



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

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1. Scope

1.1 This test method covers procedures for determining the water (moisture) content of soils by drying with direct heat, such as using a hotplate, stove, blowtorch, etc.

1.2 This test method can be used as a substitute for Test Method D 2216 when more rapid results are desired to expedite other phases of testing and slightly less accurate results are acceptable.

1.3 When questions of accuracy between this test method and Method D 2216 arise, Method D 2216 shall be the referee method.

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.

1.5 The values stated in SI units are to be regarded as standard.

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

2. Referenced Documents

2.1 ASTM Standards:

D 653 Terminology Relating to Soil, Rock, and Contained Fluids²

D 2216 Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock²

D 3740 Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction²

D 4753 Specification for Evaluating, Selecting, and Specifying Balances and Scales for Use in Testing Soil, Rock, and Related Construction Materials²

3. Terminology

3.1 *Definitions*—All definitions are in accordance with Terms and Symbols D 653.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *direct heating*—a process by which the soil is dried by conductive heating from the direct application of heat in excess of 110°C to the specimen container, such as provided by a hot plate, gas stove or burner, heatlamps, or other heat sources. Direct application of heat by flame to the specimen is not appropriate.

3.2.2 *water (moisture) content*—the ratio, expressed as a percentage, of the mass of water in a given mass of soil to the mass of the solid particles.

4. Summary of Test Method

4.1 A moist soil specimen is placed in a suitable container and its mass is determined. It is then subjected to drying by the application of direct heat until dry by appearance, removed from the heat source, and its new mass is determined. This procedure is repeated until the mass becomes constant within specified limits.

4.2 The difference between the masses of the moist specimen and the dried specimen is used as the mass of water contained in the specimen. The water content (expressed as a percentage) is determined by dividing the mass of water by the dry mass of soil, multiplied by 100. For a given soil type and specimen size, the time to achieve a constant dry mass can be noted and used to estimate drying time for subsequent tests of the same soil type using the same size specimen and drying apparatus.

5. Significance and Use

5.1 The water content of a soil is used throughout geotechnical engineering practice both in the laboratory and in the field. The use of Test Method D 2216 for water content determination can be time consuming and there are occasions when a more expedient method is desirable. Drying by direct heating is one such method. Results of this test method have been demonstrated to be of satisfactory accuracy for use in field control work, such as in the determination of water content, and in the determination of in-place dry unit weight of soils.

5.2 The principal objection to the use of the direct heating

¹ This test method is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.08 on Special and Construction Control Tests.

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² *Annual Book of ASTM Standards*, Vol 04.08.