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Designation: D 6892 – 03

An American National Standard

Standard Test Method for Pour Point of Petroleum Products (Robotic Tilt Method)[1]

This standard is issued under the fixed designation D 6892; 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 determination of the pour point of petroleum products by an automatic instrument that tilts the test jar to detect movement of the surface of the test specimen with an optical device, after being removed from a regulated, stepped-bath cooling jacket.

1.2 This test method is designed to cover the range of temperatures from −57 to +51°C; however, the range of temperatures included in the 1998 interlaboratory test program only covered the temperature range from −51 to −11°C.

1.3 Test results from this test method can be determined at either 1 or 3°C testing intervals.

1.4 This test method is not intended for use with crude oils.

NOTE 1—The applicability of this test method on residual fuel samples has not been verified. For further information on the applicability, refer to 13.4.

1.5 The values stated in SI units are regarded as standard.

1.6 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 97 Test Method for Pour Point of Petroleum Products[2]

D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products[3]

D 4177 Practice for Automatic Sampling of Petroleum and Petroleum Products[3]

2.2 *IP Standard:*

IP 15 Test Method for Pour Point of Petroleum Products[4]

3. Terminology

3.1 *Definitions:*

3.1.1 *pour point*, *n—in petroleum products*, the lowest temperature at which movement of the test specimen is observed under prescribed conditions of test.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *no-flow point*, *n—in petroleum products*, the temperature of the test specimen at which a wax crystal structure or viscosity increase, or both, impedes movement of the surface of the test specimen under the conditions of the test.

3.2.1.1 *Discussion*—The no-flow point occurs when, upon cooling, the formation of wax crystal structures or viscosity increase, or both, has progressed to the point where the applied observation device no longer detects movement under the conditions of the test. The preceding observation temperature at which flow of the test specimen is last observed is the pour point.

3.2.2 *tilting*, *vt*—technique of movement where the test jar in a vertical position is moved towards a horizontal position to induce specimen movement.

3.2.2.1 *Discussion*—When the test jar is tilted and held in a horizontal position for 5 s without detection of movement of the surface of the specimen, this is the no-flow point and the test is complete.

4. Summary of Test Method

4.1 After insertion of the specimen into the automatic pour point apparatus and initiation of the testing program, the specimen is heated and then cooled according to a prescribed profile. The specimen surface is examined periodically for movement using an optical camera system mounted on top of the specimen test jar, while tilting the specimen test jar. The test jar is removed from the jacketed cooling chamber prior to each examination. The lowest temperature, when movement of the surface of the specimen is detected, is recorded as the pour point determined by this Test Method D 6892.

5. Significance and Use

5.1 The pour point of a petroleum product is an index of the lowest temperature of its utility for certain applications. Flow characteristics, such as pour point, can be critical for the correct operation of lubricating systems, fuel systems, and pipeline operations.

5.2 Petroleum blending operations require precise measurement of the pour point.

[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.

[4] Available from Institute of Petroleum (IP), 61 New Cavendish St., London, WIG 7AR, U.K.

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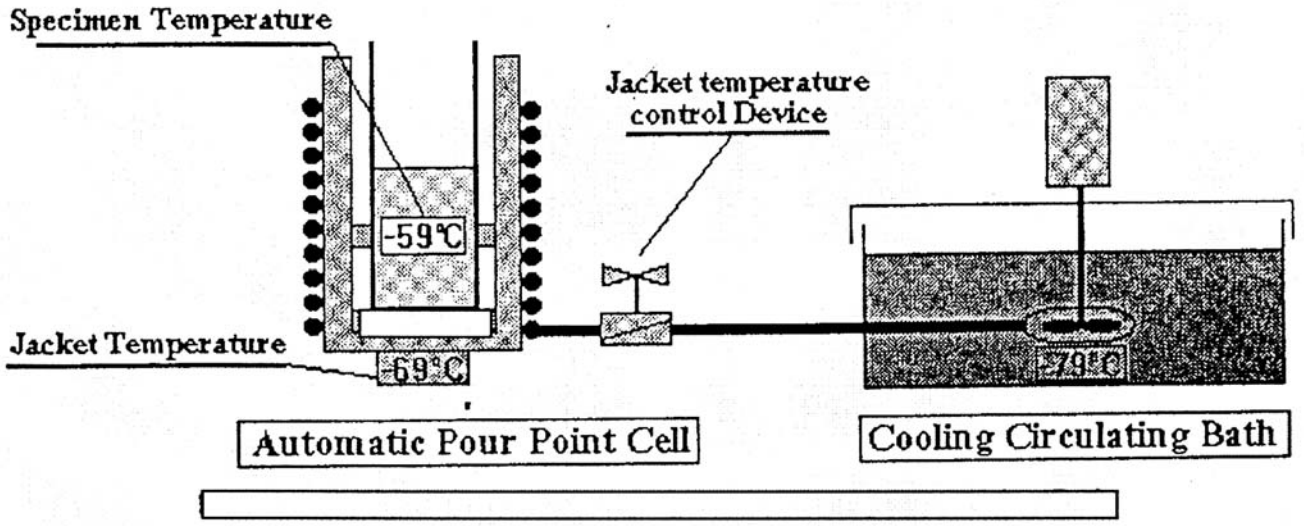

FIG. 1 Schematic of Cooling/Heating Block and Cooling Circulating Bath

5.3 Test results from this test method can be determined at either 1 or 3°C intervals.

5.4 This test method yields a pour point in a format similar to Test Method D 97 or IP 15, when the 3°C interval results are reported.

NOTE 2—Since some users may wish to report their results in a format similar to Test Method D 97 or IP 15 (in 3°C intervals) the precision data were derived for the 3°C intervals. For statements on bias relative to Test Method D 97 or IP 15, see the research report.

5.5 This test method has comparable repeatability and better reproducibility relative to Test Method D 97 or IP 15 as measured in the 1998 interlaboratory program.[5]

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6. Apparatus

6.1 *Automatic Apparatus*[6]—The automatic pour point apparatus described in this test method (see Fig. 2) consists of a microprocessor controlled measuring unit that is capable of heating the specimen to programmed temperatures, cooling the specimen according to programmed cooling profiles, mechanically manipulating the test jar according to the programmed test procedure, while optically observing the surface of the specimen for movement, using a camera system mounted on top of the specimen test jar and recording the temperature of the specimen. The apparatus shall be equipped with a user interface, cooling/heating block assembly with cylindrical jacket with an inside diameter of 44.2 to 45.8 mm, and about 115 mm in depth to accept the test jar) robotic mechanisms for lifting, tilting, replacing the test jar, optical camera system, and a temperature measuring device.

FIG. 2 Picture of Apparatus

6.2 *Test Jar*—Clear, cylindrical glass, flat bottom (darkened), 31.5 ± 0.5 mm inside diameter and 120 ± 2 mm height with a wall thickness of 1.25 ± 0.25 mm. The jar shall be marked with a line to indicate sample filling height corresponding to 45 ± 0.5 mL.

6.3 *Temperature Probe*—Capable of measurement from +70 to −80°C with a resolution of 0.1°C. The temperature probe shall be suspended in the center axis of the test jar and the top of the temperature sensing zone immersed below the surface of the specimen.

6.4 *Circulating Bath*—Refrigeration unit, equipped with a circulating pump, capable of maintaining the liquid cooling medium at a temperature at least 20°C lower than the lowest expected pour point to be measured. The circulating bath is

[5] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR: D02-1499.

[6] The sole source of supply of the Herzog Model MP 852 or HCP 852 known to the committee at this time is Walter Herzog, Lauda, Germany. 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 committee,[1] which you may attend.