



Standard Test Method for Oxidation Stability of Spark Ignition Fuel—Rapid Small Scale Oxidation Test (RSSOT)¹

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1. Scope*

1.1 This laboratory test method covers the quantitative determination of the stability of spark ignition fuel, including those containing alcohols or other oxygenates, under accelerated oxidation conditions, by an automatic instrument (**Warning**—This test method is not intended for determining the stability of gasoline components, particularly those with a high percentage of low boiling unsaturated compounds, as these can cause explosive conditions with the apparatus.²)

1.2 This test method measures the induction period, under specified conditions, which can be used as an indication of the oxidation and storage stability of spark ignition fuel.

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

1.4 *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:³

[D4057 Practice for Manual Sampling of Petroleum and Petroleum Products](#)

[D4177 Practice for Automatic Sampling of Petroleum and Petroleum Products](#)

[D6300 Practice for Determination of Precision and Bias Data for Use in Test Methods for Petroleum Products and Lubricants](#)

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 D02.14 on Stability and Cleanliness of Liquid Fuels.

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² Further information can be found in the June 1978, January 1979, and June 1986 editions of the *Institute of Petroleum Review*.

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.

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *break point, n*—pressure in the test apparatus, which is 10 % below the maximum pressure of the actual test run.

3.1.2 *induction period, n*—time elapsed between starting the heating procedure of the sample vessel and the break point, measured in minutes.

4. Summary of Test Method

4.1 A 5 mL sample is introduced into a pressure vessel which is then charged with oxygen to 500 kPa at a temperature of 15 to 25°C. The test is initiated by starting the heater and heating the pressure vessel to a temperature of 140°C.

4.2 The pressure is recorded continuously until the break-point is reached. Alternatively, the test may be terminated when a predetermined minimum requirement is reached.

5. Significance and Use

5.1 The induction period may be used as an indication of the oxidation and storage stability of spark ignition fuel.

5.2 Compared to some other oxidation and storage stability test methods, this test method uses a small sample and gives a result in a short time period.

6. Apparatus

6.1 *General*—This test method uses an automatically controlled oxidation tester⁴ ([Fig. 1](#)) comprising an oxidation pressure vessel containing a test sample cup capable of being rapidly heated, fitted with a pressure sensor capable of measuring pressures up to 2000 kPa and a temperature sensor capable of reading to 0.1°C. Pressure and temperature in the oxidation vessel are recorded continuously during the test. The oxidation pressure vessel is fitted with filling and relief valves and a means of automatically releasing the pressure at the end of the test. The integrated cooling fan cools the pressure vessel

⁴ The sole source of supply of the apparatus known to the committee at this time is Anton Paar's PetroOxy apparatus, available from Anton Paar ProveTec GmbH, Ludwig-Erhard-Ring 13, 15827 Blankenfelde-Mahlow, Germany, www.anton-paar.com. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.