



Designation: D4215 – 07

# Standard Specification for Cold-Mixed, Cold-Laid Bituminous Paving Mixtures<sup>1</sup>

This standard is issued under the fixed designation D4215; 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 specification covers cold-mixed, cold-laid and recycled cold-mixed, cold-laid bituminous paving mixtures for base, binder, leveling, and surface courses.

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

C127 Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate<sup>3</sup>

C128 Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate<sup>3</sup>

C136 Test Method for Sieve Analysis of Fine and Coarse Aggregates<sup>3</sup>

D8 Terminology Relating to Materials for Roads and Pavements

D75 Practice for Sampling Aggregates

D140 Practice for Sampling Bituminous Materials

D242 Specification for Mineral Filler For Bituminous Paving Mixtures

D448 Classification for Sizes of Aggregate for Road and Bridge Construction

D546 Test Method for Sieve Analysis of Mineral Filler for Bituminous Paving Mixtures

D692 Specification for Coarse Aggregate for Bituminous Paving Mixtures

D977 Specification for Emulsified Asphalt

D979 Practice for Sampling Bituminous Paving Mixtures

D1073 Specification for Fine Aggregate for Bituminous Paving Mixtures

D2026 Specification for Cutback Asphalt (Slow-Curing Type)

D2027 Specification for Cutback Asphalt (Medium-Curing Type)

D2028 Specification for Cutback Asphalt (Rapid-Curing Type)

D2172 Test Methods for Quantitative Extraction of Bitumen From Bituminous Paving Mixtures

D2397 Specification for Cationic Emulsified Asphalt

D2399 Practice for Selection of Cutback Asphalts

D2489 Practice for Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures

D3515 Specification for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures (Withdrawn 2009)<sup>4</sup>

D3628 Practice for Selection and Use of Emulsified Asphalts

D4318 Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

E145 Specification for Gravity-Convection and Forced-Ventilation Ovens

## 3. Terminology

3.1 Definitions are in accordance with Terminology D8.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *cold-mixed, cold-laid bituminous paving mixtures*—mixtures of coarse and fine aggregates, or coarse or fine aggregate alone, with or without mineral filler, uniformly mixed and laid at or near ambient temperature.

3.2.2 *cold-mixed, cold-laid recycled bituminous paving mixtures*—mixtures of bitumen aggregate for recycling with additional mineral aggregate as necessary, with or without mineral filler, mixed at or near ambient temperatures with additional bitumen.

3.2.3 *bitumen-aggregate for recycling*—bituminous pavement or paving mixture removed from its original location and reduced by suitable means, after removal or in place, to such particle size as may be required for use in cold-mixed, cold-laid recycled bituminous paving mixtures.

## 4. Ordering Information

4.1 Orders for cold bituminous paving mixtures under this specification shall include the following information:

4.1.1 Type of bitumen (emulsified asphalt, cutback asphalt),

4.1.2 Grade of bitumen,

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.27 on Cold Mix Asphalts.

Current edition approved Aug. 1, 2007. Published August 2007. Originally approved in 1982. Last previous edition approved in 2002 as D4215 – 96 (2002). DOI: 10.1520/D4215-07.

<sup>2</sup> 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.

<sup>3</sup> Withdrawn.

<sup>4</sup> The last approved version of this historical standard is referenced on www.astm.org.

4.1.3 The composition of the bituminous paving mixture (dense mixture and mix designation; open mixture and mix designation; open graded friction course mixture and mix designation),

4.1.4 The maximum percentage of bitumen aggregate for recycling permitted in the mixture, and

4.1.5 The percentage of crushed particles required in the aggregate if different from that specified in 5.2.

## 5. Aggregates

5.1 The aggregates shall be crushed stone, crushed slag, crushed gravel, or sand conforming to the quality requirement of the appropriate ASTM specifications as follows:

5.1.1 *Coarse Aggregate*—Specification D692.

5.1.2 *Fine Aggregate*—Specification D1073.

NOTE 1—Other mineral aggregates, such as uncrushed gravel and crushed shell, may be specified, provided that local experience or tests have demonstrated their ability to produce satisfactory bituminous paving mixtures.

5.2 The aggregates for open-graded friction course mixture described in Table number 2 of Specification D3515 shall meet all the requirements of 5.1 with the added requirement that (1) the coarse particles, retained on the No. 4 sieve, be crushed so that at least 90 weight percent have one or more fractured faces and 75 weight percent have two or more fractured faces, and (2) the coarse aggregate, or if a blend is used, the coarsest fraction be of a type known to possess adequate resistance to the polishing action of the anticipated traffic.

5.3 Recommended grading requirements for coarse and fine aggregate may be selected from Classification D448 and Specification D1073, respectively. Other aggregate gradations may be used, provided that the combined coarse and fine aggregates, and filler, when used, produce a mixture that conforms to the requirements for grading of total aggregate as described in Table number 1 of Specification D3515.

5.4 When cold-mixed, cold-laid recycled mixtures are produced, aggregates conforming to 5.1 may be blended with the bitumen aggregate for recycling as necessary to produce the results required by 5.3.

## 6. Mineral Filler

6.1 The mineral filler shall conform to Specification D242.

## 7. Bitumen

NOTE 2—Practices D2399 and D3628 provide guidance in selecting types and grades of bitumen.

7.1 When cutback asphalt is used it shall conform to Specifications D2026, D2027, or D2028.

7.2 When emulsified asphalt is used it shall conform to Specifications D977 or D2397.

7.3 When cold-mixed, cold-laid recycled mixtures are produced, bitumen conforming to 7.1 or 7.2 shall be added to the bitumen aggregate for recycling as necessary.

NOTE 3—Various bituminous modifiers or recycling agents have been used on a number of cold-mixed, cold-laid recycled bituminous paving projects. Specifications for these materials are being developed.

## 8. Composition of Bituminous Paving Mixtures

8.1 The mixture shall conform to one of the compositions by weight given in Table number 1 of Specification D3515.

NOTE 4—The mix designation selected should be determined by the intended use, thickness of paving courses, and desired texture. The required mix should be specified.

8.1.1 Compositions shown in Table number 1 of Specification D3515 are based on the use of fine and coarse aggregates having approximately the same bulk specific gravities; grading of the total aggregate, therefore, would be the same on either a weight or bulk volume basis. If the bulk specific gravities of coarse and fine aggregates differ greatly, it may be desirable to change the grading limitations to compensate for these differences.

8.2 A job mix formula shall be selected that comes within the specification limits and that is suitable for the traffic, climatic conditions, and specific gravities of the aggregates used. Below the No. 8 (2.36-mm) sieve size, the job-mix formula grading curve shall be reasonably parallel to the curves of the grading limits as selected from Table number 1 of Specification D3515.

8.3 Any variation from the job-mix formula in the grading of the aggregate, as shown by the sieve analyses of materials (Note 5) or, any variation from the job-mix formula in the bitumen content, as indicated by extraction tests of the finished mixture (Note 6) greater than the tolerances shown in Table number 3 of Specification D3515, shall be investigated, and the conditions causing such variation shall be corrected (Note 7).

NOTE 5—It is recognized that the extraction test is a generally accepted and approved method for determining the composition of a bituminous mixture. However, due to the relatively wide difference in the bitumen content and aggregate gradation sometimes found in individual samples of mixture taken from the same lot, as shown by extraction tests, it is recommended that the extraction test results on individual small samples be used as an indication of the mix composition, and not as the sole basis for acceptance or rejection of the product. It may be necessary to determine both aggregate gradation and bitumen content from extraction tests samples.

NOTE 6—Cold mixtures require special preparation in the form of curing prior to performing the extraction test. One recommended curing procedure is to place the mixture to be extracted into a suitably large metal pan with a large spoon such that the mixture, in a loose state, is from 1 to 1½ in. (25 to 38 mm) in depth. Place the mixture, pan, and spoon in an oven, conforming to Specification E145, Type 1B, the temperature of which has been adjusted to 250 + 5°F (121 + 3°C), for 3 h. At the end of each hour remove the pan and stir the mixture thoroughly for 1 min. Replace in the oven, except after the third hourly stirring, allow to cool to room temperature. The extraction test is then performed on this cured mixture. (Other curing procedures may be used provided local experience demonstrates their ability to prepare mixtures properly for the extraction test.)

NOTE 7—Application of tolerances may result in a gradation outside the composition limits in Table number 1 of Specification D3515. This will not be cause for investigation.

## 9. Mixing Equipment

9.1 The equipment for mixing shall be one of the following:

9.1.1 *Central Plant*—Batch, continuous, or drum mixer.

9.1.2 *Travel Plant*, with own bituminous spray system or with separate distributor.

9.1.3 *Grader or Drag*, with separate distributor.