

## How much DEF will I use?

Consumption rates vary but are usually around 2 – 4% of diesel fuel consumed. It can be expected that 1 to 2 gallons of DEF fluid will be used for every 50 gallons of diesel fuel. See the chart below.

### Estimated DEF Consumption

100,000 Miles Annually + 7 mpg =  
14,286 gals, diesel fuel consumed

@ 2%	DEF consumption	=	286 gals.	DEF
@ 3%	DEF consumption	=	429 gals.	DEF
@ 4%	DEF consumption	=	572 gals.	DEF

## How do I know when to refill the DEF tank?

The EPA requires manufacturers to put measures in place to ensure that SCR equipped diesel engines do not run without DEF. In response, manufacturers have equipped both on-road and off-road SCR units with multiple step driver notification systems. Before the DEF tank runs empty the operator is given a series of alerts on their dashboard display. The dashboard DEF indicator will include the following symbol:



DEF notification systems vary among manufacturers but all are designed to give the operator ample opportunity to refill the DEF storage tank before any impact to full operability. However, if driver inducements are ignored and DEF levels become too low or the fluid is of poor quality, the engine is derated and ultimately speed is limited to 5 MPH.

## Is diesel exhaust fluid readily available?

A retail DEF infrastructure is being built to handle the growing needs of users. Your local FAST STOP® or FS Cooperative has product available now and can meet your truck and fleet needs. Contact your local FAST STOP or FS Cooperative for details regarding both DEF and dispensing equipment.

### Package Sizes

1 gal.  
2.5 gal.  
55 gal.  
275 gal. tote  
Bulk – (Ask for availability)

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# Diesel Exhaust Fluid



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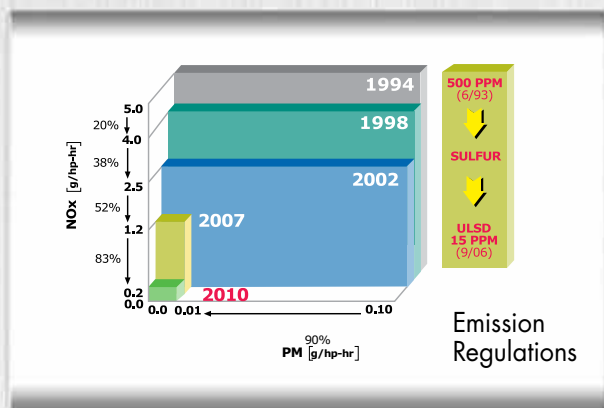


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## Why use Diesel Exhaust Fluid (DEF)?

To achieve the nitrogen oxide (NO<sub>x</sub>) levels required by the EPA 2010 standard, most engine manufacturers are utilizing Selective Catalytic Reduction (SCR) systems that require the addition of DEF. Off-road engines will be impacted by similar emission standards beginning in 2014.



## What is DEF?

DEF is a clear, non-toxic, non-flammable, and non-hazardous organic compound consisting of 32.5% urea and 67.5% de-ionized water that requires no special handling.

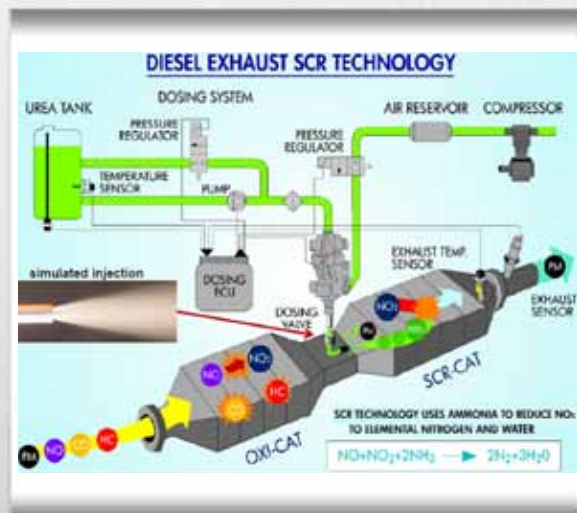
- DEF may have a slight odor similar to that of household ammonia.
- DEF is a high-purity urea solution complying with the Standards of ISO 22241.
- DEF is safe to handle.
- DEF weighs approximately 9.2 lbs. per gallon.

## How does the SCR process work?

The NO<sub>x</sub> reduction process starts with an engine burning clean Ultra Low Sulfur Diesel and producing exhaust that is already much cleaner due to leaner and more complete combustion.

Under the control of the vehicle's onboard computer, precisely metered spray patterns of DEF are injected into the exhaust stream ahead of the SCR converter allowing the exhaust gases and atomized mist of DEF to enter the converter simultaneously. Together with the catalyst inside the converter, the mixture undergoes a chemical reaction that converts the nitrogen oxides to elemental nitrogen (N<sub>2</sub>) and water (H<sub>2</sub>O).

Exhaust gases are monitored via a sensor as they leave the SCR catalyst. Feedback is supplied to the main computer that adjusts the DEF flow to keep NO<sub>x</sub> levels within acceptable parameters.



## Is there a chance of mixing DEF with the diesel fuel?

It is not likely. While the fuel and DEF tanks may be located in close proximity, the DEF tank has a smaller opening and a different color cap than the fuel tank to prevent contamination.

## How does DEF perform in cold weather?

SCR systems are designed to operate in cold climates. DEF begins to freeze into a crystalline slush at 12° F (-10° C). The 32.5% urea solution ensures that both the water and urea freeze and thaw at the same rate preventing the solution from becoming diluted. Repeated freezing and thawing does not degrade the product. Frozen DEF expands approximately 7% and tanks are designed to accommodate the expansion.

The SCR system is designed to quickly return frozen DEF back into a liquid form. Manufacturers use a variety of heating methods to thaw frozen DEF tanks, including in-tank heating elements. Sometimes supply lines are also heated to prevent freezing during operation. While the SCR system and DEF is thawing, the vehicle's performance is unaffected.

## How long can DEF be stored?

Between 12°F and 86°F, DEF can be stored for a maximum of 12 months. Shelf life deteriorates to 6 months when temperatures are held at a constant 95°F or higher.