

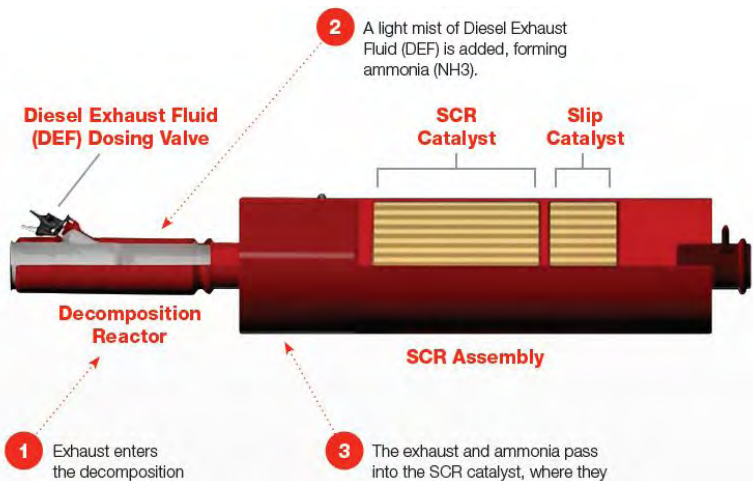
Selective Catalytic Reduction (SCR)

Q. What is Selective Catalytic Reduction (SCR)?

A. SCR is a technology that uses a urea based diesel exhaust fluid (DEF) and a catalytic converter to significantly reduce oxides of nitrogen (NOx) emissions.

Q. How does an SCR system work?

A. The purpose of the SCR system is to reduce levels of NOx (oxides of nitrogen emitted from engines) that are harmful to our health and the environment. SCR is the after-treatment technology that treats exhaust gas downstream of the engine. Small quantities of diesel exhaust fluid (DEF) are injected into the exhaust upstream of a catalyst, where it vaporizes and decomposes to form ammonia and carbon dioxide. The ammonia (NH₃) is the desired product which in conjunction to the SCR catalyst, converts the NOx to harmless nitrogen (N₂) and water (H₂O).



Q. Does SCR decrease MPG?

A. No. SCR does not decrease MPG.

DEF Q&A

Q. What keeps the Diesel Exhaust Fluid from freezing in the tank or the hoses?

A. While the vehicle is parked the DEF is allowed to freeze. The system is designed to accommodate frozen DEF. During vehicle operation, SCR systems are designed to provide heating for the DEF tank and supply lines.

Q. How much weight will the Urea System add to the vehicle?

A. Approximately 200 lbs.

Q. How will temperatures effect DEF?

A. DEF expands by approximately 7% when frozen. DEF packaging and tanks are designed to allow for expansion. The DEF lines purge themselves at each shutdown to avoid fully frozen lines. This will cause a buzzing noise after you shut down the truck, caused by the pump purging. This is completely normal.

Q. Will the Urea System have any influence on the oil change maintenance schedule?

A. No. Oil change frequency will remain as is. Refer to your owners manual.

Q. What additional maintenance is involved with SCR?

A. Filling the Urea tank with DEF is the only requirement. The system is designed to function for the life of the vehicle without scheduled maintenance.

Q. What is Diesel Exhaust Fluid (DEF)?

A. DEF is the reactant necessary for the functionality of the SCR system. It is a carefully blended aqueous urea solution of 32.5% high purity urea and 67.5% de-ionized water.

Q. What is urea?

A. Urea is a compound of nitrogen that turns to ammonia when heated. It is used in a variety of industries, including as a fertilizer in agriculture.

Q. How will I know that the DEF product I purchase will work?

A. The DEF you purchase should state and display the certification of the American Petroleum Institute (API). This will ensure the proper purity and concentration (32.5%) of urea. For more information on these specifications, visit www.iso.org.



Q. What is API Certification?

A. API Certification is a voluntary program established by the American Petroleum Institute (API) which certifies and monitors that diesel exhaust fluid meets ISO specifications. The program was launched in March 2009.

**Q. Is the 32.5% urea solution critical?**

A. Yes, The 32.5% urea concentration is the ideal solution as it provides the lowest freeze point. Also, SCR systems will be calibrated to the 32.5%, so that optimum NOx will be reduced during operation.

Q. How much does DEF weigh?

A. DEF weighs approximately 9 pounds per gallon.

Q. What is the freeze point of DEF?

A. A 32.5% solution of DEF will begin to crystallize and freeze at 12 deg F (-11 deg C). At 32.5%, both the urea and water will freeze at the same rate, ensuring that as it thaws, the fluid does not become diluted, or over concentrated. The freezing and un-thawing of DEF will not cause degradation of the product.

Q. Does DEF expand when frozen?

A. Yes, DEF expands by approximately 7% when frozen. DEF packaging and tanks are designed to allow for expansion.

Q. How do I keep the DEF from freezing? What happens if the DEF freezes in the tank on the vehicle?

A. During vehicle operation, SCR systems are designed to provide heating for the DEF tank and supply lines. If DEF freezes when the vehicle is shut down, start up and normal operation of the vehicle will not be inhibited. The SCR heating system is designed to quickly return the DEF to liquid form and the operation of the vehicle will not be impacted. The freezing and unthawing of DEF will not cause degradation of the product.

DEF Q&A

Q. Can an anti-gelling or freeze point improver be added to the DEF to prevent it from freezing?

A. No. While an additive could improve freeze point of the mixture, the 32.5% solution is very specific to providing NOx reducing properties. Any further blending or adjusting of the DEF mixture will impede its ability to perform correctly and may cause damage to the SCR components. Additives of any type are not approved for use in DEF today. If the ISO standards should change to allow antifreeze additives, Cummins Filtration will ensure our product continues to meet ISO requirements.

Q. Are there special storage requirements for DEF?

A. DEF should be stored in a cool, dry, well-ventilated area, out of direct sunlight. While the optimum storage temperature is up to 77 deg F (25 deg C), temporary exposure to higher temperatures has little to no impact on the quality of DEF. Chrysler Group LLC recommends customers consider buying DEF as it is needed, rather than stocking up in large quantities. Doing this will ensure the purity of the DEF and reduce the chance for contamination.

Q. What is the shelf life of DEF?

A. The shelf life of DEF is a function of ambient storage temperature. DEF will degrade over time depending on temperature and exposure to sun light. Expectations for shelf life as defined by ISO Spec 22241-3 are the minimum expectations for shelf life when stored at constant temperatures. If stored between 10 and 90 deg F, shelf life will easily be one year. If the maximum temperature does not exceed approximately 75 deg F for an extended period of time, the shelf life will be two years.

Q. What impact will exposure to high temperatures for an extended period of time have on DEF?

A. While DEF exposure to constant, high storage temperature may have some impact on shelf life, this should not concern operators. Extensive testing in very hot climates has been conducted confirming that DEF stored at a constant temperature of 95 deg F had a shelf life of over 6 months.

Q. Should I be concerned about handling DEF?

A. No. DEF is a nontoxic, nonpolluting, non-hazardous and nonflammable solution. It is stable, colorless, and meets accepted international standards for purity and composition. DEF is safe to handle and store and poses no serious risk to humans, animals, equipment or the environment when handled properly. MSDS sheets are currently available on cumminsfiltration.com.



DEF Q&A

Q. What should I do if I spill DEF?

A. If DEF is spilled, contain the spilled liquid and absorb it with an inert, noncombustible absorbent material, such as sand. Shovel the material into a suitable container for disposal. Spills into a drain should be avoided. If spilled into a drain, flush thoroughly with water. For significant quantities, contact local authorities for proper disposal procedures. If DEF is spilled on your vehicle, rinse with water.

Q. Does DEF smell?

A. DEF may have a slightly pungent odor similar to that of ammonia.

Q. Is DEF corrosive?

A. DEF is corrosive to copper and brass as well as other materials. Only approved materials, such as high density polyethylene (HDPE), will be used in the DEF tank, packaging and dispensing equipment.

Q. Will DEF evaporate and what happens if it does?

A. Because DEF is comprised of 67.5% water, evaporation will occur over time. As a preventative measure, it is important to keep the cap of the DEF tank and storage containers securely closed. If the urea concentration does become more or less than recommended over time, the DEF tank should be drained. Contact your nearest Chrysler Group LLC dealer for appropriate service.

Q. What measures have been put in place to prevent diesel from being pumped into the DEF tank?

A. The standard nozzle diameter for dispensing DEF has been designed at 19mm versus the standard diesel fuel nozzle diameter which is 22mm. In addition, the tank cap for the DEF tank will be blue in color to further differentiation from the diesel tank.

Q. What happens if a non-DEF substance is accidentally entered into the DEF tank?

A. The SCR system will recognize solutions other than DEF. The MIL lamp will illuminate and messages will be displayed on the EVIC in the instrument cluster. If a message appears on the cluster stating 'Service DEF System See Dealer', the vehicle requires servicing. Contact your nearest Chrysler Group LLC dealer for appropriate service.



DEF Q&A

DEF Usage**Q. How much DEF will a truck consume?**

A. DEF consumption is expected to be approximately 1-2% of fuel consumption, depending on vehicle operation, duty cycle, geography, load ratings, etc.

Q. What is the DEF tank volume and refill interval?

A. The DEF tank has a capacity of about 8 gallons, with a range of 3000 to 8000 miles for most customers, depending on their duty cycle.

Q. How can an operator determine how much DEF they will need/use?

A. DEF consumption will be approximately 1-2% of the diesel fuel consumed. Another way to consider it is that DEF will be consumed on a 50 to 1 ratio with diesel. (For every 50 gallons of diesel fuel burned, you will use 1 gallon of DEF). If you know the average fuel consumption of a vehicle, you can easily calculate the amount of DEF that will be used by following the below calculations.

MPY = Annual Average Miles per Year

MPG = Miles per Gallon

DGY = Gallons of DEF per Year

DFY = DEF Fill-Ups per Year

TS = Diesel Exhaust Fluid (DEF) Tank Size

DGY = (MPY / MPG) x .015

DFY = ((MPY / MPG) x .015) / TS

Q. Is the DEF dose rate the same for all engine manufacturers?

A. The DEF dose rate will vary slightly amongst engine manufacturers. While most engines will have a dose rate of 2% of diesel fuel consumed, the dose rate will range from 1% to 3%.

Q. What happens if the vehicle runs out of DEF?

A. Your vehicle information center will begin displaying warning messages when the DEF level remaining is approximately 2 gallons. The following warning message sequence is what the vehicle will display. If the messages are ignored your vehicle will not start unless DEF is added.

Low DEF Refill Soon – This message will display when the low level is reached, during vehicle start up, and with increased frequency during vehicle operation. It will be accompanied by a single chime. Approximately 6 gallons (23 Liters) of DEF is required to refill the tank when this message is initially displayed.



Refill DEF Engine Will Not Restart In XXX Miles – This message will continuously display starting when there is approximately 1 gallon of DEF left in the tank. The frequency of the chimes will increase, and the mileage counter will decrease, as the vehicle is driven.

Refill DEF Engine Will Not Start – This message will continuously display when the counter reaches zero, and will be accompanied by a periodic chime. Although the vehicle will continue to operate while this warning message is initially displayed, the engine will not restart the next time the vehicle is shut off. **NOTE:** A minimum of 2 gallons (7.5 Liters) must be added to restart the engine.

Q. On DEF equipped vehicles, what changes will be expected for lube filter service intervals?

A. The oil and filter change interval will continue to be at 7,500 miles as with prior Ram Chassis Cab trucks. However, Chrysler Group LLC recommends topping off your DEF Tank as needed and using your regularly schedule oil change interval maintenance as a reminder to check and top off your DEF tank.

DEF Product Options & Availability

Q. What package sizes will be available? When?

A. Chrysler Group LLC will offer 3 different DEF package sizes, 55 Gallon Drum, 2 1/2 Gallon & 1 Gallon containers which will be available for order and purchase through participating Chrysler Group LLC dealers starting in the first quarter of 2010 calendar year.

Q. Can I fill my own bottles of DEF?

A. Chrysler Group LLC does not recommend that customers refill bottles of DEF for reuse in SCR systems due to the strict ISO requirements for maintaining DEF purity (free of contamination). The ISO 22241 specifications provide detailed information regarding DEF quality, handling, testing, transportation, storage, and refilling.

Q. Where will DEF be available?

A. All participating Chrysler Group LLC dealers will have the ability to order and sell DEF to consumers. In North America, all major truck stops have committed to carrying and selling DEF in bulk / pump fill or packaged DEF containers. The initial supply of DEF will most likely be in packaged containers versus bulk dispensing.

DEF Q&A

Q. What price can be expected for DEF?

A. Current pricing for DEF centers on 'niche' markets which itself drives very low volume usage and premium pricing. This is not a realistic indication of where the industry will be in 1 year, or even 6 months. We agree with current predictions that at the pump DEF pricing will be at or below the price of diesel fuel and is forecasted to be in the \$2 - \$3 range. Individually packaged DEF is expected to be priced higher, but the market, region and packaged container size will be key factors in determining the cost of individually packaged DEF.

Q. Why does the Dodge Chassis Cab have the SCR emission system with the DEF tank and the pickup trucks do not?

A. Because of the varying applications and usages of cab chassis models (duty cycles), the federal government requires unique certification testing for them that differs from the pickup trucks. The differences in these tests are such that the pickup truck is able to meet the standards without a new emission system for 2010 while the cab chassis models need the revision.

Q. I noticed that my truck makes a rumbling noise when I shut it off?

A. This is the normal process when the DEF pump purges fluid from the lines. It typically takes about 60 seconds. The noise level of the pump can vary depending on temperature.

