



Massachusetts  
Department  
of  
ENVIRONMENTAL  
PROTECTION

## fact sheet

### **Reducing Emissions from Diesel Construction Engines**

#### ***Retrofit Requirements for Equipment Used in Wastewater and Drinking Water Infrastructure Projects***

In addition to emitting smog-forming pollutants, construction equipment engines produce more than 25 percent of all diesel fine particulate matter (PM) pollution in Massachusetts. Fine PM contributes to the state's already high rate of asthma and is also a probable carcinogen. In response to these health and environmental impacts, the Massachusetts Department of Environmental Protection (MassDEP) requires contractors working on projects financed by the State Revolving Fund (SRF) to install retrofit pollution controls in their construction equipment engines. This fact sheet discusses the SRF retrofit requirements.

#### **State Revolving Fund Retrofit Requirements**

Operated by the MassDEP Division of Municipal Services, the SRF program provides financial assistance for municipal wastewater treatment and drinking water infrastructure projects. Beginning in 2001, the SRF program required that diesel oxidation catalyst (DOC) technology be installed in at least half of the construction equipment used in SRF projects. A year later the retrofit requirement was expanded to encompass all equipment. In January 2008 MassDEP amended the retrofit requirement to apply only to engines rated 50 horsepower or greater that will be used on a project site for 30 days or more.

The SRF program's retrofit requirement is part of the larger Massachusetts Diesel Retrofit Program (MDRP), which was developed to respond to excessive diesel emissions at state-funded construction projects.

#### **What is a DOC?**

A DOC is a reliable, relatively inexpensive technology that is installed either as an on-line engine muffler replacement system or as an add-on control device. Retrofitting an off-road engine with a DOC typically costs between \$800 and \$3,500, including parts and labor. A DOC contains a flow-through metal or ceramic core that is coated with a precious metal catalyst such as platinum. This catalyst core is packaged into a metal container similar to an exhaust muffler/resonator and sits in a vehicle's exhaust stream to help break down pollutants into less harmful components.

DOCs can reduce fine PM by 25 percent, toxic carbon monoxide by 60 percent and smog-forming volatile organic compounds by 60 percent.

Under the SRF program, each DOC must be verified by the U.S. Environmental Protection Agency (EPA) or the "equivalent." The California Air Resources Board (CARB) is the "equivalent" source of verification. To achieve EPA or CARB verification, a technology must meet pollutant reduction, durability and operating performance criteria. Contractors installing EPA or CARB-verified DOCs can trust that these units will meet pollution reduction targets without affecting the performance of their engines.

#### **Engine Suitability**

A DOC can be installed on most diesel construction equipment. Engines that may not be suitable for this technology include those older than model year 1990, engines that consume excessive amounts of lubricating oil (high oil levels in exhaust can clog the flow channels of a DOC catalyst core), and those that meet EPA Tier 4 emission standards. Tier 4 engines, which are being phased in over model years 2008 through 2014, are equipped with manufacturer-installed emission control devices and emit much less PM than older engines.

*On average, a construction engine emits four times as much fine particulate pollution as a school bus engine.*

## **Installation, Maintenance & Durability**

Providing there is available space in the engine, the installation of a DOC is generally straightforward and takes only a few hours. A DOC can be installed either as a replacement for an existing muffler/resonator, with the catalyst and a resonator packaged into the same container, or as an addition to the existing muffler/resonator, in which case it would consist only of a catalyst core.

Because DOCs are usually packaged in stainless steel containers and do not generate ash or other emission residue, they require virtually no on-going maintenance and can last six years or longer.

## **Fuel Requirements**

In order to run properly, an engine retrofitted with a DOC may only use diesel fuel with a maximum allowable sulfur level of 500 parts per million (ppm). Because this off-road low sulfur diesel (LSD) fuel is currently available, contractors should not notice additional fuel costs after installing a DOC.

## **Resources**

*MassDEP Guide to Retrofitting Construction Engines:*  
<http://www.mass.gov/dep/air/diesel/conretro.pdf>

*EPA Verified Technologies List:*  
<http://www.epa.gov/otaq/retrofit/verif-list.htm>

*CARB Verified Technologies List:*  
<http://www.arb.ca.gov/diesel/verdev/vt/cvt.htm>

*Diesel Technology Forum:*  
<http://www.dieselforum.org/where-is-diesel/farming-mining-construction/>

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