



Standard Test Method for Rock Bolt Anchor Pull Test¹

This standard is issued under the fixed designation D4435; 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.

^{ε1} NOTE—Editorial corrections were made throughout in February 2014.

1. Scope*

1.1 The objective of this test method is to measure the working and ultimate capacities of a rock bolt anchor. This method does not measure the entire roof support system. This method also does not include tests for pretensioned bolts or mine roof support system evaluation.

1.2 This test method is applicable to mechanical, cement grout, resin, (epoxy, polyester, and the like), or other similar anchor systems.

1.3 *Units*—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. Reporting of test results in units other than inch-pound shall not be regarded as nonconformance with this test method.

1.3.1 The gravitational system of inch-pound units is used when dealing with inch-pound units. In this system, the pound (lbf) represents a unit of force (weight), while the unit for mass is slugs.

1.4 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026.

1.4.1 The procedures used to specify how data are collected/recorded or calculated, in this standard 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; and 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 standard to consider significant digits used in analytical methods for engineering design.

1.5 *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*—For definitions of common technical terms in this standard, refer to Terminology D653.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *displacement*—the movement of the rock bolt head.

3.2.2 *failure*—in rock bolt testing, failure is defined as the inability of the anchor system or rock to sustain increased load without rapidly increasing deformation. In some instances, the peak load itself cannot be sustained.

3.2.3 *load*—the total axial force on the rock bolt.

3.2.4 *ultimate capacity*—the maximum load sustained by the anchor system.

3.2.5 *working capacity*—the load on the anchor system at which significantly increasing displacement begins.

4. Summary of Test Method

4.1 A rock bolt is installed in the same manner and in the same material as its intended construction use. The bolt is pulled hydraulically and the displacement of the bolt head is measured concurrently. The bolt is pulled until the anchor system or rock fails. The ultimate and working capacities of the bolt are calculated from the plot of load versus displacement.

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.