



Designation: D4308 – 24

Standard Test Method for Electrical Conductivity of Liquid Hydrocarbons by Precision Meter¹

This standard is issued under the fixed designation D4308; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This test method covers and applies to the determination of the “rest electrical conductivity” of aviation fuels and other similar low-conductivity hydrocarbon liquids in the range from 1 pS/m to 2000 pS/m (see 3.1.3). This test method can be used in the laboratory or in the field.

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

1.3 **WARNING**—Mercury has been designated by many regulatory agencies as a hazardous substance that can cause serious medical issues. Mercury, or its vapor, has been demonstrated to be hazardous to health and corrosive to materials. Use Caution when handling mercury and mercury-containing products. See the applicable product Safety Data Sheet (SDS) for additional information. The potential exists that selling mercury or mercury-containing products, or both, is prohibited by local or national law. Users must determine legality of sales in their location.

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.* For specific warning statements, see 8.3 and Annex A1.

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.*

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.J0.04 on Additives and Electrical Properties.

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2. Referenced Documents

2.1 ASTM Standards:²

- D150 Test Methods for AC Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulation
- D2624 Test Methods for Electrical Conductivity of Aviation and Distillate Fuels
- D4175 Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants
- D4306 Practice for Aviation Fuel Sample Containers for Tests Affected by Trace Contamination
- E1 Specification for ASTM Liquid-in-Glass Thermometers

3. Terminology

3.1 Definitions:

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

3.1.2 *picosiemens per metre, n*—the unit of electrical conductivity is also called a conductivity unit (CU).

3.1.2.1 *Discussion*—A siemen is the SI definition of reciprocal ohm sometimes called mho.

$$1 \text{ pS/m} = 1 \times 10^{-12} \Omega^{-1} \text{ m}^{-1} = 1 \text{ cu} = 1 \text{ picomho/m} \quad (1)$$

3.1.3 *rest electrical conductivity, n*—the reciprocal of the resistivity of uncharged fuel in the absence of ionic depletion or polarization.

3.1.3.1 *Discussion*—It is the electrical conductivity at the initial instant of current measurement after a dc voltage is impressed between electrodes.

4. Summary of Test Method

4.1 A sample of liquid hydrocarbon is introduced into a clean conductivity cell which is connected in series to a battery voltage source and a sensitive dc ammeter. The conductivity, automatically calculated from the observed peak current reading dc voltage and cell constant using Ohm’s law, appears as a digital value in either a manual or automatic mode of meter operation.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.

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