



Standard Test Method for Apparent Viscosity of Adhesives Having Shear-Rate- Dependent Flow Properties¹

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1. Scope

1.1 This test method covers the measurement of the apparent viscosity of shear-rate-dependent adhesives.

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.*

2. Referenced Documents

- 2.1 *ASTM Standards:*
D 907 Terminology of Adhesives²

3. Terminology

3.1 *Definitions:* Many terms in this test method are defined in Terminology D 907.

3.1.1 *Newtonian behavior, n* —the property of a liquid in which its viscosity is constant over a stated range of strain rates. (Compare *non-Newtonian behavior*.)

3.1.2 *non-Newtonian behavior, n* —the property of a liquid in which its viscosity is not constant over a stated range of strain rates.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *apparent viscosity, n* —resistance to shear at a given rate of shear, expressed as viscosity in absolute units.

4. Significance and Use

4.1 The principle of measurement is based upon a reversible isothermal change in apparent viscosity with change in rate of shear.

4.2 Measurement is performed with a spindle, disk, T-bar, or coaxial cylinder rotational viscometer under standardized conditions with rigid control of the time intervals of measurement. Readings are obtained on the viscometer dial scale at the end of 1 min for each rotational speed. Changes from the lowest speed to the highest speed, and return to the lowest speed, are made without stopping the instrument.

5. Apparatus

5.1 *Viscometer*—The apparatus consists of a spindle,³ disk,³ T-bar,³ or coaxial-type⁴ viscometer with appropriate spindles, disks, T-bars, or cylinders. Do not use a scored, warped, or otherwise damaged spindle, disk, T-bar, or cylinder. Except when using the coaxial cylinder-type viscometer, the size of container to be used is determined by mutual agreement. Some instruments have two concentric scales, and care is to be taken to read the pointer on the correct scale.

5.2 *Supporting Stand*⁵—Use a support for the viscometer which consists of a suitable stand with a supporting arm capable of being lowered or raised either manually or mechanically.

5.3 *Thermometer*— Use a precision thermometer, with graduations not greater than 0.2°C (0.5°F), for temperature measurements.

6. Conditioning

6.1 Condition the adhesive sample and instrument at $23 \pm 0.5^\circ\text{C}$ ($73.4 \pm 1.0^\circ\text{F}$) (or other temperature agreed upon between the adhesive vendor and the purchaser) at least 16 h. If special conditioning methods are necessary, such as the use of a circulating water bath, they shall be noted in the report, see 8.1.4.

7. Procedure

7.1 Select a viscometer and spindle (see Table X1.1), disk, T-bar, or cylinder suited to the viscosity range of the material such that the model-speed-rotational element combination will give dial readings between 20 and 80 % of the full-scale reading. Firmly fit the rotational element into the shaft extension which goes down through the center of the dial casing. Place the viscometer on the supporting stand so that the rotational element is vertical. Slowly immerse the rotational element in the sample to the depth recommended by the

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² *Annual Book of ASTM Standards*, Vol 15.06.

³ The Brookfield Synchro-Lectric Viscometers, Models LV, RV, or HV have been found satisfactory for this purpose and are available from the Brookfield Engineering Laboratories, Stoughton, MA.

⁴ The Ferranti Portable Viscometers, Models VL, VM, or VH have been found satisfactory for this test method and are available from Ferranti Electric Inc., Plainview, Long Island, NY.

⁵ The Brookfield Helipath Stand or other commercially available stands may be used.