

# Better Every Call.

## Cummins 2010 Solution for Fire Truck Applications

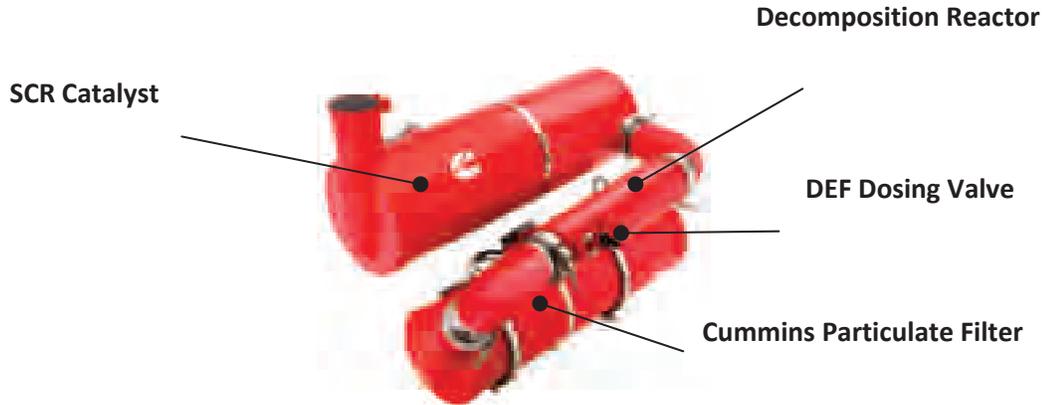


### Why Selective Catalytic Reduction (SCR) is the Right Technology for 2010

- **Increased Horsepower and Torque without increasing displacement**
- **Improved Operator Satisfaction**
  - Improved throttle response and driveability
  - Easy operation for driver
- **Improved Reliability and Durability with SCR Technology**
  - In-cylinder technology necessitates massive Exhaust Gas Recirculation (EGR) flow which may produce excessive acidic condensation resulting in power-cylinder corrosion and rapid deterioration of lube oil
  - In-cylinder technology significantly increases EGR rates up to 50% (more than double) over an SCR solution
- **Fully Integrated Subsystems efficiently reduce emissions and lessen the need for frequent Diesel Particulate Filter (DPF) regenerations.**
  - Fewer DPF Regenerations than current engines with SCR technology
- **Minimal Change in Heat Rejection vs. today's product**
  - With SCR, no need to adapt cooling packages to accommodate higher heat rejection
  - With SCR, no major redesign, if any, of radiator, charge air cooler, and/or fan systems
  - In-cylinder technology increases EGR rates up to 50% over an SCR solution, leading to increased heat rejection
- **Fuel Economy** is 5 -9 % better with SCR technology than with in-cylinder technology for both Heavy-duty and MidRange engines.
  - With SCR technology, combustion efficiency is significantly improved as compared to an in-cylinder technology and leads to:
    - Fewer engine pumping losses
    - Lower intake and exhaust manifold pressures
    - Decrease in DPF regenerations
- **SCR is a proven technology**
  - Cummins has extensive experience with this technology and has been using it in Europe since 2006
  - Cummins Emissions Solutions has built and shipped over 250,000 SCR systems
  - Cummins has built and shipped over 50,000 engines with SCR systems

## Cummins Aftertreatment System

- Proven Cummins Particulate Filter reduced particulate matter by over 90%. New for 2010 is the SCR Catalyst for NOx reduction.



## How SCR works

- Exhaust gas containing Oxides of Nitrogen (NOx) exits the Cummins Particulate Filter and enters a tube called the Decomposition Reactor, where a fine mist of Diesel Exhaust Fluid (DEF) from the holding tank is sprayed into the hot exhaust stream.
- DEF breaks down into ammonia (NH<sub>3</sub>) during a chemical reaction in the Decomposition Reactor through a process known as hydrolysis.
- The NOx and ammonia (NH<sub>3</sub>) pass into the SCR element where a catalytic reaction takes place, converting the NOx into harmless nitrogen gas (N<sub>2</sub>) and water vapor (H<sub>2</sub>O).
- The result - near zero emissions.

To watch a video on How SCR Works, go to [www.everytime.cummins.com](http://www.everytime.cummins.com)

## How much DEF will be needed?

- DEF consumption will be approximately 2% of your fuel consumption.
- DEF tank size will be determined by the vehicle manufacturer. Cummins recommends a DEF tank size at 6% the size of the vehicle fuel tank. (If the vehicle has a 50 gallon fuel tank, the DEF tank would need to be a minimum of 3 gallons.)

## **Here's an example:**

- Annual miles for average truck (urban setting) = 7,000 miles
- Assume average MPG = 5 mpg
- 7,000 miles / 5 mpg = 1,400 gallons diesel fuel per year
- DEF usage @ 2% of fuel consumption = 28 gallons of DEF / year
- **28 gallons / 5 gallon tank = only 6 DEF fill-ups / year**

\*\*Based on 5 gallon DEF tank sizing and a 50 gallon fuel tank

To calculate specific fleet usage, go to [www.cumminsfiltration.com](http://www.cumminsfiltration.com).

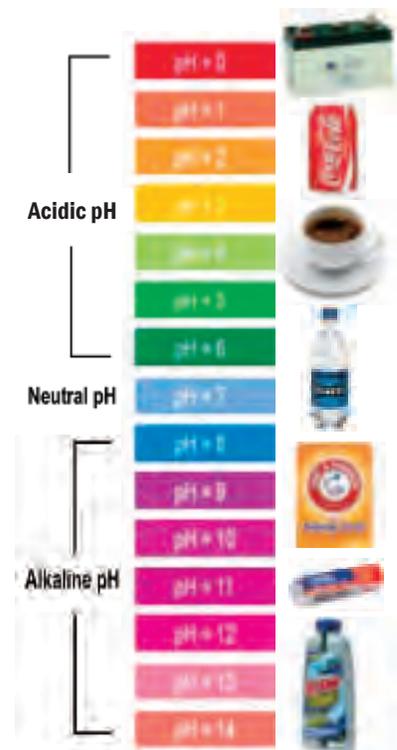
## Where can DEF be found?

- All Cummins Distributor locations will have DEF available for sale in October 2009.
- DEF will be readily available for customers to purchase in thousands of locations in US and Canada. Cummins Filtration will offer DEF in a variety of sizes of packaging from bulk to 1, 2.5 and 5 gallon jugs.
- Customers can be confident in the availability of DEF. To talk to a Cummins representative about questions on DEF or for the nearest retail outlet, customers can call:
  - Cummins Filtration at 1-800-22FILTER
  - Cummins Customer Assistance Center at 1-800-DIESELS



## The Facts about DEF

- **FACT:** DEF is a solution of 32.5% automotive grade urea and 67.5% deionized water.
- **FACT:** DEF is SAFE to handle and store. It is NON-toxic, NON-polluting, and NON-flammable.
- **FACT:** DEF will freeze at 12 F (-11C). Frozen DEF does not impact the start up of or the operation of the vehicle.
- **FACT:** DEF and urea do not become toxic – even if stored at extreme temperatures.
- **FACT:** DEF is slightly alkaline with a pH of approximately 9. That's about the same as household baking soda.
- **FACT:** DEF pricing will be at or below the price of diesel fuel in 2010 as the population of SCR equipped engines enters the marketplace.



## Driver Training and Tips

- Drivers can expect better driveability and better performance with Cummins 2010 engines
- Drivers can expect to see a new DEF Lamp. This lamp will illuminate when the DEF level is low.



**Diesel Exhaust Fluid (DEF) Lamp**

## How the Competition Stacks Up

Engine Model	Displacement	Horsepower	Peak Torque
<b><i>ISB6.7</i></b>	6.7 liters	260 - 360 Hp	660 - 800 lb-ft
<b><i>ISC8.3</i></b>	8.3 liters	270 - 380 Hp	800 - 1050 lb-ft
<b><i>ISL9</i></b>	8.9 liters	345 - 450 Hp	1150 - 1300 lb-ft
MaxxForce 10	9.3 liters	310 - 350 Hp	1050 - 1150 lb-ft
<b><i>ISX11.9</i></b>	11.9 liters	370 - 500 Hp	1450 - 1645 lb-ft
MaxxForce 13	12.4 liters	410 - 475 Hp	1450 - 1700 lb-ft
DD13	12.8 liters	350 - 500 Hp	1350 - 1650 lb-ft
<b><i>ISX15</i></b>	15 liters	455 - 600 Hp	1750 - 1850 lb-ft



## Better Every Call.

- Cummins is the only engine manufacturer to design and manufacture all critical subsystems, from air intake to exhaust aftertreatment, in-house.
- Cummins will maintain consistency in proven SCR technology to meet the ever-changing emissions standards.
- Maintenance Intervals for 2010 engines are the same as today's engines. There will be one new maintenance item, a DEF Filter, which will need to be changed every 200,000 miles.
- Cummins support network is the best in the industry with over 3,500 authorized Cummins dealers and distributors throughout North America.
- For further details on why SCR is the Right Technology for meeting EPA 2010 emissions, visit us at [www.everytime.cummins.com](http://www.everytime.cummins.com).



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