



Designation: D5864 – 23

Standard Test Method for Determining Aerobic Aquatic Biodegradation of Lubricants or Their Components¹

This standard is issued under the fixed designation D5864; 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 determination of the degree of aerobic aquatic biodegradation of fully formulated lubricants or their components on exposure to an inoculum under laboratory conditions.

1.2 This test method is intended to specifically address the difficulties associated with testing water insoluble materials and complex mixtures such as are found in many lubricants.

1.3 This test method is designed to be applicable to all lubricants that are not volatile and are not inhibitory at the test concentration to the organisms present in the inoculum.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* Specific hazards are discussed in Section 10.

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

D1193 Specification for Reagent Water

D1293 Test Methods for pH of Water

D4175 Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants

D4447 Guide for Disposal of Laboratory Chemicals and Samples

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 D02.12 on Environmental Standards for Lubricants.

Current edition approved Nov. 1, 2023. Published November 2023. Originally approved in 1995. Last previous edition approved in 2018 as D5864 – 18. DOI: 10.1520/D5864-23.

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.

D5291 Test Methods for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Petroleum Products and Lubricants

E943 Terminology Relating to Biological Effects and Environmental Fate

2.2 ISO Standard:³

4259:1992(E) Petroleum Products—Determination and Application of Precision Data in Relation to Methods of Test

2.3 APHA Standard:⁴

2540B Total Solids Dried at 103–105°C

9215 Heterotrophic Plate Count

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this test method, refer to Terminology D4175.

3.1.2 Definitions of terms applicable to this test method that are not described herein appear in the *ASTM Online Dictionary of Engineering Science and Technology*⁵ or Terminology E943.

3.1.3 *aerobic*, *adj*—(1) taking place in the presence of oxygen, (2) living or active in the presence of oxygen.

3.1.4 *biodegradation*, *n*—the process of chemical breakdown or transformation of a material caused by organisms or their enzymes.

3.1.4.1 *Discussion*—Biodegradation is only one mechanism by which materials are transformed in the environment.

3.1.5 *biomass*, *n*—biological material including any material other than fossil fuels which is or was a living organism or component or product of a living organism.

3.1.5.1 *Discussion*—In biology and environmental science, biomass is typically expressed as density of biological material per unit sample volume, area, or mass (g biomass / g (or / mL or / cm²) sample); when used for products derived from

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ From *Standard Methods for the Examination of Water and Wastewater*, latest edition. Available from the American Public Health Association, 1015 18th St., N.W., Washington, DC 20036.

⁵ *ASTM Online Dictionary of Engineering Science and Technology* (Stock#DEFONLINE) is available on the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org.

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