



Standard Test Method for Apparent Viscosity of Hot Melt Adhesives and Coating Materials¹

This standard is issued under the fixed designation D3236; 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 This test method covers the determination of the apparent viscosity of hot melt adhesives and coating materials compounded with additives and having apparent viscosities up to 200 000 millipascal second (mPa·s) (Note 3) at temperatures up to 175°C (347°F).

NOTE 1—Although precision has not been studied, this procedure may be adaptable to viscosities higher than the present 200 000-mPa·s limit and temperatures above 175°C (347°F). Equipment described in this test method permits testing of materials having viscosities as high as 16×10^6 mPa·s and provides temperatures up to 260°C (500°F).

NOTE 2—For petroleum waxes and their blends having apparent viscosities below 15 mPa·s, Test Method D445 is especially applicable.

NOTE 3—One pascal second (Pa·s) = 1000 centipoise (CP); one millipascal second = one centipoise.

1.2 The values stated in SI units are to be regarded as the standard. The values in parentheses are for information only.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*²

D445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)

3. Terminology

3.1 Definitions:

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.10.0A on Physical/Chemical Properties.

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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.

3.1.1 *apparent viscosity*—the viscosity determined by this test method and expressed in millipascal seconds. Its value may vary with the spindle and rotational speed selected because many hot melts are non-Newtonian.

3.1.2 *viscosity*—the ratio of shear stress to shear rate. The viscosity of a liquid is a measure of the internal friction of the liquid in motion. The unit of dynamic viscosity is the pascal second. For a Newtonian liquid, the viscosity is constant at all shear rates. For a non-Newtonian liquid, viscosity will vary depending on shear rate.

4. Summary of Test Method

4.1 A representative sample of the molten material to be tested is maintained in a thermally controlled sample chamber. Apparent viscosity is determined under temperature equilibrium conditions using a precision rotating spindle type viscometer. Data obtained at several temperatures can be plotted on appropriate semi-logarithmic graph paper and apparent viscosity at intermediate temperatures can be estimated.

5. Significance and Use

5.1 This test method distinguishes between hot melts having different apparent viscosities. It is believed that apparent viscosity determined by this procedure is related to flow performance in application machinery operating under conditions of low shear rate. Apparent viscosity as determined by this test method may not correlate well with end-use applications where high shear rates are encountered.

5.2 Materials of the type described in this procedure may be quite non-Newtonian and as such, the apparent viscosity will be a function of shear rate under the conditions of test. Although the viscometer described in this test method generally operates under conditions of relatively low shear rate, differences in shear effect can exist depending upon the spindle and rotational speed conditions selected for the test program. Maximum correlation between laboratories, therefore, depends upon testing under conditions of equivalent shear.

5.3 Approximate shear rates using various spindles are shown in Table A1.1.