



Designation: D2974 – 20^ε1

Standard Test Methods for Determining the Water (Moisture) Content, Ash Content, and Organic Material of Peat and Other Organic Soils¹

This standard is issued under the fixed designation D2974; 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.

^ε1 NOTE—Subsection 4.1 was editorially corrected in March 2020.

1. Scope*

1.1 These test methods cover the measurement of water (moisture) content, ash content, and organic material in peats and other organic soils, such as organic clays, silts, and mucks. Test Method D2216 provides for determining the water (moisture) content in mineral soils and rock.

1.2 This standard has two different ways to determine the water content of the specimen prior to determining the ash content based on the application for which the peat or organic soil is being used. For general classification of peat/organic soils not being used for fuel, the water content is determined using oven drying. For peat/organic soils being used as a fuel, the water content is determined first by air drying followed by oven drying.

1.3 There are two Methods, A and B, for determining the ash content and organic material of peat or organic soils. For general classification purposes, Method A is used to determine the water content, ash content, and organic material. When the peat is being used as a fuel, Method B is used to determine the water content, ash content and organic material.

1.3.1 *Method A*—The ash content and organic material of peat or organic soils is determined by igniting the oven-dried specimen as obtained from the water content determination in a furnace at $440 \pm 40^\circ\text{C}$. This method is used for general purposes and should not be used when the peat or organic soils are being used or evaluated for use as a fuel.

1.3.2 *Method B*—The ash content and organic material of peat or organic soils is determined by igniting the air-dried then oven-dried specimen obtained from the water content determination in a furnace at $750 \pm 38^\circ\text{C}$. This method is used when the peat or organic soil is being used as or evaluated for use as a fuel.

¹ These test methods are under the jurisdiction of ASTM Committee D18 on Soil and Rock and are the direct responsibility of Subcommittee D18.22 on Media for Plant Growth.

Current edition approved Jan. 15, 2020. Published March 2020. Originally approved in 1971. Last previous edition approved in 2014 as D2974 – 14. DOI: 10.1520/D2974-20E01.

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

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

1.5.1 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.

1.6 *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.*

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

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.

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

[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](#)

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 Methods

4.1 *Method A*—A peat or organic soil sample is reduced by quartering to obtain a 50.00 ± 10 g test specimen. A water content determination is made by drying the test specimen in a $110^{\circ}\text{C} \pm 5^{\circ}\text{C}$ oven. The loss of mass due to drying is considered to be water. After oven drying, the test specimen is placed in a furnace that is then gradually brought up to a temperature of $440 \pm 40^{\circ}\text{C}$. The specimen remains in the furnace until it is completely ashed. Then it is removed and placed in a desiccator to cool to room temperature before determining its mass. The substance remaining after ignition is the ash. The water content, ash content and amount of organic material is then calculated. This method is used for general purposes/classification of peats and organic soils and must not be used for peat or organic soil being used or evaluated for use as a fuel.

4.2 *Method B*—A peat or organic soil sample is reduced by quartering to obtain a 100.0 to 300.00 g test specimen. A water content determination is made by first air drying the test specimen, then taking 50.00 ± 10 g of air-dried peat/organic soil and then oven drying it in a $110^{\circ}\text{C} \pm 5^{\circ}\text{C}$ oven. After oven drying, the test specimen is placed in a furnace that is then gradually brought up to a temperature of $750^{\circ}\text{C} \pm 38^{\circ}\text{C}$. The specimen remains in the furnace until it is completely ashed. Then it is removed and placed in a desiccator to cool to room temperature before determining its mass. The substance remaining after ignition is the ash. The water content, ash content and amount of organic material is then calculated. This method is used when the peat or organic soil is to be used as fuel.

5. Significance and Use

5.1 This standard is used in various industries including, but not limited to, agriculture, forestry, energy, horticulture, and geotechnical. Over the years, the use of peat as a fuel has been on the decline for numerous reasons, however it is still being used as a fuel in some parts of the world. Peat typically has high a water content, thus when being used as a fuel, the peat must first be air dried in order to reduce the water content. When the peat is too wet, it doesn't burn well and much heat is wasted in unnecessary conversion of water to steam and more smoke/soot is created, which can coat a chimney and pose a danger to the end user.

5.2 The ash content and percent organic material are important in the following: (1) classifying peat or other organic soil, (2) geotechnical and general classification purposes, and (3) when peats are being evaluated as a fuel. The ash content is one of several parameters used to classify peat as detailed in Classification [D4427](#).

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

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

6.2 *Thermometric Device*—A thermometric device(s) capable of measuring the temperature of the drying oven and the furnace readable to 1°C or better and having an accuracy of at least $\pm 1^{\circ}\text{C}$.

6.3 *Furnace*—An ignition oven or furnace capable of producing constant temperatures of $440 \pm 40^{\circ}\text{C}$ and $750 \pm 38^{\circ}\text{C}$.

6.4 *Balance or Scale*, Balances/Scales shall conform to the requirements of Guide [D4753](#). The balance/scale must have a minimum capacity of 500 g and have a readability without estimation of 0.01 g.

6.5 *Non-Absorbent Surface*—A rubber sheet, oil cloth, or other similar non-absorbent material/surface.

6.6 *Container*—A porcelain or high-silica crucible, container, or dish having a capacity of 100 mL or more is acceptable provided its mass does not change under the ignition condition. The container must have a cover. A lid is recommended, however heavy duty aluminum foil is acceptable for use as a cover.

6.7 *Large Pan*—A 330 by 230 mm or larger flat pan or tray.

6.8 *Desiccator*—A desiccant containing device of suitable size used to prevent moisture gain during cooling of the oven-dried specimen.

6.9 *Miscellaneous Items*—Items such as, water-proof containers, spoons, spatulas are useful.

7. Sampling and Test Specimens

7.1 These test methods do 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.