



Designation: D4945 – 17

Standard Test Method for High-Strain Dynamic Testing of Deep Foundations¹

This standard is issued under the fixed designation D4945; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope*

1.1 This dynamic test method covers the procedure for applying an axial impact force with a pile driving hammer or a large drop weight that will cause a relatively high strain at the top of an individual vertical or inclined deep foundation unit, and for measuring the subsequent force and velocity response of that deep foundation unit. While in this standard force and velocity are referenced as “measured,” they are typically derived from measured strain and acceleration values. High-strain dynamic testing applies to any deep foundation unit, also referred to herein as a “pile,” which functions in a manner similar to a driven pile or a cast-in-place pile regardless of the method of installation, and which conforms with the requirements of this test method.

1.2 This standard provides minimum requirements for dynamic testing of deep foundations. Plans, specifications, or provisions (or combinations thereof) prepared by a qualified engineer may provide additional requirements and procedures as needed to satisfy the objectives of a particular test program. The engineer in responsible charge of the foundation design, referred to herein as the “Engineer”, shall approve any deviations, deletions, or additions to the requirements of this standard.

1.3 The proper conduct and evaluation of high-strain dynamic tests requires special knowledge and experience. A qualified engineer should directly supervise the acquisition of field data and the interpretation of the test results so as to predict the actual performance and adequacy of deep foundations used in the constructed foundation. A qualified engineer shall approve the apparatus used for applying the impact force, driving appurtenances, test rigging, hoist equipment, support frames, templates, and test procedures.

1.4 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. The word “shall” indicates a mandatory provision, and the word “should” indicates a

recommended or advisory provision. Imperative sentences indicate mandatory provisions.

1.5 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard. Reporting of test results in units other than SI shall not be regarded as nonconformance with this test method.

1.6 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026.

1.6.1 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 commensurate with these considerations. It is beyond the scope of this standard to consider significant digits used in analysis methods for engineering design.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* For a specific precautionary statement, see Note 4.

1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

C469 Test Method for Static Modulus of Elasticity and Poisson’s Ratio of Concrete in Compression
D198 Test Methods of Static Tests of Lumber in Structural Sizes

¹ This test method is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.11 on Deep Foundations.

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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.

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