



Designation: D5621 – 20

# Standard Test Method for Sonic Shear Stability of Hydraulic Fluids<sup>1</sup>

This standard is issued under the fixed designation D5621; 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.

## 1. Scope\*

1.1 This test method covers the evaluation of the shear stability of hydraulic fluids in terms of the final viscosity that results from irradiating a sample of the hydraulic fluid in a sonic oscillator.

1.2 Evidence has been presented that a good correlation exists between the shear degradation that results from sonic oscillation and that obtained in a vane pump test procedure.<sup>2</sup>

1.3 This test method uses millimetres squared per second ( $\text{mm}^2/\text{s}$ ), an SI unit, as the unit of viscosity. For information, the equivalent unit, cSt, is shown in parentheses.

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

1.5 *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.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>3</sup>

[D445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids \(and Calculation of Dynamic Viscosity\)](#)

[D2603 Test Method for Sonic Shear Stability of Polymer-Containing Oils](#)

<sup>1</sup> 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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<sup>2</sup> Stambaugh, R. L., Kopko, R. J., and Roland, T. F., "Hydraulic Pump Performance—A Basis for Fluid Viscosity Classification," SAE Paper No. 901633. Available from Society of Automotive Engineers, 400 Commonwealth Dr., Warrendale, PA 15096.

<sup>3</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.

[D6022 Practice for Calculation of Permanent Shear Stability Index](#)

[D7042 Test Method for Dynamic Viscosity and Density of Liquids by Stabinger Viscometer \(and the Calculation of Kinematic Viscosity\)](#)

## 3. Summary of Test Method

3.1 A convenient volume of hydraulic fluid is irradiated in a sonic oscillator for a period of time and the viscosities before and after irradiation are determined by Test Method [D445](#) and [D7042](#). A standard reference fluid containing a readily sheared polymer is run frequently to ensure that the equipment imparts a controlled amount of sonic energy to the sample.

3.2 The conditions to obtain the data for the precision statement were: 30 mL sample, 12.5 min calibration, and 40 min sample irradiation at 0 °C jacket temperature.

## 4. Significance and Use

4.1 This test method was developed using Test Method [D2603](#)–91.

4.2 This test method permits the evaluation of shear stability with minimum interference from thermal and oxidative factors that may be present in some applications. It has been found applicable to fluids containing both readily sheared and shear-resistant polymers. Correlation with performance in the case of hydraulic applications has been established.

## 5. Apparatus

5.1 *Sonic Shear Unit*, fixed frequency oscillator and sonic horn.

5.2 *Auxiliary Equipment*—To facilitate uniform performance, the following auxiliary equipment is recommended:

5.2.1 *Cooling Bath or Ice Bath*, to maintain a jacket temperature of 0 °C.

5.2.2 *Griffin 50 mL Beaker*, borosilicate glass.

5.2.3 *Sonic-Insulated Box*, to enclose the sonic horn to reduce the ambient noise level produced by the sonic shear unit.

5.3 *Viscometer*—Any viscometer and bath meeting the requirements for determining kinematic viscosity: Test Method [D445](#) or [D7042](#). Whichever method is chosen, that same

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