



Standard Guide for Considerations When Evaluating Direct Shear Results Involving Geosynthetics¹

This standard is issued under the fixed designation D7702/D7702M; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 This guide presents a summary of available information related to the evaluation of direct shear test results involving geosynthetic materials.

1.2 This guide is intended to assist designers and users of geosynthetics. This guide is not intended to replace education or experience and should only be used in conjunction with professional judgment. This guide is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. Not all aspects of this practice may be applicable in all circumstances. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.

1.3 This guide is applicable to soil-geosynthetic and geosynthetic-geosynthetic direct shear test results, obtained using either Test Method [D5321/D5321M](#) or [D6243/D6243M](#).

1.4 This guide does not address selection of peak or large-displacement shear strength values for design. References on this topic include Thiel ([1](#))², Gilbert ([2](#)), Koerner and Bowman ([3](#)), and Stark and Choi ([4](#)).

1.5 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.6 *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.*

¹ This guide is under the jurisdiction of ASTM Committee [D35](#) on Geosynthetics and is the direct responsibility of Subcommittee [D35.04](#) on Geosynthetic Clay Liners.

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² The boldface numbers in parentheses refer to a list of references at the end of this standard.

2. Referenced Documents

2.1 ASTM Standards:³

[D653 Terminology Relating to Soil, Rock, and Contained Fluids](#)

[D5321/D5321M Test Method for Determining the Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear](#)

[D6243/D6243M Test Method for Determining the Internal and Interface Shear Strength of Geosynthetic Clay Liner by the Direct Shear Method](#)

[D4439 Terminology for Geosynthetics](#)

3. Terminology

3.1 *Definitions*—For definitions of terms relating to soil and rock, refer to Terminology [D653](#). For definitions of terms relating to geosynthetics and GCLs, refer to Terminology [D4439](#).

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *adhesion, c_a or c , n* —the y-intercept of the Mohr-Coulomb shear strength envelope; the component of shear strength indicated by the term c_a , in Coulomb's equation, $\tau = c_a + \sigma \tan \delta$.

3.2.2 *failure envelope, n* —curvi-linear line on the shear stress-normal stress plot representing the combination of shear and normal stresses that define a selected shear failure criterion (for example, peak and post-peak). Also referred to as shear strength envelope.

3.2.3 *Mohr-Coulomb friction angle δ , n* —angle of friction of a material or between two materials (degrees), the angle defined by the least-squares, "best-fit" straight line through a defined section of the shear strength-normal stress failure envelope; the component of the shear strength indicated by the term δ , in Coulomb's equation, $\tau = c + \sigma \tan \delta$.

3.2.4 *Mohr-Coulomb shear strength envelope, n* —the least-squares, "best-fit" straight line through a defined section of the shear strength-normal stress failure envelope described the

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.