



Standard Test Method for In Situ Stress and Modulus of Deformation Using Flatjack Method¹

This standard is issued under the fixed designation D4729; 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 The flatjack test measures stress at a rock surface. The modulus of deformation and the long-term deformational properties (creep) may also be evaluated.

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

1.2.1 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.

1.3 *Limitation*—The flatjack test measures the average stress normal to the surface of the test chamber. Undisturbed stress levels must be determined by theoretical interpretations of these data.

1.4 *Assumptions and Factors Influencing the Data:*

1.4.1 The stress relief is assumed to be an elastic, reversible process. In nonhomogeneous or highly fractured materials, this may not be completely true.

1.4.2 The equations assume that the rock mass is isotropic and homogeneous. Anisotropic effects may be estimated by testing in different orientations.

1.4.3 The flatjack is assumed to be 100 % efficient. The design and size requirements of [7.1](#) were determined to satisfy this requirement to within a few percent.

1.4.4 The jack is assumed to be aligned with the principal stresses on the surface of the opening. Shear stresses are not canceled by jack pressure. Orientating the tests in three directions in each plane tested prevents the misalignment from being excessive for at least one of the tests.

1.5 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.

1.6 *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 requirements prior to use.*

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](#)

[D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction](#)

[D5720 Practice for Static Calibration of Electronic Transducer-Based Pressure Measurement Systems for Geotechnical Purposes](#)

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

[D6027 Practice for Calibrating Linear Displacement Transducers for Geotechnical Purposes](#) (Withdrawn 2013)³

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 *cancellation pressure*—the pressure in the flatjack required to return the rock to its initial position.

3.2.2 *skin stress*—the tangential stress at the surface of an opening.

3.2.3 *undisturbed stress*—the stress field existing in a rock mass prior to excavation of an opening.

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.

³ The last approved version of this historical standard is referenced on www.astm.org.