



Standard Test Methods for Polyurethane Raw Materials: Determination of Viscosity of Crude or Modified Isocyanates¹

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1. Scope

1.1 These test methods determine the viscosity of crude or modified isocyanates. It is applicable to products derived from toluene diisocyanate, methylene-bis-(4-phenylisocyanate), and polymethylene polyphenylisocyanates. (See Note 1.)

1.2 *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.* For specific hazards statements see Note 2 and 10.5.

NOTE 1—There is no equivalent ISO standard.

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
- E1 Specification for ASTM Thermometers⁴

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 can be used for research or for quality control to characterize isocyanates used in polyurethane products.

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

5. Sampling

5.1 Since organic isocyanates react with atmospheric moisture, special precautions must be taken in sampling (**Caution**,

Note 2). Usual sampling methods (for example, sampling an open drum thief), even when carried out rapidly, can cause contamination of the sample with insoluble urea. Therefore, the sample must be blanketed with dry air or nitrogen at all times.

NOTE 2—**Caution:**—Organic isocyanates are toxic when they are absorbed through the skin, or when the vapors are breathed. Adequate ventilation should be provided and protective gloves and eyeglasses should be worn.

6. Test Conditions

6.1 Since isocyanates react with moisture, laboratory humidity should be kept low, preferably around 50 % relative humidity.

TEST METHOD A—BROOKFIELD VISCOSITY

7. Summary of Test Method

7.1 The viscosity is measured at $25 \pm 0.3^\circ\text{C}$ with a Brookfield viscometer, either Model LVF or RVF.⁵

8. Interferences

8.1 The temperature and container size are important factors in measuring Brookfield viscosity accurately. Deviation from the prescribed conditions will affect the accuracy of the results.

9. Apparatus

9.1 *Brookfield Synchro-lectric Viscometers*⁵, Model LVF with speeds of 60, 30, 12, and 6 r/min, or Model RVF with speeds of 20, 10, 4, and 2 r/min, are to be used. The instrument should be calibrated periodically with Brookfield Engineering Laboratories 10-cP or 100-cP Viscosity Standard Fluids.

9.2 *Spindle No. 1*, The No. 1 Spindles for the LVF and RVF instruments are different and, therefore, it is important to use the correct spindle type.

9.3 *Constant-Temperature Bath*, capable of maintaining a temperature of $25 \pm 0.3^\circ\text{C}$.

9.4 *Bath and Sample Thermometers*, graduated in 0.1°C subdivisions and standardized for the range of use to the nearest 0.01°C . An ASTM Saybolt Viscosity Thermometer

¹ These test methods are under the jurisdiction of ASTM Committee D-20 on Plastics and are the direct responsibility of Subcommittee D20.22 on Cellular Plastics.

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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 Brookfield Engineering Laboratories, 240 Cushing St., Stoughton, MA 02072.