



Designation: D 2489 – 002

Standard Practice for Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures¹

This standard is issued under the fixed designation D 2489; 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 practice provides an estimate of the degree of particle coating in a bituminous-aggregate mixture on the basis of the percentage of coarse particles classified as being completely coated.

1.2 The values stated in SI units are regarded as being 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:*

D 8 Terminology Relating to Materials for Roads and Pavements²

D 979 Practice for Sampling Bituminous Paving Mixtures²

D 995 Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures²

D 3515 Specification for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures²

D 3665 Practice for Random Sampling of Construction Materials²

D 4215 Specification for Cold-Mixed, Cold-Laid Bituminous Paving Mixtures²

E 11 Specification for Wire Cloth and Sieves for Testing Purposes³

3. Terminology

3.1 For definitions of terms, see Terminology D 8.

3.2 For descriptions of mixing plant terms, see Mixing Plants, Specification D 995.

4. Significance and Use

4.1 The procedure in this practice 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 hot-mixed, hot-laid bituminous paving mixtures such as specified in Specification D 3515 or with cold-mixed, cold-laid bituminous paving mixtures such as specified in Specification D 4215.

~~4.3 It should be noted that even~~

NOTE 1—Even when a paving mixture complies with the “percent of coated particles” that may be specified, ~~this does not necessarily ensure there is no assurance~~ that the asphalt cement is uniformly distributed throughout the ~~paving~~ mixture.

5. Apparatus

5.1 *Sieves*, 9.5 mm ($\frac{3}{8}$ in.) and 4.75 mm (No. 4). The sieves shall conform to Specification E 11.

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*.

¹ This practice 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 Bituminous Surfaces and Bases.

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² *Annual Book of ASTM Standards*, Vol 04.03.

³ *Annual Book of ASTM Standards*, Vol 14.02.

***A Summary of Changes section appears at the end of this standard.**

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:

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

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 bituminous mixing plant immediately after discharge from the plant from three truck loads selected at random in accordance with Practice D 3665 and sampled in accordance with Practice D 979. 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 D 3665 and sampled in accordance with Practice D 979.

6.6 If sampling from a cold mixed stockpile, sample at three locations selected at random in accordance with Practice D 3665 and sampled in accordance with Practice D 979.

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:

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

9. Keywords

9.1 bituminous-aggregate mixtures; bituminous paving mixtures; particle coating

SUMMARY OF CHANGES

This section identifies the location of changes to this standard that have been incorporated since the last issue, D 2489-00. Committee D04 has highlighted those changes that affect the technical interpretation or use of this standard.

~~(1) Revised title.)~~ Revised paragraph 4.1.

~~(2) Added Terminology D 8, Specification D 995, Specification D 4215; Deleted paragraph 4.3, and Specification D 3515 to Section 2; replaced it with Note 1.~~

~~(3) Added a terminology section.~~

~~(4) Updated 4.1, 4.2, 5.2, 6.2, 6.3, 6.4, 6.5, 8, 8.1.~~

~~(5) Editing in various places in response to subcommittee letter ballot D04.23 (99-01).)~~ Added new paragraph 6.6.

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