



# Cooling is vital

Fleetguard Products protect and maintain  
Cooling Systems for Heavy-Duty Engines



COOLANT

# Cooling is vital ...

If not properly cooled, the temperature of a heavy-duty diesel engine can reach up to 2,000 °C, which would easily be enough to melt the engine.

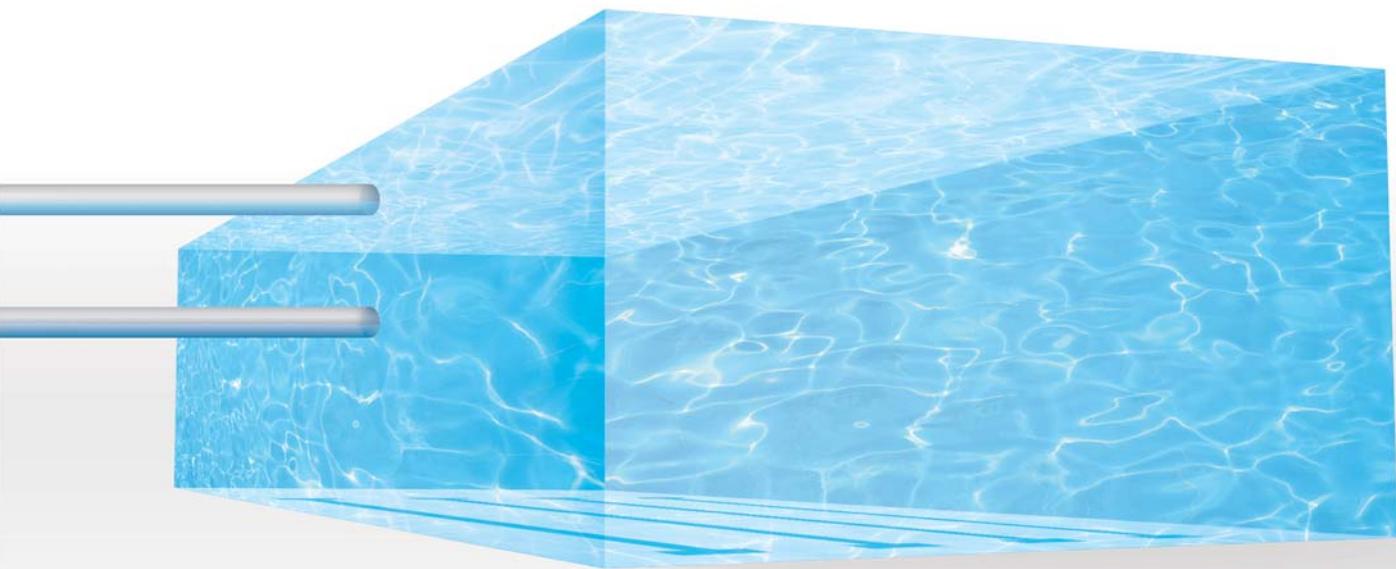
The heat must be dissipated or the engine can't operate at its maximum potential. Only one-third of the 2,000 °C is, in fact, converted into mechanical energy.

This excess heat production is clearly one reason why correct coolant maintenance is the key to reducing operating costs, minimizing engine downtime and ensuring better reliability and durability from engines and cooling systems alike.



# ... to keeping equipment running

Every fleet owner knows how important regular service intervals are for an engine. However, the main focus during most service visits is on air, lube and fuel filtration. The regular and proper maintenance of an engine's cooling system is usually considered to be of minor importance - potentially an extremely costly mistake. Research has shown that 40% of all engine problems in heavy-duty diesel engines are related, directly or indirectly, to improper cooling system maintenance. Regular cooling system maintenance is vital to keeping an engine running properly.



**Over a 24 hour period, about 720,000 litres of cooling fluid circulate through an average heavy-duty engine. That's enough to fill a large swimming pool.**

# Aluminium corrosion

Corrosion has nothing to do with age

More and more engine manufacturers are using aluminium to reduce weight in cooling systems. But there is a price for weight reduction – aluminium is the most sensitive material in the system, and corrosion is its biggest problem.

Not many people are aware of it, but corrosion is not a question of age; corrosion can start to attack an engine as early as 2,000 hours or 400,000 km.

- Oxygen in the cooling system reacts with metal parts
- In the engine, oxidation = rust
- Water pumps, radiators, thermostats and manifolds are affected
- Radiators get blocked
- Engine overheats = repair costs, downtime
- Leaks appear



**Corrosion affects all metal parts, especially the aluminium ones.**



**Tiny metal particles begin to circulate in the cooling system, causing damage to any mechanical parts.**

**“Some companies probably know a lot about chemicals, while others know a lot about engines. Cummins Filtration knows all about both.”**

Cummins Filtration has developed coolant additives with different inhibitors which create a protective layer on all the metal parts in the cooling system. The company’s major advantage is the combination of chemical research and the close cooperation with its parent company, a major diesel engine manufacturer: Cummins.

If you use appropriate Fleetguard® DCA\* or ES (longlife) liquid from the very start of an engine’s life, you can prevent oxidation.

If you start to use DCA at a later stage, you can at least stop the corrosion from getting any worse.

\*DCA = Diesel Chemical Additive



**“We use Fleetguard® DCA4 cooling additive for all the cooling systems in the engines we maintain, and we haven’t had any engine breakdowns due to cooling system failures for at least 5 years now. That DCA really pays off.”**



**The protective layer created by Fleetguard DCA prevents the aluminum from corroding.**

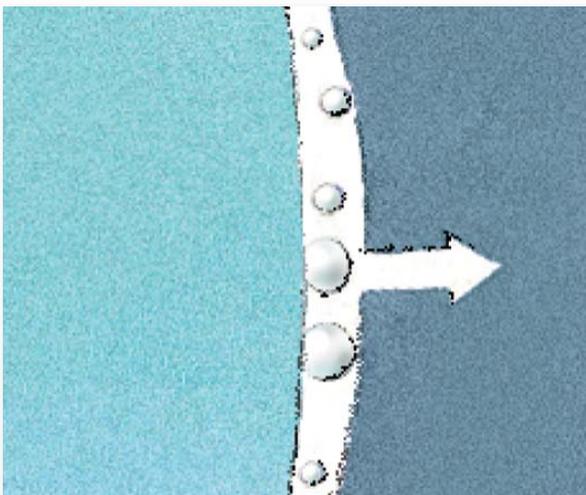
# Cavitation or liner pitting

You can't change the laws of physics, but Cummins Filtration can neutralise the consequences

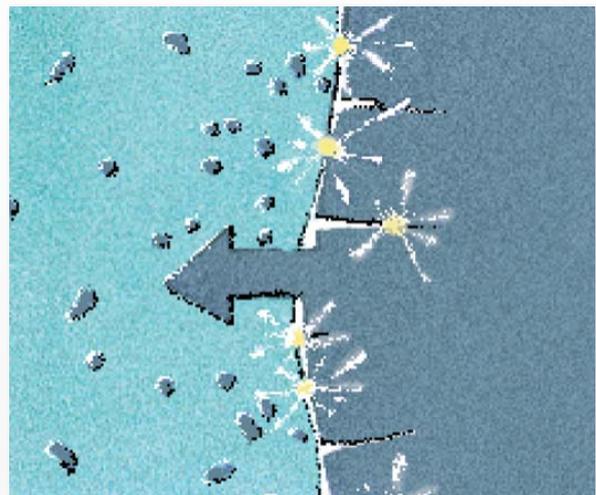
The pistons in your engine move up and down about 2,000 times a minute. While they move vertically, the crankshaft is performing a completely different movement by rotating horizontally. These contradictory movements will cause significant vibration in your engine's liners.

Although the outer wall of the liner is surrounded by cooling fluid, the fluid's inertia creates tiny vacuum pockets, causing bubbles of vapour form on the liner wall.

When the liner vibrates back through the vacuum pockets, these bubbles implode under an enormous pressure of 1,000 bar and take small chunks out of the liner.



**Liner surface deforms during vibration; in combination with the coolant's inertia, this creates vacuums and tiny vapour bubbles.**



**Vibration continues, and the liner slams back, causing the bubbles to implode. As this process goes on several thousand times a second, small chunks are kicked out of the liner.**

## **Cummins Filtration can't stop your engines' liners vibrating ...**

... or change the inertia of the cooling fluid, but Fleetguard® DCA can neutralise the destructive cavitation on your engine by creating a protective layer on the liner wall.

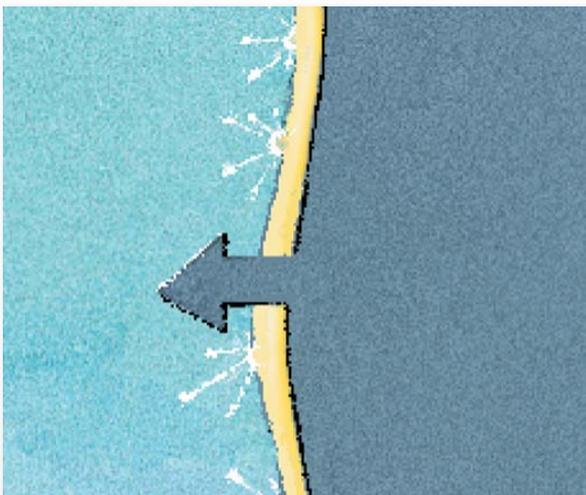
The bubble implosion will still take place, but it will occur on the protective layer without damaging the liner wall.

Additionally, any damage to the layer on the liner surface is immediately reinhibited by the DCA.

To maintain the layer's effectiveness, DCA must be added at frequent service intervals.



**“We’ve seen too many liners that looked like the surface of the moon, so we know very well why we use DCA4.”**



**Fleetguard DCA can neutralise the fatal effect on your engine by creating a protective layer on the liner wall; implosions now take place on this layer and spare the liner surface.**

# Scaling

We make hard coolant water a soft issue

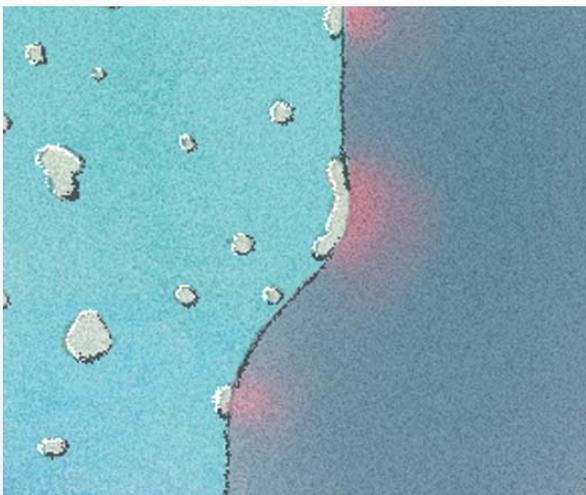
Coolant consists of 48% good-quality water, 48% glycol and 4% coolant additives. Tap water is always slightly hard because of minerals such as calcium, magnesium, etc., which cause scale to develop.

The detrimental effect of scale takes place in the hot spots of your engine, just as it does when you boil water in your kettle. In the engine, these hot spots are the liners and the cylinder heads.

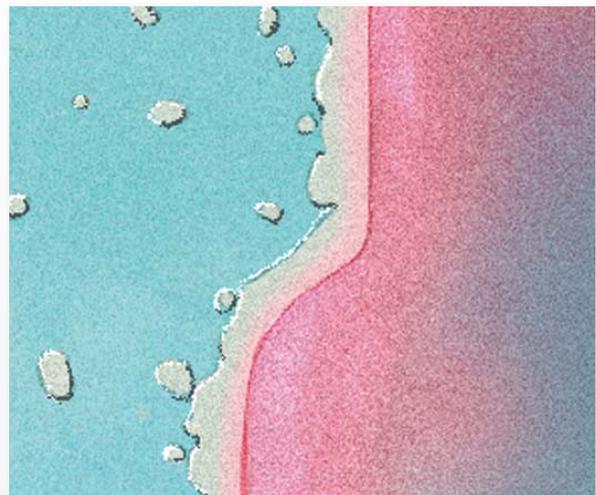
When you consider a 1 mm layer of scale has the same insulating effect as 75 mm of cast iron, it becomes obvious that scale is a major insulator. Heat cannot easily dissipate from your engine's combustion chamber.

The consequences are worn piston rings, higher oil consumption and, in the worst cases, total engine failure.

Fleetguard® DCAs contain an intelligent polymer system that 'wraps up' the scale particles so that they can't attach themselves to the liner wall.



**As the engine functions, the heat causes the formation of scale on the hot surfaces.**



**The scale shell acts as an insulator, preventing the coolant liquid from absorbing the heat of the engine.**

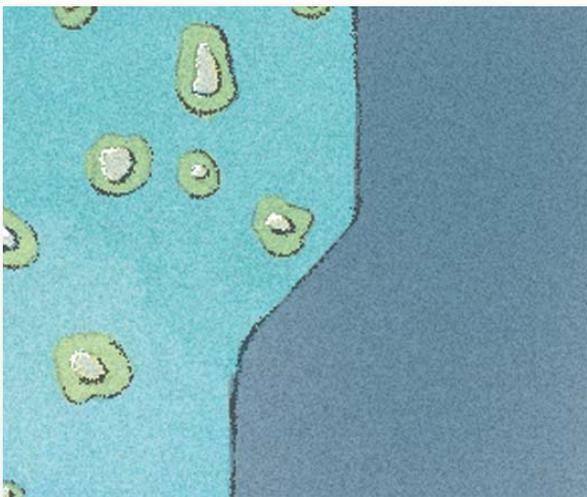
# Acidity

We make sure that acidity doesn't upset you

Corrosion in an engine usually occurs when the pH value of your cooling fluid is lower than 7. Your cooling fluid becomes acidic due to the degradation of antifreeze and sulphates entering the cooling system. That leads to general corrosion of your liners, cylinder blocks and heads, and in the waterways and hoses. A very high pH value is also bad news as you risk damage to your gaskets and to the softer metal components.

Therefore, the pH value in an ideal cooling system always needs to be between 8 and 10. To achieve this, you need buffers in your cooling fluid to neutralise the formation of acids or alkalis.

The various buffers in Fleetguard® cooling system products, including borate in DCA2 and phosphate in DCA4, ensure that your cooling system fluid maintains the proper acidity.



**Fleetguard DCAs contain an intelligent polymer system that 'wraps up' the scale particles so that they can't attach themselves to the liner wall.**

# A lot can happen to your cooling system ...

To reduce operating costs and minimize engine downtime, correct coolant maintenance is vital. Because everyone has their own preferences when it comes to cooling system maintenance, Cummins Filtration offers choices in both cooling system chemistry and water filters.

Fleetguard Supplemental Coolant Additives (SCA) meet ISO-standards and are fully approved by major engine manufacturers such as:

- Cummins®
  - Caterpillar®
  - DAF®
  - Scania®
  - M.A.N.®
  - Komatsu®
  - Liebherr®
- and others

Fully formulated coolants, such as ES Compleat EG, eliminate the need for SCA pre-charging and provide the greatest opportunity for successful cooling system maintenance. They are designed to last until engine rebuilt. They also meet the ASTM low silicate recommendations and are universal for use in all heavy-duty diesel and automotive engines. Fleetguard® DCA2 coolant additive and its fully formulated coolant, Fleetcool, have been protecting diesel engines since 1972. DCA2 uses nitrite for liner pitting protection and has a borate buffering system.



**Mechanical Filtration**



**Fully Formulated Antifreeze**



**Coolant Additive**

# ... but Cummins Filtration has even more products that can solve the problems.

DCA4 and its fully formulated coolant equivalent, Compleat EG, were first introduced in 1984 on all Cummins diesel engines, where it is still used today. DCA4 is less toxic than typical nitrite/borate chemistry and provides improved protection against solder and aluminium corrosion, liner pitting and is more tolerant to SCA under- or overtreatment. In today's competitive environment, reducing maintenance costs by extending coolant life meets critical fleet needs. To meet these needs, Cummins Filtration has launched an extended service coolant, Fleetguard® ES Compleat.

For use in extended service long life coolant maintenance programs, simply fill the cooling system with ES Compleat and once a year (250,000 km or 4,000 running hours) service the system with Fleetguard ES Slow Release Filters or ES Extender Liquid Booster. For use in standard coolant maintenance programs, simply use ES Compleat in combination with DCA4 mentioned above.

In addition to additives, coolants and cleaners, Cummins Filtration offers a wide range of Fleetguard water filters. Many different sources have shown a direct beneficial relationship between filtering contaminate from the coolant and reducing wear, corrosion, pitting and plugging.

One of the most significant studies observed 11,000 trucks, half of which used water filters. The trucks with water filters experienced two-thirds fewer failures from leaking water pump seals compared to the trucks without filters.

This data also indicates a close correlation between filtration and a reduction in scale formation, which helps the engine to maintain effective heat transfer for optimum performance.

\*ES = Extended Service



Coolant Test Products



Cooling System Cleaners



Extended Service Products



If you'd like to know more about coolants or any other Fleetguard product or technology, please contact your local Distributor or Cummins Filtration Customer Assistance.

Your local Distributor



For more information, visit  
[cumminsfiltration.com](http://cumminsfiltration.com)

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