



Standard Test Method for Oxidation Characteristics of Extreme-Pressure Lubrication Oils¹

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1. Scope

1.1 This test method covers determination of the oxidation characteristics of extreme-pressure fluid lubricants, gear oils, or mineral oils.

NOTE 1—The changes in the lubricant resulting from this test method are not always necessarily associated with oxidation of the lubricant. Some changes may be due to thermal degradation.

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.*

2. Referenced Documents

2.1 ASTM Standards:

D 91 Test Method for Precipitation Number of Lubricating Oils²

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

E 1 Specification for ASTM Thermometers³

3. Summary of Test Method

3.1 The oil sample is subjected to a temperature of 95°C in the presence of dry air for 312 h.

3.2 The oil is then tested for precipitation number and increase in kinematic viscosity.

4. Significance and Use

4.1 This test method has been widely used to measure the oxidation stability of extreme pressure lubricating fluids, gear oils, and mineral oils.

NOTE 2—It is recognized that many of the newer extreme pressure oils cannot reasonably be evaluated by this test method. The test has also been run at 121°C, however, the precision has not been established at other than 95°C.

5. Apparatus

5.1 *Heating Bath*, thermostatically controlled, capable of maintaining the oil sample in the test tube at a temperature of $95 \pm 0.2^\circ\text{C}$, fitted with a suitable stirring device to provide a uniform temperature throughout the bath, and large enough to hold the desired number of oxidation cells immersed in the heating liquid to a depth of approximately 300 mm.

5.2 *Test Tubes* of borosilicate glass, 41 ± 0.5 mm inside diameter and 600 mm in length are required, each fitted with a slotted cork (Note 3) stopper into which shall be inserted a glass air delivery tube of 4 to 5 mm of inside diameter. The length of the air delivery tube shall be such that one end reaches to within 6 mm of the bottom of the tube and the other end projects 60 to 80 mm from the cork stopper.

NOTE 3—New corks should be used for each run.

5.3 *Flowmeter*, one to each test tube, capable of measuring an air flow of 10 L/h with an accuracy of ± 0.5 L/h.

5.4 *Thermometer*—ASTM Solvent Distillation Thermometer having a range from 76 to 126°C and conforming to the requirement for Thermometer 40C as prescribed in Specification E 1.

5.5 *Air Supply*—Oil-free, dried air at constant pressure shall be supplied to each flowmeter.

5.6 *Air Dryer*—Before being supplied to the flowmeters, the air shall be passed through a drying tower packed with indicating grade of anhydrous calcium sulfate or equivalent. The quantity of desiccant should be sufficient to last for the entire test.

6. Preparation of Apparatus

6.1 *Cleaning of Oxidation Cells*—Clean glassware with a suitable cleaning solution.

NOTE 4—While other suitable cleaning solutions are now available, the round robin used glassware cleaned with chromic acid. (**Warning**—Causes severe burns. A recognized carcinogen. Strong oxidizer, contact

¹ This test method is under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.09 on Oxidation.

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

³ *Annual Book of ASTM Standards*, Vol 14.03.