



Designation: D4215 – 21

Standard Specification for Cold-Mixed, Cold-Laid Asphalt Paving Mixtures¹

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 asphalt paving mixtures for base, binder, leveling, and surface courses.

1.2 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

- C127 Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate
- C128 Test Method for Relative Density (Specific Gravity) and Absorption of Fine Aggregate
- C136/C136M Test Method for Sieve Analysis of Fine and Coarse Aggregates
- D8 Terminology Relating to Materials for Roads and Pavements
- D75/D75M Practice for Sampling Aggregates
- D140/D140M Practice for Sampling Asphalt Materials
- D242/D242M Specification for Mineral Filler for Asphalt Mixtures
- D448 Classification for Sizes of Aggregate for Road and Bridge Construction
- D546 Test Method for Sieve Analysis of Mineral Filler for Asphalt Paving Mixtures
- D692/D692M Specification for Coarse Aggregate for Asphalt Paving Mixtures
- D977 Specification for Emulsified Asphalt
- D979/D979M Practice for Sampling Bituminous Paving Mixtures

- D1073 Specification for Fine Aggregate for Asphalt Paving Mixtures
- D2026/D2026M Specification for Cutback Asphalt (Slow-Curing Type)
- D2027/D2027M Specification for Cutback Asphalt (Medium-Curing Type)
- D2028/D2028M Specification for Cutback Asphalt (Rapid-Curing Type)
- D2172/D2172M Test Methods for Quantitative Extraction of Asphalt Binder from Asphalt Mixtures
- D2397/D2397M Specification for Cationic Emulsified Asphalt
- D2399 Practice for Selection of Cutback Asphalts
- D2489/D2489M Test Method for Estimating Degree of Particle Coating of Asphalt Mixtures
- D3515 Specification for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures (Withdrawn 2009)³
- 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 *asphalt-aggregate for recycling*—asphalt 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 asphalt paving mixtures.

3.2.2 *cold-mixed, cold-laid asphalt 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.

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

¹ 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 May 1, 2021. Published May 2021. Originally approved in 1982. Last previous edition approved in 2013 as D4215 – 07 (2013). DOI: 10.1520/D4215-21.

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.

4. Ordering Information

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

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

4.1.2 Grade of asphalt,

4.1.3 The composition of the asphalt 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 asphalt 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/D692M**.

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 asphalt paving mixtures.

5.2 The aggregates for open-graded friction course mixture described in Table 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 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 asphalt 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/D242M**.

7. Asphalt

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

7.1 When cutback asphalt is used it shall conform to Specification **D2026/D2026M**, **D2027/D2027M**, or **D2028/D2028M**.

7.2 When emulsified asphalt is used it shall conform to Specification **D977** or **D2397/D2397M**.

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

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

8. Composition of Asphalt Paving Mixtures

8.1 The mixture shall conform to one of the compositions by weight given in Table 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 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 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 asphalt content, as indicated by extraction tests of the finished mixture (Note 6) greater than the tolerances shown in Table 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 an asphalt mixture. However, due to the relatively wide difference in the asphalt 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 asphalt 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 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 asphalt spray system or with separate distributor.

9.1.3 *Grader or Drag*, with separate distributor.

10. Mixing Operation

10.1 *Aggregate Storage*—Aggregates furnished in different sizes or from different sources shall be kept separate, and adequate provisions shall be made to keep them from becoming mixed or otherwise contaminated. Preblending of aggregates for travel plants and road mixing is permissible so long as grading requirements are maintained. Stockpiles shall be built and the materials removed therefrom in such a manner as to minimize size segregation.

10.2 *Old Asphalt Pavement*—Asphalt aggregate for recycling shall be reduced in size as may be required. Adequate provisions shall be made to keep asphalt aggregate for recycling from being mixed with aggregates or otherwise contaminated.

10.3 *Preparation of Asphalt*—The asphalt shall be maintained at a temperature at which it can be properly handled through the pumping system and uniformly distributed throughout the mixture. At no time will the temperature of the asphalt be allowed to exceed the following:

	Temperature	
	°F	°C
Asphalt		
Cutback asphalt	250	121
Emulsified asphalt	180	82

NOTE 8—The flash point of some grades of cutback asphalt is below 250 °F; therefore, caution must be used when applying heat to cutbacks.

10.4 *Preparation and Handling of Mineral Aggregates*—Each aggregate shall be separately fed by feeders, except in the case of preblended aggregates where only one feeder is required, in proper uniform proportion to produce a satisfactory mixture within the limits specified. In the case of road mixing a known uniform volume or weight of a single aggregate, several aggregates or preblended aggregate shall be windrowed or otherwise placed on the road or mixing area.

10.5 *Preparation and Handling of Asphalt Aggregate for Recycling*—Asphalt aggregate for recycling shall be separately fed by a feeder, except in the case of preblended aggregates where only one feeder is required, in proper uniform proportions to produce a satisfactory mixture within the limits

specified. In the case of road mixing, a known volume or weight shall be windrowed or otherwise placed on the road or mixing area.

10.6 *Preparation of Mixture*—The proportions of the components of the mixture, within the limits specified, shall be regulated so as to produce a satisfactory mixture. The sequence in which the asphalt material is proportioned with the aggregate, aggregate and asphalt aggregate for recycling, or asphalt aggregate for recycling may vary under different mixing procedures.

10.6.1 The mixing shall be accomplished in the shortest time that will produce a satisfactory mixture.

10.6.2 Minimum mixing time may be established on the best coating obtainable or percentage of coated particles as determined by Test Method **D2489/D2489M**. These values will vary with aggregate gradation, particle shape, and surface texture, and with the type of asphalt, asphalt content, and use for which the mix is intended.

NOTE 9—All the coarse particles may not be coated, particularly in dense-graded mixtures.

10.7 *Mixing Plant Inspection*—The engineer or his authorized representatives shall have access at any time to all parts of the mixing plant in order to ensure the manufacture of the mixture in strict accordance with this specification.

11. Methods of Sampling and Testing

11.1 Sample all material and determine the properties enumerated in this specification in accordance with the following ASTM standards:

11.1.1 *Sampling Aggregates*—Practice **D75/D75M**.

11.1.2 *Sampling Asphalt Paving Mixtures*—Practice **D979/D979M**.

11.1.3 *Sieve Analysis of Fine and Coarse Aggregates*—Test Method **C136/C136M**.

11.1.4 *Sieve Analysis of Mineral Filler for Asphalt Mixtures*—Test Method **D546**.

11.1.5 *Quantitative Extraction of Asphalt Binder from Asphalt Mixtures*—Test Methods **D2172/D2172M**.

11.1.6 *Sampling Asphalt Materials*—Practice **D140/D140M**.

11.1.7 *Relative Density (Specific Gravity) and Absorption of Coarse Aggregate*—Test Method **C127**.

11.1.8 *Relative Density (Specific Gravity) of Fine Aggregate*—Test Method **C128**.

11.1.9 *Liquid Limit, Plastic Limit, and Plasticity Index of Soils*—Test Method **D4318**.

11.1.10 *Degree of Particle Coating of Asphalt Mixtures*—Test Method **D2489/D2489M**.