



# Diesel Emission Standards

## The Role of Insulation in Reducing Emissions for On-Highway Vehicles





## Diesel Emission Standards - The Role of Insulation

As emission standards for heavy duty on-highway diesel engines become increasingly stringent, emission control technologies are becoming increasingly sophisticated. New engines being introduced by the major diesel engine manufacturers are designed to minimize emissions, and a variety of catalytic filters are available to treat harmful exhausts. A perhaps lesser-known but nonetheless important aspect of effective emissions reduction is the maintenance of **high exhaust temperatures**. Properly insulated exhaust and emissions reduction equipment is crucial in order to ensure that emission reduction targets are met.

### Background: On-Highway Emission Standards

Although Diesel Emission Standards for on-highway engines have been around since the early 1990's, the year 2007 introduced a new level of emission control requirements. In the U.S., beginning in January 2007, all new heavy duty on-highway diesel engines became subject to a 90% reduction (from 2004 levels) for NOx (Nitrogen Oxide) and PM (Particulate Matter). PM levels were mandated at 0.01 –g/hp-hr, while the mandated NOx level of 0.2-g/hp-hr is to be phased in from 2007 through 2009.

Other jurisdictions, including Canada and the European Union, have standards that closely match those of the EPA. (For more information on diesel emission standards, please visit <http://www.dieselnet.com/standards/us/hd.php>).

### Response of Industry to Emission Standards

Be it on-highway or off-highway, emission control standards for diesel engines are intended to reduce the emission of NOx (Nitrogen Oxides), DPM (Diesel Particulate Matter), HC (Hydro Carbons), and CO (Carbon Monoxide). Engine and catalyst manufacturers have responded to the challenge of these new regulations with various strategies aimed at ensuring compliance.

In general, the approach of industry can be divided into two categories:

- Engine Modification: In engine modification, the aim is to reduce harmful emissions at the engine level via a combination of improved electronic engine control, better engine design, and turbo-charging systems.



- After-Treatment: This approach treats the exhaust after it has left the engine. Different types of after-treatment strategies include the use of a variety of catalytic filters, fuel modifications (e.g. biodiesel or ultra low sulfur diesel), secondary fuel injection, and Selective Catalytic Reduction (SCR) systems.

These approaches are by no means mutually exclusive. Indeed, engine modifications alone are not always sufficient, and must be complemented with one or more after-treatment strategies in order to meet the mandated emissions target.

## High Exhaust Temperatures - Role of Insulation Blankets

Whatever approach one chooses to emissions reduction, proper insulation is an important aspect of ensuring that emission reduction targets are achieved. Many of the technologies require a high exhaust heat [in some cases in excess of 800°F (425°C)] in order to function properly.

Without proper insulation, the exhaust gases lose heat as they travel along the various pipes and components of the engine and the exhaust system. It is imperative that the exhaust, catalysts and SCR systems be properly insulated to maintain internal temperature and ensure optimal performance / burn-off.

Removable insulation blankets are an excellent way to provide the requisite insulation in a cost-effective manner. The fact that they can be removed allows easy access to components during periodic maintenance and replacement. Indeed, major engine users, as well as major catalyst manufacturers, recommend removable insulation blankets as an important component of their emissions reduction strategy.

## Conclusion

As increasingly stringent emission standards for both on and off road diesel engines continue to be phased in over the next number of years, we expect insulation will continue to play a significant role in the various emission reduction solutions.