

Product: HEX BASED SPL SOLUTION

Model: M317D HEX BASED SPL SOLUTION CET

Configuration: OEM SOLUTIONS GROUP PRODUCT COMMONALITY CHART CET00001-UP (MACHINE)

Operation and Maintenance Manual Caterpillar Machine Fluids Recommendations

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Distillate Diesel Fuel

SMCS - 1280

Note: For on-highway diesel engine fluids requirements, refer to specific engine Operation and Maintenance Manuals, and also refer to the most current revision level of Special Publication, SEBU6385, "Caterpillar On-Highway Diesel Engine Fluids Recommendations". Also consult your Cat dealer.

Caterpillar is not in the position to continuously evaluate and monitor all the many worldwide distillate diesel fuel specifications and the on-going revisions that are published by governments and technological societies.

The "Caterpillar Specification for Distillate Fuel for Off-Highway Diesel Engines" provides a known, reliable baseline to judge the expected performance of distillate diesel fuels that are derived from conventional sources (crude oil, shale oil, oil sands, etc.) when used in Cat diesel engines.

Using the Cat distillate diesel fuel specification as the baseline, it is much easier to determine any potential economic and/or performance trade-offs, and overall acceptability when using fuels of varying characteristics and quality levels.

- When required, have the diesel fuel that either is being used or is planned to be used, tested per the Cat distillate diesel fuel specification.
- Use the Cat distillate diesel fuel specification as a fuel quality baseline for comparison of distillate diesel fuel analysis results, and/or a baseline for comparison of other distillate diesel fuel specifications.
- Typical fuel characteristics can be obtained from the fuel supplier.

Fuel parameters outside of the Cat fuel specification limits have explainable consequences.

- Some fuel parameters that are outside of the specification limits can be compensated for (e.g. fuel can be cooled to address low viscosity; etc.).
- Some fuel parameters that are outside of specification limits may be able to be improved with the use of appropriate amounts of well proven fuel additives. Refer to this Special

Publication, "Distillate Diesel Fuel" article, "Aftermarket Fuel Additives" and "Cat Diesel Fuel Conditioner" topics for guidance.

To help ensure optimum engine performance, a complete fuel analysis should be obtained before engine operation. The fuel analysis should include all of the properties that are listed in the "Caterpillar Specification for Distillate Fuel for Nonroad Diesel Engines", Table 1.

Note: The diesel fuel has to be bright and clear. The diesel fuel cannot have any visually apparent sediment, suspended matter, or undissolved water.

Diesel Fuels that meet the specifications in table 1 will help provide maximum engine service life and performance.

In North America, diesel fuels that are identified as meeting the latest version of "ASTM D975" Grades No. 1-D or No. 2-D (all listed sulfur levels) generally meet the table 1 requirements.

In Europe, diesel fuels that are identified as meeting the latest version of "European Standard EN590" generally meet the table 1 requirements.

Table 1 is for diesel fuels that are distilled from conventional sources (crude oil, shale oil, oil sands, etc.). Diesel fuels from other sources could exhibit detrimental properties that are not defined or controlled by this specification.

NOTICE

Ultra Low Sulfur Diesel (ULSD) fuel 0.0015 percent (≤ 15 ppm (mg/kg)) sulfur is required by regulation for use in engines certified to nonroad Tier 4 standards (U.S. EPA Tier 4 certified) and that are equipped with exhaust aftertreatment systems.

European ULSD 0.0010 percent (≤ 10 ppm (mg/kg)) sulfur fuel is required by regulation for use in engines certified to European nonroad Stage IIIB and newer standards and are equipped with exhaust aftertreatment systems.

Certain governments/localities and/or applications MAY require the use of ULSD fuel. Consult federal, state, and local authorities for guidance on fuel requirements for your area.

Typical aftertreatment systems include Diesel Particulate Filters (DPF), Diesel Oxidation Catalysts (DOC), Selective Catalytic Reduction (SCR) and/or Lean NO_x Traps (LNT). Other systems may apply.

Low sulfur diesel (LSD) fuel 0.05 percent (≤ 500 ppm (mg/kg)) sulfur is strongly recommended for use in engines that are pre-Tier 4 models, while diesel fuel with > 0.05 percent (500 ppm (mg/kg)) sulfur is acceptable for use in areas of the world where allowed by law. Pre-Tier 4 engines that are equipped with a Diesel Oxidation Catalyst (DOC) require the use of LSD fuel or ULSD fuel.

ULSD fuel or sulfur-free diesel fuel are applicable for use in all engines regardless of the engine Tier or Stage.

Use appropriate lubricating oils that are compatible with the engine certification and aftertreatment system and with the fuel sulfur levels. Refer to the “Diesel Fuel Sulfur Impacts” article of this “Fuels Specifications” section and to the “Lubricants Specifications” section of this Special Publication.

Recommendations for Europe Stage V Certified Nonroad Engines:

All the fuel recommendations and requirements for U S EPA Tier 4 Certified Nonroad Engines” section above are applicable to the Europe Stage V type-approved Nonroad Engines. Additionally, for the correct operation of the engine in order to maintain the gaseous and particulate pollutant emissions of the engine within the limits of the type-approval, unless specified otherwise in the engine-specific Operation and Maintenance Manual, EU Stage V regulations REQUIRE the diesel fuels (also called non-road gas oil) used in engines operated within the European Union (EU) to have the characteristics below:

- The sulfur content should be ≤ 10 mg/kg (20 mg/kg) at point of final distribution
- The Cetane number should be ≥ 45
- The biodiesel (also called Fatty Acid Methyl Ester (FAME)) content should be ≤ 7 % volume/volume

Follow all the local regulations and fluids requirements in your area. Refer to your engine-specific Operation and Maintenance Manual, and refer to your aftertreatment device documentation, if available, for additional guidance.

Engine operating conditions play a key role in determining the effect that fuel sulfur will have on engine deposits and on engine wear.

Note: The removal of sulfur and other compounds in Ultra Low Sulfur Diesel (ULSD) fuel decreases the conductivity of ULSD and increases the ability of the fuel to store static charge. Refineries may have treated the fuel with a static dissipating additive. However, there are many factors that can reduce the effectiveness of the additive over time. Static charges can build up in ULSD fuel while the fuel is flowing through fuel delivery systems. Static electricity discharge when combustible vapors are present could result in a fire or explosion. Therefore, ensuring that the entire system used to refuel your machine (fuel supply tank, transfer pump, transfer hose, nozzle, and others) is properly grounded and bonded is important. Consult with your fuel or fuel system supplier to ensure that the delivery system is in compliance with fueling standards for proper grounding and bonding practices.

NOTICE

Do not add new engine oil, waste engine oil or any oil product to the fuel unless the engine is designed and certified to burn diesel engine oil (for example Caterpillar ORS designed for large engines). Caterpillar experience has shown that adding oil products to Tier 4 engine fuels (U.S. EPA Tier 4 certified), to EURO Stage IIB and IV certified engine fuels, or to the fuels of engines equipped with exhaust aftertreatment

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devices, will generally cause the need for more frequent ash service intervals and/or cause loss of performance.

Adding oil products to the fuel may raise the sulfur level of the fuel and may cause fouling of the fuel system and loss of performance.

ULSD and any other fuel used in Cat engines have to be properly formulated and additized by the fuel supplier and have to meet Special Publication, "Caterpillar Specification for Distillate Diesel Fuel for Off-Highway Diesel Engines". Fuels that are defined as "ASTM D975" Grade No. 1-D S15 or "ASTM D975" Grade No. 2-D S15 generally meet Cat requirements for ULSD.

Refer to this Special Publication, "Characteristics of Diesel Fuel" article for additional pertinent information concerning fuel lubricity, fuel oxidative stability, fuel sulfur, and aftertreatment devices. Also refer to the latest version of "ASTM D975", the latest version of "EN 590", the specific engine Operation and Maintenance Manual, and to aftertreatment device documentation for guidance.

Note: Caterpillar strongly recommends the filtration of distillate fuel and/or biodiesel/biodiesel blends through a fuel filter with a rating of four microns(c) absolute or less. This filtration should be on the device that dispenses the fuel to the fuel tank for the engine, and also on the device that dispenses fuel from the bulk storage tank. Series filtration is recommended. Caterpillar recommends that the fuel dispensed into the machine tank meets "ISO 18/16/13" cleanliness level.

Note: The owner and the operator of the engine has the responsibility of using the correct fuel that is recommended by the manufacturer and allowed by the U.S. EPA and, as appropriate, other regulatory agencies.

NOTICE

Operating with fuels that do not meet Cat recommendations can cause the following effects: starting difficulty, reduced fuel filter service life, poor combustion, deposits in the fuel injectors, reduced service life of the fuel system, deposits in the combustion chamber and reduced service life of the engine.

NOTICE

The footnotes are a key part of the "Caterpillar Specification for Distillate Diesel Fuel" Table. Read ALL of the footnotes.

For additional guidance related to many of the fuel characteristics that are listed, refer to "Cat Specification for Distillate Fuel for Off-Highway Diesel Engines", table 1.

The values of the fuel viscosity given in table 1 are the values as the fuel is delivered to the fuel injection pumps. For ease of comparison, fuels should also meet the minimum and maximum viscosity requirements at 40° C (104° F) that are stated by the use of either the "ASTM D445" test method or the "ISO 3104" test method. If a fuel with a low viscosity is used, cooling of the fuel may be required to maintain 1.4 cSt or greater viscosity at the fuel injection pump. Fuels with a high viscosity might require fuel heaters to lower the viscosity to either 4.5 cSt or less for rotary fuel injection pumps or 20 cSt viscosity or less for all other fuel injection pumps.

Table 1

Cat Specification for Distillate Fuel for Nonroad Diesel Engines			
Specifications	Requirements	ASTM Test	ISO Test
Aromatics	35% volume, maximum	"D1319"	"ISO 5186"
Ash	0.01% maximum (weight)	"D482"	"ISO 6245"
Density at 15° C (59° F) ⁽¹⁾ ⁽²⁾	800 kg/m ³ minimum 860 kg/m ³ maximum	"D4052", "D287"	"ISO 3675", "ISO 12185"
Cetane Number	40 minimum (DI engines) 35 minimum (PC engines)	"D613"	"ISO 5165"
Cetane Index	40, minimum	"D976"	"ISO 4264"
Flash Point	legal limit	"D93"	"ISO 2719"
Carbon Residue on 10% distillation residue - Ramsbottom, % mass	0.30% mass, maximum	"D524"	"ISO 10370"
Oxidation Stability	25 g/m ³ , maximum	"D2274"	"ISO 12205"
Thermal Stability	Minimum of 80% reflectance after aging for 180 minutes at 150° C (302° F)	"D6468", "D3241"	No equivalent test
Copper Strip Corrosion (Control temperature 50° C (122° F) minimum)	No. 3 maximum	"D130"	"ISO 2160"
Distillation, vol recovered	10%, Record 90% at 360° C (680° F) maximum ⁽³⁾ 90% at 350° C (662° F) maximum ⁽³⁾	"D86"	"ISO 3405"
Lubricity (HFRR Wear Scar)	0.52 mm (0.0205 inch) maximum at 60° C (140° F)	"D6079"/"D7688"	"ISO 12156– 1.3"
Pour Point		"D97"	

	6°C (10°F) minimum below ambient temperature		
Cloud Point	The cloud point must not exceed the lowest expected ambient temperature.	"D2500"	"ISO 3015"
Low Temperature Flow Test/Cold Filter Plugging Point Test (LTFT/CFPP)	Must not exceed the lowest expected ambient temperature.	"D4539"/"D6371"	No equivalent test
Sulfur by weight	(4)	"D5453", "D2622", "D129" (based on the sulfur level)	"ISO 20846", "ISO 20884"
KInematic Viscosity at 40° C (104° F) for No. 1 diesel	1.3 cSt minimum and 2.4 cSt maximum	"D445"	"ISO 3104"
KInematic Viscosity at 40° C (104° F) for No. 2 diesel	1.9 cSt minimum and 4.5 cSt maximum	"D445"	"ISO 3104"
Contaminants			
Solids	10 mg/l	"D6217"	"ISO 12662"
Sediment	0.05% maximum (weight)	"D473"	No Equivalent Test
Water/Sediment	0.05% maximum	"D2709"	"ISO 3734"
Water	0.02% maximum	"D1744"	"ISO 12937"
Cleanliness	(5)	"D7619"	"ISO 4406"
Appearance	Clear and Bright	"D4176"	No equivalent test

(1) The equivalent API gravity of 875.7 kg/m³ is 30 and for 801.3 kg/m³ is 45 (per "ASTM D287" test method temperature of 15.56° C (60° F)).

(2) The density range allowed included # 1 and # 2 diesel fuel grades. Fuel density varies depending on sulfur levels, where high sulfur fuels have higher densities. Some unblended (neat) alternative fuels have lower densities than diesel fuel. This density is acceptable if the other properties of the alternative fuel fall within this specification.

(3) Distillation of 90% at 350° C (662° F) maximum is recommended for Tier 4 engines and preferred for all engines. Distillation of 90% at 350° C (662° F) is equivalent to 95% at 360° C (680° F). Distillation of 90% at 360° C (680° F) maximum is 360° C (680° F). Distillation of 90% at 360° C (680° F) maximum is acceptable for Pre-Tier 4 engines.

(4) Follow the federal, state, local, and other governing authorities for guidance concerning the fuel requirements in your area. Follow the engine Operation and Maintenance Manual and the details provided in this Fuel section. ULSD 0.0015% (<15 ppm S) is required by law for Tier 4 engines and engines with aftertreatment devices. ULSD and LSD 0.05% (≤500 ppm S) are strongly recommended for pre-Tier 4 engines. Diesel fuel with >0.05% (>500

ppm) sulfur is acceptable for use where allowed by law. Consult your Cat dealer for guidance when sulfur levels are above 0.1% (1000 ppm). Certain Cat fuel systems and engine components can operate on fuel with a maximum sulfur content of 3%. Refer to the specific engine Operation and Maintenance Manual and consult your Cat dealer

- ⁽⁵⁾ Recommended cleanliness level for fuel as dispensed into machine or engine fuel tank is "ISO 18/16/13" or cleaner per "ISO 4406" or "ASTM D7619". Refer to the "Recommendations for Cleanliness of Fuels" in this chapter

There are many other diesel fuel specifications that are published by governments and by technological societies. Usually, those specifications do not review all the requirements that are addressed in the "Caterpillar Specification for Distillate Fuel for Off-Highway Diesel Engines", Table 1. To help ensure optimum engine performance, a complete fuel analysis should be obtained before engine operation. The fuel analysis should include all the properties that are listed in the "Cat Specification for Distillate Fuel for Off-Highway Diesel Engines", Table 1.

NOTICE

In order to meet expected fuel system component life, 4 micron(c) absolute or less secondary fuel filtration is required for all Cat diesel engines that are equipped with common-rail fuel systems. Also, 4 micron(c) absolute or less secondary fuel filtration is required for all Cat diesel engines that are equipped with unit injected fuel systems. For all other Cat diesel engines (mostly older engines with pump, line and nozzle type fuel systems), the use of 4 micron(c) absolute or less secondary fuel filtration is strongly recommended. Note that all current Cat diesel engines are factory equipped with Cat Advanced Efficiency 4 micron(c) absolute fuel filters.

To obtain additional information on Cat designed and produced filtration products, refer to this Special Publication, "Reference Material" article, "Filters" and "Miscellaneous" topics, and then contact your Cat dealer for assistance with filtration recommendations for your Cat machine.



WARNING

Mixing alcohol or gasoline with diesel fuel can produce an explosive mixture in the engine crankcase or fuel tank.

Personal injury and damage to the engine may result. Caterpillar recommends against this practice.

Caterpillar S&ATMO&MTM Services Fuel Analysis

Caterpillar has developed a maintenance management tool that evaluates fuels. The Cat tool for fuel analysis is called SâTMOâTMS Fuel Analysis and is part of the SâTMOâTMS Services Program.

Testing the diesel fuel that goes into your engine is an important tool in your equipment management toolkit. Diesel fuel testing can help identify production limiting issues such as rapid fuel filter plugging, hard starting, white smoke, deposits, accelerated wear, and low power. Diesel fuel testing can also provide extra benefits including helping to identify fuel saving steps, environmental regulation compliance in countries with higher fuel regulations, minimizing Diesel Particulate Filter (DPF) regeneration and maximizing the life of the DPF filter and Diesel Oxidation Catalyst. Some facilities with standby generators may have requirements that fuel is tested regularly. Operations without requirements will benefit from knowing that the fuel in the standby generators is going to provide the expected performance when needed.

SâTMOâTMS Services Fuel Analyses

The Cat SâTMOâTMS Fuel Analysis program provides testing of the fuel for the properties listed below. The actual analyses provided may vary depending on your requirements and reasons for testing. Consult your local Cat Dealer for complete information and assistance about the SâTMOâTMS Fuel Analysis program.

- Biodiesel content
- Sulfur content
- Water contamination
- Particle cleanliness level
- Microbial growth
- Identification of elements that can increase deposit formation
- Identification of fuel conditions that can indicate contamination or adulteration
- Identification of fuel conditions that can indicate increased abrasive wear, adhesive wear, or wear in the combustion chamber
- Identification of fuel characteristics that can indicate low power
- Indication of fuel to perform in cold weather
- Identification of fuel conditions that can increase filter plugging
- Indication of fuel condition during storage
- Indication of ability of fuel to perform at startup

The results are reported and appropriate recommendations are provided.

A properly administered SâTMOâTMS Services Program can reduce repair costs and lessen the impact of down time. SâTMOâTMS Fuel Analysis is a key component of this program and can ensure that your fuel is stored in a clean environment, meets government requirements, and can meet the expected guidelines for performance in your engine. Consult your Cat Dealer to determine your fuel testing needs and establish a regular testing interval based on those needs.

Consult the “Cat Fuel Specification” and the “Contamination Control” sections of this Special Publication for related details on fuel recommendations including cleanliness.

Obtaining SâTMOâTMS Fuel Samples

Fuel sampling methods depend on the type of fuel tank to be sampled. Storage tanks may have an automatic sampling valve at different levels. Storage tanks without an automatic sampling valve require a tank sampling device (commonly known as a “Bacon Bomb” or “Sample Thief”). Refer to "Fuel Sampling Guide" PEDJ0129, for more information and instructions on proper sampling techniques. Fuel analysis sampling kits can be obtained from your local Cat Dealer. Size of fuel sample needed may be dependent upon the list of tests required.

Heavy Fuel Oil, Residual Fuel, Blended Fuel

NOTICE

Heavy Fuel Oil (HFO), Residual fuel, or Blended fuel must NOT be used in Caterpillar diesel engines (except in 3600 Series HFO engines). Blended fuel is residual fuel that has been diluted with a lighter fuel (cutter stock) so that they will flow. Blended fuels are also referred to as heavy fuel oils. Severe component wear and component failures will result if HFO type fuels are used in engines that are configured to use distillate fuel.

Fuels For Cold-Weather Applications

In extreme cold ambient conditions, you may choose to use the distillate fuels that are specified in table 2. However, the fuel that is selected must meet the requirements that are specified in the “Cat Specification for Distillate Diesel Fuel for Off-Highway Diesel Engines”, Table 1. These fuels are intended to be used in operating temperatures that are down to -54°C (-65°F).

Note: The fuels that are listed in table 2 may have higher sulfur levels than the 15 ppm maximum sulfur allowed for ULSD. The sulfur levels for these fuels may exceed 50 ppm maximum sulfur allowed in "EN590:2004". These fuels may not be acceptable for use in areas that restrict maximum fuel sulfur levels to 15 ppm maximum or to 50 ppm maximum.

The jet fuels described in Table 2 are of lower viscosity than #2 diesel. To meet the viscosity requirements given in Table 1, cooling of the fuel may be required to maintain 1.4 cSt or greater viscosity at the fuel injection pump. Ensure that the lubricity of these fuels is per the requirements given in Table 1. Consult the supplier for the recommended additives to maintain the proper fuel lubricity.

The fuel specifications listed in this table allow and/or recommend the use of fuel additives that have not been tested by Cat for use in Cat fuel systems. The use of these specifications allowed and/or recommended fuel additives are at the risk of the user.

Jet A is the standard fuel used by U.S. commercial airlines when operating within the U.S. Jet A-1 is the standard fuel used by commercial airlines worldwide. Per "ASTM D1655, Table 1 (Detailed



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Requirements of Aviation Turbine Fuels)", Jet A and Jet A-1 have identical requirements except for freezing point. Jet A has a freeze point requirement of $-40\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F}$) versus the Jet A-1 has a freeze point requirement of $-47\text{ }^{\circ}\text{C}$ ($-52.6\text{ }^{\circ}\text{F}$), but the fuel purchaser and the fuel supplier may agree on other freezing points.

Table 2

Alternative Distillate Fuels - Cold-Weather Applications	
Specification	Grade
"MIL-DTL-5624U"	JP-5
"MIL-DTL-83133F"	JP-8
"ASTM D1655-08a"	Jet A, Jet A-1

These fuels are lighter than the No. 2 grades of fuel. The cetane number of the fuels in table 2 must be at least 40. If the viscosity is below 1.4 cSt at $40\text{ }^{\circ}\text{C}$ ($104\text{ }^{\circ}\text{F}$), use the fuel only in temperatures below $0\text{ }^{\circ}\text{C}$ ($32\text{ }^{\circ}\text{F}$). Do not use any fuels with a viscosity of less than 1.2 cSt at $40\text{ }^{\circ}\text{C}$ ($104\text{ }^{\circ}\text{F}$).

Note: Fuel cooling may be required to maintain the minimum viscosity of 1.4 cSt at the fuel injection pump.

Note: These fuels may not prove acceptable for all applications.

Aftermarket Fuel Additives

There are many different types of fuel additives that are available to use. Caterpillar does not generally recommend the use of fuel additives.

In special circumstances, Caterpillar recognizes the need for fuel additives. Fuel additives need to be used with caution. The additive may not be compatible with the fuel. Some additives may precipitate. This action causes deposits in the fuel system. The deposits may cause seizure. Some additives may plug fuel filters. Some additives may be corrosive, and some additives may be harmful to the elastomers in the fuel system. Some additives may damage emission control systems. Some additives may raise fuel sulfur levels above the maximum allowed by the United States (U.S.) Environmental Protection Agency (EPA) and/or, as appropriate, other regulatory agencies. Consult your fuel supplier for those circumstances when fuel additives are required. Your fuel supplier can make recommendations for additives to use and for the proper level of treatment.

Note: Metallic fuel additives can cause fuel system/injector fouling and after treatment device fouling. Caterpillar discourages the use of metallic fuel additives in most applications. Metallic fuel additives should only be used in applications where their use is specifically recommended by Caterpillar.

Note: Diesel fuel additives/conditioners may not improve markedly poor diesel fuel properties enough to make them acceptable for use.

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

Diesel Fuel Conditioner

Fuels that are per specifications detailed in this publication should not require the use of additives. In case a fuel conditioner is needed to improve certain fuel properties, consult with your fuel supplier or with a reputable provider. Refer to your Cat dealer and to Cat special publication PELJ2095 for more details.

When needed, high performance, multipurpose diesel fuel conditioners are designed to improve:

- Fuel economy (through fuel system cleanup)
- Lubricity
- Oxidative stability
- Detergency/dispersancy
- Moisture dispersancy
- Corrosion protection
- Cetane (typically 2-3 cetane numbers)

Cat Diesel Fuel System Cleaner

Note: Cat Diesel Fuel System Cleaner, part number 343-6210, is the only fuel system cleaner available to the end user that is tested and approved by Caterpillar for use in Cat diesel engines.

Cat Diesel Fuel System Cleaner is a proven high-performance detergent product specifically designed for cleaning deposits that form in the fuel system. Deposits in the fuel system reduce system performance and can increase fuel consumption. Cat Diesel Fuel System Cleaner addresses the deposits formed due to the use of degraded diesel fuel, poor quality diesel fuel, and diesel fuel containing high quantities of high molecular weight compounds. Cat Diesel Fuel System Cleaner addresses deposits formed due to the use of biodiesel, biodiesel blends, and biodiesel that does not meet the appropriate quality specifications. Continued use of Cat Diesel Fuel System Cleaner is proven to inhibit the growth of new deposits.

Cat Diesel Fuel System Cleaner can be added directly to diesel fuel, biodiesel, or biodiesel blends. Cat Diesel Fuel System Cleaner is a United States Environmental Protection Agency registered fuel additive that can be used with Ultra Low Sulfur Diesel Fuel. In addition this cleaner is appropriate for use with other ultra low, low, and higher sulfur diesel fuels around the world.

Cat Diesel Fuel System Cleaner is a proven high-performance cleaner that is designed to perform the following:

- Clean performance-robbing fuel system deposits
- Restore fuel economy losses resulting from injector deposits
- Restore power losses resulting from injector deposits
- Eliminate visible black exhaust smoke resulting from injector deposits
- Prevent the formation of new fuel-related deposits

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