



Standard Test Method for Moisture Content Penetration Resistance Relationships of Fine-Grained Soils¹

This standard is issued under the fixed designation D 1558; 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 is for establishing the moisture-penetration resistance relationships of fine-grained soils as determined by the soil penetrometer.

1.2 The values stated in inch-pound units are to be regarded as the standard.

1.3 *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:

C 670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials²

D 653 Terminology Relating to Soil, Rock, and Contained Fluids³

D 698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft. lbf/ft³ (600 kN·m/m³))

D 2216 Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock³

D 3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction³

D 4753 Specification for Evaluating, Selecting, and Specifying Balances and Scales for Use in Testing Soil, Rock, and Related Construction Materials³

E 380 Practice for Use of the International System of Units (SI) (the Modernized Metric System)³

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method⁴

3. Terminology

3.1 Definitions:

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 04.02.

³ *Annual Book of ASTM Standards*, Vol 04.08.

⁴ *Annual Book of ASTM Standards*, Vol 14.02.

3.1.1 *penetration resistance curve (proctor penetration curve)*—the curve showing the relationship between 1 the penetration resistance and 2 the water content.

3.1.2 All other terms and definitions are in accordance with Terminology D 653.

4. Significance and Use

4.1 This test method is used with Methods A and B of Test Method D 698 to develop relationships between moisture content, density, and penetration resistance. These relationships are used with a previously prepared family of moisture-penetration curves as a rapid field test to determine the approximate amount of moisture in the soil.

NOTE 1—When a penetration-resistance measurement of material in place is compared at a given moisture content with penetration-density curves prepared at a specified compactive effort, an approximate check of compaction (density) may be obtained.

4.2 Penetration resistance determinations are not reliable for very dry molded soil specimens or very granular soils.

NOTE 2—Notwithstanding the statements on Precision and bias contained in this Standard: The precision of this test method is dependent on the competence of the personnel performing it and the suitability of the equipment and the facilities used. Agencies that meet the criteria of Practice D 3740 are generally considered capable of competent and objective testing. Users of this test method are cautioned that compliance with Practice D 3740 does not in itself assure reliable testing. Reliable testing depends on many factors; Practice D 3740 provides a means of evaluating some of those factors.

5. Apparatus

5.1 *Moisture-Density Apparatus*, conforming to the requirements prescribed in Test Method D 698.

5.2 *Soil Penetrometer*—A soil penetrometer (Fig. 1) consisting of a special spring dynamometer with pressure-indicating scale on the stem of the handle. The pressure scale shall be graduated to 90 lbf in 2-lbf divisions with a line encircling the stem at each 10-lbf interval, or graduated to 181 N in 9.8 N divisions with a line encircling the stem at each 5-kg interval. A sliding ring on the stem shall indicate the maximum pressure obtained in the test.

5.3 *Set of Penetrometer Needles*—Each penetrometer needle (Fig. 1) shall consist of a shank with a head of known end area. The set of interchangeable needles shall include the sizes given in Table 1. The needle shank shall have graduations

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