



Technical Highlights

Questions and Answers on Using a Diesel Particulate Matter Filter in Heavy-Duty Trucks and Buses

The pollution emitted by diesel engines contributes greatly to our nation's air quality problems. Even with more stringent heavy-duty highway engine standards set to take effect in 2004 and 2007, existing trucks and buses will continue to emit large amounts of nitrogen oxides (NOx) and particulate matter (PM), both of which contribute to serious public health problems in the United States. Fortunately, there are several techniques and technologies designed to reduce diesel pollution from existing trucks and buses. Using pollution control devices such as a diesel particulate matter filter (DPF) is one way existing engines can be upgraded (or "retrofitted") to pollute less. This fact sheet discusses diesel particulate matter filters.

What are the health and environmental effects of diesel exhaust?

Heavy-duty trucks and buses account for about one-third of NOx emissions and one-quarter of PM emissions from mobile sources. In some urban areas, the contribution is even greater. The fine particles in diesel exhaust (known as particulate matter) can penetrate deep into the lungs and pose serious health risks including aggravated asthma, lung damage, and other serious health problems. In addition, diesel exhaust is a likely human carcinogen. Children are more susceptible to air pollution than healthy adults because their respiratory systems are still developing and they have a faster breathing rate.

Diesel exhaust also has environmental impacts. PM from diesel engines contribute to haze, which restricts visibility. In addition, diesel exhaust contributes to ozone formation (a component of smog), acid rain, and global climate change.

What is a Diesel Particulate Matter Filter?

A diesel particulate matter filter (DPF) is a ceramic device that collects the particulate matter in the exhaust stream. The high temperature of the exhaust heats the ceramic structure and allows the particles inside to break down (or oxidize) into less harmful components.

What are the benefits of a DPF retrofit?

DPFs reduce emissions of particulate matter by 60 to 90 percent. DPFs also reduce emissions of hydrocarbons and carbon monoxide by 60 to 90 percent.

Does the EPA verify these emission reductions?

Yes, EPA verifies individual DPFs based on information supplied to the EPA by the DPF manufacturer. Since EPA generally receives results of testing conducted on a limited number of diesel engine models, a conservative approach is taken to establish the verified levels of reduction. In most cases the actual reductions are higher than the verified values. For a list of DPFs and other technologies that EPA has verified, visit: www.epa.gov/otaq/retrofit/retroverifiedlist.htm. For more information about EPA's verification process, visit: www.epa.gov/otaq/retrofit/retrofittech.htm.

How much does a DPF cost?

DPFs for school buses currently cost between \$5,000 and \$10,000. The cost depends on the specific bus engine and operating characteristics, such as exhaust temperatures. Field experience suggests DPFs take about 6-8 hours to install.

What type of fuel does a DPF require?

DPFs must be used with ultra-low sulfur diesel fuel (ULSD – 15 parts per million sulfur). Use of regular diesel fuel in a DPF equipped bus could eventually clog the filter. This could lead to exhaust back-pressure increases and engine damage.

Currently, ULSD costs between 8 and 25 cents per gallon more than regular diesel. ULSD is available in many parts of the country now and will be available nationwide beginning in 2006.

Can a DPF be used on any engine?

No. DPFs work best on engines built after 1995. Therefore, knowing the age and type of each engine in the fleet as well as the exhaust temperature is an important part of any retrofit project. These factors determine whether or not vehicles are candidates for filters.

Are there special maintenance requirements for a DPF?

Manufacturers of DPFs recommend that the device be cleaned about every 100,000 miles. Some of the PM collected does not completely oxidize and inert ash remains in the filter. After about 100,000 miles this ash should be removed by blowing or vacuuming it out. Generally this process takes no more than 3 hours.

How long does a DPF last?

Most DPFs come with 100,000 to 150,000 mile warranty, and can last 7 to 15 years.

Where can I get a DPF?

For more information about manufacturers of DPFs or other retrofit equipment visit our Web site at: www.epa.gov/otaq/retrofit/cont_retromfrs.htm.

Where can I find more information?

For more information on these topics, please visit these EPA Web sites:

- Voluntary Diesel Retrofit Program: www.epa.gov/otaq/retrofit
- Clean School Bus USA – Basic Information on Retrofit Options: www.epa.gov/otaq/schoolbus/retrofit.htm

- Clean Diesel Independent Review Panel: www.epa.gov/air/caaac/clean_diesel.html
- Health Assessment Document for Diesel Engine Exhaust: <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=29060>

You can also contact the Office of Transportation and Air Quality library for document information at:

U.S. Environmental Protection Agency
OTAQ Library
2000 Traverwood Drive
Ann Arbor, MI 48105
Phone: 734-214-4311
Email: GroupAALibrary@epa.gov