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# **Standard Method of Test for Determining Degree of Particle Coating of Asphalt Mixtures**

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**AASHTO Designation: T 195-22**

Technically Revised: 2022

Editorially Revised: 2022

**Technical Subcommittee: 2c, Asphalt–Aggregate Mixtures**

**ASTM Designation: D2489/D2489M-16**



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## 1. SCOPE

- 1.1. This method covers the determination of the degree of particle coating in an asphalt mix on the basis of the percentage of coarse aggregate particles that are completely coated. Determination of the percentage of coated particles for varying mixing times may be used to establish the least mixing time required to produce satisfactory coating of the aggregate for a given set of conditions. This test method applies to mixtures containing aggregate of a nominal maximum aggregate size less than 38 mm (1½ in.).
- 1.2. The values stated in SI units are to be regarded as the standard.
- 1.3. *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.*
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## 2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
- M 156, Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
  - 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
- 2.2. *ASTM Standards:*
- 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
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- 2.3. *International Electrotechnical Commission Standard:*  
■ IEC 60584-1: 2013 Thermocouples - Part 1: EMF Specifications and Tolerances

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### 3. APPARATUS

- 3.1. *Sieves*—9.5-mm ( $3/8$ -in.) and 4.75-mm (No. 4) sieves conforming to ASTM E11.
- 3.2. *Stopwatch*—For checking the actual mixing time.
- 3.3. *Thermometer*—For measuring the temperature of the asphalt mix, meeting the requirements of M 339M/M 339 with a temperature range of at least 10 to 204.4°C (50 to 400°F) and an accuracy of  $\pm 0.5^\circ\text{C}$  ( $\pm 0.9^\circ\text{F}$ ) (Note 1).  
**Note 1**—Thermometer types suitable for use include ASTM E1 mercury thermometers; ASTM E2877 digital metal stem thermometer; ASTM E230/E230M thermocouple thermometer, Type T, Special Class; or IEC 60584 thermocouple thermometer, Type T, Class 1.
- 3.4. *Sample Shovel.*
- 3.5. *Sample Trays.*

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### 4. SAMPLING

- 4.1. *Batch Plant, as defined in M 156*—Permit the plant to operate at an established mixing time per batch (timed by a stopwatch).
- 4.2. *Continuous Mix Plant, as defined in M 156*—Establish a mixing time by use of the following formula:
- $$\frac{\text{plant contents, kg (lb)}}{\text{plant output, } \frac{\text{kg}}{\text{s}} \left( \frac{\text{lb}}{\text{s}} \right)} \quad (1)$$
- 4.3. *Drum Mix Plant, as defined in M 156*—Operate the plant at a steady state condition for a period of time long enough to complete the sampling.
- 4.4. Samples should be taken at the asphalt mixing plant, immediately after discharge from the plant, using the most appropriate sampling location and sampling procedure according to R 97.
- 4.5. The amount of material required to perform the test is approximately 2.3 to 3.6 kg (5 to 8 lb).

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### 5. PROCEDURE

- 5.1. Sieve each material immediately, while it is still hot, on a 9.5-mm ( $3/8$ -in.) sieve for materials with a maximum size larger than 9.5 mm ( $3/8$  in.). For materials with a maximum size of 9.5 mm ( $3/8$  in.) or less, use a 4.75-mm (No. 4) sieve. Take a sample large enough to yield between 200 and 500 coarse particles retained on the 9.5-mm ( $3/8$ -in.) or 4.75-mm (No. 4) sieve. Do not overload the sieves. If necessary, sieve the sample in two or three operations. Shaking should be reduced to a minimum to prevent recoating of uncoated particles.
- 5.2. Place the particles on a clean surface in a one-particle layer, and start counting them immediately.

- 5.3. Very carefully examine each particle under direct sunlight, fluorescent light, or similar light conditions. If even a tiny speck of uncoated stone is noted, classify the particle as “partially uncoated.” If completely coated, classify the particle as “completely coated.”

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## 6. CALCULATION

- 6.1. The required computation is as follows:

$$\text{percent of coated particles} = \frac{\text{no. of completely coated particles} \times 100}{\text{total no. of particles}} \quad (2)$$

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## 7. REPORT

- 7.1. *Report the following information:*
- 7.1.1. Type of plant—batch, continuous mix, or drum mix;
  - 7.1.2. Type of mix;
  - 7.1.3. Mixing time to the nearest 1 s, if applicable;
  - 7.1.4. Mixing temperature to the nearest 5°C (9°F); and
  - 7.1.5. Percent of coated particles to the nearest 0.1 percent.

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## 8. PRECISION AND BIAS

- 8.1. *Precision*—No precision data are available at this time. As the test is intended to be performed as soon after mixing as possible, there is a concern that remixing due to shipping samples will change the coating of the aggregates.
- 8.2. *Bias*—Because there are no accepted reference materials suitable for determining the bias of this test method, no statement of bias is presented.

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## 9. KEYWORDS

- 9.1. Asphalt; asphalt mixing plant; coating; mixing time; pug mill.