



Standard Test Method for Fuel Injector Shear Stability Test (FISST) for Polymer Containing Fluids¹

This standard is issued under the fixed designation D5275; 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 measures the percent viscosity loss at 100°C of polymer-containing fluids using fuel injector shear stability test (FISST) equipment. The viscosity loss reflects polymer degradation due to shear at the nozzle.

NOTE 1—Test Method D2603 has been used for similar evaluation of this property. It has many of the same limitations as indicated in the significance statement. No detailed attempt has been undertaken to correlate the results by the sonic and the diesel injector methods. Equipment and replacement parts are no longer available for Test Method D2603 as it is currently written. The test method is currently under revision.

NOTE 2—This test method was originally published as Procedure B of Test Methods D3945. The FISST method was made a separate test method after tests of a series of polymer-containing fluids showed that Procedures A and B of Test Methods D3945 often give different results.

1.2 The values given in SI units are to be regarded as the standard. The inch-pound units given in parentheses are for information only.

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 and health practices and determine the applicability of regulatory limitations prior to use.* Specific precautionary statements are given in Section 7.

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

D3945 Test Methods for Shear Stability of Polymer-

Containing Fluids Using a Diesel Injector Nozzle³

3. Summary of Test Method

3.1 The polymer-containing fluid is passed through a diesel injector nozzle at a shear rate that causes the less shear stable polymer molecules to degrade. The resultant degradation reduces the kinematic viscosity of the fluid under test. The reduction in kinematic viscosity, reported as percent loss of the initial kinematic viscosity, is a measure of the shear stability of the polymer-containing fluid.

4. Significance and Use

4.1 This test method evaluates the percent viscosity loss for polymer-containing fluids resulting from polymer degradation in the high shear nozzle device. Minimum interference from thermal or oxidative effects are anticipated.

4.2 This test method is not intended to predict viscosity loss in field service for different polymer classes or for different field equipment. Some correlation for a specific polymer type in specific field equipment can be possible.

5. Apparatus

5.1 The apparatus consists of two fluid reservoirs, a single-plunger diesel fuel injection pump with an electric motor drive, a pintle-type fuel injection nozzle installed in a nozzle holder, and instrumentation for automatic operation. Annex A1 contains a more complete description of the apparatus.^{4,5}

6. Reference Fluids

6.1 Diesel fuel is required for adjusting the nozzle valve assembly to the prescribed valve opening pressure.

6.2 Calibration fluid TL-11074^{5,6} is used to verify that the shearing severity of the apparatus is within the prescribed limits.

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 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 Withdrawn.

⁴ The sole source of supply of the entire apparatus and spare parts (injectors) known to the committee at this time is Falex Corporation, 1020 Airpark Dr., Sugar Grove, IL 60554.

⁵ 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 committee¹, which you may attend.

⁶ 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.

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