High Sulphur Diesel/ Jet Fuel

Following we would like to give you some information concerning High Sulphur Diesel or Jet Fuel usage.

All Cummins diesel engines up to emission certification standards Euro3 or Tier3/ Stage 3a can be run with High Sulphur Diesel (max. 5000ppm) and Jet Fuel. Cummins Diesel engines with aftertreatment systems (e.g. Euro4 & Euro5 engines) can technically be run with High Sulphur Diesel & Jet Fuel but only if the aftertreatment system is plugged off.

As Jet Fuel has a much lower lubricity as standard diesel usage of jet fuel is only allowed if a fuel pre filter with lubricity additive (such as Cummins Filtration diesel filters of type FS20000 or FS20022) is used. Otherwise engine damages due to low lubricity of Jet Fuel can occur and Cummins engine warranty will be lost. If Jet Fuel and such a filter is used and if the used fuel fulfills our regulations stated in our Fuels for Cummins® Engines bulletin 3379001 the Cummins warranty will not be affected for products up to Euro 3 or Tier3/ Stage 3a. Operating Euro 4 or Euro 5 engines as described before will not have any impact on the engine but the aftertreatment system will be destroyed due to the high Sulphur content. For these cases we offer special calibrations. With such a special calibration (emergency vehicle calibration) the engine can be run without an aftertreatment system without any derates. For detailed information how to use and install our FS20000 and FS20022 filters please investigate our application engineering bulletins and the datasheets of the filters.

Please take note following facts when using Jet Fuel:

- Jet Fuel standards allow Sulphur levels up to 5000ppm (diesel fuel is currently regulated at 15ppm in Europe)
- Jet Fuel has approx. up to 10% less energy content than standard diesel. Therefore power output will be reduced by approx. up to 10% (depending on the fuel quality). Less energy content means that also fuel consumption will increase.
- Fuels and fuel cleanliness used for certifying engine emissions is regulated by EPA (or EEC) therefore engines will no longer be emissions compliant when operating with Jet Fuel as this is not fulfilling commercial regulations dedicated by EPA or EEC. Fuels are regulated as only with clean fuels high emission standards can be realized.
- In terms of particle contamination Jet Fuel standards are not in line with commercial standard diesel fuel regulations. This means Jet Fuel could have higher abrasive particles.
- High Sulphur content can lead to soot deposits and can increase wear and tear in Euro6 & Tier 4 engines (with and without cooled exhaust gas recirculation systems)
- When using aftertreatment systems Sulphur deposits will form on the catalyst substrate and damage the aftertreatment system (tests showed that aftertreatment systems can be destroyed even below 100 operating hours)
- Sulfate deposits mixed with water forms sulfuric acid
- Jet Fuels do not typically specify a cetane rating, so ignition of fuel may be a problem in cold climates.

The very strict emission regulations for Euro 6 and Tier 4 made it necessary to increase injection pressures significantly (High Pressure Common Rail), to inject fuel much finer and to operate with multiple injections per engine cycle. The extremely high injection pressures create a very fine fuel mist spray in the combustion chamber, resulting in more complete burning of fuel. This more complete fuel burning yields lower emissions and can also improve fuel economy.

In order to maintain these high injection pressures, the injector assemblies have been highly engineered, and have very tight clearance tolerances (1 - 3 microns, a human hair is typically 70 -100 microns thick). So it would not take much material depositing on these parts to cause poor injector needle actuation, leading to poor engine performance. In extreme cases, these deposits can lead to complete sticking or seizing of the injector needles, particularly after the vehicle has been shut down and the engine has been allowed to cool. While traditional injectors (up to Euro 5 & Tier 3) tend to build up deposits over time, slowly affecting engine performance, deposits on modern injectors (such as used for Euro 6 and Tier 4 engines) can have a more abrupt impact. In extreme cases, injector parts can get stuck in an open or closed position. More commonly, the parts will move slowly and not be able to accomplish the needed multiple injections. Under some conditions, issues can develop in as little as 100 operating hours with worsening impacts on combustion and performance.

In order to meet ultra-low emissions with Euro 6 & Tier 4 regulations also piston assemblies have been highly engineered and also have very tight clearances. Soot caused by High Sulphur Fuel (such as Jet Fuel) can cause severe damages on pistons and piston rings.

Ultra Low Sulphur Diesel is mandatory for operating Euro 6 & Tier 4 engines. Otherwise severe damages on aftertreatment systems, injectors, pistons and piston rings will occur.

Combustibil Diesel / Combustibil de avitatie (Kesosen)

Mai jos , dorim să vă oferim câteva informații referitoare la utilizarea pentru combustibil diesel / Combistibil de aviatie (Kerosen).
Toate motoarele diesel Cummins până la standardele de certificare a emisiilor Euro3 sau Tier3 / Etapa 3a pot functiona cu combustibil diesel de mare putere (max 5000ppm) și combustibil de aviatie (Kerosen) . Motoarele Cummins Diesel cu sisteme de post-tratare (de exemplu, motoarele Euro4 și Euro5) din punct de vedere tehnic pot functiona cu combustibil Diesel &Combustibil de aviatie, dar numai dacă sistemul de post-tratare este deconectat.
Deoarece carburantul de aviatie are o lubricitate mult mai scăzută decât utilizarea standard a combustibilului diesel, este permisă numai dacă se folosește un filtru de prealimentare cu aditiv de lubrifiere (cum ar fi filtre diesel Cummins Filtration tip FS20000 sau FS20022). În caz contrar, pot apărea daune cauzate de gradul scazut de lubrifiere a Kerosenului si se va pierde garanția motorului Cummins. Dacă se utilizează combustibil de aviatie și un astfel de filtru și dacă combustibilul utilizat îndeplinește regulamentele noastre enumerate în Buletinul nostru 3379001 pentru Combustibili pentru Cummins®, garanția Cummins nu va fi afectată pentru produsele până la Euro 3 sau Tier 3 / Etapa 3a.
Motoarele Euro 4 sau Euro 5 descrise mai sus nu vor avea niciun impact asupra motorului, dar sistemul de post-tratare va fi distrus datorită conținutului ridicat de sulf. Pentru aceste cazuri, oferim calibrări speciale. Cu o astfel de calibrare specială (calibrarea vehiculului de urgență), motorul poate funcționa fără un sistem de post-tratare fără derapaje. Pentru informații detaliate despre utilizarea și instalarea filtrelor FS20000 și FS20022, vă rugăm să investigați buletinele noastre de inginerie de aplicație și fișele tehnice ale filtrelor.

Vă rugăm să luați notă de urmatoarele atunci când utilizați Jet Fuel:
- Standardele pentru jet de combustibil permit nivelurile de sulf până la 5000 ppm (motorina este în prezent reglementată la 15 ppm în Europa)

- Combustibilul Jet are aprox. cu până la 10% mai puțin conținut de energie decât combustibilul diesel standard. De aceea puterea ieșirea va fi redusă cu aprox. până la 10% (în funcție de calitatea combustibilului). Mai puțina energie înseamnă că și consumul de combustibil va crește.
- Combustibilii și curățenia combustibililor folosiți pentru certificarea emisiilor de motor sunt reglementate de APE (sau CEE) prin urmare, motoarele nu vor mai fi conforme cu emisiile atunci când operează cu Jet Fuel, deoarece aceasta nu îndeplinește reglementările comerciale dedicate EPA sau CEE. Combustibilii sunt reglementați deoarece numai cu combustibili curate pot fi realizate standarde ridicate de emisie.
- În ceea ce privește contaminarea cu particule, standardele Jet Fuel nu respectă standardele comerciale reglementările privind combustibilii diesel.
Acesta înseamnă că Jet Fuel ar putea avea particule abrazive mai mari.
- Conținutul ridicat de sulf poate duce la depozitele de funingine și poate crește uzura în Euro6 & Tier 4 motoare (cu și fără sisteme de recirculare a gazelor de eșapament răcite)
- Când se utilizează sisteme de post-tratare se vor forma depuneri de sulf pe suportul catalizatorului și deteriorarea sistemului de post-tratare (testele au arătat că sistemele de post-tratare pot fi distruse chiar și sub 100 ore de funcționare)
- Depunerile de sulfat amestecate cu apă formează acid sulfuric - Jet Fuels nu specifică de obicei un rating cetanic, astfel încât aprinderea combustibilului poate fi o problemă la climate reci .

Regulile foarte stricte privind emisiile pentru Euro 6 și Tier 4 au făcut necesară creșterea semnificativă a presiunii de injecție (High Pressure Common Rail), injecția de combustibil mult mai fină și operarea cu mai multe injecții pe ciclul motorului. Presiunile de injecție extrem de ridicate creează o pulverizare foarte fină a vaporilor de combustibil în camera de ardere, rezultând o ardere mai completă a combustibilului. Această ardere mai completă a combustibilului generează emisii mai reduse și poate, de asemenea, să îmbunătățească economia de combustibil.

Pentru a menține aceste presiuni ridicate de injecție, ansamblurile injectorului au fost foarte inginerizate și au toleranțe foarte limitate la cleme (1-3 microni, părul uman este de obicei de 70 -100 microni gros). Deci, nu ar fi nevoie de depunerea multor materiale pe aceste părți pentru a provoca o acționare slabă a acului injectorului, ceea ce ar duce la o performanță slabă a motorului. În cazuri extreme, aceste depuneri pot duce la lipirea sau înfundarea completă a acelor de injecție, în special după oprirea autovehiculului și la răcirea motorului. În timp ce injectorii tradiționali (până la Euro 5 și nivelul 3) tind să acumuleze depozite în timp, afectând încet performanța motorului, depozitele pe injectoare moderne (cum ar fi cele utilizate pentru motoarele Euro 6 și Tier 4) pot avea un impact mai brusc. În cazuri extreme, piesele injectorului pot fi blocate într-o poziție deschisă sau închisă. Mai frecvent, piesele se vor mișca încet și nu vor putea realiza injecțiile multiple necesare. În anumite condiții, problemele se pot dezvolta în doar 100 de ore de funcționare, cu agravarea impactului asupra arderii și a performanțelor.

Pentru a satisface emisiile ultra-scăzute cu reglementările Euro 6 și Tier 4, ansamblurile de pistoane au fost foarte bine proiectate și, de asemenea, au o distanță foarte strânsă. Funcția de funinginã cauzată de combustibilul cu sulf ridicat (cum ar fi combustibilul cu jet) poate provoca daune grave pe pistoanele și inelele cu piston.

Ultra Sulfur Diesel este obligatoriu pentru motoarele Euro 6 și Tier 4. În caz contrar, se vor produce daune grave asupra sistemelor de posttratare, injectoarelor, pistoanelor și inelurilor pistonului.

Fleetguard®

8 • Fuel Additives













Introduction 8-3

Fuel Additives 8-5
Treatment Rates 8-6
Winter Conditioner 8-7
Asphaltene Conditioner 8-8
Turbo Diesel 8-9
Microbicide 8-10
Diesel Fuel Injector Cleaner 8-11
Field Maintenance Tools 8-12

Lubricity-Enhancing Filters 8-13

Fuel Additives and Lubricity-Enhancing Filters

Most global emission regulations require a major reduction in the sulfur content of diesel fuels and emission levels from diesel engines. Fuel producers have created new formulations of diesel fuels with significantly lower levels of sulfur (typically less than 15 ppm). Often, these new formulations are also being combined with alternative fuels created from renewable resources such as biodiesel. These fuels reduce emission levels and consumption of petroleum.

The New Diesel

Low sulfur diesel fuel is cleaner burning and typically contains less than 15 ppm of sulfur. Under typical operating conditions, there should be no noticeable impact on overall power using low sulfur diesel fuel. Fuel economy may be reduced slightly because the process that removes sulfur also can reduce the energy content of the fuel. In some instances, the introduction of low sulfur diesel fuel to older engines may affect fuel system components or loosen deposits in fuel tanks. As part of a thorough maintenance program, customers should monitor diesel-powered vehicles closely for potential fuel system leaks or premature fuel filter plugging during the changeover to low sulfur diesel fuel.

Low sulfur diesel fuel has an increased wax content. The result of this increase could include higher cloud point (where first wax crystals form) and greater winter wax gelation, which is also likely to increase fuel filter plugging.

Additionally, low sulfur diesel fuel has lower lubricity due to the refining de-sulfurization process. Lubricity additives are added at the fuel pipeline rack, however, lubricity additives sold in the aftermarket can be considered insurance to provide fuel system wear protection.

Biodiesel fuel is a blend of petroleum diesel fuel and any fuel processed from a grain or vegetable, such as soy, canola (rapeseed), palm, cotton, olive, coconut, peanut, corn, etc. B2 blends (98% low sulfur diesel fuel, 2% biodiesel) actually add lubricity to low sulfur diesel fuel and help protect fuel systems. However, B5 – B20 low sulfur diesel fuel blends (formulations containing between 5% and 20% biodiesel) exhibit poor thermal and oxidative stability, resulting in premature filter plugging; have a higher wax content, which increases wax gelling; have a lower density and lower BTU value, which relates to 1 to 2% poorer fuel economy; and act as a solvent when initially used in fuel systems, resulting in premature filter plugging.

To provide optimal protection for the fuel system, Cummins Filtration® developed an innovative line of fuel additives and lubricity-enhancing filters.

Fuel Additives

As the engine's key energy source, diesel fuel requires extra care to keep fuel systems operating at peak performance. Diesel fuel can contain organic elements, microorganisms, inorganic elements, and water, all of which can adversely affect fuel performance. In the past, natural sulfur content was a deterrent to this microorganism growth. The severely reduced sulfur content of low sulfur diesel fuel, however, allows more microorganisms to reproduce at a faster rate.

To condition the fuel system in extended service regimens, Cummins Filtration developed specific fuel additive packages and field test tools that best meet customers' specific operating requirements:

- **Asphaltene Conditioner**, for all-weather operations, improves filter performance by keeping organic contaminant in solution, preventing filter plugging and increasing fuel filter life. It also provides fuel stability and maintains fuel viscosity for better lubrication, improved fuel economy and injector clean-up.
- **Winter Conditioner**, for cold weather, prevents ice crystal formation/fuel line freeze-up and reduces cold filter plugging point and pour point.
- **Turbo Diesel** addresses all fuel concerns in one treatment, including pour point/cold filter plugging point, fuel line freeze-up, corrosion inhibition, and lubricity enhancement (currently only in the Continental U.S.).
- **Microbicide**, a dual phase fuel system preservative, quick-kills diesel fuel microorganisms, bacteria and fungi that can shorten fuel filter life.
- **Fuel Tank Sampling Kit CC2523** uses a Bacon Bomb tool to sample the bottom of storage tanks where water is present to identify need for treatment.
- **Microbicide Test Kit CC2524** bug alert test strips find aerobic bacteria, yeast and mold in #1 and #2 diesel fuels.
- **Diesel Fuel Injector Cleaner** is an ultra concentrated detergent additive that uses a technologically-advanced formula to remove traditional and soap-based deposits, which helps restore fuel injector performance.

Introduction

Fleetguard® fuel additives are approved for use with all US EPA low sulfur diesel fuel and US EPA low sulfur diesel fuel/Biodiesel blends to support extended service regimens. With the rising cost of diesel fuel, Fleetguard fuel conditioners and sampling test kits are a vital part of every maintenance program.

Cummins® Filtration develops products required to meet strict emission guidelines. These products optimize emission system performance and life.

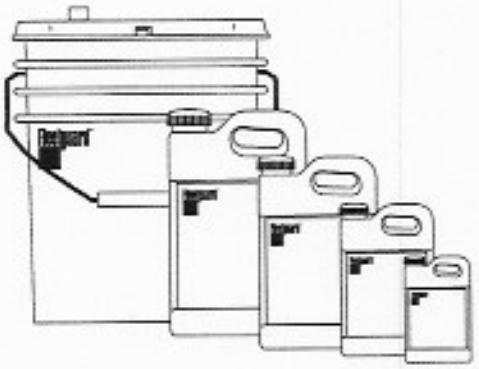
Lubricity-Enhancing Filters

For customers who choose to run light fuels in Tier 2 Cummins B Series engines with electronic and mechanical fuel pumps, or Jet A fuel in airport ground equipment, Cummins Filtration designed a spin-on filter with slow-release chemical technology. These filters are also recommended for applications using Kerosene, Winter Fuel Blends (50% #2 and 50% #1 Diesel) and Low Sulfur Diesel (below 50 ppm sulfur). The patented chemical technology improves fuel lubricity and works with proprietary StrataPore™ media for extra protection from abrasives.

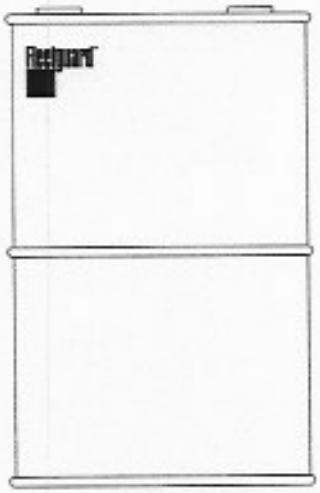
Fleetguard FS20000 and FS20022 Slow Release Lubricity-Enhancing Fuel Filtration Systems protect components from excessive wear, enhance fuel lubricity for life of the filter and remove free and emulsified water.

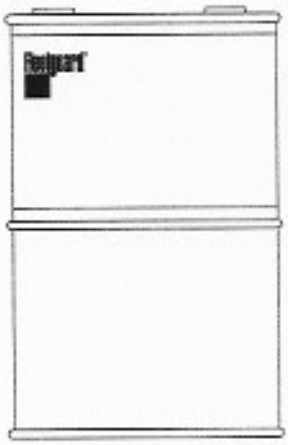
These fuel additives, emission related chemicals and lubricity-enhancing products, along with Fleetguard fuel processors, Ultra Low Sulfur Diesel and Biodiesel compatible fuel filtration, and proprietary StrataPore multi-layer media, ensure maximum protection and performance for your fuel system while meeting global emissions guidelines.

Fuel Additives

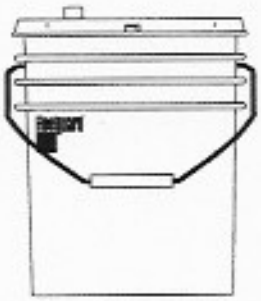








55 Gallon (208.20 Liter)
Winter Conditioner Base
Winter Conditioner Concentrate
Asphaltene Base
Diesel Fuel Injector Cleaner



5 Gallon (18.93 Liter)
Winter Conditioner Base
Winter Conditioner Concentrate
Asphaltene Base
Diesel Fuel Injector Cleaner



2.5 Gallon (9.46 Liter)
Asphaltene Concentrate



1 Gallon (3.79 Liter)
Microbicide



1 Quart (0.95 Liter)
Microbicide



1 Gallon (3.79 Liter)
Diesel Fuel Injector Cleaner



1 Quart (0.95 Liter)
Winter Conditioner Base
Asphaltene Base
Diesel Fuel Injector Cleaner



1 Pint (0.47 Liter)
Winter Conditioner Base
Asphaltene Base
Turbo Diesel

Treatment Rates

Product	Treatment Ratio	Treatment Rate per Package gal (L)					
		1 pt (0.47 L)	1 qt (0.95 L)	1 gal (3.78 L)	2.5 gal (9.46 L)	5 gal (18.93 L)	55 gal (208.20 L)
Winter Conditioner Base	1 pt/125 gal (0.47/473.18 L)	125 (473.18)	250 (946.35)	N/A	N/A	5,000 (18,927.06)	55,000 (208,197.65)
Winter Conditioner Concentrate	1/1,500 gal (3.78/18,927.06 L)	N/A	N/A	N/A	N/A	7,500 (28,390.59)	82,500 (312,296.47)
Asphaltene Base	1 pt/125 gal (0.47/473.18 L)	125 (473.18)	250 (946.35)	N/A	N/A	5,000 (18,927.06)	55,000 (208,197.65)
Asphaltene Concentrate	1/3,000 gal (3.78/11,356.24 L)	N/A	N/A	N/A	7,500 (28,390.59)	N/A	N/A
Turbo Diesel	1 pt/30-40 gal (0.47/113.56-151.42 L)	30-40 (113.56-151.42)	N/A	N/A	N/A	N/A	N/A
Microbicide	1/10,000 gal (3.78/37,854.12 L)	N/A	2,500 (9,463.53)	10,000 (37,854.12)	N/A	N/A	N/A
Diesel Fuel Injector Cleaner (Cleanup)	1/1,000 gal (3.78/3785.41 L)	N/A	250 (946.35)	1,000 (3,785.41)	N/A	5,000 (18,927.06)	55,000 (208,197.65)
Diesel Fuel Injector Cleaner (Maintenance)	1/5,000 gal (3.78/18,900 L)	N/A	1,250 (4731.77)	5,000 (18,927.06)	N/A	25,000 (94,635.30)	275,000 (1,040,988.20)

Note: Not all container sizes are available in all countries.

Type

Winter Conditioners are multi-functional diesel fuel additives designed to ensure reliable fuel system performance in severe winter conditions.

Composition

Winter Conditioners are proprietary mixtures of aliphatic hydrocarbons formulated to reduce Cold Filter Plugging Point (CFPP), reduce fuel Pour Point, and prevent fuel line freeze-up. They do not contain sulfur, and they burn ash free. They are completely compatible with all low sulfur diesel fuel, #2 and #1 diesel fuels and mixtures thereof.

Products

Winter Conditioner Concentrate is a concentrated formula with a very low pour point designed to treat bulk diesel fuel storage tanks. Simply add the proper amount of Concentrate to the tank and load bulk diesel fuel. Winter Conditioner Base is formulated to treat both bulk diesel fuel tanks as well as vehicle diesel tanks.

Benefits

- Reduces Cold Filter Plugging Point (CFPP) by up to 30 °F (16.6°C)
- Reduces pour point by up to 38 °F (21.1 °C)
- Prevents fuel filter gelling
- Prevents fuel line freeze up
- Prevents fuel system freeze damage

Specifications

Specification	Winter Conditioner Base	Winter Conditioner Concentrate
Appearance	Clear golden liquid	Clear amber liquid
Specific Gravity	0.900	0.925
Flash Point	Greater than 142 °F (61 °C)	Greater than 142 °F (61 °C)
Pour Point	-74 °F (-58 °C)	-74 °F (-58 °C)
Density	7.51 lb/gal (0.90 kg/L)	7.64 lb/gal (0.92 kg/L)
Sulfur (ppm) at Recommended Treatment	Less than 1 ppm	Less than 1 ppm

Specifications subject to change without notice.

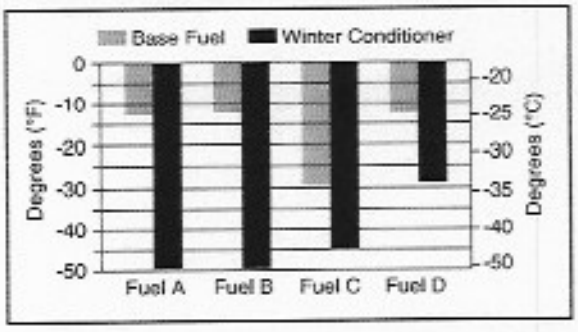
Ordering Information

Part Number	Product	Package Size	Case Quantity
CC2591	Winter Conditioner Base	1 pt (0.47 L)	12
CC2592	Winter Conditioner Base	1 qt (0.95 L)	12
CC2590	Winter Conditioner Base	Bulk	N/A
CC2593	Winter Conditioner Base	5 gal (18.93 L)	1
CC2594	Winter Conditioner Base	55 gal (208.20 L)	1

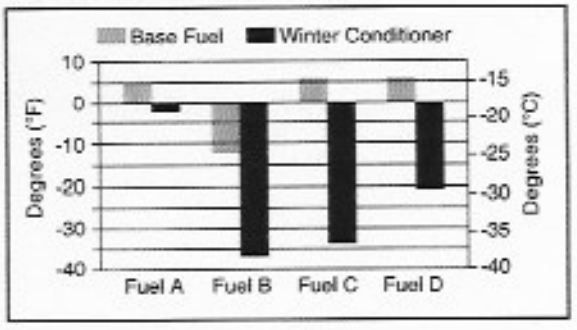
Part Number	Product	Package Size	Case Quantity
CC2552	Winter Conditioner Concentrate	5 gal (18.93 L)	1
CC2553	Winter Conditioner Concentrate	55 gal (208.20 L)	1

Performance

PP (Pour Point) Improvement



Cold Filter Plugging Point (CFPP)



Type Asphaltene Conditioners are multi-functional diesel fuel additives designed for year-round use.

Composition Asphaltene Conditioners are proprietary mixtures of aliphatic hydrocarbons formulated to clean fuel injectors and stabilize diesel fuel. They provide for optimum fuel system performance year-round. They do not contain sulfur and they burn ash free. They are completely compatible with all low sulfur diesel fuel, #2 and #1 diesel fuels and mixtures thereof.

Products Asphaltene Conditioner Concentrate is a concentrated formula designed to treat bulk diesel fuel storage tanks. Simply add the proper amount of Concentrate to the tank and load bulk diesel fuel. Asphaltene Conditioner Base is formulated to treat both bulk diesel fuel tanks as well as vehicle diesel tanks.

Benefits

- Cleans fouled injectors
- Prevents injector fouling
- Optimizes fuel economy
- Optimizes power
- Reduces exhaust emissions
- Improves fuel stability
- Increases fuel filter life
- Prevents fuel system corrosion
- Improves lubricity for prolonged pump and injector life
- Meets Cummins L10 injector cleanliness spec at recommended treatment
- Meets Peugeot XUD 9 deposit test spec at recommended treatment
- Meets EMA lubricity spec at recommended treatment

Specifications

Specification	Asphaltene Conditioner Base	Asphaltene Conditioner Concentrate
Appearance	Clear amber liquid	Clear dark brown liquid
Specific Gravity	0.900	0.915
Flash Point	Greater than 142 °F (61 °C)	Greater than 142 °F (61 °C)
Pour Point	-17 °F (-27 °C)	-27 °F (-33 °C)
Density	7.51 lb/gal (0.90 kg/L)	7.64 lb/gal (0.92 kg/L)
Sulfur (ppm) at Recommended Treatment	Less than 1 ppm	Less than 1 ppm

Specifications subject to change without notice.

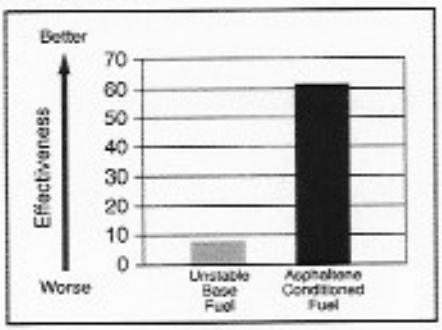
Ordering Information

Part Number	Product	Package Size	Case Quantity
CC2598	Asphaltene Conditioner Base	1 pt (0.47 L)	12
CC2597	Asphaltene Conditioner Base	1 qt (0.95 L)	12
CC2589	Asphaltene Conditioner Base	Bulk	N/A
CC2549	Asphaltene Conditioner Base	5 gal (18.93 L)	1
CC2550	Asphaltene Conditioner Base	55 gal (208.20 L)	1

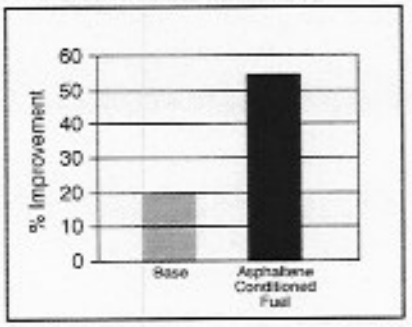
Part Number	Product	Package Size	Case Quantity
CC2559	Asphaltene Conditioner Concentrate	Bulk	N/A
CC2596	Asphaltene Conditioner Concentrate	2.5 gal (9.46 L)	2

Performance

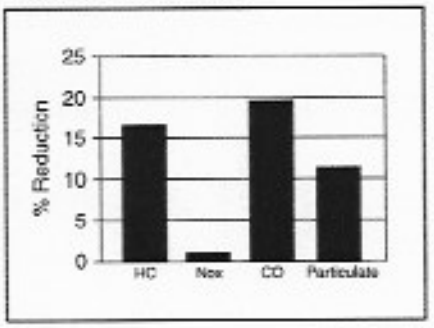
Effectiveness



Injector Clean-Up Improvement



Emissions Improvement



Type

Turbo Diesel Fuel Additive is a multi-functional diesel fuel additive designed for year round use.

Composition

Turbo Diesel Additive is a proprietary mixtures of aliphatic hydrocarbons formulated for year round use. The formulation is designed to stabilize diesel fuel and clean injectors. In addition, during cold weather the conditioner prevents filter plugging from wax gelation and also prevents ice crystal formation. It provides for optimum fuel system performance year-round. It does not contain sulfur and burns ash free. It is completely compatible with all low sulfur diesel fuel, #2 and #1 diesel fuels and mixtures thereof.

Products

Turbo Diesel Additive is specifically formulated for use in Turbo Diesel engines in pick-up trucks, RVs, and light duty vehicles. It is sold in pint bottles, with one pint (0.47 liters) treating 30 to 40 gallons (113.56-151.42 liters) of diesel fuel. The conditioner should be added to the fuel tank before the fuel is added to ensure proper mixing. Fuel temperatures should be above 0 °F (-17.78 °C).

Benefits

Year Round Conditions

- Stabilizes diesel fuel
- Cleans injectors – Optimizes fuel economy and optimizes/improves lost engine power
- Cetane boost of 3-6 (easier starting)
- Increases fuel lubricity
- Optimizes fuel filter life
- Prevents fuel system corrosion

Winter Conditions

- Winter conditions diesel fuel
- Reduces pour point
- Prevents wax gelation
- Improves cold weather starting
- Fuel deicer – Prevents fuel line freeze-up
- Prevents fuel system freeze damage

Specifications

Specification	Turbo Diesel
Appearance	Clear dark brown liquid
Specific Gravity @ 60 °F (15.5 °C)	0.8850 - 0.9250
Flash Point	Greater than 142 °F (61.1 °C)
Pour Point	-11.2 °F (-24 °C)
Sulfur (ppm) at Recommended Treatment	Less than 1 ppm

Specifications subject to change without notice.

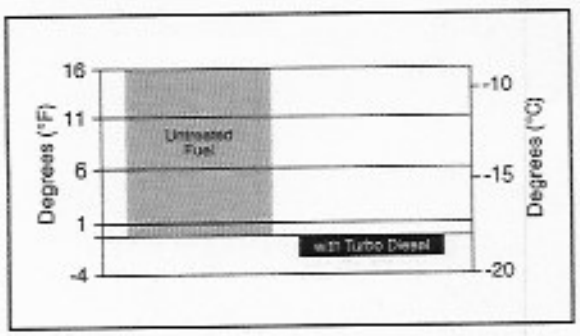
Ordering Information

Part Number	Product	Package Size	Case Quantity
CC2588	Turbo Diesel Additive	1 pt (0.47 L)	12

Performance

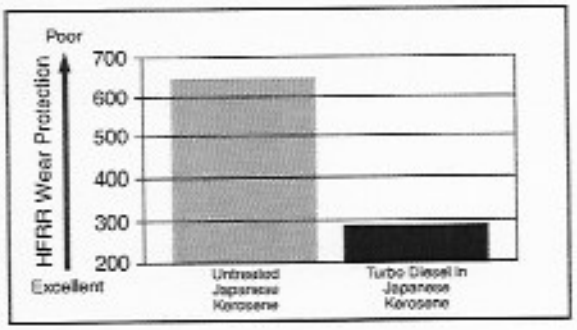
CFPP Reduction

Cold Filter Plugging Point (CFPP) is the temperature at which filter wax gelation can occur. This chart shows that Turbo Diesel Fuel Additive provides superior protection against filter gelation when added to untreated fuel.



Lubricity Enhancement

The High Frequency Reciprocating Rig (HFRR) test evaluates the wear potential of fuel. This chart shows that Turbo Diesel Fuel Additive provides fuel system wear protection even when added to one of the most severe wear fuels (Japanese kerosene).



Type

Microbicide is a dual phase fuel system treatment. Fuel is vulnerable to water contamination during transport and storage. Once there is water in the fuel system, microbes can make their way into fuel tanks leading to premature fuel filter plugging, hazy fuel, clogged injectors, as well as fuel storage tank corrosion and leakage requiring costly government clean-up. If left unchecked, microbial contamination can even lead to the replacement of the fuel storage tank.

Composition

Microbicide is a dual phase fuel preservative that concentrates in the water phase and partitions in the fuel phase. It effectively quick kills micro-organisms, bacteria, and fungi in the following liquid hydrocarbon fuels and oils: diesel fuel, gasoline, aviation fluids, kerosene, heating oils, residual fuel oils, and liquefied petroleum gases. When used as directed in a properly maintained fuel tank system, two treatments per year can prevent microbial growth, improve the fuel quality, eliminate microbe influenced corrosion problems, and extend fuel island filter and vehicle filter life. Microbicide is packaged in plastic fluorinated bottles with a "tip and pour" measuring feature.

Benefits

- Concentrates in the water phase where microbes grow
- Partitions into the fuel phase
- Kills microorganisms, including bacteria and fungi
- Protects tanks from microbe influenced corrosion
- Effective as a quick-kill biocide and for long-term fuel maintenance
- 100% biodegradable
- Approved for use in diesel fuel, gasoline, and aviation fuel
- Approved for use by US military and airlines

Specifications

Specification	Microbicide
Appearance	Clear to pale yellow liquid
Specific Gravity	1.044 @ 77 °F (25 °C)
Flash Point (PMCC)	280 °F (138 °C)
Viscosity	97.8 cps @ 77 °F (25 °C)
pH	4.4
Density	8.7 lb/gal (1.04 kg/L)

Specifications subject to change without notice.

Ordering Information

Part Number	Product	Package Size	Case Quantity
CC2661	Microbicide	1 qt (0.95 L)	4
CC2663	Microbicide	1 gal (3.78 L)	1

Diesel Fuel Injector Cleaner

Type

Fleetguard Diesel Fuel Injector Cleaner is an ultra concentrated detergent additive that uses a technologically-advanced formula to remove traditional and soap-based deposits, which helps restore fuel injector performance. Designed for year round use, Diesel Fuel Injector Cleaner's proprietary mixture of advanced additives is specifically formulated to clean fuel injectors. When used continuously, it also prevents new deposit formations thereby enhancing engine performance and maximizing injector life.

Composition

Diesel Fuel Injector Cleaner is a powerful cleaning agent which removes existing fuel system deposits, asphaltenes and other residue and prevents deposit formation when used on a continuous basis. Diesel Fuel Injector Cleaner is fully compatible with all ULSD fuel, #1 and #2 diesel fuels, combination fuels and with after treatment devices including EGR, DPF and SCR Systems.

Benefits

- Restores injector performance
- Restores power
- Prevents new deposits from forming
- Effective on both traditional and ULSD-based soapy deposits
- Optimizes Fuel Economy
- Reduces white and black smoke

Specifications

Specification	Microbicide
Appearance	Dark Amber
Specific Gravity	0.872 min, 0.892 target, 0.912 max @ 60 °F (15.6 °C)
Flash Point (PMCC)	153 °F (67 °C)
Viscosity	225 cSt @ 104 °F (40 °C)
Pour Point	-65 °F (-54 °C)
Density	7.44 lb/gal,US (0.89 kg/L) 8.94 lb/gal, Imperial (0.89 kg/L)

Specifications subject to change without notice.

Ordering Information

Part Number	Product	Package Size	Case Quantity
CC36095	Diesel Fuel Injector Cleaner	1 qt (0.95 L)	12
CC36096	Diesel Fuel Injector Cleaner	1 gal (3.78 L)	4
CC36097	Diesel Fuel Injector Cleaner	5 gal (18.93 L)	1
CC36098	Diesel Fuel Injector Cleaner	55 gal (208.20 L)	1

Product Usage Recommendations

Cummins Filtration strongly recommends that an initial treat rate of 1:1000 gal (3.78:3,785.41 L) be used for the first 48 hours or 2400 miles (whichever occurs first) under normal operating conditions to ensure injector performance is fully restored. To achieve superior cleaning, the initial 48 hours should not include idle or down time. Diesel Fuel Injector Cleaner is a powerful cleaning agent which removes existing fuel system deposits, asphaltenes and other residue during initial use. It is therefore recommended that an initial 48 hour clean up be performed prior to a scheduled fuel filter service interval to avoid degradation of engine performance due to the possibility of filter plugging. Following clean-up, a treat rate of 1:5000 (3.78:18,927.06) should be used on a continuous basis to prevent deposit formation.

Fuel Tank Sampling Kit

This Fuel Sampling Kit is equipped with all the necessary supplies needed to properly collect a fuel sample for testing. The kit comes complete with an eight ounce Bacon Bomb, chain for lowering the bomb into the tank, sample bottles and labels, and a sturdy carrying case.

Ordering Information

Part Number	Product
CC2523	Fuel Tank Sampling Kit



Microbicide Test Kit

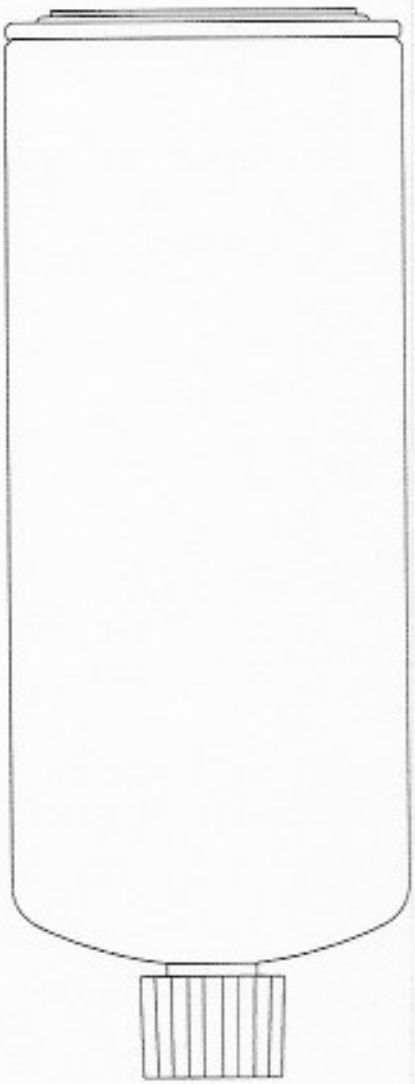
The Bug Alert Test Kits make routine determination of fungal and bacteria populations quick and easy. Microbicide Test Kits are kits that contain flexible plastic strips to which nutrient containing filter paper is attached. The kits are complete and ready to use. Each kit contains 10 test strips and can be used to test #1 and #2 diesel, gasoline and aviation fuels for bacteria, mold and yeast. No special equipment or training is necessary.

Ordering Information

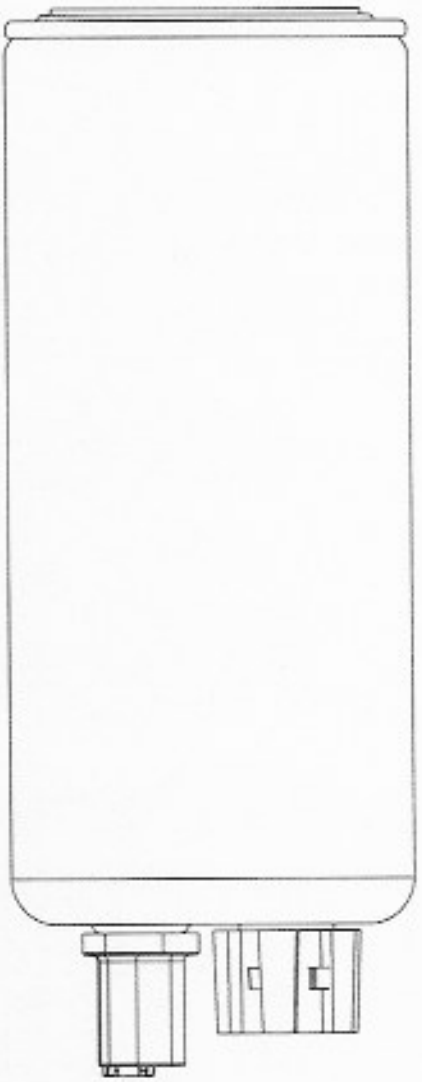
Part Number	Product
CC2524	Microbicide Test Kits



Lubricity-Enhancing Filters



FS20000



FS20022

Type

FS20000 filters are premium quality filters with a Lubricity-Enhancing Additive with patented slow release technology and utilizing StrataPore™ media.
FS20022 filters use capillary pressure release technology and utilize StrataPore™ media.

Composition

Slow Release Filters disperse premium Lubricity-Enhancing Additive over the life of the filter. The additive is released into the fuel using pressure gradient capillary technology in the FS20022 and a polymeric slow release diffusion mechanism in the FS200000. The media consists of the revolutionary StrataPore media for extra protection from abrasive particles.

Application

Required for light fuel applications of Tier 2 compliant Cummins B Series engines with electronic and mechanical fuel pumps. Other light fuel applications where additional protection is required include airport ground equipment (Jet A fuel), applications that use Kerosene, Winter Fuel Blends (50% #2 and 50% #1 Diesel) and Low Sulfur Diesel (below 50 ppm sulfur).

Benefits

- Enhances Fuel Lubricity for the life of the filter
- Provides Lubricity-Enhancing Additive with patented slow release technology
- Removes both free and emulsified water
- Protects fuel system from abrasive wear particles
- Unique thread size prevents non-chemical filters from mistakenly being used

Specifications

Specification	FS20000	FS20022
Rated Flow	90 gal/h (227 L/h)	40 gal/h (151 L/h)
Height	9.806" (249.07 mm)	9.79" (248.67 mm)
Outside Diameter	3.67" (93.37 mm)	3.69" (93.73 mm)
Rated Efficiency	98.7% efficient at 5 microns per single pass SAE J1985	98.7% efficient at 25 microns per SAE 1985 single pass
Rated Capacity	25 g per SAE J905	13 g per SAE J905
Service Interval	250 hours or 6 months from date of installation (whichever comes first)	500 hours engine operation per 5000 gallons fuel treated
Thread Size	1-1/8-16 UN-2B	1-1/8-16 UN-2B
Head Dimensions	3.7" (93.98 mm) x 3.5 (98.9 mm)	3.7" (93.98 mm) x 3.5 (98.9 mm)

Specifications subject to change without notice.

Ordering Information

Part Number	Product
FS20000	Slow Release Lubricity-Enhancing Fuel Filter
FS20022	Slow Release Lubricity-Enhancing Fuel Filter
3936173J	FS20000 Fuel Filter/Filter Head Assembly
FF9830	Fuel Filter Plumbing