



Designation: D2974 – 13

Standard Test Methods for Moisture, Ash, and Organic Matter 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 reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope*

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

1.1.1 *Test Method A*—Moisture is determined by drying peat or organic sample at $110 \pm 5^\circ\text{C}$.

1.1.2 *Test Method B*—Alternative moisture method which removes the total moisture in two steps: (1) evaporation of moisture at room temperature, (2) subsequent oven drying of air dried sample at $110 \pm 5^\circ\text{C}$. This method is used when the peat is to be used as fuel.

1.1.3 *Test Method C*—Ash content of a peat or organic soil sample, for general purposes, is determined by igniting oven dried sample from moisture content determination in a furnace at $440 \pm 40^\circ\text{C}$.

1.1.4 *Test Method D*—Ash content of a peat or organic soil sample, for materials used for fuel, is determined by igniting oven dried sample from moisture content determination in a furnace at $750 \pm 38^\circ\text{C}$.

1.2 Test Method A should be used for general classification, except for use of the peat as a fuel. Test Method B should be used when peats are being evaluated for use as a fuel

1.3 The values stated in SI units are to be regarded as the standard. No other units of measurement are included in this standard. Use Practice D6026 for determining significant digits to report.

1.4 *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.*

1.5 *This test method offers a set of instructions for performing one or more specific operations. This document cannot*

replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this test method may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.

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

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

E145 Specification for Gravity-Convection and Forced-Ventilation Ovens

3. Terminology

3.1 Definitions:

3.1.1 For common definitions of terms in this standard, refer to Terminology D653.

4. Summary of Test Methods

4.1 *Test Method A*—Moisture is determined by drying a peat or organic soil sample at $110 \pm 5^\circ\text{C}$. The moisture content is expressed as a percent of the oven dry mass.

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 Soil as a Medium for Plant Growth.

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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

4.2 *Test Method B*—This is an alternative moisture method which removes the total moisture in two steps: (1) evaporation of moisture in air at room temperature (air-drying), and (2) the subsequent oven drying of the air-dried sample at $110 \pm 5^\circ\text{C}$. This method is used when the peat is to be used as fuel. The moisture content is expressed as both a percent of the oven dry mass and of the as received mass.

4.3 *Test Methods C and D*—Ash content of a peat or organic soil sample is determined by igniting the oven-dried sample from the moisture content determination in a furnace at $440 \pm 40^\circ\text{C}$ (Test Method C) or $750 \pm 38^\circ\text{C}$ (Test Method D). The substance remaining after ignition is the ash. The ash content is expressed as a percentage of the mass of the oven-dried sample.

4.4 Organic matter is determined by subtracting percent ash content from one hundred.

5. Significance and Use

5.1 This test method can be used to determine the moisture content, ash content, and percent organic matter in soil.

5.2 The percent organic matter is 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.

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 *Oven*, meeting the requirements of E145 and capable of being regulated to a constant temperature of $110 \pm 5^\circ\text{C}$.

6.2 The temperature of $110 \pm 5^\circ\text{C}$ is quite critical for organic soils. The oven should be checked for “hot spots” to avoid possible ignition of the specimen.

6.3 *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*, a balance or scale for determining the mass of the soil having a minimum capacity of 500 g and meeting the requirements of Guide D4753 for a balance or scale of 0.01 g readability.

6.5 *Rubber Sheet, Oil Cloth*, or other non-absorbent material.

6.6 *Evaporating Dishes*, of high silica or porcelain of not less than 100-mL capacity.

6.7 *Aluminum Foil*, heavy-duty.

6.8 *Porcelain Pan, Spoons*, and equipment of the like.

6.9 *Desiccator*.

7. Sampling and Test Specimens

7.1 Place a representative field sample on a rubber sheet, oil cloth, or equivalent material and mix thoroughly.

7.2 Reduce the sample to the quantity required for a test specimen by quartering.

7.3 Place the test specimen and the remaining sample in separate waterproof containers.

7.4 Work rapidly to prevent moisture loss or perform the operation in a room with a high humidity.

8. Procedure

8.1 *Moisture Content Determination:*

8.1.1 *Test Method A:*

8.1.1.1 Record to the nearest 0.01 g the mass of a high silica or porcelain evaporating dish fitted with a heavy-duty aluminum foil cover. The dish shall have a capacity of not less than 100 mL.

8.1.1.2 Following the instruction in Section 7 above, place a test specimen of at least 50 g in the container described in 8.1.1.1. Crush soft lumps with a spoon or spatula. The thickness of peat in the container should not exceed 3 cm.

8.1.1.3 Record the mass to the nearest 0.01 g.

8.1.1.4 Dry uncovered for at least 16 h at $110 \pm 5^\circ\text{C}$ or until there is less than 0.1 % change in mass of the sample per hour. Remove from the oven, cover tightly, cool in a desiccator, and record the mass to the nearest 0.01 g keeping exposure to the room atmosphere to a minimum.

8.1.2 *Calculations for Test Method A:*

8.1.2.1 Calculate the moisture content as follows:

$$\text{Moisture Content, \%} = [(A - B) \times 100]/B \quad (1)$$

where:

A = mass of the as-received test specimen, g, and

B = mass of the oven-dried specimen, g.

(1) This calculation is used for general purposes (except when the peat is to be used as a fuel) and the result should be referred to as the moisture content as a percentage of oven-dried mass.

8.1.3 *Test Method B:*

8.1.3.1 This test method should be used if the peat is to be used as a fuel.

8.1.3.2 Following the instructions in 7.1 above, select a 100 to 300 g representative test specimen. Determine the mass of this test specimen to the nearest 0.01 g and spread it evenly on a large flat pan. Crush soft lumps with a spoon or spatula and let the sample come to moisture equilibrium with room air. This will require at least 24 h. Stir occasionally during the normal workday to maintain maximum air exposure of the entire sample. Continue drying until there is less than 0.1% change in mass per hour, then calculate the moisture removed during air drying as a percentage of the as-received mass.

8.1.3.3 Thoroughly mix the air-dried sample and weigh 50 g of air-dried sample to the nearest 0.01 g.

8.1.3.4 Place the sample in a container as described in 8.1.1 and proceed as in Test Method A.

8.1.4 *Calculations for Test Method B:*

8.1.4.1 Calculate the moisture content as follows:

$$\text{Moisture Content for Air-Dried Sample, \%} = ((A_D - B) \times 100)/B \quad (2)$$