Designation: D452/D452M – 91 (Reapproved 2013)ε1

Standard Test Method for Sieve Analysis of Surfacing for Asphalt Roofing Products[1]

This standard is issued under the fixed designation D452/D452M; 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.

ε1 NOTE—Units information was editorially corrected in July 2013.

1. Scope

1.1 This test method covers the determination of the particle size distribution of surfacing material, other than mineral granules, such as sand, mica, talc, or other powdered or flaky mineral particles, used on both sides of "smooth" roll roofing and on the reverse side of asphalt shingles and mineral-surfaced roll roofing.

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 non-conformance 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 and health practices and determine the applicability of regulatory limitations prior to use.*

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 surfacing material is separated through a series of sieves of progressively smaller openings for the determination with particle size distribution.

4. Significance and Use

4.1 This test method is used to determine the grading of materials used as 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 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.

NOTE 1—For relatively coarse or flaky materials, such as coarse mica, sieves from 1.18-mm to 212-µm (Nos. 16 to 70) inclusive, will usually be found suitable. For finer surfacing materials, such as fine mica or talc flour, sieves from 600 to 75-µm (Nos. 30 to 200) inclusive, will usually give a satisfactory sieve analysis.

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 hard maple plug to receive the impact of the tapping device. The entire apparatus shall be rigidly mounted by bolting to a solid foundation, preferably concrete.

5.3 *Sampling Splitter*—A riffle sampler with 9.5 or 12.7-mm [⅜ or ½-in.] divisions, for reducing the sample to the specimen required for sieve analysis.

5.4 *Oven,* capable of maintaining 105°C [221°F].

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

6. Sampling

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

6.2 Take the sample of surfacing shipped in bulk from the chute or conveyor while the vehicle is being loaded or unloaded. The ideal place is just where the material drops from the chute or belt. Collect equal portions from the full width and thickness of the stream at regular intervals, with such frequency that a minimum of five samples will be taken and the total mass of the sample will be not less than 7.3 kg [16 lb]. Do not allow the sampling receptacle to overflow under any

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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.

TABLE 1 Report Form

Retained on Sieve		Passing Sieve		Percent
1.70-mm	(No. 12)	...	...	...
1.18-mm	(No. 16)	1.70-mm	(No. 12)[A]	...
850-µm	(No. 20)	1.18-mm	(No. 16)	...
600-µm	(No. 30)	850-µm	(No. 20)	...
425-µm	(No. 40)	600-µm	(No. 30)	...
300-µm	(No. 50)	425-µm	(No. 40)	...
212-µm	(No. 70)	300-µm	(No. 50)	...
150-µm	(No. 100)	212-µm	(No. 70)	...
75-µm	(No. 200)	150-µm	(No. 100)	...
		75-µm	(No. 200)	...
Total				...

[A] Designates U.S. Standard Sieve.

circumstances. Overflow would tend to reject a higher proportion of the large particles than the small ones, and a representative sample would not be obtained. The sample should not include the initial material discharged from the chute or conveyor.

6.3 Take the sample from a shipment of surfacing shipped in bags, selected at random and equal in number to the cube root of the total number of bags in the vehicle. Collect equal portions of not less than 0.23 kg [0.5 lb] from each of the bags taken from sampling and combine.

7. Test Specimen

7.1 Reduce the sample by riffling to a specimen of 100 to 112 g. Use the entire specimen obtained from reduction of the sample for the sieve analysis.

8. Procedure

8.1 Assemble the group of sieves selected from Table 1 in order, with the sieve having the largest opening at the top and the one having the smallest opening at the bottom. Add a solid collecting pan below the bottom sieve. Dry the test specimen in an oven at about 105°C [221°F] for 2 h. Remove from the oven, cool in a desiccator, and then weigh to within ±0.1 g. Place the specimen in the topmost sieve and complete the assembly by placing a solid cover over the top sieve. Securely fasten the sieve assembly in the mechanical sieve-shaking device (see 5.2).

8.2 Pass the specimen through the assembled group of sieves by subjecting it to the action of the sieve shaker for a period of 20 ± 1 min. At the end of this period, remove the solid collecting pan containing the portion of the material passing the finest sieve and weigh the contents to within ±0.1 g. Then reassemble the collecting pan with the sieves and continue shaking for an additional 10 min. At the end of this period remove the collecting pan and weigh the contents again. If the additional material passing the finest sieve during this second shaking period does not exceed 0.5 mass % of the specimen, consider the sieving complete. If it does exceed 0.5 %, reassemble the collecting pan and sieves and shake for successive additional 10-min periods, weighing the material collected in the pan after each period of shaking, until the amount passing the finest sieve in a 10-min shaking period is less than 0.5 mass % of the specimen.

8.3 Carefully remove the portion of the specimen retained on each of the sieves and on the pan, and weigh each portion to within ±0.1 g.

9. Report

9.1 Report the results of the sieve analysis to the nearest 0.1 % (omitting the results for those sieves on which less than 0.05 mass % of the test specimen was collected), as illustrated in Table 1.

9.2 The sum of the percentages reported shall be 100 ± 1.5 %.

10. Precision and Bias

10.1 A retest made after recombining a freshly screened sample by the same operator using the same sieves should give results within ±1 percentage point of the results previously obtained on each sieve. For example, if 25.0 % was retained originally on the 212-µm (No. 70) sieve, a retest should give between 24.0 and 26.0 %.

11. Keywords

11.1 asphalt roofing; minerals; sieves; surfacing