

STANDARDS AUSTRALIA

RECONFIRMATION

OF

AS 1289.6.7.2—2001

Methods of testing soils for engineering purposes

Method 6.7.2: Soil strength and consolidation tests—Determination of permeability of a soil—Falling head method for a remoulded specimen

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

Methods of testing soils for engineering purposes

Method 6.7.2: Soil strength and consolidation tests—Determination of permeability of a soil—Falling head method for a remoulded specimen

This Standard incorporates Amendment No. 1 (January 2003). 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.

1 SCOPE

This Standard sets out a method for determining the coefficient of permeability for the flow of water through a remoulded specimen under the influence of a falling head of water (see Note 1). The method is suitable for soils with coefficient of permeability of about 10^{-7} to 10^{-9} metres per second.

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
1289.1.1	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)
1289.5.1.1	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
1289.5.5.1	Method 5.5.1: Soil compaction and density tests—Determination of the minimum and maximum dry density of a cohesionless material—Standard method
1289.6.7.1	Method 6.7.1: Soil strength and consolidation tests—Determination of permeability of a soil—Constant head method for a remoulded specimen
1289.6.7.3	Method 6.7.3: Soil strength and consolidation tests—Determination of permeability of a soil—Constant head method using a flexible wall permeameter

3 DEFINITIONS

3.1 Laboratory density ratio

The ratio of the dry density of the compacted specimen to the maximum dry density of the material as determined by AS 1289.5.1.1, AS 1289.5.2.1 or AS 1289.5.5.1, as applicable, expressed as a percentage.

3.2 Laboratory moisture ratio

The ratio of the moisture content of the compacted specimen to the optimum moisture content of the material as determined from AS 1289.5.1.1 or AS 1289.5.2.1, as applicable, expressed as a percentage.

3.3 Hydraulic gradient

The difference in hydraulic head between the top and the bottom of the specimen, divided by the specimen thickness.

4 APPARATUS

The following apparatus is required:

- (a) Permeameter cylinder and collar of rigid corrosion-resistant material having a diameter meeting the requirements as shown in Table 1. The height of the mould shall be sufficient to include the test specimen of height greater than 5 times the maximum particle size for testing, porous plates and surcharges. The height of the specimen shall be not less than 50 mm.

TABLE 1
PERMEAMETER CYLINDER DIAMETER

Maximum particle size for testing mm	Minimum cylinder diameter mm
5	50
10	100
20	150
40	200

- (b) Permeameter baseplate containing suitable inlets and outlets to allow water to flow through the specimen and a suitable spacer disc to ensure there is room for the surcharges in the mould after the specimen has been compacted.
- (c) Rigid porous discs for containment of the specimen within the cylinder and allowing free flow of water. The disc placed on top of the specimen may contain a hole of about 25 mm diameter. The maximum flow capacity of the apparatus shall be known.
NOTE: The flow capacity can be measured using the assembled apparatus under test conditions without a specimen.
- (d) A system for applying a confining axial load to the specimen or surcharges.
- (e) Standpipe assembly with a standpipe of known cross-sectional area and a ruler graduated in millimetres.
- (f) Timer that reads in minutes.
- (g) Balance of adequate capacity having a limit of performance not exceeding ± 1 g.
- (h) Thermometer graduated to 1°C or less with an uncertainty not exceeding 0.5°C .
- (i) Fast flow filter paper discs appropriate to the diameter of the mould.
- (j) Microcrystalline wax or similar material of known density, and waxing apparatus to line the inside of the mould.

- (k) Sieves of suitable sizes for example 37.5 mm, 19.0 mm, 9.50 mm, 4.75 mm complying with AS 1152, for material being tested.
- (l) Measurement device for determining the height of specimen to the nearest 1 mm or measured moulds and spacers.
- (m) Vacuum evacuation apparatus to assist in saturation of the specimen.

5 PREPARATION OF THE TEST PORTION

Prepare the test portion as follows:

- (a) Using the sieve appropriate to the maximum size (e.g. the 19 mm sieve for 20 mm nominal maximum size), sieve a representative sample of the soil prepared in accordance with the procedure prescribed in AS 1289.1.1. Determine the percentage of material retained on the sieve and discard it (see Note 2).
- (b) Obtain, by riffing or quartering the sieved material, a representative test portion of the soil to enable the manufacture of the specimen in the mould.
- (c) Dampen the test portion or dry at not more than 50°C to achieve the required laboratory moisture ratio. Thoroughly mix the test portion to ensure the moisture is uniform throughout the portion.
- (d) Allow the soil test portion to cure for an appropriate time for the soil type (see Note 3). Record the duration of curing.

6 PREPARATION OF THE TEST SPECIMEN

Prepare the test specimen as follows:

- (a) Saturate the porous discs in water under vacuum for at least 1 h prior to use. Store the discs in water between tests.
- (b) Apply a thin layer of wax to the side of the mould to prevent piping of water between the mould and the specimen. The amount of wax on the side of the mould shall be taken into account when calculating the volume of the specimen.
- (c) Insert the spacer disc, clamp the mould (with the extension collar attached) to the baseplate, and place a coarse filter paper on top of the spacer disc.
- (d) Immediately prior to compaction, thoroughly mix the cured soil and determine the moisture content (w_1) of a representative fraction of the test portion, as prepared in Clause 5, in accordance with AS 1289.2.1.1. The soil shall be compacted within $\pm 5\%$ of the laboratory moisture ratio specified.
- (e) Compact the specimen in the mould (see Note 4) in equal layers (within 5 mm) to achieve the required laboratory density ratio within $\pm 1\%$ using the appropriate compaction rammer and layers (see AS 1289.5.1.1 and AS 1289.5.2.1) depending on the compactive effort specified. Ensure that material is not segregated and that each layer is scarified about 2 to 5 mm prior to the compaction of the next layer.
- (f) Free the material from around the inside of the collar and carefully remove the collar.
- (g) While the baseplate is still attached, ensure the surface of the compacted specimen is level with the top of the mould by means of a straightedge. Use smaller size material to patch any holes developed in the surface by the removal of coarse material during trimming (see also AS 1289.5.1.1 or AS 1289.5.2.1).
- (h) Remove the baseplate, spacer disc, if used, and filter paper. Calculate the dry density of the compacted specimen. Reject a specimen where the density ratio is outside the permitted laboratory density ratio limits.