

# LUBRICANT VISCOSITY CLASSIFICATIONS

## *ENGINE OIL LUBRICANT CLASSIFICATIONS*

### **SAE J300 September 1980 (Engine Oils)**

The most widely used system for engine oil viscosity classification is that established by the Society of Automotive Engineers (SAE) in the USA.

In this system two series of viscosity grades are defined – those containing the letter W and those without the letter W.

Grades with the letter W are intended for use at lower temperatures and are based on a maximum low temperature viscosity and a maximum borderline pumping temperature, as well as a minimum viscosity at 100C. The low temperature viscosity is measured by means of a multi-temperature version of ASTM D2602 ‘Method of Test for apparent Viscosity of Motor Oils at Low temperature using the Cold Cranking Simulator’. Viscosities measured by this method have been found to correlate with engine speeds developed during low temperature cranking. Borderline pumping temperature is measured according to ASTM D3829 ‘Standard Method for Predicting the Borderline Pumping Temperature of Engine Oil’. This provides a measure of an oils’ ability to flow to the engine oil pump inlet and provide adequate engine oil pressure during the initial stages of operation.

Oils without the letter W, intended for use at higher temperatures, are based on the viscosity at 100°C only. These are measured by ASTM D445 ‘Method of Test for Kinematic Viscosity of temperature and Opaque Liquids’.

A ‘Multi-grade’ oil is one whose low temperature viscosity and borderline temperature satisfy the requirements of one of the W grades and whose viscosity at 100°C is within the stipulated range of one-W-grades.

<b>Automotive Lubricant Viscosity Grades<sup>1</sup></b>					
Engine Oils – SAE J 300, June 2001 (Dec. 1999)					
<b>SAE Viscosity Grade</b>	<b>Viscosity (cP) At Temp (°C), Max</b>		<b>Viscosity<sup>4</sup> (cSt) at 100°C</b>		<b>High-Shear Viscosity<sup>5</sup> (cP) at 150°C and 10sec<sup>-1</sup>, Min</b>
	<b>Cranking<sup>2</sup></b>	<b>Pumping<sup>3</sup></b>	<b>Min</b>	<b>Max</b>	
0W	6200 at -35	60,000 at -40	3.8		
5W	6600 at -30	60,000 at -35	3.8		
10W	7000 at -25	60,000 at -30	4.1		
15W	7000 at -20	60,000 at -25	5.6		
20W	9500 at -15	60,000 at -20	5.6		
25W	135000 at -10	60,000 at -15	9.3		
20			5.6	<9.3	2.6
30			9.3	<12.3	2.9
40			12.5	<16.3	2.9 <sup>6</sup>
40			12.5	<16.3	3.7 <sup>7</sup>
50			16.3	<21.9	3.7
60			21.9	<26.1	3.7

<sup>1</sup>All values are critical specifications as defined by ASTM D3244

<sup>2</sup>ASTM D5293

<sup>3</sup>ASTM D4684. Note that the presence of any yield stress detectable by this method constitutes a failure regardless of viscosity.

<sup>4</sup>ASTM D445

<sup>5</sup>ASTM D4683, CEC L-36-A-90 (ASTM D 4741) or ASTM DS481

<sup>6</sup>0W-40, 5W-40 & 10W-40 grades

<sup>7</sup>15W-40, 20W-40, 25W-40 & 40grades