SANDY SPRINGS FIRE/RESCUE

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Eden,

To note in 2014 we replaced our fleet of fire engines and ladder trucks. Prior to this project, our old fleet was not manufactured before the new EDA guidelines for diesel truck emissions was introduced. Our current fleet has the latest emissions technology, which meets these requirements, thus reducing the amount of diesel emissions into the environment. Below is an outline of the system, and attached is a diagram of the technology installed in our fleet.

Diesel Exhaust Fluid (DEF), is a solution made from 67.5% purified water and 32.5 percent automotive-grade urea that serves as a carrying agent for the ammonia needed to reduce nitrogen oxide (NOx) emissions from diesel engines. When DEF is injected into the engine exhaust gas, downstream of the DPF, it will be rapidly hydrolyzed producing the oxidizing ammonia needed by the SCR catalyst to complete NOx emissions reductions. DEF begins to freeze at 12 degrees Fahrenheit (-11 degrees Celsius), manufacturers are incorporating a heating system to prevent this.

Unlike other solutions used to control NOx, a DEF system allows the diesel engine to run at its optimum range in terms of fuel mixture – some systems require the engine to run richer, which can be harmful to diesel engines, to control the NOx.

Selective Catalytic Reduction (SCR), is a general term for aftertreatment equipment which promotes a chemical reaction by using a catalyst for eliminating or detoxifying particular chemical ingredients. To meet the EPA2010 regulation, the vehicle out NOx level will be extremely close to zero (0.2 Grams per brake horsepower). By mixing the NOx with the ammonia contained in urea, it will be separated into harmless water and nitrogen. It is an extremely effective, dependable, efficient and economical selection. SCR has already been adopted in Europe and Japan for truck and mobile vehicle applications, so it only makes sense to be used as a solution for EPA 2010. Almost every U.S. diesel engine manufacturer plans to adopt SCR technology, further proving its reliability.

How it works

The first step in cleaning the diesel exhaust occurs when the exhaust stream enters the Diesel Oxidation Catalyst (DOC). The role of the DOC is twofold. First, it converts and oxidizes hydrocarbons – at about 250 degrees Celsius – into water and carbon dioxide.
Second, the is used to provide and promote heat, using specific engine management strategies, into the exhaust system. Through appropriate thermal management, this heat increases the conversion efficiency of the downstream subsystem(s) in reducing emissions.

The second step in the process is known as Selective Catalytic Reduction (SCR). In this process, the NOx in the exhaust stream is converted into water and inert nitrogen, which is present in the atmosphere and harmless. Before the exhaust gas enters the SCR chamber, it is dosed with Exhaust Fluid (DEF), also known as urea, an aqueous solution that is approximately 67.5 percent water and 32.5 percent pure urea.
When heated, the DEF splits into ammonia and carbon dioxide. These molecules are atomized, broken up and vaporized, then enter a mixer that resembles a corkscrew. This twist mixer evenly distributes the ammonia within the exhaust flow. The ammonia enters the SCR module, which contains a catalyzed substrate, and through chemical reactions combines and converts the NOx and ammonia into the harmless inert nitrogen and water. Dosing typically occurs between 200 and 500 degrees Celsius.

The final step of the cleansing system for the diesel exhaust gas involves the Particulate Filter (DPF). DPF traps any remaining soot, which is then periodically burned away, known as regenerating, when sensors detect the trap is full. The regeneration process sees temperatures in excess of 600 degrees Celsius to burn away soot.

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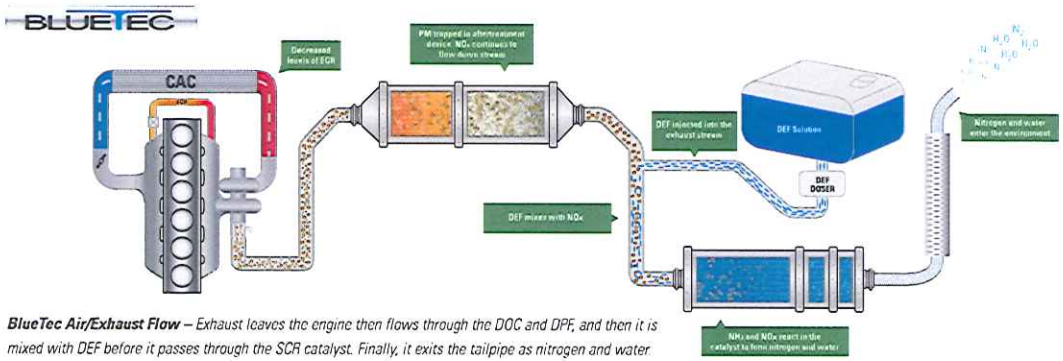
DD13: WITH BLUETEC® EMISSIONS TECHNOLOGY.

How BlueTec Emissions Technology Works

BlueTec is a complete emissions system that combines exhaust gas recirculation (EGR), diesel particulate filter (DPF), diesel oxidation catalyst (DOC) and selective catalytic reduction (SCR) to efficiently meet the 2010 emissions standards. BlueTec treats the exhaust gases downstream of the engine instead of requiring complex changes under the hood. It does this by injecting a small amount of diesel exhaust fluid (DEF) into the exhaust stream which reacts with the NOx in the SCR catalyst, forming nitrogen and water. Lastly, the nitrogen and water, safe elements in the air we breathe, are released into the environment.



BlueTec Air/Exhaust Flow *– Exhaust leaves the engine then flows through the DOC and DPF, and then it is mixed with DEF before it passes through the SCR catalyst. Finally, it exits the tailpipe as nitrogen and water*

What You Need to Know About Diesel Exhaust Fluid (DEF)

DEF is a simple, non-toxic and inexpensive pre-mixed fluid composed of two-thirds pure water and one-third automotive-grade urea. The distribution infrastructure for DEF is in place, and it is available in ample supply at cost-effective prices. As with other standardized fluids, the American Petroleum Institute controls DEF quality through a rigorous testing system.

DEF comes in various size containers including bulk fill, 275 gallon totes and 2.5 gallon jugs. It can be purchased directly from DEF distributors (see DetroitDiesel.com for a list of these companies) and at these convenient locations:

Operating a BlueTec-Equipped Truck is Simple

There is one basic thing to keep in mind when operating a BlueTec-equipped truck: Watch the DEF gauge to see when it's time for a refill. DEF is stored on the truck in its own tank located next to the fuel tank on the driver's side. The typical tank ranges in size from 6 to 23 gallons depending on the truck's application.

The On-Board Diagnostic (OBD) system is designed to keep the engine's control module informed of the performance of BlueTec. OBD monitors the DEF level in the tank, emissions levels going out the tailpipe and all of the components of the BlueTec emissions system. The DEF tank fill opening is designed to only accommodate a DEF fill nozzle to ensure only DEF is put in this