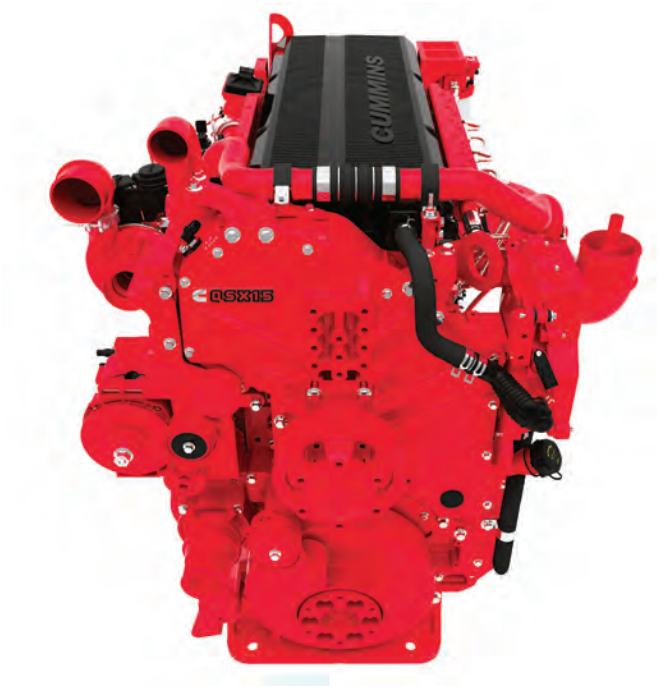
The Impact Of Fuel Quality. Every™ Injector.

For Off-Highway Engines.

High-Quality Fuel Is Required. Every™ Engine.



Throughout the years, Cummins has remained at the forefront in the development of high-performance engines. Efforts to produce engines with increased performance and that are more reliable and more environmentally friendly have led to new advancements in fuel-system technology.

The tolerances for the internal components of High Pressure Common Rail (HPCR) fuel systems have decreased by a factor greater than 25, over the years. Wear of these internal components due to contaminated fuel will decrease component life, and may cause malfunctions that could result in severe damage to other engine components.

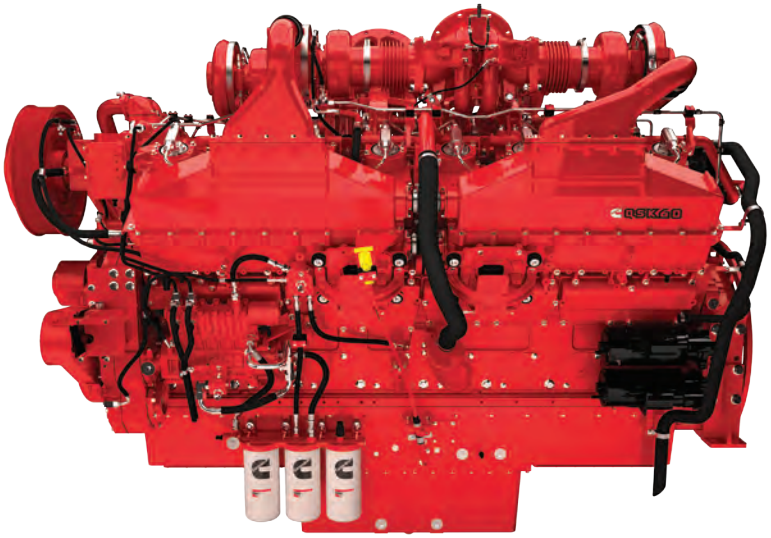
Meeting The Standards. Every Drop.

Cummins, in accordance with the Worldwide Fuel Charter, has specified a minimum fuel cleanliness level 18/16/13 – measured by the ISO 4406 standard.

The three-number coding system 18/16/13 corresponds to the number of particles of a size greater than 4, 6 and 14 microns per milliliter of fuel, respectively. A micron is the unit of measurement assigned to the size of unwanted particles in fuel. Particles 4 and 6 microns are so small they are impossible to see with the human eye.

Fuel Contamination.

Samples from around the globe show as many as 2,500 particles (4 microns or larger) per milliliter of fuel. That amounts to 2.3 billion particles in every tankful. This comes at a time when high-pressure fuel systems operate at pressures as high as 30,000 psi. As system tolerances become tighter, smaller contaminants can cause wear, and damage metal surfaces. This is particularly true of fuel injectors operating under extremely high pressure, with nozzle bores that can become scarred and worn, distorting the fuel spray pattern and degrading engine performance and fuel efficiency.



Protecting Your Engine. Every Day.

Operators can control and limit the amount of contaminants entering the engine's fuel system with some simple monitoring and maintenance steps.

Suppliers.

It may seem reasonable to expect that the fuel you are receiving from a supplier meets or exceeds the standards, but this is not always the case. The only way to be sure of the cleanliness of the fuel you are receiving is to take samples and have them analyzed, remembering to keep detailed records from all testing results.

Fuel Storage.

It is important to purchase fuel for the environment in which it will be used and stored, and maintain it according to seasonal conditions. The composition of diesel fuel can vary dramatically depending on the region and temperatures. For example, fuel intended for warm weather will not store properly in cold weather.

Internal Delivery Systems.

It is important to use only hoses and piping specifically designed for diesel fuel, and perform regular maintenance on those elements.

Equipment.

Keeping your equipment clean, along with regular servicing and maintaining of the fuel tank, fuel lines and filtration system via the manufacturers' recommendations, will help prevent contaminants in your fuel system.

Keep Contamination At Bay. Every Step.

Fuel Filtration.

High-efficiency filtration is critical for maintaining clean fuel through every part of the fuel-handling process. Following the proper maintenance and service practices recommended by your engine manufacturer is the best way to ensure clean fuel, which leads to optimal engine performance and life.

NanoNet® fuel filters are available on all Cummins engine platforms.

Use Fleetguard® filters with NanoNet® advanced media for the ultimate protection against contaminated fuel. Developed alongside each Cummins engine, Fleetguard filters provide up to 13 times greater protection against particles 4 microns and larger than the closest competitor. Despite other filter suppliers' claims, Cummins has proven the dependability of Fleetguard filters with rigorous comparative engine tests, and lab results indicate that most aftermarket filters are inferior in filtration efficiency, capacity and water-separation capability. A primary concern with off-highway equipment is the amount of vibration and shock loading that shake an engine to its core. Fleetguard NanoNet filters are extensively tested under real-world conditions, and have been proven to better trap contamination and not allow particles to be dislodged under extreme shaking and vibration.

In addition to harmful contamination, removing water is a secondary but no less critical function of your fuel filtration system. Traditional filters absorb water over time, eventually letting water pass through to the injectors. The unique synthetic structure of NanoNet enables best-in-class fuel/water separation over the life of the filter to protect sensitive fuel-injection components from premature damage. This protection is especially evident when filters experience water "slugs," which can quickly saturate and overwhelm conventional media.

Sampling And Analysis.

Continually sampling and analyzing your fuel at all possible sources of fuel contamination provides you with the opportunity to clearly identify where contamination is being introduced along your handling and storage process. It also provides you with the opportunity to address the contamination at its source before it becomes a costly and widespread problem.

The detailed procedure for sampling fuel is located in Service Bulletin 4022123, "Fuel Sampling For Particle Counting Test." Fuel requirements such as additives, biofuels, sulfur content, lubricity and viscosity are located in Service Bulletin 3379001, "Fuels For Cummins Engines." Both can be found on QuickServe® Online or obtained from your local Cummins distributor.

Cleaner Fuel. Greater Productivity. Increased Profitability.

You have a responsibility to yourself and to your company to ensure that fuel quality allows your equipment to continue performing at optimal levels while maintaining minimum downtime and maintenance costs. Cummins is committed to helping you achieve this goal. Together we will make sure that your equipment remains productive for years to come.

See The Solution. In Every Detail.

Looking for more information? An in-depth video on fuel cleanliness and maintaining fuel quality can be found at cumminsengines.com/fuel-quality.

Cummins Inc.
Box 3005
Columbus, IN 47202-3005
U.S.A.

Phone: 1-800-DIESELS™ (1-800-343-7357)
Internet: cumminsengines.com/fuel-quality

Twitter.com/CumminsEngines
YouTube.com/CumminsEngines

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