Australian Standard®

Geotextiles—Methods of test

Method 9: Determination of permittivity

1 SCOPE. This Standard sets out the method for determining the permittivity of geotextiles by measuring the flow of water through the fabric normal to its surface under a constant head.*

2 APPLICATION. This method is applicable to both woven and non-woven geotextiles.

NOTE: The test is intended to simulate laminar flow conditions. The permittivity will vary significantly with the flow rate in turbulent flow conditions. It should also be remembered that the permittivity may decrease under in-service conditions if the geotextile is placed in the soil (e.g. owing to compressive stresses and contamination).

3 REFERENCED DOCUMENTS. The following documents are referred to in this Standard.

AS
1289 Methods of testing soils for engineering purposes
1289.F7.1 Part F7.1: Soil classification tests—Determination of permeability of a soil—Constant head method

3704 Geotextiles—Glossary of terms

3706 Geotextiles—Methods of test
3706.1 Method 1: General requirements, sampling, conditioning, basic physical properties, and statistical analysis

ASTM
D 4491—85 Test method for water permeability of geotextiles by permittivity

4 PRINCIPLE. Water is made to flow at a constant rate under laminar flow conditions through a specimen comprising one or more layers of fabric with a known cross-sectional area. The head loss is measured using piezometric tubes. Measurements are made using at least five different flow rates, and the permittivity is determined by graphical methods.

NOTES:

1. The determination of the permittivity (ψ) is based on Darcy's law. This means that ψ is only constant for a particular material if laminar flow conditions exist, which is likely in a typical soil environment where geotextiles are used.
2. It appears that for most fabrics, Darcy's law holds if the approach velocity (the velocity of the water approaching the fabric) is kept at or below 0.035 m/s.

5 DEFINITIONS. For the purpose of this Standard, the definitions given in AS 3704 apply.

6 APPARATUS. The following apparatus is required:

(a) Supply of clean de-aired water.

NOTES:

1. ASTM D 4491—85 states that water used in this test should be de-aired under a vacuum if the dissolved oxygen content is more than 6 mg/L.
2. Where de-aired water is not available, the dissolved oxygen content of the water used should be measured and recorded.
3. If air bubbles or sediments are trapped in the fabric, its permittivity could be reduced significantly. If de-aired water is not available, improved results may be obtained if the water is filtered upstream of the test specimen by a fabric similar to or finer than that being tested. The formation and trapping of these bubbles and sediments on the fabric can be observed visually. If it occurs it should be reported.

* This method is based on RILEM SM-6-9, *Hydraulic permittivity*.