



Designation: D7109 – 18

Standard Test Method for Shear Stability of Polymer-Containing Fluids Using a European Diesel Injector Apparatus at 30 Cycles and 90 Cycles¹

This standard is issued under the fixed designation D7109; 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 viscosity loss, in mm^2/s and percent, 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. Viscosity loss is evaluated after both 30 cycles and 90 cycles of shearing.

NOTE 1—This test method evaluates the shear stability of oils after both 30 cycles and 90 cycles of shearing. For most oils, there is a correlation between results after 30 cycles and results after 90 cycles of shearing, but this is not universal.

NOTE 2—Test Method D6278 uses essentially the same procedure with 30 cycles only instead of both 30 cycles and 90 cycles. The correlation between results from this test method at 30 cycles and results from Test Method D6278 has not been established.

NOTE 3—Test Method D2603 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 4—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 5—Test Method D5275 also shears oils in a diesel injector apparatus but may give different results.

NOTE 6—This test method has different calibration and operational requirements than withdrawn Test Method D3945.

1.2 The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered standard.

1.3 *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.* Specific warning statements are given in Section 8.

1.4 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:²

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

D5275 Test Method for Fuel Injector Shear Stability Test (FISST) for Polymer Containing Fluids

D6278 Test Method for Shear Stability of Polymer Containing Fluids Using a European Diesel Injector Apparatus

D6299 Practice for Applying Statistical Quality Assurance and Control Charting Techniques to Evaluate Analytical Measurement System Performance

2.2 Coordinated European Council (CEC) Standard:

CEC L-14-A-93 Evaluation of the Mechanical Shear Stability of Lubricating Oils Containing Polymers³

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 gauge pressure when calibration fluid RL233 undergoes a viscosity loss of $2.70 \text{ mm}^2/\text{s}$ to $2.90 \text{ mm}^2/\text{s}$ when the recorded gauge pressure is within the range of 13.0 MPa to 18.0 MPa.

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 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 CEC Secretariat, Interlynk Administrative Services, Ltd., Lynk House, 17 Peckleton Lane, Desford, Leicestershire, LE9 9JU, United Kingdom.

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