



Standard Test Method for Torsional Ring Shear Test to Determine Drained Residual Shear Strength of Cohesive Soils¹

This standard is issued under the fixed designation D 6467; 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 provides a procedure for performing a torsional ring shear test under a drained condition to determine the residual shear strength of cohesive soils. An undisturbed specimen can be used for testing. However, obtaining a natural slip surface specimen, determining the direction of field shearing, and trimming and properly aligning the usually non-horizontal shear surface in the ring shear apparatus is difficult. As a result, this test method focuses on the use of a remolded specimen. This test method is performed by deforming a presheared, remolded specimen at a controlled displacement rate until the constant minimum drained shear resistance is offered on a single shear plane determined by the configuration of the apparatus. An unlimited amount of continuous shear displacement can be achieved to obtain a residual strength condition. Generally, three or more normal stresses are applied to a test specimen to determine the drained residual failure envelope. A separate test specimen may be used for each normal stress.

1.2 A shear stress-displacement relationship may be obtained from this test method. However, a shear stress-strain relationship or any associated quantity, such as modulus, cannot be determined from this test method because possible soil extrusion and volume change prevents defining the height needed in the shear strain calculations. As a result, shear strain cannot be calculated but shear displacement can be calculated.

1.3 The selection of normal stresses and final determination of the shear strength envelope for design analyses and the criteria to interpret and evaluate the test results are the responsibility of the engineer or office requesting the test.

1.4 *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.*

1.5 The values stated in SI units are to be regarded as the standard. The values stated in inch-pound units are approximated.

2. Referenced Documents

2.1 ASTM Standards:

D 422 Test Method for Particle-Size Analysis of Soils²

D 653 Terminology Relating to Soil, Rock, and Contained Fluids²

D 854 Test Method for Specific Gravity of Soils²

D 2216 Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock²

D 2435 Test Method for One-Dimensional Consolidation Properties of Soils²

D 2487 Classification of Soils for Engineering Purposes (Unified Soil Classification System)²

D 3740 Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction²

D 4318 Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils²

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology D 653.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *consolidated*—soil specimen condition after primary consolidation under a specific normal stress.

3.2.2 *presheared*—soil specimen condition after shearing at least one revolution of the ring in the direction of shear to create a failure surface prior to drained shearing.

3.2.3 *residual shear force*—the shear force being applied to the specimen when the shear resistance neither increases nor decreases with continued shear displacement.

3.2.4 *residual shear strength*—the constant minimum resistance of soil to shear along a fully developed failure surface and equals the residual shear force divided by the cross-sectional area of the specimen.

4. Summary of Test Method

4.1 This test method consists of placing the specimen in the annular specimen container, applying a predetermined normal stress through the top loading platen, providing for wetting and draining of the specimen (optional); consolidating the specimen under the normal stress; decreasing the normal stress to yield an overconsolidated specimen; preshearing the specimen

¹ This test method is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.05 on Strength and Compressibility of Soils.

Current edition approved Oct. 10, 1999. Published February 2000.

² Annual Book of ASTM Standards, Vol 04.08.