

Product: EXCAVATOR
Model: 314D CR EXCAVATOR MFK
Configuration: ISJ HEX COMMONALITY CHART MFK00001-UP (MACHINE)

Operation and Maintenance Manual Caterpillar Machine Fluids Recommendations

Media Number -SEBU6250-26

Publication Date -01/11/2018

Date Updated -05/10/2017

Foreword

SMCS - 1000; 7000

Fluids/Filters Recommendation

Literature Information

This manual should be stored in the literature holder or in the literature storage area on the machine. Immediately replace this manual if lost, damaged, or unreadable.

The information contained in this document is the most current information available for fluid maintenance and service products. Special maintenance and service products may be required for some machine compartments. Refer to the Operation and Maintenance Manual for your machine for the maintenance and service requirements. Read, study, and keep this manual with the product. This manual should be read carefully before using this product for the first time and before performing maintenance.

Whenever a question arises regarding your product, or this publication, consult your dealer for the latest available information.

Safety

Refer to the Operation and Maintenance Manual for your machine for all safety information. Read and understand the basic safety precautions listed in the Safety Section. In addition to safety precautions, this section identifies the text and locations of warning signs used on the machine.

Read and understand the applicable precautions listed in the Maintenance and Operation Sections before operating or performing lubrication, maintenance, and repair on this machine.

Maintenance

Refer to the Operation and Maintenance Manual for your machine to determine all maintenance requirements.

Proper maintenance and repair are essential to keep the equipment and systems operating correctly. As the owner, you are responsible for the performance of the required maintenance listed in the Owner Manual, Operation and Maintenance Manual, and Service Manual.

Maintenance Interval Schedule

Use the Maintenance Interval Schedule in the Operation and Maintenance Manual for your machine to determine servicing intervals. Use the service hour meter to determine servicing intervals. Calendar intervals shown (daily, weekly, monthly, etc.) can be used instead of service hour meter intervals if calendar intervals provide more convenient servicing schedules and approximate the indicated service hour meter reading. Recommended service should always be performed at the interval that occurs first.

Under extremely severe, dusty, or wet operating conditions, more frequent lubrication and/or filter changes than is specified in the maintenance intervals chart might be necessary.

Following the recommended maintenance intervals reduces the risk of excessive wear and potential failures of components.

Aftermarket Products and Warranty

NOTICE

When auxiliary devices, accessories or consumables (filters, oil, additives, catalysts, fuel, etc.) made by other manufacturers are used on Cat products, the Caterpillar warranty is not affected simply because of such use. Failures that result from the installation or usage of other manufacturers auxiliary devices, accessories or consumables, however, are not Caterpillar factory defects and therefore are NOT covered by Caterpillar's warranty.

Caterpillar is not in a position to evaluate the many auxiliary devices, accessories or consumables promoted by other manufacturers and their effect on Cat products. Installation or use of such items is at the discretion of the customer who assumes ALL risks for the effects that result from this usage.

Furthermore, Caterpillar does not authorize the use of its trade name, trademark, or logo in a manner which implies our endorsement of these aftermarket products.

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Lubricant Information

SMCS - 1000; 1300; 7581

NOTICE

Every attempt is made to provide accurate, up-to-date information. By the use of this document, you agree that Caterpillar Inc. is not responsible for errors or omissions.

The information that is provided is the latest recommendations for Cat diesel engines that are covered by this Special Publication. This information supersedes all previous recommendations which have been published for Cat diesel engines that are covered by this Special Publication. Special fluids are required for some engines. These fluids will still be necessary in those engines. Refer to the applicable Operation and Maintenance Manual.

This publication is a supplement to the Operation and Maintenance Manual. This publication does not replace the engine-specific Operation and Maintenance Manuals.

NOTICE

These recommendations are subject to change without notice. Consult your local Cat dealer for the most up to date recommendations.

Failure to follow the recommendations found in this Special Publication can cause engine failures, shortened engine service life, and reduced engine performance.

In order to avoid potential damage to your Cat engine, only purchase Cat fluids and Cat filters through your Cat dealer or Cat authorized outlets. For a list of authorized Cat parts outlets in your area, consult your Cat dealer.

If you purchase what appear to be Cat fluids and/or Cat filters through other outlets/sources, you are at a very high risk of purchasing counterfeit (“look-alike”) products.

Counterfeit or “look-alike” products may visually appear the same as the original Cat product. The product performance and internal quality will typically be very low.

Counterfeit or “look-alike” products have a very high likelihood of causing and/or allowing engine and/or machine compartment damage.

Many of the guidelines, recommendations, and requirements that are provided in this Special Publication are interrelated. Before using the provided information, The user is responsible to read this Special Publication and understand the information provided.

The user is responsible to follow all safety guidelines found in this Special Publication and in the engine Operation and Maintenance Manual when performing all recommended and/or required engine, engine systems, and/or machine maintenance.

For questions concerning the information presented in this Special Publication and/or in your product Operation and Maintenance Manual, and/or for additional guidelines and recommendations (including maintenance interval recommendations/requirements) consult your Cat dealer.

Commercial products that make generic claims of meeting “Cat” and/or “Cat” requirements without listing the specific Cat recommendations and/or requirements that are met may not provide acceptable performance. Reduced engine and/or machine fluid compartment life may result. Refer to this Special Publication and refer to the product Operation and Maintenance Manual for Cat fluids recommendations and/or requirements.

Use of fluids that do not meet at least the minimum performance recommendations and/or requirements may lead to lower compartment performance and/or compartment failure.

Problems/failures that are caused by using fluids that do not meet the minimum recommended and/or required performance level for the compartment are not warrantable by Caterpillar Inc.. The fluid manufacturer and customer are responsible.

When fluids made by other manufacturers are used on Cat products, the Cat warranty is not affected simply because of such use. Failures that result from the installation or usage of other manufacturer fluids, however, are not Cat factory defects and therefore are NOT covered by the Cat warranty. Cat is not in a position to evaluate the many fluids promoted by other manufacturers and the effect on Cat products. Installation or use of such items is at the discretion of the customer who assumes ALL risks for the effects that result from this usage.

Different brand oils may use different additive packages to meet the various engine performance category/specification requirements. For the best results, do not mix oil brands.

The overall performance of engine and machine compartments is dependent on the choice of the lubricants and on the maintenance and cleanliness practices. The choices include filtration products, contamination control, tank management, and general handling practices. Cat designed and produced filtration products offer optimal performance and system protection.

In order to obtain additional information on Cat designed and produced filtration products, refer to Special Publication, SEBU9208, "Caterpillar Filters Recommendations". Also refer to the “Reference Material” article, “Filters” and “Miscellaneous” topics in this Special Publication. Consult your Cat dealer for assistance with filtration recommendations for your Cat machine.

Note: In order to help ensure the maximum expected compartment performance and life, use a fluid that meets Cat highest level of fluid performance as described in this Special Publication for the compartment. Using a fluid that is considered an acceptable, but lower performing option for typical applications, will provide lower performance.

NOTICE

Faulty engine coolant temperature regulators, or operating with light loads, short operation cycles, excessive idling, or operating in applications where normal operating temperature is seldom reached can contribute to excessive water in the crankcase oil. Corrosive damage, piston deposits, increased oil consumption, and other damage can result. If a complete oil analysis program is not followed or if the results are ignored, the potential for damage increases. Follow engine warmup recommendations provided in this Special Publication and/or given in your engine Operation and Maintenance Manual.

Cat Fluids

Cat fluids have been developed and tested by Cat in order to increase the performance and the life of Cat components. The quality of finished oil is dependent on the quality of the base stock, the quality of the additives and the compatibility of the base stock and additives. Cat fluids are formulated of high-quality refined oil base stocks and additives of optimal chemistry and quantity in order to provide high performance in engines and machine components. Cat fluids are used for factory fill of Cat engines and components and are offered by Cat dealers for service fills and as aftermarket products. Consult with your Cat dealer for more information on these Cat fluids.

Cat recommends the use of the following Cat fluids:

Table 1

Cat Lubricants	Viscosity Grade	
Diesel Engine Oil-Ultra Low Sulfur (API CK-4)	Cat DEO-ULS	SAE 15W-40
	Cat DEO-ULS SYN	SAE 10W-30
	Cat DEO-ULS SYN	SAE 5W-40
	Cat DEO Cold Weather	SAE 0W-40
Diesel Engine Oil (API CI-4/API CI-4PLUS)	Cat DEO	SAE 15W-40
	Cat DEO	SAE 10W-30
Multi-Application Engine Oil	Cat MAEO Plus (Non-Cat mixed fleets)	SAE 10W-40
Diesel Engine Oil (API CF)	Cat DEO (3600 engines only)	SAE 40
Pre Combustion Oil	Cat PCO	SAE 40

		SAE 10W
	Cat TDTO	SAE 30
Transmission/Drive Train Oil		SAE 50
	Cat TDTO-TMS	Multigrade
	Cat TDTO Cold Weather	SAE 0W-20
Special Application Transmission Oil	Cat SATO	Multigrade
Automatic Transmission Fluid	Cat ATF-HD2	Multigrade Synthetic
	Cat FDAO	SAE 60
Final Drive and Axles Oil	Cat FDAO SYN	Multigrade
	Cat GO	SAE 80W-90
Gear Oil		SAE 85W-140
	Cat Synthetic GO	SAE 75W-140
		SAE 10W
	Cat HYDO Advanced	SAE 20W
Hydraulic Oil		SAE 30
	Cat Bio HYDO Advanced (HEES)	ISO 46 Multigrade
Multipurpose Tractor Oil	Cat MTO	SAE 10W-30

Note: Additional Cat fluids may be available.

Note: Cat offers Special Application Engine Oil (SAEO), API CF oil of SAE 30 and SAE 40 viscosity grades. These oils are recommended for use in 3116 and 3126 marine engines.

Table 2

Cat Grease products	
Grease	Cat Utility Grease
	Cat Prime Application Grease
	Cat Extreme Application Grease
	Cat Extreme Application Grease - Desert
	Cat Extreme Application Grease - Arctic (Semi-Synthetic)
	Cat Ball Bearing Grease
	Cat White Assembly Grease
	Cat Hammer Paste

Note: Cat fluids availability will vary by region.

This information applies to Cat machines. For more lubricant recommendations see the following Special Publications:

- Special Publication, SEBU6251, "Caterpillar Commercial Diesel Engine Fluid Recommendations"
- Special Publication, SEBU6385, "Caterpillar On-Highway Diesel Engine Fluids Recommendations"
- Special Publication, SEBU6400, "Caterpillar Gas Engine Fluids Recommendations"
- Special Publication, SEBU7003, "Caterpillar 3600 Series and C280 Series Diesel Engine Fluids Recommendations"

Always consult your Cat dealer in order to ensure that you have the current revision level of the publication.

Note: The optimal application of the lubricants is dependent on the oil quality and the maintenance practices such as contamination control, tank management, and general handling practices.

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Engine Oil - Cat Machine Diesel Engines

SMCS - 1348; 7581

Engine lubricants play multiple roles in engines. Appropriate lubricants offer the following:

- Provide lubrication to the moving components of the engine under a wide range of temperatures and pressures
- Keep the engine components clean and remove wear debris
- Remove heat from the lubricated components
- Neutralize acidic products due to combustion process
- Protect the engine from cavitation and foaming
- Protect the engine from corrosion and rust
- Control Oil Consumption
- Disperse/Solubilize Contaminants (soot)
- Support the regulated engine emissions limits

Current lubricant formulations are more advanced and complex than previous formulations. Current lubricants are developed to support advanced engine technologies that have lower emissions while supporting the performance and durability of these engines.

High-performance oils are produced and validated using industry standard tests, proprietary tests, field tests, and often prior experience with similar formulation. The American Petroleum Institute (API) categories describe the key industry standards that set the minimum acceptable performance for engine oils. Other global standard setting organizations may also develop common standards, for example the European ACEA oil specs. Cat high quality and high-performance lubricants are validated based on these factors.

In order to provide optimal engine performance and life and comply with regulated emission reduction, use the recommended engine oil as provided in this special publication. Due to the

significant variations in the quality and performance of commercially available oils on a global basis, Cat recommends the use of Cat oils as detailed in this article.

Cat Diesel Engine Oils

Cat fluids have been developed and tested by Caterpillar in order to provide the full performance and service life that has been designed and built into Cat engines. The quality of finished oil is dependent on the quality of the base stock, the quality of the additives, and the compatibility of the base stock and additives. Cat fluids are formulated of high-quality refined oil base stocks and additives of optimal chemistry and quantity in order to provide high performance in engines and machine components. Cat fluids are used for factory fill of Cat engines and components and are offered by Cat dealers for service fills and as aftermarket products. Consult your Cat dealer for more information on these Cat fluids.

Cat recommends the use of the following lubricants in commercial engines covered by this Special Publication are in Table 1 below:

Table 1

Cat Lubricants ⁽¹⁾			Viscosity Grade
Recommendations for all Cat diesel engines	Cat Diesel Engine Oil-Ultra Low Sulfur (API CK-4) ⁽²⁾	Cat DEO-ULS	SAE 15W-40
			SAE 10W-30
		Cat DEO-ULS SYN	SAE 5W-40
		Cat DEO Cold Weather	SAE 0W-40
	Cat Diesel Engine Oil (API CI-4/CI-4 PLUS and API CH-4)	Cat MAEO Plus (Non-Cat mixed fleets)	SAE 15W-40
			SAE 10W-30
Specialty oils for specific Cat diesel engines	Cat Multi-Application Engine Oil	Cat MAEO Plus (Non-Cat mixed fleets)	SAE 10W-40
	Cat Diesel Engine Oil	Cat DEO (3600 engines only)	SAE 40
	Cat Precombustion Chamber Oil	Cat PCO (Specific applications only)	SAE 30

⁽¹⁾ Cat engine oils exceed the performance requirements of the respective API categories

⁽²⁾ These oils have changed from API CJ-4 to API CK-4 early in 2017

Note: Cat offers Special Application Engine Oil (SAEO), API CF oil of SAE 30 and SAE 40 viscosity grades. These oils are recommended for use in 3116 and 3126 marine engines.

Note: Additional Cat fluids may be available.

This information applies to Cat commercial engines. For more lubricant recommendations see the following Special Publications:

- Special Publication, SEBU6251, "Caterpillar Commercial Diesel Engine Fluids Recommendations"
- Special Publication, SEBU6385, "Caterpillar On-Highway Diesel Engine Fluids Recommendations"
- Special Publication, SEBU6400, "Caterpillar Gas Engine Fluids Recommendations"
- Special Publication, SEBU7003, "Caterpillar 3600 Series and C280 Series Diesel Engine Fluids Recommendations"

Always consult your Cat dealer in order to ensure that you have the current revision level of the publication.

Note: The optimal application of the lubricants is dependent on the oil quality and the maintenance practices. Such practices include contamination control, oil tank management and general handling practices.

Cat Diesel Engine Oils Recommendations

Cat DEO-ULS and Cat DEO multigrade oils are the preferred oils for use in ALL Cat diesel engines that are covered by this Special Publication. Commercial alternative diesel engine oils are, as a group, second choice oils. Refer to Table 2 below for information.

Table 2

Cat Engine Lubricants Recommendations/Requirements		
	Non-Road Tier 4 Certified	Non-Road Pre Tier 4 Certified
Preferred	Cat DEO-ULS (API CK-4)	Cat DEO-ULS (API CK-4) Cat DEO (API CI-4/API CI-4 PLUS)
Commercial Lubricants	API CK-4 Cat ECF-3/API CJ-4	API CK-4 Cat ECF-3/API CJ-4, Cat ECF-2 Cat ECF-1-a

Note: API engine oil categories are backwards compatible. Cat DEO-ULS (API CK-4) oil can be used in all engines with some restrictions related to fuel sulfur level, refer to Table 2 for more details. Cat DEO (API CI-4/API CI-4 PLUS) can be used in engines that are Tier 3 emissions certified and prior, and in engines that do not use aftertreatment devices.

Note: When the recommended Cat diesel engine oils are not used, commercial oils that are API CK-4 licensed and/or meet the requirements of the Cat ECF-1-a, Cat ECF-2, and/or the Cat ECF-3 specification are acceptable, but second choice, for use in Cat diesel engine.

Refer to "The Current American Petroleum Institute (API) Oil Categories" and "Commercial Engine Oil Recommendations" sections of this chapter for information on the API categories and corresponding Cat engine oils.

API CK-4 exceeds the performance requirements of prior oil categories.

Caterpillar has released a new Cat diesel engine oil, Cat DEO-ULS that is per the new API CK-4 heavy duty engine oil category. The new Cat DEO-ULS replaces the prior Cat oil that was per API CJ-4 category, but it is of the same brand name. The new Cat DEO-ULS preserved the same level of phosphorous, 1000 ppm (parts per million) (mg/kg), to ensure achieving long hour engine durability goals.

Note: The new API FA-4 Heavy Duty Engine Oil Category is NOT allowed in Cat engines. API FA-4 is a special low High Temperature High Shear (HTHS) viscosity oil that is designed for certain 2017 On-Highway engine models.

Note: Each of the Cat ECF specifications provides increased performance over lower Cat ECF specifications. For example, Cat ECF-3 provides higher performance than Cat ECF-2 and Cat ECF-3 provides much higher performance than Cat ECF-1-a. Refer to Table 3 for details.

The engine oils recommended/required for Tier 4 certified engines are formulated with limited ash and chemical limits:

- 1 percent sulfated ash maximum
- 0.12 percent phosphorous maximum
- 0.4 percent sulfur maximum

These chemical limits were developed in order to maintain the expected aftertreatment devices life, performance, and service intervals. Use of oils other than those listed in this section of this special publication in aftertreatment equipped engines can negatively impact performance of the aftertreatment devices, can contribute to Diesel Particulate Filter (DPF) plugging and/or can cause the need for more frequent DPF ash service intervals.

Cat DEO-ULS and Cat DEO are recommended for all pre-Tier 4 engines that use Ultra Low Sulfur Diesel (ULSD) or Low Sulfur Diesel (LSD) fuels. Cat DEO is recommended for engines using fuels of sulfur levels that exceed 0.2 percent (2000 ppm). Cat DEO-ULS may be used in these applications if an oil analysis program is followed. The oil change interval may be affected by the fuel sulfur level. Refer to Table 4 in this section of this Special Publication.

Table 3 below provides details of Cat ECF specifications.

Table 3

Cat Engine Crankcase Fluids (ECF) Definitions	
Cat Minimum Performance Requirements for Commercial Oils	Cat ECF Specifications Requirements
(1)	API CK-4 Oil Category performance requirements
Cat ECF-3	API CJ-4 Oil Category performance requirements

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