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.

Designation: D7647 – 10 (Reapproved 2018)

Standard Test Method for Automatic Particle Counting of Lubricating and Hydraulic Fluids Using Dilution Techniques to Eliminate the Contribution of Water and Interfering Soft Particles by Light Extinction[1]

This standard is issued under the fixed designation D7647; 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 particle concentration and particle size distribution in new and in-service oils used for lubrication and hydraulic purposes.

1.2 Particles considered are in the range from 4 µm $_{(c)}$ to 200 µm $_{(c)}$ with the upper limit being dependent on the specific automatic particle counter being used.

NOTE 1—For the purpose of this test method, water droplets not masked by the diluent procedure are detected as particles, and agglomerated particles are detected and reported as a single larger particle.

NOTE 2—The subscript$_{(c)}$ is used to denote that the apparatus has been calibrated in accordance with ISO 11171. This subscript$_{(c)}$ strictly only applies to particles up to 50 µm.

1.3 Lubricants that can be analyzed by this test method are categorized as petroleum products or synthetic based products, such as: polyalpha olefin, polyalkylene glycol, or phosphate ester. Applicable viscosity range is up to 1000 mm^2/s at 40 °C. This procedure may be appropriate for other petroleum and synthetic based lubricants not included in the precision statement.

1.4 Samples containing visible particles may not be suitable for analysis using this test method.

1.5 Samples that are opaque after dilution are not suitable for analysis using this test method.

1.6 The test method is specific to automatic particle counters that use the light extinction principle and are calibrated according to the latest revision of ISO 11171.

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

1.8 *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.*

1.9 *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]

D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

D4177 Practice for Automatic Sampling of Petroleum and Petroleum Products

D6786 Test Method for Particle Count in Mineral Insulating Oil Using Automatic Optical Particle Counters

2.2 *ISO Standards:*[3]

ISO 3722 Hydraulic fluid power—Fluid sample containers—Qualifying and controlling cleaning methods

ISO 4406 Hydraulic fluid power—Fluids—Method for coding level of contamination by solid particles

ISO 11171 Hydraulic fluid power—Calibration of automatic particle counters for liquids

3. Terminology

3.1 *Definitions:*

3.1.1 For the purposes of this test method, the following definitions apply:

[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 D02.96.05 on In-Service Lubricants Particle Counting Practices and 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.

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

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