



Standard Practice for Identifying Cationic Emulsified Asphalts¹

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1. Scope

1.1 This practice is used to identify cationic emulsified asphalts. Positively charged particles are classified as cationic. Emulsified asphalts that don't register a positive charge may also be classified as cationic slow-setting if they coat a specific type of negatively charged silica sand.

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

[C778 Specification for Sand](#)

[D2397 Specification for Cationic Emulsified Asphalt](#)

[E1 Specification for ASTM Liquid-in-Glass Thermometers](#)

3. Significance and Use

3.1 Cationic emulsified asphalts are identified by the migration of the particles to a negatively charged electrode (cathode) by means of a direct current. Aggregates and sands used in conjunction with emulsified asphalts are often predominantly either negatively or positively charged. Emulsified asphalts should be selected to be compatible with the available aggregate or sand. This practice will aid in identifying a cationic type of emulsified asphalt as defined by Specification [D2397](#).

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 $50 \pm 3^\circ\text{C}$ 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.

4.3 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 [4.2](#) if necessary. In the event the [4.2](#) method is used, the sample should be cooled to $25 \pm 3^\circ\text{C}$ before testing.

METHOD A

5. Apparatus

5.1 *Current Source*, of 12-V DC, a milliammeter, and a variable resistor (see [Figs. 1 and 2](#)).

5.2 *Electrodes*—Two stainless steel plates, approximately 25 mm by 100 mm insulated from each other and rigidly held parallel 12.5 ± 0.5 mm apart (see [Fig. 3](#)).

5.3 *Insulator*—Polytetrafluoroethylene resin square rod, virgin electrical grade, 12.5 ± 0.5 mm thick (see [Fig. 3](#)).

5.4 *Glass Beaker*, 250 mL.

5.5 *Glass Rod*, approximately 100 mm long and 6 mm thick or other suitable material or device that is capable of insulating and suspending the electrode assembly in emulsified asphalt.

5.6 *Water Bath*, capable of maintaining the required testing temperature within the limits specified in this test method.

5.7 *Thermometer*, ASTM 19C or 19F conforming to the requirements of Specification [E1](#) or equivalent thermometric device.

6. Hazards

6.1 **Warning**—Mercury has been designated by the United States Environmental Protection Agency (EPA) and many state agencies as a hazardous material that can cause central nervous system, kidney and liver damage. Mercury, or its vapor, may be hazardous to health and corrosive to materials. Caution should be taken when handling mercury and mercury containing products. See the applicable product Material Safety Data Sheet (MSDS) for details and EPA's website (www.epa.gov/mercury/faq.htm) for additional information. Users should be

¹ This practice is under the jurisdiction of ASTM Committee [D04](#) on Road and Paving Materials and is 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.

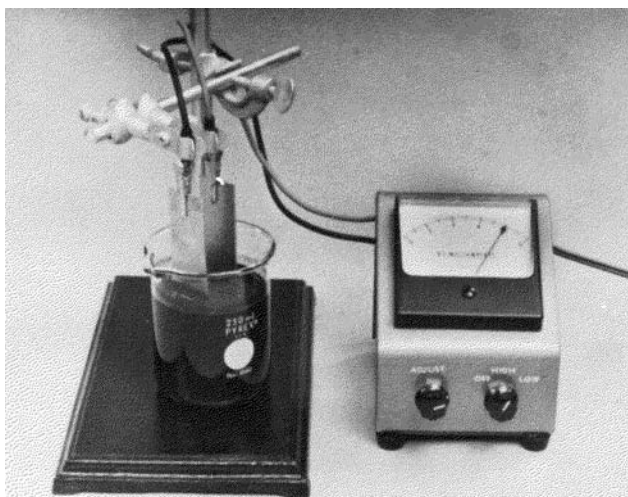


FIG. 1 Particle Charge Tester

aware that selling mercury and/or mercury containing products into your state may be prohibited by state law.

7. Procedure

7.1 Prepare the emulsified asphalt to be tested as shown in Section 4.

7.2 Pour the emulsified asphalt to be tested into the 250-mL beaker to a height that will allow the electrodes to be suspended approximately 25 mm in the emulsified asphalt. To facilitate suspension of the electrodes, insert the glass rod or equivalent between the two electrodes under the insulator. Place the ends of the glass rod or equivalent on the two opposite top edges of the beaker. An apparatus capable of manual height adjustment to insulate and suspend electrode assembly in emulsified asphalt may be used if desired.

7.3 Connect the electrodes, that have been properly cleaned (Note 2), to the DC source. The cathode (negative electrode) should be connected to the negative terminal of the current source. If the electrodes are connected to the current source internally, the negative one should be identified in black.

NOTE 2—New electrodes and electrodes to be reused should be cleaned in the following sequence: (1) wash with distilled water; (2) wash with a suitable asphalt solvent; (3) wash with isopropyl or ethyl alcohol; and (4) wash with distilled water.

7.4 Adjust the current to at least 8 mA with the variable resistor and start timing with a suitable timing device. In some cases, a higher current levels may be specified, however, the current used shall be reported.

7.5 When the current drops to 2 mA or at the end of 30 min, whichever occurs first, disconnect the current source and gently wash the electrodes with a smooth, thin stream of distilled water.

7.6 Observe the asphalt deposit on the electrodes. A cationic emulsified asphalt will deposit a discernible amount of asphalt on the cathode (negative electrode) while the anode (positive electrode) will be relatively clean. Any evidence of a deposit of asphalt on the cathode which is clearly discernible when compared to the anode is to be considered passing.

8. Report

8.1 Report the following information:

8.1.1 Level of current used, and

8.1.2 Whether the tested emulsified asphalt passes or is non-conclusive as defined in 7.6.

8.2 If the emulsified asphalt does not produce conclusive results using Method A and it is purported to be a cationic slow-setting grade, then proceed with Method B shown below for Identification of Cationic Slow-Set Emulsified Asphalt

METHOD B

9. Summary of Practice

9.1 A weighed amount of washed and dried silica sand is hand mixed with a weighed amount of emulsified asphalt. Mixing time should extend until aggregate is completely coated. The amount of Cationic Slow-Setting grade emulsified asphalt in the mix should give a total mix asphalt content of about 5.0 %. The sample is spread out and allowed to air cure for 24 h. The retained coating, after boiling, is determined.

10. Significance and Use

10.1 The conditions of the practice are designed to identify the adequacy of a slow-setting grade of emulsified asphalt (CSS-D2397) to properly mix, coat, and adhere to a specified silica sand aggregate.

10.2 This practice is intended to confirm the adhesive properties that exist between a cationic emulsified asphalt and silica sand and the adequacy of the sample to remain coated after being submerged in boiling water.

NOTE 3—Obtaining an acceptable result utilizing Method B does not guarantee to the user that the emulsified asphalt will be compatible with other cationic emulsified asphalts. It is recommended that the user verify compatibility of the products in some other manner prior to mixing or blending of emulsified asphalts into one storage vessel.

11. Apparatus and Material

11.1 *Heat Source*—Hot plate or Bunsen burner. The use of a Bunsen burner will necessitate the placement of an interfacial material between the flame and beaker.

11.2 *Screen*—850 μm mesh folded into a circular configuration with the edges folded downward, or cut a strip of 850 μm mesh screen approximately 25 mm by 355 mm in length and a circular screen of the circumference of 1000-mL beaker. Bend the strip into a circle and insert it in the bottom of the beaker. Place the circular screen on top of the strip.

11.3 *Glass Beaker*, 1000-mL.

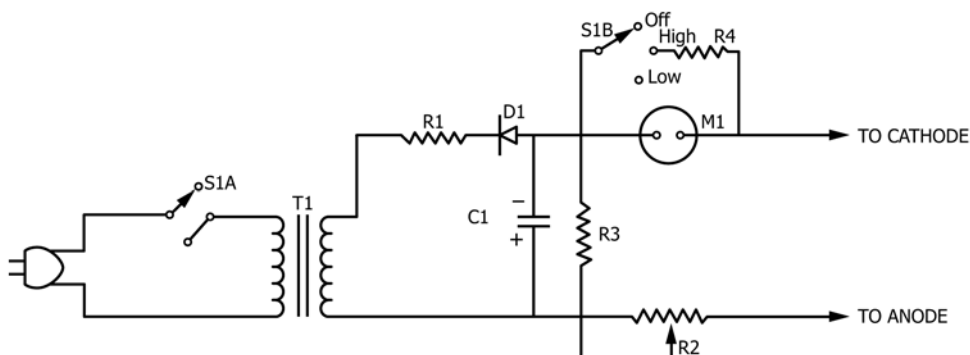
11.4 *Paper Napkin*.

11.5 *20–30 Standard Ottawa Silica Sand*, as described in Specification C778 (silica sand should be washed to remove impurities prior to test).

11.6 *Spatula*—A metal spatula or its equivalent, having a blade of approximately 200 mm in length.

11.7 *Mixing Container*, 400-mL glass or metal beaker or bowl.

11.8 *Beaker Tongs*.



C1—500 μ F 25-V capacitor
 D1—silicon diode
 R1—47 Ω , 1-W resistor
 R2—5000 Ω potentiometer
 R3—6800 Ω , 1/4-W resistor

R4—meter shunt (determined by type of meter used)
 S1—2-pole, 3-position rotary switch
 T1—12.6-V filament transformer
 M1—0 to 10-mA milliammeter

FIG. 2 Particle Charge Tester Circuit Diagram

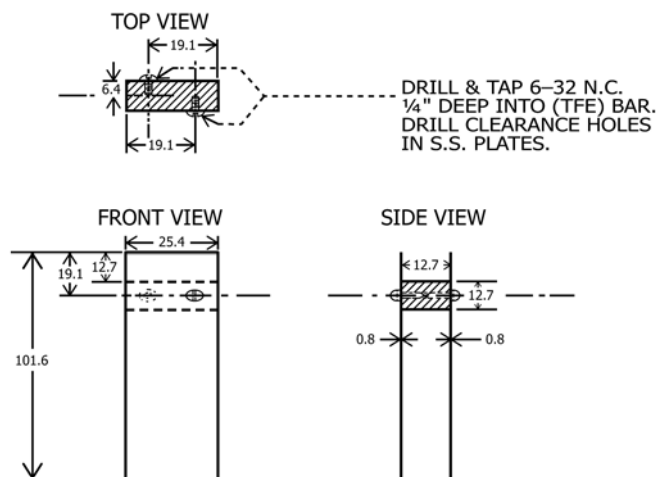


FIG. 3 Insulator

12. Procedure

12.1 Weigh 150 g of dry silica sand into the mixing container.

12.2 Add 12 g of the emulsified asphalt and immediately begin to mix vigorously for 20 to 60 seconds or until silica sand is completely coated. (Water may be added to facilitate mixing; 1.0 % is generally sufficient.)

12.3 The sample should be spread onto a paper napkin in such a manner as to facilitate curing. Allow to air cure for 24 hours. (Remove sample from paper napkin and break into several pieces; observe whether sample is completely cured. If sample is not completely cured, allow additional curing time.)

12.4 Boil about 500 mL of distilled water in a 1000-mL beaker containing 850 μ m mesh screen shelf. Place the coated silica sand in the boiling water on top of the screen.

12.5 Boil for 10 minutes and then decant the water.

12.6 Spread the sample on a level surface and observe the coating of the mix.

13. Report

13.1 From the visual examination of the amount of coated and uncoated areas in the mixture, record the retained coating, after boiling, of the total sand surface area. If the retained coating is in excess of 50 %, the emulsified asphalt should be considered as having a passing rating for classification of slow-setting cationic emulsified asphalt.

13.2 Report the following information:

13.2.1 Whether the emulsified asphalt has a passing or failing rating as described in 13.1.

14. Keywords

14.1 asphalt emulsion; cationic emulsified asphalt; emulsified asphalt; emulsion; particle charge

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