



Designation: D1997 – 20

# Standard Test Method for Laboratory Determination of the Fiber Content of Peat and Organic Soils by Dry Mass<sup>1</sup>

This standard is issued under the fixed designation D1997; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope\*

1.1 This test method covers the laboratory determination of the fiber content of peat and organic soils by dry mass. Classification [D4427](#) provides the methodology to classify peat as it is used in this standard.

1.2 Pieces of plant material such as roots or wood, larger than 20 mm in smallest dimension are not considered fibers.

1.3 Because this test method is simple and does not need sophisticated equipment in order to be performed, it is especially recommended for routine reconnaissance work where large numbers of samples need to be tested and mineral contents are low.

1.4 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard. Alternate sieve designations in parentheses are as provided in Specification [E11](#).

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

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.7 *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.*

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee [D18](#) on Soil and Rock and is the direct responsibility of Subcommittee [D18.22](#) on Media for Plant Growth.

Current edition approved March 1, 2020. Published March 2020. Originally approved in 1991. Last previous edition approved in 2013 as D1997 – 13. DOI: 10.1520/D1997-20.

## 2. Referenced Documents

2.1 *ASTM Standards*:<sup>2</sup>

[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

[D2974](#) Test Methods for Determining the Water (Moisture) Content, Ash Content, and Organic Material of Peat and Other Organic Soils

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

[D4427](#) Classification of Peat Samples by Laboratory Testing

[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

## 3. Terminology

3.1 *Definitions*:

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

## 4. Summary of Test Method<sup>3</sup>

4.1 A sample of peat or organic soil is reduced using quartering to obtain a representative sample. The representative sample is further reduced via quartering to obtain a test

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> This test method is a modified version of one described in: Riley, J. L., "Laboratory Methods for Testing Peat," *Ontario Peatland Inventory Project*, Ontario Geological Survey Open File Report 5572, 1986, pp. 21–22.

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

specimen. A portion of the test specimen is used to obtain a water content determination. Another portion of the test specimen is placed in a beaker and mixed with a dispersing agent and allowed to stand for approximately 15 h. The mixture is then poured over a sieve stack. Materials larger than 20 mm are removed and the remaining specimen is washed until the water runs clear. Then, the sieve with the specimen is soaked in HCl for 10 min and rewashed. The specimen is then filtered. The specimen retained on the filter and the filter paper is then dried to constant mass. The fiber content is then calculated.

## 5. Significance and Use

5.1 This test method is useful for determining the quantity of fibers in a peat or organic soil specimen. Fiber content is one parameter used to classify the peat as determined in Classification **D4427**. It is also a significant parameter in predicting or defining the many end uses of these materials. In this regard, fiber content has been related to agricultural and horticultural end uses (such as mulching and soil enrichment), geotechnical measurements (such as strength, compressibility, and permeability), industrial chemical uses (such as production of waxes, activated carbon, and medicines), and energy uses (such as direct combustion, methanol production, and gas yields).

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 assure reliable results. Reliable results depend on many factors; Practice **D3740** provides a means of evaluating some of those factors.

## 6. Apparatus

6.1 *Sieve*—A 150- $\mu\text{m}$  (No. 100) sieve and 19 mm ( $\frac{3}{4}$  in.) sieve. The sieve cloth of the 150- $\mu\text{m}$  (No. 100) sieve must be made of stainless steel to offer more resistance to wear and damage. These sieves must conform to the requirements given in Specification **E11**.

6.2 *Drying Oven*—Vented, thermostatically controlled oven capable of maintaining a uniform temperature of  $110^{\circ}\text{C} \pm 5^{\circ}\text{C}$  throughout the drying chamber. The oven shall not have any “hot spots.” The uniformity of the oven’s temperature shall be verified annually and the temperature should be checked or monitored as detailed in Test Methods **D2216** (Note 2).

NOTE 2—The temperature of the drying oven is very important for organic soils. Hot spots in the oven could alter the specimen. Care should be taken when monitoring the oven’s temperature and placement of the specimens within the oven to avoid possible alteration.

6.3 *Balance*—The balance shall conform to the requirements of Guide **D4753**. The balance must have a minimum capacity of 200 g and have a readability without estimation of 0.001 g (1 mg).

6.4 *Laboratory Stirrer*—A mechanical stirring device capable of achieving and maintaining 240 r/min.

6.5 *Beaker*—A glass or plastic beaker with a capacity of 1000-mL.

6.6 *Washing Sink with a Water Delivery System*—A sink or other suitable receptacle having a mechanism to deliver a stream of water directly to the sieve. The delivery system may be a rigid or flexible line to facilitate washing. Preferably, the system will include a spray nozzle capable of easily adjusting the flow of water and must have the ability to regulate the temperature of the water. A rubber hose connected to a water faucet is also acceptable. The water must be close to room temperature to avoid expansion or contraction of the sieve cloth. A rubber hose connected to a water faucet is also acceptable.

6.7 *Funnel*—A large funnel used in conjunction with number 4 filter paper (20–25  $\mu\text{m}$  pore size, very fast flow rate).

6.8 *Miscellaneous Items*—Items such as spoons, spatulas, wash/rinse bottle (squirt bottle), shallow pan/tank, rubber scraper, non-absorbent surface, water proof containers are useful.

## 7. Reagents

7.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society where such specifications are available.<sup>4</sup>

7.2 *Hydrochloric Acid (HCl)*—2 % solution.

7.3 *Sodium Hexametaphosphate*—5 % solution. Also referred to as sodium metaphosphate is the dispersion agent. When making the 5% solution, the solution should be used within 1 week of creation.

7.4 Consult the Safety Data Sheet (SDS) for specific information regarding these chemicals.

## 8. Sampling and Test Specimens

8.1 This test method does not address, in any detail, procurement of the sample. It is assumed the sample is obtained using appropriate methods and is representative of the peat or organic soil under evaluation.

8.2 Work rapidly to prevent changes in water content or perform the sample and specimen preparation in an environment where the humidity is high (>50 %). Place the sample on a non-absorbent surface, such as a rubber sheet or oil cloth and mix thoroughly. Use quartering to obtain a representative sample that will yield 600 g or more. Put any unused sample in a tightly-sealed, labeled, waterproof container.

8.3 Reduce the representative sample to obtain the test specimen by quartering. The mass of the test specimen must be at least 150 g. Then immediately, place the test specimen and the unused representative sample in separate tightly-sealed, labeled, waterproof containers.

<sup>4</sup> *ACS Reagent Chemicals, Specifications and Procedures for Reagents and Standard-Grade Reference Materials*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.