



Designation: D5918 – 13^{ε1}

Standard Test Methods for Frost Heave and Thaw Weakening Susceptibility of Soils¹

This standard is issued under the fixed designation D5918; 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—Editorially updated units of measurement statement in April 2018.

1. Scope*

1.1 These laboratory test methods cover the frost heave and thaw weakening susceptibilities of soil that is tested in the laboratory by comparing the heave rate and thawed bearing ratio² with values in an established classification system. This test was developed to classify the frost susceptibility of soils used in pavements. It should be used for soils where frost-susceptibility considerations, based on particle size such as the limit of 3 % finer than 20 mm in Specification D2940, are uncertain. This is most important for frost-susceptibility criteria such as those used by the Corps of Engineers,³ that require a freezing test for aggregates of inconclusive frost classification. The frost heave susceptibility is determined from the heave rate during freezing. The thaw weakening susceptibility is determined with the bearing ratio test (see Test Method D1883).

1.2 This is an index test for estimating the relative degree of frost-susceptibility of soils used in pavement systems. It cannot be used to predict the amount of frost heave nor the strength after thawing, nor can it be used for applications involving long-term freezing of permafrost or for foundations of refrigerated structures.

1.3 The test methods described are for one specimen and uses manual temperature control. It is suggested that four specimens be tested simultaneously and that the temperature control and data taking be automated using a computer.

1.4 All recorded and calculated values shall conform to the guide for significant digits and rounding established in Practice D6026.

¹ These test methods are under the jurisdiction of ASTM Committee D18 on Soil and Rock and are the direct responsibility of Subcommittee D18.19 on Frozen Soils and Rock.

Current edition approved Feb. 1, 2013. Published March 2013. Originally approved in 1996. Last previous edition approved in 2006 as D5918 – 06. DOI: 10.1520/D5918-13E01.

² Sometimes called California Bearing Ratio (CBR).

³ The Army Corps of Engineers uses a frost susceptibility classification procedure (TM 5-818-2) based on particle size criteria and the Unified Soil Classification System (MIL-STD-619) field. Furthermore, this test should only be used for seasonal freezing and thawing conditions and not for long-term freezing of permafrost or of foundations of refrigerated structures.

1.4.1 The procedures used to specify how data are collected/recorded and calculated in this standard are regarded as the industry standard. In addition, they are representative of the significant digits that should generally 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.

1.4.2 Measurements made to more significant digits or better sensitivity than specified in this standard shall not be regarded a nonconformance with this standard.

1.5 The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered standard.

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

1.5.2 It is common practice in the engineering/ construction profession to concurrently use pounds to represent both a unit of mass (lbm) and 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. As stated, this standard includes the gravitational system of inch-pound units and does not use/present the slug unit for mass. However, the use of balances or scales recording pounds of mass (lbm) or recording density in lbm/ft³ shall not be regarded as nonconformance with this 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, 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*

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