



Standard Test Method for Laboratory Determination of Abrasiveness of Rock Using the CERCHAR Method¹

This standard is issued under the fixed designation D7625; 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 determination of the abrasiveness of rock by the CERCHAR Abrasiveness Index (CAI) method. The test method consists of measuring the wear on the tip of steel stylus with a cone shape and known Rockwell Hardness, caused by scratching against a freshly broken or saw cut rock surface for a prescribed 10 mm distance using one of the two test apparatus.

1.2 This test method is intended for freshly broken rock surfaces; however, saw cut surfaces are covered for when a satisfactory rock surface cannot be obtained.

1.3 Stylus Rockwell Hardness (HRC) can have a profound effect on the results and the focus of this test method is an HRC value of 55 for every test (1,2).² However, there are situations where stylus with different Rockwell Hardness can be used. Therefore, this test method includes discussions on stylus with different Rockwell Hardness.

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

1.5 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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 limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:³

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. Current edition approved May 15, 2010. Published July 2010. DOI: 10.1520/D7625-10.

² The bold numbers in parenthesis refer to a list of references at the end of this standard.

³ 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

D2216 Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

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

D5079 Practices for Preserving and Transporting Rock Core Samples

D6026 Practice for Using Significant Digits in Geotechnical Data

E18 Test Methods for Rockwell Hardness of Metallic Materials

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology D653.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *abrasiveness, n*—the wear or loss of material which the rock produces on contact with another material such as TBM cutter or drill bit.

3.2.2 *Rockwell Hardness Scale (HRC), n*—a hardness scale based on the indentation hardness of a material, which correlates linearly with its tensile strength. The Rockwell test determines the hardness by measuring the depth of penetration of an indenter under a large load compared to the penetration made by a preload. The results, as a dimensionless number, are noted by HR followed by the designation letter from A-F based upon used scale. For current standard, letter C is used as the scale letter for hard steel.

4. Summary of Test Method

4.1 A steel stylus having a 90E conical tip with its axis perpendicular, and in contact with a rock surface, under a total constant force of 70 N, is scratched in a direction parallel to the rock surface over a distance of 10 mm.

4.2 Basically, the CERCHAR test is a measurement of the relative different hardness of stylus tip and rock specimen surface. The stylus tip is made of steel having a known Rockwell Hardness. Experiments have shown that CAI varies inversely with stylus hardness. Test results with the same steel