Designation: D6079 – 11 (Reapproved 2016)

Standard Test Method for Evaluating Lubricity of Diesel Fuels by the High-Frequency Reciprocating Rig (HFRR)[1]

This standard is issued under the fixed designation D6079; 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 evaluation of the lubricity of diesel fuels using a high-frequency reciprocating rig (HFRR).

1.2 This test method is applicable to middle distillate fuels, such as Grades No. 1-D S15, S500, and S5000, and Grades No. 2-D S15, S500, and S5000 diesel fuels, in accordance with Specification D975; and other similar petroleum-based fuels which can be used in diesel engines. This test method is applicable to biodiesel blends. B5 was included in the round robin program that determined the precision statement.

NOTE 1—It is not known that this test method will predict the performance of all additive/fuel combinations. Additional work is underway to establish this correlation and future revisions of this test method may be necessary once this work is complete.

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

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 and health practices and determine the applicable regulatory limitations prior to use.* Specific warning statements are given in Section 7.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D975 Specification for Diesel Fuel Oils

D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

D4177 Practice for Automatic Sampling of Petroleum and Petroleum Products

D4306 Practice for Aviation Fuel Sample Containers for Tests Affected by Trace Contamination

D6078 Test Method for Evaluating Lubricity of Diesel Fuels by the Scuffing Load Ball-on-Cylinder Lubricity Evaluator (SLBOCLE)

E18 Test Methods for Rockwell Hardness of Metallic Materials

E92 Test Methods for Vickers Hardness and Knoop Hardness of Metallic Materials

2.2 *SAE Standard:*[3]

SAE-AMS 6440 Steel, Bars, Forgings, and Tubing, 1.45 Cr (0.93-1.05C) (SAE 52100), for Bearing Applications

2.3 *ISO Standard:*[4]

ISO 3290 Roller Bearings, Balls – Dimensions and tolerances

3. Terminology

3.1 *Definitions:*

3.1.1 *boundary lubrication, n*—a condition in which the friction and wear between two surfaces in relative motion are determined by the properties of the surfaces and the properties of the contacting fluid, other than bulk viscosity.

3.1.1.1 *Discussion*—Metal to metal contact occurs and the chemistry of the system is involved. Physically adsorbed or chemically reacted soft films (usually very thin) support contact loads. As a result, some wear is inevitable.

3.1.2 *lubricity, n*—a qualitative term describing the ability of a fluid to affect friction between, and wear to, surfaces in relative motion under load.

3.1.2.1 *Discussion*—In this test method, the lubricity of a fluid is evaluated by the wear scar, in microns, produced on an oscillating ball from contact with a stationary disk immersed in the fluid operating under defined and controlled conditions.

3.2 *Abbreviations:*

3.2.1 *HFRR*—high frequency reciprocating rig

[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.E0 on Burner, Diesel, Non-Aviation Gas Turbine, and Marine Fuels.

Current edition approved April 1, 2016. Published May 2016. Originally approved in 1999. Last previous edition approved in 2011 as D6079 – 11. DOI: 10.1520/D6079-11R16.

This test method was developed by ISO/TC22/SC7/WG6 and is a part of ISO 12156.

[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 SAE International (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001, http://www.sae.org.

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

Copyright © ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. United States