



SURFACE VEHICLE STANDARD	J300®	MAY2024
	Issued	1911-06
	Revised	2024-05
Superseding J300 APR2021		
Engine Oil Viscosity Classification		

RATIONALE

This revision includes multiple revisions to the standard. First, an additional acceptable method for determination of low shear rate kinematic viscosity at 100 °C, ASTM D7945, has been introduced. The inclusion of an additional method can enable engine oil producers to improve logistics and quality assurance. The equivalence of ASTM D445 and ASTM D7945 in determination of kinematic viscosity at 100 °C for a wide variety of engine oil formulations within the viscosity range covered by the current SAE J300 Standard has been demonstrated in the ASTM Research Report RR:D02-1797 and the ASTM Research Report RR:D02-2057.

Additionally, this revision clarifies editorially the Low-Temperature Cranking Viscosity requirements for SAE xW grades in Table 1 and related text, while the title for ASTM D5293 referenced in SAE J300 has been updated to align with the current method title. Finally, ASTM D4683 has been defined as the referee method for high-temperature high-shear-rate viscosity.

1. SCOPE

This SAE Standard defines the limits for a classification of engine lubricating oils in rheological terms only. Other oil characteristics are not considered or included.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J1510 Lubricants for Two-Stroke-Cycle Gasoline Engines

SAE J1536 Two-Stroke-Cycle Engine Oil Fluidity/Miscibility Classification

Covitch, M., Brown, M., May, C., Selby, T. et al., "Extending SAE J300 to Viscosity Grades below SAE 20," *SAE Int. J. Fuels Lubr.* 3(2):1030-1040, 2010, <https://doi.org/10.4271/2010-01-2286>.

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Documents

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2.1.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D97	Standard Test Method for Pour Point of Petroleum Oils
ASTM D445	Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)
ASTM D2500	Standard Test Method for Cloud Point of Petroleum Oils
ASTM D3244	Standard Practice for Utilization of Test Data to Determine Conformance with Specifications
ASTM D3829	Standard Test Method for Predicting the Borderline Pumping Temperature of Engine Oil
ASTM D4683	Standard Test Method for Measuring Viscosity at High Temperature and High-Shear Rate by Tapered Bearing Simulator
ASTM D4684	Standard Test Method for Determination of Yield Stress and Apparent Viscosity of Engine Oils at Low Temperature
ASTM D4741	Standard Test Method for Measuring Viscosity at High Temperature and High-Shear Rate by Tapered-Plug Viscometer
ASTM D5133	Standard Test Method for Low Temperature, Low Shear Rate, Viscosity/Temperature Dependence of Lubricating Oils Using a Temperature-Scanning Technique
ASTM D5293	Standard Test Method for Apparent Viscosity of Engine Oils Between -35 and -10 °C Using the Cold-Cranking Simulator
ASTM D5481	Standard Test Method for Measuring Apparent Viscosity at High-Temperature and High-Shear Rate by Multicell Capillary Viscometer
ASTM D7042	Standard Test Method for Dynamic Viscosity and Density of Liquids by Stabinger Viscometer (and the Calculation of Kinematic Viscosity)
ASTM D7945	Standard Test Method for Determination of Dynamic Viscosity and Derived Kinematic Viscosity of Liquids by Constant Pressure Viscometer
ASTM STP 1143	Low-Temperature Lubricant Rheology: Measurement and Relevance to Engine Operation

2.1.3 Other Publications

CEC L-36-90	The Measurement of Lubricant Dynamic Viscosity Under Conditions of High Shear
CRC Report No. 409	Evaluation of Laboratory Viscometers for Predicting Cranking Characteristics of Engine Oils at 0 °F and -20 °F, April 1968

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM DS 62	The Relationship Between High-Temperature Oil Rheology and Engine Operation - A Status Report
ASTM STP 1068	High-Temperature, High-Shear Oil Viscosity - Measurement and Relationship to Engine Operation
ASTM RR:D02-1442	Cold Starting and Pumpability Studies in Modern Engines
ASTM RR:D02-1767	Interlaboratory Study to Establish Precision Statements for ASTM D4683-10, D5481-10, and D4741-12
ASTM RR:D02-1741	Interlaboratory Study to Establish Precision Statements on formulated oil to be included in ASTM D7042, Standard Test Method for Dynamic Viscosity and Density of Liquids by Stabinger Viscometer (and the Calculation of Kinematic Viscosity)
ASTM RR:D02-1931	Interlaboratory Study for ASTM D7042, STM for Dynamic Viscosity and Density of Liquids by Stabinger Viscometer (and the Calculation of Kinematic Viscosity)
ASTM RR:D02-1797	Interlaboratory Study to Establish Precision Statements for ASTM D7945, Test Method for Determination of Dynamic Viscosity and Derived Kinematic Viscosity of Liquids by Constant Pressure Viscometer
ASTM RR:D02-2057	Shear Rate and Sample Specific Bias Study for ASTM D7945, Standard Test Method for Determination of Dynamic Viscosity and Derived Kinematic Viscosity of Liquids by Constant Pressure Viscometer

3. SIGNIFICANCE AND USE

The limits specified in Table 1 are intended for use by engine manufacturers in determining the engine oil viscosity grades to be used in their engines, and by oil marketers in formulating, manufacturing, and labeling their products. Oil marketers are expected to distribute only products which are within the relevant specifications in Table 1.

The application of ASTM D3244 is used only for dispute resolution and shall not modify the limiting values in Table 1.

Two series of viscosity grades are defined in Table 1: (a) those containing the letter "W," and (b) those without the letter "W." Single viscosity-grade oils ("single-grades") with the letter "W" are defined by minimum and maximum low-temperature cranking viscosities, a maximum pumping viscosity, and a minimum kinematic viscosity at 100 °C. Single-grade oils without the letter "W" are based on a set of minimum and maximum kinematic viscosities at 100 °C, and a minimum high-shear-rate viscosity at 150 °C. The shear rate will depend on the test method used. Multiviscosity-grade oils ("multigrades") are defined by both of the following criteria:

- Maximum and minimum low-temperature cranking viscosities and maximum pumping viscosity corresponding to one of the W grades, and
- Maximum and minimum kinematic viscosities at 100 °C and a minimum high-shear-rate viscosity at 150 °C corresponding to one of the non-W grades.