

# PROTECT YOUR WORKFORCE



## CATALYTIC DIESEL EXHAUST FILTERS

### DIESEL PARTICULATE FILTERS FOR CAT R2900 LOADERS

Direct Replacement for OEM Muffler



FREUDENBERG  
FILTRATION TECHNOLOGIES

 **FREUDENBERG**  
INNOVATING TOGETHER

# CAT R2900 LOADER DIESEL EXHAUST FILTERS

## FFT (Freudenberg Filtration Technologies)

### Diesel Exhaust filters:

- Reduce mine site personnel exposure to Diesel Exhaust Emissions, a Group 1 Carcinogen listed by the World health Organisation IARC and recognised by Australian Cancer Council as Cancer Causing.
- Improve air quality underground and help improve the short and long term health of workers in enclosed space.
- Are locally made in Australia by Murray Engineering for Australian mining conditions.
- Have full product installation and service support provided by Murray Engineering and Freudenberg Filtration.
- Are direct replacements for OEM mufflers, quick and easy to install.



### FFT Cat R2900 diesel exhaust filters come in two distinct technologies, PFF (Partial Flow Filter) and CRT (Continuous Regeneration Technology).

- The CRT technology provides the highest DPM reduction of any exhaust filter technology available and will ensure operators are protected to the highest level.
- The PFF technology has marginally lower efficiency but will simply lose efficiency over time should maintenance not be performed rather than block, potentially stopping machine. Pending maintenance can easily be predicted through performing a simple gas test. The filter substrate is also more durable and less prone to cracking / damage.

Both systems need cleaning approximately every 2000-3000 hours (like all DPF's due to lube oil ash build up) and service life is around 10,000 hours.

Our PFF and CRT filter elements are interchangeable on all mufflers so technology can be swapped later if site should wish (and makes for easy service exchange of filter elements without need to remove entire muffler).

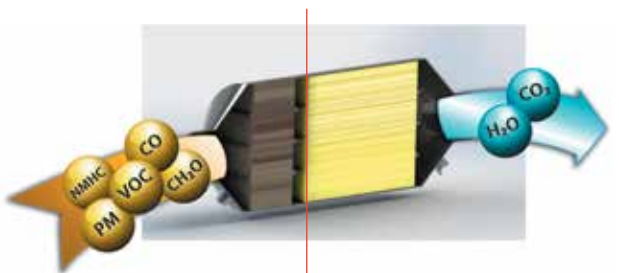
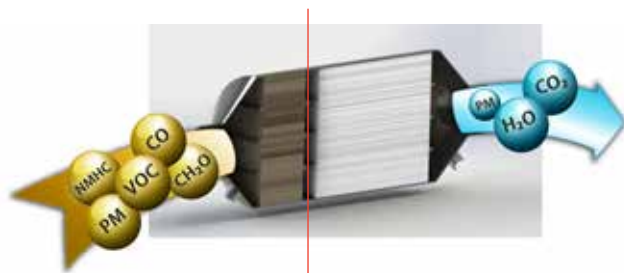
Murray Engineering offer a full service exchange / cleaning service for these filters. Murray Engineering are a mining services company who understand underground machines, mining operations and the importance of reducing onsite maintenance concerns.

### PFF Filter Housing Composition

- Stainless Steel DOC & Sintered Metal PFF Element
- High Density cell with unique coating
- Available in multiple Vehicle Configurations
  - Custom exhaust available.

### CRT Filter Housing Composition

- Stainless Steel DOC & Ceramic CRT Element
- High Density cell with unique coating
- Available in multiple Vehicle Configurations
  - Custom exhaust available



#### PFF Filter Stage 1

- Diesel Oxidation Catalyst
- Removes Gaseous Emissions
- Removes up to 45% of particulate
- Assists self-cleaning action of DPF

#### PFF Filter Stage 2

- Metallic DPF
- Removes up to 92% of particulate
- Meets NO<sub>2</sub> Emission limits

#### CRT Filter Stage 1

- Diesel Oxidation Catalyst
- Removes Gaseous Emissions
- Removes up to 45% of particulate
- Assists self-cleaning action of DPF

#### CRT Filter Stage 2

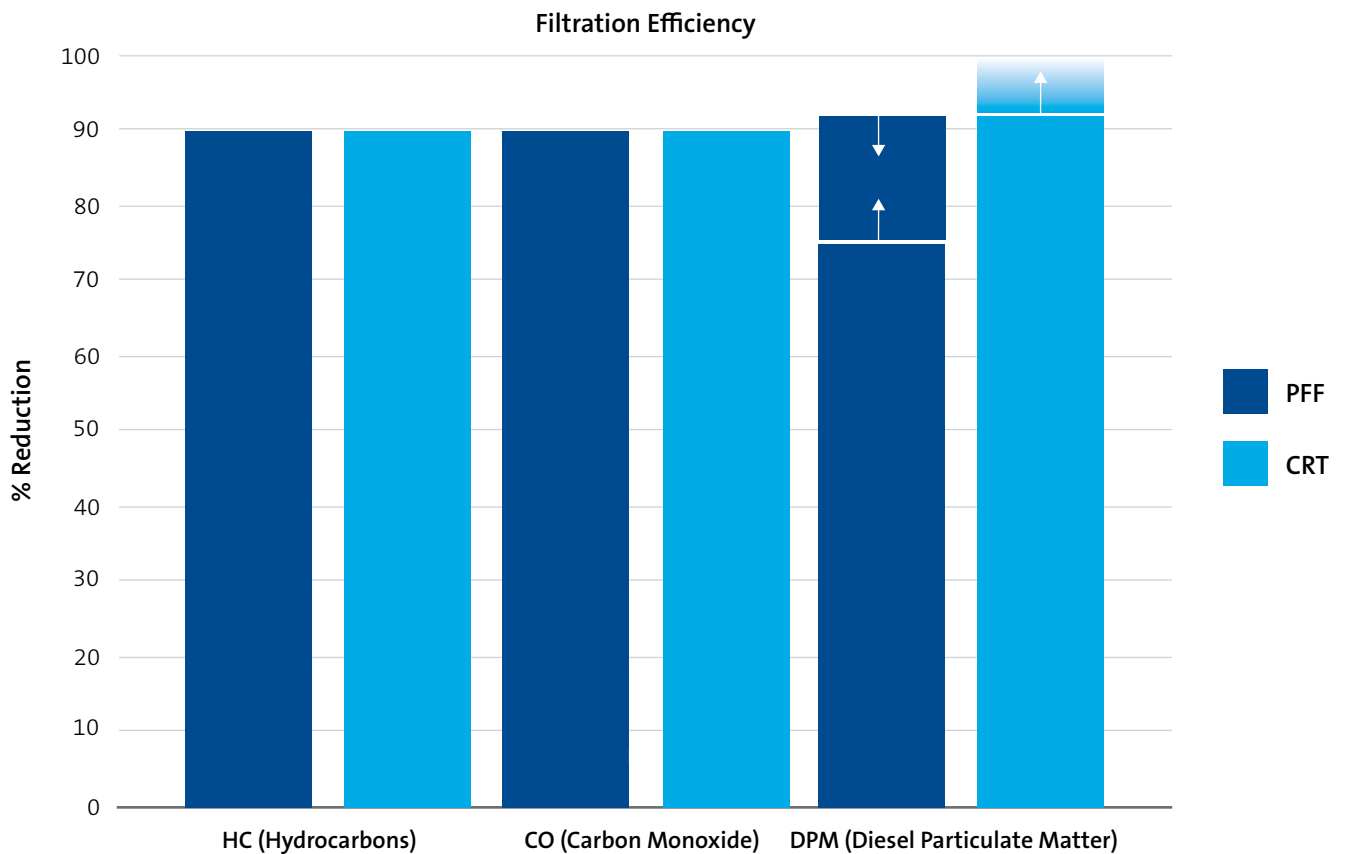
- Ceramic DPF
- Removes up to 99% of particulate
- Meets NO<sub>2</sub> Emission limits

**FFT Partial Flow Filter (PFF) technology:**

- Provide superior filtration efficiency compared to OEM technology
- Stainless steel housing and filter element construction ensures filters are durable and vibration resistant.
- Partial Flow design ensure filters do not block up and cause back pressure issues.
- Provide 90% reduction of Carbon Monoxide and Hydrocarbons, and a 75-92% reduction in diesel particulate matter DPM.
- No back pressure monitoring required.

**FFT Continuous Regeneration Technology (CRT)**

- Are most efficient filtration technology available
- Provide 90% reduction of Carbon Monoxide and Hydrocarbons, and a 92+% reduction in diesel particulate matter DPM.
- Eliminate cold start up soot.
- Passively regenerate through the use of proprietary catalysts meaning longer service intervals compared to other ceramic filters.
- Come standard with Back Pressure Monitoring equipment.



**PFF Filter Maintenance**

- Minimal maintenance required with PFF Technology
- FFT, recommend a maintenance interval of 2000 – 3000 hours that includes heat treatment, and compressed air cleans.

**PFF Filter Operating Conditions**

- Exhaust Temperature range between 150 - 500 °C
- Optimal Operating Temperature is between 250 - 320 °C
- Safe to operate in enclosed space
- Normal Operation Pressure Drop - 1.5 - 4.5KPA

**PFF Filter Life Span**

- 10,000 operating hours.

**CRT Filter Maintenance**

- Designed to be low maintenance when installed on a regularly maintained engine
- FFT, recommend a maintenance interval of 1000 – 2000 hours that includes heat treatment, and compressed air cleans.

**CRT Filter Operating Conditions**

- Exhaust Temperature range between 150 - 500 °C
- Optimal Operating Temperature is between 250 and 320 °C
- Safe to operate in enclosed space
- Normal Operation Pressure Drop - 2 - 10 KPA

**CRT Filter Life Span**

- 10,000 operating hours.

# CATALYTIC DIESEL EXHAUST FILTERS

## DIESEL PARTICULATE FILTERS FOR CAT R2900 LOADERS

### EXHAUST POLLUTANT COMPONENTS & THEIR EFFECTS

**CO (Carbon Monoxide)** = The deadliest and most watched of pollutants, CO if not removed from exhaust can upon exposure be very toxic and lethal. CO restricts the red blood cells ability to absorb oxygen molecules thereby suffocating the body. CO can be cancer causing.

**HC (Hydrocarbons)** = A very deadly and toxic pollutant, hydrocarbons are responsible for creating small irritants that can be easily absorbed into the lungs if not removed from the exhaust stream. Once in the lungs it can cause respiratory infections and shortness of breath. The harsh smell associated with all diesel engines is a by-product of HC.

**DPM (Diesel Particulate Matter)** = Although not immediately lethal, prolonged exposure to these groups of pollutants can cause serious illness including cancer and respiratory problems. DPM is made up of dry carbon (soot), inorganic oxides (primarily as sulfates), and liquids. Liquids are a combination of unburned diesel fuel and lubricating oils which as a group are referred to as soluble organic fractions (SOF) or volatile organic fractions (VOF).

**Acrolein** - Clear, colorless or yellowish liquid with a piercing, disagreeable odor.

Extremely flammable and toxic by inhalation or ingestion. Can cause tearing of the lung (Lachrymator). Will also cause irritation to skin and eyes.

FFT PFF Acrolein Reduction Rate: up to **90%**  
FFT CRT Acrolein Reduction Rate: up to **90%**

### CASE STUDIES

#### Vehicle CAT R2900 Loader, C 15 Engine Partial Flow Filter Test (PFF):

Test conducted onsite comparing standard CAT R2900 Loader, C 15 Engine exhaust with one fitted with a Freudenberg PFF Exhaust system.

TEST TYPE	STANDARD OEM EXHAUST SYSTEM	WITH PFF EXHAUST	PFF % REDUCTION
Stall Test	38.8 mg/m <sup>3</sup>	5.8 mg/m <sup>3</sup>	85%

#### Vehicle CAT R2900 Loader, C 15 Engine Continuous Regeneration Technology (CRT):

Test conducted onsite comparing standard CAT R2900 Loader, C 15 Engine exhaust with one fitted with a Freudenberg CRT Exhaust system.

TEST TYPE	STANDARD OEM EXHAUST SYSTEM	WITH CRT EXHAUST	CRT % REDUCTION
Stall Test	22.5 mg/m <sup>3</sup>	0.5 mg/m <sup>3</sup>	97%
Stall Test @ 1800 Hours	-	0.4 mg/m <sup>3</sup>	98%

