Designation: D6155 – 15

Standard Specification for Nontraditional Coarse Aggregates for Bituminous Paving Mixtures[1]

This standard is issued under the fixed designation D6155; 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 the use of coarse aggregates not traditionally used in bituminous paving mixtures. These nontraditional aggregates can be described as any aggregate other than those described in Specifications D692, D693, D1139, and D5106, (crushed stone, crushed hydraulic-cement concrete, crushed blast-furnace slag, steel furnace slag, and crushed gravel) suitable for use in bituminous paving mixtures, as described in Specifications D3515 or D4215.

1.2 The text of this specification references notes and footnotes that provides explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the specification.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

NOTE 1—Sieve size is identified by its standard designation in Specification E11. The alternative designation given in parentheses is for information only and does not represent a different standard sieve size.

1.4 *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]

C29/C29M Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate

C88 Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

C125 Terminology Relating to Concrete and Concrete Aggregates

C131 Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

C136 Test Method for Sieve Analysis of Fine and Coarse Aggregates

C142 Test Method for Clay Lumps and Friable Particles in Aggregates

C294 Descriptive Nomenclature for Constituents of Concrete Aggregates

D8 Terminology Relating to Materials for Roads and Pavements

D75 Practice for Sampling Aggregates

D448 Classification for Sizes of Aggregate for Road and Bridge Construction

D692 Specification for Coarse Aggregate for Bituminous Paving Mixtures

D693 Specification for Crushed Aggregate for Macadam Pavements (Withdrawn 2008)[3]

D1139 Specification for Aggregate for Single or Multiple Bituminous Surface Treatments

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

D3319 Practice for the Accelerated Polishing of Aggregates Using the British Wheel

D3515 Specification 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

D4792 Test Method for Potential Expansion of Aggregates from Hydration Reactions

D4867/D4867M Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures

D5106 Specification for Steel Slag Aggregates for Bituminous Paving Mixtures

D5711 Test Method for Determining the Adherent Coating

[1] This specification is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.50 on Aggregate Specifications.

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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.

on Coarse Aggregates (Withdrawn 2012)[3]
D5821 Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

2.2 *U. S. Environmental Protection Agency Standards:*
SW846 1311 EPA Test Method, Toxicity Characteristic Leaching Procedure[4]

3. Terminology

3.1 *Definitions*—For defining aggregate types, see Descriptive Nomenclature C294 and Terminologies C125 and D8.

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 number as given in Classification D448 or grading to be furnished,
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 5.3 and 5.4), and whether for surface courses or base courses,
4.1.5 In case of sulfate soundness tests, which salt is to be used,
4.1.6 Any angularity requirements, and
4.1.7 Any special requirements.

5. Physical Properties

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

5.2 *Grading*—The grading shall conform to one of the following subparagraphs:
5.2.1 The coarse aggregate grading shall conform to the requirements of Classification D448 for the size number designated in the order. The size to be used is dependent upon the desired composition of the paving mixture, and the required size or sizes either before or after blending as specified.
5.2.2 The coarse aggregate grading shall conform to the grading as specified in the purchase order. The grading to be used is dependent upon the desired composition of the paving mixture and shall be determined by the purchaser.

5.3 *Fractured Particles in Coarse Aggregate*—Orders for material under this specification shall state the appropriate requirements for percentage of fractured particles.
5.3.1 *Conventional Mixtures,* not less than 40 %, by mass, of the aggregate particles retained on the 4.75-mm (No. 4) sieve shall have at least one fractured face (see Note 2 and Note 3).
5.3.2 *Open–Graded Friction Course Mixtures,* of the aggregate particles retained on the 4.75-mm (No. 4) sieve, not less than 90 %, by mass, shall have one or more fractured faces and not less than 75 %, by mass shall have 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 D3515.

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

5.4 *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 polishing action of the anticipated traffic (see Note 4).

NOTE 4—No ASTM test method has been recognized to be capable of defining adequate resistance to the polishing action of specific traffic conditions. Test Method D3319 has been found useful in evaluating the relative polish resistance between samples of different aggregates or mixtures containing different aggregates.

5.5 *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 (see Note 5). If the salt is not designated by the purchaser, the aggregate shall be considered to be in compliance with this specification if it meets the indicated limit for either salt used.

5.6 *Degradation*—Aggregate subjected to testing in accordance with Test Method C131 shall have a loss not greater than 40 % for surface courses or 50 % for base courses (see Note 5).

NOTE 5—Coarse aggregate failing to meet the requirements of 5.5 or 5.6 may be considered for use provided that *(1)* similar aggregates from the same source have been shown by experience, to the satisfaction of the purchaser, to result in satisfactory pavement and *(2)* the results of other tests indicate that the desired performance can be obtained. Aggregate from a new source that fails the requirements of 5.5 or 5.6 and for which no experience exists, may be considered acceptable provided the results of the other relevant laboratory tests indicate that the desired performance can be obtained.

5.7 *Expansion*—Aggregates that contain components subject to hydration shall be obtained from sources approved by the purchaser on the basis of either satisfactory performance record, aging, or other treatment known to reduce potential expansion to a satisfactory level (see Note 6).

NOTE 6—Test Method D4792 has been used to evaluate the potential for expansion of dense graded materials.

5.8 *Environmental Stability*—Aggregates shall be evaluated for environmental considerations (air quality, water quality, and storage) using the required local, state, and federal test methods in effect at the time of use.
5.8.1 Aggregates that exhibit a potential for producing leachates shall be tested using the Toxicity Characteristic Leaching Procedure (EPA Method SW846 1311) or appropriate test method as approved by the purchaser. Results shall indicate that all areas tested (metals, volatiles, semivolatiles, and organics) are below regulatory limits.
5.8.2 The aggregate shall meet all applicable local, state, and federal environmental requirements in effect at the time of use.

[4] Available from Department of Commerce, National Technical Information Center, 5285 Port Royal Road, Springfield, VA 22151. Order Number: EPASW-846.3.3.

5.9 *Special Requirements*—Evaluation will be required, but not exclusive of, the following items, when specified by the purchaser: the potential for stripping, friable particles.

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 *Random Sampling*—Practice D3665.
6.1.2 *Sampling*—Practice D75.
6.1.3 *Grading*—Test Method C136.
6.1.4 *Unit Weight*—Test Method C29/C29M.
6.1.5 *Soundness*—Test Method C88.
6.1.6 *Degradation*—Test Method C131.
6.1.7 *Expansion*—Test Method D4792.
6.1.8 *Friable Particles*—Test Method C142.
6.1.9 *Coating*—Test Method D2489.
6.1.10 *Adherent Coatings*—Test Method D5711.
6.1.11 *Fractured Particles*—Test Method D5821.
6.1.12 *Leaching*—EPA Test Method SW846 1311.
6.1.13 *Stripping*—Test Method D4867/D4867M.

7. Keywords

7.1 bituminous paving; coarse aggregate; nontraditional aggregate; paving mixtures; recycled aggregate