



Standard Test Method for Semiquantitative Micro Determination of Acid Number of Lubricating Oils During Oxidation Testing¹

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1. Scope

1.1 This test method is a semiquantitative micro method intended for monitoring the changes in acidic constituents occurring in lubricating oils during oxidation testing, when the acid number of such oils falls within the range from 0.02 to 1.0 mg of potassium hydroxide per gram of sample. It is applicable to such oils as turbine oils, hydraulic oils, and other circulating oils.

NOTE 1—This test method is a micro version of Test Method D 974 and it produces results similar to that method.

1.2 This test method is designed for use where sample size is limited. It shall not be used as a replacement for higher precision methods such as Test Methods D 974 or D 664. It shall not be used to monitor oils in-service.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 *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 664 Test Method for Acid Number of Petroleum Products by Potentiometric Titration²
- D 943 Test Method for Oxidation Characteristics of Inhibited Mineral Oils²
- D 974 Test Method for Acid and Base Number by Color-Indicator Titration²
- D 3339 Test Method for Acid Number of Petroleum Products by Semi-Micro Color Indicator Titration³
- D 4871 Guide for Universal Oxidation/Thermal Stability Test Apparatus⁴

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 D02.06.01 on Chemical Analysis.

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² Annual Book of ASTM Standards, Vol 05.01.

³ Annual Book of ASTM Standards, Vol 05.02.

⁴ Annual Book of ASTM Standards, Vol 05.03.

3. Terminology

3.1 Definitions:

3.1.1 *acid number, n*—the quantity of base, expressed in milligrams of potassium hydroxide per gram of sample, that is required to titrate a sample to a specified endpoint.

3.1.1.1 *Discussion*—In this test method, the acid number is calculated from the number of drops required to produce a change in solution color from blue-green to orange, compared to the number of drops required to produce an identical color change using a reference standard. Because this is a direct comparison method, the acid number value can be reported in milligrams of potassium hydroxide per gram of sample.

4. Summary of Test Method

4.1 A 2.0-mL portion of the titration solution is titrated with a sample using a dropping pipet. The number of drops of sample required to turn the blue-green titration solution to a persistent orange color is noted.

4.2 A second 2.0-mL portion of the titration solution is titrated with an acid number reference solution of known acid number. The number of drops of the reference solution required to turn the blue-green titration solution to a persistent orange color is noted.

4.3 The estimated acid number of the sample is calculated using the acid number of the reference solution and the ratio of the number of drops of the reference solution required to effect the color change to the number of drops of the sample required for the same change.

5. Significance and Use

5.1 This test method provides a semiquantitative estimate of the acid number of lubricating oils obtained from laboratory oxidation tests using smaller amounts of sample than Test Methods D 974, D 664, or D 3339. It has specific application in Test Method D 943 and in Test Method D 4871. This test method, therefore, provides a means of monitoring the relative oxidation of lubricating oils by measuring changes in acid number, at different time intervals and under various oxidizing test conditions.

5.2 Since this test method is semiquantitative, each laboratory shall develop its own criteria for each oxidation test method for determining when to switch from this semiquantitative test method to a more precise test method for acid number.