

STANDARDS AUSTRALIA

RECONFIRMATION

OF

AS 1289.7.1.2—1998

Methods of testing soils for engineering purposes

Method 7.1.2: Soil reactivity tests—Determination of the shrinkage index of a soil—
Loaded shrinkage index

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 13 June 2013.

The following are represented on Technical Committee CE-009:

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NOTES

Australian Standard®

Methods of testing soils for engineering purposes

Method 7.1.2: Soil reactivity tests — Determination of the shrinkage index of a soil — Loaded shrinkage index

1 SCOPE This Standard sets out a method for the determination of the shrinkage index of a soil (see AS 2870) using a spring-loaded shrinkage cell.

2 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS

1289	Methods of testing soils for engineering purposes
1289.0	Part 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)
1289.2.2.1	Method 2.2.1: Soil moisture content tests — Determination of the total suction of a soil — Standard method
2870	Residential slabs and footings — Construction

3 APPARATUS The following apparatus is required:

- (a) Thin-walled sampler consisting of a tube with a bevelled cutting edge machined directly on the sample tube. The bevelled cutting edge shall make an angle not exceeding 15° to the axis of the tube with a permitted land width at the cutting edge not exceeding 0.5 mm. The ratio of net projected area of sampler to projected area of sample core shall not exceed 10%, and any internal clearance shall not exceed 1% of the diameter at the cutting edge.
- (b) Drying oven complying with AS 1289.0.
- (c) Balance of 500 g capacity and limit of performance not exceeding ± 0.05 g.
- (d) Spatula or palette knife of convenient size.
- (e) Flat glass plate approximately 10 mm thick and at least 400 mm square.
- (f) Vacuum desiccator with stopcock to accommodate a vacuum pump.
- (g) Vacuum pump or similar system capable of achieving a minimum vacuum pressure of 600 mm Hg (80 kPa) (see Note 1).
- (h) Loaded shrinkage cell similar to that illustrated in Figure 1.
- (i) Vernier callipers to measure spring compression.
- (j) Comparator with a reference rod, similar to that illustrated in Figure 2, or other length-measuring system. The dial gauge shall be graduated at intervals not exceeding 0.005 mm.

- (k) Saturated copper sulfate solution.
- (l) Drying room with temperature controlled at $23 \pm 2^\circ\text{C}$.
- (m) Apparatus to measure total soil suction in accordance with that described in AS 1289.2.2.1.

4 SAMPLE An undisturbed soil sample shall be obtained from a thin-walled sampler pushed into the soil. The sample shall have a minimum diameter of 38 mm and a minimum length of 50 mm. A visual description of the soil shall be recorded.

5 PROCEDURE The procedure shall be conducted in a drying room as follows:

- (a) Determine the mass of the assembled apparatus without the soil sample (m_c) and the height of the sample ring (y).
- (b) Taking care to minimize loss of moisture, press the sample into the sample ring of the loaded shrinkage cell and trim the ends level. Retain and seal the sample trimmings. Determine the soil suction (u_o) using the sample trimmings in accordance with AS 1289.2.2.1 and determine the moisture content (w_o) of the remainder of the soil in accordance with AS 1289.2.1.1.
- (c) Assemble the shrinkage cell and apply a seating pressure of 5 kPa by compressing the calibrated springs the required distance. Measure the total mass of the assembled apparatus with the soil sample (m_o), and record the initial dial gauge reading from the comparator for the apparatus with the soil sample (H_o) (see Note 2).
- (d) Increase to 25 kPa the pressure applied to the sample and record the dial gauge reading from the comparator (see Note 3).
- (e) Place the loaded shrinkage cell in the vacuum desiccator over the saturated copper sulfate solution. Apply a vacuum pressure of not less than 600 mm Hg and close the stopcock.
- (f) On each of the first three days thereafter, remove the loaded shrinkage cell from the desiccator, determine the total mass (m_t) and record the dial gauge reading (H_t) from the comparator. Adjust the spring compression if required to maintain the pressure on the sample. Replace the loaded shrinkage cell in the desiccator and reapply the vacuum.
- (g) Thereafter, take mass and comparator dial gauge readings at intervals of not less than one week. Adjust springs as required to maintain the sample pressure. Readings may be terminated once three successive comparator dial gauge readings are within 0.05 mm and three successive readings of mass are within 0.05 g.
- (h) Remove the sample from the loaded shrinkage cell and determine the final soil suction (u_f), in accordance with AS 1289.2.2.1, using subsamples taken near the centre of the sample. Determine the final moisture content (w_f) of the remaining soil in accordance with AS 1289.2.1.1.
- (i) Break the specimen apart and inspect for uniformity and for rock, gravel or organic inclusions. Estimate the percentage by volume of significant inert inclusions.

6 CALCULATIONS The following calculations shall be performed:

- (a) Calculate the sample strain (ϵ_t) at each time of measurement t from the following equation (see Note 4):

$$\epsilon_t = 100 \left(\frac{H_o - H_t}{y} \right) \quad \dots 6(1)$$