



Standard Test Method for Sieve Analysis of Mineral Filler for Asphalt Paving Mixtures¹

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, health, and environmental 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.*

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. 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/C702M Practice for Reducing Samples of Aggregate to Testing Size
- C786/C786M 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/D242M Specification for Mineral Filler for Asphalt Mixtures
- D4753 Guide for Evaluating, Selecting, and Specifying Balances and Standard Masses for Use in Soil, Rock, and Construction Materials Testing
- D6913/D6913M Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
- 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/D242M.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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 $110 \pm 5^\circ\text{C}$ [$230 \pm 9^\circ\text{F}$].

6. Test Sample

6.1 Obtain the sample for test in accordance with the requirements of Specification D242/D242M and reduce to testing size in accordance with Practice C702/C702M. 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 $110 \pm 5^\circ\text{C}$ [$230 \pm 9^\circ\text{F}$] 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.

7.2.1 A spray nozzle or a piece of rubber tubing attached to a water faucet to assist with the washing process is not prohibited. When using rubber tubing the velocity of the water increases when pinching the end of the tubing and must be controlled to prevent loss of any of the sample by splashing over the sides of the sieves (Note 2).

NOTE 2—An example of a spray nozzle, utilizing a pressure gage, is given in Test Methods C110 and C786/C786M for testing hydrated lime and portland cement, respectively.

7.2.2 Continue washing the sample until the water coming through the nest of sieves is clear (Note 3).

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.

7.3 Dry the residue from each sieve to constant mass at a temperature of $110 \pm 5^\circ\text{C}$ [$230 \pm 9^\circ\text{F}$] (Note 4).

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 Methods D6913/D6913M.

7.4 Calculate the mass of material retained on each sieve as a percentage of the original sample.

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 Bias³

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

³ 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 www.astm.org/contact.