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

AASHTO Designation: T 327-22¹

Technically Revised: 2022

Technical Subcommittee: 1c, Aggregates

ASTM Designation: D6928-10



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Resistance of Coarse Aggregate
to Degradation by Abrasion in
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1. SCOPE

- 1.1. This method covers a procedure for testing coarse aggregate for resistance to abrasion using the Micro-Deval apparatus.
- 1.2. The values stated in SI units are to be regarded as the standard.
- 1.3. The text of this method references notes and footnotes that provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the test method.
- 1.4. *This procedure may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user of this procedure to establish appropriate safety and health practices and to determine the applicability of regulatory limitation prior to its use.*
- 1.5. *The quality of the results produced by this standard are dependent on the competence of the personnel performing the procedure and the capability, calibration, and maintenance of the equipment used. Agencies that meet the criteria of R 18 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with R 18 alone does not completely assure reliable results. Reliable results depend on many factors; following the suggestions of R 18 or some similar acceptable guideline provides a means of evaluating and controlling some of those factors.*

2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
 - M 231, Weighing Devices Used in the Testing of Materials
 - M 339M/M 339, Thermometers Used in the Testing of Construction Materials
 - R 18, Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
 - T 27, Sieve Analysis of Fine and Coarse Aggregates
- 2.2. *ASTM Standards:*

- C670, Standard Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials
- E1, Standard Specification for ASTM Liquid-in-Glass Thermometers
- E11, Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves
- E230/E230M, Standard Specification for Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples
- E2877, Standard Guide for Digital Contact Thermometers

2.3. *International Electrotechnical Commission Standard:*

- IEC 60584-1:2013, Thermocouples - Part 1: EMF Specifications and Tolerances

2.4. *Other Documents:*

- Kandhal, P. S. and F. Parker, Jr. *Aggregate Tests Related to Asphalt Concrete Performance in Pavements*. Final Report prepared for National Cooperative Highway Research Program, Transportation Research Board, Washington, DC, May 1997.
- Rogers, C. Canadian Experience with the Micro-Deval Test for Aggregates. In *Advances in Aggregates and Armourstone Evaluation*. Latham, J. P. (ed). Geological Society, London, Engineering Geology Special Publications, 13, 1998, pp. 139–147.

3. SUMMARY OF TEST METHOD

- 3.1. 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 sample with standard grading is initially soaked in water for not less than 1 h. The sample is then placed in a jar mill with 2.0 L of water and an abrasive charge consisting of 5000 g of 9.5-mm diameter steel balls. The jar, aggregate, water, and charge are revolved at 100 rpm for 2 h depending on the particle size. The sample is then washed and oven-dried. The loss is the amount of material passing the 1.18-mm sieve, expressed as a percent by mass of the original sample.

4. SIGNIFICANCE AND USE

- 4.1. The Micro-Deval abrasion test is a test of coarse aggregates 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, in contrast to some other tests that are conducted on dry aggregate. The test results are helpful in evaluating the toughness/abrasion resistance of coarse aggregate subject to abrasion when adequate information is not available from service records.
- 4.2. The Micro-Deval abrasion test is a useful test for detecting changes in properties of aggregate produced from an aggregate source as part of a quality control or quality assurance process.

5. TERMINOLOGY

5.1. *Definition:*

- 5.1.1. *constant mass*—test sample dried at a temperature of $110 \pm 5^\circ\text{C}$ ($230 \pm 9^\circ\text{F}$) to a condition such that it will not lose more than 0.1 percent moisture after 2 h of drying. Such a condition of dryness can be verified by weighing 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 $110 \pm 5^\circ\text{C}$ ($230 \pm 9^\circ\text{F}$) for an equal or longer period than that