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: D4683 – 17

Standard Test Method for Measuring Viscosity of New and Used Engine Oils at High Shear Rate and High Temperature by Tapered Bearing Simulator Viscometer at 150 °C[1]

This standard is issued under the fixed designation D4683; 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.

1. Scope*

1.1 This test method covers the laboratory determination of the viscosity of engine oils at 150 °C and $1.0 \cdot 10^6$ s^{-1} using a viscometer having a slightly tapered rotor and stator called the Tapered Bearing Simulator (TBS) Viscometer.[2]

1.2 The Newtonian calibration oils used to establish this test method range from approximately 1.2 mPa·s to 7.7 mPa·s at 150 °C. The precision has only been determined for the viscosity range 1.47 mPa·s to 5.09 mPa·s at 150 °C for the materials listed in the precision section.

1.3 The non-Newtonian reference oil used to establish the shear rate of $1.0 \cdot 10^6$ s^{-1} for this test method has a viscosity closely held to 3.55 mPa·s at 150 °C by using the absolute viscometry of the TBS.

1.4 Manual, semi-automated, and fully automated TBS viscometers were used in developing the precision statement for this test method.

1.5 Application to petroleum products such as base oils and formulated engine oils was determined in preparing the viscometric information for this test method.

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

1.6.1 This test method uses the milliPascal·second (mPa·s) as the unit of viscosity. This unit is equivalent to the centipoise (cP).

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

2. Referenced Documents

2.1 *ASTM Standards:*[3]

D4741 Test Method for Measuring Viscosity at High Temperature and High Shear Rate by Tapered-Plug Viscometer

D5481 Test Method for Measuring Apparent Viscosity at High-Temperature and High-Shear Rate by Multicell Capillary Viscometer

D6300 Practice for Determination of Precision and Bias Data for Use in Test Methods for Petroleum Products and Lubricants

D6708 Practice for Statistical Assessment and Improvement of Expected Agreement Between Two Test Methods that Purport to Measure the Same Property of a Material

2.2 *Coordinating European Council (CEC) Standard:*[4,5]

CEC L-36-90 The Measurement of Lubricant Dynamic Viscosity under Conditions of High Shear

2.3 *Energy Institute Standard:*[6,5]

IP 370 Test Method for the Measurement of Lubricant Dynamic Viscosity Under Conditions of High Shear Using the Ravenfield Viscometer

3. Terminology

3.1 *Definitions:*

[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.

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[2] The sole source of supply of the apparatus known to the committee at this time is Tannas Co., 4800 James Savage Rd., Midland, MI 48642. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,[1] which you may attend.

[3] 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.

[4] Available from Coordinating European Council (CEC), Services provided by Kellen Europe, Avenue Jules Bordet 142 - 1140, Brussels, Belgium, http://www.cectests.org.

[5] This test method is technically identical to that described in CEC L-36 (under the jurisdiction of the CEC Engine Lubricants Technical Committee) and IP 370 references CEC L-036.

[6] Available from Energy Institute, 61 New Cavendish St., London, W1G 7AR, U.K., http://www.energyinst.org.

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

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