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An American National Standard

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Standard Test Method for Hydrolytic Stability of Hydraulic Fluids (Beverage Bottle Method)[1]

This standard is issued under the fixed designation D 2619; 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[2] covers the determination of the hydrolytic stability of petroleum or synthetic-base hydraulic fluids.

NOTE 1—Water-base or water-emulsion fluids can be evaluated by this test method but are run "as is." Additional water is not added to the 100-g sample.

1.2 The values stated in SI units are to be regarded as the standard. The inch-pound units given in parentheses are provided 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 hazard statements are given in Note 2, Note 3, Note 4, Note 5 and Annex A1.

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)[3]

D 974 Test Method for Acid and Base Number by Color-Indicator Titration[3]

3. Summary of Test Method

3.1 The sample of 75 g of fluid plus 25 g of water and a copper test specimen are sealed in a pressure-type beverage bottle. The bottle is rotated, end for end, for 48 h in an oven at 93°C (200°F). Layers are separated, and insolubles are weighed. Weight change of copper is measured. Viscosity and acid number changes of fluid and acidity of water layer are determined.

NOTE 2—**Precaution:** In addition to other precautions, because this test method involves the use of a glass bottle that may contain approximately 200 kPa (2 atm) of air and water vapor at temperatures up to 93°C, a full face shield and heavy woven fabric gloves should be worn when handling or working with the heated and sealed sample container.

4. Significance and Use

4.1 This method differentiates the relative stability of hydraulic fluids in the presence of water under the conditions of the test. Hydrolytically unstable hydraulic fluids form acidic and insoluble contaminants which can cause hydraulic system malfunctions due to corrosion, valve sticking, or change in viscosity of the fluid. The degree of correlation between this test and service performance has not been fully determined.

5. Apparatus

5.1 *Air Oven*, convection, adjusted to 93 ± 0.5°C (200 ± 1°F).[4]

5.2 *Pressure-Type Beverage Bottles*,[5] 200 mL (7-oz).

5.3 *Capping Press*, for bottles.

5.4 *Rotating Mechanism*, for holding bottles and rotating end over end at 5 rpm in oven.

5.5 *Centrifuge*, 1500 rpm.

5.6 *Centrifuge Tubes*, cone-shaped, 100-mL.

5.7 *Filtration Assembly*,[6] stainless screen/glass, membrane type 47-mm diameter.

5.8 *Typewriter Brush*.

5.9 *Separatory Funnel*, 125-mL.

5.10 *Microscope*, for 20× magnification.

5.11 *Balance*, sensitive to 0.2 mg.

5.12 *Caps*, for sealing bottles.

5.13 *Inert Seal*,[7] for cap gasket.

5.14 *Membrane Type Filter*,[8] cellulosic, 5-µm porosity, 47-mm diameter.

6. Reagents and Materials

6.1 *n-Heptane*.

[1] This test method is under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricantsand is the direct responsibility of Subcommittee D02.N0.08on Stability.

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[2] This test method is a modification of Federal Test Method Standard No. 791a, Method 3457 for Hydrolytic Stability.

[3] *Annual Book of ASTM Standards*, Vol 05.01.

[4] An acceptable commercial unit is available from Falex Corp. 1020 Airpark Dr., Sugar Grove, IL 60554.

[5] A 200-mL (7-oz) glass Coca Cola® bottle has proven satisfactory. Bottles can be obtained from beverage distributors.

[6] A Millipore XX10 047 30 or equivalent has proven satisfactory.

[7] A 0.127-mm (0.005-in.) thick fluorocarbon seal has proven satisfactory.

[8] A Millipore SMWP 04700 or (5.0-µm porosity) or equivalent has proven satisfactory. If there is a test fluid filter material incompatibility a fluorocarbon membrane may be used. A Millipore FSLW 04700 (3.0-µm or equivalent porosity) has proven satisfactory for example with phosphate ester fluids.