



Designation: D4943 – 18 (Reapproved 2024)

Standard Test Method for Shrinkage Factors of Cohesive Soils by the Water Submersion Method¹

This standard is issued under the fixed designation D4943; 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 procedure for determining the shrinkage factors of cohesive soils, using the water submersion technique, whereby the volume of a dried soil pat is determined while suspended in a water bath.

1.2 The data obtained following this test method are also used to determine the shrinkage ratio, volumetric shrinkage, and linear shrinkage of the soil.

1.3 This test method is applicable only for cohesive soils.

1.4 Since this test method is performed only on that portion of a soil which passes the 425- μm (No. 40) sieve, the relative consistency of the tested portion of the soil to the properties of the sample as a whole must be considered when evaluating the entire soil sample.

1.5 All recorded and calculated values shall conform to the guide for significant digits and rounding established in Practice D6026.

1.5.1 The procedures, used to specify how data are collected/recorded and calculated in this standard, are regarded as the industry standard. In addition, they are representative of the significant digits that should generally 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.

1.6 *Units*—The values stated in SI units are to be regarded as standard except the sieve designations are shown using the alternative sieve designation in parentheses. No other units of measurement are included in this standard.

1.7 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use. For specific safety hazards, see Section 8.

1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

- C670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials**
- C702/C702M Practice for Reducing Samples of Aggregate to Testing Size**
- D75/D75M Practice for Sampling Aggregates**
- D420 Guide for Site Characterization for Engineering Design and Construction Purposes**
- D653 Terminology Relating to Soil, Rock, and Contained Fluids**
- D854 Test Methods for Specific Gravity of Soil Solids by the Water Displacement Method**
- D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction**
- D4318 Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils**
- 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 and Data Records in Geotechnical Data**
- E2251 Specification for Liquid-in-Glass ASTM Thermometers with Low-Hazard Precision Liquids**
- E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves**

¹ This test method is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.03 on Texture, Plasticity and Density Characteristics of Soils.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

***A Summary of Changes section appears at the end of this standard**