

Date: 05/05/2006

Technical Service Bulletin

Product Description: ALL AMSOIL Motor Oils

Subject: Use of Biodiesel Fuel with AMSOIL Motor Oils

OBJECTIVE:

To explain to AMSOIL Dealers the nature of biodiesel fuel and its effects on engine operation and lubricant service life.

TECHNICAL DISCUSSION:

Definition of Biodiesel (1)

Biodiesel is a mixture of methyl esters of long chain fatty acids like lauric, palmitic, steric, oleic, etc. It is produced by the transesterification of animal fats and vegetable oils. Typical examples are rapeseed oil, canola oil, soybean oil, sunflower oil, palm oil and its derivatives from vegetable sources. Beef and sheep tallow and poultry oil from animal sources and cooking oil are also the sources of raw materials. The chemistry of conversion to biodiesel is essentially the same. Oil or fat react with methanol or ethanol in the presence of catalyst sodium hydroxide or potassium hydroxide to form biodiesel (methylesters) and glycerin.

Biodiesel is not the same as those vegetable oils or animal fats. The properties of biodiesel must adhere to the industrial standard (ASTM D6751). Raw vegetable oils and animal fats do not meet ASTM D6751 specifications.

Biodiesel can be blended with petroleum fuel to create biodiesel blends. These blends are designated as Bxx, where "xx" is the percentage of biodiesel in the blend. For example, a B5 blend is 5% biodiesel and 95% diesel fuel.

Advantage of Using Biodiesel

The physical and chemical properties of biodiesel are similar to petroleum based diesel in terms of operation of compression ignition engines. Therefore, biodiesel can be used in diesel vehicles without expensive alterations to the engine or fuel system. The other major benefits of using biodiesel include the following:

- Biodiesel is biodegradable, non toxic and essentially free of sulfur and aromatics.
- Improved lubricity.
- High cetane number.
- Improved conductivity, particularly for Ultra Low Sulfur fuel.

Disadvantage of using Biodiesel

Lower Energy Content (2)

The energy content of neat biodiesel fuel is about eleven percent (11%) lower than that of petroleum based diesel fuel, resulting in a power loss in engine operation. Engine adjustment for the power losses could lead to violation of EPA anti-tampering provisions.

Engine Operation Problems (2)

Neat biodiesel and higher percentage biodiesel blends can cause a variety of engine performance problems, including filter plugging, injector coking, piston ring sticking and breaking, elastomer seal swelling and hardening/cracking and severe engine lubricant degradation. There is very little information on the use of biodiesel with engine durability over the mileage and operating conditions of heavy-duty diesel engines. More information is needed.

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Reviewed By: DY

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Storage and Handling

Biodiesel fuels have shown poor oxidation stability, which can result in long-term storage problems. When biodiesel fuels are used at low temperatures, filters can be plugged and the fuel can thicken. Sub-standard biodiesel fuel might contain glycerin that can precipitate out of the biodiesel fuel and plug the filter at low temperatures.

Biodiesel fuel is an excellent media for microbial growth, which may cause operation problems, fuel system corrosion and premature fuel filter plugging.

Emissions

Oxygen and other biodiesel characteristics can contribute to increased NOx emissions.

Engine Manufacturer's Position (3-12)

Generally, diesel engine manufacturers accept blending biodiesel fuels up to 5% with petroleum diesel (B5). Concentration beyond 5% could have adverse effects on the engine performance and the fuel system integrity and durability.

Most OEMs express concern regarding the service life of lubricants when higher concentrations of biodiesel are used.

Cummins:

“The oil change interval can be affected by the use of biodiesel fuels and some applications may require shortening intervals to half of the diesel equivalent.”

International:

“The use of higher biodiesel blends may reduce the engine service life and drain intervals.”

Volvo Truck:

“When the customer wishes to use fuels based on vegetable oils, we recommend that the oil changing intervals be halved in order to eliminate the risk of dilution of the engine oil.”

Effect of Biodiesel on Lubricants (13)

- Fuel dilution resulting in viscosity reduction.
- Sludge and varnish formation.
- Depletion of alkalinity reserve in the oil indicated by total base number decrease.
- Total acid number increases more rapidly, indicating oil degradation probably from more NOx acid formation.
- Certain metals such as copper and lead leached from bearing due to biodiesel fuel in the lubricant.
- Oil filters plugging from sludge.

RECOMMENDATIONS:

AMSOIL Motor Oil extended drain interval recommendations do **not** apply to vehicles using biodiesel fuels at any mix ratios with petroleum diesel.

When using biodiesel fuels at any mix ratio, follow the OEM recommended oil drain interval.

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