

# CleanAIR PERMIT™ Filter/Silencer

## For Stationary Engines

### The PERMIT™ Advantage:

- Works with All Diesel Stationary Engines
- Passive Regeneration with Wall-Flow Ceramic Filter Design
- Reduces Diesel Particulate Matter by Greater than 85%
- Reduces Carbon Monoxide (CO) and Hydrocarbons (HC) by up to 99%
- Sound Attenuation
- All Stainless Steel Construction

### Applications:

- Generator Sets
- Pumps

### The CleanAIR™ Difference:

- CARB Verified for Emergency and Prime Power Stationary Engines
- Custom Engineering and Design
- Integrated Manufacturing
- Product Optimization for Space Availability
- Rust-resistant, All Stainless Steel Construction
- Fully Insulated
- Durable Product Manufacturing for Operation Under Extreme Conditions
- 50% Weight Reduction Over Mild Steel Construction
- Available for All Engine Sizes
- Comparable in Price to Mild Steel Construction, with All the Benefits of Stainless Steel

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**CleanAIR**  
**SYSTEMS**

### The CleanAIR PERMIT™ Filter/Silencer – Multiple Catalyzed Particulate Filter and Sound Attenuation for Stationary Engines

The [CARB verified](#) PERMIT™ Filter/Silencer for diesel engines is designed to reduce [diesel particulate matter \(PM\)](#), [carbon monoxide \(CO\)](#) and [hydrocarbons \(HC\)](#). Applications for the PERMIT™ Filter/Silencer include stationary diesel engines used for power generation and water pumps.

Wall-flow filters are first coated with a unique, high performance catalyst then housed within a custom-designed, all stainless steel, fully-insulated shell. For most large diesel engine applications, multiple PERMIT™ Filters integrated into a silencer design can take the place of a standard exhaust silencer.

The PERMIT™ Filter/Silencer is available for applications that require higher levels of sound attenuation or that require multiple PERMIT™ Filters for emissions control. The corrosion-resistant stainless steel shell has a removable panel allowing full access to the filters mounted inside.

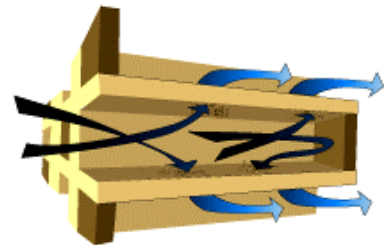
### How the PERMIT™ Filter Works

The wall-flow design of the CleanAIR PERMIT™ Filter/Silencer captures [diesel PM](#) as soon as the engine is started and continues through operation, dramatically reducing PM and visible black smoke.

Due to the PERMIT™ Filter's unique catalyst incorporated within the wall-flow filters, the captured PM is then oxidized into CO<sub>2</sub> while the engine is operating. This results in a passive, [self-cleaning \(or regenerating\) filter](#) without the need for manual intervention. Regeneration is dependent upon exhaust temperature and fuel sulfur level. Also, emissions of carbon monoxide and hydrocarbons are eliminated when exhaust gases interact with the filter's unique catalyst.



A PERMIT™ Filter/Silencer installed on an emergency generator to eliminate visible black smoke and odor. (Note stack at top of photo)



Exhaust Flow of PERMIT™ Filters

### Emissions Reduction Summary

Control Technology	Fuel	CO	HC	PM
PERMIT™ Filter/Silencer for Stationary Engines	ULSD (< 15 ppm S)	Up to 99%	Up to 99%	Over 85%
	LSD (< 500 ppm S)	Up to 99%	Up to 99%	Varies with fuel and engine
	HSD (> 500 ppm S)	Up to 99%	Up to 99%	Varies with fuel and engine
	Biodiesel (<15 ppm S)	Up to 99%	Up to 99%	Over 85%

Results are fuel dependent and may vary with application.

## CleanAIR Systems: Committed to a Cleaner Environment

The PERMIT™ Filter/Silencer utilizes an innovative light-weight design made with corrosion-resistant stainless steel. Easy-to-install, the Filter/Silencer works with all diesel engine sizes and [diesel fuels](#) for compliance with air quality regulations.



PERMIT™ Filter/Silencer with 2-filters



PERMIT™ Filter/Silencer with 10-filters

### HiBACK USB™ Data Logging and Alarm System

The [HiBACK USB™](#) is a microprocessor-based data logger and alarm system used in conjunction with the CleanAIR PERMIT™ Filter System as both an alarm and a data logger to record time, backpressure and temperature data. The [HiBACK USB™](#) unit can warn the operator of possible problems with excessive backpressure, can track the duty cycle of the engine and allow analysis for operation time, exhaust temperature and backpressure profiles. Data collected by the [HiBACK USB™](#) can be downloaded to a computer for detailed analysis using optional software. (Optional software sold separately. The HiBACK USB™ is required for warranty of the PERMIT™ Filter.)



Silencer Type	Typical Attenuation
Industrial Grade	22 – 29 dBA
Critical Grade	27 – 35 dBA
Super Critical Grade	30 – 38 dBA



Custom steel fabrication is part of the manufacturing process of the PERMIT™ Filter/Silencer.

### How Sulfur in Fuel Affects The PERMIT™ Filter Performance

The PERMIT™ Filter is designed to operate on fuel sulfur content as high as 8000 ppm. However, maximum performance is achieved when [low sulfur fuels](#) are used.

Sulfur Content by Weight	Regeneration Temp.	% Run Time Required
< 15 ppm	280° C (536° F)	>30%
< 500 ppm	360° C (680° F)	>30%
> 500 ppm	390° C (734° F)	>30%