



Designation: **D4427—18** **D4427 – 23**

## Standard Classification of Peat Samples by Laboratory Testing<sup>1</sup>

This standard is issued under the fixed designation D4427; 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.

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

### 1. Scope\*

1.1 This classification is a system for subdividing and assigning nomenclature to peat samples through laboratory tests.

1.2 Peat is considered to be a naturally occurring organic soil primarily derived from decomposing plant material that has sedentarily accumulated in water-saturated, anaerobic environments. It is found in peatlands, bogs, mangroves, mires, moors, and muskegs and is generally composed of mosses, grasses, leaves, sedges, and shrubs. Changes in depositional environment can create subsurface peat deposits underlying inorganic soils. Typically, peat has a low density, high water content, and is quite compressible when compared to other types of soil

1.3 *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.*

1.4 *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:<sup>2</sup>

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

[D1997 Test Method for Laboratory Determination of the Fiber Content of Peat and Organic Soils by Dry Mass](#)

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

[D2976 Test Method for pH of Peat Materials](#)

[D2980 Test Method for Saturated Density, Moisture-Holding Capacity, and Porosity of Saturated Peat Materials](#)

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

[D5715 Practice for Estimating the Degree of Humification of Peat and Other Organic Soils \(Visual/Manual Method\)](#)

### 3. Terminology

#### 3.1 Definitions:

<sup>1</sup> This classification is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.07 on Identification and Classification of Soils.

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<sup>2</sup> 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.

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

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 *absorbency*—the amount of water by mass that can be held by the peat. This amount is expressed in terms of the water-holding capacity as measured using Test Method [D2980](#).

3.2.2 *acidity*—expressed as the pH of the peat in water as measured using Test Method [D2976](#).

3.2.3 *ash content*—the percentage by dry mass of material remaining after the oven dry peat is burned, using the methods described in Test Methods [D2974](#).

3.2.4 *botanical composition*—the dominant plant genus, genera, or informal plant group identified by visual observation as comprising a portion of the fiber in the peat.

3.2.5 *fiber content*—the dry mass of fibers remaining after wet sieving over a No. 100 (150- $\mu$ m) sieve. Fiber content is expressed as a percentage of the original dry mass, using the method described in Test Method [D1997](#).

## 4. Significance and Use

4.1 The purpose of this classification is to standardize the naming of peat materials so that the peat-producer can better identify the product and the peat-consumer can better select peat materials to meet requirements. This system may also be used for peat resource evaluations, environmental impact reports, and preliminary engineering studies. The parameters selected for use in this classification are ones which have been determined to relate to the agricultural/horticultural, geotechnical, and energy uses of peats.

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. 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.

## 5. Sampling

5.1 ~~Representative—Obtain representative samples of the peat should be used. peat. The size and type of sample needed is dependent on the tests to be performed and the coarseness and moisture content of the peat. When taking the sample, it should be accurately identified and placed in a sealed containers~~ samples, accurately identify the samples and place them in sealed containers to prevent moisture loss.

## 6. Basis for Classification

### 6.1 *Fiber Content:*

6.1.1 *Fibric*—Peat with greater than 67 % fibers.

6.1.2 *Hemic*—Peat with between 33 % and 67 % fibers.

6.1.3 *Sapric*—Peat with less than 33 % fibers.

NOTE 2—These fiber content categories may be related to the widely used field assessment of the degree of humification ( $H$ ) developed by Von Post.<sup>3</sup> Fibric corresponds approximately to  $H_1 - H_3$ , hemic to  $H_4 - H_6$ , and sapric to  $H_7 - H_{10}$ . Practice [D5715](#) can be used to determine the degree of humification.

### 6.2 *Ash Content*—As measured by Test Methods [D2974](#):

6.2.1 *Low Ash*—Peat with less than 5 % ash.

<sup>3</sup> Korpijaakko, E. O., and Woolnough, D. F., "Peatland Survey and Inventory", *Muskeg and the Northern Environment in Canada*, University of Toronto Press, 1977.

6.2.2 *Medium Ash*—Peat with between 5 and 15 % ash.

6.2.3 *High Ash*—Peat with more than 15 % ash.

6.3 *Acidity*—As measured by Test Method **D2976**:

6.3.1 *Highly Acidic*—Peat with a pH less than 4.5.

6.3.2 *Moderately Acidic*—Peat with a pH between 4.5 and 5.5.

6.3.3 *Slightly Acidic*—Peat with a pH greater than 5.5 and less than 7.

6.3.4 *Basic*—Peat with a pH equal to or greater than 7.

6.4 *Absorbency*—As measured by Test Method **D2980**:

6.4.1 *Extremely Absorbent*—Peat with a water-holding capacity greater than 1500 %.

6.4.2 *Highly Absorbent*—Peat with a water-holding capacity between 800 and 1500 %.

6.4.3 *Moderately Absorbent*—Peat with a water-holding capacity greater than 300 and less than 800 %.

6.4.4 *Slightly Absorbent*—Peat with a water-holding capacity less than or equal to 300 %.

6.5 *Botanical Composition*—If a botanical designation is necessary, the following rules of naming should be applied:

6.5.1 If a single botanical name or other botanical designation is used, for example, *Sphagnum* Peat, *Taxodium* Peat, Moss Peat, Herbaceous Peat, or Woody Peat, it is necessary that at least 75 % of the fiber content of that peat should be derived from the designated type of plant material.

6.5.2 If two or more botanical designations are used in naming the peat, for example, Reed-Sedge Peat, Bay-Gum Peat, *Myrica-Persea-Salix* Peat, Spruce-Moss-Sedge Peat, it is necessary that at least 75 % of the fiber content of that peat be composed of these types of plants as a group. Furthermore, the order of the plant types in the group name should indicate the relative quantity of each type in the peat with the dominant component appearing last.

NOTE 3—For peats with less than 33 % fiber (that is, Sapric) it would be advisable to refrain from using a botanical designation unless a significant portion of the non-fiber can be identified (for example, algal peat).

## 7. Use of This System

7.1 The order of classification should be as follows: fiber content, ash content, acidity, absorbency, and botanical designation, if necessary.

7.2 For example, a peat sample with a fiber content of 55 %, an ash content of 8 %, a pH of 4.7, a water-holding capacity of 1200 %, and with 70 % of its fibers derived from *Sphagnum* and 20 % from *Carex* would be designated a Hemic, Medium Ash, Moderately Acidic, Highly Absorbent, *Carex-Sphagnum* Peat.

## 8. Precision and Bias

8.1 *Precision*—Test data on precision is not presented due to the nature of the materials tested by this standard. It is either not feasible or too costly at this time to have ten or more laboratories participate in a round-robin testing program. In addition, it is either not feasible or too costly to produce multiple specimens that have uniform physical properties. Any variation observed in the data is just as likely to be due to specimen variation as to operator or laboratory testing variation.

8.1.1 Subcommittee D18.07 is seeking any data from the users of this classification that might be used to make a limited statement on precision.