Introduction to DPF Technology

MaxFilter

What is a Particulate Filter?

- Serves as a ***Garbage Can*** for your Diesel Exhaust System.

- Designed to control emissions by ***Trapping Particulate Matter*** within a filter.

- The DPF impacts overall performance and efficiency of the vehicle.

How The Filter Works

- Air passes through a catalyst prior to entering the particulate filter, adding oxygen chemical to nitrogen oxide & carbon monoxide coming out of exhaust.

- Exhaust is turned into carbon dioxide and nitrogen dioxide prior to entering the DPF.

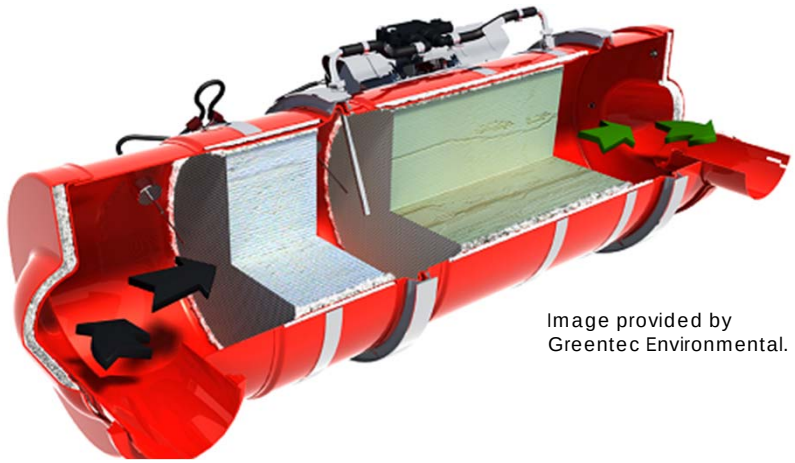
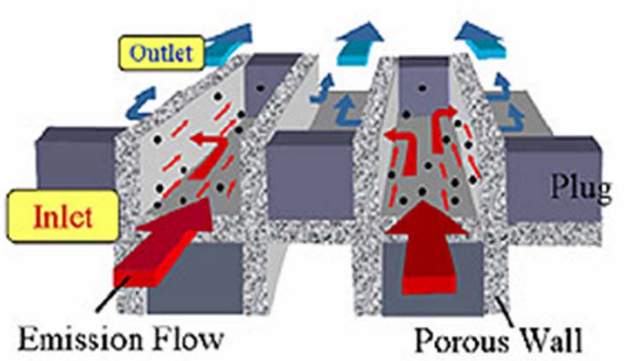


Image provided by Greentec Environmental.

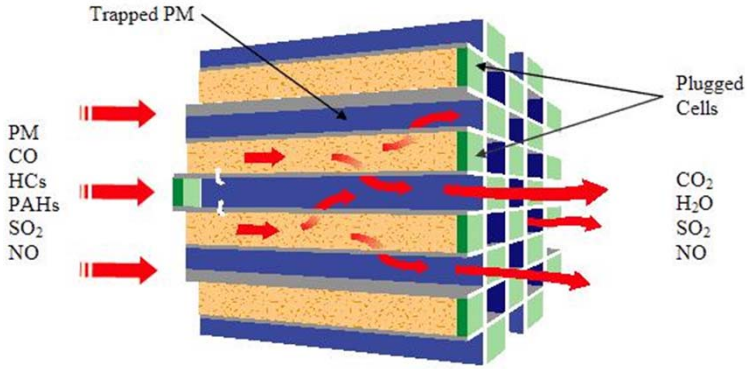
- Filter fills up with Hydrocarbon soot & Nitrogen Dioxide present in exhaust.

How The Filter Works continued

- Inlet cells of the DPF are plugged at opposite ends.
- Plugs force dirty air through porous ceramic wall. Particles larger than 0.5 microns are trapped in filter wall.
- Clean air exits filter.

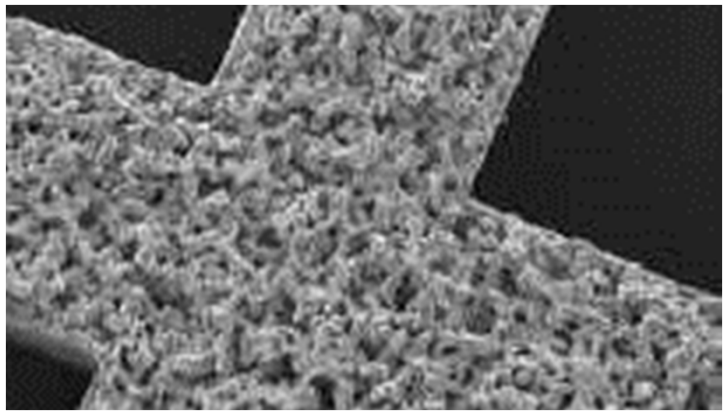


Images provided by Greentec Environmental.



Internal Structure of a DPF

- ***200 Cells per inch*** create porous surface area to trap particles entering filter.



3/64” square x depth of filter

Image provided by Greentec Environmental.

- ***Porous Wall Structure*** creates large surface area for air to pass through and around.

- Soot can build up on square area of surface or anywhere within the wall.

What is in Diesel Exhaust

- In a perfect world, soot from diesel fuel can be 100% burned up.
- Only 80% of fuel is burned during combustion.
- Soot also contains fuel additives, oil additives, bypass oil from rings and seals & metal particles.
- These particles cannot be completely burned during the regeneration process, resulting in ash.
- Ash is what stays in the filter and ultimately needs to be physically removed for filter to function properly.

Filter Regeneration

- Perfect filter operating temperature is roughly 1300°F, that’s when the filter will regenerate on its own.
- Unburned soot inside the filter will eventually cause backpressure.
- This signals the engine it is time to be “cleaned” and begins the regeneration process.
- Engine doses raw diesel fuel on face of catalyst.
- This oxidizes fuel and creates heat at nearly 1300°F.
- Regeneration process begins which burns soot and creates leftover ash.

Fuel Efficiency Example

Filter Efficiency	Miles per Gallon	Average Miles per Day	Gallons Used per Day
Under 50% Contamination	7 mpg	550	78.57
60% Contamination	6.65 mpg	550	82.71
70% Contamination	6.3 mpg	550	87.30

- A filter contaminated at 70% can cost you $339.60 per month…or more…per truck!
- For every 2% a filter is dirty, over 50%, you lose 1% of fuel economy.
- DPF warning light does not come on until the filter is 75% to 80% contaminated.

Based on average of 550 miles per day. Twenty days of travel per month.
Using an average diesel fuel cost of $1.945 per gallon.

What's Creating Demand?

- ***EPA requirement*** on Class 5 or higher diesel powered trucks, model year 2007 & newer.

- ***3.46 Million Class 8 Trucks*** on the road in the United States

  Source: American Trucking Association (updated 8/15), Professional Truck Drivers and the Trucking Industry. Retrieved from www.trucking.org

- Professional drivers logged over ***275 Billion miles*** in 2013

  Source: American Trucking Association (updated 8/15), Professional Truck Drivers and the Trucking Industry. Retrieved from www.trucking.org

Survey Results

- ***American Transportation Research Institute Survey.***
- Based on roughly 55,000 respondents.
- Accrued an estimated 5.3 Billion miles in 2014.
- Nearly 54,000 units were Truck-Tractors.

Region	% of Miles Traveled in U.S.
Southeast	31%
Midwest	27%
West	16%
Northeast	15%
Southwest	10%

Source: American Transportation Research Institute (9/2015): An Analysis of the Operational Costs of Trucking: 2015 Update. Retrieved from www.atri-online.org.

Survey Results continued…

- ***Record Number*** of Class 8 truck orders in 2014

  Source: American Transportation Research Institute (9/2015): An Analysis of the Operational Costs of Trucking: 2015 Update. Retrieved from www.atri-online.org.

- Truck-Tractors are replaced on average every ***6.7 Years***

  Source: American Transportation Research Institute (9/2015): An Analysis of the Operational Costs of Trucking: 2015 Update. Retrieved from www.atri-online.org.

- Average Marginal Costs have ***Increased 5.5¢*** per mile from 2008-2014

  Source: American Transportation Research Institute (9/2015): An Analysis of the Operational Costs of Trucking: 2015 Update. Retrieved from www.atri-online.org.

Survey Results continued…

- Average marginal costs were lowest in Midwest (13.7¢) and highest in Northeast (18.3¢)

  Source: American Transportation Research Institute (9/2015): An Analysis of the Operational Costs of Trucking: 2015 Update. Retrieved from www.atri-online.org.

- Despite falling fuel, permit and licensing costs, average marginal costs continue to increase

  Source: American Transportation Research Institute (9/2015): An Analysis of the Operational Costs of Trucking: 2015 Update. Retrieved from www.atri-online.org.

MaxFilter Advantage

- Manufactured to ***Exact OEM Specifications***.
- ***OEM Style Fit*** for quick installation.
- No modification, cutting or welding required.
- Substrate loading is duplicated.
- Substrates cured in oven for one week.
- Precious Group Metals are dip coated to match OEM.
- Matches OEM porosity between 28-33%.

MaxFilter Advantage

- **New Filter** not remanufactured or service unit.
- ***No Core Charge*** – saves hundreds.
- Backed by our ***Lifetime Warranty*** covering manufacturer defects for the life of the vehicle.
- Saves money vs OE options.

- Clamps & Gaskets offer additional sales opportunities at high margins.

MaxFilter Accessories

- Gaskets are OEM construction.
- Graphite or woven steel materials.
- Clamps are OEM design, v-style clamp.

- Add-on sales opportunities at High Margins.

MaxFilter Distributed by:

Area Diesel Service, Inc.

1.800.637.2658 (IL) | 1.800.237.4692 (IA) | areadiesel.com