



Standard Test Method for Resistance of Fine Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus¹

This standard is issued under the fixed designation D7428; 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 a procedure for testing fine aggregate for resistance to abrasion using the Micro-Deval apparatus.

1.2 The text of this method 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 test method.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *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

- C88 Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
- C117 Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing
- C136 Test Method for Sieve Analysis of Fine and Coarse Aggregates
- C670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials
- D6928 Test Method for Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus
- E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

¹ This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.51 on Aggregate Tests.

Current edition approved Jan. 1, 2015. Published February 2015. Originally approved in 2008. Last previous edition approved in 2008 as D7428 – 08^{ε1}. DOI: 10.1520/D7428-15.

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. Terminology

3.1 *Definitions*:

3.1.1 *constant mass, n*—the condition of a test sample dried at a temperature of $110 \pm 5^\circ\text{C}$ such that it will not lose more than 0.1 % moisture after 2 h of drying.

3.1.1.1 *Discussion*—Such a condition of dryness can be verified by determining the mass of the sample before and after successive 2-h drying periods. In lieu of such a determination, samples may be considered to have reached constant mass when they have been dried at a temperature of $110 \pm 5^\circ\text{C}$ for an equal or longer period than that previously found adequate for producing the desired constant mass condition under equal or heavier loading conditions of the oven.

4. Summary of Test Method

4.1 The Micro-Deval Test is a measure of abrasion resistance and durability of mineral aggregates resulting from a combination of actions including abrasion and grinding with steel balls in the presence of water. A 500-g sample with standard grading is initially soaked in water for not less than one hour. The sample is then placed in a jar mill with 0.75 L of water and an abrasive charge consisting of 1250 g of 9.5-mm diameter steel balls. The jar, aggregate, water, and charge are revolved at 100 rpm for 15 minutes. The sample is then washed and oven dried. The loss is the amount of material passing the 75 μ m sieve expressed as a percent by mass of the original sample.

5. Significance and Use

5.1 The Micro-Deval abrasion test is a test of fine aggregate to determine abrasion loss in the presence of water and an abrasive charge. Many aggregates are more susceptible to abrasion when wet than dry, and the use of water in this test incorporates this reduction in resistance to degradation. The test results are helpful in evaluating the toughness/abrasion resistance of fine aggregate subject to abrasion when adequate information is not available from service records. This test is suitable for measuring the amount of weak, soft material such as shale or shaley carbonate in fine aggregate. Materials that give a low loss in this test are unlikely to exhibit significant degradation during handling, mixing or placing. There is a relationship between drying shrinkage of cement mortar and