

ClearTech™

SCR SYSTEM



MACK CLEARTECH SCR SYSTEM

MACK® TRUCKS ARE POWERFUL, DURABLE, FUEL EFFICIENT AND DELIVER NEAR ZERO EMISSIONS

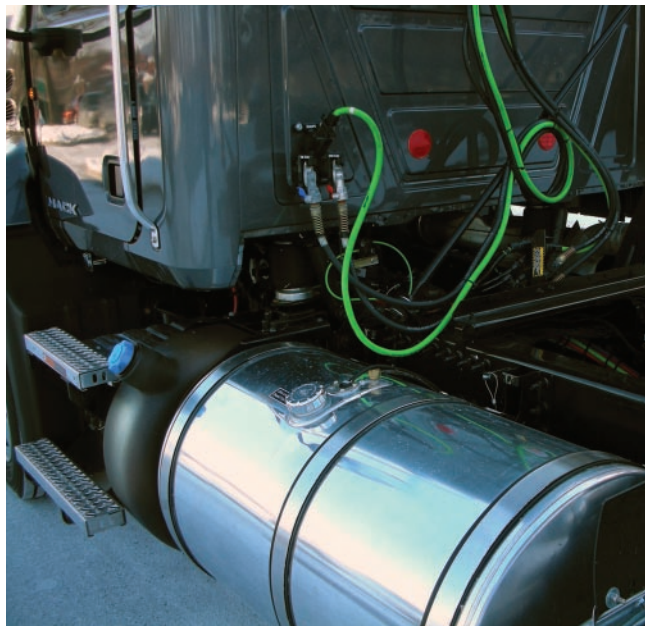
All trucks must meet the 2010 EPA mandated emissions requirements, reducing oxides of Nitrogen (NOx) to near zero levels. To meet these stringent requirements for 2010, Mack integrated the after-treatment process known as Selective Catalytic Reduction (SCR) technology across the complete MP™ Engine Series. And after extensive field testing the Mack ClearTech™ SCR System has proven to deliver better fuel efficiency and the same great power and performance you've come to expect from Mack.

HOW THE CLEARTECH™ SCR SYSTEM FITS

When incorporating SCR technology into the MP Engine Series we were careful to configure the system without impacting normal daily operation. As outlined below, the compact design allows for easy integration without altering the cab or chassis.

1 DIESEL EXHAUST FLUID (DEF) TANK

On the driver side of the truck, the DEF tank (blue cap) is tucked between the cab steps and the fuel tank. This placement is convenient for refilling operations.



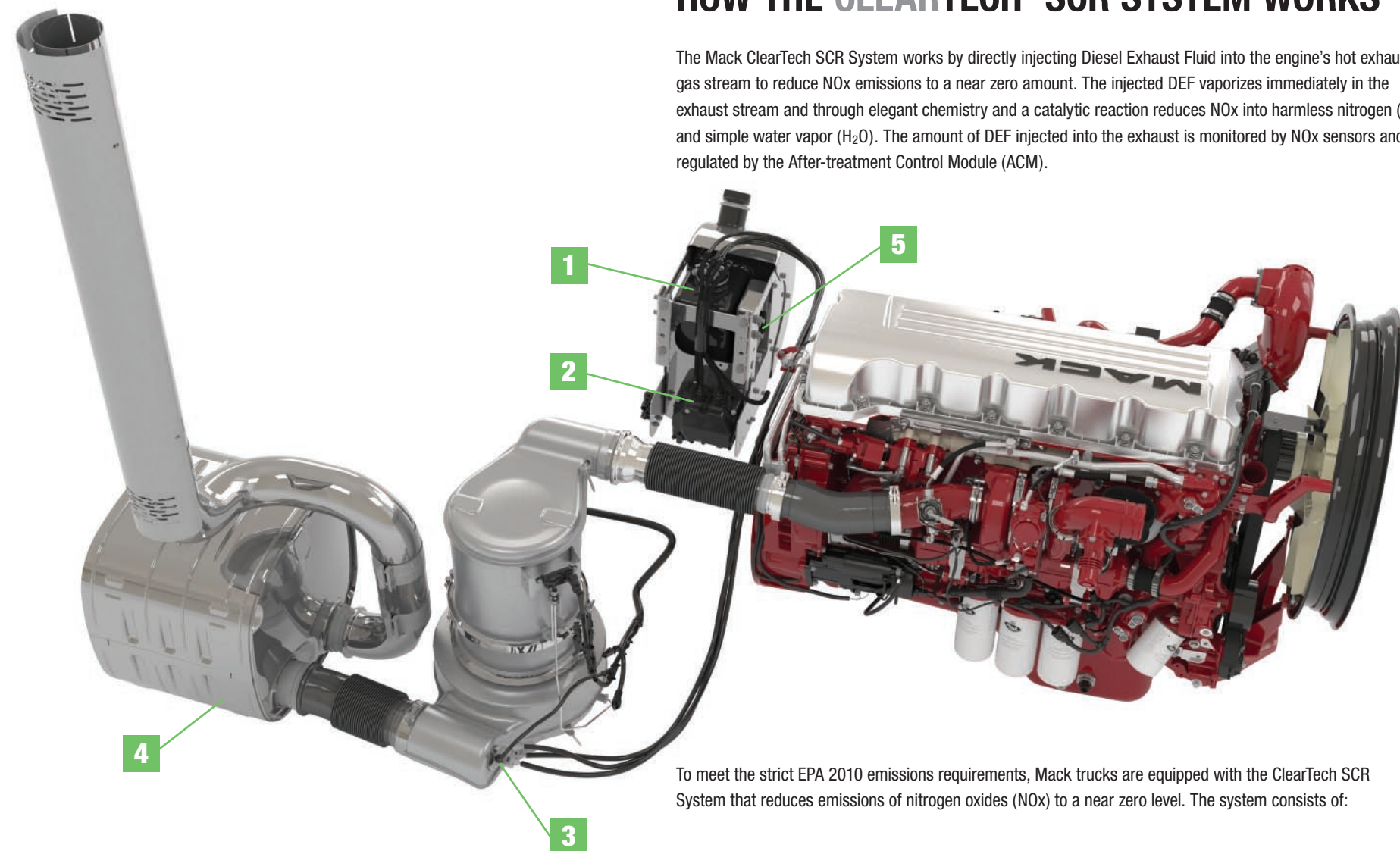
2 SCR CATALYST

The passenger side of the truck houses the catalytic conversion chamber that sits behind the Mack Cap DPF. It is positioned just behind the cab and along the frame rail.



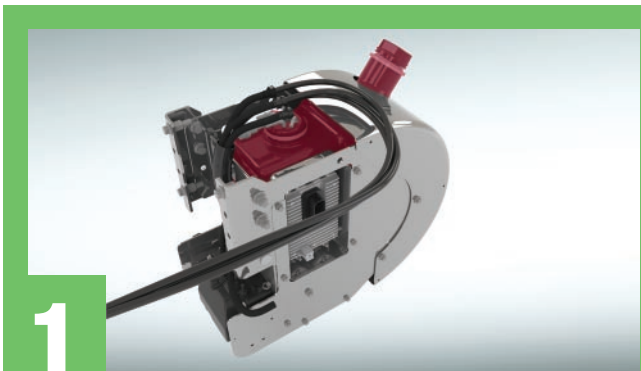
HOW THE CLEARTECH™ SCR SYSTEM WORKS

The Mack ClearTech SCR System works by directly injecting Diesel Exhaust Fluid into the engine's hot exhaust gas stream to reduce NOx emissions to a near zero amount. The injected DEF vaporizes immediately in the exhaust stream and through elegant chemistry and a catalytic reaction reduces NOx into harmless nitrogen (N₂) and simple water vapor (H₂O). The amount of DEF injected into the exhaust is monitored by NOx sensors and regulated by the After-treatment Control Module (ACM).



To meet the strict EPA 2010 emissions requirements, Mack trucks are equipped with the ClearTech SCR System that reduces emissions of nitrogen oxides (NOx) to a near zero level. The system consists of:

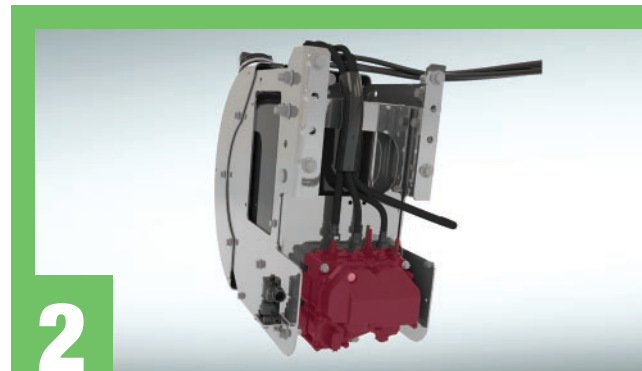
- 1** DEF Tank (27L/7.1 gal., 45L/11.8 gal. or 70L/18.5 gal.)
- 2** DEF Pump
- 3** DEF Injector
- 4** SCR Catalyst
- 5** After-treatment Control Module (ACM)



1

DEF TANK

The tank is filled with liquid urea (DEF), which is a clear, non-hazardous fluid. DEF will slush at approximately 12°F, so DEF temperature is continuously monitored and, when needed, heated to 60°F by a heat exchanger in the tank.



2

DEF PUMP

This low-pressure pump supplies the DEF to the SCR injector system. When the engine is turned off, the pump returns the DEF in the system back to the tank.



3

DEF INJECTOR

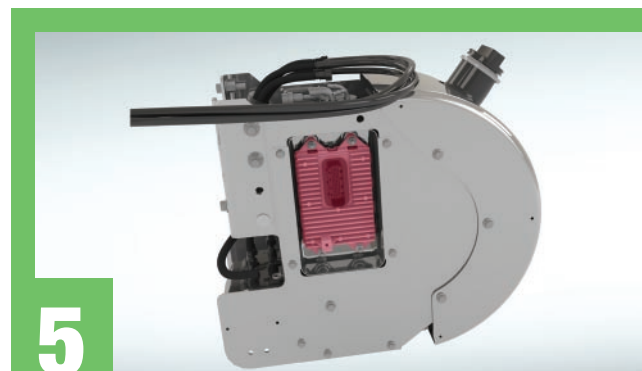
The amount of NOx in the engine-out exhaust gas is closely monitored. When needed, a measured amount of DEF is injected directly into the exhaust gas stream. The vaporized DEF mixes with the exhaust gas and converts immediately into ammonia (NH₃) which instantly neutralizes the NOx.



4

SCR CATALYST

The ammonia (NH₃) reacts with nitrogen oxides (NOx) as the exhaust gases pass over the catalyst. The catalytic substrates quickly enable the NH₃ and NOx to chemically react to produce harmless nitrogen (N₂) and water (H₂O) vapor.



5

AFTER-TREATMENT CONTROL MODULE (ACM)

The entire SCR system is constantly monitored by V-MAC® IV via the After-treatment Control Module (ACM), which directly controls the flow or dosing rate of the DEF. This matched system ensures industry leading fuel economy and the reduction of emissions allowing for certification to the strict EPA 2010 ultra low level of 0.02 grams of NOx per brake horsepower hour.

BENEFITS OF THE CLEARTECH™ SCR SYSTEM

IMPROVED FUEL EFFICIENCY

SCR does not increase soot loading of the DPF. Additionally by using the available engine-out NOx we can better manage passive exhaust heat levels that dramatically reduce the amount of active regeneration events that consume expensive diesel fuel.

LOWER HEAT REJECTION

Heat rejection is the amount of thermal energy that is created through combustion that cannot be harnessed into motive power. SCR technology significantly lowers heat rejection which is less taxing on your cooling system. This also adds to better fuel economy by better thermal management.

SAME PROVEN POWER

With SCR technology, horsepower ratings in the MP Engine Family will remain the same.

EVERY BIT AS DURABLE

SCR technology uses the same proven engines we offer today, giving you the same trusted and proven engines you've come to rely on from Mack.

PROVEN SCR TECHNOLOGY

We've been testing our SCR system for more than four years and have logged more than one million miles in the field. Mack trucks using SCR technology have been in use with contractor Haines and Kibblehouse and the results have been spectacular. Our SCR technology has proven to be reliable, so you can rest assured you're getting a proven system right out of the gate.



FREQUENTLY ASKED QUESTIONS

WHAT IS DEF?

DEF consists of ultra pure deionized water and 32.5 percent high-grade urea, which is a domestically sourced organic nitrogen-containing compound.

HOW DOES SCR IMPROVE FUEL EFFICIENCY?

SCR affords the opportunity to fine tune engine efficiency, optimizing combustion that directly improves horsepower while significantly improving fuel economy. Additionally by using the available engine-out NOx we can better manage passive exhaust heat temperatures that allow for dramatically reduced Diesel Particulate Filter active regeneration events that consume expensive diesel fuel.

WHAT IS HEAT REJECTION?

Heat rejection is the amount of thermal energy that is created through combustion that cannot be harnessed into motive power. You could consider this as wasted energy. With SCR we can significantly lower the heat loading on the cooling system. This also adds to better fuel economy by better thermal management.

WHAT IS NOx?

Nitrogen oxide (NOx) is a byproduct of efficient diesel fuel combustion. The higher the temperature of combustion the higher level of NOx produced. This is why we have used Exhaust Gas Recycling (EGR) to lower the combustion temperature, which lowers NOx to 1.2 grams. You can increase the amount of EGR into the massive range further reducing the efficiency of the engine to achieve lower NOx or you can simply treat the NOx via SCR exhaust aftertreatment. SCR affords the ability to neutralize the NOx while allowing improved engine efficiency that equals improved fuel economy and performance.

WHERE CAN I REFILL MY DIESEL EXHAUST FLUID RESERVOIR WITH DEF?

Truck stops, service centers, dealer locations and trucking terminals across the country will supply DEF.

HOW LONG CAN I GO BETWEEN FILL UPS?

We are sizing the DEF tank so you will only have to top it off approximately every 2.5 times you refuel.

HOW WILL I KNOW WHEN MY DEF RESERVOIR NEEDS TO BE REFILLED?

There is a DEF level gauge in the dash instrument cluster. There are also warning lamps and audible tones when the DEF reserve gets low. When the tank is almost empty some power derates or vehicle speed limits will occur.

WILL MY TRUCK SHUT DOWN BECAUSE OF AN EMPTY DEF TANK?

At no time will your vehicle shut down because of an empty DEF tank.

WHERE IS THE SCR SYSTEM LOCATED?

To minimize the amount of space the system takes up, we've located the SCR unit behind the Diesel Particulate Filter.

WILL DEF FREEZE?

DEF will "slush" at approximately 12°F and will "wax" at -12°F. DEF tanks have an internal heating system and heated supply lines from the tank to the injector. When the ignition key is turned off, the unused fluid is returned to the tank. A heating element thaws a small amount of DEF for immediate use.

WILL DEF BREAK DOWN IN EXTREMELY HOT TEMPERATURES?

The DEF would have to be left in an open and exposed container for some time before any degradation could be measured. The DEF system is sealed and vented to prevent evaporation.

WILL SCR BE COVERED UNDER MY WARRANTY?

Because the SCR system is an emission device, warranty coverage is 5 years/100,000 miles.

FOR MORE INFORMATION, CALL 1-800-922-MACK (6225)
OR VISIT WWW.MACKSCR.COM AND MACKTRUCKS.COM



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