



Standard Test Method for Oxidation Onset Temperature of Hydrocarbons by Differential Scanning Calorimetry¹

This standard is issued under the fixed designation E 2009; 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 describes the determination of the oxidative properties of hydrocarbons by differential scanning calorimetry or pressure differential scanning calorimetry under linear heating rate conditions and is applicable to hydrocarbons, which oxidize exothermically in their analyzed form.

1.2 Computer or electronic-based instruments, techniques, or data treatment equivalent to this test method may also be used.

NOTE 1—Users of this test method are expressly advised that all such instruments or techniques may not be equivalent. It is the responsibility of the user of this standard to determine the necessary equivalency prior to use.

1.3 *Test Method A*—A differential scanning calorimeter (DSC) is used at ambient pressure, of one atmosphere of oxygen.

1.4 *Test Method B*—A pressure DSC (PDSC) is used at high pressure, for example, 3.5 MPa (500 psig) oxygen.

1.5 *Test Method C*—A differential scanning calorimeter (DSC) is used at ambient pressure of one atmosphere of air.

1.6 SI units are the standard.

1.7 *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 3350 Specification for Polyethylene Plastics Pipe and Fittings Materials²

D 3895 Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry²

¹ This test method is under the jurisdiction of ASTM Committee E37 on Thermal Measurements and is the direct responsibility of Subcommittee E37.01 on Test Methods and Recommended Practices.

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² *Annual Book of ASTM Standards*, Vol 08.02.

D 4565 Test Method for Physical Environmental Performance Properties of Insulations and Jackets for Telecommunications Wire and Cable³

D 5483 Test Method for Oxidation Induction Time of Lubricating Greases by Pressure Differential Scanning Calorimetry⁴

E 473 Terminology Relating to Thermal Analysis⁵

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method⁵

E 967 Practice for Temperature Calibration of Differential Scanning Calorimeters and Differential Thermal Analyzers⁵

E 1858 Test Method for Determining Oxidative Induction Time of Hydrocarbons by Differential Scanning Calorimetry⁵

3. Terminology

3.1 Definitions:

3.1.1 *oxidation (extrapolated) onset temperature (OOT)*—a relative measure of oxidative stability at the cited heating rate is determined from data recorded during a DSC scanning temperature test. The temperature at which the onset to the observed oxidation is taken as the OOT.

3.1.2 For definitions of terms used in this test method, refer to Terminology E 473.

4. Summary of Method

4.1 The test specimen in an aluminum container and an empty reference aluminum container or pan are heated at a specified constant heating rate in an oxygen (or air) environment. Heat flow out of the specimen is monitored as a function of temperature until the oxidative reaction is manifested by heat evolution on the thermal curve. The oxidation (extrapolated) onset temperature (OOT), a relative measure of oxidative stability at the cited heating rate, is determined from data recorded during the scanning temperature test. The OOT

³ *Annual Book of ASTM Standards*, Vol 10.02.

⁴ *Annual Book of ASTM Standards*, Vol 05.03.

⁵ *Annual Book of ASTM Standards*, Vol 14.02.