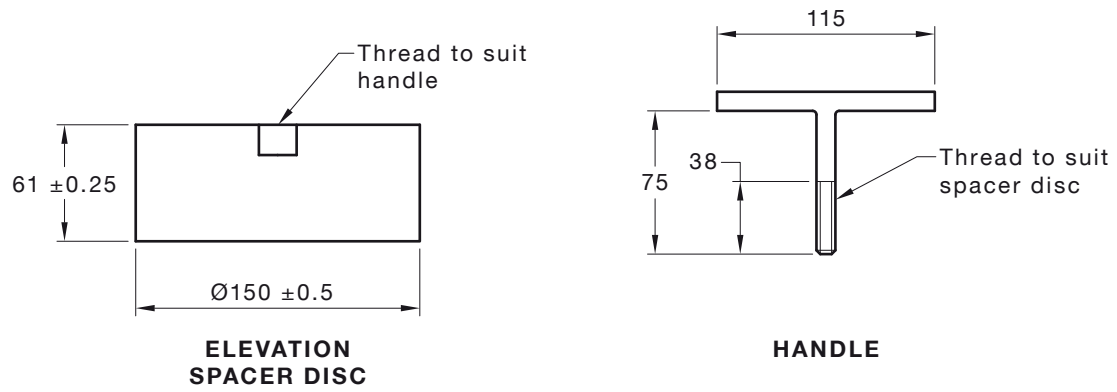
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- (p) Metal rule or gauge bar, marked with the layer depths, to measure the depth of the compacted layers.
- (q) Other apparatus such as a mixing bowl, straightedge, filter paper and dishes.



NOTE: Essential dimensions are toleranced.

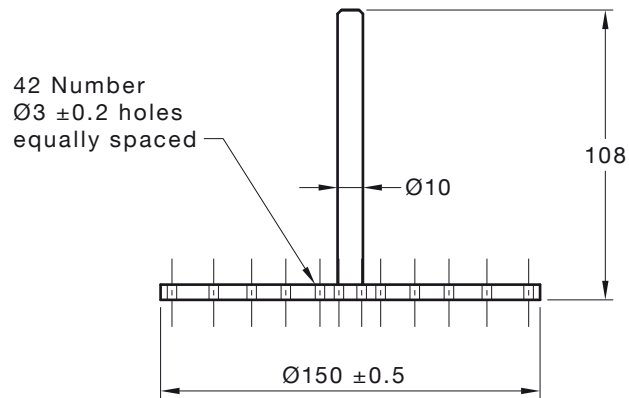
FIGURE 1 MOULD



DIMENSIONS IN MILLIMETRES

NOTE: Essential dimensions are toleranced.

FIGURE 2 SPACER DISC AND HANDLE



DIMENSIONS IN MILLIMETRES

NOTE: Essential dimensions are toleranced.

FIGURE 3 STEM AND PLATE

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