



Standard Test Method for Energy Measurement for Dynamic Penetrometers¹

This standard is issued under the fixed designation D4633; 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 describes procedures for measuring the energy that enters the penetrometer drill rod string during dynamic penetrometer testing of soil due to the hammer impact.

1.2 This test has particular application to the comparative evaluation of N-values obtained from the Standard Penetration Tests (SPT) of soils in an open hole as in Test Method [D1586](#) and Practice [D6066](#). This procedure may also be applicable to other dynamic penetrometer tests.

1.3 The values stated in SI units are to be regarded as standard. The inch-pound units given in parentheses are mathematical conversions which are provided for information purposes only and are not considered standard. Reporting of test results in units other than SI shall not be regarded as nonconformance with this test method.

1.3.1 The converted inch-pound units use 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 *Limitations*—This test method applies to penetrometers driven from above the ground surface. It is not intended for use with down-hole hammers.

1.5 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice [D6026](#).

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 of 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.

1.6 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

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

2. Referenced Documents

2.1 ASTM Standards:²

[D653 Terminology Relating to Soil, Rock, and Contained Fluids](#)

[D1586 Test Method for Penetration Test \(SPT\) and Split-Barrel Sampling of Soils](#)

[D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction](#)

[D6026 Practice for Using Significant Digits in Geotechnical Data](#)

[D6066 Practice for Determining the Normalized Penetration Resistance of Sands for Evaluation of Liquefaction Potential](#)

3. Terminology

3.1 Definitions:

3.1.1 For definitions of common technical terms used in this standard, refer to Terminology [D653](#).

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *anvil, n*—the mass at the top of the drill rods that is struck by the hammer.

3.2.2 *drill rods, n*—the steel rods connecting the hammer system above the ground surface to the sampler below the surface.

¹ This test method is under the jurisdiction of ASTM Committee [D18](#) on Soil and Rock and is the direct responsibility of Subcommittee [D18.02](#) on Sampling and Related Field Testing for Soil Evaluations.

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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.