



Designation: D 5321 – 92 (Reapproved 1997)

Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method¹

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1. Scope

1.1 This test method covers a procedure for determining the shear resistance of a geosynthetic against soil, another geosynthetic, or a soil and geosynthetic in any combination.

1.1.1 The test method is intended to indicate the performance of the selected specimen by attempting to model certain field conditions.

1.2 The test method is applicable for all geosynthetics. Remolded or undisturbed soil samples can be used in the test device.

1.3 The test method is not suited for the development of exact stress-strain relationships within the test specimen due to the non-uniform distribution of shearing forces and displacement.

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

1.5 *This standard does not purport to address all 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 653 Terminology Relating to Soil, Rock and Contained Fluids²

D 698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN/m/m³))²

D 1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56 000 ft-lbf/ft³ (2700 kN/m/m³))²

D 3080 Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions²

D 4354 Practice for Sampling of Geotextiles for Testing³

¹ This test method is under the jurisdiction of ASTM Committee D-35 on Geosynthetics and is the direct responsibility of Subcommittee D35.01 on Mechanical Properties.

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² Annual Book of ASTM Standards, Vol 04.08.

³ Annual Book of ASTM Standards, Vol 04.09.

D 4439 Terminology for Geosynthetics³

3. Terminology

3.1 Definitions—For definitions of terms relating to soil and rock, refer to Terminology D 653. For definitions of terms relating to geosynthetics, refer to Terminology D 4439.

3.2 Descriptions of Terms Specific to This Standard:

3.2.1 *adhesion*, c_a (FL⁻²), n —the shearing resistance between soil and another material under zero externally applied pressure. **(D 653, D-18)**

3.2.2 *angle of friction*, n —(angle of friction between solid bodies) (degrees) the angle whose tangent is the ratio between the maximum value of the shear stress that resists slippage between two solid bodies at rest with respect to each other and the normal stress across the contact surface. **(D 653, D-18)**

3.2.3 *atmosphere for testing geosynthetics*, n —air maintained at a relative humidity of $65 \pm 5\%$ and temperature of $21 \pm 2^\circ\text{C}$ ($70 \pm 4^\circ\text{F}$). **(D 4439)**

3.2.4 *coefficient of friction*, n —a constant proportionality factor, relating normal stress and the corresponding critical shear stress, at which sliding starts between two surfaces. **(D 653, D-18)**

3.2.5 *direct shear friction test*, n —for geosynthetics, a procedure in which the interface between a geosynthetic and any other surface, under a range of normal stresses specified by the user, is stressed to failure by the horizontal movement of one surface against the other.

3.2.6 *geosynthetic*, n —a planar synthetic product manufactured from polymeric material used with soil, rock, earth, or other geotechnical engineering-related material as an integral part of a man-made project, structure, or system. **(D 4439)**

4. Summary of Test Method

4.1 The coefficient of friction between a geosynthetic and soil, or between any geosynthetic combination selected by the user, is determined by placing the geosynthetic and one or more contact surfaces, such as soil, within a direct shear box. A constant normal compressive stress is applied to the specimen, and a tangential (shear) force is applied to the apparatus so that one section of the box moves in relation to the other section. The shear force is recorded as a function of the horizontal displacement of the moving section of the shear box.