Designation: D2272 – 14a

Standard Test Method for Oxidation Stability of Steam Turbine Oils by Rotating Pressure Vessel[1]

This standard is issued under the fixed designation D2272; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This test method[2] utilizes an oxygen-pressured vessel to evaluate the oxidation stability of new and in-service turbine oils having the same composition (base stock and additives) in the presence of water and a copper catalyst coil at 150°C.

1.2 Appendix X1 describes a new optional turbine oil (unused) sample nitrogen purge pretreatment procedure for determining the percent residual ratio of RPVOT value for the pretreated sample divided by RPVOT value of the new (untreated) oil, sometimes referred to as a "% RPVOT Retention." This nitrogen purge pretreatment approach was designed to detect volatile antioxidant inhibitors that are not desirable for use in high temperature gas turbines.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3.1 *Exception*—Other units are provided in parentheses (psi, grams, and inches), because they are either the industry accepted standard or the apparatus is built according the figures in this standard, or both.

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.* For specific warning statements, see 6.2, 6.4, 6.5, 6.6, and 6.10.

2. Referenced Documents

2.1 *ASTM Standards:*[3]

B1 Specification for Hard-Drawn Copper Wire

D943 Test Method for Oxidation Characteristics of Inhibited Mineral Oils

D1193 Specification for Reagent Water

D4742 Test Method for Oxidation Stability of Gasoline Automotive Engine Oils by Thin-Film Oxygen Uptake (TFOUT)

D6299 Practice for Applying Statistical Quality Assurance and Control Charting Techniques to Evaluate Analytical Measurement System Performance

2.2 *Energy Institute Standard:*[4]

IP 229 Determination of the Relative Oxidation Stability by Rotating Bomb of Mineral Turbine Oil

2.3 *ISO Standard:*[5]

ISO 3170 Petroleum Liquids—Manual Sampling

3. Summary of Test Method

3.1 The test oil, water, and copper catalyst coil, contained in a covered glass container, are placed in a vessel equipped with a pressure gauge. The vessel is charged with oxygen to a gauge pressure of 620 kPa (90 psi, 6.2 bar) (see Eq 1), placed in a constant-temperature oil bath set at 150°C or dry block taken to 150°C (Fig. 1 and Fig. 2), and rotated axially at 100 rpm at an angle of 30° from the horizontal.

3.2 The number of minutes required to reach a specific drop in gauge pressure is the oxidation stability of the test sample.

$$100 \text{ kPa} = 1.00 \text{ bar} = 14.5 \text{ psi} \quad (1)$$

[1] This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.09.0C on Oxidation of Turbine Oils.

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[2] von Fuchs, G. H., Claridge, E. L., and Zuidema, H. H., "The Rotary Bomb Oxidation Test for Inhibited Turbine Oils," *Materials Research and Standards*, MTRSA (formerly ASTM Bulletin), No. 186, December 1952, pp. 43–46; von Fuchs, G. H., "Rotary Bomb Oxidation Test," *Lubrication Engineering*, Vol 16, No.1, January 1960, pp. 22–31.

[3] 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.

[4] Available from Energy Institute, 61 New Cavendish St., London, WIG 7AR, U.K., http://www.energyinst.org.uk.

[5] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

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

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