



Standard Test Method for Measurement of the Permeability of Unsaturated Porous Materials by Flowing Air¹

This standard is issued under the fixed designation D6539; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers laboratory determination of the coefficient of permeability for the flow of air through unsaturated porous materials.

1.2 This test method may be used with intact or compacted coarse grained soils, silts, or lean cohesive soils that have a low degree of saturation and that have permeability between $1.0 \times 10^{-15} \text{ m}^2$ (1.01 millidarcy) and $1.0 \times 10^{-10} \text{ m}^2$ (101 darcy).

1.3 The values stated in SI units are to be regarded as standard.

1.3.1 By tradition in U.S. practice, the permeability of porous media is reported in units of darcy, although the SI unit for permeability is m^2 .

1.4 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026.

1.4.1 For the purpose of comparing a measured or calculated value with specified limits, the measured or calculated value shall be rounded to the same precision as the specified limits.

1.4.2 The procedures used to specify how data are collected/recorded or calculated, in this standard are regarded as the industry standard. In addition, they are representative of the significant digits that generally should be retained. The procedures used do not consider material variation, purpose for obtaining the data, special purpose studies, or any considerations for the user's objectives; and it is common practice to increase or reduce significant digits of reported data to be commensurate with these considerations. It is beyond the scope of this standard to consider significant digits used in analysis methods for engineering design.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appro-*

priate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. Referenced Documents

2.1 ASTM Standards:²

- D653 Terminology Relating to Soil, Rock, and Contained Fluids
- D698 Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³))
- D1557 Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))
- D2216 Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- D3550 Practice for Thick Wall, Ring-Lined, Split Barrel, Drive Sampling of Soils
- D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
- D4220 Practices for Preserving and Transporting Soil Samples
- D4525 Test Method for Permeability of Rocks by Flowing Air
- D4564 Test Method for Density and Unit Weight of Soil in Place by the Sleeve Method (Withdrawn 2013)³
- D4753 Guide for Evaluating, Selecting, and Specifying Balances and Standard Masses for Use in Soil, Rock, and Construction Materials Testing
- D4767 Test Method for Consolidated Undrained Triaxial Compression Test for Cohesive Soils
- D5084 Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
- D5856 Test Method for Measurement of Hydraulic Conductivity of Porous Material Using a Rigid-Wall,

¹ This test method is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.04 on Hydrologic Properties and Hydraulic Barriers.

Current edition approved May 1, 2013. Published July 2013. Originally approved in 2000. Last previous edition approved in 2000 as D6539 – 00 (2006)². DOI: 10.1520/D6539-13.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.