



Standard Test Method for Measuring the Soil-Geotextile System Clogging Potential by the Gradient Ratio¹

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1. Scope

1.1 This test method covers a performance test applicable for determining the soil-geotextile system permeability and clogging behavior for cohesionless soils under unidirectional flow conditions.

1.2 The values stated in SI units are to be regarded as standard. The values in parentheses are for information only.

1.3 *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:

D 123 Terminology Relating to Textiles²

D 653 Terminology Relating to Soil, Rock, and Contained Fluids³

D 737 Test Method for Air Permeability of Textile Fabrics³

D 4354 Practice for Sampling of Geosynthetics for Testing⁴

D 4439 Terminology for Geosynthetics⁴

3. Terminology

3.1 Definitions:

3.1.1 *clogging potential, n* —in geotextiles, the tendency for a given fabric to lose permeability due to soil particles that have either lodged in the fabric openings or have built up a restrictive layer on the surface of the fabric.

3.1.2 *geotextile, n* —a permeable geosynthetic comprised solely of textiles.

3.1.3 *gradient ratio, n* —in geotextiles, the ratio of the hydraulic gradient through a soil-geotextile system to the hydraulic gradient through the soil alone.

3.1.4 *hydraulic gradient, i , s (D)*—the loss of hydraulic head per unit distance of flow, dH/dL .

3.1.5 For definitions of other textile terms, refer to Terminology D 123. For definitions of other terms related to geotextiles, refer to Terminology D 4439 and Terminology D 653.

3.2 *Acronyms: Symbols and Acronyms:*

3.2.1 CO_2 —the chemical formula for carbon dioxide gas.

3.2.2 *CHD*—the acronym for constant head device.

4. Summary of Test Method

4.1 This test method requires setting up a cylindrical, clear plastic permeameter (see Fig. 1 and Fig. 2) with a geotextile and soil, and passing water through this system by applying various differential heads. Measurements of differential heads and flow rates are taken at different time intervals to determine hydraulic gradients. The following test procedure describes equipment needed, the testing procedures, and calculations.

5. Significance and Use

5.1 This test method is recommended for evaluating the performance of various soil-geotextile systems under controlled test conditions. Gradient ratio values obtained may be plotted and used as an indication of the soil-geotextile system clogging potential and permeability. This test method is not appropriate for initial comparison or acceptance testing of various geotextiles. The test method is intended to evaluate geotextile performance with specific on-site soils. It is improper to utilize the test results for job specifications or manufacturers' certifications.

5.2 It is important to note the changes in gradient ratio values with time versus the different system hydraulic gradients, and the changes in the rate of flow through the system (see Section 11 and Annex A1.).

6. Apparatus and Supplies

6.1 *Soil-Geotextile Permeameter*—(three-piece unit) equipped with support stand, soil-geotextile support screen, piping barriers (caulk), clamping brackets, and plastic tubing (see Fig. 2). Both 100-mm (4-in.) and 150-mm (6-in.) diameter permeameters are described.

6.2 *Two Constant Water Head Devices*, one mounted on a jack stand (adjustable) and one stationary (Fig. 3).

6.3 *Soil Leveling Device* (Fig. 4).

6.4 *Manometer Board*, of parallel glass tubes and measuring rulers.

¹ This test method is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.03 on Permeability and Filtration.

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² *Annual Book of ASTM Standards*, Vol. 07.01.

³ *Annual Book of ASTM Standards*, Vol. 04.08.

⁴ *Annual Book of ASTM Standards*, Vol. 07.01.