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# Standard Test Method for Sieve Analysis of Mineral Filler for Asphalt Paving Mixtures[1]

This standard is issued under the fixed designation D546; 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.

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

## 1. Scope

1.1 This test method covers the sieve analysis of mineral fillers used in asphalt paving mixtures.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

NOTE 1—Regarding sieves, per Specification E11, "the values stated in SI units shall be considered standard for the dimensions of the wire cloth openings and the diameter of the wires used in the wire cloth." When sieve mesh sizes are referenced, the alternate inch-pound designations are provided for information purposes and enclosed in parentheses.

1.3 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.

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.*

1.5 *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]

C110 Test Methods for Physical Testing of Quicklime, Hydrated Lime, and Limestone

C670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials

C702 Practice for Reducing Samples of Aggregate to Testing Size

C786 Test Method for Fineness of Hydraulic Cement and Raw Materials by the 300-µm (No. 50), 150-µm (No. 100), and 75-µm (No. 200) Sieves by Wet Methods

D8 Terminology Relating to Materials for Roads and Pavements

D242 Specification for Mineral Filler For Bituminous Paving Mixtures

D422 Test Method for Particle-Size Analysis of Soils (Withdrawn 2016)[3]

D4753 Guide for Evaluating, Selecting, and Specifying Balances and Standard Masses for Use in Soil, Rock, and Construction Materials Testing

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

## 3. Terminology

3.1 For definition of terms, see Terminology D8.

## 4. Significance and Use

4.1 The method is used to determine compliance of mineral fillers with the grading requirements of Specification D242.

[1] This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.51 on Aggregate Tests.

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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.

**TABLE 1 Average Precision**

| Precision | Test Result Value, % in Size Fraction[A] | Standard Deviation, (1s), %[B] | Acceptable Range of Test Results, (d2s), %[B] |
|---|---|---|---|
| Single Operator | Less than 2 | 0.14 | 0.5[C] |
| | More than 2 | 0.7 | 2.0 |
| Multilaboratory | Less than 2 | 0.17 | 0.5 |
| | More than 2 | 1.0 | 2.8 |

[A] The percent between consecutive sieves, or percent retained on the largest sieve, 600-µm (No. 30), or percent passing the smallest sieve, 75-µm (No. 200).
[B] These numbers represent, respectively, the (1s) and (d2s) limits as described in Practice C670.
[C] The minimum d2s is 0.5 % in this case since results of the test are expressed to the nearest 0.5 %.

## 5. Apparatus

5.1 *Balance or Scale,* readable to 0.01 g and conforming to the requirements of Guide D4753, Class GP-1, with a minimum capacity of 200 g.

5.2 *Sieves,* conforming to Specification E11 with nominal opening sizes of 75-µm (No. 200), 300-µm (No. 50), 600-µm (No. 30), and 1.18-mm (No. 16).

5.3 *Oven*—An oven of sufficient size, capable of maintaining a uniform temperature of 110 ± 5 °C [230 ± 9 °F].

## 6. Test Sample

6.1 Obtain the sample for test in accordance with the requirements of Specification D242 and reduce to testing size in accordance with Practice C702. Use a minimum of 100 g of dry material for each sieve analysis.

## 7. Procedure

7.1 Dry the test sample to constant mass at a temperature of 110 ± 5 °C [230 ± 9 °F] and determine the mass to the nearest 0.01 g.

7.2 After drying and determining the mass, place the test sample on the 1.18-mm (No. 16) sieve, which shall be nested above the 600-µm (No. 30), 300-µm (No. 50), and 75-µm (No. 200) sieves. Wash the material by means of a stream of water from a faucet (Note 2). Continue the washing until the water coming through the sieve is clear (Note 3). Dry the residue from each sieve to constant mass at a temperature of 110 ± 5 °C [230 ± 9 °F] (Note 4). Calculate the mass of material retained on each sieve as a percentage of the original sample.

NOTE 2—A spray nozzle or a piece of rubber tubing attached to a water faucet may be used for the washing. The velocity of the water, which may be increased by pinching the tubing, must be controlled to prevent loss of any of the sample by splashing over the sides of the sieves. A spray nozzle, utilizing a pressure gage, is also used in Test Methods C110 and Test Method C786 for testing hydrated lime and Portland cement, respectively.

NOTE 3—Take care to avoid accumulation of water on the 75-µm (No. 200) sieve, because it may become clogged and the operation cannot be completed within a reasonable period.

NOTE 4—Some material passes the 75-µm (No. 200) sieve on dry sieving that did not pass during the washing operation. When desired, additional information may be obtained by dry sieving the portion of the sample retained on the 75-µm (No. 200) sieve, in accordance with Test Method D422.

## 8. Report

8.1 Report the results of the sieve analysis as the total percentage passing each sieve, expressed to the nearest 0.5 %.

## 9. Precision and Bias[4]

9.1 *Precision*—The estimates of precision for this test method are shown in Table 1. They are based on results of an interlaboratory testing program where replicable samples of four different mineral fillers were tested in 20 laboratories using this test method. The materials tested ranged from a coarse mineral filler, that had about 93 % passing the 600-µm (No. 30) sieve and 51 % passing the 75-µm (No. 200), to finer mineral fillers that had about 99 % passing the 300-µm (No. 50) sieve and 95 % passing the 75-µm (No. 200) sieve.

9.2 *Bias*—Bias has not been determined since there is no acceptable reference for determining the bias for the procedure in this test method.

## 10. Keywords

10.1 asphalt paving mixtures; grading; mineral filler; sieve analysis

[4] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D04-1017. Contact ASTM Customer Service at service@astm.org.