

# CleanAIR PERMIT™ Filter

Diesel Particulate Filters for Electric Power, Industrial, Petroleum, and Marine

## The PERMIT™ Advantage:

- Works with All Diesel 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%
- Available as Industrial, Critical or Super Critical designs
- Available with V-Clamp or Welded Design
- All Stainless Steel Construction

## Applications:

- Electric Power
- Industrial
- Petroleum
- Marine

## The CleanAIR™ Difference:

- CARB Verified for emergency and prime power stationary engines
- Custom Engineering and Design
- Integrated Manufacturing
- Product Optimization for Space Availability
- 304 Stainless Steel Housing, Corrosion-Resistant
- Double-walled, Fully Insulated Construction
- Durable Product Manufacturing for Operation Under Extreme Conditions

For a price quote call

**WILL RING**

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## The CleanAIR PERMIT™ Filter – Catalyzed Particulate Filter for Stationary Engines

The CARB verified, Level 3 PERMIT™ Filter for diesel engines is designed to reduce diesel particulate matter (PM), carbon monoxide (CO) and hydrocarbons (HC). Applications for the PERMIT™ Filter include stationary engines for electric power, industrial, oil and gas, and marine.

The wall-flow filter is coated with a unique, high performance catalyst, housed within a stainless steel package. The PERMIT™ Filter is available in industrial, critical and super critical designs with a variety of custom inlet and outlet configurations. Engines as small as 50 hp and as large as 4000 hp can easily be fitted with the PERMIT™ Filter.

## How the PERMIT™ Filter Works

The wall-flow design of the CleanAIR PERMIT™ Filter 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 filter, 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.

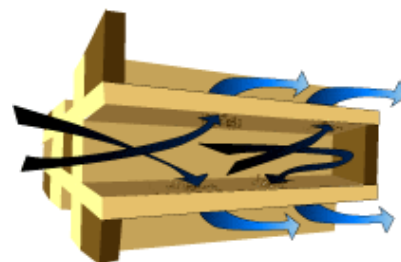
The easy-to-install, CARB verified CleanAIR PERMIT™ Filter works with all diesel engines and diesel fuels for compliance with air quality regulations.



The PERMIT™ Filter/Silencer Unit manufactured by CleanAIR Systems utilizing an innovative light-weight design made with corrosion-resistant stainless steel.



PERMIT™ Filter/Silencer Unit Installed on Diesel Back-up Generator



Exhaust Flow of PERMIT™ Filter

## Emissions Reduction Summary

| Control Technology                    | Fuel                  | CO        | HC        | PM                          |
|---------------------------------------|-----------------------|-----------|-----------|-----------------------------|
| PERMIT™ Filter 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 PERMIT™ Filter

## Diesel Particulate Filters for Electric Power, Industrial, Petroleum, and Marine

### PERMIT™ Filter Package Designs for Stationary Engines

The CleanAIR Systems' PERMIT™ Filter is packaged in a 304 stainless steel shell, finished using bead blasting to offer a highly corrosion-resistant product that will last for years. The packaged filter can be incorporated into many different configurations depending upon the application requirements.

Replacement designs are used for applications where space is too tight to add the filter separate from the existing muffler or silencer. Special inlet or outlet configurations and brackets can be used that will allow the PERMIT™ Filter/Silencer unit to replace an existing muffler or silencer. Typical sound attenuation ranges from 22 dBA to 38 dBA depending on the design.

Filter/Silencer replacement designs are available for applications requiring high levels of sound attenuation or multiple PERMIT™ Filters. The corrosion-resistant stainless steel shell has a removable panel, allowing full access to the filters mounted inside.

The PERMIT™ Filter/Silencer incorporating 10-filters within a corrosion-resistant stainless steel shell



Inside view of Filter/Silencer Design Using 2 - PERMIT™ Filters



PERMIT™ Filter Industrial Design



PERMIT™ as a 4-Filter Industrial Design



The PERMIT™ Filter with Bolt Flanges



PERMIT™ as a 2-Filter Industrial Design

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

### 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%                |

### 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.)