



Standard Test Method for Shear Stability of Polymer Containing Fluids Using a European Diesel Injector Apparatus¹

This standard is issued under the fixed designation D 6278; 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 test method covers the evaluation of the shear stability of polymer-containing fluids. The test method measures the percent viscosity loss at 100°C of polymer-containing fluids when evaluated by a diesel injector apparatus procedure that uses European diesel injector test equipment. The viscosity loss reflects polymer degradation due to shear at the nozzle.

NOTE 1—Test Method D 2603 has been used for similar evaluation of shear stability; limitations are as indicated in the significance statement. No detailed attempt has been undertaken to correlate the results of this test method with those of the sonic shear test method.

NOTE 2—This test method uses test apparatus as defined in CEC L-14-A-93. This test method differs from CEC-L-14-A-93 in the period of time required for calibration.

NOTE 3—Test Method D 5275 also shears oils in a diesel injector apparatus but may give different results.

NOTE 4—This test method has different calibration and operational requirements than Test Method D 3945.

1.2 *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.* Specific precautionary statements are given in Section 8.

2. Referenced Documents

2.1 ASTM Standards:

D 445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)²

D 2603 Test Method for Sonic Shear Stability of Polymer-Containing Oils²

D 3945 Test Method for Shear Stability of Polymer-Containing Fluids Using a Diesel Injector Nozzle³

D 5275 Test Method for Fuel Injector Shear Stability Test (FISST) for Polymer Containing Fluids³

¹ 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.

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² *Annual Book of ASTM Standards*, Vol 05.01.

³ *Annual Book of ASTM Standards*, Vol 05.02.

D 6299 Practice for Applying Statistical Quality Assurance Techniques to Evaluate Analytical Measurement System Performance⁴

2.2 *Coordination European Council (CEC) Standard:*
CEC L-14-A-93 Evaluation of the Mechanical Shear Stability of Lubricating Oils Containing Polymers⁵

3. Terminology

3.1 Definitions:

3.1.1 *kinematic viscosity, n* —a measure of the resistance to flow of a fluid under gravity.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *calibration pressure, n* —the recorded gage pressure when calibration fluid RL 34 undergoes a viscosity loss of 2.75 to 2.85 mm²/s when the recorded gage pressure is within the range of 13.0 to 18.0 MPa.

3.2.2 *viscosity loss, n* —the loss in viscosity determined from the difference in kinematic viscosity at 100°C of pre-sheared and post-sheared fluid.

3.2.3 *percent viscosity loss, n* —viscosity loss, as defined in 3.2.2, divided by the pre-sheared viscosity, and reported as a percent.

4. Summary of Test Method

4.1 A polymer-containing fluid is passed through a diesel injector nozzle at a shear rate that causes polymer molecules to degrade. The resultant degradation reduces the kinematic viscosity of the fluid under test. The percent viscosity loss is a measure of the mechanical shear stability of the polymer-containing fluid.

5. Significance and Use

5.1 This test method evaluates the percent viscosity loss for polymer-containing fluids resulting from polymer degradation in the high shear nozzle device. Thermal or oxidative effects are minimized.

5.2 This test method is used for quality control purposes by manufacturers of polymeric lubricant additives and their customers.

⁴ *Annual Book of ASTM Standards*, Vol 05.03.

⁵ Available from CEC Secretariat, Madou Plaza, 25th floor, Place Madou 1, B-1210 Brussels, Belgium.

