



Designation: D8350 – 24

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

This standard is issued under the fixed designation D8350; 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 – Annex A4](#)).

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.

Laboratories that choose not to use the TMC services may simply disregard these portions. 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 alternate 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 alternate 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 alternate 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 measures the ability of an engine crankcase oil to control valve-train wear in spark-ignition engines at low operating temperature conditions. This test method is designed to simulate extended engine cyclic vehicle operation. The Sequence IVB Test Method uses a Toyota 2NR-FE water cooled, 4 cycle, in-line cylinder, 1.5 L engine. The primary result is bucket lifter wear. Secondary results include cam lobe nose wear and measurement of iron (Fe) wear

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.B0 on Automotive Lubricants.

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² The ASTM Test Monitoring Center will update changes in this test method by means of Information Letters. Information letters may be obtained from the ASTM Test Monitoring Center (TMC), 203 Armstrong Drive, Freeport, PA 16229, Attention: Director. www.astmtmc.org. This edition incorporates revisions in all Information Letters through No. 23-2.

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

metal concentration in the used engine oil. Other determinations such as fuel dilution of the crankcase oil, non-ferrous wear metal concentrations, total fuel consumption, and total oil consumption, can be useful in the assessment of the validity of the test results.²

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*—Where there is no direct SI equivalent such as pipe fittings, tubing, NPT screw threads/diameters, or single source equipment specified.

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 throughout this document as necessary in each particular section.*

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

- C534** Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
- D86** Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure
- D235** Specification for Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)
- 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
- D2622** Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry
- D3244** Practice for Utilization of Test Data to Determine Conformance with Specifications
- D3525** Test Method for Gasoline Fuel Dilution in Used Gasoline Engine Oils by Wide-Bore Capillary Gas Chromatography
- 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

D4739 Test Method for Base Number Determination by Potentiometric Hydrochloric Acid Titration

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)

D6304 Test Method for Determination of Water in Petroleum Products, Lubricating Oils, and Additives by Coulometric Karl Fischer Titration

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E84 Test Method for Surface Burning Characteristics of Building Materials

E168 Practices for General Techniques of Infrared Quantitative Analysis

2.2 SAE Standards:⁴

J300 Engine Oil Viscosity Classification

J304 Engine Oil Tests

J1423 Classification of Energy-Conserving Engine Oil for Passenger Cars and Light-Duty Trucks

2.3 API Standard:⁵

API 1509 Engine Oil Licensing and Certification System

2.4 ANSI Standard:⁶

ANSI MC96.1-1975 Temperature Measurement—Thermocouples

2.5 GM Worldwide Engineering Standards:

GMW3420⁷ Coolant – Extended Life – Ethylene Glycol (Warning—Health hazard—see appropriate SDS)

NOTE 1—ShellZone⁸ dex-cool 50/50 pre-diluted with de-ionized H₂O meeting the specification for GMW3420, GM Worldwide Engineering Standard has been found satisfactory for this purpose.

3. Terminology

3.1 Terminology **D4175** lists terms and definitions internationally recognized for testing procedures as they may apply to Petroleum Products, Liquid Fuels, and Lubricant testing. Terminology **D4175** may provide the user of this test method a more in-depth reference to the definitions listed in **3.2**.

3.2 Definitions:

3.2.1 *air-fuel ratio, n*—in internal combustion engines, the mass ratio of air-to-fuel in the mixture being induced into the combustion chambers.

3.2.2 *automotive, adj*—descriptive of equipment associated with self-propelled machinery, usually vehicles driven by internal combustion engines.

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

⁵ Available from American Petroleum Institute (API), 1220 L. St., NW, Washington, DC 20005-4070, <http://www.api.org>.

⁶ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁷ Available from retailers, auto parts stores, or any Shell retailer / distributor.

⁸ ShellZone is a registered trademark of Shell Trademark Management BV. Available from retailers, auto parts stores, or any Shell retailer / distributor.

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.