



From 10W-40 to 0W-0 motor oil?

The choice of the right motor oil is essential to ensure good operation and protection of the engine. In addition to its lubricating function, motor oil has various other functions including cooling, noise reduction, cleaning, sealing and management (for example variable valve timing). Motor oil with the right viscosity is crucial to perform these tasks properly. Whereas 20 years ago the standard was a motor oil with 10W-40 viscosity, this is a 0W-20 viscosity nowadays, and the trend is towards an even lower viscosity. In this newsletter, you can read more about the background to this important development.

In summary:

- Having to reduce CO₂ emissions due to legislation, is the reason for motor oil with an ever lower viscosity.
- The viscosity of specified motor oils for cars has become gradually lower since the 1980s, from a 10W-40, via a 5W-40, 5W-30, 0W-30 to a 0W-20 nowadays.
- In the future, it will be compulsory to specify motor oils with an even lower viscosity, such as 0W-16, 0W-12 or even 0W-8.
- In a modern car fleet (cars after 1999), a premium synthetic motor oil is almost always (>92%) a compulsory requirement. So the standard oil is certainly not 10W-40.
- When developing a motor oil specification, the car manufacturer is always looking for an optimum balance between fuel saving and engine protection. It is therefore essential to always use the right motor oil.

Tips for the workshop

- The use of too 'thin' a motor oil leads to premature wear of bearings, camshafts, piston rings and cylinder liners.
- The use of too 'thick' a motor oil has, among others, a negative effect on the hydraulic operation of the variable valve timing, resulting in damage, continual additional fuel consumption and more soot deposit, leading to a direct risk of wear.
- Not all 0W-20 motor oils are the same! Car manufacturers may specify the same viscosity, for example 0W-20, but for each make or model the other specifications may differ considerably.

- In case of many short journeys and start/stop systems, motor oil is diluted by fuel, so always change the motor oil in good time!
- Modern engines are designed to function within a specific operating temperature range to regulate emissions, fuel consumption and engine performance. The motor oil makes an important contribution to this.
- Motor oils with the same viscosity may have different 'HTHS values' (see below).
- Always check www.mpmoil.nl to see which is the right motor oil specified by the car manufacturer.

Why increasingly thinner motor oils?

The European Union has stated that all new cars delivered from 2021 may have an average maximum emission of 95 gram CO₂ per kilometre. A motor oil with a lower viscosity ensures a lower CO₂ emission. This is because an oil with a lower viscosity causes less friction, so less power (i.e. energy) is required. Less friction means better fuel economy and therefore lower (CO₂) emissions. This is the reason why car manufacturers are looking for motor oils with an even lower viscosity. The constructors at the OEM (original equipment (car) manufacturers) determine which viscosity of motor oil must be used. The choice of the right formulation and viscosity of motor oil is made very carefully. This determines the life and the correct functioning of the engine. The 'lubrication film thickness' is an essential factor here. This term can be described as the thickness of the oil film between two running surfaces. A sufficient lubrication film thickness ensures running surface separation and hence prevents wear.

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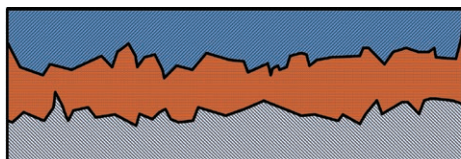
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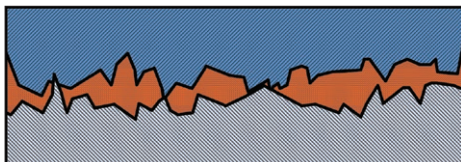
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Moving things forward...

Full and sufficient lubrication film = protection against wear



Axle
Lubrication film
Plain Bearing



Insufficient lubrication film thickness = wear

What exactly is viscosity?

To lubricate engine parts and to prevent wear, a sufficient lubrication film thickness is therefore necessary. To achieve this, the use of motor oil with the right viscosity is required. Viscosity, also known as sluggishness, is in fact the resistance to flows. For motor oils, the international 'Society of Automotive Engineers' has laid down standards (SAE 300J) for viscosity (at low temperatures and at 100°C).

Car manufacturers are constantly trying to reduce CO₂ emissions. One of the measures that clearly helps here, is to reduce the viscosity of the oil. Finally, a lower viscosity provides less resistance and therefore less friction. As a result, fuel is saved and CO₂ emissions are reduced. Meanwhile, tests are already being carried out with 0W-8 and 0W-12 multigrade motor oils. There are also car manufacturers that are already recommending 0W-16 for certain models in 2019, such as the latest Toyota Yaris 1.0 12V VVT-i, for example. The 0W-20 is now common for models of Volvo, for one. Note here that the 0W-20 specification may vary considerably by make and model. Not all 0W-20 motor oils are necessarily the same. Incorrect use of this motor oil irrevocably leads to damage. In order to protect the engine against wear at high temperatures and pressures, there is another value that is enormously important next to the viscosity: the HTHS value.

What is HTHS?

One of the properties of motor oil is that the viscosity reduces as motor oil temperature increases. The oil also comes under extreme pressure in the engine. The minimum viscosity value at 100°C alone, as explained above, is not sufficient to guarantee protection against wear at high temperatures and pressures. Then how?

The prevention of wear at high temperatures and pressures is achieved by combining various additives with the right base oil, resulting in the right 'lubrication film thickness'.

The measurement of this lubrication film thickness is expressed in the 'HTHS value' and forms a specific parameter of the motor oil specification. HTHS stands for High Temperature High Shear. The value that results from an "HTHS test" gives information about the viscosity of the motor oil at the high temperature of 150°C and high pressure (shear pressures).

Saving versus protection

The car manufacturer (OEM) has, on the one hand, determined what the right viscosity should be, and on the other what the HTHS value of the motor oil for a specific car should be. Deviation from these values leads to great risk of damage, and will always lead to rejection of warranty claims by the car manufacturer.

A motor oil with a low HTHS value therefore has a thin lubrication film. This causes less friction and as a result a lower fuel consumption. And therefore a lower CO₂ emission. However, a thinner lubrication film increases the risk of wear. The car manufacturer therefore looks for the optimum lubrication film thickness, where both fuel saving and good wear protection are achieved.

In practice

So far for the theory. In practice, certainly for short journeys and frequent starting/stopping, the motor oil is diluted by the fuel, so the viscosity reduces even further! As a result, the risk of damage increases considerably (insufficient lubrication film).

Ensure that the motor oil is changed in good time. It has also been found that ultra-thin engine oils such as 0W-16 and lower are more volatile and have a high loss on evaporation, so the oil consumption increases. The car manufacturer is therefore looking very carefully for an optimum balance between fuel savings and engine protection. The right choice of the base oils and additives, i.e. the total specifications of the motor oil, is essential here.

0W-0?

The trend towards even thinner engine oils will certainly increase in years to come. An 0W-0 oil provisionally remains a dream.

For technical questions:

Contact MPM Technical Support via
support@mpmoil.nl or call 0031 (0)15 - 251 40 30.



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