



A Better Class of Oil

INDUSTRY OIL CLASSIFICATIONS

There are many oil industry classifications covering viscosity and other performance criteria. Just a few are quoted in the following pages, and some you will recognise.

SAE Viscosity

SAE stands for Society of Automotive Engineers. The SAE developed a classification system to define the viscosity, or thickness, of the oil. This system has been progressively modified over the years.

It defines “operating” engine oil viscosities for different grades and contains specifications for “cranking” viscosity and pumpability at start up, the “W” grades or winter. A multigrade oil is one that meets both a “W” low temperature viscosity requirement and a 100°C “operating temperature” requirement. For engine oils there is a specification that must be met at 150°C, known as a High Temperature/High Shear (HT/HS) viscosity. This is to simulate what happens in high stress areas of the engine eg bearings.

Centipoise (cP) and Centistokes (cSt) are the units each is measured in.

In addition, gear oils require a KRL test. This is a severe oil shear test, and the oil must stay in grade or within a nominated range after shear. Its severity is the main reason why 75W-x gear oils are expensive as these are difficult to make.

SAE Viscosity has little relevance to industrial oils but some compressor oils are stated as meeting SAE 30 for example.

SAE J300 - Engine Oils					
SAE Grade	Cold Cranking MAX Viscosity cP@Temp, °C	Pumpability Max Viscosity cP@ Temp, °C	Viscosity @100 °C		HT/HS@ 150 °C Min cP
			Min cSt	Max cSt	
0W	6200 @ -35	60,000 @ -40	3.8	NA	NA
5W	6600 @ -30	60,000 @ -35	3.8	NA	NA
10W	7000 @ -25	60,000 @ -30	4.1	NA	NA
15W	7000 @ -20	60,000 @ -25	5.6	NA	NA
20W	9500 @ -15	60,000 @ -20	5.6	NA	NA
25W	13000 @ -10	60,000 @ -15	9.3	NA	NA
20	NA	NA	5.6	<9.3	2.6
30	NA	NA	9.3	<12.5	2.9
40	NA	NA	12.5	<16.3	See note
50	NA	NA	16.3	<21.9	3.7
60	NA	NA	21.9	<26.1	3.7

Note: 2.9cP for 0W-40, 5W-40 and 10W-40 grades, 3.7cP for 15W-40, 20W-40, 25W-40 and 40 grades. Penrite define “70” engine oils as above 26.1cSt at 100°C and “30W” as less than 13,000cP at -5°C.

SAE J306 (Jun 2005) Gear Oils			
SAE Grade	Max Temperature for a Viscosity of 150,000cP	Viscosity @100 °C	
		Min cSt	Max cSt
70W	-55	4.1	NA
75W	-40	4.1	NA
80W	-26	7.0	NA
85W	-12	11.0	NA
80	NA	7.0	<11.0
85	NA	11.0	<13.5
90	NA	13.5	<18.5
110	NA	18.5	<24.0
140	NA	24.0	<32.5
190	NA	32.5	<41.0
250	NA	41.0	NA

Note: Limit must also be met after testing in 20 hour KRL Shear Stability Test (CEC-L45-T-93 Method C).



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Fact Sheet

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ISO Viscosity

ISO-Viscosity System for industrial lubricants					
ISO Viscosity Grade	Mid Point cSt @ 40°C	Kinematic Viscosity Limits			
		Minimum		Maximum	
		cSt	S.U.S.	cSt	S.U.S.
2	2.2	1.98	32.0	2.42	34.0
3	3.2	2.88	35.5	3.52	37.5
5	4.6	4.14	39.5	5.06	42.5
7	6.8	6.12	46.0	7.48	50.5
10	10	9.00	55.5	11.0	62.5
15	15	13.5	71.5	16.5	83.5
22	22	19.8	97.0	24.2	116
32	32	28.8	136	35.2	165
46	46	41.4	193	50.6	235
68	68	61.2	284	74.8	347
100	100	90.0	417	110	510
150	150	135	625	165	764
220	220	198	917	242	1121
320	320	288	1334	352	1631
460	460	414	1918	506	2344
680	680	612	2835	748	3465
1000	1000	900	4169	1100	5095
1500	1500	1350	6253	1650	7643

This is the defining category for industrial oils. The following table shows the kinematic viscosity limits for each ISO Viscosity Grade. Each viscosity grade is 50% higher in viscosity than the preceding viscosity grade. These limits are set at a 10 percent tolerance level above and below the mid-point of a grade. Any product with a viscosity outside these tolerance levels is not a recognized ISO Viscosity Grade.

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