



Standard Test Method for Oxidation Stability of Steam Turbine Oils by Rotating Pressure Vessel¹

This standard is issued under the fixed designation D 2272; 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 Department of Defense.

1. Scope

1.1 This test method² 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 The values stated in SI units are to be regarded as the standard.

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. For specific warning statements, see 6.2, 6.4, 6.5, 6.6, 6.10, and 6.11.*

2. Referenced Documents

2.1 ASTM Standards:

- B 1 Specification for Hard-Drawn Copper Wire³
- D 235 Specification for Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)⁴
- D 943 Test Method for Oxidation Characteristics of Inhibited Mineral Oils⁵
- D 1193 Specification for Reagent Water⁶
- D 2112 Test Method for Oxidation Stability of Inhibited Mineral Insulating Oil by Pressure Vessel⁷
- D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products⁸
- D 4742 Test Method for Oxidation Stability of Gasoline

Automotive Engine Oils by Thin-Film Oxygen Uptake (TFOU)⁸

2.2 British Standard:⁹

B2 2000 Part 0: Section 0.1,
IP 37C Thermometer

2.3 Institute of Petroleum Standard:¹⁰

IP 229

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 gage. The vessel is charged with oxygen to a gage pressure of 620 kPa (90 psi, 6.2 bar) (see Eq 1), placed in a constant-temperature oil bath set at 150°C, and rotated axially at 100 rpm at an angle of 30° from the horizontal. The number of minutes required to reach a specific drop in gage pressure is the oxidation stability of the test sample.

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

4. Significance and Use

4.1 The estimate of oxidation stability is useful in controlling the continuity of this property for batch acceptance of production lots having the same operation. It is not intended that this test method be a substitute for Test Method D 943 or be used to compare the service lives of new oils of different compositions.

4.2 This test method is also used to assess the remaining oxidation test life of in-service oils.

NOTE 1—A modification of the rotating vessel method has been published as Test Method D 2112, which uses a similar procedure and apparatus but a lower (140°C) bath temperature. Test Method D 2112 requires duplicate testing and Test Method D 2272 conducted duplicate testing in the past.

5. Apparatus

5.1 *Oxidation Vessel, Glass Sample Container with Four-Hole PTFE Disk, Hold-Down Spring, Catalyst-Coil, Pressure*

⁹ Available from British Standards Institute, 389 Chiswick High Rd., London, W4 4AL, United Kingdom.

¹⁰ Available from Institute of Petroleum, 61 New Cavendish St., London, W1G 7AR, United Kingdom.

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

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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 *Annual Book of ASTM Standards*, Vol 02.03.

⁴ *Annual Book of ASTM Standards*, Vol 06.04.

⁵ *Annual Book of ASTM Standards*, Vol 05.01.

⁶ *Annual Book of ASTM Standards*, Vol 11.01.

⁷ *Annual Book of ASTM Standards*, Vol 10.03.

⁸ *Annual Book of ASTM Standards*, Vol 05.02.