



Standard Test Method for Bulk Solids Using Schulze Ring Shear Tester¹

This standard is issued under the fixed designation D6773; 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 the apparatus and procedures for measuring the unconfined yield strength of bulk solids during both continuous flow and after storage at rest. In addition, measurements of internal friction, bulk density, and wall friction on various wall surfaces are included.

1.2 This test method covers operation of the manually-controlled Schulze Ring Shear Tester. An automated version of this tester is also available. Its method of testing bulk solids is similar in principle to that described in this test method.

1.3 The most common use of this information is in the design of storage bins and hoppers to prevent flow stoppages due to arching and ratholing, including the slope and smoothness of hopper walls to provide mass flow. Parameters for structural design of such equipment may also be derived from this data. Another application is the measurement of the flowability of bulk solids, for example, for comparison of different products or optimization.

1.4 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice [D6026](#).

1.4.1 The procedures used to specify how data are collected/recorded or calculated in this standard are regarded as the industry standard. In addition, they are representative of the significant digits that generally should be retained. The procedures used do not consider material variation, purpose for obtaining the data, special purpose studies, or any considerations for the user's objectives; and it is common practice to increase or reduce significant digits of reported data to be commensurate with these considerations. It is beyond the scope of this standard to consider significant digits used in analysis methods for engineering design.

1.5 *Units*—The values stated in SI units are to be regarded as standard. No other units of measure are included in this 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.*

2. Referenced Documents

2.1 *ASTM Standards*:²

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

[D2216](#) Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

[D3740](#) Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

[D4753](#) Guide for Evaluating, Selecting, and Specifying Balances and Standard Masses for Use in Soil, Rock, and Construction Materials Testing

[D6026](#) Practice for Using Significant Digits in Geotechnical Data

[D6128](#) Test Method for Shear Testing of Bulk Solids Using the Jenike Shear Cell

3. Terminology

3.1 *Definitions*—For common definitions of technical terms in this standard, refer to Terminology [D653](#).

4. Summary of Test Method

4.1 A representative specimen of bulk solid is placed in a shear cell of specific dimensions.

4.2 When running an instantaneous or time shear test, a normal load is applied to the cover, and the specimen is presheared until a steady state shear value has been reached. The shear stress is then immediately reduced to zero.

4.3 An instantaneous test is run by shearing the specimen under a reduced normal load until the shear force goes through a maximum value and then begins to decrease.

¹ This test method is under the jurisdiction of ASTM Committee [D18](#) on Soil and Rock and is the direct responsibility of Subcommittee [D18.24](#) on Characterization and Handling of Powders and Bulk Solids.

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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.