



Standard Test Method for Estimating Degree of Particle Coating of Asphalt Mixtures¹

This standard is issued under the fixed designation D2489/D2489M; 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 provides an estimate of the degree of particle coating in an asphalt-aggregate mixture on the basis of the percentage of coarse particles classified as being completely coated.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

1.3 *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

[D8 Terminology Relating to Materials for Roads and Pavements](#)

[D979 Practice for Sampling Bituminous Paving Mixtures](#)

[D995 Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures \(Withdrawn 2009\)](#)³

[D3665 Practice for Random Sampling of Construction Materials](#)

[D4215 Specification for Cold-Mixed, Cold-Laid Bituminous Paving Mixtures](#)

[E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves](#)

3. Terminology

3.1 For definitions of terms, see Terminology [D8](#).

¹ This test method is under the jurisdiction of ASTM Committee [D04](#) on Road and Paving Materials and is the direct responsibility of Subcommittee [D04.23](#) on Plant-Mixed Asphalt Surfaces and Bases.

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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 The last approved version of this historical standard is referenced on www.astm.org.

3.2 For descriptions of mixing plant terms, see *Mixing Plants, Specification [D995](#)*.

4. Significance and Use

4.1 The procedure in this test method for estimating the percentage of coated particles after varying mixing times is used to establish the least mixing time required to produce satisfactory coating for a given set of conditions. This procedure can also be used to sample cold mixtures from stockpiles to determine that satisfactory coating has been retained in the stockpile.

4.2 This procedure is used with asphalt mixtures or with cold-mixed, cold-laid asphalt paving mixtures such as specified in *Specification [D4215](#)*.

NOTE 1—Even when a paving mixture complies with the “percent of coated particles” that may be specified, there is no assurance that the asphalt cement is uniformly distributed throughout the mixture.

4.3 This test method should not be used for acceptance/rejection by owner agencies.

5. Apparatus

5.1 *Sieves*, 9.5 mm [$\frac{3}{8}$ in.] and 4.75 mm [No. 4]. The sieves shall conform to *Specification [E11](#)*.

5.2 *Stopwatch*, for checking actual mixing time of batch plants.

5.3 *Thermometer*, range at least from 10 °C [50 °F] to 204 °C [400 °F].

5.4 *Sample Shovel*.

5.5 *Sample Trays*.

6. Sampling

6.1 *Batch Plant*—Permit the plant to operate at an established mixing time per batch (timed by a stopwatch).

6.2 *Continuous Mix Plant*—Establish a mixing time by use of the following formula:

$$\text{mixing time} = \text{pug mill contents, kg [lb]}/\text{pug mill output, kg/s [lb/s]} \quad (1)$$

6.3 *Drum Mix Plant*—Operate the plant at a steady state condition for a period of time long enough to complete the sampling.



6.4 Samples should be taken at the site of the asphalt mixing plant immediately after discharge from the plant from three truck loads selected at random in accordance with Practice D3665 and sampled in accordance with Practice D979. Approximately 2.5 to 4.0 kg [5 to 8 lb] is required to perform the procedure.

6.5 If sampling truck loads is impractical, sample from the roadway before compaction starts at three locations selected at random in accordance with Practice D3665 and sampled in accordance with Practice D979.

6.6 If sampling from a cold-mixed stockpile, sample at three locations selected at random in accordance with Practice D3665 and sampled in accordance with Practice D979.

7. Procedure

7.1 Sieve each sample immediately while it is still hot on a 9.5-mm [$\frac{3}{8}$ -in.] sieve, or a 4.75-mm [No. 4] sieve for material with a maximum 9.5-mm [$\frac{3}{8}$ -in.] size. Take a sample large enough to yield between 200 and 500 coarse particles retained on the 9.5-mm [$\frac{3}{8}$ -in.] or 4.75-mm [No. 4] sieve. Do not overload the sieves. If necessary, sieve the sample in two or three operations. Reduce shaking to a minimum to prevent recoating of uncoated particles.

7.2 Place particles on a clean surface in a one-particle layer and start count immediately.

7.3 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 coated.” If completely coated, classify the particle as “completely coated.”

8. Report

8.1 Report the estimated percentage of coated particles as follows:

$$\text{estimated \% of coated particles} = \left(\frac{\text{number of completely coated particles}}{\text{total number of particles}} \right) \times 100 \quad (2)$$

9. Precision and Bias

9.1 It is not possible to specify the precision of the procedure in Test Method D2489/D2489M for measuring the estimated degree of particle coating because remixing or shipping, or both, of the samples between or within labs will change the coating of aggregates.

10. Keywords

10.1 asphalt mixtures; asphalt paving mixtures; particle coating

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