Designation: D6080 – 12a

Standard Practice for Defining the Viscosity Characteristics of Hydraulic Fluids[1]

This standard is issued under the fixed designation D6080; 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 practice covers all hydraulic fluids based either on petroleum, synthetic, or naturally-occurring base stocks. It is not intended for water-containing hydraulic fluids.

1.2 For determination of viscosities at low temperature, this practice uses millipascal·second (mPa·s) as the unit of viscosity. For reference, 1 mPa·s is equivalent to 1 centipoise (cP). For determination of viscosities at high temperature, this practice uses millimetre squared per second (mm^2/s) as the unit of kinematic viscosity. For reference, 1 mm^2/s is equivalent to 1 centistoke (cSt).

1.3 This practice is applicable to fluids ranging in kinematic viscosity from about 4 to 150 mm^2/s as measured at a reference temperature of 40°C and to temperatures from −50 to +16°C for a fluid viscosity of 750 mPa·s.

NOTE 1—Fluids of lesser or greater viscosity than the range described in 1.3 are seldom used as hydraulic fluids. Any mathematical extrapolation of the system to either higher or lower viscosity grades may not be appropriate. Any need to expand the system should be evaluated on its own merit.

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

2. Referenced Documents

2.1 *ASTM Standards:*[2]

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

D2270 Practice for Calculating Viscosity Index from Kinematic Viscosity at 40 and 100°C

D2422 Classification of Industrial Fluid Lubricants by Viscosity System

D2983 Test Method for Low-Temperature Viscosity of Lubricants Measured by Brookfield Viscometer

D5621 Test Method for Sonic Shear Stability of Hydraulic Fluids

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

2.2 *Society of Automotive Engineers (SAE) Standards:*[3]

J300 Engine Oil Viscosity Classification

J306 Axle and Manual Transmission Lubricant Viscosity Classification

3. Terminology

3.1 *Definitions:*

3.1.1 *hydraulic fluid, n*—a liquid used in hydraulic systems for lubrication and transmission of power.

3.1.2 *kinematic viscosity, n*—the ratio of the dynamic viscosity to the density of a liquid.

3.1.2.1 *Discussion*—For gravity flow under a given hydrostatic head, the pressure head of a liquid is proportional to its density. Therefore, kinematic viscosity is a measure of the resistance to flow of a liquid under gravity.

3.1.3 *Newtonian oil or fluid, n*—an oil or fluid that at a given temperature exhibits a constant viscosity at all shear rates or shear stresses.

3.1.4 *non-Newtonian oil or fluid, n*—an oil or fluid that at a given temperature exhibits a viscosity that varies with changing shear stress or shear rate.

3.1.5 *shear degradation, n*—the decrease in molecular weight of a polymeric thickener (VI improver) as a result of exposure to high shear stress.

3.1.6 *shear rate, n*—the velocity gradient in fluid flow.

3.1.7 *shear stability, n*—the resistance of a polymer-thickened fluid to shear degradation.

3.1.8 *shear stress, n*—the motivating force per unit area for fluid flow.

3.1.9 *viscosity, n*—the ratio between the applied shear stress and the rate of shear.

[1] This practice is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.N0.10 on Specifications.

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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] Available from Society of Automotive Engineers (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001, http://www.sae.org.

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

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