

Fleetguard®



Fuel Additives



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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.

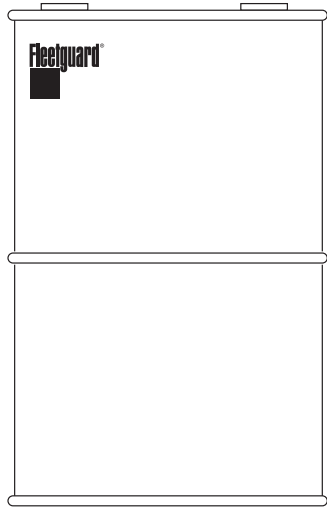
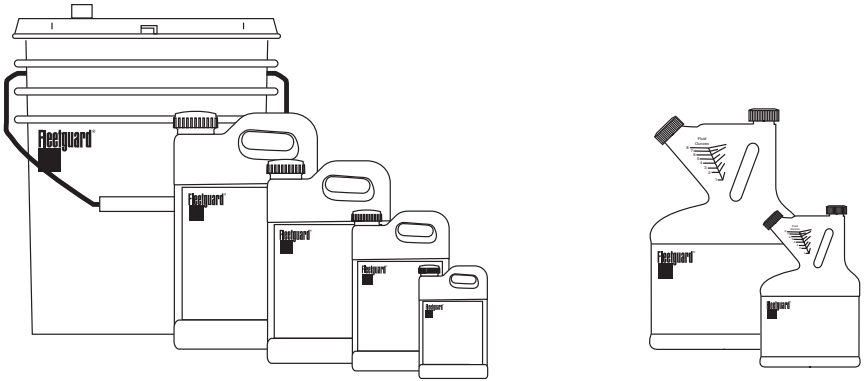
Lubricity-Enhancing Filters

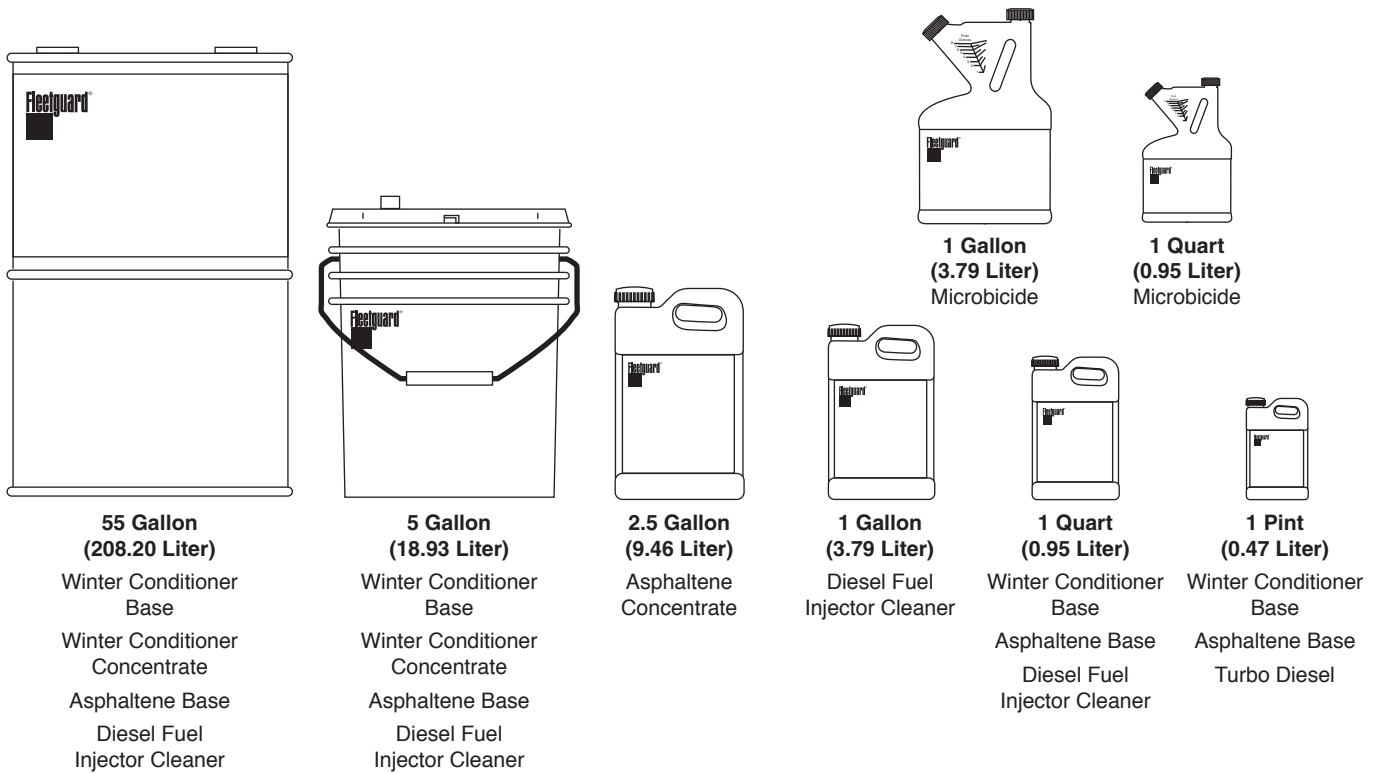
For customers who choose to run light fuels in Tier 2 Cummins B Series engines with electronic and mechanical fuel pumps, or Jet A fuel in airport ground equipment, Cummins Filtration designed a spin-on filter with slow-release chemical technology. These filters are also recommended for applications 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





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.

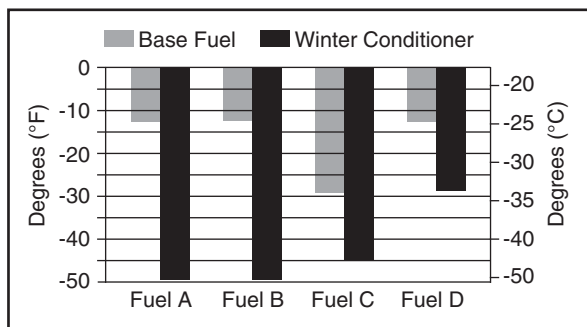
Ordering Information

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

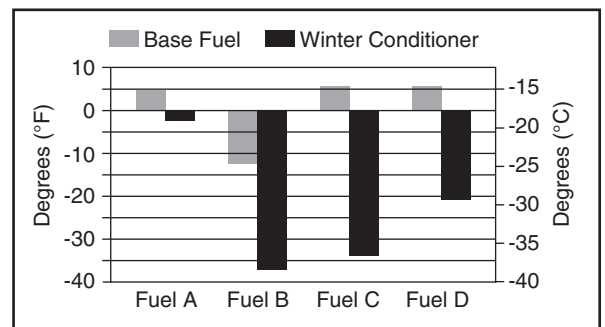
Part Number	Product	Package Size	Case Quantity
CC2552	Winter Conditioner Concentrate	5 gal (18.93 L)	1
CC2553	Winter Conditioner Concentrate	55 gal (208.20 L)	1

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

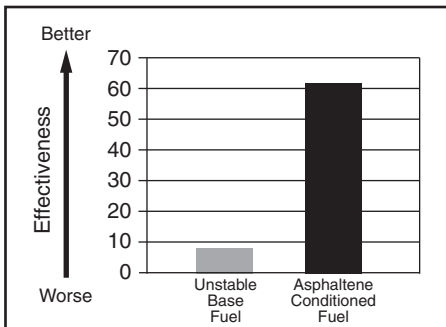
Specifications subject to change without notice.

Ordering Information

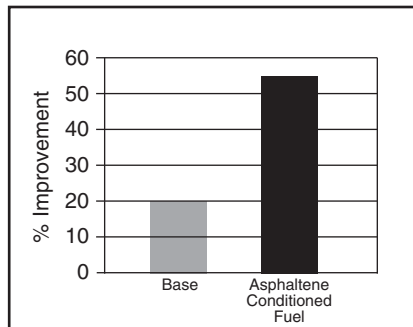
Part Number	Product	Package Size	Case Quantity	Part Number	Product	Package Size	Case Quantity
CC2598	Asphaltene Conditioner Base	1 pt (0.47 L)	12	CC2559	Asphaltene Conditioner Concentrate	Bulk	N/A
CC2597	Asphaltene Conditioner Base	1 qt (0.95 L)	12	CC2596	Asphaltene Conditioner Concentrate	2.5 gal (9.46 L)	2
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				

Performance

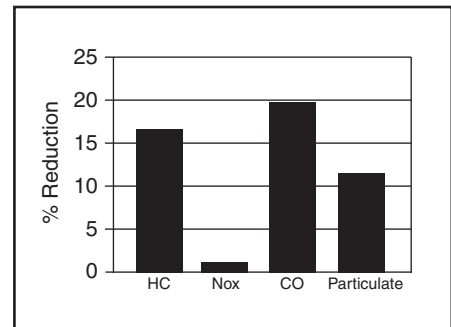
Effectiveness



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

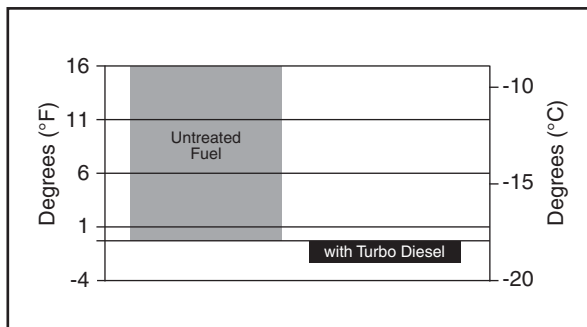
Specification	Turbo Diesel
Appearance	Clear dark brown liquid
Specific Gravity @ 60 °F (15.5 °C)	0.8850 - 0.9250
Flash Point	Greater than 142 °F (61.1 °C)
Pour Point	-11.2 °F (-24 °C)
Sulfur (ppm) at Recommended Treatment	Less than 1 ppm

Specifications subject to change without notice.

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.

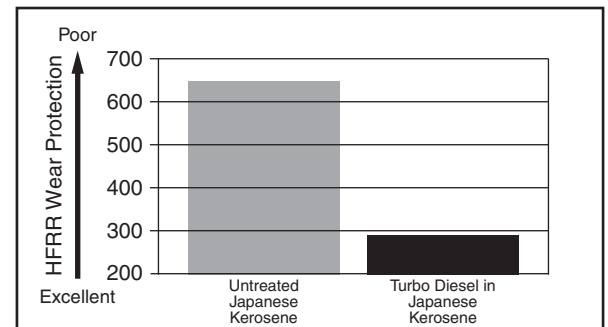


Ordering Information

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

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

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

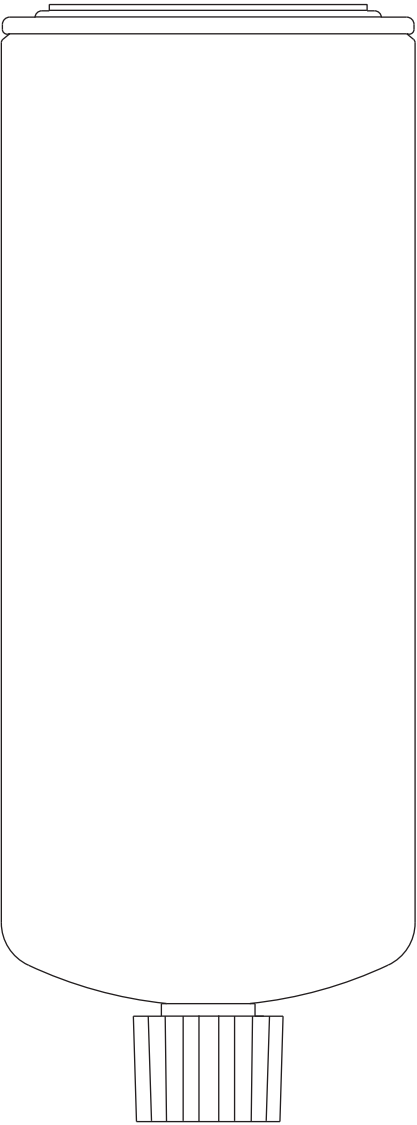
The Bug Alert Test Kits make routine determination of fungal and bacteria populations quick and easy. Microbicide Test Kits are kits that contain flexible plastic strips to which nutrient containing filter paper is attached. The kits are complete and ready to use. Each kit contains 10 test strips and 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

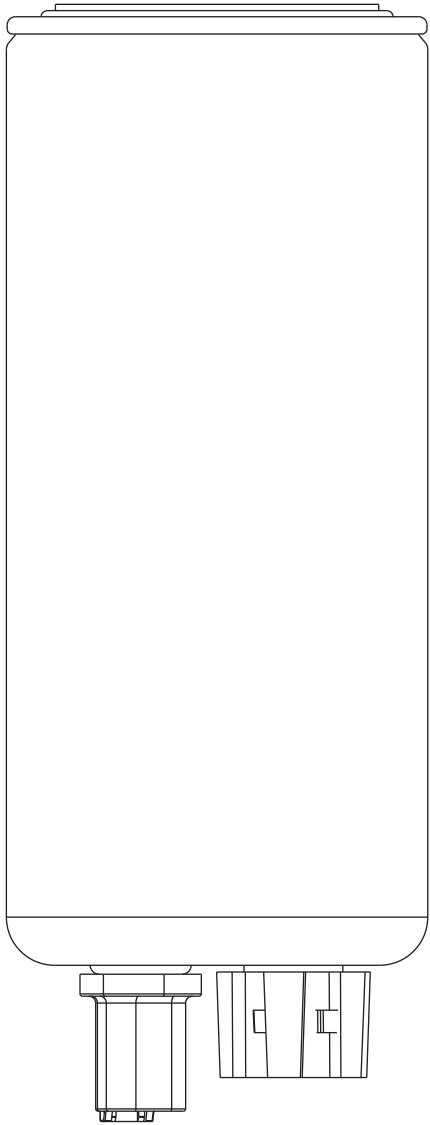
Part Number	Product
CC2524	Microbicide Test Kits



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 FS20000. 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
3938173J	FS20000 Fuel Filter/Filter Head Assembly
FF9830	Fuel Filter Plumbing

Revisions



Revisions

Revisions

Revision	Date	Description
A	02-26-2018	Added Revision Block. LT36503 was LT32599.