



Standard Test Method for Monitoring Ground Movement Using Probe-Type Inclinometers¹

This standard is issued under the fixed designation D6230; 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 covers the use of inclinometers to monitor the internal movement of ground. The test method covers types of instruments, installation procedures, operating procedures, and maintenance requirements. It also provides formulae for data reduction.

1.2 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice **D6026** unless superseded by this test method.

1.2.1 The procedures used to specify how data are collected, recorded or calculated in this test method 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; 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 test method to consider significant digits used in analytical methods for engineering design.

1.3 The values stated in SI units are to be regarded as the standard. The inch-pound units given in parentheses are for information only.

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

2. Referenced Documents

2.1 ASTM Standards:²

¹ This test method is under the jurisdiction of ASTM Committee **D18** on Soil and Rock and is the direct responsibility of Subcommittee **D18.23** on Field Instrumentation.

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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.

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

D7299 Practice for Verifying Performance of a Vertical Inclinometer Probe

3. Terminology

3.1 Definitions:

3.1.1 For definitions of general terms, see Terminology **D653**.

3.1.2 Definitions of terms specific to this test method are included in Section 5.

4. Significance and Use

4.1 An inclinometer is a device for measuring deformation normal to the axis of a pipe by passing a probe along the pipe and measuring the inclination of the probe with respect to the line of gravity. Measurements are converted to distances using trigonometric functions. Distances are summed to find the position of the pipe. Successive measurements give differences in position of the pipe and indicate deformation normal to the axis of the pipe. In most cases the pipe is installed in a near-vertical hole. Measurements indicate subsurface horizontal deformation. In some cases the pipe is installed horizontally and the measurements indicate vertical deformation.

4.2 Inclinometers are also called slope inclinometers or slope indicators. Typical applications include measuring the rate of landslide movement and locating the zone of shearing, monitoring the magnitude and rate of horizontal movements for embankments and excavations, monitoring the settlement and lateral spread beneath tanks and embankments, and monitoring the deflection of bulkheads, piles or structural walls.

NOTE 1—Notwithstanding the statements on precision and bias contained in this test method, the precision of this test method is dependent on the competence of the personnel performing it and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice **D3740** are generally considered capable of competent and objective testing. Users of these test methods are cautioned that compliance with Practice **D3740** does not in itself ensure reliable results. Reliable testing

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