



Designation: D8184 – 18

Standard Test Method for Ferrous Wear Debris Monitoring in In-Service Fluids Using a Particle Quantifier Instrument¹

This standard is issued under the fixed designation D8184; 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 use of offline particle quantification (often referred to as PQ) magnetometers to trend wear rates in machinery by monitoring the amount of ferromagnetic material suspended in a fluid sample that has been in contact with the moving parts of the machinery. It is particularly relevant to monitoring wear debris in lubricating oils and greases.

1.2 The values stated in SI units are to be regarded as standard. Values of the burden (mass) of ferrous wear debris in the sample are reported as a PQ Index. The PQ Index is a numerical value that scales with the ferrous debris burden.

1.3 *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.*

1.4 *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

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

D4177 Practice for Automatic Sampling of Petroleum and Petroleum Products

D5185 Test Method for Multielement Determination of Used and Unused Lubricating Oils and Base Oils by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES)

D6300 Practice for Determination of Precision and Bias Data for Use in Test Methods for Petroleum Products and Lubricants

D7720 Guide for Statistically Evaluating Measurement Alarm Limits when Using Oil Analysis to Monitor Equipment and Oil for Fitness and Contamination

3. Terminology

3.1 Definitions:

3.1.1 *condition monitoring, n*—the recording and analyzing of data relating to the condition of equipment or machinery for the purpose of predictive maintenance or optimization of performance.

3.1.2 *ferromagnetic, n*—metals, alloys, and other materials that exhibit medium to high magnetic permeabilities; further classified into “hard” and “soft” magnetic materials when capable of becoming permanently magnetized or not, respectively.

3.1.3 *inductively coupled plasma optical emission spectroscopy (ICP-OES), n*—a form of emission spectroscopy that uses a plasma to excite atoms and ions that subsequently emit electromagnetic radiation in the visible region; the emission wavelengths are characteristic of a particular wavelength, and the intensity of emission is related to the concentration of the emitting element.

3.1.4 *machinery health, n*—qualitative indication of the overall condition of equipment or machinery; may depend on data and trend analysis from several sources.

3.1.5 *PQI, n*—a dimensionless index related to the ferromagnetic content of an oil or grease sample.

3.1.5.1 *Discussion*—The scale is defined by a 750 PQI primary standard developed by The University of Swansea in the 1980s. The original primary standard is currently in the possession of Parker Hannifin Manufacturing Ltd. (Littlehampton, UK) who manufacture and supply secondary standards for instrument validation purposes.

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 D02.96.06 on Practices and Techniques for Prediction and Determination of Microscopic Wear and Wear-related Properties.

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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.