



Designation: D4564 – 08^{ε1}

Standard Test Method for Density and Unit Weight of Soil in Place by the Sleeve Method¹

This standard is issued under the fixed designation D4564; 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.

^{ε1} NOTE—A typo in A1.5.1 was corrected editorially in May 2011.

1. Scope*

1.1 This test method covers the determination of the density of soil in place by the sleeve method.

1.2 The sleeve method of determining the density of soil in place is used for cohesionless, granular soils for which other methods of determining the density (sand cone, test pit, and the like) may not be practical. Typically, the sleeve method is applicable for soils that are predominantly fine gravel size, with a maximum of 5 % fines, and a maximum particle size of $\frac{3}{4}$ in. (19.0 mm).

NOTE 1—There have been other methods developed for testing cohesionless soils. Compared to other methods, this procedure is convenient for field construction control testing because smaller and lighter equipment is used and the test can be performed in a smaller area.

1.3 A calibration equation is necessary in the application of this test method to obtain a reliable value of the in-place density of the soil (see Annex A1). The calibration equation is used to calculate the density of the soil in place from the mass of dry soil per inch of test hole measured by the sleeve method.

1.3.1 The calibration equation is predetermined for a particular soil type that is to be tested. When the soil changes significantly in either gradation or particle angularity, the calibration equation may have to be adjusted or redefined before the sleeve method can be used.

1.3.2 There may be certain soils meeting the general description in 1.2 for which a calibration equation may not be appropriate due to unsatisfactory correlation of the data. The sleeve method would not be applicable for these soils.

1.3.3 There may be certain soils meeting the description in 1.2 for which the calibration equation may be applicable only for a certain range of densities. The sleeve method will give reliable values of the density in place only within that range of densities.

1.4 This test method uses inch-pound units with SI rationalized units; that is, a combined standard.

1.4.1 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.4.2 The converted inch-pound units used the gravitational system of units. In this system, the pound (lbf) represents a unit of force (weight), while the unit for mass is slugs. The converted slug unit is not given, unless dynamic ($F = ma$) calculations are involved.

1.4.3 It is common practice in the engineering profession to concurrently use pounds to represent both a unit of mass (lbm) and a unit of force (lbf). This implicitly combines two separate systems of units; that is, the absolute system and the gravitational system. It is scientifically undesirable to combine the use of two separate sets of inch-pound units within a single standard. This standard has been written using the gravitational system of units when dealing with the inch-pound system. In this system the pound (lbf) represents a unit of force (weight). However, the use of balances or scales recording pounds of mass (lbm), or the recording of density in lbm/ft³ should not be regarded as nonconformance with this test method.

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

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 or reported data to be commensurate with these considerations. It is beyond the scope of this standard to consider significant digits used in analytical methods for engineering design.

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.

Current edition approved Feb. 1, 2008. Published February 2008. Originally approved in 1986. Last previous edition approved in 2002 as D4564 – 02a. DOI: 10.1520/D4564-08.