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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures[1]

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers crushed stone, crushed hydraulic-cement concrete, crushed blast-furnace slag, and crushed gravel suitable for use in bituminous paving mixtures, as described in Specifications D 3515 or D 4215.

NOTE 1—Other slags having demonstrated a satisfactory service record may be used.

1.2 The values stated in SI units are to be regarded as standard. Inch-pound units, shown in parentheses, are for information only.

2. Referenced Documents

2.1 *ASTM Standards:*

C 29/C 29M Test Method for Unit Weight and Voids in Aggregate[2]

C 88 Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate[2]

C 125 Terminology Relating to Concrete and Concrete Aggregates[2]

C 131 Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine[2]

C 136 Test Method for Sieve Analysis of Fine and Coarse Aggregates[2]

C 294 Descriptive Nomenclature of Constituents of Natural Mineral Aggregates[2]

D 8 Terminology Relating to Materials for Roads and Pavements[3]

D 75 Practice for Sampling Aggregates[3]

D 448 Classification for Sizes of Aggregate for Road and Bridge Construction[3]

D 3319 Test Method for Accelerated Polishing of Aggregates Using the British Wheel[3]

D 3515 Specification for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures[3]

D 3665 Practice for Random Sampling of Construction Materials[3]

D 4215 Specification for Cold-Mixed, Cold-Laid Bituminous Paving Mixtures[3]

3. Terminology

3.1 *Definitions:*

3.1.1 For defining aggregate types, see Descriptive Nomenclature C 294, and Terminology D 8 and C 125.

4. Ordering Information

4.1 Orders for the material under this specification shall include the following information:

4.1.1 The specification designation and year of issue.

4.1.2 The size to be furnished (see 5.2).

4.1.3 The quantity required.

4.1.4 Use of the coarse aggregate, whether for conventional mixtures or open-graded friction course mixtures (see 5.4), and whether for surface courses or base courses (see 5.7),

4.1.5 In the case of sulfate soundness tests (5.6), which salt is to be used.

4.1.6 Any special requirements.

5. Physical Requirements

5.1 *General*—The coarse aggregate shall consist of hard, strong, durable pieces, free of coherent coatings and conforming to the requirements of this specification.

5.2 *Grading*:

5.2.1 The coarse aggregate grading shall conform to the requirements of Specification D 448 for the size number designated in the order.

5.2.2 The size to be used is dependent upon the desired composition of the paving mixture, and the required size or sizes will be specified.

5.2.3 Other coarse aggregate gradings may be used provided that the combined aggregates and filler, when used, produce a paving mixture that provides the desired characteristics.

5.3 *Unit Weight of Slag*—Air-cooled blast-furnace-slag coarse aggregate, when tested in size No. 57 or No. 8, shall have a compacted unit weight not less than 1120 kg/m^3 (70 lb/ft^3).

5.4 *Crushed Pieces in Gravel*—Where gravel is being considered, orders for material under this specification shall state the appropriate requirements for crushed pieces.

5.4.1 *Conventional Mixtures*—not less than 40 weight % of the gravel pieces retained on the 4.75-mm (No. 4) sieve shall

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[2] *Annual Book of ASTM Standards,* Vol 04.02.

[3] *Annual Book of ASTM Standards,* Vol 04.03.

have at least one fractured face. (Note 2 and Note 3)

5.4.2 *Open Graded Friction Course Mixtures*—of the gravel pieces retained on the 4.75-mm (No. 4) sieve, not less than 90 weight % shall have one or more fractured faces and 75 weight % two or more fractured faces.

NOTE 2—Attention is called to the distinction between conventional (dense mixtures or open mixtures) and open-graded friction course mixtures in Specification D 3515.

NOTE 3—Some sources of gravel contain angular particles that will perform similarly to a mechanically crushed particle. Where laboratory tests or service records indicate this to be true, such angular particles may be considered as crushed.

5.5 *Polishing Characteristics*—The coarse aggregates, or the coarsest fraction of the aggregate for use in surface course mixtures, shall be of a type known to possess adequate resistance to the polishing action of the anticipated traffic. (Note 4)

NOTE 4—No standard ASTM method has been recognized to be capable of defining adequate resistance to the polishing action of specific traffic conditions. Test Method D 3319 has been found useful in evaluating the relative polish resistance between samples of different aggregates or mixtures containing different aggregates.

5.6 *Soundness*—The coarse aggregate, when subjected to five cycles of the soundness test, shall have a weighted loss not greater than 12 % when sodium sulfate is used or 18 % when magnesium sulfate is used. (Note 5). If the salt is not designated by the purchaser, the aggregate will be acceptable if it meets the indicated limit for the salt used.

5.7 *Degradation*—Crushed stone and crushed gravel, when subjected to testing in the Los Angeles machine, shall have a loss not greater than 40 % for surface courses or 50 % for base courses (Note 5).

NOTE 5—Coarse aggregate (other than crushed hydraulic-cement concrete) failing to meet the requirements of 5.6 or 5.7, may be considered for use provided that (*a*) similar aggregates from the same source or geologic formation have been shown by experience to result in satisfactory pavements and (*b*) the results of other tests suggest that the desired performance can be obtained. Aggregate from a new source (including crushed hydraulic-cement concrete) that fails the requirements of 5.6 or 5.7 and for which no experience exists, may be considered provided the results of the other tests suggest that the desired performance can be obtained. Crushed hydraulic-cement concrete may chemically react with Na_2SO_4 or $MgSO_4$, giving higher results which may not reflect the aggregate's freeze-thaw properties. Additional tests may be required.

6. Methods of Sampling and Testing

6.1 Sample the aggregates and determine the properties enumerated in this specification in accordance with the following methods:

6.1.1 *Sampling*—Practice D 75 and Practice D 3665.

6.1.2 *Grading*—Test Method C 136.

6.1.3 *Unit Weight of Slag*—Test Method C 29/C 29M.

6.1.4 *Soundness*—Test Method C 88.

6.1.5 *Degradation*—Test Method C 131.

7. Keywords

7.1 aggregate; bituminous paving; coarse aggregate; open graded friction; paving mixtures