How to select lubricating oil for farm engines

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, and
• Provide protection against rusting and attacks by acids.

Consider these factors when you select engine oil:
• Oil types (API service classifications),
• Oil viscosity, and
• 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, and
• Fuel characteristics.

The current API engine service classification system includes 10 categories: six for spark ignition (gasoline) engines (S) and four for compression ignition (diesel) engines (C). The API service classification chart gives a brief description of each category.

### Additives

Engine lubricating 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,
• Antifoam agents,
• Antiwear agents,
• Viscosity index improvers, and
• 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, shorten the engine oil’s serviceable life, and may even prove detrimental to the engine.**

<table>
<thead>
<tr>
<th>API service classification chart</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>For spark ignition engines</strong></td>
</tr>
<tr>
<td>SA - Gasoline and diesel engines in mild-duty utility service (not applicable in heavy-duty equipment). Not recommended for farm tractors. Contains no additives.</td>
</tr>
<tr>
<td>SB - Gasoline engines in minimum-duty service (not applicable in heavy-duty equipment).</td>
</tr>
<tr>
<td>SD - Engine warranty maintenance service for 1968 through 1970 gasoline engines and certain 1971 and later models as specified in the owners' manuals.</td>
</tr>
<tr>
<td>SF - Engine warranty maintenance service for gasoline engines beginning with 1980-model passenger cars and some trucks. May be used where API service categories SE, SD, or SC are recommended.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>For compression ignition (diesel) engines</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA - Service typical of diesel engines operated in mild to moderate duty, but with high-quality fuels.</td>
</tr>
<tr>
<td>CB - Service typical of diesel engines operated in mild to moderate duty, but with lower quality fuels.</td>
</tr>
<tr>
<td>CC - Service typical of naturally aspirated and lightly supercharged diesel engines operated in moderate to severe duty and certain heavy-duty, gasoline engines.</td>
</tr>
<tr>
<td>CD - Severe operating conditions: supercharged, high-speed, high-output diesel engine operations. Also, when high sulfur fuels are used.</td>
</tr>
</tbody>
</table>
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 F. The SAE categories that do not include the “W” are suitable for use at high temperatures and must have the specified viscosity at 210 degrees F.

A multi-viscosity oil meets an SAE viscosity requirement at both 0 degrees F (-18 degrees C) and 210 degrees F (99 degrees C). It does not thin out as much when heated or thicken as much when cooled as does a single viscosity oil.

For example, SAE 10W-30 and 10W-40 oils meet cold cranking requirements of SAE 10W at 0 degrees F and high temperature viscosity requirements of SAE 30 and SAE 40 respectively at 210 degrees F.

Thus, a multi-viscosity 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 hydro-carbon fuels, such as gasoline and diesel fuel, forms by-products 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 is in gaseous form 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.

Selecting oil for two-stroke cycle engines

Most two-stroke cycle gasoline engines (like those found on chain saws) require the oil to be premixed with the gasoline. There is no oil reservoir, and the oil is taken into the engine with the gasoline. The requirements of two-stroke cycle (or two-cycle) oil are different from the requirements of four-stroke cycle oil.

In fact, some of the additives that make four-stroke cycle oil so effective are harmful to two-stroke cycle engines. Since the oil is completely used in a two-stroke cycle engine, oil contamination is not a problem. However, it is important that the oil be highly soluble in gasoline and the combustion chamber deposits be kept to a minimum.

Two-cycle engine oil is not well classified. For best performance, low-maintenance, and long engine life, follow these guidelines.

Oil for two-stroke engines

Selection

1. Select only manufacturer’s recommended SAE rating.

Note: Pumps on oil-injection systems are designed for the weight of oil recommended by the manufacturer. Using the wrong SAE rating can affect lubrication.

2. Select only oil recommended for use in either air-cooled or water-cooled two-cycle engines.

Note: The use of standard detergent oils can cause carbon build up in cylinder head and around moving parts.

Use

1. Use the oil-fuel mixture recommended by engine manufacturer.

Note: Just because an oil is rated for a 50-1 mixture doesn’t mean your engine is.

2. Use oils that meet or exceed engine manufacturer’s recommendations.

Note: A good quality oil may seem expensive when compared to a more economical brand, but it is inexpensive when compared to an overhaul.

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. For more information write to American Petroleum Institute, 2101 L St. Northwest, Washington, D.C. 20037 for the following publication:

- Publication 1509, “Engine Service Classifications and Guide to Crankcase Oil Selection.”

Written by Bill Hires and James Frisby, Department of Agricultural Engineering, College of Agriculture.