



Standard Test Method for Determining In Situ Modulus of Deformation of Rock Mass Using Rigid Plate Loading Method¹

This standard is issued under the fixed designation D4394; 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 preparation, equipment, test procedure, and data reduction for determining in situ modulus of deformation of a rock mass using the rigid plate loading method.

1.2 This test method is designed to be conducted in an adit or small underground chamber; however, with suitable modifications it could be conducted at the surface.

1.3 This test method is usually conducted parallel or perpendicular to the anticipated axis of thrust, as dictated by the design load.

1.4 Time dependent tests can be performed but are to be reported in another standard.

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

1.5.1 The method used to specify how data are collected, calculated, or recorded in this standard is not directly related to the accuracy to which the data can be applied in design or other uses, or both. How one applies the results obtained using this standard is beyond its scope.

1.6 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.7 The references appended to this standard contain further information on this test method.

1.8 *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 requirements prior to use.* For specific precaution statements, see Section 8.

2. Referenced Documents

2.1 *ASTM Standards*:²

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

[D2113](#) Practice for Rock Core Drilling and Sampling of Rock for Site Exploration

[D4395](#) Test Method for Determining In Situ Modulus of Deformation of Rock Mass Using Flexible Plate Loading Method

[D4403](#) Practice for Extensometers Used in Rock

[D4879](#) Guide for Geotechnical Mapping of Large Underground Openings in Rock

[D5079](#) Practices for Preserving and Transporting Rock Core Samples

[D5434](#) Guide for Field Logging of Subsurface Explorations of Soil and Rock

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

[D6032](#) Test Method for Determining Rock Quality Designation (RQD) of Rock Core

3. Terminology

3.1 For terminology used in this test method, refer to Terminology, [D653](#).

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *deflection*—movement of the rigid plate, mortar pad, or rock in response to and in the same direction as the applied load.

3.2.2 *load*—total force acting on the rock face.

3.2.3 *peak-to-peak modulus of deformation*—the slope of the stress - strain curve line connecting the peaks of the curves obtained from successive pressure cycles (see [Fig. 1](#)).

3.2.4 *recovery modulus of deformation*—the tangent modulus of the unloading stress - strain curve. This modulus is usually higher than the other moduli and is used in calculations where unloading conditions exist. The difference between the

¹ This test method is under the jurisdiction of ASTM Committee [D18](#) on Soil and Rock and is the direct responsibility of Subcommittee [D18.12](#) on Rock Mechanics.

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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.