
Standard Method of Test for Saybolt Viscosity

AASHTO Designation: T 72-22

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 covers the empirical procedures for determining the Saybolt Universal or Saybolt Furol viscosities of petroleum products at specified temperatures between 21 and 99°C (70 and 210°F). Special procedures for emulsified asphalts and waxy products are indicated.
- Note 1**—T 201 and ASTM D445 are preferred for the determination of kinematic viscosity. These methods require smaller samples and less time, and provide greater accuracy. Kinematic viscosities may be converted to Saybolt viscosities by use of the tables in ASTM D2161. It is recommended that viscosity indexes be calculated from kinematic rather than Saybolt viscosities.
- 1.2. The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information 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 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 Asphalts
 - T 201, Kinematic Viscosity of Asphalts (Bitumens)
- 2.2. *ASTM Standards:*
- D117, Standard Guide for Sampling, Test Methods, and Specifications for Electrical Insulating Liquids

- D445, Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)
- D2161, Standard Practice for Conversion of Kinematic Viscosity to Saybolt Universal Viscosity or to Saybolt Furol Viscosity
- E1, Standard Specification for ASTM Liquid-in-Glass Thermometers
- E11, Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves
- E102/E102M, Standard Test Method for Saybolt Furol Viscosity of Bituminous Materials at High Temperatures
- E230/E230M, Standard Specification for Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples
- E879, Standard Specification for Thermistor Sensors for General Purpose and Laboratory Temperature Measurements
- E1137/E1137M, Standard Specification for Industrial Platinum Resistance Thermometers
- E2251, Standard Specification for Liquid-in-Glass ASTM Thermometers with Low-Hazard Precision Liquids

2.3. *International Electrotechnical Commission Standards:*

- IEC 60584-1: 2013 Thermocouples - Part 1: EMF Specifications and Tolerances
- IEC 60751: 2008 Industrial Platinum Resistance Thermometers and Platinum Temperature Sensors

3. TERMINOLOGY

3.1. *Definitions:*

3.1.1. *Furol*—an acronym of “Fuel and Road Oils.”

3.1.2. *Saybolt Furol viscosity*—the corrected efflux time in seconds of 60 mL (2 oz) of sample flowing through a calibrated Furol orifice under specified conditions. The viscosity value is reported in “Saybolt Furol seconds,” abbreviated “SFS,” at a specified temperature.

3.1.3. *Saybolt Universal viscosity*—the corrected efflux time in seconds of 60 mL (2 oz) of sample flowing through a calibrated Universal orifice under specified conditions. The viscosity value is reported in “Saybolt Universal seconds,” abbreviated “SUS,” at a specified temperature.

4. SUMMARY OF TEST METHOD

4.1. The efflux time in seconds of 60 mL of sample, flowing through a calibrated orifice, is measured under carefully controlled conditions. This time is corrected by an orifice factor and reported as the viscosity of the sample at that temperature.

5. SIGNIFICANCE AND USE

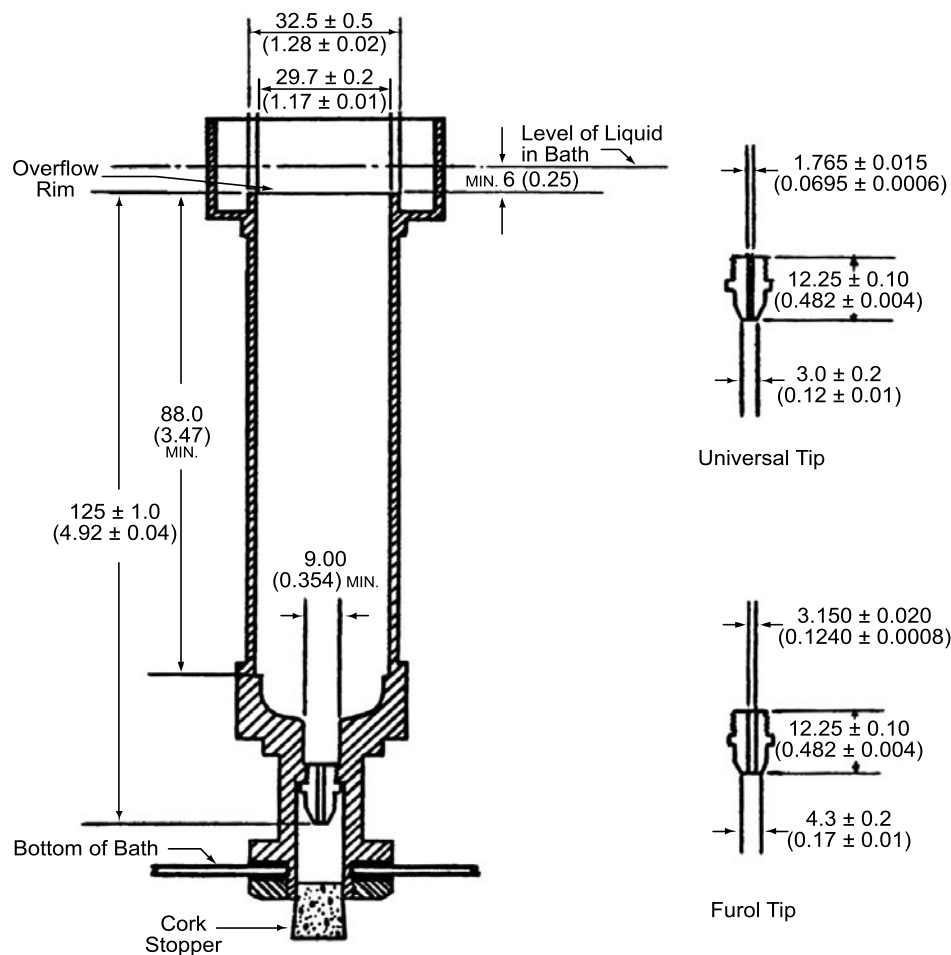
5.1. This test method is useful in characterizing certain petroleum products, as one element in establishing uniformity of shipments and sources of supply.

5.2. See ASTM D117 for applicability to mineral oils used as electrical insulating oils.

- 5.3. The Saybolt Furol viscosity is approximately one tenth of the Saybolt Universal viscosity and is recommended for characterization of petroleum products such as fuel oils and other residual materials having Saybolt Universal viscosities greater than 1000 s.
- 5.4. Determination of the Saybolt Furol viscosity of asphalt materials at higher temperatures is covered by ASTM E102/E102M.

6. APPARATUS

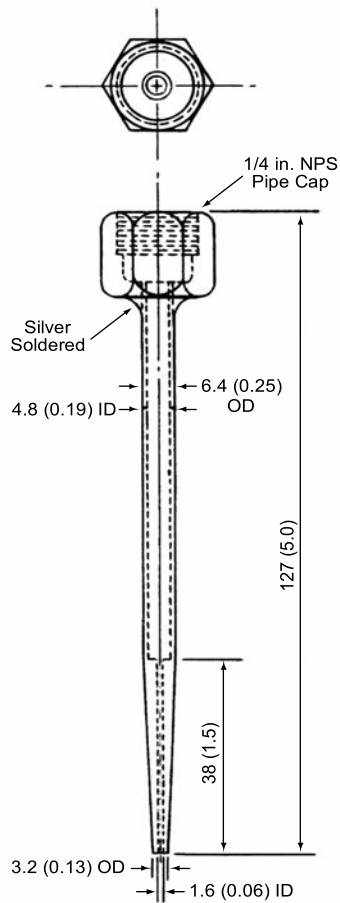
- 6.1. *Saybolt Viscometer and Bath*—as shown in Figure 1 and described in Annex A2.



Note: All dimensions are in millimeters (inches).

Figure 1—Saybolt Viscometer with Universal and Furol Orifice

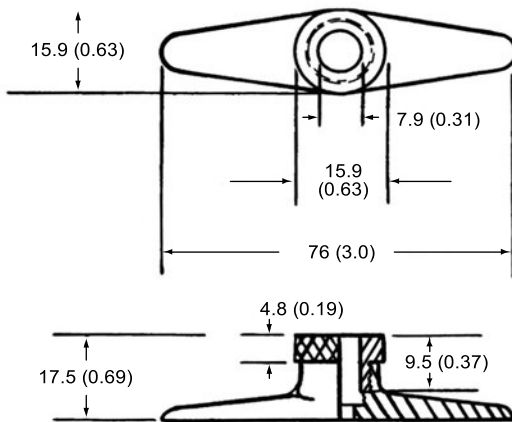
6.2. *Withdrawal Tube*—as shown in Figure 2, or other suitable device.



Note: All dimensions are in millimeters (inches).

Figure 2—Withdrawal Tube for Use with Saybolt Viscometer

6.3. *Thermometer Support*—One suitable design is shown in Figure 3.



Note: All dimensions are in millimeters (inches).

Figure 3—Thermometer Support