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# Urea must flow or new Mercedes diesels won't go

## All brands eventually could use technology

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### Fill 'em up

Some diesel-powered vehicles will come with a tank for the urea solution needed to reduce emissions. Here are details on diesel emissions fluid.

**What is it?** A solution of 32.5 percent urea in deionized water.

**How is it used?** The solution is injected in small amounts into an exhaust catalyst.

**How does it work?** The urea combines with pollutants called oxides of nitrogen, or NOx, to form inert nitrogen and water.

**What if the fluid runs out?** The catalyst can't function without the urea, so exhaust NOx is emitted. To prevent that from happening, some vehicles won't start if the urea tank is empty.

Mercedes sales staffers: Get ready for ribald jokes about standard-equipment urinals and emergency fill-ups when you explain to customers that they have a new fluid level to check.

Those gags already are rife in the online community's discussions of the urea additive used to reduce exhaust emissions in some diesel-powered vehicles.

Dealers of other brands won't be immune, either. Any dealership that sells a diesel vehicle eventually may have to contend with urea. And it doesn't end with jokes.

Mercedes expects to refill the urea tank in its diesel vehicles when customers return to the dealership every 10,000 miles for regularly scheduled maintenance. If customers fail to do so and the tank isn't refilled, they could be stranded.

Mercedes warns the driver with an instrument panel light if the tank falls below 1 gallon of fluid. If the urea level gets "critically low," a counter will appear on the dashboard saying 20 restarts remain.

"It will count down, and if you ignore all those warnings, then it won't start," said Dan Barile, a Mercedes-Benz USA spokesman.

Modern "clean diesel" engines, which deliver high torque and high miles per gallon, have been promoted as alternatives to hybrid or electric vehicles. But the Clean Air Act and some state emissions standards mean many new diesel systems will have to use an SCR, or selective catalyst reduction, to eliminate oxides of nitrogen, or NOx, a byproduct of diesel combustion. NOx is one of the main ingredients in the formation of ground-level ozone. It contributes to both global warming and acid rain, the Environmental Protection Agency says.

The catalysts in a diesel engine use a small spray of injected urea, carried in a separate tank on the vehicle. Without the urea, the catalyst does nothing to treat the exhaust.

These systems have been used for years in commercial trucks in Europe. But for North America, the advent of the clear fluid means educating drivers on the value of the system.

The urea solution used in cars isn't urine. It's synthesized from natural gas. Although not much is used at a time, the fluid initially will be at least as expensive as diesel fuel. Most European and North American automakers are working on the urea-SCR system for introduction in North American passenger vehicles because it's the cheaper of two competing technologies.

The more expensive alternative is the NOx storage catalyst, or NOx trap. It captures the pollutant and periodically changes the engine's air-to-fuel mixture to burn off the NOx. The 2009 Volkswagen Jetta TDI, the first diesel car to meet emissions requirements in all 50 states, uses an NOx trap.

An EPA spokeswoman said the agency is technology-neutral and doesn't care whether vehicles use urea or another system.

Each vehicle must undergo EPA certification for a system that's tamperproof and won't allow drivers to continue operating if the vehicle is polluting. Automakers can take different approaches to make sure drivers refill the urea tank.

Mercedes introduced the urea-injection technology on its ML320 and R320 crossovers and GL320 SUV, which went on sale Oct. 1. Mercedes also will introduce the system on the E320 sedan in the 2010 model year.

If a car won't start because it's out of urea, the driver or a Mercedes roadside-assistance technician will need to add at least 2 gallons of fluid to the urea tank for the system to reset, allowing the engine to start again.

## **Can't water it down**

Sensors in the tank detect the correct urea concentration. A separate NOx sensor monitors the exhaust. Filling up with water won't suffice.

Mercedes has chosen to put a 7-gallon tank in its SUVs and crossovers (8½ gallons for the GL320), and the fluid will be checked and refilled as part of scheduled maintenance. The tank occupies what would have been the spare-wheel well, so there's no spare tire. The vehicles will have run-flat tires, and towing to the closest Mercedes-Benz dealership will be arranged, Barile said.

In the United States, the generic term for the urea solution is “diesel emissions fluid.” Mercedes and its dealers will use the solution's European trade name, AdBlue. That name comes from a European working group that includes engine and vehicle manufacturers and refiners. The same group has developed standards for refill nozzles and urea-filler-tank necks.

AluMag Automotive LLC is providing a no-spill, tamperproof refill bottle that drivers can use when refueling, said Roberto Boeker, the suburban Detroit representative for the market service company. Boeker said the bottle gives motorists a simple way to add up to a half-gallon of solution to their urea holding tank.

“The idea is really to have a closed system, for many reasons,” he said. “If you spill urea anywhere, you are going to have a mess. Let it dry, and it's still going to be a mess.”

Boeker said the ammonialike smell of the solution increases with heat and can be “quite strong.” When a spill dries, the urea crystals remain.

The Kruse bottles are designed to not discharge the liquid until they're safely screwed on. The bottles include overflow protection and a venting mechanism so that any vapors from refilling end up in the bottle.

## **'Quality is the key'**

Using the bottles rather than a dealership's bulk replenishment system could be pricey. Mercedes will charge \$7.75 for the half-gallon bottle, Barile said.

While bulk generic urea prices haven't been set, the solution shouldn't cost more than diesel fuel, said Matt Green, vice president of commercial operations for Terra Environmental Technologies Inc. The Sioux City, Iowa, company is a unit of Terra Industries Inc., one of the largest urea providers in the United States. Terra Industries' fluid is called TerraCair.

Green warned that consumers who try to use the cheaper, agriculture-grade urea instead of automotive-grade solution could cause themselves expensive trouble. The two aren't interchangeable because of differences in quality, purity and concentration.

“Quality is the key,” Green said, because “this little injector that's spraying over the catalyst bed is probably about as big as your pencil lead.”

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