BB00.40-P-0210-00A	General information on lubricants	Sheet 210.0	

MODEL ALL

General

Functions to be fulfilled by lubricant are just as important as those of structural components. Lubricants, too, should be adapted to all the stresses occurring in a component or vehicle to meet all the technical demands imposed with regard to their lubricating functions. The basic oil, the composition of the lubricants, as well as the kind and the share of the additives to the lubricant employed are subject to high demands, since the efficiency, the service life and the operational safety of a vehicle and all the parts requiring lubrication also depend on the quality of the respective lubricant.

Viscosity

The viscosity (flow resistance) is the ability of a lubricating oil to establish internal resistance (friction) against distortion (relative motion between two fluid layers). The viscosity rating indicates the flowability of the lubricating oils (e.g. in the low and high temperature range).

Dynamic viscosity

The SI unit (SI = Système International d'Unités) for dynamic viscosity is the Pascal second (Pa s).

Measuring unit: 1 Pa s = 1 Ns/m2,

Viscosity conversion: 1 mPa s = 1 cP (centipoise).

Kinematic Viscosity

The quotient of dynamic viscosity and density is the kinematic viscosity = /.

The SI unit is m2/s.

Viscosity conversion: 1 mm2/s = 1 cSt (centistoke).

Viscosity temperature response (VT response)

The VT response of a mineral oil indicates the change in viscosity under the influence of temperature. The viscosity of lubricating oils changes with temperature and pressure, that of structurally viscous oils also under the influence of the shear rate. Generally viscosity decreases as temperature rises.

Viscosity index (VI)

The viscosity index identifies the viscosity temperature characteristics of lubricating oil. It is a calculated number on a conventional, graduated scale which indicates the viscosity change of a mineral oil under the influence of temperature. A high viscosity index identifies a relatively minor change of viscosity in relation to temperature and vice versa. The viscosity index can be calculated from viscosity values which were measured at 40 °C and 100 °C.

SAE viscosity grades

The Society of Automotive Engineers (SAE) has established a classification for the two most important lubricating oils of motor vehicles, engine and gear oils, with regard to their viscosity, which was included in the respective national standards. The SAE class indicates the viscosity at low and high temperatures. Viscosity is of importance at low temperatures for cold-starting and at high temperatures for adequate lubricating properties at full load or at high speeds. It is therefore important to pay attention to the SAE grades specified on Sheets 224.1/.2 and 231.1/.2/.3.

SAE grades for engine oils

SAE J 300 defines the SAE viscosity grades for engine oils (refer to Sheet 211.0). In today's customary multi-grade oils, two numbers are stated, e.g. 10W-40. The number before the "W" specifies the oil's flow behavior at low temperatures, the number after "W" specifies the viscosity in the high-temperature range. In oils designated by "W", the cold flow behavior is defined over two specified limits, Cold Cranking Viscosity and Pumping Viscosity (both dynamic viscosities in mPa s). In the high-temperature range, the viscosity is specified at a temperature of 100 °C (kinematic viscosity in mm^2/s) as well as dynamic viscosity at 150 ° C and a high shear rate 10^6 1/s (dynamic viscosity in mPa s).

SAE grades for gear oils

The SAE viscosity grades for gear oils are standardized in SAE J 306. As for engine oils the SAE viscosity grades with the letter "W" (e.g. 75W) indicates a limit for the low temperature viscosity characteristics of the gear oil. The limit defines the temperature at which the dynamic viscosity

of the gear oil must be less than or equal to 150 000 mPa s. The viscosity characteristics at 100 °C are defined for all SAE grades by the limits for the minimum kinematic viscosity as well as for SAE grades 80, 85, 90 and 140 in addition by a limit for the maximum kinematic viscosity.

Additives

The high demands made on lubricating oils today can only be met by blended lubricating oils, that is, by oils with special chemical additives which are dissolved in the oil.

The type and quantity of the additives must be accurately adapted to the functions of the respective components. The effects of additive components in the oils and their performance characteristics are tested during lengthy and expensive tests.

For this reason, the Mercedes-Benz Specifications for Operating Fluids only list products whose performance characteristics have been comprehensively tested and documented by the corresponding approval process. Only lubricants tested and ready-formulated such as these are approved by Daimler AG.

Up to now Daimler AG has not approved any product that is allowed to be introduced or mixed into approved, ready-formulated lubricants for engines, transmissions or major assemblies in Mercedes-Benz vehicles as a special additive! More detailed information is available on Sheet 219.0.

The basic requirements on lubricating oils, that is on their additives, are described in Sheet 221.0 for engine oils, 231.0 for transmission oils and 261.0 for lubricating greases.

If lubricants must be changed or replenished, and the brand used up to now is not available, another approved brand of the same type may be used without fear of subsequent damage. No special relubricating (cleaning) instructions need to be observed.

However, repeated changes of oil brands without a definite reason should be avoided, since the resulting mixtures may be less efficient than intended.