



Designation: D 1073 – 9901

## Standard Specification for Fine Aggregate for Bituminous Paving Mixtures<sup>1</sup>

This standard is issued under the fixed designation D 1073; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

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

### 1. Scope

1.1 This specification covers fine aggregate for use in bituminous paving mixtures.

1.2 This specification is intended to describe material from a single supplier. When material from two or more suppliers is to be blended to produce a grading to meet requirements as described in Specification D 3515 or other specifications for bituminous paving mixtures, the grading requirements of Table 1 of this specification need not apply.

NOTE 1—When obtaining materials from two or more suppliers that do not meet the gradings in Table 1, and that are to be blended, it is recommended that the specifying or the ordering agency specify the alternative gradings to be supplied.

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

1.4 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

### 2. Referenced Documents

2.1 *ASTM Standards:*

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee D-4 D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.50 on Aggregate Specifications.

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**TABLE 1 Grading Requirements for Fine Aggregates**

Sieve Size	Amounts Finer than Each Laboratory Sieve (Square Openings), mass %				
	Grading No. 1	Grading No. 2	Grading No. 3	Grading No. 4	Grading No. 5
9.5-mm (3/8-in.)	100	....	....	100	
9.5-mm (3/8-in.)	100	....	....	100	100
4.75-mm (No. 4)	95 to 100	400	400	80 to 100	
4.75-mm (No. 4)	95 to 100	100	100	80 to 100	80 to 100
2.36-mm (No. 8)	70 to 100	75 to 100	95 to 100	65 to 100	
2.36-mm (No. 8)	70 to 100	75 to 100	95 to 100	65 to 100	65 to 100
1.18-mm (No. 16)	40 to 80	50 to 74	85 to 100	40 to 80	
1.18-mm (No. 16)	40 to 80	50 to 74	85 to 100	40 to 80	40 to 80
600- $\mu$ m (No. 30)	20 to 65	28 to 52	65 to 90	20 to 65	
600- $\mu$ m (No. 30)	20 to 65	28 to 52	65 to 90	20 to 65	20 to 65
300- $\mu$ m (No. 50)	7 to 40	8 to 30	30 to 60	7 to 40	7 to 46
150- $\mu$ m (No. 100)	2 to 20	0 to 12	5 to 25	2 to 20	2 to 30
75- $\mu$ m (No. 200)	0 to 10	0 to 5	0 to 5	0 to 10	....

- C 88 Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate<sup>2</sup>
- C 117 Test Method for Material Finer Than 75- $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing<sup>2</sup>
- C 125 Terminology Relating to Concrete and Concrete Aggregates<sup>2</sup>
- C 136 Test Method for Sieve Analysis of Fine and Coarse Aggregates<sup>2</sup>
- C 294 Descriptive Nomenclature for Constituents of Concrete Aggregates<sup>2</sup>
- D 8 Terminology Relating to Materials for Roads and Pavements<sup>3</sup>
- ~~D 8 Terminology Relating to Materials for Roads and Pavements<sup>3</sup>~~
- ~~D 75 Practice 75 Practice for Sampling Aggregates<sup>3</sup>~~
- D 3515 Specification for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures<sup>3</sup>
- D 3665 Practice for Random Sampling of Construction Materials<sup>3</sup>
- D 4318 Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils<sup>4</sup>
- E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications<sup>5</sup>

### 3. Terminology

#### 3.1 Definitions:

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

3.1.2 *expanded shale, n; expanded clay, n; expanded slate, n*; the product resulting from the expanding of selected materials (shale, clay, or slate) in a rotary kiln at temperatures over 1000°C.

### 4. Ordering Information

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

4.1.1 This specification designation including year,

4.1.2 Grading (6.2 and Table 1), or alternative grading designated by the purchaser,

4.1.3 Supplementary requirement for sulfate soundness, if required, including salt to be used (See S1), and

4.1.4 Any exceptions or additions to this specification.

### 5. General Characteristics

5.1 Fine aggregate is aggregate passing the 9.5-mm (3/8-in.) sieve and almost entirely passing the 4.75-mm (No. 4) sieve. It shall consist of natural sand; or of manufactured fine aggregate from crushed stone, crushed blast-furnace slag, or crushed gravel; or crushed or uncrushed expanded shale, expanded clay, or expanded slate; or combinations thereof. It shall consist of hard, tough grains, free of injurious amounts of clay, loam, or other deleterious substances.

### 6. Physical Properties

6.1 To determine conformance to this specification, each value for grading (and sulfate soundness, when required) shall be rounded to the nearest 1 %, and each value for the plasticity index shall be rounded to the nearest 0.1 unit, both in accordance with the rounding-off method of Practice E 29.

<sup>2</sup> Annual Book of ASTM Standards, Vol 04.02.

<sup>3</sup> Annual Book of ASTM Standards, Vol 04.03.

<sup>4</sup> Annual Book of ASTM Standards, Vol 04.08.

<sup>5</sup> Annual Book of ASTM Standards, Vol 14.02.

6.2 *Grading*—Grading of fine aggregate shall conform to the grading in Table 1 for the Grading Number specified in the order, or other grading designated by the purchaser.

6.3 *Grading Variability Limits*—For continuing shipments of fine aggregate from a given source, the fineness modulus shall not vary more than 0.25 from the base fineness modulus. The base fineness modulus shall be that value that is typical of the source, and shall be determined from previous tests, or if no previous tests exist, from the average of the fineness modulus values for the first ten samples (or all preceding samples if less than ten) on the order. The base fineness modulus shall not be changed except when approved by the purchaser.

NOTE 2—The proportioning of a bituminous mixture may be dependent on the base fineness modulus of the fine aggregate to be used. Therefore, when it appears that the base fineness modulus is considerably different from the value used in the bituminous mixture, a suitable adjustment in the mixture may be necessary.

6.4 *Plasticity Index*—The plasticity index of the fraction passing the 425- $\mu\text{m}$  (No. 40) sieve shall not exceed 4.0.

## 7. Methods of Sampling and Testing

7.1 The aggregate shall be sampled and the properties enumerated in this specification shall be determined in accordance with the following ASTM methods:

7.1.1 *Sampling*—Practice D 75,

7.1.2 *Random Sampling*—Practice D 3665,

7.1.3 *Grading*—Test Method C 136 and Test Method C 117, Procedure A,

7.1.4 *Fineness Modulus*—Test Method C 136, and

7.1.5 *Plasticity Index*—Test Method D 4318.

## 8. Keywords

8.1 aggregate; fine aggregate; bituminous paving; paving mixtures

## SUPPLEMENTARY REQUIREMENTS

The following supplementary requirement shall apply only when specified by the purchaser in the contract or order.

### S1. Sulfate Soundness

S1.1 The fine aggregate, when subjected to 5 cycles of the soundness test in accordance with Test Method C 88, shall have a weighted loss of not more than 15 % when sodium sulfate is used or 20 % when magnesium sulfate is used. If the salt to be used is not stated by the purchaser, the fine aggregate shall be acceptable if it meets the requirements when tested with either salt.

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