This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

Designation: D2983 – 19ε1

Standard Test Method for Low-Temperature Viscosity of Automatic Transmission Fluids, Hydraulic Fluids, and Lubricants using a Rotational Viscometer[1]

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 (ε) indicates an editorial change since the last revision or reapproval.

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

ε1 NOTE—Formatting in Section Annex A3 was corrected editorially in October 2019.

1. Scope*

1.1 This test method covers the use of rotational viscometers with an appropriate torque range and specific spindle for the determination of the low-shear-rate viscosity of automatic transmission fluids, gear oils, hydraulic fluids, and some lubricants. This test method covers the viscosity range of 300 mPa·s to 900 000 mPa·s

1.2 This test method was previously titled "Low-Temperature Viscosity of Lubricants Measured by Brookfield Viscometer." In the lubricant industry, D2983 test results have often been referred to as "Brookfield[2] Viscosity" which implies a viscosity determined by this method.

1.3 This test method contains four procedures: Procedure A is used when only an air bath is used to cool samples in preparation for viscosity measurement. Procedure B is used when a mechanically refrigerated programmable liquid bath is used to cool samples in preparation for viscosity measurement. Procedure C is used when a mechanically refrigerated constant temperature liquid bath is used to cool samples by means of a simulated air cell (SimAir)[3] Cell in preparation for viscosity measurement. Procedure D automates the determination of low temperature, low-shear-rate viscosity by utilizing a thermoelectrically heated and cooled temperature-controlled sample chamber along with a programmable rotational viscometer.

1.4 There are multiple precision studies for this test method.

1.4.1 The viscosity data used for the precision studies for Procedures A, B, and C covered a range from 300 mPa·s to 170 000 mPa·s at test temperatures of –12 °C, –26 °C, and –40 °C. Appendix X5 includes precision data for –55 °C test temperature and includes samples with viscosities greater 500 000 mPa·s.

1.4.2 The viscosity data used for Procedure D precision study was from 6400 mPa·s to 256 000 mPa·s at test temperatures of –26 °C and –40 °C.

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

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

1.6 **WARNING**—Mercury has been designated by many regulatory agencies as a hazardous substance that can cause serious medical issues. Mercury, or its vapor, has been demonstrated to be hazardous to health and corrosive to materials. Use Caution when handling mercury and mercury-containing products. See the applicable product Safety Data Sheet (SDS) for additional information. The potential exists that selling mercury or mercury-containing products, or both, is prohibited by local or national law. Users must determine legality of sales in their location.

1.7 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

[1] This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.07 on Flow Properties.

Current edition approved June 15, 2019. Published July 2019. Originally approved in 1971. Last previous edition approved in 2017 as D2983 – 17. DOI: 10.1520/D2983-19E01.

[2] Brookfield viscometer and accessories are a trademark of AMETEK Brookfield, Inc, 11 Commerce Blvd., Middleboro, MA 02346, http://www.brookfieldengineering.com.

[3] SimAir is a trademark of Tannas Co., 4800 James Savage Rd., Midland, MI 48642, http://www.savantgroup.com.

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

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