

FACTS - Approved Emissions Reduction Measures (ERM)

There are several Emission Reduction Measures available that reduce the levels of Particulate Matter emissions from by diesel equipment. The US Environmental Protection Agency (EPA) and California Air Resource Board (CARB) both maintain lists of ERMs that have been verified to reduce emissions when installed with particular engines (see web pages listed below). Installation of a verified ERM may be eligible for reduced NRDE Fees and/or receive partial rebates of fees paid. More information, including a manual of available ERMs, which is available on the VFPA NRDE website.

Emission reduction measures include replacement, retrofit of a similar device, alteration or technological change that reduces the Particulate Matter (PM) emissions from a non-road diesel engine, or use of alternative fuels such as biodiesel.

- To **replace** means to remove an older Tier 0 or Tier 1 engine and install a less polluting higher Tier engine (Tier 2 or better).
- To **retrofit** means to install devices developed to reduce PM emissions from diesel engines. Most are installed in the exhaust stream of the engine, in place of a muffler. The engine condition and maintenance practices need to be considered before installing a retrofit device. Installing an exhaust retrofit on worn engines or engines not maintained in good working condition can cause power loss, excessive fuel consumption, overheating and the retrofit device generally will not perform as designed. Engine manufacturers and equipment suppliers can assist in selecting an appropriate retrofit device for your equipment and the engine duty cycle.

Exhaust stream retrofits fall into 3 broad categories:

- **Diesel Oxidation Catalysts** (DOCs) can be used on most diesel engines and can reduce PM emissions by 20% or more. A DOC contains a flow-through metal or ceramic core coated with a precious metal catalyst. The catalyst promotes the oxidation of unburned PM, volatile organic compounds (VOC) and carbon monoxide (CO).
- **Flow-Through Filters** (FTFs) can be used on a wide variety of engines and can reduce PM emissions by approximately 50%. An FTF is similar to a DOC, but it uses a different type of core material to hold the catalyst. The core configuration results in greater contact with the catalyst.
- **Diesel Particulate Filters** (DPF) can be either "passive" or "active" devices and can reduce PM emissions by 85% or more. A passive DPF uses the heat from the engine exhaust to oxidize the PM collected in the filter. Active DPFs raise the temperature inside the filter using electricity or by injecting additional diesel fuel into the exhaust stream. Active DPF systems can be used on a much wider range of engines and duty cycles.

Using biodiesel is another way to reduce emissions because the PM emission rate for biodiesel is lower than petroleum based diesel fuel. PM reductions associated with biodiesel are proportional to the amount blended with petroleum based diesel fuel.

Web Resources:

1. EPA National Clean Diesel Campaign (NCDC), Verified Technologies List
<http://www.epa.gov/cleandiesel/verification/verif-list.htm>
2. CARB Verification Procedure - Currently Verified
<http://www.arb.ca.gov/diesel/verdev/vt/cvt.htm>

Content developed with support from Metro Vancouver.