
Standard Method of Test for Determining the Viscosity of Emulsified Asphalt by a Rotational Paddle Viscometer

AASHTO Designation: T 382-22¹

Technically Revised: 2022

Technical Subcommittee: 2a, Emulsified Asphalts



**American Association of State Highway and Transportation Officials
555 12th Street NW, Suite 1000
Washington, DC 20004**

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1. SCOPE

- 1.1. This test method utilizes a rotational paddle viscometer to measure the viscosity of emulsified asphalt. It is applicable to all the emulsified asphalts described in M 140, M 208, and M 316, and with temperatures between 25°C and less than 90°C (77°F and less than 194°F).
- Note 1**—The viscometer makes measurements at 25°C (77°F), 40°C (104°F), 50°C (122°F), 80°C (176°F), and 90°C (194°F) without any external ancillary equipment and with a temperature probe directly in the liquid sample. The viscosity measurement range is from 30 mPa·s to 3000 mPa·s (30 to 3000 cP).
- 1.2. The values stated in SI units are to be regarded as the standard. The values given in parentheses are for informational purposes only.
- 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.*
- 1.4. *The quality of the results produced by this standard are dependent on the competence of the personnel performing the procedure and the capability, calibration, and maintenance of the equipment used. Agencies that meet the criteria of R 18 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with R 18 alone does not completely assure reliable results. Reliable results depend on many factors; following the suggestions of R 18 or some similar acceptable guideline provides a means of evaluating and controlling some of those factors.*

2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
- M 140, Emulsified Asphalts
 - M 208, Cationic Emulsified Asphalts
 - M 316, Polymer-Modified Emulsified Asphalts
 - M 339M/M 339, Thermometers Used in the Testing of Construction Materials
 - R 18, Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
 - R 66, Sampling Asphalt Materials
 - T 59, Emulsified Asphalt

- 2.2. *ASTM Standards:*
- D7226, Standard Test Method for Determining the Viscosity of Emulsified Asphalts Using a Rotational Paddle Viscometer
 - E1, Standard Specification for ASTM Liquid-in-Glass Thermometers
 - E11, Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves
 - E230/E230M, Standard Specification for Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples
 - E2877, Standard Guide for Digital Contact Thermometers
- 2.3. *International Electrotechnical Commission Standard:*
- IEC 60584-1: 2013 Thermocouples - Part 1: EMF Specifications and Tolerances

3. TERMINOLOGY

- 3.1. *Definition:*
- 3.1.1. *viscosity*—a ratio of shear stress to shear rate, η

4. SUMMARY OF TEST METHOD

- 4.1. The viscometer is used to measure the apparent viscosity of emulsified asphalt at 25°C (77°F), 50°C (122°F), or other agreed-upon temperatures.
- 4.2. A microprocessor circuitry system functioning in tandem with a temperature probe inserted directly in the sample and equipped with internal electronic sensors detects and analyzes the preset temperature. The system shall control the preset temperature to $\pm 0.1^\circ\text{C}$ (0.5°F) of the preset temperature.
- 4.3. A paddle is immersed in the emulsified asphalt sample and is rotated at 100 rpm. The apparent viscosity of the sample is obtained and read from the electronic display or printer.

5. SIGNIFICANCE AND USE

- 5.1. This test method is useful to characterize the viscosity of emulsified asphalt products, as an element to establish uniformity of shipments and sources of supply.
- 5.2. The viscosity of emulsified asphalts characterizes their flow properties and affects their utility at 50°C (122°F) or at other temperatures. For many applications, the spray-ability and workability of emulsified asphalt are directly related to the viscosity. The material must have a viscosity low enough to be sprayed yet high enough to not flow from the crown or grade of the road.
- 5.3. For mixing-grade emulsified asphalts, the viscosity will affect its workability and resulting film thickness on the aggregate.
- 5.4. This test method is useful to measure the apparent viscosity of emulsified asphalt at a temperature of 25°C (77°F), 50°C (122°F), or another agreed-upon temperature. The preset temperature and rotational speed at 100 rpm allow for an automated and consistent determination of an emulsified asphalt viscosity within a short time.