MOTOR OIL
USER GUIDE

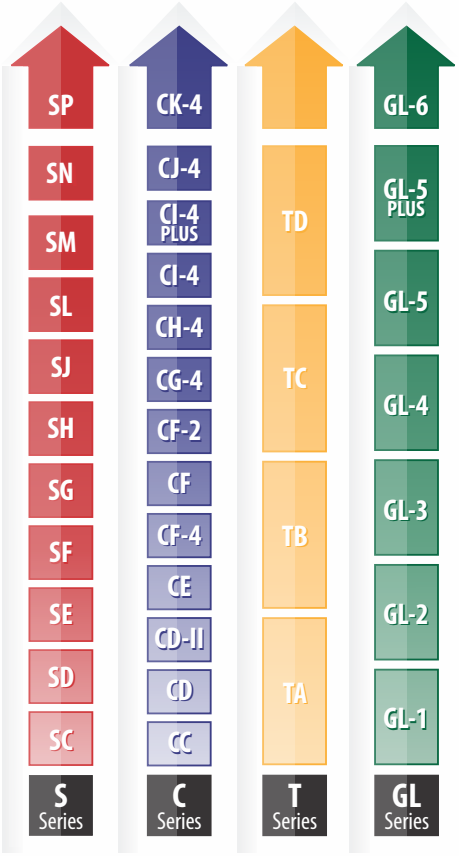
API CLASSIFICATION

What is API?

The American Petroleum Institute is the national association that represents all the aspects of the American oil and natural gasses industry. API ensures the licensing of motor oils and certification system (EOLCS). It is a voluntary licensing and certification program, which authorizes motor oil producer and merchants that fulfill the needed requirements to be able to use API quality certification.

What does API evaluation mean?

The API classification system provides information regarding the motor oil itself. The letter "S" (spark) followed by another letter (for example "SN") indicates the fact that this oil is indicated for engines with a spark ignition. The letter "C" followed by another letter and/or number (for example CI-4) indicates the fact that this oil is suitable for diesel engines (compression ignition). The second letters from the C and S categories are attributed in alphabetical order. The further down the alphabet the higher the quality of the oil is.



The classification of oils in accordance with API (follow automaker recommendations)

S series – gasoline engine motor oils

SP - Introduced in May 2020, designed to provide protection against low-speed pre-ignition (LSPI), timing chain wear protection, improved high temperature deposit protection for pistons and turbochargers, and more stringent sludge and varnish control. API SP with Resource Conserving matches ILSAC GF-6A by combining API SP performance with improved fuel economy, emission control system protection and protection of engines operating on ethanol-containing fuels up to E85.
SN – Introduced in October 2010 for 2011 and older vehicles, designed to provide improved high temperature deposit protection for pistons, more stringent sludge control, and seal compatibility. API SN with Resource Conserving matches ILSAC GF-5 by combining API SN performance with improved fuel economy, turbocharger protection, emission control system compatibility, and protection of engines operating on ethanol-containing fuels up to E85.
SM – Oils designed for vehicle produced in 2010 and older, to provide improved oxidation resistance, improved deposit protection, better wear protection, and better low-temperature performance over the life of the oil. Some SM oils may also meet the latest ILSAC specification and/or qualify as Energy Conserving. They may be used where API Service Category SJ and SL earlier categories are recommended.
SL – adopted to describe engine oils for use in 2001. It can be used anywhere an oil which meets API SJ or older is recommended
SJ –was adopted in 1996 to describe engine oil first mandated in 1997. It can be used in any application where an API SH oil or older is recommended.
SH – Obsolete – For model year 1996 and older engines. Can be used when an API SG or previous specification is required. Starting with July 1, 1997 API SH can only be used together with API CF, CF-2, CF-4 or CG-4
SG – Obsolete – For model year 1993 and older engines.
SF – Obsolete – For model year 1988 and older engines.
SE – Obsolete – For model year 1979 and older engines.
SD – Obsolete – For model year 1971 and older engines.
SC – Obsolete – For model year 1967 and older engines.

C series – Diesel engine motor oils

CK-4 - motor oils for use in high-speed four-stroke cycle diesel engines designed to meet 2017 model year on-highway and Tier 4 non-road exhaust emission standards as well as for previous model year diesel engines. These oils are formulated for use in all applications with diesel fuels ranging in sulfur content up to 500 ppm (0.05% by weight)
CJ-4 – Designed for high-speed, four-stroke diesel engines to meet 2007 on highway exhaust emission standards as well as Tier 4 non-road, along with previous diesel engines.
CI-4 Plus – Contains motor oils used in four-stroke diesel engines designed after 2004. This oil has good energy conserving properties.
CI-4 - Contains motor oils used in four-stroke diesel engines designed after 2002 that work in severe conditions. It ca be applied also in cases where the oil recommended has to meet API CH-4, CG-4 and CF-4 requirements.
CH-4 - Contains motor oils used in four-stroke diesel engines designed after 1998 that work in severe conditions. It can be applied also in cases where the oil recommended has to meet API CF-4 and API CG-4 requirements.
CG-2 - Contains motor oils used in four-stroke diesel engines designed after 1994 that work in severe conditions. It can be applied also in cases where the oil recommended has to meet API CD, CE and CF-4 requirements.
CF-2 – Obsolete- Contains motor oils used in two stroke diesel engines designed after 1004. It can be applied in cases where the recommended oil is an API CD-2.
CF - Contains motor oils used in diesel engines with direct injection designed after 1994. Can also be used in applications where API CD or previous oil is recommended.
CF-4 - Contains motor oils used in diesel engines designed after 1990. It ensures the maintenance of high-speed, four-stroke engines. These oils can also replace API CE and are adequate for heavy trucks. They can also be combined with applications from the S category (gasoline oils).
CE-Obsolete-Contains motor oils used in diesel designed after 1983. Can also be used in applications where API CD or previous oil is recommended.
CD II- Obsolete-Contains motor oils used for two-stroke diesel engines that work in severe conditions and require protection against deposits and wear and tear.
CD- Obsolete-Contains oils used in naturally aspirated or turbo diesel engines, which use a lot of fuel (including fuels high in sulfur). This type of oil has been introduced in 1955.
CC- Obsolete-Contains oils used in diesel engines. This series of oils should never be used in diesel engines produced after 1990.

T series – oils for two-stroke engines

TA- This specification is used for extremely small two-stroke engines used in mopeds.
TB- This specification is used for scooters and motorcycles with two-stroke engines.
TC- This specification is used for high performance with engines with high fuel-oil ratio. Oil with this specification use metal-based additives that produce ash.
TD- This specification is used for water-cooled outboard two-stroke engines with separate oil container or mixed (oil with fuel).

G series – gear oils

GL-1- Denotes lubricants intended for manual transmissions operating under mild conditions that straight petroleum or refined petroleum oil may be used satisfactorily. Oxidation and rust inhibitors, defoamers and pour depressants may be added to improve the characteristics. Friction modifiers and extreme pressure additives shall not be used.
GL-2- Denotes lubricant intended for automotive worm-gear axles operating under conditions of load and temperature that lubricants satisfactory for API GL-1 service nor suffice.
GL-3- Denotes lubricants intended for manual transmissions operating under moderate to severe conditions and spiral-bevel axles operating under mild to moderate conditions.
GL-4- Denotes lubricants intended for axles with spiral bevel gears operating under moderate to severe conditions of speed and load or axles with hypoid gears operating under moderate speeds and loads. These oils may be used in selected manual transmission and transaxle applications where MT-1 lubricants are unsuitable. The manufacturer`s specific lubricant quality recommendations should be followed.
GL-5 – Denotes lubricants intended for gears, particularly hypoid gears, in axles operating under various combinations of high-speed/shock load and low-speed/high-torque conditions.
GL-6- Denotes lubricants intended for gears designed with a very high pinion offset. Such designs typically require protection from gear scoring in excess of that provided by APL GL-5 gear oils.

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ACEA CLASSIFICATION

What is ACEA?

Associtation des Constructeurs Européens d'Automobiles - The European Automobile Manufacturers Association (ACEA), founded in 1991, represents the interests of fifteen European car, truck and bus manufacturer at EU level. Though its specialist working groups and an extensive network of individual experts from Member Companies at all levels of the industry, ACEA has access to a wealth of expertise and applied technical experience. ACEA oil sequences define the minimum quality level of a product for presentation to ACEA members.

What is the ACEA classification?

Category A/B – gasoline and diesel engines; Category C - catalyst compatible oils; Category E - heavy truck and diesel engines;

ACEA Category A/B

ACEA A1/B1 – withdrawn - For gasoline vehicle engines and for light truck diesel engines that require oil with low viscosity and reduced friction

ACEA A3/B3 - withdrawn - Stable, stay-in-grade engine oil intended for use in passenger car and light-duty gasoline & diesel engines and/or for extended oil drain intervals where specified by the engine manufacturer.

ACEA A3/B4 – Stable, stay-in-grade engine oil intended for use at extended oil drain intervals in passenger car and light-duty gasoline & DI diesel engines, but also suitable for applications described under A3/B3.

ACEA A5/B5 – Stable, stay-in-grade engine oil intended for use at extended oil drain intervals in passenger car and light-duty gasoline & DI diesel engines designed for low viscosity engine oils with HTHS viscosity of 2.9 to 3.5 mPa•s.

ACEA A7/B7 - Stable, stay-in-grade engine oil intended for use at extended oil drain intervals in passenger car and light-duty gasoline & DI diesel engines designed for low viscosity engine oils with HTHS viscosity of 2.9 to 3.5 mPa•s. Relative to A5/B5 these engine oils provide also low speed pre-ignition- and wear protection for turbocharged gasoline DI engines as well as turbocharger compressor deposit (TCCD) protection for modern DI diesel engines.

ACEA Category C

ACEA C2 – Stable, stay-in-grade engine oil with mid-SAPS Level, for aftertreatment system compatibility. Intended for use at extended oil drain intervals in passenger car and light-duty gasoline & DI diesel engines designed for low viscosity engine oils with a minimum HTHS Viscosity of 2.9 mPa·s.

ACEA C3 – Stable, stay-in-grade engine oil with mid-SAPS Level, for aftertreatment system compatibility. Intended for use at extended oil drain intervals in passenger car and light-duty gasoline & DI diesel engines designed for engine oils with HTHS viscosity of minimum 3.5 mPa•s.

ACEA C4 – Stable, stay-in-grade engine oil with low-SAPS Level, for aftertreatment system compatibility. Intended for use at extended oil drain intervals in passenger car and light-duty gasoline & DI diesel engines designed for engine oils with HTHS viscosity of minimum 3.5 mPa•s.

ACEA C5 – Stable, stay-in-grade engine oil for improved fuel economy, with mid-SAPS Level, for aftertreatment system compatibility. Intended for use at extended oil drain intervals in passenger car and light-duty gasoline & DI diesel engines designed and OEM-approved for engine oils with HTHS viscosity of minimum 2.6 mPa•s.

**SAPS – Sulfated Ash, Phosphorous, Sulfur; **HTHS – High Temperature High Shear, viscosity at 150 °C*

ACEA C6 – Relative to C5 these engine oils provide also low speed pre-ignition- and wear protection for turbocharged gasoline DI engines as well as turbocharger compressor deposit (TCCD) protection for modern DI diesel engines.

ACEA Category E

ACEA E2 – Standard quality oil for use with naturally aspirated or turbo diesel engines

ACEA E4 – Stable, stay-in-grade oil providing excellent control of piston cleanliness, wear, soot handling and lubricant stability. It is recommended for highly rated diesel engines meeting Euro I, Euro II, Euro IV and Euro V emission requirements and running under very severe conditions. It is suitable for engines without particle filters, and for some EGR engines and some engines fitted with SCR NOx reduction systems.

ACEA E5 – It is suitable for diesel engines meeting Euro I, Euro II, Euro II, Euro IV emissions requirements.

ACEA E6 – Stable, stay-in-grade oil providing excellent control of piston cleanliness, wear, soot handling and lubricant stability. It is recommended for highly rated diesel engines meeting Euro I, Euro II, Euro III, Euro IV, Euro V and Euro VI emission requirements and running under very severe conditions, e.g. significantly extended oil drain intervals according to the manufacturer's recommendations. It is suitable for EGR engines, with or without particulate filters, and for engines fitted with SCR NOx reduction systems. E6 quality is strongly recommended for engines fitted with particulate filters and is designed for use in combination with low sulphur diesel fuel.

ACEA E7 – Stable, stay-in-grade oil providing effective control with respect to piston cleanliness and bore polishing. It further provides excellent wear control, soot handling and lubricant stability. It is recommended for highly rated diesel engines meeting Euro I, Euro II, Euro III, Euro IV and Euro V emission requirements and running under severe conditions, e.g. extended oil drain intervals according to the manufacturer's recommendations. It is suitable for engines without particulate filters, and for most EGR engines and most engines fitted with SCR NOx reduction systems.

ACEA E9 - Stable, stay-in-grade oil providing effective control with respect to piston cleanliness and bore polishing. It further provides excellent wear control, soot handling and lubricant stability. It is recommended for highly rated diesel engines meeting Euro I, Euro II, Euro III, Euro IV, Euro V and Euro VI emission requirements and running under severe conditions, e.g. extended oil drain intervals according to the manufacturer's recommendations. It is suitable for engines with or without particulate filters, and for most EGR engines and for most engines fitted with SCR NOx reduction systems. E9 is strongly recommended for engines fitted with particulate filters and is designed for use in combination with low sulphur diesel fuel.

The DEXRON classification for ATF -Automatic Transmission Fluid

Type A - Introduced by Ford (GM) in 1949

Type A Suffix A - Introduced by Ford (GM) in 1957 and replaced Type A

Dexron B - Introduced by Ford (GM) in 1967

Dexron II - the same GM formula enhanced with better viscosity control

Dexron IIE - Oil for electronic transmission

Dexron III (F) - Replaces Dexron IIE and has increased anticorrosive properties

Dexron III (H) - The enhanced version of the Dexron III that was introduced in 2003

Dexron III/Saturn - Oil specially created for Saturn cars

Dexron VI - Introduced in 2006 for GM hydromantic 6L80 vehicles, replacing Dexron II and III

SAE Classification – Society of Automotive Engineers

This classification has at its basis the measurement of viscosity at various temperatures both high and low. The values registered at high temperatures are determined in accordance with the ASTM D445 method. Values at low temperatures are determined in accordance with ASTM D2983 method. The apparent viscosity is measured using a Brookfield viscometer and is measured in mPa/s(cP). Multigrade oils satisfy a certain requirement in low temperatures marked with a "W" (for winter) and different requirement for non-W category at high temperatures. Also, important to note that there is no correlation between the SAE classification of motor oils and that of transmission oils.

LOWEST AMBIENTAL TEMPERATURE	SAE VISCOSITY GRADE RECOMMENDE FOR PASSENGER CARS
0°C(32°F)	0W-20,0W-30,5W-20,5W-30,10W-30,10W-40,20W50
-18°(0°F)	0W-20,0W-30,5W-20,5W-30,10W-30,10W-40
Sub-18°C (0°F)	0W-20,0W-30,5W-20,5W-30

NLGI Greases Classification

National Lubricating Greases Institute

NLGI is a non-profit organization formed by companies that produce and market all types of greases. The objectives of the NLGI are that accumulating as much information as possible leading to the development of the industry both from a consumer's and a producer's perspective. In 1993 the institute has elaborated a classification system for greases based on its consistency from NLGI 000 to 6, NLGI 2 being the most commonplace. To more easily distinguish greases the NLGI has created a symbol for chassis grease (LB) and another on for bearings grease (GC-LB).

NLGI Grade	Penetration after 60 beats at 25°C	Aspect	Consistency
000	445 - 475	Fluid	Cooking oil
00	400 - 430	Semi-fluid	Apple sauce
0	355-385	Very soft	Brown mustard
1	310-340	Soft	Tomato paste
2	265-295	Normal	Peanut butter
3	220-250	Firm	Vegetal fat
4	175-205	Very firm	Frozen yogurt
5	130-160	Hard	Fine pate
6	85-115	Very hard	Cedar cheese