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Standard Specification for Performance of Active API Service Category Engine Oils¹

This standard is issued under the fixed designation D4485; 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.

^{ε1} NOTE—Editorial changes made throughout in December 2022.

INTRODUCTION

This specification covers all the currently active American Petroleum Institute (API) engine oil performance categories that have been defined in accordance with the ASTM consensus process. There are organizations with specifications not subject to the ASTM consensus process, such as the International Lubricant Standardization and Approval Committee (ILSAC), American Petroleum Institute (API – SM, SN, SP Specifications), and the Association des Constructeurs Européens d'Automobiles (ACEA). Certain of these specifications, which have been defined primarily by the use of current ASTM test methods, have also been included in the Appendixes for information.

In the ASTM system, a specific API designation is assigned to each category. The system is open-ended, that is, new designations are assigned for use with new categories as each new set of oil performance characteristics are defined. Oil categories may be referenced by engine builders in making lubricant recommendations, and used by lubricant suppliers and customers in identifying products for specific applications. Where applicable, candidate oil programs are conducted in accordance with the American Chemistry Council (ACC) Petroleum Additives Product Approval Code of Practice.

Other service categories not shown in this document have historically been used to describe engine oil performance (SA, SB, SC, SD, SE, SF, SG, SH and CA, CB, CC, CD, CD-II, CE, CF, CF-2, CF-4, CG-4) (see 3.1.2). SA is not included because it does not have specified engine performance requirements. SH is not included because it was a category that could not be licensed for gasoline engine oil use in the API Service Symbol after Dec. 2, 2010. The others are not included because they are based on test methods for which engine parts, test fuel, or reference oils, or a combination thereof, are no longer available. Also, the ASTM 5-Car and Sequence VI Procedures are obsolete and have been deleted from the category Energy Conserving and Energy Conserving II (defined by Sequence VI). Information on excluded older categories and obsolete test requirements can be found in SAE J183.

1. Scope*

1.1 This specification covers engine oils for light-duty and heavy-duty internal combustion engines used under a variety of

operating conditions in automobiles, trucks, vans, buses, and off-highway farm, industrial, and construction equipment.²

¹ This specification 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 Until the next revision of this specification, the ASTM Test Monitoring Center will update changes in specification by means of information letters. Information letters may be obtained from the ASTM Test Monitoring Center, 203 Armstrong Drive, Freeport, PA 16229, www.astmtmc.org. This edition incorporates revisions in all information letters through No. 22-1.

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

1.2 This specification is not intended to cover engine oil applications such as outboard motors, snowmobiles, lawn mowers, motorcycles, railroad locomotives, or oceangoing vessels.

1.3 This specification is based on engine test results that generally have been correlated with results obtained on reference oils in actual service engines operating with gasoline or diesel fuel. As it pertains to the API SL engine oil category, it is based on engine test results that generally have been correlated with results obtained on reference oils run in gasoline engine Sequence Tests that defined engine oil categories prior to 2000. It should be recognized that not all aspects of engine oil performance are evaluated by the engine tests in this specification. In addition, when assessing oil performance, it is desirable that the oil be evaluated under actual operating conditions.

1.4 This specification includes bench and chemical tests that help evaluate some aspects of engine oil performance not covered by the engine tests in this specification.

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

1.5.1 *Exceptions:*

1.5.1.1 The roller follower shaft wear in Test Method **D5966** is in mils.

1.5.1.2 The oil consumption in Test Method **D6750** is in grams per kilowatthour.

NOTE 1—The kWh unit is deprecated. The preferred SI unit is the joule (J); 1 kWh = 3.6 MJ.

1.5.1.3 The bearing wear in Test Method **D6709** is in grams and is described as weight loss, a non-SI term.

1.5.1.4 Some of the appendixes are verbatim from other sources, and non-SI units are included.

1.6 *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

- D92** Test Method for Flash and Fire Points by Cleveland Open Cup Tester
- D93** Test Methods for Flash Point by Pensky-Martens Closed Cup Tester
- D130** Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test
- D412** Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
- D471** Test Method for Rubber Property—Effect of Liquids

- D874** Test Method for Sulfated Ash from Lubricating Oils and Additives
- D892** Test Method for Foaming Characteristics of Lubricating Oils
- D2240** Test Method for Rubber Property—Durometer Hardness
- 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
- D4171** Specification for Fuel System Icing Inhibitors
- D4683** Test Method for Measuring Viscosity of New and Used Engine Oils at High Shear Rate and High Temperature by Tapered Bearing Simulator Viscometer at 150 °C
- D4684** Test Method for Determination of Yield Stress and Apparent Viscosity of Engine Oils at Low Temperature
- D4741** Test Method for Measuring Viscosity at High Temperature and High Shear Rate by Tapered-Plug Viscometer
- D4951** Test Method for Determination of Additive Elements in Lubricating Oils by Inductively Coupled Plasma Atomic Emission Spectrometry
- D5119** Test Method for Evaluation of Automotive Engine Oils in the CRC L-38 Spark-Ignition Engine (Withdrawn 2003)⁴
- D5133** Test Method for Low Temperature, Low Shear Rate, Viscosity/Temperature Dependence of Lubricating Oils Using a Temperature-Scanning Technique
- D5185** Test Method for Multielement Determination of Used and Unused Lubricating Oils and Base Oils by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES)
- D5293** Test Method for Apparent Viscosity of Engine Oils and Base Stocks Between –10 °C and –35 °C Using Cold-Cranking Simulator
- D5302** Test Method for Evaluation of Automotive Engine Oils for Inhibition of Deposit Formation and Wear in a Spark-Ignition Internal Combustion Engine Fueled with Gasoline and Operated Under Low-Temperature, Light-Duty Conditions (Withdrawn 2003)⁴
- D5480** Test Method for Engine Oil Volatility by Gas Chromatography (Withdrawn 2003)⁴
- D5481** Test Method for Measuring Apparent Viscosity at High-Temperature and High-Shear Rate by Multicell Capillary Viscometer
- D5533** Test Method for Evaluation of Automotive Engine Oils in the Sequence IIIE, Spark-Ignition Engine (Withdrawn 2003)⁴
- D5800** Test Method for Evaporation Loss of Lubricating Oils by the Noack Method
- D5844** Test Method for Evaluation of Automotive Engine Oils for Inhibition of Rusting (Sequence IID) (Withdrawn 2003)⁴
- D5966** Test Method for Evaluation of Engine Oils for Roller Follower Wear in Light-Duty Diesel Engine
- D5967** Test Method for Evaluation of Diesel Engine Oils in T-8 Diesel Engine

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 The last approved version of this historical standard is referenced on www.astm.org.