



Standard Test Method for Residue by Evaporation of Emulsified Asphalt¹

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1. Scope

1.1 This test method covers the quantitative determination of residue in emulsified asphalts composed principally of a semisolid or liquid asphaltic base, water, and an emulsifying agent.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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

D6997 Test Method for Distillation of Emulsified Asphalt
E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

3. Significance and Use

3.1 The test may be used to indicate compositional characteristics of emulsified asphalt. Evaporation residue may also be subjected to other characterization tests.

3.2 This test method for residue by evaporation tends to give an asphaltic residue lower in penetration and ductility than the distillation test method (D6997). Material may be accepted but shall not be rejected as failing to meet specifications containing requirements for determination of residue by distillation, on data obtained by evaporation. If residue from evaporation fails to meet the requirements for properties specified for residue from distillation, tests shall be rerun using the distillation test method.

¹ This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and are the direct responsibility of Subcommittee D04.42 on Emulsified Asphalt Test.

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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. Summary of Method

4.1 A sample of emulsified asphalt in an open top beaker is heated in an oven at $163 \pm 3^\circ\text{C}$ to determine the percentage of asphalt residue. The residue from the evaporation may be tested as required.

5. Sample Conditioning for Testing

5.1 All emulsified asphalts shall be properly stirred to achieve homogeneity before testing.

5.2 All emulsified asphalts with viscosity testing requirements of 50°C shall be heated to $50 \pm 3^\circ\text{C}$ in the original sample container in a water bath or oven. The container should be vented to relieve pressure. After the sample reaches $50 \pm 3^\circ\text{C}$, stir the sample to achieve homogeneity.

5.3 Emulsified asphalts with viscosity testing requirements of 25°C should be mixed or stirred at $25 \pm 3^\circ\text{C}$ in the original sample container to achieve homogeneity.

NOTE 1—Emulsified asphalts with viscosity testing requirements of 25°C may be heated and stirred as specified in 5.2 if necessary. In the event the 5.2 method is used, the sample should be cooled to $25 \pm 3^\circ\text{C}$ before testing.

6. Apparatus

6.1 *Beakers*—low form, 1000-mL capacity, made of glass or metal.

6.2 *Glass Rods*—with flame-polished ends, approximately 6 mm in diameter and approximately 180 mm in length.

6.3 *Balance*—capable of weighing 500 g to within 0.1 g.

6.4 *Oven*—Capable of maintaining a temperature of $163 \pm 3^\circ\text{C}$.

6.5 *Sieve*—A 76.2-mm diameter 300- μm sieve conforming to Specification E11.

7. Procedure A

7.1 Use Procedure A when determination of the percentage of residue only is required.

7.2 Determine the weight of each of three beakers containing a glass rod to 0.1 g. Weigh 50 ± 0.1 g of thoroughly mixed, emulsified asphalt into each of three beakers.

7.3 Place the beakers containing the rods and sample in the oven, which has been adjusted to $163 \pm 3.0^\circ\text{C}$, for 2 h. At the

end of this period remove each beaker and stir the residue thoroughly. Replace in the oven for 1 h, then remove the beakers from the oven, allow to cool to room temperature, and weigh with the rods.

NOTE 2—Exercise care to prevent loss of asphalt from the beaker through foaming or spattering, or both. It is permissible for the technician to observe the beakers periodically and prevent boilover by stirring the sample. The placing of beakers and emulsified asphalt samples in a cold or warm oven and bringing the oven and sample up to a temperature of 163°C together is also permissible.

NOTE 3—If preferred, preliminary evaporation of water may be accomplished by careful heating on a hot plate, followed by oven treatment at 163°C for 1 h.

8. Procedure B

8.1 Use Procedure B when tests on the residue from the emulsified asphalts are required.

8.2 Proceed in accordance with 7.2 and 7.3 using four 50 ± 0.1 g samples. After the calculation for percentage of residue, replace the beakers in the oven until the asphalt residue is sufficiently fluid to pass through a 300-µm sieve (usually requiring 15 to 30 min). Pour the residue through the 300-µm sieve into suitable containers and molds for residue testing.

9. Calculation and Report

9.1 Calculate the percentage of residue on each beaker as follows:

$$\text{residue, \%} = 2(A - B) \quad (1)$$

where:

A = weight of beaker, rod, and residue, g; and

B = tare weight of beaker and rod, g.

9.2 Report the percentage of residue by evaporation as the average of all the beakers tested provided the maximum difference in the measurements is less than or equal to 0.4 %. If any of the measured values differs by more than 0.4 % from the other measured values, that data point should be rejected in the calculation and the average of the remaining data points should be reported.

10. Precision and Bias

10.1 The following criteria should be used for judging the acceptability of results (95 % probability):

10.1.1 Duplicate results by the same operator should not be considered suspect unless they differ by more than the following amount:

Residue by Evaporation, weight % 50 to 70	Repeatability, weight %
	0.4

10.1.2 The results submitted by each of two laboratories should not be considered suspect unless they differ by more than the following amount:

Residue by Evaporation, weight % 50 to 70	Reproducibility, weight %
	0.8

10.2 The bias of this test method cannot be determined because no material having an accepted reference value is available.

11. Keywords

11.1 asphalt; asphalt emulsion; cationic emulsified asphalt; emulsified asphalt; evaporation; residue

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