

STANDARDS AUSTRALIA

RECONFIRMATION

OF

AS 1289.5.3.1—2004

Methods of testing soils for engineering purposes

Method 5.3.1: Soil compaction and density tests —Determination of the field
density of a soil—Sand replacement method using a sand-cone pouring apparatus

RECONFIRMATION NOTICE

Technical Committee CE-009 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

Certain documents referenced in the publication may have been amended since the original date of publication. Users are advised to ensure that they are using the latest versions of such documents as appropriate, unless advised otherwise in this Reconfirmation Notice.

Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 17 December 2015.

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NOTES

Methods of testing soils for engineering purposes

Method 5.3.1: Soils compaction and density tests—Determination of the field density of a soil—Sand replacement method using a sand-cone pouring apparatus

1 SCOPE

This Standard sets out the procedure for determining the field density of fine-grained and medium-grained soils (as defined in AS 1289.0) by the sand replacement method using a sand-cone pouring apparatus.

The gross mass per unit volume (wet density) may be calculated and the dry mass per unit volume (dry density) obtained by correcting for the moisture content.

The field dry density is determined for the total material at the test site.

A tray with a 200 mm hole is normally used for material with more than 20% of particles retained on the 19.0 mm sieve but, for material with less than 20% of particles retained on the 19.0 mm sieve, a tray with a 150 mm hole may be used.

NOTE: The choice of hole diameter and depth depends on the soil type and maximum particle size of the material excavated. Normally a 200 mm diameter hole is used but a 150 mm diameter hole may be used for fine-grained soils. The method of test may be used to any depth between 50 mm and 250 mm consistent with the soil type and the requirements for sand calibration. In clean sands, the lip projecting from the bottom should not be used as it will penetrate into the sand being tested.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

1152	Specification for test sieves
1289	Methods of testing soils for engineering purposes
1289.0	Method 0: General requirements and list of methods
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)

1289.2.3.1	Method 2.3.1:	Soil moisture content tests—Establishment of correlation—Subsidiary method and the standard method
1289.3.5.1	Method 3.5.1:	Soil classification tests—Determination of the soil particle density of a soil—Standard method
1289.5.4.1	Method 5.4.1:	Soil compaction and density tests—Compaction control test—Dry density ratio, moisture variation and moisture ratio

3 APPARATUS

The following apparatus is required:

- (a) A sand pouring apparatus; either a sand-cone or a wind-shield sand-cone complete with conical funnel and tap. Typical designs are shown in Figures 1 and 2.
- (b) A rigid tray with sides and with a central hole about 200 mm or about 150 mm diameter, with pins for nailing down the tray, when required. A typical design is shown in Figure 3. A flat surface of at least 100 mm around the hole should be provided. A lip of about 2 mm projecting from the bottom may be used if desired except when testing clean sands (see Note to Clause 1).
- (c) Clean, dry, one-size sand, with particles approximately uniform in size, e.g., 90% passing a 1.18 mm sieve and 90% retained on a 600 μ m sieve.

NOTE: Other sand or grits with particles roughly uniform in size e.g., 2.36 mm/1.18 mm or 600 μ m/300 μ m sieves) may be used. The size of the particles to use in a field density test depends on the size of the largest particles and voids in the compacted soils. The sand should be shielded at all times from any moistening, e.g., rain, as bulking may invalidate volume calculations.

- (d) Tools for excavating holes in soil, e.g., scoop, spoon, trowel, chisel, mallet or brush.
 - (e) A calibrating cylinder of the type illustrated in Figure 4, with a depth not less than 100 mm.
- NOTE: It is necessary that the dimensions of the calibrating cylinder and the excavated hole be about the same so that the calibrated poured density of the sand will be applicable to the field test. Thus when the depth and diameter of the hole have been determined a calibrating cylinder with appropriate dimensions may be selected.
- (f) A balance of adequate capacity with a limit of performance not greater than ± 5 g.
 - (g) A steel straightedge of appropriate length for the calibrating cylinder.
 - (h) A flat plate approximately 300 mm square or a suitable flat surface.

- (i) Sealable containers for the excavated soil.

NOTE: It is important to ensure that moisture is not lost from the samples of soil during excavation of holes after material has been placed in them. When plastic bags are used extra protection may be necessary to prevent damage.

- (j) Sealable containers of appropriate capacity for the sand.
- (k) Sieves, complying with AS 1152.
- (l) Clay or modelling plastic (if required).