



Designation: D8111 – 23a

Standard Test Method for Evaluation of Automotive Engine Oils in the Sequence IIH, Spark-Ignition Engine¹

This standard is issued under the fixed designation D8111; 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.

INTRODUCTION

Portions of this test method are written for use by laboratories that make use of ASTM Test Monitoring Center (TMC)² services (see [Annex A1](#)).

The TMC provides reference oils, and engineering and statistical services to laboratories that desire to produce test results that are statistically similar to those produced by laboratories previously calibrated by the TMC.

In general, the test purchaser decides if a calibrated test stand is to be used. Organizations such as the American Chemistry Council require that a laboratory utilize the TMC services as part of their test registration process. In addition, the American Petroleum Institute and the Gear Lubricant Review Committee of the Lubricant Review Institute (SAE International) require that a laboratory use the TMC services in seeking qualification of oils against their specifications.

The advantage of using the TMC services to calibrate test stands is that the test laboratory (and hence the test purchaser) has an assurance that the test stand was operating at the proper level of test severity. It should also be borne in mind that results obtained in a non-calibrated test stand may not be the same as those obtained in a test stand participating in the ASTM TMC services process.

ASTM International policy is to encourage the development of test procedures based on generic equipment. It is recognized that there are occasions where critical/sole-source equipment has been approved by the technical committee (surveillance panel/task force) and is required by the test procedure. The technical committee that oversees the test procedure is encouraged to clearly identify if the part is considered critical in the test procedure. If a part is deemed to be critical, ASTM encourages alternative suppliers to be given the opportunity for consideration of supplying the critical part/component providing they meet the approval process set forth by the technical committee.

An alternative supplier can start the process by initiating contact with the technical committee (current chairs shown on ASTM TMC website). The supplier should advise on the details of the part that is intended to be supplied. The technical committee will review the request and determine feasibility of an alternative supplier for the requested replacement critical part. In the event that a replacement critical part has been identified and proven equivalent the sole-source supplier footnote shall be removed from the test procedure.

1. Scope*

1.1 This test method covers an engine test procedure for evaluating automotive engine oils for certain high-temperature performance characteristics, including oil thickening (as measured by kinematic viscosity increase), piston deposits, ring sticking, oil consumption, and phosphorus retention. Such oils include both single-viscosity and multiviscosity grade oils that are used in both spark-ignition, gasoline-fueled engines, as well as in diesel engines.

1.1.1 Additionally, with nonmandatory supplemental requirements, a Sequence IIIHA Test (Mini Rotary Viscometer and Cold Cranking Simulator measurements), or a Sequence

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² Until the next revision of this test method, the ASTM Test Monitoring Center will update changes in the test method by means of information letters. Information letters may be obtained from the ASTM Test Monitoring Center, 203 Armstrong Drive, Freeport, PA 16229, Attention: Director. This edition incorporates revisions in all information letters through No. 23-1.

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

IIIBB Test (phosphorus retention measurement) can be conducted. These supplemental test procedures are contained in [Appendix X1](#) and [Appendix X2](#), respectively.

NOTE 1—Companion test methods used to evaluate engine oil performance for specification requirements are discussed in SAE J304.

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

1.2.1 Exceptions:

1.2.1.1 Where there is no direct SI equivalent such as screw threads, national pipe threads/diameters, tubing sizes, and valve sizes and springs.

1.2.1.2 The ring end gaps in [Table A8.7](#), the dimensions for the blowby ventilation support bracket in [Fig. A3.2](#), and the torque wrenches in [Table A8.1](#) are in inch-pound units.

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.* Specific warning statements are provided in [6.11.6](#), [7.1](#), [7.2.1](#), and [7.3](#).

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:³

- D86 Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure
- D130 Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test
- [D235](#) Specification for Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)
- D240 Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter
- D323 Test Method for Vapor Pressure of Petroleum Products (Reid Method)
- D381 Test Method for Gum Content in Fuels by Jet Evaporation
- [D445](#) Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)
- D525 Test Method for Oxidation Stability of Gasoline (Induction Period Method)
- [D664](#) Test Method for Acid Number of Petroleum Products by Potentiometric Titration
- D1319 Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption

- D2699 Test Method for Research Octane Number of Spark-Ignition Engine Fuel
 - D2700 Test Method for Motor Octane Number of Spark-Ignition Engine Fuel
 - D3231 Test Method for Phosphorus in Gasoline
 - D3237 Test Method for Lead in Gasoline by Atomic Absorption Spectroscopy
 - [D3244](#) Practice for Utilization of Test Data to Determine Conformance with Specifications
 - D3338 Test Method for Estimation of Net Heat of Combustion of Aviation Fuels
 - D3343 Test Method for Estimation of Hydrogen Content of Aviation Fuels
 - D4052 Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter
 - [D4175](#) Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants
 - [D4485](#) Specification for Performance of Active API Service Category Engine Oils
 - [D4684](#) Test Method for Determination of Yield Stress and Apparent Viscosity of Engine Oils at Low Temperature
 - [D4739](#) Test Method for Base Number Determination by Potentiometric Hydrochloric Acid Titration
 - D4815 Test Method for Determination of MTBE, ETBE, TAME, DIPE, tertiary-Amyl Alcohol and C₁ to C₄ Alcohols in Gasoline by Gas Chromatography
 - [D5185](#) Test Method for Multielement Determination of Used and Unused Lubricating Oils and Base Oils by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES)
 - D5191 Test Method for Vapor Pressure of Petroleum Products and Liquid Fuels (Mini Method)
 - [D5293](#) Test Method for Apparent Viscosity of Engine Oils and Base Stocks Between –10 °C and –35 °C Using Cold-Cranking Simulator
 - D5452 Test Method for Particulate Contamination in Aviation Fuels by Laboratory Filtration
 - D5453 Test Method for Determination of Total Sulfur in Light Hydrocarbons, Spark Ignition Engine Fuel, Diesel Engine Fuel, and Engine Oil by Ultraviolet Fluorescence
 - [D7320](#) Test Method for Evaluation of Automotive Engine Oils in the Sequence IIIG, Spark-Ignition Engine
 - [D8047](#) Test Method for Evaluation of Engine Oil Aeration Resistance in a Caterpillar C13 Direct-Injected Turbocharged Automotive Diesel Engine
 - [E29](#) Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
 - [E168](#) Practices for General Techniques of Infrared Quantitative Analysis
 - E191 Specification for Apparatus For Microdetermination of Carbon and Hydrogen in Organic and Organo-Metallic Compounds
- 2.2 SAE Standards:⁴
- [J183](#) Engine Oil Performance and Engine Service Classification (Other Than “Energy-Conserving”)

³ 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.

⁴ Available from SAE International (SAE), 400 Commonwealth Dr., Warrendale, PA 15096, <http://www.sae.org>.