Designation: D4889 – 15

Standard Test Methods for Polyurethane Raw Materials: Determination of Viscosity of Crude or Modified Isocyanates [1]

This standard is issued under the fixed designation D4889; 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 These test methods (A and B) determine the viscosity of crude or modified *iso*cyanates. They are applicable to products derived from toluene di*iso*cyanate, methylene di(phenylisocyanate), and polymeric (methylene phenylisocyanate) (see Note 1).

NOTE 1—Test method A includes a procedure for measuring dynamic viscosity using a rotational instrument. Test method B is simply a reference to a general procedure for measuring kinematic viscosity, D445.

1.2 The values stated in SI units are to be regarded as 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.* For specific hazards statement, see **Warning** at the end of 5.1.

NOTE 2—This standard is equivalent to ISO 3219 and 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

E2251 Specification for Liquid-in-Glass ASTM Thermometers with Low-Hazard Precision Liquids

2.2 *ISO Standards:*[3]

ISO 3104 Petroleum Products—Transparent and Opaque Liquids—Determination of Kinematic Viscosity and Calculation of Dynamic Viscosity

ISO 3219 Plastics—Polymers/Resins in the Liquid State or as Emulsions or Dispersions—Determination of Viscosity Using a Rotational Viscometer with Defined Shear Rate

3. Terminology

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

4. Significance and Use

4.1 These test methods can be used for research, quality control, or specification tests to characterize *iso*cyanates used in polyurethane products.

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

4.3 Some isocyanates exhibit non-Newtonian behavior under certain conditions. Whenever possible, generate results for comparison under the same conditions, that is, the same spindle/speed combination for rotational viscosity and the same tube size for kinematic viscosity.

5. Sampling

5.1 Since organic *iso*cyanates react with atmospheric moisture, take special precautions in sampling. Usual sampling methods, even when conducted rapidly, can cause contamination of the sample with insoluble urea. Therefore, blanket the sample with dry air or nitrogen at all times. (**Warning—** Di*iso*cyanates are eye, skin and respiratory irritants at concentrations above the occupational exposure limit (TLV or PEL). Di*iso*cyanates can cause skin and respiratory sensitization (asthma) in some people. Once sensitized, it is essential to limit further exposure to diisocyanates. Use a combination of engineering controls and personal protective equipment, including respiratory, skin and eye protection, to prevent overexposure to di*iso*cyanates. Consult the product suppliers' Safety Data Sheet (SDS) for more detailed information about potential health effects and other specific safety and handling instructions for the product.)

6. Test Conditions

6.1 Since isocyanates react with moisture, keep laboratory humidity low, preferably about 50 % relative humidity. See Warning in 5.1.

[1] These test methods are under the jurisdiction of ASTM Committee D20 on Plastics and are 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.

***A Summary of Changes section appears at the end of this standard**