



# Standard Test Method for Low-Temperature Viscosity of Lubricants Measured by Brookfield Viscometer<sup>1, 2</sup>

This standard is issued under the fixed designation D2983; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

## 1. Scope

1.1 This test method covers the use of Brookfield viscometers of appropriate torque for the determination of the low-shear-rate viscosity of lubricants. The test is applied over the viscosity range of 500 to 900 000 mPa·s within a low temperature range appropriate to the capacity of the viscometer head.<sup>3</sup>

1.2 The range of viscosity used to generate the precision data for this test method was from 1000 to 900 000 mPa·s. [Appendix X4](#) lists another interlaboratory study that specifically targeted hydraulic fluid ranging from 500 to 1700 mPa·s.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3.1 The test method uses the SI unit, milliPascal-second (mPa·s), as the unit of viscosity. (1 cP = 1 mPa·s).

1.4 *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*:<sup>4</sup>

[D341 Practice for Viscosity-Temperature Charts for Liquid Petroleum Products](#)

[D5133 Test Method for Low Temperature, Low Shear Rate, Viscosity/Temperature Dependence of Lubricating Oils](#)

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee [D02](#) on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee [D02.07](#) on Flow Properties.

Current edition approved Aug. 1, 2009. Published November 2009. Originally approved in 1971. Last previous edition approved in 2004 as D2983–04a. DOI: 10.1520/D2983-09.

<sup>2</sup> Brookfield viscometer and accessories are a trademark of Brookfield Engineering Laboratories, Inc., 11 Commerce Blvd., Middleboro, MA 02346, [www.brookfieldengineering.com](http://www.brookfieldengineering.com).

<sup>3</sup> Selby, T. W., "Automatic Transmission Fluid Viscosity at Low-Temperatures and Its Effect on Transmission Performance," *Transactions, Society of Automotive Engineers*, Vol. 68, 1960, pp. 457-465.

<sup>4</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[Using a Temperature-Scanning Technique](#)

[E1 Specification for ASTM Liquid-in-Glass Thermometers](#)

[2.2 European Procedure](#):<sup>5</sup>

CEC L18-A-80

## 3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *apparent viscosity*—dynamic viscosity determined by this test method. Apparent viscosity may vary with the spindle speed (shear rate) of the Brookfield viscometer if the lubricant is non-Newtonian. See [Appendix X1](#) for a brief explanation.

3.1.2 *reference viscosity*—viscosity of a Newtonian standard reference fluid specified at each of several user-specified temperatures. Reference viscosities of typical standard reference fluids are listed in [Appendix X2](#).

## 4. Summary of Test Method

4.1 An oleaginous fluid sample is preheated, allowed to stabilize at room temperature, and then poured to a predetermined depth into a glass cell and an insulated or uninsulated spindle inserted through a special stopper and suspended by a clip. The contained sample is cooled to a predetermined temperature for 16 h and analyzed by a Brookfield viscometer and, depending on the viscometer model used, the viscosity of the test fluid is read directly from the viscometer or the resultant torque reading is used to calculate the viscosity of the oil at the temperature chosen.

## 5. Significance and Use

5.1 The low-temperature, low-shear-rate viscosity of automatic transmission fluids, gear oils, torque and tractor fluids, and industrial and automotive hydraulic oils (see [Annex A4](#)) are of considerable importance to the proper operation of many mechanical devices. Measurement of the viscometric properties of these oils and fluids at low temperatures is often used to specify their acceptance for service. This test method is used in a number of specifications.

<sup>5</sup> Available from The Coordinating European Council for the Development of Performance Tests for Fuels, Lubricants and Other Fluids, Madou Plaza, 25th floor, Place Madou 1, B – 1210, Brussels, Belgium, [www.cectests.org](http://www.cectests.org).