Designation: ~~D6267/D6267M – 13~~ D6267/D6267M – 13 (Reapproved 2017)

Standard Test Method for Apparent Viscosity of Hydrocarbon Resins at Elevated Temperatures[1]

This standard is issued under the fixed designation D6267/D6267M; 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 the apparent viscosity of hydrocarbon resins having apparent viscosities up to 2,000,000 millipascal seconds (mPa·s) (Note 1) at temperatures up to 300°C [572°F].

NOTE 1—The SI unit of (dynamic) viscosity is the pascal second. The centipoise (cP) is one millipascal second (mPa·s) and is frequently used as a viscosity unit.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the 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*~~ *safety, health, and* ~~*health*~~*environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D6440 Terminology Relating to Hydrocarbon Resins

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

E1 Specification for ASTM Liquid-in-Glass Thermometers

3. Terminology

3.1 The definitions in Terminology D6440 are applicable to this test method.

3.2 *Definition Specific to This Standard:*

3.3 *apparent viscosity, n—of a hydrocarbon resin*, the viscosity determined by this test method, expressed in millipascal seconds.

3.3.1 *Discussion—*

Its value may vary with the spindle and rotational speed selected.

4. Summary of Test Method

4.1 The viscometer described in this test method can be used to determine the apparent viscosity of hydrocarbon resins at elevated temperatures. Apparent viscosity is determined under temperature equilibrium conditions using a rotating spindle type viscometer. The torque on a spindle rotating in a thermostatted sample holder containing a small amount of sample is used to measure the relative resistance to rotation. A factor is applied to the torque reading to yield the viscosity in mPa·s.

---

[1] This test method is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.34 on Pine Chemicals and Hydrocarbon Resins.

Current edition approved ~~Nov. 1, 2013~~Dec. 1, 2017. Published ~~December 2013~~December 2017. Originally approved in 1998. Last previous edition approved in ~~2008~~2013 as ~~D6267 – 08.~~D6267 – 13. DOI: ~~10.1520/D6267_D6267M-13.~~10.1520/D6267_D6267M-13R17.

[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.

5. Significance and Use

5.1 This test method is used to measure the apparent viscosity of hydrocarbon resins *at elevated temperatures. Elevated temperature viscosity values of a hydrocarbon resin may be related to the properties of coatings, adhesives and the like, containing such a resin.*

5.2 For hydrocarbon resins, values of apparent viscosity will usually be a function of shear rate under the conditions of test. Although the type of viscometer described in this test method operates under conditions of relatively low shear rate, shear rate depends on the spindle and rotational speed selected for a determination; therefore, comparisons between apparent viscosity values should be made only for measurements made with similar viscometers under conditions of equivalent shear rate.

6. Apparatus

6.1 *Rotational Viscometer*—rotating-spindle type with leveling stand.

6.2 *Viscometer Spindles,* stainless steel. (**Warning**—Care must be taken in the storage and handling of spindles and assemblies. Protect them from scratches, dust, corrosion or deposits, and mechanical abuse. Replace the spindle extension if it is bent. Avoid touching the calibrated section of the spindle with hands. Clean the spindle and sample chamber thoroughly after each use. A recommended cleaning procedure is included in the procedure.)

6.3 *Temperature Controller, Thermocontainer (a heater for the sample chamber), and Sample Chamber,* designed for use with the viscometer in 6.1, complete with locating ring, leveling screws, safety guard, spindle extension, insulating cap, alignment bracket, cooling plug (optional) and extracting tool. The precision temperature controller shall provide control accuracy of ±1.0°C or better through the range from 100 to 150°C [212 to 302°F] and ± 2.0°C or better through the range from 150 to 300°C [302 to 572°F].

7. Assembly of Apparatus

7.1 Assemble the apparatus according to the ~~manufacturer's~~manufacturer's instructions.

8. Calibration

8.1 A digital viscometer should be zeroed according to the ~~manufacturer's~~manufacturer's instructions. For a dial-reading viscometer, no zero adjustment is required, since experience has shown that the zero point will not vary due to changes in the spring.

NOTE 2—The viscometer and spindles are precision equipment and should be kept from undue shock and mishandling. Physical damage to the instrument will often reveal itself as erratic or no oscillation of the reading when the instrument, with or without the spindle in place, is operated in air. When operating normally, the reading in air will be stable and have free oscillation about the zero point.

8.2 The calibration of the instrument may be verified using standard reference fluids. Suitable fluids are available in nominal viscosities up to 15 000 mPa·s at 149°C [300°F]. The procedure for instrument calibration using standard reference fluids shall be that described by this test method. Results obtained using standard reference fluids should not deviate from the nominal viscosity by more than the following amount:

$$\sqrt{a^2+b^2} \tag{1}$$

where "*a*" is 1 % of the full measurement range under the conditions of the test, and "*b*" is 1 % of the nominal viscosity of the calibration fluid. If the results deviate by more than this value, the instrument should be removed from use and repaired.

8.3 To check the controller and verify the calibration of the controller settings, use the procedure in 8.3.1 and 8.3.2.

8.3.1 Place enough silicone oil (or other high-boiling material that is liquid under the conditions of the determination) in the sample container to permit immersion of the appropriate ASTM thermometer to the proper depth. Suitable thermometers are shown in Table 1 in accordance with Specification E1. Temperature measuring devices such as RTDs, thermocouples and liquid-in-glass thermometers with temperature range and accuracy consistent with thermometers in Table 1 may be used. Adjust the thermal controller setpoint to provide the desired temperature.

8.3.2 Insert the thermometer through the insulating cover of the sample container, into the liquid, and hold it in place at the level required for proper immersion depth. *Do not permit the thermometer bulb to rest on the bottom of the sample container*. Adjust the thermal *controller set point to provide the desired temperature*. Repeat this procedure for each test temperature desired.

TABLE 1 Suitable ASTM Thermometers

Temperature Range	Immersion mm	Scale Error, max
90°C - 170°C	51	0.2°C
94°F - 338°F	51	0.5°F
145°C - 206°C	76	0.4°C