



Standard Test Method for Evaluating Lubricity of Diesel Fuels by the Scuffing Load Ball-on-Cylinder Lubricity Evaluator (SLBOCLE)¹

This standard is issued under the fixed designation D6078; 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 (load carrying ability) of diesel fuels using a scuffing load ball-on-cylinder lubricity evaluator (SLBOCLE).

1.2 This test method is applicable to middle distillate fuels, such as Grades Low Sulfur No. 1 D, Low Sulfur No. 2 D, No. 1 D, and No. 2 D diesel fuels, in accordance with Specification **D975**; and other similar petroleum-based fuels which can be used in diesel engines.

NOTE 1—It is not known that this test method will predict the performance of all additive/fuel combinations. Additional work is underway to further establish this correlation and future revisions of the standard 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 applicability of 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

D5001 Test Method for Measurement of Lubricity of Aviation Turbine Fuels by the Ball-on-Cylinder Lubricity Evaluator (BOCLE)

D6079 Test Method for Evaluating Lubricity of Diesel Fuels by the High-Frequency Reciprocating Rig (HFRR)

2.2 *American Iron and Steel Institute Standard*:³

AISI E-52100 Chromium Alloy Steel

2.3 *American National Standards Institute Standard*:⁴

ANSI B3.12, Metal Balls

2.4 *Society of Automotive Engineers Standard*:⁵

SAE 8720 Steel

3. Terminology

3.1 *Definitions of Terms Specific to This Standard*:

3.1.1 *applied load, n*—the weight in grams added to the load arm of the SLBOCLE unit.

3.1.2 *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.

3.1.2.1 *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.

3.1.3 *contact load, n*—the force in grams with which the ball contacts the test ring.

3.1.3.1 *Discussion*—For the SLBOCLE cantilever system the contact load is two times the applied load.

3.1.4 *friction coefficient, n*—tangential friction force divided by the contact load.

3.1.5 *friction trace, n*—a recorded trace of the tangential friction force in grams.

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

3.1.6.1 *Discussion*—In this test method the lubricity of a fluid is evaluated by the minimum applied load in grams that, at any time during the test, will produce a friction coefficient

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.E0.02 on Diesel Fuel Oils.

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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 American Iron and Steel Institute (AISI), 1140 Connecticut Ave., Suite 705, Washington, DC 20036.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁵ Available from Society of Automotive Engineers, 400 Commonwealth Ave., Warrendale, PA 15096.