CATERPILLAR®

BI619733
SEBU6251-08
March 2004

Caterpillar Commercial Diesel Engine Fluids Recommendations

For All 3500 Series and Smaller Commercial Diesel Engines

- Reduce the oil change interval. Base the oil change interval on the oil analysis. Ensure that the oil analysis includes the condition of the oil and a wear metal analysis.

Excessive piston deposits can be produced by an oil with a high TBN and/or high ash. These deposits can lead to a loss of control of the oil consumption and to the polishing of the cylinder bore.

NOTICE
Operating Direct Injected (DI) diesel engines with fuel sulfur levels over 1.0 percent may require shortened oil change intervals in order to help maintain adequate wear protection.

Lubricant Viscosity Recommendations (3116 and 3126 Marine Engines)

The proper SAE viscosity grade of oil is determined by the minimum ambient temperature during cold engine start-up, and the maximum ambient temperature during engine operation.

Refer to Table 3 (minimum temperature) in order to determine the required oil viscosity for starting a cold engine.

Refer to Table 3 (maximum temperature) in order to select the oil viscosity for engine operation at the highest ambient temperature that is anticipated.

Generally, use the highest oil viscosity that is allowed for the ambient temperature at start-up.

Table 3

Engine Oil Viscosity		
API CF-4 Oil Viscosity Grade	Ambient Temperature	
	Minimum	Maximum
SAE 30	0 °C (32 °F)	40 °C (104 °F)
SAE 40	5 °C (41 °F)	50 °C (122 °F)

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Engine Oil for Precombustion Chamber (PC) Diesel Engines (Engine Crankcase Fluid Recommendations for All 3500 Series and Smaller PC Diesel Engines)

SMCS Code: 1348; 7581

Cat DEO (Diesel Engine Oil)

Caterpillar Oils have been developed and tested in order to provide the full performance and service life that has been designed and built into Caterpillar Engines. Caterpillar Oils are currently used to fill diesel engines at the factory. These oils are offered by Caterpillar dealers for continued use when the engine oil is changed. Consult your Caterpillar dealer for more information on these oils.

Due to significant variations in the quality and in the performance of commercially available oils, Caterpillar makes the following recommendations:

- **Cat DEO (Diesel Engine Oil) (10W30)**
- **Cat DEO (Diesel Engine Oil) (15W40)**

Caterpillar multigrade DEO is formulated with the correct amounts of detergents, dispersants, and alkalinity in order to provide superior performance in Caterpillar Diesel Engines.

Cat multigrade DEO is available in several viscosity grades that include SAE 10W30 and SAE 15W40. For precombustion chamber engines, see Table 4 in order to choose the correct viscosity grade for the ambient temperature. Multigrade oils provide the correct viscosity for a broad range of operating temperatures.

Multigrade oils are effective in maintaining low oil consumption and low levels of piston deposits.

Cat multigrade DEO can be used in other diesel engines and in gasoline engines. See the engine manufacturer's guide for the recommended specifications. Compare the specifications to the specifications of Caterpillar multigrade DEO. The current industry standards for Cat DEO are listed on the product label and on the data sheets for the product.

Consult your Caterpillar dealer for part numbers and for available sizes of containers.

Illustration 5

Grease Application Chart

Caterpillar Grease Name	NLGI Grade	[1] Low Temp. Pumpability	[2] Severe Applications	[2] Severe Applications	[2] Severe Applications	[2] Severe Applications with Extremely Heavy Loads	[2] Severe Applications	[3] Extreme Pressure (EP)	[4] Service Life	[5] Environmentally Friendly	[6] Corrosion Protection	[7] Water Washout Resistance
Recommended Operating Conditions		[In Centralized (Auto-Lube) Systems]	Extremely Low to Low Temps.	Low to Moderate Temps.	Moderate to High Temps.	Moderate to High Temps.	High to Extremely High Temps.	(Anti-Wear Protection)	(Shear Stability)			
Optimum Operating Temperature Range			-59°C (-75°F) to -18° C (0° F)	-23° C (-10° F) to +29° C (+85° F)	+18° C (+65° F) to +41° C (+105° F)	+18° C (+65° F) to +41° C (+105° F)	+38° C (+100° F) to +232° C (+450° F)					
Paver Grease	2	above 10° C (+50° F)	N/R	[8] Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Yes	Excellent	Excellent
Desert Gold	2	above 2° C (+35° F)	N/R	Excellent	Excellent	Excellent	Very Good	Excellent	Excellent	Yes	Excellent	Excellent
Auto-Lube Grease 2	2	above -7° C (+20° F)	N/R	Excellent	Excellent	Very Good	Good	Excellent	Excellent	Yes	Excellent	Excellent
Auto-Lube Grease 1	1	above -18° C (0° F)	Good	Excellent	Good	Good	Fair	Excellent	Excellent	Yes	Excellent	Excellent
Auto-Lube Grease 0	0	above -29° C (-20° F)	Very Good	Excellent	Fair	Fair	Fair	Excellent	Excellent	Yes	Excellent	Excellent
Arctic Platinum 2	2	above -29° C (-20° F)	Very Good	Excellent	Good	N/R	N/R	Excellent	Excellent	Yes	Excellent	Excellent
Arctic Platinum 1	1	above -34° C (-30° F)	Excellent	Very Good	N/R	N/R	N/R	Excellent	Excellent	Yes	Excellent	Excellent
Arctic Platinum 0	0	above -43° C (-45° F)	Excellent	Very Good	N/R	N/R	N/R	Excellent	Excellent	Yes	Excellent	Excellent
Arctic Platinum 00	00	above -51° C (-60° F)	Excellent	Good	N/R	N/R	N/R	Excellent	Excellent	Yes	Excellent	Excellent
Arctic Platinum 000	000	above -59° C (-75° F)	Excellent	Good	N/R	N/R	N/R	Excellent	Excellent	Yes	Excellent	Excellent
MPGM	2	above -18° C (0° F)	N/R	Fair	Good	Good	N/R	Very Good	Good	No	Fair	Fair
MPG	2	above -23° C (-10° F)	N/R	N/R	N/R	N/R	N/R	Fair	Good	No	Fair	Fair
WTR	2	above -23° C (-10° F)	Good	Good	Good	Fair	Fair	Very Good	Very Good	Yes	Excellent	Excellent

[1] Based on USS Mobility and Lincoln Ventmeter Tests
Performance may vary depending on lubrication equipment and length of lines

[2] Severe Applications are those with: very heavy loads, frequent oscillations,and heavy shock loads.

[3] Extreme pressure (EP), refer to 4-Ball Weld point in technical data sheet ASTM D 2596

[4] Service Life, refer to % change after 100,000 strokes in technical data sheet ASTM D 217

[5] Is not Formulated to Contain: Lead, Antimony, Barium, Zinc, Phosphorous, or Chlorine additives.

[6] Resistance to Salt water and Salt Spray ASTM B 117

[7] Water Washout Resistance, refer to Roll Stability with Water, % Change ASTM D 1264

[8] depending on the application

N/R = Not Recommended

Note : For additional performance data on these greases refer to NEHP5621

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Characteristics of Diesel Fuel

SMCS Code: 1250; 1280

Lubricity and Low Sulfur Fuel

Note: The fuel lubricity is important. You should consider the fuel's lubricity whenever you operate the equipment in arctic weather. Also, you should consider the fuel's lubricity whenever you use fuels that are lower in viscosity. There are many aftermarket additives that are available to treat fuel. If the fuel's lubricity is an issue, consult your fuel supplier for proper recommendations regarding fuel additives.

In the USA, a 0.05 percent limit on the amount of fuel sulfur in diesel fuel was mandated in January of 1994 for on-highway trucks. The removal of sulfur from diesel fuel helps to reduce particulate emissions from diesel engines. While limits for fuel sulfur have not generally been mandated for off-highway use, some local governments have regulations that include off-highway use. There is frequently no difference in the fuel that is sold for different applications. The same fuel is often used for both on-highway applications and off-highway applications. Other areas of the world are mandating similar limits. Regulations continue to become more stringent. Lower sulfur limits can be expected in the future.

The fluid's lubricity describes the ability of the fluid to reduce the friction between surfaces that are under load. This ability reduces the damage that is caused by friction. Fuel injection systems rely on the lubricating properties of the fuel. Until fuel sulfur limits were mandated, the fuel's lubricity was generally believed to be a function of fuel viscosity.

The process that is most commonly used to remove sulfur from fuel is called hydro-treatment. This process is also the most economical process. Each source of crude oil contains different amounts of sulfur. Crude oils with low sulfur require little hydro-treatment to obtain the 0.05 percent limit. Crude oils with high sulfur require a more severe treatment.

The Hydro-treatment removes the fuel's sulfur as well as other components. The treatment removes nitrogen compounds, polar materials, bicyclic aromatics, polycyclic aromatics, and oxygen compounds. While the removal of sulfur has shown no detrimental effects to the engine, the removal of other compounds have lowered the lubricity of the fuel. As a result of the lowered lubricity, the fuel is less tolerant of contamination by water and dirt. The lower fuel lubricity can be seen as abrasive wear of fuel system components. Fuels that have a low lubricity may not provide adequate lubrication to plungers, to barrels, and to injectors. This problem may be compounded in areas that require winter blends of fuel. The lighter winter fuel blend has the following characteristics: lower viscosity, lower cloud point, and lower pour point.

All low sulfur fuels do not have a low lubricity. The fuel's lubricity may be enhanced with additives. Many fuel suppliers treat the fuel with these additives. Do not use a fuel lubricity additive before you consult the fuel's supplier. Some aftermarket additives may not be compatible with the additives that are already in the fuel. Some additive packages that are supplied by the aftermarket manufacturer may not be compatible with the seals that are used in fuel systems of some diesel engines. Other additive packages that are supplied by aftermarket manufacturers cannot provide proper performance in high temperature conditions. These additives may leave deposits because of the high temperatures that exist in the fuel systems of diesel engines.

Maximum life of the fuel system can be achieved by performing the following tasks: using a reliable fuel supplier, performing proper maintenance of the fuel system, and installing Caterpillar high efficiency fuel filters in the fuel system.

Note: Lighter fuels are frequently used in arctic temperatures. Lighter fuels may include the following fuels: Jet A-1, JP-8, JP-5, and kerosene. The fuel lubricity is not a requirement of the specifications for these fuels. Do not assume that a fuel meets the minimum Caterpillar specification. Contact the fuel supplier for proper recommendations on fuel lubricity additives.

Note: For best results, your fuel supplier should treat the fuel when additives are required.

Cat ELC Cooling System Contamination

NOTICE
Mixing ELC with other products reduces the effectiveness of the ELC and shortens the ELC service life. Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specification for premixed or concentrate coolants. Use only Cat ELC Extender with Cat ELC. Failure to follow these recommendations can result in shortened cooling system component life.

Cat ELC cooling systems can withstand contamination to a maximum of ten percent of conventional heavy-duty coolant/antifreeze or SCA before the advantages of Cat ELC are reduced. If the contamination exceeds ten percent of the total system capacity, perform ONE of the following procedures:

- Drain the cooling system into a suitable container. Dispose of the coolant according to local regulations. Flush the system with clean water. Fill the system with the Cat ELC.
- Maintain the system as a conventional DEAC (Diesel Engine Antifreeze/Coolant). Treat the system with an SCA. Change the coolant at the interval that is recommended for Cat DEAC or at the interval that is recommended for the conventional commercial coolants.

Commercial ELC

If Cat ELC is not used, then select a commercial extended life coolant that meets the Caterpillar specification of EC-1 and either the "ASTM D6210" specification or the "ASTM D4985" specification. Do not use an extended life coolant that does not meet the EC-1 specification. Follow the maintenance guide for the coolant from the supplier of the commercial extended life coolant. Follow the Caterpillar guidelines for the quality of water and the specified coolant change interval.

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Diesel Engine Antifreeze/ Coolant

SMCS Code: 1350; 1352; 1395

Caterpillar recommends using Cat DEAC (Diesel Engine Antifreeze/Coolant) for cooling systems that require a heavy-duty coolant/antifreeze. Cat DEAC is an alkaline single-phase ethylene glycol type antifreeze that contains corrosion inhibitors and antifoam agents.

Cat DEAC is formulated with the correct amount of Cat SCA (Supplemental Coolant Additive) . Do not use Cat SCA at the initial fill when Cat DEAC is used.

Containers of several sizes are available. Consult your Caterpillar dealer for the part numbers.

If concentrated Cat DEAC is used, Caterpillar recommends mixing the concentrate with distilled water or with deionized water. If distilled water or deionized water is not available, use water which has the required properties. For the water properties, see this publication, "General Coolant Information" topic (Maintenance Section). The concentrated Cat DEAC and the recommended water must be thoroughly mixed prior to filling the cooling system.

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Supplemental Coolant Additive

SMCS Code: 1350; 1352; 1395

The use of SCA (supplemental coolant additive) helps to prevent the following conditions from occurring:

- Corrosion
- Formation of mineral deposits
- Cavitation erosion of the cylinder liners
- Foaming of the coolant

Cat DEAC (Diesel Engine Antifreeze/Coolant) is formulated with the correct level of Cat SCA. When the cooling system is initially filled with Cat DEAC, adding more Cat SCA is not necessary until the concentration of Cat SCA has been depleted. To ensure that the correct amount of Cat SCA is in the cooling system, the concentration of Cat SCA must be tested on a scheduled basis. Refer to the specific engine's Operation and Maintenance Manual, "Maintenance Interval Schedule".

Containers of Cat SCA are available in several sizes. Consult your Caterpillar dealer for the part numbers.