



Standard Practice for Extensometers Used in Rock¹

This standard is issued under the fixed designation D4403; 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 practice covers the description, application, selection, installation, data collecting, and data reduction of the various types of extensometers used in the field of rock mechanics.

1.2 Limitations of each type of extensometer system are covered in Section 5.

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

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.

1.5 *This practice offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgement. Not all aspects of this guide may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

1.6 *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

3. Terminology

3.1 *Definitions*—Terms not defined below may appear in Terminology **D653**.

3.2 Definitions of terms specific to this standard are included in Section 5.

4. Significance and Use

4.1 Extensometers are widely used in the field of engineering and include most devices used to measure displacements, separation, settlements, convergence, and the like.

4.2 For tunnel instrumentation, extensometers are generally used to measure roof and sidewall movements and to locate the tension arch zone surrounding the tunnel opening.

4.3 Extensometers are also used extensively as safety monitoring devices in tunnels, in underground cavities, on potentially unstable slopes, and in monitoring the performance of rock support systems.

4.4 An extensometer should be selected on the basis of its intended use, the preciseness of the measurement required, the anticipated range of deformation, and the details accompanying installation. No single instrument is suitable for all applications.

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 depends on many factors; Practice **D3740** provides a means of evaluating some of those factors.

¹ This practice 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.