



Designation: D4959 – 24

Standard Test Method for Determination of Water Content of Soil By Direct Heating¹

This standard is issued under the fixed designation D4959; 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 This test method covers procedures for determining the water content of soils by drying with direct heat, such as using a hotplate, stove or a blowtorch, where the heat is applied to the container and not directly to the soils.

1.2 This test method can be used as a substitute for Test Methods **D2216** when more rapid results are desired to expedite other phases of testing and less accurate results are acceptable.

1.3 When questions of accuracy between this test method and Test Methods **D2216** arise, the results of Test Methods **D2216** will be used.

1.4 This test method is applicable for most soil types. For some soils, such as those containing significant amounts of halloysite, mica, montmorillonite, gypsum, or other hydrated materials, highly organic soils or soils that contain dissolved solids, (such as salt in the case of marine deposits), this test method may not yield reliable water content values due to the potential for heating above 110°C or lack of means to account for the presence of precipitated solids that were previously dissolved.

1.5 *Units*—The values stated in SI units are to be regarded as standard. No other units of measure are included in this standard. The sieve designations are identified using the “standard” system in accordance with Specification **E11**, such as 2.0-mm and 19-mm, followed by the “alternative” system of No. 10 and ¾-in., respectively, in parentheses. Reporting of test results in units other than SI shall not be regarded as nonconformance with this standard.

1.6 All observed and calculated values must conform to the guidelines for significant digits and rounding established in Practice **D6026**, unless otherwise superseded by this standard.

1.6.1 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 design.

1.6.2 Significant digits are especially important if the water content will be used to calculate other relationships such as moist mass to dry mass or vice versa, wet unit weight to dry unit weight or vice versa, and total density to dry density or vice versa. For example, if four significant digits are required in any of the above calculations, then the water content must be recorded to the nearest 0.1 %, for water contents below 100 %. This occurs since 1 plus the water content (not in percent) will have four significant digits regardless of what the value of the water content is (below 100 %); that is, 1 plus 0.1/100 = 1.001, a value with four significant digits. While, if three significant digits are acceptable, then the water content can be recorded to the nearest 1 %.

1.7 *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.*

1.8 *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

¹ This test method is under the jurisdiction of ASTM Committee **D18** on Soil and Rock and is the direct responsibility of Subcommittee **D18.08** on Special and Construction Control Tests.

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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