



Frequently asked questions about ZF lubricants

• Why does ZF develop transmission oils?

Each new generation of modern vehicles and transmissions is required to meet increasingly challenging demands. Finally, they are transferred to the transmission oils. Moreover, certain properties of the oils are now absolutely essential for the optimal functioning of specific transmission components ("oil as a constructive element of the transmission").

In order to ensure optimum performance and comfort of the gear shift, each type of transmission needs to be filled with the perfect oil according to it.

• What tasks should lubricants perform?

Preventing the friction and wear of sliding or rotating the internal components of a transmission. ZF transmission oils are designed to prevent, conserve and seal mechanical components and also to reduce fuel consumption and increase performance.

• What requirements do lubricants have to meet?

For most components, oil as a lubricant, cooling fluid and control and execution component, is relevant for their operation as well as for their service life. Moreover, the requirements for the various components of the transmission are very specific and for some, however, lead to conflicts. For bearings and bearings, for example, designers are trying to obtain the lowest possible friction value, for a favorable transmission efficiency index. In contrast, couplings and synchronous devices require a high coefficient of friction in order to function properly. Good oil, defined as such by ZF, is one whose properties perfectly meet the different specific needs in the operation of a transmission.

• What is meant by the term "synthetic oil"?

"Synthetic oil" is really a marketing (market) name, and is interpreted differently from country to country. A reliable guide is the API classification issued by the American Petroleum Institute. API Group 1 includes mineral oils. API Group 2 and 3 include hydrogenated mineral oils, some of which are now known as "synthetic". Synthetic oils, as included in API Group 4, are those of polyalphaolefins, which are artificially created from other chemical compounds.

• What are the properties of synthetic oils?

The main advantage of polyalphaolefins is their high thermal stability, which allows long intervals of oil exchange even in high operating temperatures. Another advantage is the its characteristic "viscosity - temperature" which is relatively linear (quota - stable). This is why the use of these oils is particularly suitable for regions with hot or cold climates.

• What is viscosity?

Viscosity is the measure of the oil's resistance to flow. With high viscosity, thick lubricating films are created to protect the bearings from slipping and bearings from wear. Low viscosity usually means less losses through swirling, and thus a high level of efficiency, resulting in lower fuel consumption. In manual transmissions, the forces for changing gears increase with increasing viscosity, thus generating low comfort for shifting gears.

• What causes the change in viscosity of an oil?

Temperature fluctuations (hot = low viscosity / cold = high viscosity) as well as shear (viscosity decreases during operation) or aging (viscosity increases). In the field of engines, the infiltration of fuel or soot in oil is also important.

- **How can lubricants adapt to meet particular requirements?**

By adding additives (additive content up to 25% by volume to oils with extreme use).

- **What does SAE mean in the classification of the fields of viscosity (example: SAE 15W-40)?**

SAE is the abbreviation for the "Society of Automotive Engineers" in the USA.

- **What improves the viscosity index?**

Very large molecules that increase the viscosity of the oil at high temperatures (=> multigrade oils for a wider range of temperatures). Disadvantages: the efficiency is lost by shear (the oil becomes thinner), so, depending on the quality of the viscosity enhancer, the viscosity of this oil can decrease significantly after only a short operating period.

- **Can synthetic oil be mixed with mineral oil?**

Synthetic oils based on polyalphaolefins can be easily blended with mineral oils. But this reduces the quality, and the intervals of exchange must be shortened accordingly.

- **Is it possible for a transmission that has worked for a long time with synthetic oil to be replaced with a mineral one?**

Yes. But we can not expect the same performance. The same is true for the additives package, which is especially designed to be more effective in synthetic oils. Refer to the list of ZF, TE-ML xx lubricants, if necessary.

- **Can higher quality oil be changed with lower frequency?**

Yes. Oil change intervals are specified in the list of lubricants ZF, TE-ML xx, specific to the transmission types.

- **What is wrong with using a low-cost oil as I change it more often?**

Low-priced oils can give way from the beginning, leading to internal transmission wear and contamination. It is recommended to use synthetic products, especially if the operating temperature is high.

- **Is it possible to use a different viscosity from the specified one?**

The viscosity categories suitable for the individual units (transmissions) are specified in the ZF, TE-ML xx oil lists, specific to each type of product.

- **What specific properties should a transmission oil possess?**

In addition to general properties, such as lubrication and cooling, corrosion protection, etc., modern transmissions often require oil properties that are not described in the technical data sheet for an oil type (friction characteristics, compatibility with special materials, special protection for bearings or bearings with heavy loads, etc.). That is why we urgently recommend using only the oils approved according to the list of ZF lubricants, TE-ML xx, for each type of transmission.

- **What is the flow point?**

It is the lowest temperature at which a liquid will continue to flow when it is cooled under well-defined conditions. The flow point determination is made according to DIN ISO 3016.

- **What is shear stability?**

In order to improve the viscosity - temperature behavior, enhancers of the viscosity index (oil soluble polymers) are added in many oils. Depending on the quality of these additives, the viscosity of the additive oils may decrease significantly after only a short period of operation. This decrease in viscosity during use is also defined as the decrease in shear stability. Oils without appreciable decrease in viscosity during operation are also stable at shear.

- **What are EP / AW additives (aditives against wear)?**

They are active substances intended to reduce wear in the field of different combined friction. These additives ultimately protect bearings of bearings and bearings subjected to large loads.

- **What does the ability to prevent wear / grip under load mean?**

The ability to prevent wear / grip under load describes the protective effect of the oil with respect to the failure through the grip. This capacity is determined by a special gear test during which the load is increased in steps. The measured values indicate the level of applied force at which this defect begins to appear.

- **What is meant by improving thermal stability?**

At a high oil sorption temperature, its oil life is limited. By using synthetic-based oils (polyalphaolefins) and suitable additives, the thermal stability can be markedly increased.

- **What is meant by the point of flammability?**

The flammability point refers to the lowest temperature at which a flammable liquid produces sufficient vapors that ignite instantly when exposed to a source of ignition.

- **What is a self-ignition point?**

The self-ignition point is the lowest temperature at which the vapor ignites a flammable liquid.