MÉGUIN
OILS OF GERMANY

MÉGUIN
Lubricants from A-Z

compact expertise



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TECHNICAL TERMS

1. Terms from A-Z

ACEA
ACEA (Association des Constructeurs Européens d'Auto mobiles) has been the official successor organization of CCMC since 1/1/1996. It defines the quality of motor oils according to the requirements of European motor manufacturers.

ADDITIVE PACKAGE
An additive package is a mixture of various chemical materials that influence the properties of the motor oil in different ways.

ALKALINE RESERVES
The alkaline reserves of an oil neutralize acidic reaction products, which are created during the combustion of fuel.

API
The American Petroleum Institute (API) determines the global quality requirements and testing criteria for lubricants.

ATF
So-called Automatic Transmission Fluids (ATF) have a defined friction value and have a high viscosity index. The oils are mainly used in automatic transmissions and power steering.

BASE NUMBER
The base number shows the quantity of alkaline reserves in motor oils. In used oils the base number gives an idea of the remaining additives that have not yet been used.

BASE OIL
Base oil is the base product for the manufacture of lubricating oils. Base oils (mineral, hydrocracked or fully synthetic) are manufactured by various refinery processes.

CATALYTIC HYDROCRACKING
During catalytic hydrocracking, in the presence of a catalytic converter (e.g. synthetic aluminosilicates), and at a temperature of 500 °C the molecule chains are broken.

CRACKING
In cracking, long hydrocarbon molecules are broken up. These broken molecule chains form the base product for synthetic oils.

CRUDE OIL
Crude oil is a mixture mainly made up of hydrocarbons, which is created by the decomposition process of organic materials.

DISTILLATION
During distillation crude oil is heated under atmospheric pressure and disassembled into its natural components.

DETERGENTS
Detergents are wash-active substances that protect the motor against deposits. Also, detergents form the so-called alkaline reserves.

DEWAXING
During dewaxing wax crystals are removed from the corresponding distillate, in order to improve the pour point (the lowest temperature in which the oil is still flowing, when it is cooled under certain conditions)

DISPERSANTS
The dispersants contained in motor oil coat solid and liquid contamination in the oil and transport them to the oil filter.

EP ADDITIVES
Extreme Pressure additives (EP) form a "protective layer" on the metal surfaces under high pressure and great heat.

FULLY SYNTHETIC BASE OIL
Fully synthetic base oils are manufactured based on naphtha (petroleum). These oils have very good temperature and aging stability.



GL
GL means "Gear Lubricant" and identifies the pressure stability of a gear oil according to API.

HTHS VISCOSITY
High Temperature High Shear (HTHS) is the dynamic viscosity of a liquid measured at 150 °C under the influence of high shear forces.

HYDROCRACKED BASE OIL
Hydrocracked base oils are manufactured based on paraffin. These oils are currently state-of-the-art and are also used in cutting edge petrol/diesel motors.

HYDROCRACKING
During hydrocracking, long molecule chains are broken up in the presence of hydrogen. This hydrogen stores itself in the open chain ends and "repairs" the breakage.

HYDROFINISHING
Hydrofinishing is the addition of hydrogen during the manufacturing of mineral base oil for ensuring optimum aging stability.

JASO
The Japanese Automotive Standards Organisation (JASO) divides lubricating oils into various classes and is mainly used in the motorbike sector or in Asia.

LIMIT TEMPERATURE
The pump limit temperature identifies the temperature up to which the motor oil can still flow to the oil pump by itself.

LOWER TEMPERATURE VISCOSITY
This is the temperature at which a vehicle that is in good technical condition can still be started. The cold start safety is at approx. 5 °C over the limit pump temperature.



MINERAL BASE OIL
Mineral base oils are a direct product of Crude oil distillation.
This type of base oil is no longer used in modern motors.

NAPHTA
Naphta is petroleum, which represents a product of Crude oil distillation.

PARAFFIN
Wax crystals that form the byproduct of the manufacture of mineral base oil are described as paraffin.

POUR-POINT
The pour point is the lowest temperature at which the oil just about flows when it is cooled down under certain conditions.

POUR-POINT-DEPRESSANT
A Pour Point Depressant (PPD additive) changes the structure of the wax crystals in the base oil and delays their growth. This minimizes the solidification point of the oil or improves the low temperature property.

REFINING
Refining is the removal/conversion of unwanted parts from vacuum distillation.

SAE International
SAE International (formerly the Society of Automotive Engineers) specifies the valid viscosity classes for motor and gear oils in the automotive industry, which manufacturers around the world conform to.

VACUUM DISTILLATION
In vacuum distillation objects are separated from distillation of the raffinate under a vacuum. With the vacuum the boiling point can be reduced by approx. 150 °C and therefore the cracking of the molecules is prevented.

VISCOSITY SINDEX

The Viscosity index (VI) describes the viscosity/temperature behavior of the oil.
The higher the VI, the lower the change in viscosity across the entire temperature range.

VISCOSITY INDEX IMPROVERS

Viscosity index improvers are polymers that are constructed in such a way that they influence the temperature-dependent viscosity change of an oil.

VISCOSITY

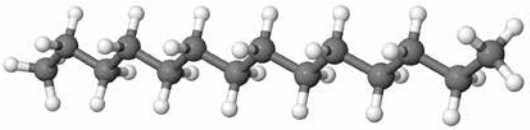
Viscosity is the resistance (inner friction) of a fluid. The higher the resistance, the more viscous the oil is. The viscosity in motor and gear oils is given according to SAE.



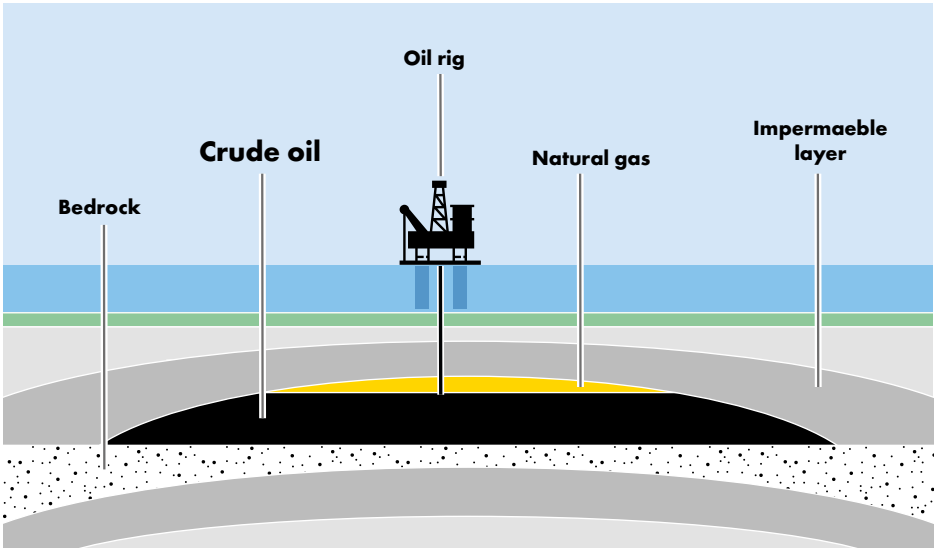


BASICS

2. Crude oil



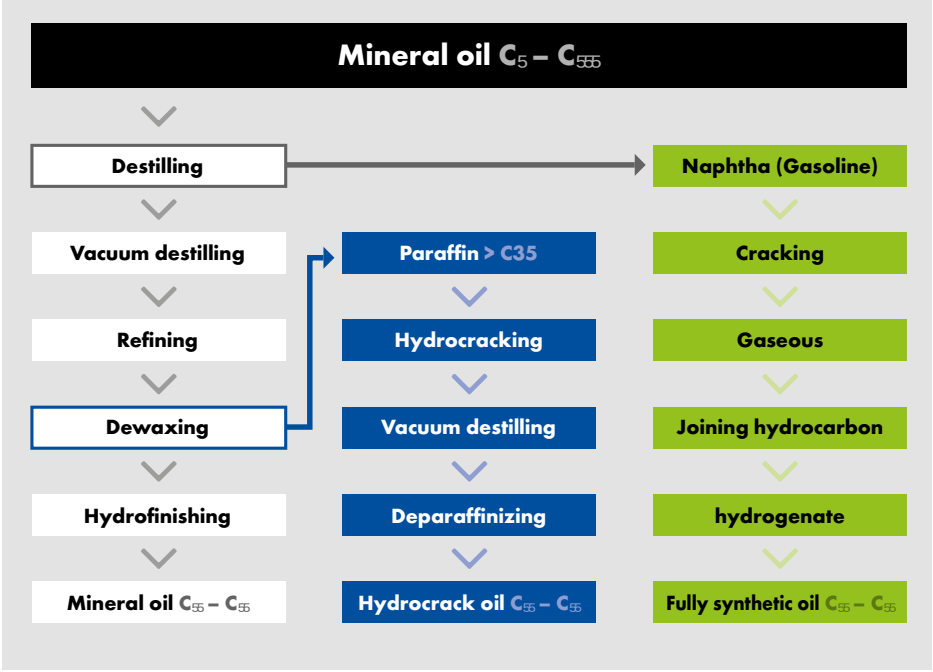
Crude oil was created by dead plankton that sank to the bottom of the seabed millions of years ago. Over the course of time, sand and stones built up on top of it. Due to this impermeable layer and under oxygen exclusion, pressure and heat, the conversion of these "lifeforms" into Crude oil took place. The basic building blocks of Crude oil are hydrocarbon compounds, which can occur in various chain lengths (C5 - C100).





3. Various base oils

Base oils form the base product for the manufacturing of motor oils. The various base oils (mineral, hydrocracked or fully synthetic) are manufactured by various refinery processes (see sketch).



3.1 Mineral base oil

Mineral base oil is the simplest and oldest form of base oil. In manufacturing the already described crude oil serves as a direct base product. The crude oil is heated in a furnace and disassembled into its natural components (distilled). Then unwanted and damaging components are removed from the distillate by the refining process or by dewaxing. Thanks to the subsequent hydrofinishing, the raffinate specifically has hydrogen added to it, which closes the open molecule chains and therefore significantly increases the aging stability.

3.2 Fully synthetic base oil

Fully synthetic base oil is mainly characterized by its very good thermal stability and cleaning performance. As high performance as it is, so laborious its manufacture also is. So-called naphtha (petrol without additives) serves as the base product. Naphta in cracked in the first step, which means that the molecule chains (C5 – C12) split open and are broken down to a length of C2. The former liquid is now gaseous. In the consequent synthesis process the short molecule chains (C2) are added to long molecule chains (C20 – C35) and sealed by adding hydrogen (hydrogenation).

3.3 Hydrocracked base oil

Hydrocracked base oil combines the positive properties of mineral and fully synthetic base oils with one another. This base oil type offers a very good thermal stability and resistance to aging with simultaneously absolute material compatibility. The basis for hydrocracked base oils are formed by the paraffin taken from the mineral oil extraction. The paraffin is made up of long-chained molecule compounds (> C35). These are split open in the presence of a catalytic converter under a pressure of 70 - 200 bar and temperatures of up to 500 °C and shortened to a useful length of C20 – C35 (catalytic hydrocracking). The liquid in the vacuum is subsequently distilled, in order to avoid the cracking of the molecule chains.
In the last step, any paraffin deposits are removed





4. Additive package

In most cases the base oil alone is not sufficient to cover the many tasks that an oil has to fulfill in a motor, for example. For a reliable lubrication and seamless operation the base oils of additives are added. With the help of these additives, certain properties of the oil can be improved or completely new properties achieved. The list of the additives used for this is varied and long. The individual materials are, depending on the requirement, comprised in an additive package. This package added to the base oil heated from 40 °C to 60 °C and is stirred until it is completely dissolved in the oil. In modern motor oils the concentration of additives can be up to 30% or less than 1% in gear oils.

Fundamentally, you can differentiate between two types of additives:

- Additives that have an effect on the base oil, e.g. pour point improvers, anti-foam additives or viscosity index improvers.
- Additives that have an effect on the material surfaces (bearings, cylinders ...), e.g. bonding enhancers or friction modifiers (friction value improvers).

Here is a list of the properties of an oil that can be influenced by additives:

Characteristics	Influenceable by additives	Only possilbe by additives	Not influenceable by additives
Low-temperature behaviour	●	○	○
Aging stability	●	○	○
Viscosity/ temperature behaviour	●	○	○
Corrosion protection	●	○	○
Dirt solving ability	●	●	○
Dispersing power	●	●	○
High presure properties	●	●	○
Foaming characteristics	●	●	○
Air discharging	○	○	●
Water separation	○	○	●



4.1 Detergents

Detergents are wash-active substances in the oil, which prevent the formation of deposits or free the motor of them. If these are used up by exceeded oil change intervals, for example, the result is the increased formation of deposits (see picture). This causes friction to measurably increase in the motor, risking motor damage.

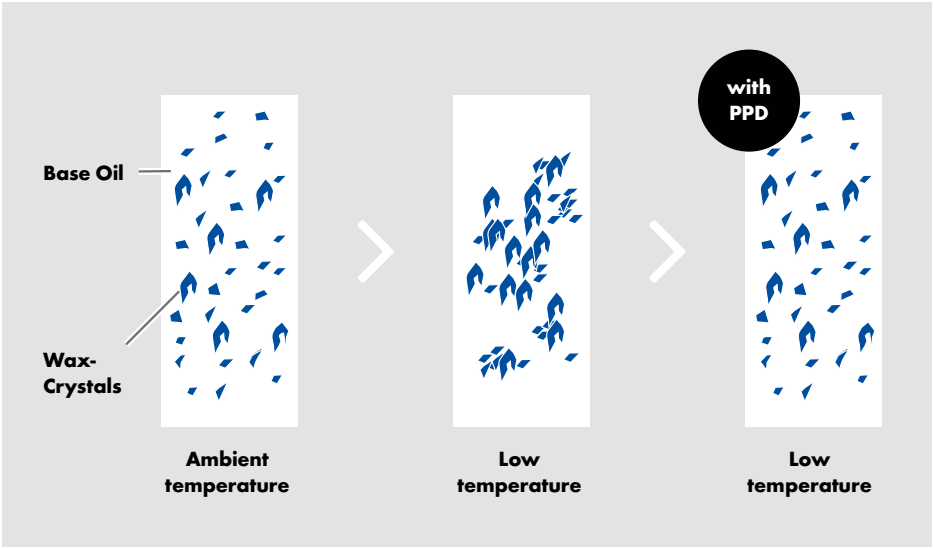
4.2 Extreme Pressure Additives



Extreme Pressure Additives (EP additives) are added to the oil in the form of sulfur or phosphorous in order to prevent fusing due to high pressures or loads of the friction partners. In this case, EP additives in lubricants are indispensable. Under high pressures or loads, high temperatures are created in the lubricant. This causes sulfur (sulfur carriers) or a phosphorous derivative (compounds containing phosphorous) to be released from the EP additive. Under these conditions, the released substance immediately reacts with the metal surface to metal sulfides or phosphates. The connections form on the metal surface layers that are sheared off under the high pressure, with which a fusing of the metal surfaces is prevented.

4.3 Pour-Point-Depressant (PPD)

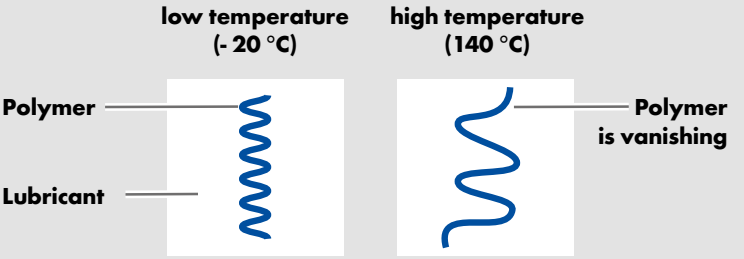
The PPD additive is used to reduce the solidification point of the lubricant and therefore improve the low temperature properties. The wax crystals included in base oil are changed in their structure by the additive and their growth is significantly slowed down at low temperatures.



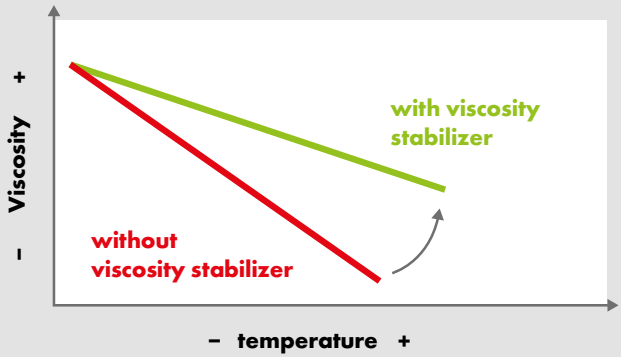
4.4 Viscosity index improvers

Viscosity index improvers are macromolecular polymers (combination of macromolecules) that are constructed in such a way that they influence the temperature-dependent viscosity change of an oil. The polymer contracts at low temperatures. This makes the resistance that the polymer opposes an invading body with smaller and the viscosity change of the base oil is equalized.

The image shows how this mechanism works:



Graphical description:



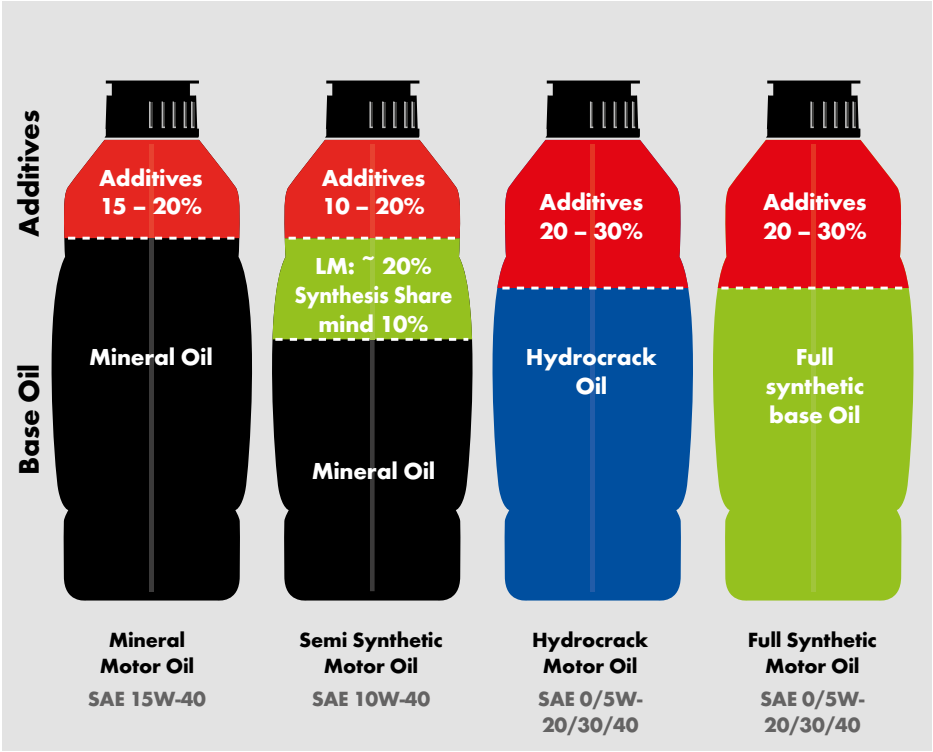
Note: The higher the viscosity index of an oil, the lower the change in viscosity is over a wide temperature range.

4.5 Anti-foam additives

An unwanted byproduct of circulation lubrication is the inclusion of small air bubbles in the motor oil. Anti-foam additives cause a significant reduction of foam created in the circulation of oil (air pockets).



4.6 Additive share in motor oils





CLASSIFICATION

5. Classification of motor oil

In order to select the correct motor oil, two pieces of information are required. Firstly, the viscosity, and, secondly, the quality is required. Numerous organizations have arisen over the past few decades for these classifications:

- **SAE** (Society of Automotive Engineers)
- **API** (American Petrol Institute)
- **ACEA** (Association des Constructeurs Européens d'Automobiles)
- **ILSAC** (International Lubricant Standardization and Approval Committee)
- **JASO** (Japanese Automotive Standards Organization)

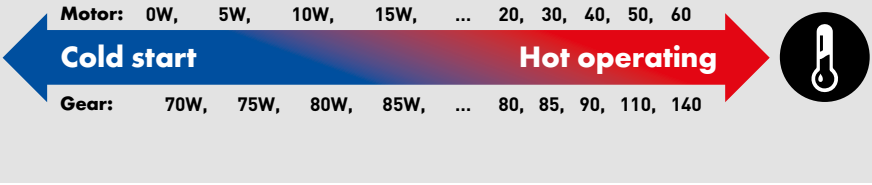
The well-known European vehicle or motor manufacturers (Mercedes-Benz, BMW, VW ...) conform to SAE for viscosity information and ACEA for quality information. The motor oils to be used for import vehicles that were developed outside of Europe (Toyota, Mitsubishi, Chrysler ...) mainly conform to API or ILSAC and SAE.



Tip: You can find the specifications and approvals on the front of our products.

5.1 Classifications by SAE

The viscosity gives only information about the inner friction of a motor or gearbox oil and therefore does not define any kind of qualitative properties. This means that a motor oil that fulfills a viscosity as per SAE has a prescribed flow behavior at various temperatures. The viscosity is divided into the cold start range (e.g. 0W) and the operating temperature range (e.g. 30). The higher the given figure, the more viscous the motor/gear oil is in the corresponding temperature range. The letter "W" identifies the winter suitability of the oil (multi-grade oil). If this addition is missing, then the oil may only be used in summer.



Up to which low temperature a motor/gear oil can be used depends on the flowability in the limit temperature range. The deeper the expected temperature, the less viscous the oil has to be.

Limit temperature for motor oil

SAE 0W	- 40 °C
SAE 5W	- 35 °C
SAE 10W	- 30 °C
SAE 15W	- 25 °C
SAE 20W	- 20 °C
SAE 25W	- 15 °C

Low temperature viscosity (max. 150.000 mPa*s)

SAE 70W	- 55 °C
SAE 75W	- 40 °C
SAE 80W	- 26 °C
SAE 85W	- 12 °C

5.2 Classifications by API

The American Petrol Institute fundamentally differentiates between two different types of motor oil: On the one hand, motor oils for gasoline motors (S), on the other, motor oils for diesel motors (C). The letter following the first letter, e.g. "G" or "H", defines the quality of the lubricant. The later in the alphabet this letter is, the higher quality the motor oil is. The higher classifications such as API SN can be used by API for the preceding classifications without hesitation, e.g. API SL. For motor oils for diesel motors a "4" can additionally be displayed. This addition identifies the suitability for large motors such as trucks or buses (heavy duty).



5.3 Classification by ACEA

The Association des Constructeurs Européens d`Automobiles forms the oil standard for European vehicle or motor manufacturers. Here – as with API – oils for petrol motors (A) and light diesel motors (B) are differentiated. Unlike with the API, at the ACEA every category has its own meaning and cannot be used backwards compatibly.



5.3.1 Car petrol and diesel motors

A1/B1 High-performance motor oil for petrol and diesel motors, so-called fuel economy motor oils with particularly low High Temperature High Shear viscosity (2,9 - 3,5 mPA*s). Reserved for viscosity class xW-20. Invalid since 12/2016.

A3/B4 High-performance motor oil for petrol and diesel motors, extends and replaces conventional motor oils like ACEA A2/B2 and A3/B3 and can be used for extended change intervals.

A5/B5 High-performance motor oil for petrol and diesel motors, so-called fuel economy motor oils with particularly low High Temperature High Shear viscosity (2,9 - 3,5 mPa*s). Reserved for viscosity class xW-30.

5.3.2 Car diesel motors with diesel particulate filters

C1 Category for low SAPS oil with reduced HTHS viscosity ≥ 2.9 mPa*s, low viscosity, performance as with A5/B5, but with very limited proportions of sulfate ash, phosphorous, sulfur.

C2 Category for mid SAPS oil with reduced HTHS viscosity ≥ 2.9 mPa*s, low viscosity, performance as with A5/B5, with limited, but higher proportions of sulfate ash, phosphorous, sulfur compared to C1.

C3 Category for mid SAPS oil with high HTHS viscosity ≥ 3.5 mPa*s, low viscosity, performance as with A3/B4, with limited, but higher proportions of sulfate ash, phosphorous, sulfur compared to C1.

C4 Category for low SAPS oil with high HTHS viscosity ≥ 3.5 mPa*s, low viscosity, performance as with A3/B4, with the same proportions of sulfate ash and sulfur, but increased proportion compared to C1.

C5 C5 category for mid-SAPS oil with reduced HTHS 2.6 – 2.9 mPas*s, low viscosity, for even more improved and optimum fuel savings, for vehicles with state-of-the-art exhaust aftertreatment systems, only for engines meeting the corresponding technical requirements.

5.3.3 Commercial vehicle diesel motors

E1/E2 Category not up to date.

E3 Category is included in ACEA E7.

E4 Based on MB 228.5, extended oil change possible, suitable for Euro 3 motors.

E5 Category is included in ACEA E7.

E6 Category for EGR motors with/without diesel particulate filters (DPF) and SCR-NOX motors. Recommended for motors with diesel particulate filters combined with sulfur-free fuel. Sulfate ash content max. 1%.

E7 Category for motors without diesel particulate filters (DPF) of the most EGR motors and the most SCR-NOX motors. Sulfate ash content max. 2 %.

E9 Category for motors with/without diesel particulate filters (DPF) of the most EGR motors and the most SCR-NOX motors. Recommended for motors with diesel particulate filters combined with sulfur-free fuel. Sulfate ash content max. 1%.

5.4 Classification by ILSAC

The International Lubricants Standardization and Approval Committee is very strongly based on the categories according to API in its classification of motor oils. There are five classification categories for petrol motors, but none for diesel motors.

ILSAC	
GF-1	introduction year 1996, comparable with API SH, category not up to date
GF-2	introduction year 1997, comparable with API SJ
GF-3	introduction year 2001, comparable with API SL
GF-4	introduction year 2004, comparable with API SM
GF-5	introduction year 2010, comparable with API SN

5.5 Classification by JASO

The Japanese Automobile Standard Organisation sets out the criteria for two-wheel oils. Here increased requirements of friction behavior (wet clutches), shear stability and burning behavior are set out. The JASO and API classifications are always occur together in the two-wheel sector.

JASO	
MA	4-stroke motors – high friction value for motorbikes with wet clutches
MA 2	4-stroke motors – high friction value for motorbikes with wet clutches
MB	4-stroke motors – low friction value for motorbikes without wet clutches
FB	2-stroke motors – low cleaning, incomplete combustion
FC	2-stroke motors – high cleaning, almost complete combustion
FD	2-stroke motors – highest cleaning, complete combustion



CAR SPECIFICATIONS

6. Car manufacturer specifications

Based on European vehicle manufacturers, the prescribed vehicle specifications are based on the motor tests of the ACEA. In order to achieve a manufacturer approval for a certain oil, in addition to the respective ACEA test procedure, further motor tests and requirements must be fulfilled. There is an overview on the following page of which manufacturer specification is based on which ACEA classification.

Attention: These approvals may not be valid in certain countries.



Standard SAPS

A3 / B3	A3 / B4	A5 / B5	C1
	VW 502 00 / 505 00	Mercedes-Benz MB-Approval 229.6	
	MB-Approval 229.3 / .5 MB-Approval 226.5	BMW Longlife-01 FE	
VW 501 01 / 505 00	BMW Longlife-01	Renault RN 0700	
Mercedes-Benz MB-Approval 229.1	Renault RN 0700 Renault RN 0710	Ford WSS-M2C 913-C WSS-M2C 913-D	Ford M2C934-B
Porsche A40	Fiat 9.55535-H2 Fiat 9.55535-M2, N2, Z2	Volvo VCC 95200377	Jaguar / Land Rover STJLR.03.5005 STJLR.03.5007
Fiat 9.55535-G1, G2, D2	Peugeot / Citroen PSA B71 2296 PSA B71 2300	Volvo VCC 95200377	
Peugeot / Citroen PSA B71 2294		Volvo VCC 95200377	Peugeot / Citroen PSA B71 2296
			DPF / CAT
High level Gasoline / diesel Fuel saving	High level Gasoline / diesel (incl. DI Diesel)	High level Gasoline / diesel (incl. DI Diesel)	Low SAPS Fuel saving (reduced HTHS)

HTHS = High Temperature High Shear Rate viscosity,
DPF = diesel particulate filter, CAT = catalytic systems,
SAPS = Sulfated Ash Phosphorus Sulfur

Low and Mid SAPS

C2	C3	C4	C5
DPF / CAT	DPF / CAT	DPF / CAT	DPF / CAT
BMW Longlife-12 FE	VW 504 00 / 507 00		
Toyota Other japanese	MB approval 229.31 MB-Approval 229.51 / .52		
Volvo VCC RBSO-2AE	Porsche A40 Porsche C30		
Fiat 9.55535-S1 Fiat 9.55535-GS1, DS1	BMW Longlife-04		
Ford M2C948-B Ford M2C950-A	Fiat 9.55535-S2, S3, GH2 Fiat 9.55535-T2		VW 508 00 / 509 00
Peugeot / Citroen PSA B71 2290 PSA B71 2312	Opel GM dexos2	Mercedes-Benz MB-Approval 226.51	Mercedes-Benz MB-Approval 229.71
	Peugeot/Citroen PSA B71 2297	Renault RN 0720	Porsche C20
Mid SAPS Fuel saving (reduced HTHS)	Mid SAPS	Low SAPS	Mid SAPS Fuel saving (heavily reduced HTHS)

Reduced HTHS = These oils may only be used in engines that are configured for them. Follow the manufacturer's instructions!

6.1 BMW

Approvals for BMW motors

Longlife-98	Based on ACEA A3/B3, can be used from model year ´98 Invalid – is replaced by Longlife-01
Longlife-01	Based on ACEA A3/B4, can be used from model year ´01, for petrol and diesel engines without DPF
Longlife-04	Based on ACEA C3, can be used from model year ´04
Longlife-12 FE	Based on ACEA C2, can be used from model year ´13, reduced HTHS viscosity, not backward compatible, only for selected engines
Longlife-14 FE+	Based on ACEA A1/B1, can be used from model year ´14, reduced HTHS viscosity, not backward compatible, only for selected engines

6.1 Fiat / Alfa Romeo / Lancia

Approvals for Fiat, Alfa Romeo and Lancia motors

9.55535-CR1	Based on ILSAC GF-5 or API SN, viscosity class 5W-20
9.55535-DS1	Based on ACEA C2, viscosity class 0W-30
9.55535-G1	Based on ACEA A1 or A5, viscosity class 5W-30, special development for CNG motors
9.55535-G2	Based on ACEA A3, viscosity classes 10W-40 and 15W-40, can be used in older gasoline motors
9.55535-GH2	Based on ACEA C3, viscosity class 5W-40, special development for "1750 turbo motor"
9.55535-GS1	Based on ACEA C2, viscosity class 0W-30, special development for 0.9 Twin Air (turbo) motor
9.55535-H2	Based on ACEA A3, viscosity class 5W-40, suitable for extended change intervals
9.55535-M2	Based on ACEA A3/B4, viscosity classes 0W/5W-40, suitable for extended change intervals
9.55535-N2	Based on ACEA A3/B4, viscosity class 5W-40, suitable for gasoline and diesel turbo motors
9.55535-S1	Based on ACEA C2, viscosity class 5W-30, suitable for gasoline and diesel turbo motors with WIV
9.55535-S2	Based on ACEA C3, viscosity class 5W-40, suitable for gasoline and diesel motors with WIV
9.55535-S3	Based on ACEA C3, viscosity class 5W-30, special development for Chrysler, Jeep and Lancia
9.55535-T2	Based on ACEA C3, viscosity class 5W-40, special development for gas motors
9.55535-Z2	Based on A3/B4, viscosity class 5W-40, special development for twin turbo diesel motors

6.2 Ford

Approvals for Ford motors

WSS-M2C-913-A	Based on ACEA A1/B1
WSS-M2C-913-B	Based on ACEA A1/B1, backwards compatible with WSS-M2C-913-A
WSS-M2C-913-C	Based on ACEA A5/B5, backwards compatible with WSS-M2C-913-B
WSS-M2C-913-D	Based on ACEA A5/B5, replaces WSS-M2C-913-A, B and C
WSS-M2C-925-B	Based on API SM, backwards compatible with WSS-M2C-925-B, is replaced by WSS-M2C-948-B
WSS-M2C-917-A	Based on ACEA A3/B4, counterpart to VW 505 01
WSS-M2C-934-B	Based on ACEA C1, viscosity class 5W-30
WSS-M2C-948-B	Based on API SN, specially developed for Ford EcoBoost motors
WSS-M2C-950-A	Based on ACEA C2, specially developed for Euro 6 TDCi-engines, viscosity class 0W-30



6.3 Mercedes-Benz

Approvals for Mercedes-Benz motors	
MB-Approval 229.1	For all cars up to 03/2002, is replaced by MB 229.3
MB-Approval 229.3	For intervals up to 30,000 km, is replaced by MB 229.5
MB-Approval 229.5	Stricter requirements than with 229.3, intervals up to 40,000 km possible
MB-Approval 229.31	Requirements as with 229.3 but low-ash, is replaced by MB 229.51
MB-Approval 229.51	Requirements as with 229.5 but low-ash, is replaced by MB 229.52
MB-Approval 229.52	Increased requirements of oxidation stability and fuel saving
MB-Approval 226.5	Based on Renault RN0700
MB-Approval 226.51	Based on Renault RN0720
MB-Approval 229.6	Based on ACEA A5/B5, not backward compatible, only for selected engines
MB-Approval 229.71	Based on ACEA C5, not backward compatible, only for selected engines

6.4 Opel

Approvals for Opel motors	
GM LL-A-025	Based on ACEA A3/B3, specification for petrol motors, is replaced by GM dexos2
GM LL-B-025	Based on ACEA A3/B4, specification for diesel motors, is replaced by GM dexos2
GM dexos2	Based on ACEA C3, applicable for all motors from model year ´10

6.5 Peugeot / Citroen

Approvals for Peugeot motors	
PSA B71 2290	Based on ACEA C3 with viscosity class 5W-30
PSA B71 2295	Based on ACEA A2/B2 for motors before model year 1998, no defined viscosity
PSA B71 2296	Based on ACEA A3/B4 with viscosity classes 0W-30, 0W-40, 5W-30 and 5W-40
PSA B71 2300	Based on ACEA A3/B4 with viscosity class xW-40, xW-50
PSA B71 2312	Based on ACEA C2 with viscosity class 0W-30

6.6 Porsche

Approvals for Porsche motors	
A 40	Based on ACEA A3 with viscosity classes 0W-40 and 5W-40, for petrol motors from 1994
C 20	Based on ACEA C5, corresponds to VW 508 00/509 00, not backward compatible, only for selected engines
C 30	Based on ACEA C3, corresponds to VW 504 00/507 00

6.7 Renault

Approvals for Renault motors	
RN 0700	Based on ACEA A3/B4, permitted for all Renault petrol motors
RN 0710	Based on ACEA A3/B4, permitted for all Renault diesel motors without a particulate filters
RN 0720	Based on ACEA C4, permitted for all Renault diesel motors with particulate filters from model year 2010

6.8 Volkswagen

Approvals for VW motors

VW 500 00	Multi-grade oil with viscosity classes SAE 5W-X/10W-X, is replaced by VW 501 01
VW 501 01	Multi-grade oil with viscosity classes SAE 5W-X/10W-X, is replaced by VW 502 00
VW 502 00	Multi-grade oil for higher requirements
VW 503 00	Longlife specification for petrol motors, based on ACEA A1, viscosity classes 0W-30/5W-30
VW 503 01	Longlife specification for supercharged petrol motors, viscosity class 5W-30
VW 505 00	Multi-grade oil for vacuum and turbo diesel motors
VW 505 01	Multi-grade oil for unit injector motors, based on ACEA B4, viscosity class 5W-40
VW 506 00	Longlife specification for supercharged diesel motors, viscosity class 0W-30
VW 506 01	Longlife specification for unit injector motors
VW 504 00	Specification for petrol motors with and without Longlife service, replaces all petrol specifications listed above
VW 507 00	Specification for diesel motors with and without Longlife service, replaces all diesel specifications listed above (Except for R5 and V10 TDI motors before CW 22/06)
VW 508 00	Longlife IV-specification for petrol motors with and without Longlife service, is not backward compatible, viscosity class SAE 0W-20
VW 509 00	Longlife IV-specification for diesel motors with and without Longlife service, is not backward compatible, viscosity class SAE 0W-20



COMMERCIAL VEHICLE SPECIFICATIONS

7. Commercial vehicle manufacturer specifications

Based on European vehicle manufacturers, the prescribed vehicle specifications are based on the motor tests of the ACEA or the API. In order to achieve a manufacturer approval for a certain oil, in addition to the respective ACEA/API test procedure, further motor tests and requirements must be fulfilled. An overview of which manufacturer specification is based on which ACEA/API classification is shown in the illustration below.



Standard SAPS

MAN M 3277 MAN M 3377	MAN M 3275
Mercedes-Benz MB-Approval 228.5	Mercedes-Benz MB-Approval 228.3
Volvo VDS-3 Scania LDF-2 / LDF-3	Volvo VDS-3 Scania LDF-2 / LDF-3
API CI-4	API CI-4

E4	E7
Supercharged diesel engines up to Euro V under very difficult operating conditions, e.g. much longer oil change intervals	Supercharged diesel engines up to Euro V under difficult operating conditions, e.g. longer oil change intervals

DPF = diesel particulate filter,
SAPS = Sulfated Ash Phosphorus Sulfur

Mid SAPS

MAN M 3477 MAN M 3677	MAN M 3575
Mercedes-Benz MB-Approval 228.51	Mercedes-Benz MB-Approval 228.31
Volvo VDS-3 Scania LA-2	Volvo VDS-4
API CI-4	API CJ-4 API CK-4
DPF and sulfur-free fuel	DPF and sulfur-free fuel
E6	**E9**
Supercharged diesel engines up to Euro VI under very difficult operating conditions, e.g. much longer oil change intervals and exhaust gas aftertreatment	Supercharged diesel engines up to Euro VI under difficult operating conditions, e.g. longer oil change intervals and exhaust gas aftertreatment

7.1 Iveco

Approvals for Iveco motors	
18-1804 FE	Based on ACEA E4/E5 with TBN content >14
18-1804 TLS E6	Based on ACEA E6 with TBN content >13
18-1804 T2 E7	Based on ACEA E7 with TBN content >14
18-1804 TLS E9	Based on ACEA E9 or API CJ-4
18-1804 TFE	Based on ACEA E4/E7 with TBN content >16

7.2 MAN

Approvals for MAN motors	
M3275	SHPD motor oil, change interval of up to 60,000 km possible
M3277	UHPD motor oil, change interval of up to 80,000 km possible
M3377	Higher requirements of cleanliness/deposits than M3277, change interval according to display
M3477	Same as M3277 but low-ash for Euro 5 motors with DPF
M3677	Euro 6 motors with DPF, change interval up to 120,000 km possible

7.3 Mercedes-Benz

Approvals for Mercedes-Benz motors	
MB-Approval 228.1	Based on ACEA E2 + further engine tests
MB-Approval 228.3	Based on ACEA E7 + further engine tests
MB-Approval 228.5	Based on ACEA E4 + further engine tests, extended change interval
MB-Approval 228.31	Based on ACEA E9 + further engine tests, suitable for DPF
MB-Approval 228.51	Based on ACEA E6 + further engine tests, suitable for DPF, extended change interval
MB-Approval 228.61	Based on API FA-4 + further engine tests

7.5 Renault

Approvals for Renault motors	
RD/RD-2	Based on ACEA E3 + Volvo VDS-2
RLD/RLD-2	Based on ACEA E7 + Volvo VDS-3
RLD-3	Based on ACEA E9 + Volvo VDS-4
RXD	Based on ACEA E7 + Volvo VDS-3
RGD (Gas)	Based on ACEA E6 + Volvo VDS-3 + TBN >8

7.6 Scania

Approvals for Scania motors

Scania LDF	Based on ACEA E5
Scania LDF-2	Based on ACEA E7 applicable from Euro 4
Scania LDF-3	Based on ACEA E7 applicable from Euro 6
Scania Low Ash	Basis ACEA E6/E9 (low-ash)



7.7 Volvo

Approvals for Volvo motors	
Volvo VDS	Based on API CD/CE, maintenance intervals up to 50,000 km possible
Volvo VDS-II	Based on ACEA E7, maintenance intervals up to 60,000 km possible
Volvo VDS-III	Based on ACEA E5, maintenance intervals up to 100,000 km possible
Volvo VDS-IV	Based on API CJ-4, short-distance, low-ash





GEAR OIL

8. Gear oil

In order to be able to ensure a malfunction-free operation, modern gearboxes require a modern high-performance lubricant, which protects the gearbox against friction and, at the same time, does not affect the shifting characteristics. The type and quantity of additives in the lubricant has a significant influence on various parameters, such as the shifting capacity, the change interval, the friction behavior and the wear protection. It is therefore urgently necessary that the classifications or approvals given by the manufacturer are upheld upon changing the gear oil. There are as many gear oils as there are types of gearbox. They are first roughly differentiated by manual gearbox or axle drive, automatic gearbox and dual-clutch gearbox. Within these upper groups there are various subgroups, which each need a special lubricant aligned to the construction type and purpose of use. In gear oils there is no uniform basis that the manufacturers are obliged to uphold (e.g. ACEA). This leads to a variety of special manufacturer approvals.



Note: In gear oils there is no uniform basis that the manufacturers are obliged to uphold (e.g. ACEA). This leads to a variety of special manufacturer approvals.

Examples:	
Mercedes-Benz:	
24 ATF approvals	(MB-Approval 236.x)
21 (Hypoid) gear oil approvals	(MB-Approval 235.x)
Volkswagen:	
14 ATF approvals	(G 052 xxx, G055 xxx, G060 xxx)
15 (Hypoid) gear oil approvals	(G 052 xxx, G055 xxx, G060 xxx)

8.1 Classification of gear oils

In order to at least be able to get a general answer as to what quality or which properties a gear oil corresponds to, over the course of the past few decades, division into by API for manual gearbox and axle drives and by Dexron for automatic gearboxes. he manufacturers made use of this division over a long period of time.

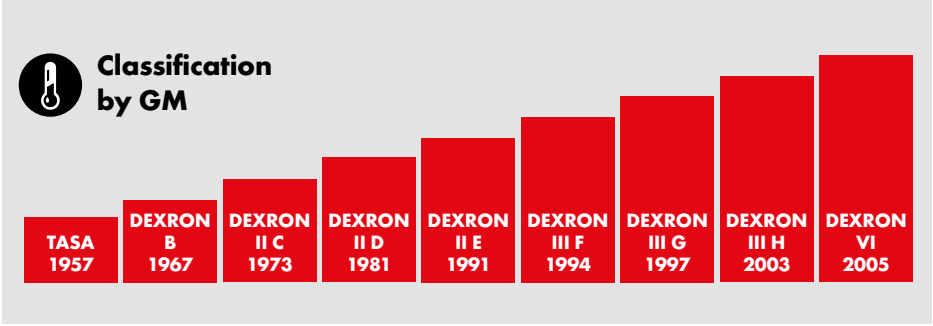
After the gearbox became ever more complex, however, this division was no longer sufficient. The viscosity of the manual gearbox and axle drive is – as with motor oils – classified by SAE. The viscosity of automatic gear oils, so-called ATF oils (Automatic Transmission Fluid), is not classified by SAE, as the viscosity is a part of the respective manufacturer approval.



8.1.1 API (manual gear or axle drive oils)

GL 1	low load hypoid or worm gearbox
GL 2	Worm gearbox (not in road vehicles)
GL 3	Manual gearbox (vintage)
GL 4	Manual gearbox, hypoid gearbox if permitted
GL 5	Hypoid gearbox, manual gearbox if permitted

8.1.2 GM Dexron (automatic gearbox)



MÉGUIN GmbH & Co KG
Mineraloelwerke
Rodener Straße 25
66740 Saarlouis
GERMANY

Phone: +49 6831 89 09-0
Fax: +49 6831 89 09-59
E-Mail: vertrieb@meguin.de

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