



Designation: D7100 – 11 (Reapproved 2020)

Standard Test Method for Hydraulic Conductivity Compatibility Testing of Soils with Aqueous Solutions¹

This standard is issued under the fixed designation D7100; 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 hydraulic conductivity compatibility testing of saturated soils in the laboratory with aqueous solutions that may alter hydraulic conductivity (for example, waste related liquids) using a flexible-wall permeameter. A hydraulic conductivity test is conducted until both hydraulic and chemical equilibrium are achieved such that potential interactions between the soil specimen being permeated and the aqueous solution are taken into consideration with respect to the measured hydraulic conductivity.

1.2 This test method is applicable to soils with hydraulic conductivities less than approximately 1×10^{-8} m/s.

1.3 In addition to hydraulic conductivity, intrinsic permeability can be determined for a soil if the density and viscosity of the aqueous solution are known or can be determined.

1.4 This test method can be used for all specimen types, including undisturbed, reconstituted, remolded, compacted, etc. specimens.

1.5 A specimen may be saturated and permeated using three methods. Method 1 is for saturation with water and permeation with aqueous solution. Method 2 is for saturation and permeation with aqueous solution. Method 3 is for saturation with water, initial permeation with water, and subsequent permeation with aqueous solution.

1.6 The amount of flow through a specimen in response to a hydraulic gradient generated across the specimen is measured with respect to time. The amount and properties of influent and effluent liquids are monitored during the test.

1.7 The hydraulic conductivity with an aqueous solution is determined using procedures similar to determination of hydraulic conductivity of saturated soils with water as described in Test Methods D5084. Several test procedures can be used, including the falling headwater-rising tailwater, the constant-

head, the falling headwater-constant tailwater, or the constant rate-of-flow test procedures.

1.8 *Units*—The values stated in SI units are to be regarded as standard. The values given in parentheses are provided for information only and are not considered standard.

1.8.1 Hydraulic conductivity has traditionally been expressed in cm/s in the U.S., even though the official SI unit for hydraulic conductivity is m/s.

1.8.2 The gravitational system of inch-pound units is used when dealing with inch-pound units. In this system, the pound (lbf) represents a unit of force (weight), while the unit for mass is slugs.

1.8.3 The slug unit of mass is almost never used in commercial practice; i.e., density, balances, etc. Therefore, the standard unit for mass in this standard is either kilogram (kg) or gram (g), or both. Also, the equivalent inch-pound unit (slug) is not given/presented in parentheses. However, the use of balances or scales recording pounds of mass (lbm) or recording density in lbm/ft³ shall not be regarded as nonconformance with this standard.

1.9 This standard contains a Hazards section related to using hazardous liquids (Section 7).

1.10 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.11 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

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 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.