Designation: D6935 – 11

Standard Test Method for Determining Cement Mixing of Emulsified Asphalt[1]

This standard is issued under the fixed designation D6935; 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 is intended to be a mixing test used to identify or classify a slow setting, SS or CSS, type of emulsified asphalt.

1.2 *This test method 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]

C115 Test Method for Fineness of Portland Cement by the Turbidimeter

C150 Specification for Portland Cement

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

D6934 Test Method for Residue by Evaporation of Emulsified Asphalt

D6997 Test Method for Distillation of Emulsified Asphalt

3. Significance and Use

3.1 The result of this test method indicates the ability of a slow setting emulsified asphalt to mix with a finely divided, high surface area material (high early strength, Type III, portland cement) without breaking the emulsified asphalt.

4. Sample Conditioning for Testing

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

4.2 All emulsified asphalts with viscosity testing requirements of 50°C shall be heated to 50 ± 3°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 ± 3°C, stir the sample to achieve homogeneity.

4.3 Emulsified asphalts with viscosity testing requirements of 25°C should be mixed or stirred at 25 ± 3°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 4.2, if necessary. In the event the 4.2 method is used, the sample should be cooled to 25 ± 3°C before testing.

5. Apparatus

5.1 *Sieves*—a 180-µm sieve and a 1.40-mm sieve with a diameter of approximately 75 mm, made of wire cloth conforming to Specification E11.

5.2 *Pan*—a tin box cover or shallow metal pan of appropriate size to fit over the bottom of the standard sieve.

5.3 *Mixing Bowl*—a round-bottom metal dish or a kitchen saucepan of approximately 500-mL capacity.

5.4 *Stirring Rod*—a metal rod with rounded ends, approximately 10 mm in diameter.

5.5 *Graduate*—a 100-mL graduated cylinder.

5.6 *Balance,* capable of weighing 1000 g to the nearest 0.1 g .

5.7 *Oven*—capable of maintaining a temperature of 163 ± 3°C.

5.8 *Thermometer*—a thermometric device capable of measuring the temperature of the oven and the emulsified asphalt to within 1°C.

6. Reagents and Materials

6.1 *Cement*—high-early-strength portland cement conforming to the requirements for Type III portland cement in Specification C150 and having a minimum specific surface area of 1900 cm^2/g, as measured by Test Method C115, Standard Test Method for Fineness of Portland Cement by the Turbidimeter.

7. Procedure

7.1 Dilute the emulsified asphalt with distilled or deionized water to a residue of 55 %, as determined by distillation (Test Method D6997) or by evaporation for 3 h at 163 ± 3°C. (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.

Method D6934). Calculate the amount of water to be added to the emulsified asphalt by using the equation:

$$\%\ Water = 100 - [(55 \div \%\ Residue)\ x\ 100] \quad (1)$$

7.2 Sieve a portion of the cement through the 180-µm sieve. Weigh 50.0 ± 0.1 g of the cement passing the 180-µm sieve into the metal dish or saucepan.

7.3 Bring the ingredients and apparatus to a temperature of approximately 25°C before mixing. Add 100 mL of the diluted emulsified asphalt to the cement and stir the mixture at once with the metal rod, using a circular motion at a rate of 60 revolutions per minute, for 1 min. At the end of the 1-min mixing period, add approximately 150 mL of distilled or deionized water, and continue the stirring for an additional 3 min.

NOTE 2—Rinsing the sample cylinder with three portions of approximately 50 mL of distilled or deionized water is an acceptable procedure for accomplishing this step.

7.4 Determine the mass of the 1.40-mm sieve and pan to the nearest 0.1 g, and record the weight.

7.5 Pour the mixture through the 1.40-mm sieve. Use repeated washings to completely remove material from the mixing bowl and pour these washings over the sieve. Rinse the sieve using distilled or deionized water poured from a height of approximately 150 mm until the rinse water is clear.

7.6 Place the sieve in the pan and heat at 163 ± 3°C for 1 h. Allow the sieve and pan to cool, and then weigh. Repeat the heating and weighing until successive weights differ by no more than 0.1 g.

8. Calculation

8.1 Calculate the mass of sample retained on the sieve and pan as follows:

$$mass\ retained = B - A \quad (2)$$

where:

A = mass of sieve and pan, g,
B = mass of sieve, pan, and residue, g.

9. Report

9.1 Report the mass, in grams, of the material retained on the sieve and in the pan as the percentage of break in the test.

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:

Cement Mixing, mass %	Repeatability, mass %
0 to 2	0.2

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:

Cement Mixing, mass %	Reproducibility, mass %
0 to 2	0.4

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; emulsified asphalt; asphalt emulsion; cationic emulsified asphalt; cement