

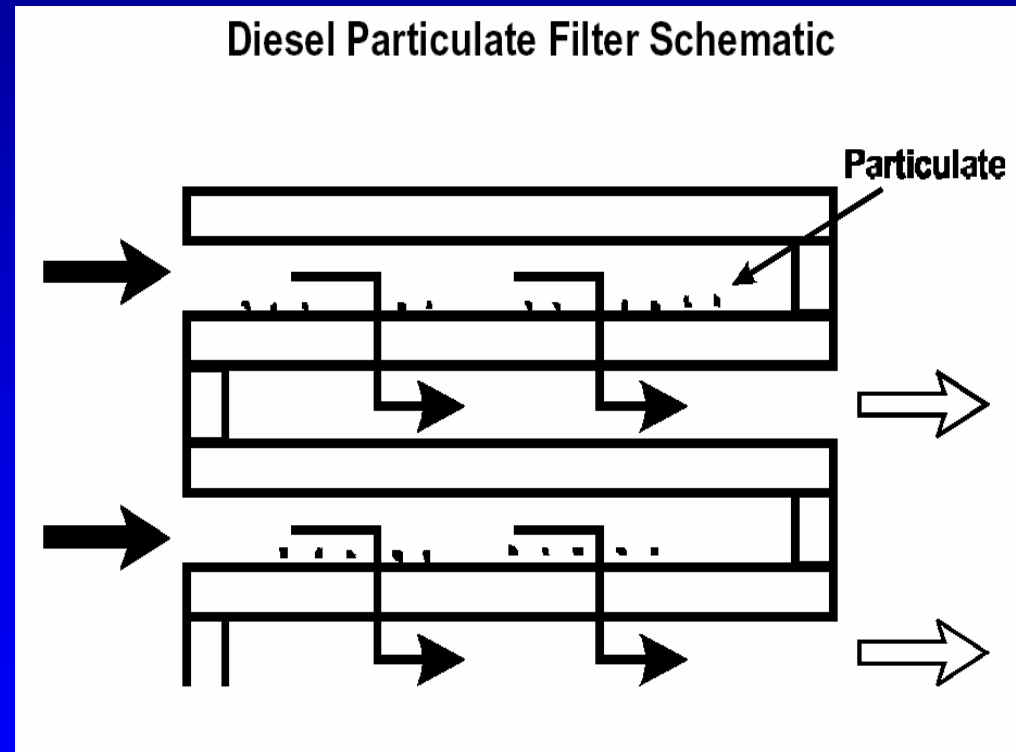
Diesel Particulate Filter Maintenance

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How a Diesel Particulate Filter (DPF) Works

- A DPF forces the diesel exhaust through a ceramic wall with micro pores
- Exhaust gases and vapors can pass through...the particles are almost all trapped inside the filter



DPFs Require “Cleaning”

- Soot collected in the filter must be periodically combusted (like a self-cleaning oven)
 - Passive filters use a combination of exhaust heat and catalytic coatings to combust the soot
 - Active filters use a heat source such as an electrical heater or fuel introduced into the exhaust to combust the soot
 - If insufficient high-temperature events occur, this PM can collect in the DPF and require physical removal
- Inorganic ash does not combust and will collect in the DPF over time
 - This ash must be physically removed periodically

Inorganic Ash Content

- Sources
 - Phosphates and metal oxides (including zinc) from lubricating oils
 - Wear metals from the engine
- Inorganic ash is a hazardous material in California:
 - Zinc concentrations from California Waste Extraction Test exceed total and soluble threshold concentration limits set by California regulations
 - Ash may not be a hazardous material in other states
- Anything removed from a DPF can clearly be characterized as a potential health hazard

Filter Maintenance: Out of the Air and Into a Hazardous Waste Facility

Captured in tail pipe . . .



Collected in filter bag . . .



Sealed in containers . . .



and sent to hazardous waste facility.

Cleaning Event

- Failure to clean a filter when necessary can:
 - Lead to engine performance problems
 - Potentially damage or destroy the filter
 - Potentially void the manufacturer's warranty
- During the cleaning, the filter and all associated systems should be inspected for proper function
 - Technicians should be properly trained to perform these inspections
- A filter should never be cleaned in a manner that is not approved by the filter manufacturer

Fleet Manager Checklist

- ❑ DPFs have widely varying requirements for high exhaust temperature
 - Be sure to select a DPF that matches your fleet's operating characteristics
- ❑ Most DPF manufacturers require annual filter cleaning
 - Actual cleaning may be required more often
 - Insufficient high temperature exhaust events
 - Bad injector or heavy oil consumption
- ❑ Residual ash is a hazardous material in California
 - If you elect to do your own filter cleaning, worker and community exposure to the residual material must be considered
 - If you use a cleaning service, be sure that they are properly certified as a Hazardous Waste Generator

Fleet Manager Checklist (cont.)

- ❑ Vehicle Downtime for Filter Cleaning can vary significantly depending on many factors
 - Ease of removal and replacement of the filter system
 - Use of “swing” filters
 - Location of filter cleaner
 - In your own shop
 - Using a filter cleaning service
 - Shipping a filter to a remote site for cleaning

- ❑ Owning your own cleaning machine
 - You become a Hazardous Waste Generator in California
 - Look for a machine that meets OSHA standards
 - Look for a machine that verifies that the filter is completely clean
 - A cleaning machine is an air toxics SOURCE and may require an air permit from your local or state air agency

Other Diesel Retrofit Maintenance Items

- **Periodic inspections should include mounting brackets & clamps; presence of soot in the tailpipe of a DPF-equipped vehicle; condensation in tubing associated with pressure sensors/monitors used with DPFs**
- **DOCs**
 - **Generally maintenance free; periodic inspections recommended**
- **Crankcase Filters**
 - **Filter change generally required at normal oil change intervals**
- **Low Pressure EGR**
 - **Regular inspections**
 - **Secondary filter needs replacement – 6-12 month intervals typical**