



Standard Test Method for Hydraulic Conductivity of Essentially Saturated Peat¹

This standard is issued under the fixed designation D4511; 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 the determination of the hydraulic conductivity (permeability) of essentially saturated, intact cylindrical specimens of peat when the hydraulic conductivity is greater than 1×10^{-7} m/s (1×10^{-5} cm/s). During the test, the specimens are contained in the core holder, or in right, regular cylindrical sections cut from the sampling tube in which they were originally obtained in the field.

1.2 Hydraulic conductivity is calculated on the basis of the measured constant flow rate through the specimen under constant head.² For verification, flow rate determinations may be made at two or more values of constant head with corresponding calculations of hydraulic conductivity.

1.3 *Units*—The values stated in SI units are to be regarded as the standard. The inch-pound units given in parentheses are mathematical conversions, which are provided for information purposes only and are not considered standard.

1.3.1 The converted inch-pound units use the gravitational system of units. In this system, the pound (lbf) represents a unit of force (weight), while the unit for mass is slugs. The converted slug unit is not given, unless dynamic ($F = ma$) calculations are involved.

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

1.4.1 The procedures used to specify how data are collected/recorded and calculated in this standard are regarded as the industry standard. In addition, they are representative of the significant digits that should generally 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 appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:³

D653 Terminology Relating to Soil, Rock, and Contained Fluids

D1587 Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes

D2434 Test Method for Permeability of Granular Soils (Constant Head)

D2974 Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic 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

D4753 Guide for Evaluating, Selecting, and Specifying Balances and Standard Masses for Use in Soil, Rock, and Construction Materials Testing

D6026 Practice for Using Significant Digits in Geotechnical Data

2.2 NRC Document:

Peat Testing Manual⁴

3. Terminology

3.1 *Definitions*—For common definitions of terms in this standard, refer to Terminology D653.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *deaerated (de-aired) water*—water in which the amount of dissolved gas (air) has been reduced.

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.

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² For further information, see “Methods for Measurement of Saturated Hydraulic Conductivity,” *Peat Testing Manual*, Technical Memorandum No. 125, NRC Canada, pp. 80–84.

³ 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.

⁴ National Research Council of Canada, Publications Section, Building R–88, Ottawa, Canada K1A 0R6. Out of print.