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Standard Test Methods for Polyurethane Raw Materials: Determination of Viscosity of Polyols¹

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1. Scope

1.1 These test methods (A and B) determine the viscosity of polyols in the range from 10 to 100 000 mPa·s(cP) at 25°C or at 50°C. Test Method A also applies to more viscous samples that are soluble in *n*-butyl acetate. Test Method B is simply a reference to a general procedure for kinematic viscosity, D445. (See Note 1.)

1.2 The values stated in SI units are to be regarded as the standard. Other equivalent units are provided because of current common usage.

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.*

NOTE 1—There is no equivalent ISO standard for Test Method A although ISO 3219 is similar. Test Method B is equivalent to ISO 3104.

2. Referenced Documents

- 2.1 *ASTM Standards:*²
 - D445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)
 - D883 Terminology Relating to Plastics
 - E1 Specification for ASTM Liquid-in-Glass Thermometers
- 2.2 *ISO Standards:*³
 - ISO 3104
 - ISO 3219

¹ These test methods are under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.22 on Cellular Materials - Plastics and Elastomers.

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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 Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

3. Terminology

3.1 For definitions of terms used in these test methods see Terminology D883.

4. Significance and Use

4.1 These test methods are suitable for research or as quality control or specification tests.

4.2 Viscosity measures the resistance of a fluid to uniformly continuous flow without turbulence or other forces.

5. Sampling

5.1 Polyesters and polyethers usually contain molecules covering an appreciable range of molecular weights. These have a tendency to fractionate during solidification. Unless the material is a finely ground solid it is necessary to melt (using no higher temperature than necessary) and mix the resin well before removing a sample for analysis. Many polyols are hygroscopic and care should be taken to provide minimum exposure to atmospheric moisture during the sampling.

TEST METHOD A—BROOKFIELD VISCOSITY

6. Summary of Test Method

6.1 The viscosity of resins is measured by determining the torque on a spindle rotating at constant speed in the liquid sample which is adjusted to $25 \pm 0.1^\circ\text{C}$. Samples with viscosities exceeding 100 000 mPa·s(cP) at 50°C are dissolved in *n*-butyl acetate (or other solvent) and the viscosity is determined at $25 \pm 0.1^\circ\text{C}$.

7. Apparatus

7.1 *Constant-Temperature Bath*, capable of maintaining temperatures of $25 \pm 0.1^\circ\text{C}$ and $50 \pm 0.1^\circ\text{C}$ should be used. Water, water and glycerin, or oil may be used as the heating medium and the bath should be provided with heating, stirring, and thermostating devices.

7.2 *Bath and Sample Thermometers*, graduated in 0.1°C subdivisions and standardized for the range of use to the nearest 0.01°C . ASTM Saybolt Viscosity Thermometers having ranges from 19 to 27°C and 49 to 57°C , as specified, and