



Designation: D1140 – 17

Standard Test Methods for Determining the Amount of Material Finer than 75- μ m (No. 200) Sieve in Soils by Washing¹

This standard is issued under the fixed designation D1140; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 These test methods cover the determination of the amount of material finer than a 75- μ m (No. 200) sieve by washing of material with a maximum particle size of 75 mm (3 in.).

1.2 The methods used in this standard rely on the use of water or a dispersant to separate and remove materials finer than a 75- μ m (No. 200) sieve. During these processes soluble substances, such as salts and other minerals, may also be removed. It is not within the scope of this standard to differentiate between the removal of fine particles and soluble substances. It is recommended that materials containing significant amounts of soluble substances be tested using other methods of separation.

1.3 Two methods for determining the amount of material finer than the 75- μ m (No. 200) sieve are provided. The method to be used shall be specified by the requesting authority. If no method is specified, the choice should be based upon the guidance given in 5.2, 5.3, and 5.4.

1.3.1 *Method A*—Test specimen is dispersed by soaking in water prior to wash sieving.

1.3.2 *Method B*—Test specimen is dispersed by soaking in a dispersing solution prior to wash sieving.

1.4 *Units*—The values stated in SI units are to be regarded as standard. Except the sieve designations are typically identified using the “alternative” system in accordance with Specification E11, such as 3 inch and No. 200, instead of the “standard” of 75-mm and 75- μ m, respectively. Reporting of test results in units other than SI shall not be regarded as nonconformance with this test method. The use of balances or scales recording pounds of mass (lbm) shall not be regarded as nonconformance with this standard.

¹ These test methods are 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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1.5 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026, unless superseded by this test method.

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 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 these test methods to consider significant digits used in analysis methods for engineering design.

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

C702 Practice for Reducing Samples of Aggregate to Testing Size

D75 Practice for Sampling Aggregates

D422 Test Method for Particle-Size Analysis of Soils (Withdrawn 2016)³

D653 Terminology Relating to Soil, Rock, and Contained Fluids

D1586 Test Method for Penetration Test (SPT) and Split-Barrel Sampling of Soils

D1587 Practice for Thin-Walled Tube Sampling of Fine-Grained Soils for Geotechnical Purposes

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

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.

³ The last approved version of this historical standard is referenced on www.astm.org.

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

- [D2487 Practice for Classification of Soils for Engineering Purposes \(Unified Soil Classification System\)](#)
- [D2488 Practice for Description and Identification of Soils \(Visual-Manual Procedure\)](#)
- [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](#)
- [D6913 Test Methods for Particle-Size Distribution \(Gradation\) of Soils Using Sieve Analysis](#)
- [E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves](#)
- [E145 Specification for Gravity-Convection and Forced-Ventilation Ovens](#)
- [E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods](#)
- [E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method](#)

3. Terminology

3.1 Definitions:

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

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *guard sieve*—a sieve or sieves that are placed over the actual wash sieve and are constructed of wire mesh instead of wire cloth.

3.2.1.1 *Discussion*—The guard sieve(s) acts to prevent coarse particles from contacting the wire cloth of the wash sieve resulting in punctures, tears, and damage that may require the sieve to be replaced.

4. Summary of Test Method

4.1 A soil specimen is washed over a 75- μm (No. 200) sieve. Clay, silt, and other particles that are dispersed by the wash water, as well as water-soluble materials, are removed from the soil during the test. The loss in mass resulting from the wash treatment is calculated as mass percent of the original sample specimen and is reported as the percentage of material finer than a 75- μm (No. 200) sieve by washing.

5. Significance and Use

5.1 Material finer than the 75- μm (No. 200) sieve can be separated from larger particles or soil aggregations can be broken down much more efficiently and completely by wet sieving than with dry sieving. Therefore, when accurate determinations of material finer than a 75- μm (No. 200) sieve are desired, these test methods are used on the test specimen prior to dry sieving, or as a determination of the percent of material that is finer than a 75- μm (No. 200) sieve. Usually the additional amount of material finer than a 75- μm (No. 200) sieve obtained in the dry sieving process is a small amount. If it is large, the efficiency of the washing operation should be checked, as it could be an indication of degradation of the soil (see [Note 2](#)).

5.2 Method A shall be used with non-cohesive soils containing fine material with little or no plasticity. The specimen is soaked in water to facilitate the separation of the fine and coarse fractions prior to washing through the 75- μm (No. 200) sieve.

5.3 Method B shall be used with soils, particularly clayey soils, where the fine material demonstrates plastic behavior and tends to adhere to the larger particles. To provide adequate fine grain dispersal, it is necessary to soak the specimen in a dispersing solution prior to washing through the 75- μm (No. 200) sieve.

5.4 To facilitate determination of which method to utilize, the sample may be classified as non-cohesive or having plastic characteristics based upon procedures outlined in Practice [D2488](#) or other means of determining the soil properties.

NOTE 1—The quality of the result produced by this standard is dependent on the competence of the personnel performing it, and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice [D3740](#) are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with Practice [D3740](#) does not in itself ensure reliable results. Reliable results depend on many factors; Practice [D3740](#) provides a means of evaluating some of those factors.

NOTE 2—As outlined in [5.1](#), if the sample is dry sieved after washing, such as for Test Methods [D422](#) or [D6913](#), some material may pass the 75- μm (No. 200) sieve that did not pass during washing operations. The material passing the 75- μm (No. 200) sieve may be a significant amount for samples with a high percentage of silt or clay.

6. Apparatus

6.1 *Balance*—A balance or scale conforming to the requirements of Specification [D4753](#), having a readability with no estimation to four significant digits. The mass of the specimen may be determined in parts if necessary.

6.2 *Wash Sieve*—A 75- μm (No. 200) sieve with a diameter sufficient to handle the required size of specimen in [9.4](#). Usually 203-mm (8-in.) diameter sieves are adequate for the washing process. The 75- μm (No. 200) sieve shall have a minimum height above the screen of 50 mm (2 in.) to prevent loss of retained material while washing. The sieve may be reinforced with a larger mesh supporting the 75- μm (No. 200) mesh cloth. The reinforcing mesh shall be bonded to the sieve frame below the point where the 75- μm (No. 200) cloth is attached. It is recommended that the sieve cloth be stainless steel to offer more resistance to wear and damage. The sieve shall conform to the requirements of Specification [E11](#) for compliance sieves.

6.3 *Guard Sieves (optional)*—A sieve or multiple sieves having a sieve opening of 425- μm (No. 40) or larger. The diameter of the guard sieve(s) frame shall be equal to or less than the 75- μm (No. 200) wash sieve when stacked. Guard sieves do not need to conform to the requirements of Specification [E11](#).

6.4 *Drying Oven*—An oven of sufficient size, thermostatically controlled and capable of maintaining a uniform temperature of $110 \pm 5^\circ\text{C}$ ($230 \pm 9^\circ\text{F}$). The oven shall meet the criteria of Specification [E145](#) and preferably be a forced draft oven.

6.5 *Specimen Containers*—The specimen containers shall be made of smooth walled, corrosion resistant material and of