Designation: D6937 – 16

Standard Test Method for Determining Density of Emulsified Asphalt[1]

This standard is issued under the fixed designation D6937; 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 density of emulsified asphalt used in highway construction. This unit is computed by determining the mass of an emulsified asphalt contained in a standard measure of known volume.

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 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:*

E1 Specification for ASTM Liquid-in-Glass Thermometers

3. Significance and Use

3.1 This test method provides a controlled laboratory test for the determination of quantitative volumes of emulsified asphalt for use in bills of lading, invoicing, and application rates.

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 *Density Cup*—Stainless steel measure of known standard volume (83.2 mL).

5.2 *Balance*—capable of being read to the nearest 0.01 g.

5.3 *Water Bath*—constant-temperature, maintained at 25 ± 0.5°C.

5.4 *Thermometer*—ASTM 17C conforming to the requirements of Specification E1 or equivalent thermometric device.

6. Procedure

6.1 Stir the emulsified asphalt sample and place in a constant-temperature water bath maintained at 25 ± 0.5°C and bring sample to temperature.

6.2 Place the measure and its cap on the balance, tare, and zero the balance.

6.3 Remove the emulsified asphalt sample from the bath and stir, using care to avoid trapping air in the sample. If necessary, strain through a 850-µm sieve to remove any skin or film that might be present in the emulsified asphalt.

6.4 Bring the measure to approximately 25°C and pour the emulsified asphalt into the measure, filling it completely (or within 2 mm of the rim).

6.5 Start placing the cap into the measure and remove, with a clean dry rag or paper, the excess emulsified asphalt oozing through the orifice in the cap.

6.6 When the cap is placed on tightly, clean the measure carefully, determine the mass on the tared balance to the nearest 0.01 g, and record.

7. Calculation

7.1 Calculate the density of the emulsified asphalt as follows:

$$W = (G)(11.98) \quad (1)$$

where:

W = unit density of the emulsified asphalt, as expressed in g/L, and

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G = mass of emulsified asphalt in the measure, g.

NOTE 2—If the desired units are to be expressed in pounds per gallon at 25°C, then the calculation would be W = G/10. Pounds per gallon at 25°C may be translated to pounds per gallon at 15.6°C by using a multiplier of 1.00475. The calculation of Imperial gallon mass may be made by using the proper conversion factors.

8. Report

8.1 Report the unit density of the emulsified asphalt in g/L to the nearest whole unit at 25°C.

9. Precision and Bias

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

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

Unit Density grams per litre 25°C	Repeatability
	0.019

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

Unit Density grams per litre 25°C	Reproducibility
	0.034

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

10. Keywords

10.1 asphalt emulsion; cationic emulsified asphalt; density; emulsified asphalt; emulsion; weight per gallon

APPENDIX

(Nonmandatory Information)

X1. RECOMMENDED CUP STANDARDIZATION PROCEDURE

X1.1 The density cup has been used for testing of various materials (emulsified asphalts, paints, lacquer, other liquids) for a number of years. This Appendix is intended to provide a recommended basis for the verification of the capacity of the cup, or a cup factor to make determinations more accurate.

X1.2 *Recommended Procedure*—Determine the mass of the empty cup with cover and record the mass (optional: tare the balance). Condition the cup and distilled water to 25 ± 0.5°C. Fill the cup within 2 mm of the rim with the distilled water, being careful not to incorporate any air bubbles. Carefully place the cover on the cup, and seal it with a rotary motion. Wipe off the excess water that exudes through the hole in the cover and around the rim. Determine the mass of the filled cup, cover and water after wiping and find the net mass of water (optional: read mass directly from previously tared balance).

$$\text{Net mass of water} = \text{final mass} - \text{empty mass}$$

It is recommended that this process be repeated 3 times for each cup, with the data being averaged, to get a reading as accurate as possible.

X1.3 *Recommended Calculation* —The cup factor is calculated by dividing the net mass value from above into 83.205.

X1.3.1 Example 1: If the cup actually holds 83.000 g:

83.205/83.000 = 1.0025. Multiply all cup readings by 1.0025.

X1.3.2 Example 2: If the cup actually holds 83.400 g:

83.205/83.400 = 0.9977. Multiply all cup readings by 0.9977.

X1.4 *Useful Conversions*—The following conversions are for pounds per U.S. gallon and specific gravity at 25°C:

$$\text{pounds per U.S. gallon} = (\text{mass of cup contents}) \times (0.1000) \times (\text{cup factor})$$

$$\text{specific gravity} = (\text{mass of cup contents}) \times (0.01202) \times (\text{cup factor})$$