



Standard Test Methods for Thermal Integrity Profiling of Concrete Deep Foundations¹

This standard is issued under the fixed designation D7949; 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 These test methods provide procedures for measuring the temperature profile within a deep foundation element constructed using cast-in-place concrete, such as bored piles, drilled shafts, augered piles, diaphragm walls, barrettes, and dams, and alike. The thermal profile induced by the curing concrete can be used to evaluate the homogeneity and integrity of the concrete mass within the deep foundation element.

1.2 Two alternative procedures are provided:

1.2.1 Method A uses a thermal probe lowered into access ducts installed in the deep foundation element during construction.

1.2.2 Method B uses multiple embedded thermal sensors attached to the reinforcing cage installed in the deep foundation element during construction.

1.3 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice [D6026](#), unless superseded by this standard.

1.3.1 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.

1.4 This standard provides minimum requirements for thermal profiling of concrete deep foundation elements. Plans, specifications, and/or provisions prepared by a qualified engineer, and approved by the agency requiring the test, may provide additional requirements and procedures as needed to satisfy the objectives of a particular test program.

1.5 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.

1.6 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

NOTE 1—ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

1.7 *Limitations*—Proper installation of the access ducts or thermal sensors is advised for effective testing and interpretation. If a flaw is detected, then the method does not give the exact type of flaw (for example, inclusion, bulge, honeycombing, lack of cement particles, and alike.) but rather only that a flaw exists. The method is limited primarily to testing the concrete during the early curing process.

1.8 *This standard may involve hazardous materials, operations, and equipment. 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](#)

[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](#)

3. Terminology

3.1 *Definitions*:

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

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. Current edition approved Nov. 1, 2014. Published November 2014. DOI: 10.1520/D7949-14.

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.