Section K/S
Technical Information

The demands placed upon lubricants parallel the developments of the automobile industry. Although the basic functions of the lubricants have not changed, the changes in the automobile over the past fifteen years have made some of the tasks more difficult. The oil companies have, however, met the challenge. The quality lubricants of today are able to carry out their required functions better than ever before.

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Engine Oil

Engine oils are now classed both by viscosity and by their performance under various service requirements.

Viscosity

The use of the proper viscosity engine oil is essential to satisfactory engine performance. The lubricant must be thick enough at high temperatures to provide a protective oil film between moving parts, yet must also be sufficiently thin at lower temperatures to allow quick starting and adequate lubrication during the warmup period. Because of the importance of viscosity, this property is one of the primary means of classifying motor oils.

Viscosity is a measure of the resistance of a liquid to flow. This resistance is due to the internal friction of the liquid molecules moving past each other. The most important variable affecting viscosity is temperature.

While there are many ways of measuring viscosity, the system presently used to classify motor oils (for example SAE 30, SAE 10W) was developed by the Society of Automotive Engineers (SAE). The SAE grade numbers which are not followed by the letter W are obtained from determined viscosity measurements at 210° F. Numbers containing a W (for "winter") are developed on the basis of a viscosity at 0° F. These grade numbers serve as an important guide in the selection of the proper viscosity oil for various temperature and service conditions.

Service Classification Requirements

These requirements range from the mildest (SA, SB, SC), requiring minimum protection against deposits, wear or rust to the severe requirements (SD, SE) imposed on automotive gasoline engines by:

Short-trip, start-and-stop service

High temperature trailer towing

Sustained high-speed, high-temperature driving.

For Volkswagen vehicles, the new designation SD (S for Service; D for the class of Service) replaces the former designation MS (Motor Severe) which in turn replaced the original designation HD (Heavy Duty).

The designation SD is a rating of the new alphabetically graded system, with the letters (SA) being the lowest and, at present, (SE) being the highest service classification level.

A combination of designations (SB/SD) indicate that the oil meets more than one service classification requirement.

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Transmission oil

There are two groups of transmission oils which may be used in vehicles:

High pressure transmission oil (HP)

Hypoid transmission oil (EP extreme pressure).

Oils of the first group are used in manual transmission and final drives with spiral gears. The hypoid transmission oils are used in hypoid gear final drives.

Construction features which combine the final drive and manual transmission in the same housing require an oil which fulfills the demands of both hypoid and manual transmissions.

Hypoid oils of the specification MIL-L 2105 B (additive base: sulphur/phosphorus) are oils which will stand great stress and whose wear capabilities are influenced by additives such as sulphur/phosphorus. Under pressure, these additives react upon the tooth surface and build up a protective coating, thereby preventing metal to metal contact and consequent wear.

This specification, which was originally developed for U.S. military vehicles, has also been adopted for use on Volkswagen vehicles.

Automatic transmission fluid (ATF) DEXRON ®

The fluid used in automatic transmissions fulfills several functions. It lubricates the bearings and gears, minimizes wear of the clutch linings and brake bands, serves as a hydraulic fluid, works as a power transfer medium in the torque converter and acts as a means to transfer heat.

(Dexron is the registered trademark of the General Motors Corporation for automatic transmission fluid formulated to their specifications).

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High pressure grease (calcium universal grease)

The term high pressure grease indicates its suitability in high pressure applications. Greases which have saponified calcium as a thickening agent are used on vehicles at points of secondary importance. They are greases which, due to their resistance to water, are used at locations that remain cold during operation and where the sealing quality of the grease is also of importance.

Multipurpose grease (lithium grease)

Lithium saponified greases have a wider temperature range of operation than calcium saponified greases. Bearing pressure and anti-corrosion capabilities are greatly improved by the addition of chemical additives. Such a grease can be used in plain (sleeve) and roller bearings.

Molybdenum grease (lithium grease with microfine molybdenum disulphide additive)

Lithium grease with molybdenum disulphide additive provides a low friction level for minimal drag and prevents metal to metal contact. It is used in the constant velocity joints.

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General

The fuel most commonly used in automobile and internal combustion engines is gasoline. Fuels such as diesel, liquid petroleum gas (LPG) and others are usually for specialized applications.

The two most important characteristics of gasoline as used for fuel in automotive engines are volatility and antiknock qualities.

Volatility

The volatility of any liquid is its vaporizing ability. This characteristic is of vital importance when starting a cold engine.

Anti-knock qualities

The ability of a fuel to burn without causing detonation or knocking is aided by the addition of such compounds as tetraethyl lead and in the case of some gasolines, by additional refining processes.

Knocking

In most cases knocking or pinging is an audible indication that normal combustion is not taking place in an engine. During normal combustion, the burning is progressive. However, under certain conditions, the extreme heating of the unburned part of the mixture may cause it to ignite spontaneously and explode. It is this rapid uncontrolled burning that causes knocking with consequent loss of power, overheating and possible damage to the engine.

Octane rating

The ability of a fuel to resist detonation is measured by its octane rating. This rating is determined by matching a fuel against mixtures of normal heptane and iso-octane in a test engine under specified test conditions, until a mixture of the pure hydrocarbons is found which gives the same degree of knocking in the engine as the gasoline being tested. The octane number of the fuel is then the percent of the iso-octane in the matching iso-octane normal heptane mixture. For example, a gasoline rating of 90 octane is equivalent in its knocking characteristics to a mixture of 90 percent iso-octane and 10 percent normal heptane.

However the tendency of a fuel to detonate varies in different engines, and also in the same engine under different operating conditions. It is important to emphasize that the octane number of a fuel has nothing to do with its starting qualities, power, volatility or other major characteristics. If an engine operates satisfactorily with a fuel of a certain octane rating, its performance will not be improved by using fuel of a still higher octane rating.

Of the two methods of determining octane ratings (Research or Motor) the Research method is the one most commonly quoted by fuel suppliers and automobile manufacturers.

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