



Technical Bulletin

Diesel Particulate Filter Installation



National Clean Diesel Campaign

www.epa.gov/cleandiesel

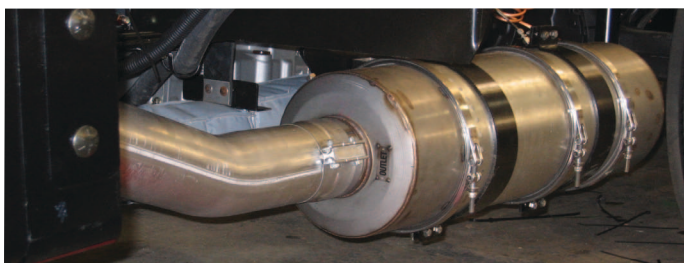
Pre-Installation

Prior to installing any retrofit device, it is important to perform a thorough engine inspection and review maintenance records to ensure proper engine operation. Vehicles with excessive fuel or lubrication oil consumption should be repaired prior to installing retrofit technologies. Excessive blowby emissions can be a sign of engine wear and further inspection of the engine may be necessary. Opacity testing with a smoke meter may also be useful to confirm proper engine operation. Prior to installing a retrofit, the exhaust system integrity should also be confirmed.

Technology Selection

To select the best Diesel Particulate Filter (DPF) for a specific vehicle it is necessary to identify:

- Vehicle Type: Highway or Nonroad
- Vehicle Class: School Bus, Class 8A Tractor, Ferry, Locomotive, Forklift, etc
- Vehicle Specifications: Manufacturer, Model, Model Year
- Engine Specifications: Manufacturer, Model, Model Year, Displacement, Horsepower, Engine Location on Vehicle, Turbo-charger, Exhaust Gas Recirculation (EGR)
- EPA Engine Family Name: Can be found on the engine's emission label and contains 12 or 13 characters such as TCP7.2RZBDBRB or 3NVXHO466ANA
- Annual Miles Traveled (Highway) or Annual Hours of Operation (Nonroad)
- Engine-out PM emission levels
- Engine duty cycle and the resultant exhaust temperatures.



**Diesel Particulate Filter (DPF)
installed on municipal truck**

- Any unique vehicle, equipment or engine operation that may create unusual conditions on the exhaust system or DPF. Conditions such as high vibration or shock loading may warrant special consideration in DPF selection and/or mounting.

The United States Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) maintain lists of verified diesel retrofit technologies that define the specific applications and engine operating criteria that must be met to successfully apply a particular retrofit technology (www.epa.gov/otaq/retrofit/verif-list.htm). When installed as described on the verified technologies list and within the verified scope of coverage, a device is expected to achieve the verified performance and durability.

Exhaust Temperature Data Logging

The exhaust temperature profile is one of the main factors in determining whether a passive or active DPF system is acceptable for a specific vehicle or piece of equipment. The required minimum exhaust temperatures for regeneration of passive DPF systems depend on the filter design and often range from 210°C for 40 percent of the time to 260°C for 30 percent of the time. Active DPF systems rely on an additional heat source for filter regeneration. Therefore, active DPFs are not as dependent as passive DPFs are on the engine duty cycle and the resultant exhaust temperatures typically encountered in normal operation.

Exhaust temperature data logging must be performed on each vehicle. The filter manufacturer or an authorized representative must perform the data logging and analysis of results. If varying vehicle routes or sporadic work loads are used, or significant changes in ambient temperatures are expected, data logging under a variety of conditions may be necessary to accurately document the duty cycle and the resultant exhaust temperatures. Exhaust pipe insulation may be used to retain heat. If insulation is used, data logging should be performed with insulation installed. When data logging, temperature measurements must be recorded at the installation location for the DPF. Fleets should maintain data logging records for all vehicles in case they are needed for later reference.

Installation

Installation may be performed by the retrofit supplier, or the retrofit supplier may provide training to fleet personnel to perform installation.

In some applications, the DPF matches the dimensions of the conventional muffler and can be installed as a muffler replacement. In other cases the space available for DPF installation on the vehicle or equipment is very restricted and the DPF configuration must be custom-designed. Safety, visibility, and vibration may also need to be addressed by a custom installation. The time required for DPF installation will vary depending on the situation and can range from two to twelve hours or more for an active system. Special equipment or a regeneration station may be necessary for some active systems.

Since a DPF typically weighs more and may be larger than the muffler, stronger clamps and brackets are required in place of those used with the original muffler. Failure to utilize appropriate hardware and follow mounting instructions can result in a failure of support brackets and damage to the equipment or vehicle. To facilitate removal of the DPF for cleaning, quick-release clamps are often used at the filter element.

Passive DPF systems impose strict requirements on exhaust temperatures and must be mounted within a set distance from the exhaust manifold, as specified by the manufacturer. Exhaust pipe insulation may be used to

retain heat. Active systems may have more flexibility in their installation location.

Documentation should remain with the vehicle and/or in fleet records which lists installation and vehicle information such as mileage, opacity readings, date, device model number, DPF serial number, installer, etc. Records should also be maintained to document when service is performed and when the DPF is cleaned. If a fleet moves a DPF between different vehicles, records should be carefully monitored to identify if a particular vehicle or device appears to require different service intervals than another.

Backpressure Monitoring

An exhaust backpressure monitoring and operator notification system must be installed with every DPF. The driver notification system must be installed where it is readily visible by the driver during normal vehicle/equipment operation. In some cases an additional notification system may be installed in the engine compartment to alert maintenance technicians of service needs. If exhaust backpressure exceeds certain thresholds, the operator is notified that maintenance is needed. It is important that all vehicle/equipment operators and fleet service technicians are properly trained to recognize and respond to backpressure warning signals as well as understand whether or not the warning signal is continuously displayed or only during certain operating conditions. It is also important that the backpressure monitoring system be periodically inspected to confirm proper operation.