



Standard Test Method for Measurement of Antioxidant Content in Lubricating Greases by Linear Sweep Voltammetry¹

This standard is issued under the fixed designation D7527; 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 voltammetric determination of antioxidants in new or in-service lubricating greases in concentrations from 0.0075 weight percent up to concentrations found in new greases by measuring the amount of current flow at a specified voltage in the produced voltammogram.

1.2 This test method is intended to monitor the antioxidant content in lubricating greases; it cannot be applied for lubricating greases that do not contain antioxidants.

1.3 This test method is designed to allow the user to monitor the antioxidant depletion rate of in-service greases through its life cycle as part of condition monitoring programs. This test method is performed in order to collect and trend early signs of deteriorating lubricant grease, and it may be used as a guide for the direction of any required maintenance activities. This will ensure a safe, reliable, and cost-effective operation of the monitored plant equipment.

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

1.5 *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

[D942 Test Method for Oxidation Stability of Lubricating Greases by the Oxygen Pressure Vessel Method](#)

[D1193 Specification for Reagent Water](#)

[D5483 Test Method for Oxidation Induction Time of Lubri-](#)

[cating Greases by Pressure Differential Scanning Calorimetry](#)

[D6810 Test Method for Measurement of Hindered Phenolic Antioxidant Content in Non-Zinc Turbine Oils by Linear Sweep Voltammetry](#)

[D6971 Test Method for Measurement of Hindered Phenolic and Aromatic Amine Antioxidant Content in Non-zinc Turbine Oils by Linear Sweep Voltammetry](#)

3. Summary of Test Method

3.1 A measured quantity of sample is weighed into a vial containing a measured quantity of acetone based electrolyte solution and containing a layer of sand. When the vial is shaken, the dissolved antioxidants and other solution soluble oil components present in the sample are extracted into the solution, and the remaining droplets suspended in the solution are agglomerated by the sand. The sand/droplet suspension is allowed to settle out, and the antioxidants dissolved in the solution are quantified by voltammetric analysis.

NOTE 1—Voltages are listed with respect to reference electrode. The voltammograms shown in [Figs. 1 and 2](#) were obtained with a platinum reference electrode and a voltage scan rate of 0.1 V/s.

4. Significance and Use

4.1 The quantitative determination of antioxidants in new greases measures the amount of the chemical compounds that were added to the base oil as protection against grease oxidation. For in-service oil greases, the voltammetric test method measures the amount of original (individual) antioxidants remaining after grease oxidation have reduced its concentration. Before making final judgment on the remaining useful life of the in-service grease, which might result in the replacement of the grease reservoir, it is advised to perform additional analytical techniques, such as Test Method [D942](#) and [D5483](#), which may be used to measure the remaining oxidative life of the used grease.

4.1.1 This test method is applicable to mineral oil-based and synthetic oil-based greases, based on all type of applied thickeners. This test method is applicable to greases containing at least one type of antioxidant. The presence of other types of additives like corrosion inhibitors or metal deactivators will not interfere with this test method.

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.G0.07](#) on Research Techniques.

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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.