



Designation: D451/D451M – 17 (Reapproved 2022)

Standard Test Method for Sieve Analysis of Granular Mineral Surfacing for Asphalt Roofing Products¹

This standard is issued under the fixed designation D451/D451M; 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 test method covers the determination of the particle size distribution of granular mineral surfacing material such as crushed slate, stone, coated granules, and so forth, used on the weather surface of prepared asphalt roofing and shingles.

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.

1.3 *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.*

1.4 *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

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

3. Summary of Test Method

3.1 A weighed sample of granular mineral surfacing material is separated through a series of sieves of progressively smaller openings for the determination of particle size distribution.

¹ This test method is under the jurisdiction of ASTM Committee D08 on Roofing and Waterproofing and is the direct responsibility of Subcommittee D08.02 on Steep Roofing Products and Assemblies.

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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.

4. Significance and Use

4.1 This test method is used to determine the grading of materials used as granular mineral surfacing. The results are used to determine compliance of the particle size distribution with applicable specification requirements.

5. Apparatus

5.1 *Sieves*—A set of the sieves listed in **Table 1**, conforming to Specification **E11**. For routine testing, the group of sieves actually used shall include only those appropriate for the granular material being graded. Coarser or finer sieves, on which less than 0.05 mass % of the specimen would be found after sieving, need not be included in the group.

5.2 *Sieve Shaker*—A mechanically operated sieve shaker, which produces a uniform rotary motion and tapping action with 140 to 160 taps per minute. The sieve shaker shall be fitted with a plug to receive the impact of the tapping device. The plug shall be one of the following: a hard maple plug; a #9 black rubber plug; or a #22 cork plug as chosen by the user. Plug dimensions are: top diameter 44 ± 1 mm, bottom diameter 37 ± 1 mm, and length of 38 ± 6 mm. See **Note 1**. The entire apparatus shall be rigidly mounted by bolting to a solid foundation, preferably concrete.

NOTE 1—Supporting data on the equivalency of the plug materials is on file at ASTM Headquarters.

5.3 *Sample Splitter*—The riffle sample splitter is an open V-shaped box in which a series of chutes is mounted at right angles to the long axis to give a series of rectangular slots of equal area alternatively feeding two trays placed on either side of the trough. The sample is poured into the chute and split into equal portions by the slots, until, after repeated cycles, a sample of the desired size is obtained. A riffle sampler with 9.5 or 12.7 mm [$\frac{3}{8}$ or $\frac{1}{2}$ in.] divisions shall be used for reducing the sample to the specimen required for sieve analysis.

5.4 *Balance*—A laboratory balance sensitive to 0.1 g.

6. Sampling

6.1 Each shipment of mineral granules of a single type shall be considered a unit for sampling. If a shipment contains more than one type of granule, the entire quantity of each type in the vehicle shall be considered a unit for sampling.