
Standard Method of Test for

Cantabro Abrasion Loss of Asphalt Mixture Specimens

AASHTO Designation: T 401-22¹

Adopted with Revisions: 2022

**Technical Subcommittee: 2d, Proportioning
of Asphalt–Aggregate Mixtures**



American Association of State Highway and Transportation Officials
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1. SCOPE

- 1.1. This test method describes the procedure for determining the percent abrasion loss of asphalt mixture specimens using the Los Angeles abrasion machine.
- 1.2. *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems 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.*
- 1.3. The values stated in SI units are to be regarded as the standard.
- 1.4. *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
 - < R 97, Sampling Asphalt Mixtures
 - < T 96, Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 - < T 312, Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor
- 2.2. *ASTM Standards:*
 - < D7227/D7227M, Standard Practice for Rapid Drying of Compacted Asphalt Mixture Specimens Using Vacuum Drying Apparatus
 - < E1, Standard Specification for ASTM Liquid-in-Glass Thermometers

- < 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:*

- < Cox, B.C., B. T. Smith, I. L. Howard, , and R. S. James, State of Knowledge for Cantabro Testing of Dense Graded Asphalt. *Journal of Materials in Civil Engineering*, 29(10), 040171174. American Society of Civil Engineers, Reston, VA, 2017.
- < NCHRP. *National Cooperative Highway Research Report 640: Construction and Maintenance Practices for Permeable Friction Courses. National Cooperative Highway Research Program*, Transportation Research Board, Washington, DC, 2009.
- < Smith, B. T., and I. L. Howard. Comparing Laboratory Conditioning Protocols to Longer-Term Aging of Asphalt Mixtures in the Southeast United States. *Journal of Materials in Civil Engineering*, 31(1), 04018346. American Society of Civil Engineers, Reston, VA, 2019.

3. TERMINOLOGY

3.1. *Definitions:*

- 3.1.1. *abrasion loss*—the loss of mass from an asphalt mixture specimen due to abrasion.
- 3.1.2. *air voids*—the total volume of the air between the coated aggregate particles throughout a compacted paving mixture, expressed as a percent of the total volume of the compacted specimen.
- 3.1.3. *draindown*—separation of asphalt binder from the coarse aggregate structure, generally during storage or transportation.
- 3.1.4. *stabilizing additive*—materials used to minimize draindown of asphalt during transport and placement of SMA or PFC, which may include fibers, polymers, crumb rubber, or a combination of these additives.

4. SUMMARY OF TEST METHOD

- 4.1. A single specimen of compacted asphalt mixture is placed within the drum of a Los Angeles abrasion machine without the charge of steel spheres. The specimen is subjected to a total of 300 revolutions within the Los Angeles abrasion drum. At the conclusion of the test, the percent material loss is determined based on the original mass of the specimen.

5. SIGNIFICANCE AND USE

- 5.1. This test method produces a brittleness index that has been shown to relate to factors generally thought to impact asphalt mixture durability (e.g., recycled materials, combined environmental effects, and mixture proportions). The method can also indirectly assess the cohesion, bonding, and effects of traffic abrasion on asphalt mixtures. This test method is applicable to dense graded asphalt, permeable friction course, stone matrix asphalt, and comparable deviations that are either laboratory compacted or sampled from pavements. Specimens can be tested unconditioned or after simulation of field aging with protocols such as documented in Appendix A.