



## Understanding Engine Oil Viscosity

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The large numbers on a bottle of oil like 5W30 or 10W40 refer to its viscosity. It's loosely defined as the 'flowability' of the oil. Put another way, thin oil has low viscosity, while thick oil has high viscosity. So for example, beer has low viscosity and golden syrup has high viscosity. Just don't put those in your engine...

Ambient temperature, i.e how hot or cold it is outside also has an effect on the engine oil in your car. When it's cold, the oil will flow more slowly, when it's hot, the oil will flow more quickly. However, In order to lubricate an engine properly the oil must be able to flow at a consistent rate through a broad range of temperatures.

To put this in perspective, imagine a jar of Golden Syrup, put it in the fridge (at roughly 1-3 degrees C) for a few hours, then take off the lid and try to pour the syrup out. It will start to flow but extremely slowly as the cold temperature has made it more viscous. Now take your jar of syrup and stick it in the oven for 20 minutes at 100 degrees C then take the lid off and pour it out. It should flow out extremely easily. The heat has reduced the viscosity and allowed the syrup to flow more quickly. The same thing happens with engine oil. If you live in Siberia and it's -20 degrees outside, when you go to start your car's engine, the oil inside it needs to be thin enough to flow and lubricate all the internal components as soon as you turn the key. Similarly, if you live in Dubai and it's 50 degrees outside and you're driving in heavy traffic your engine oil needs to stay viscous enough to lubricate properly.

At the moment there is no one oil that can cope with all these situations and for that reason, the SAE (Society of Automotive Engineers) introduced a grading system which tells us how suitable a grade of oil is for a certain temperature range.

So...oils are manufactured to different viscosities in order to be effective in different climates and operating conditions. To broaden the range of temperatures that oils can be used in, grades of oil are combined. These are known as Multi-grade oils

### Understanding the Numbers

Most oils these days are Multi-grade (multi viscosity) and will have two numbers on the label separated by a 'W' (e.g. 5W-30) There are oils with a single viscosity rating (e.g. SAE 20W) known as Mono-grade oils but they are less common these days.

The SAE tests oils and assigns an arbitrary weight or grade (viscosity) number to the oil depending on its flow rate at different temperatures. The SAE numbering systems goes: 0, 5, 10, 20, 30, 40, 50, 60. The grade refers to the oils ability to flow or lubricate an engine at a certain temperature.

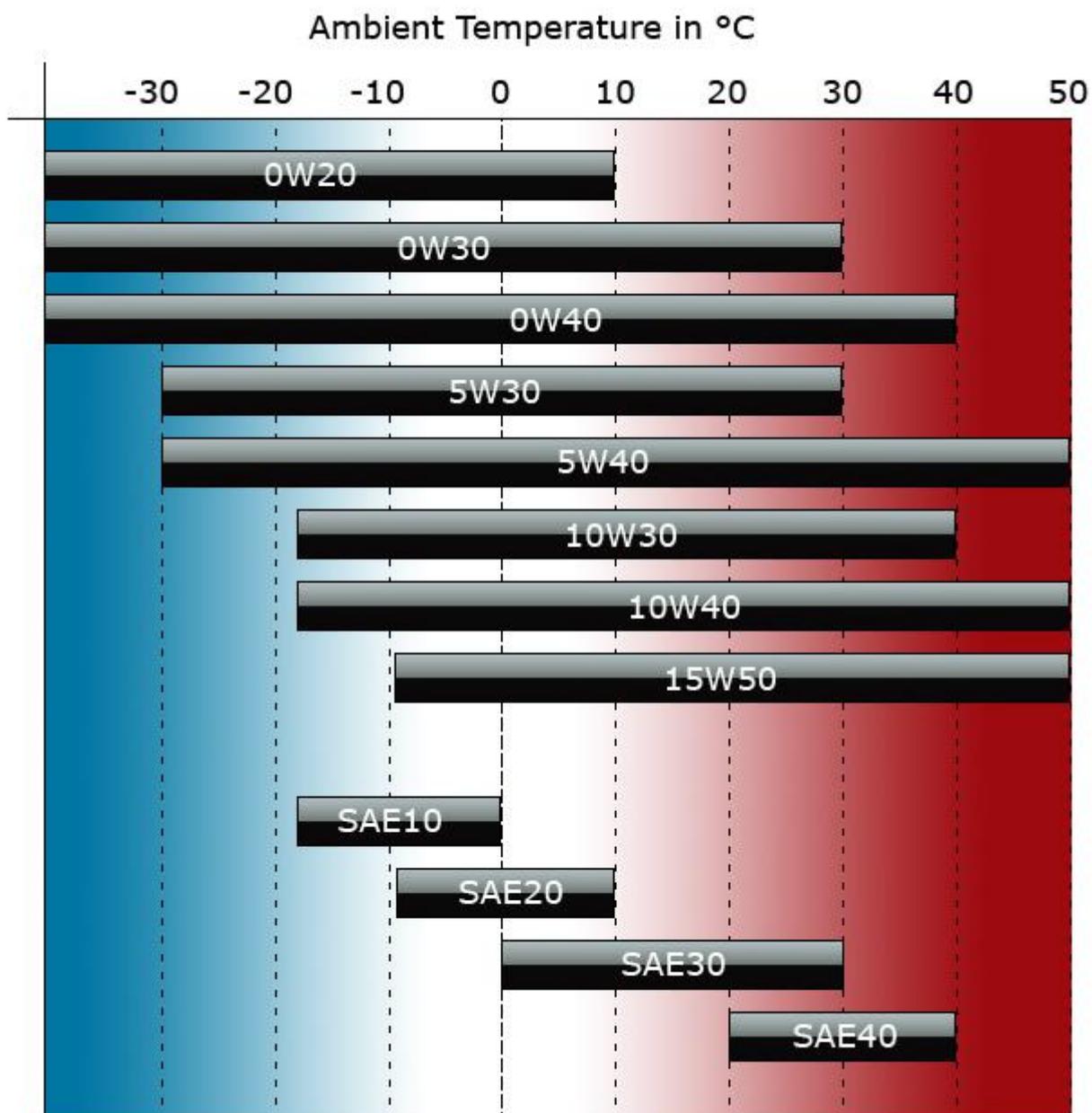
The lower numbers are thinner, less viscous oils suitable for low temperatures generally found in winter. The 'W' seen in an oil's grade stands for 'winter' (eg 5W30)

- 0W oil will flow correctly up to -30 degrees C
- 5W oil will flow correctly up to -25 degrees C
- 10W oil will flow correctly up to -20 degrees C
- 15W oil will flow correctly up to -15 degrees C
- 20W oil will flow correctly up to -10 degrees C.

The flow rate of oils are also tested at a 'hot' temperature of 100 degrees C to simulate a running engine. The 2<sup>nd</sup> number in a Multi-grade oil refers to the 'hot' viscosity of the oil. So a 5W30 oil at 100°C will only thin as much as its higher rating. Think of it like this: a 5W30 oil is a 5-weight oil that will not thin more than a 30-weight oil when it gets hot.

Multi-grade oil ratings look like this: SAE 5W-30. This is based on a 5W oil, tested at -25 degrees C, but at high temperature it will not thin out more than a '30' weight oil would.

SAE simply stands for the Society of Automotive Engineers, the organisation responsible for defining a numerical system for grading car oils. There are alternatives, such as ACEA (European Automobile Manufacturer's Association) and the API (American Petroleum Institute), but SAE is generally considered the standard in this part of the world.



The chart above illustrates a rough guide to ambient temperatures vs oil viscosity performance in both Multi-grade (top half) and Mono-grade (lower half) oils. So you can see that multigrade oils have a much broader spectrum of use.