

We are often asked why don't you do an article on Gear Oils? Well, an article would be very complex but here are the answers to a few FAQ's that we have had over the years.

What does API GL mean?

API stands for American Petroleum Industry and GL stands for Gear Lubricant, see below for their definitions:

API GL-1 Straight mineral oil

API GL-2 Mild EP for worm gears

API GL-3 Mild EP for spur and spiral bevel gears in axles and transmissions

API GL-4 Medium EP, MIL-L-2105 quality, moderate severity hypoid gears, manual transmissions

API GL-5 High EP, MIL-L-2105D quality, all hypoid axles, some manual transmissions

API GL-6 Extra high EP, now obsolete

Is it important to select the right API GL rating?

Yes. Selecting the correct gear oil performance level will provide the best protection to the components of the transmission.

What do the SAE grades mean?

SAE stands for the Society of Automotive Engineers. The SAE classification system is a way of defining how thin or how thick an oil is. This is known as an oil's viscosity. The classifications are listed here in order of increasing thickness: SAE 75W, SAE 80W, SAE 85W, SAE 90, SAE 140, SAE 250.

What does EP mean?

EP means extreme pressure and refers to the additive used in gear oils. This additive is designed to stop metal-to-metal contact taking place between transmission components. The EP additives are usually based on sulphur and phosphorous. These elements bond to the metal surfaces where there are points of extreme pressure and temperature, forming a sacrificial chemical layer. The sulphur gives gear oils their characteristic smell.

Will synthetic gear oils and mineral gear oils mix together?

Yes, but beware that there are two kinds of synthetic gear available: polyalphaolefin (PAO) based and polyalkylene glycol (PAG) based. PAOs are basically a man-made version of mineral oils (although with greatly improved properties) and can therefore be mixed with mineral oils. In fact, semi-synthetic products have mineral and synthetic base fluids in them, so obviously, they must be able to mix. PAGs, on the other hand, will not mix with PAOs or mineral oil. Utmost care must be taken when using this kind of product.

What is a hypoid axle?

Hypoid is an abbreviation for hypocycloidal and relates to the geometry of the crown wheel and pinion arrangement usually on rear wheel drive cars. The pinion is usually highly offset to reduce propshaft intrusion into the passenger compartment.

Do I need a special oil for limited slip differentials?

Yes. When the power distribution between two drive shafts is no longer equal (usually due to the surface condition that the drive wheels are turning on, i.e. ice, mud), limited slip differentials are able to effectively lock the two half shafts, ensuring equal power distribution once again. When this limited slip differential mechanism 'kicks in' there is a high shock loading on the clutch mechanism that requires protection from wear and slippage. Use of the incorrect oil can lead to clutch degradation and vibration.

Why should I choose non-EP straight oils for my classic car?

Depending on the age, make and model non-EP gear oils may be required for use in gearboxes and final drives. Certain designs contained a lot of phosphor-bronze (copper containing) components that are sensitive particularly to the sulphur extreme pressure (EP) additive. The sulphur attacks the copper and destroys the integrity of the meshing gear surfaces.

Is it alright to use ATF in a manual gearbox?

Certain designs do specify the use of an ATF in manual gearboxes, but they should only be used where it is clearly stated by the manufacturer.

Is there one gear oil that will meet all my requirements?

This will depend on makes and models, but very often the answer is no. Gearboxes, final drives, transfer boxes, etc., all have their own specific lubrication requirements. The specification of the oil required will be outlined by the design engineers, who will determine which type of oil will provide the maximum protection to the transmission components. It may certainly be possible to rationalise and reduce the number of lubricants used, but the magical single product may not be achievable.

What is the difference between a gear oil, an ATF and an MTF and why are they sometimes interchangeable?

There is a fair amount of common ground, all do a basically similar job, an ATF could be regarded as a low viscosity gear oil with more precisely controlled frictional properties.

What is an MTF and why is it used instead of a gear oil?

MTF (manual transmission fluid) is a term preferred by some OEMs, perhaps they think it's more descriptive than "gear oil". It doesn't call up any particular performance or viscosity. For example a Volvo MTF will not be the same as a Honda MTF.

How do gear oil, ATF and MTF viscosities relate to engine oil viscosities?

Gear oils and engine oils are classified by 2 different viscosity grading systems. A 75W-90 gear oil, for example, is about the same viscosity as a 10W-40 engine oil. In theory ATFs and MTFs can be any viscosity as required by the OEM. In practice ATFs are approx. the same viscosity as a SAE 10 engine oil or a ISO 32 hydraulic oil. MTFs are about the same, possibly slightly thicker.

What is a 75W gear oil as this is only a cold crank rating isn't it?

The target here is 4.1 cSt minimum @ 100 deg. C + the low temp target. If the gear oil in question is, for example, a 75W-80 it must meet both specs which is effectively the 75W low temp + the high temp targets of both specs.; 4.1 cSt minimum for the SAE 75W and 7.0 - 11.0 cSt for the SAE 80. You can see that the SAE 80 target "overlays" the SAE 75W target so expect the KV 100 of a 75W-80 to be about 9 cSt.

Can one gear oil cover a number of viscosities like 75w-90, 80w-90 and 90 and why?

Yes it can, the viscosity grades are not mutually exclusive, it is possible to blend a gear oil with multigrade characteristics such that it falls within, for example, the SAE 75W and the SAE 90 viscosity bands. A multigrade oil (gear or otherwise) is simply an oil which falls into more than one viscosity grade.

Why do some synthetic gear oils cause poor shifting in older or high mileage boxes?

If this really happens it can be that the generally lower viscosity of a synthetic gear oil may not suit an older or worn box.

Can engine oils be used in gearboxes if they are the right viscosity and are there advantages to using them?

Engine oils can be used in certain gearboxes, in the past it was the norm to do just that. Modern engine oils can be expected to attain the baseline API GL4 performance required for gear protection. Viscosity is not likely to be an issue, the viscosity of a 10W-40 engine oil, for instance, approximates to a 75W-90 in gear oil terms. The gear oil viscosity grade system uses bigger numbers than the engine oil system but that doesn't mean the oils are thicker.

The advantages? The detergency and antiwear systems in engine oils may cope with excessive "competition" temperatures better. Engine oils are intended for a shorter service life than gear oils so one point to be aware of is the viscosity modifiers used in multigrade engine oils may not be as shear stable as true gear oil VM's so a bigger viscosity drop in service is possible. If you are considering this, use a top quality shear stable engine oil, or talk to us first.

Are filled for life gear oils a gimmick and are they in the long term bad for your gearbox?

I wouldn't say they are a gimmick but they do assume "normal" service conditions. Having a modified engine putting more power through the box & competition conditions don't lend themselves to gentle gear changes so you may see higher wear rates and more wear debris in circulation. It's logical to change the oil periodically if only to flush out the wear debris.

Of course the discerning owner may wish to change the oil occasionally even if

the service conditions are considered to be less severe.

This may raise more questions than it answers but hopefully it is of use to some of you.