



Standard Test Method for Rust-Preventing Characteristics of Steam Turbine Oil in the Presence of Water (Horizontal Disk Method)¹

This standard is issued under the fixed designation D3603; 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 covers the ability of steam-turbine oils to prevent the rusting of horizontal and vertical ferrous surfaces when water becomes mixed with the oil.

1.2 The values stated in SI units are to be regarded as standard. The values given in parentheses are 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.*

2. Referenced Documents

2.1 ASTM Standards:²

A108 Specification for Steel Bar, Carbon and Alloy, Cold-Finished

A240/A240M Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

D91 Test Method for Precipitation Number of Lubricating Oils

D665 Test Method for Rust-Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water

D1193 Specification for Reagent Water

E1 Specification for ASTM Liquid-in-Glass Thermometers

E2251 Specification for Liquid-in-Glass ASTM Thermometers with Low-Hazard Precision Liquids

2.2 Other Standards:

IP 60/80 Specification for Petroleum Spirit³

SAE 30304 Steel, Corrosion-Resistant, Sheet, Strip, and Plate, 19Cr - 9.2Ni⁴

BS 970:Part 1:1983 Specification for wrought steels for mechanical and allied engineering purposes. General inspection and testing procedures and specific requirements for carbon, carbon manganese, alloy and stainless steels⁵

BS 871:1981 Specification for abrasive papers and cloths

3. Summary of Test Method

3.1 The test method involves completely immersing a horizontal steel disk and vertical steel cylinder in a stirred mixture of 275 mL of the oil under test and 25 mL of distilled water (water conforming to Specification D1193, Type II) at a temperature at 60 °C (140 °F).

3.2 The horizontal specimen allows water to puddle on the surface, and the vertical specimen is continually washed with the oil-water mixture during the test.

3.3 The test is run for 6 h and the specimens are evaluated.

4. Significance and Use

4.1 Horizontal metal surfaces, on which water droplets tend to be retained, are more prone to rusting and corrosion than vertical or sloping surfaces. This test method is therefore more discriminating than Test Method D665 (Procedure A), since it gives a separate evaluation of the oil on a horizontal and a vertical surface. The test method indicates the ability of oils to prevent rusting and corrosion of all ferrous surfaces in steam turbines under full flow and quasi-static conditions. It is used for specification of new oils.

5. Apparatus

5.1 *Oil Bath*—A thermostatically controlled liquid bath capable of maintaining a temperature in the oil sample of 60 °C $\pm$ 1 °C (140 °F $\pm$ 2 °F). The bath shall have a cover with holes to accommodate the test beakers.

NOTE 1—The bath used for Test Method D665 may be used with slight modification, that is, the centers of the beaker holes are moved from

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 D02.C0.02 on Corrosion and Water/Air Separability.

Current edition approved Dec. 1, 2014. Published February 2015. Originally approved in 1977. Last previous edition approved in 2007 as D3603 – 07. DOI: 10.1520/D3603-14.

² 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.

³ Available from Energy Institute, 61 New Cavendish St., London, W1G 7AR, U.K., <http://www.energyinst.org.uk>.

⁴ Available from SAE World Headquarters, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

⁵ BSI, British Standards, 389 Chiswick High Road, London W4 4AL, United Kingdom.

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