

## University of Missouri Extension

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# How to Select Lubricating Oil for Farm Engines

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Engine lubricating oil must perform several functions. It should:

- Reduce friction and wear between moving surfaces
- Remove heat caused by friction
- Provide a seal against escaping gases
- Keep the engine clean by holding carbon and sludge-forming material in suspension, so they will be removed by the oil filter or when the oil is changed
- Provide protection against rusting and attacks by acids.

Consider these factors when you select engine oil:

- Oil types (API service classifications)
- Oil viscosity
- Operating conditions.

### **API service classification**

This system, developed by the American Petroleum Institute, provides guidelines for the selection of crankcase oils suitable for various service conditions. It classifies general ranges of engine service needs based upon:

- Engine design and construction
- Lubricating oil
- Operating conditions
- Maintenance practices
- Fuel characteristics.

The API engine service classification system presently includes 13 classes of service — seven for automotive (spark ignition) engines and six for diesel (compression ignition) engines. Five of the automotive and two of the diesel service categories are obsolete. Only currently recommended categories are listed in this guide.

## Additives

Engine lubrication oils have chemical compounds or additives added to them for improved performance. Some of these additives are:

- Oxidation inhibitors
- Detergent dispersants
- Corrosion inhibitors
- Rust inhibitors
- Anti-foam agents
- Anti-wear agents
- Viscosity index improvers
- Pour point depressants.

Every good oil does not necessarily include each of these additives.

### Packaged additives

Mixing additives with modern engine oil is not recommended. There is the possibility that their use could upset the chemical balance of the engine oil and its original additive system or shorten the engine oil's serviceable life, and may even prove detrimental to the engine.

## Oil viscosity

Viscosity is the measure of the resistance to flow. It is the body or thickness of the oil. Viscosity is not a measure of oil quality.

Poor-quality oil can have the same viscosity classification as a good oil. Seven viscosity categories are defined by the Society of Automotive Engineers (SAE). These are SAE 5W, SAE 10W, SAE 20, SAE 20W, SAE 30, SAE 40 and SAE 50.

The "W" (for winter) following a viscosity number indicates that an oil is suitable for cold temperature and must have the indicated viscosity at 0 degrees Fahrenheit. The SAE categories that do not include the "W" are suitable for use at high temperatures and must have the specified viscosity at 212 degrees Fahrenheit.

A multiviscosity oil meets an SAE viscosity requirement at both 0 degrees Fahrenheit (-18 degrees Celsius) and 212 degrees Fahrenheit (100 degrees Celsius). It does not thin out as much when heated or thicken as much when cooled as does a single-viscosity oil.

For example, SAE 5W-30 and 10W-30 oils meet cold ranking requirements of SAE 5W at 0 degrees Fahrenheit and high temperature viscosity requirements of SAE 30 at 212 degrees Fahrenheit.

Thus, a multiviscosity oil stretches the usable temperature range. It provides easier cold-weather starting, more efficient lubrication, reduced engine wear, better fuel economy and adequate protection against excessive oil thinning at operating temperatures.

## Source of contamination

Combustion of hydrocarbon fuels such as gasoline and diesel fuel forms byproducts that cause corrosion and engine deposits. For example, each gallon of fuel burned causes about 1 gallon of water to be formed. Most of the water forms as vapor and goes out the exhaust. However, a small amount condenses on the cylinder wall (especially when the engine is cold) and eventually is trapped in the oil reservoir.

Carbon (or soot) formed by incomplete combustion of fuel is also picked up by the oil and carried into the oil reservoir. In combination with water, the carbon forms sludge which, if allowed to accumulate, may restrict oil passageways and cause insufficient oil flow to engine parts.

## Summary

Information in this guide sheet should not replace the operator's manual recommendations. Always follow all engine oil specifications and use the manuals furnished by the engine manufacturer.

## API Service Classification Chart

### SF — 1980 Gasoline Engine Warranty Maintenance Service

The category of SF denotes service typical of gasoline engines in passenger cars and some trucks beginning with the 1980 through 1988 model years operating under engine manufacturers' recommended maintenance procedures. Oils developed for this service provide increased oxidation stability and improved anti-wear performance relative to oils that meet the minimum requirements for API Service Category SE. These oils also provide protection against engine deposits, rust and corrosion. Oils meeting API Service Category SF may be used when API Service Categories SE, SD, or SC are recommended.

### SG — 1989 Gasoline Engine Warranty Maintenance Service

The category SG denotes service typical of present gasoline engines in passenger cars, vans and light-duty trucks operating under manufacturers' recommended maintenance procedures. Category SG-quality oils include the performance properties of API Service Category CC. (Certain manufacturers of gasoline engines require oils also meeting the higher diesel engine Category CD.) Oils developed for this service provide improved control of engine deposits, oil oxidation and engine wear relative to oils developed for previous categories. These oils also provide protection against rust and corrosion. Oils meeting API Service Category SG may be used when API Service Categories SF, SE, SF/CC are recommended.

## Commercial Diesel Engine Service

## CC — Diesel Engine Service

The category CC denotes service typical of certain naturally aspirated, turbocharged, or supercharged diesel engines operated in moderate- to severe-duty service and certain heavy-duty gasoline engines. Oils designed for this service provide protection from high-temperature deposits and bearing corrosion in these diesel engines and also from rust, corrosion and low-temperature deposits in gasoline engines. These oils were introduced in 1961.

## CD — Diesel Engine Service

The category CD denotes service typical of certain naturally aspirated, turbocharged, or supercharged diesel engines where highly effective control of wear and deposits is vital or when using fuels of a wide quality range, including high-sulfur fuels. Oils designed for this service were introduced in 1955 and provide protection from bearing corrosion and from high-temperature deposits in these diesel engines.

## CD-II — Severe Duty Two-Stroke Cycle Diesel Engine Service

Service typical of two-stroke cycle diesel engines requiring highly effective control over wear and deposits. Oils designed for this service also meet all performance requirements of API Service Category CD.

## CE — 1983 Diesel Engine Service

Service typical of certain turbocharged or supercharged heavy-duty diesel engines manufactured since 1983 and operated under both low-speed, high-load and high-speed, high-load conditions. Oils designed for this service may also be used when API Engine Service Category CD is recommended for diesel engines.

# Energy-Conserving Oil Classification

There are presently two energy-conserving oil categories: **Energy Conserving** and **Energy Conserving II**.

The fuel economy obtained by individual vehicle operators using engine oils that are labeled **Energy Conserving** or **Energy Conserving II** may differ because of many factors including type of vehicle and engine, engine manufacturing variables, mechanical condition and maintenance of the engine, oil previously used, operating conditions and driving habits.

## Energy Conserving

Engine oils categorized as **Energy Conserving** are formulated to improve the fuel economy of passenger cars, vans and light-duty trucks. These oils have produced a fuel economy improvement of 1.5 percent or greater over a standard reference oil in a standard test procedure. Oils meeting

this requirement display the **Energy Conserving** label in the lower portion of the doughnut-shaped API Service Symbol.

## Energy Conserving II

Engine oils categorized as **Energy Conserving II** are formulated to improve the fuel economy of passenger cars, vans and light-duty trucks. These oils have produced a fuel economy improvement of 2.7 percent or greater over a standard reference oil in a standard test procedure. Oils meeting this requirement display the **Energy Conserving II** label in the lower portion of the doughnut-shaped API Service Symbol.

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