



Designation: ~~D7226 – 11~~ D7226 – 13

Standard Test Method for Determining the Viscosity of Emulsified Asphalts Using a Rotational Paddle Viscometer¹

This standard is issued under the fixed designation D7226; 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 ~~uses a paddle rotational~~ utilizes the rotational paddle viscometer to measure the ~~apparent~~ viscosity of emulsified asphalt with viscosities between 30 and 1500 mPa·s (centipoises) at 50°C (122°F). ~~asphalt.~~ It is applicable to all the emulsified ~~asphalts~~ asphalts described in Specifications [D977](#) and [D2397](#).

1.2 The values ~~given stated~~ in SI units are to be considered the standard. The values given in parentheses are for information only; 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

~~C670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials~~

~~D140 Practice for Sampling Bituminous Materials~~

~~D977 Specification for Emulsified Asphalt~~

~~D2397 Specification for Cationic Emulsified Asphalt~~

~~D7496 Test Method for Viscosity of Emulsified Asphalt by Saybolt Furol Viscometer~~

~~E1 Specification for ASTM Liquid-in-Glass Thermometers~~

~~E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves~~

3. Terminology

3.1 *Definitions:*

3.1.1 *viscosity, n*—ratio of shear stress to shear rate.

¹ This test method 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.

3.1.1.1 *Discussion*—

The SI unit of viscosity is the Pascal second (Pa·s). ~~The~~³ centimetre gram second (cgs) unit of viscosity is the poise (dynes/cm²) and is equivalent to 0.1 Pa·s. One centipoise (cP) is one millipascal second (mPa·s).

4. Summary of Test Method

4.1 The ~~paddle rotational viscometer for this test~~ paddle viscometer method is used to measure the apparent viscosity of emulsified asphalt at 50°C (122°F) between 30 and 1500 mPa·s (cP). ~~50°C, 25°C, or other agreed-upon temperatures.~~ A

³ Emulsions are sensitive to RPM, therefore, the manufacturer has preset the instrument to run at 100 RPM.

³ No accurate predictable conversion from mPa·seconds to Saybolt Furol Seconds (SFS) is available at this time. The centimetre gram second (cgs) unit of viscosity is the poise (dynes/cm²·time. However, an empirical correlation between SFS and mPa·seconds can be obtained by performing the respective viscosity measurements on the appropriate equipment) and is equivalent to 0.1 Pa·s. One centipoise (cP) is one millipascal second (mPa·s).

microprocessor circuitry system functioning in tandem with a temperature probe and equipped with internal electronic sensors detects and analyzes the preset temperature. A paddle is immersed in the emulsified asphalt sample and is rotated at 100 RPM. The apparent viscosity of the sample is obtained within 5 min and read from the electronic display or an optional printer.

5. Significance and Use

5.1 The viscosity of emulsified asphalts characterizes their flow properties and affects their utility at 50°C (122°F) or at other temperatures. ~~An emulsified asphalt~~ The sprayability and workability ~~is of an emulsified asphalt~~ are directly related to ~~their~~ viscosity for many ~~applications types~~ applications. The material must be thin enough to be sprayed yet thick enough such that it will not flow from the crown or grade of the road. For mixing grade emulsified asphalts the viscosity will affect its workability and resulting film thickness on the aggregate. This test method is useful to measure the apparent viscosity of emulsified asphalt at a temperature of ~~50°C (122°F)~~ 50°C, 25°C, 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.

6. Apparatus

6.1 The rotational paddle viscometer test system consists of a paddle, temperature probe, sample cup, the sample cup cover, a means ~~for~~ of controlling the sample temperature to $50 \pm 0.1^\circ\text{C}$ ($122 \pm 0.18^\circ\text{F}$), and within $\pm 0.1^\circ\text{C}$ and a readout system to display viscosity. The dimensions of the sample cup and paddle are shown in Figs. 1-3.

6.2 Thermometer—ASTM No. 19F or 19C for tests at 50°C conforming to the requirements of Specification ~~Any E1~~. Other thermometric devices of equal accuracy may be used. ~~Measuring devices including liquid-in-glass thermometers, thermistors, thermocouples, or platinum resistance thermometers that provide equivalent accuracy and precision, that cover the temperature range for thermometers 19C and 19F may be used.~~ thermometric device can be used to monitor the temperature of the sample being conditioned for testing.

6.3 Sieve—An 850- μm sieve or a 20-mesh strainer of wire cloth, framed or unframed, conforming to Specification ~~E11~~ is used.

6.4 Oven/Water Bath—An oven/water bath capable of maintaining the required testing temperature within the limit of $\pm 3^\circ\text{C}$; $\pm 3^\circ\text{C}$.

7. Hazards

7.1 **Warning**—Mercury has been designated by 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 – <http://www.epa.gov/mercury/faq.htm> - for additional information. Users should be aware that selling mercury and/or mercury containing products into your state may be prohibited by state law. **WARNING**—Mercury has been designated by 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

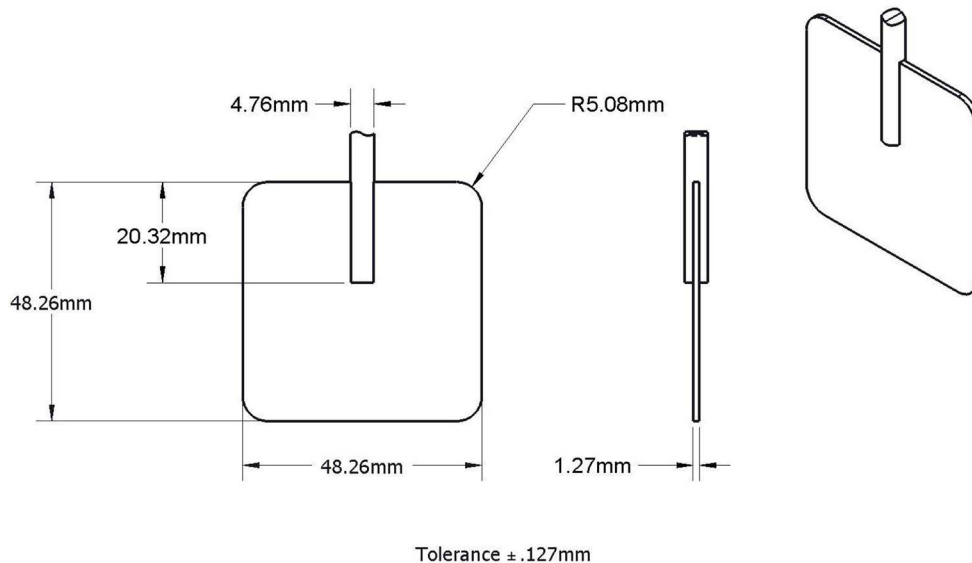
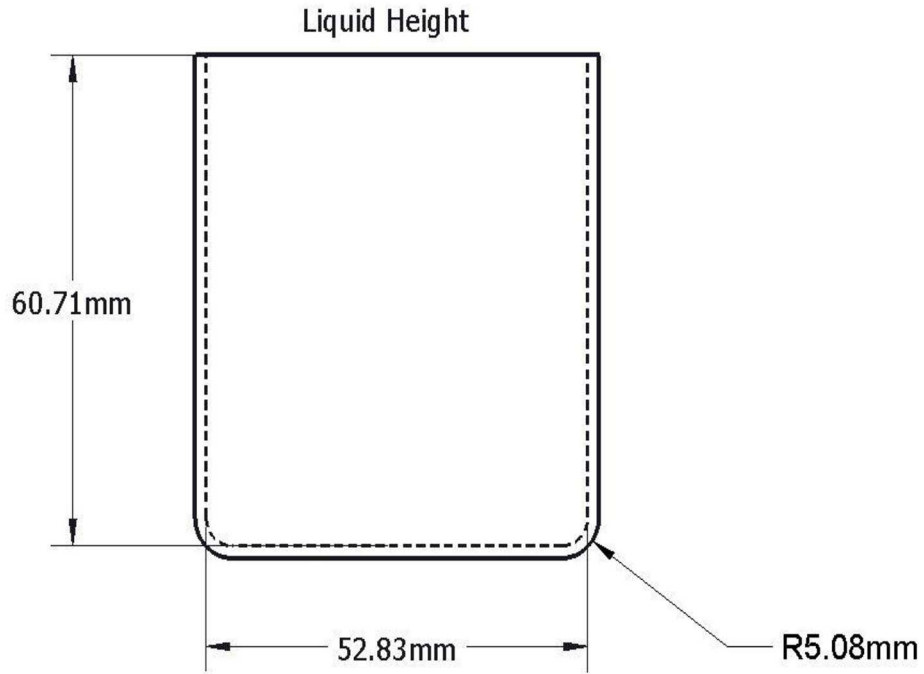
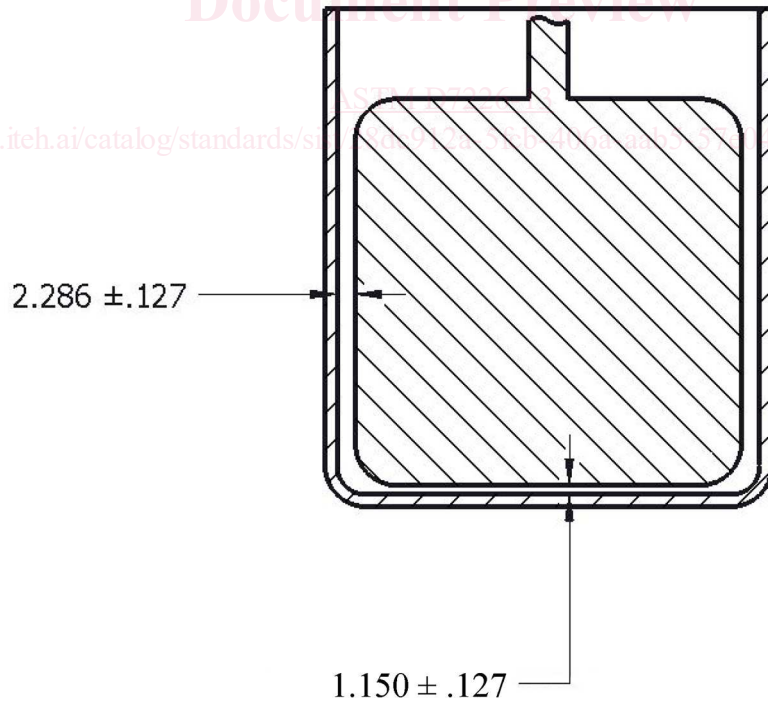


FIG. 1 Paddle Dimensions, mm (in.)



Tolerance $\pm .127$ mm

FIG. 2 Sample Cup Dimensions, mm (in.)



All dimensions in millimeters.

FIG. 3 Paddle and Sample Cup, mm (in.)

website — <http://www.epa.gov/mercury/faq.htm> — for additional information. Users should be aware that selling mercury and/or mercury-containing products into your state may be prohibited by state law.