



Designation: D 4878 – 98

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 viscosities of polyols in the range from 10 to 100 000 cP at 25°C or at 50°C. Test Method A also applies to more viscous samples that are soluble in *n*-butyl acetate. (See Note.)

1.2 The values stated in SI units are to be regarded as 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 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:

D 445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)²

D 883 Terminology Relating to Plastics³

E 1 Specification for ASTM Thermometers⁴

2.2 ISO Standards:⁵

ISO 3104

ISO 3219

3. Terminology

3.1 For definitions of terms used in these test methods see Terminology D 883.

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 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 conforming to the requirements for Thermometers 17C and 19C, respectively, as prescribed in Specification E 1 are recommended.

7.3 *Brookfield Synchroelectric Viscometer*⁶—Model LVF with speeds of 60, 30, 12, and 6 r/min is to be used when available. It is applicable to the range of 10 to 100 000 cP. If this model is not available, Model RVF or HAF may be substituted. However, samples should be heated or dissolved in

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² *Annual Book of ASTM Standards*, Vol 05.01.

³ *Annual Book of ASTM Standards*, Vol 08.01.

⁴ *Annual Book of ASTM Standards*, Vol 14.03.

⁵ Available from American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.

⁶ Obtainable from Brookfield Engineering Laboratories, 240 Cushing Street, Stoughton, MA 02072.