

DIESELYTIC SXS

**DIESEL PARTICULATE FILTERS FOR CONTROL OF
DIESEL EXHAUST GASES, VAPORS AND SMOKE**

**FOR DIESEL ENGINES USED IN UNDERGROUND MINING, TUNNELING, CONSTRUCTION,
POWER GENERATION AND WAREHOUSING EQUIPMENT APPLICATIONS.**



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DIESELYTIC SXS

Diesel Particulate Filters

THE HAZARDS OF DIESEL EXHAUST:

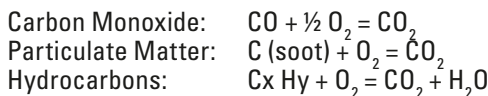
During diesel engine operation a number of harmful pollutants are produced in various quantities in the combustion chambers of diesel engines. Diesel engine exhaust contains the following harmful pollutants:

- 1) Hydrocarbons (HC) - (Aliphatic, Polyaromatic and Aldehyde)
- 2) Carbon Monoxide (CO)
- 3) Nitrogen Oxides (NOx) - (Nitric Oxide and Nitrogen Dioxide)
- 4) Sulfur Oxides (Sox)
- 5) Particulate Matter (PM) - (Carbon and Soluble Organic Fraction)

Many diesel engines operate in difficult working conditions. Exposure to diesel particulate matter and gaseous pollutants by equipment operators and surrounding personnel is of great concern since ventilation air is sometimes inadequate and/or poorly distributed in mines, tunnels, construction sites, etc.... Exposure to diesel exhaust is a contributing factor in heart disease, lung disease and has been linked to various forms of cancers. Exposure to diesel exhaust may decrease productivity and increase employee sick time.

REDUCING THE HAZARDS OF DIESEL EXHAUST:

The **SXS** diesel particulate filter effectively reduces particulate matter (PM), aldehydes (HCHO), carbon monoxide (CO) and hydrocarbons (HC) from the exhaust flow of diesel engines by oxidizing harmful pollutants. The major catalytic oxidation reactions which occur are:



SXS diesel particulate filters are designed to meet MSHA and OSHA standards for particulate matter and gaseous pollutant reduction in diesel fueled engines. The correct use of **SXS** diesel particulate filters will minimize equipment downtime and costs while achieving diesel emission reduction objectives. **SXS** diesel particulate filters work best on diesel engines manufactured after 1996 (Tier 1 or higher) or newer diesel engines. Contact the CEP sales office toll free at: 1-(800) 551-5525 to determine the feasibility of a **SXS** diesel particulate filters for older pre-tier 1 diesel engine applications.

Particulate Matter Filtering Process of SXS diesel particulate filters:

The **SXS** diesel particulate filter is a "wall flow" filter which is made up of a large number of small channels or cells which are alternately open or closed (plugged) at the inlet / outlet ends of the DPF substrate. The engine exhaust gases, vapors and particulate matter (PM) are forced to flow through the porous channel walls of the filter substrate core due to the restriction imposed by the alternating inlet / outlet plugs. The PM is trapped within the porous walls of the substrate core due to the sieving action of the internal pores and the agglomeration action of PM. Changes in the porosity of the channel walls, the substrate channel cell density, substrate volume and other variables can be altered to increase PM trapping efficiency and reduce diesel engine exhaust gas backpressure restriction.

Product Features of DIESELYTIC SXS diesel particulate filters:

1. V-Band Clamps and Flanges

Use of Stainless steel alloy V-band clamps and "V" configuration flanges allow for ease of service and minimal equipment downtime when period cleaning of accumulated non-combustible ash and unburned particulate matter is required.



2. Heavy Duty Construction

SXS DPF are heavily constructed and efficiently designed to resist the effects of stress due to high heat, vibration, corrosion and impact typically found in severe applications and environments typical of mobile underground mining, tunneling and construction equipment applications.



3. Custom Connections

The **SXS** DPF are available in a wide variety of inlet/outlet terminations. Currently we can supply ID/OD imperial tube, ID/OD metric tube, NPT pipe, ANSI flanges or any custom flanges, clamps, flex-hose, exhaust tube, exhaust elbows, etc.... as specified.



4. Direct Fit Engineered Designs

The **SXS** DPF canning designs can be supplied in standard or custom configurations which can duplicate OEM mufflers and OEM exhaust components to provide a proper fitment into crowded engine compartments.



5. High Quality Catalytic Coatings

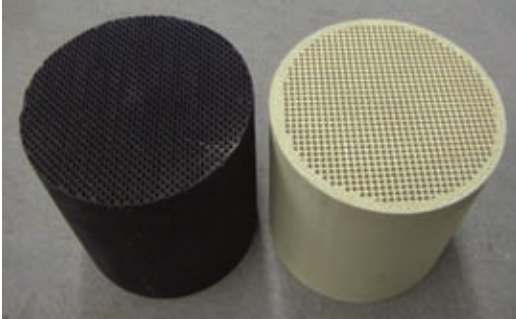
SXS diesel particulate filters feature several high quality bare, precious metal and/or base metal coatings which provide high efficiency oxidation of harmful diesel exhaust gases, vapors and particulate matter emissions. **SXS** diesel particulate filter coatings provide superior low temperature performance, low PM regeneration temperature requirements and long operating life. Use of NO₂ suppression coating technology enables harmful diesel exhaust emissions to be effectively reduced without increasing NO₂ emissions.



Available Substrate Materials for SXS diesel particulate filters:

The **SXS** diesel particulate filter substrates are available in two material compositions. Each substrate core material composition has inherent advantages and disadvantages. The compositions are:

- 1) Cordierite Ceramic (**CC**) - Cordierite Ceramic substrates have a low thermal expansion rate with good mechanical strength. Cordierite substrates have a lower resistance melting point and a lower heat capacity in relation to Silicon Carbide substrates. Cordierite substrates are lighter, lower in cost and have very strong segment joints.



- 2) Silicon Carbide (**SC**) - Silicon Carbide substrate cores have a high thermal expansion rate with good mechanical strength. Silicon Carbide substrates have a higher melting point and a higher heat capacity in relation to Cordierite ceramic. Therefore a Silicon Carbide substrate core has a higher capacity per liter of filter volume in terms of PM mass in comparison to a Cordierite Ceramic substrate core. Silicon Carbide substrate cores are more expensive in comparison to Cordierite Ceramic substrate cores. Silicon Carbide substrate cores are heavier in comparison to ceramic substrate cores and may have weaker segment joints.



Substrate Coatings for SXS diesel particulate filters:

SXS diesel particulate filters are available in several basic coatings (bare, precious metal and base metal) formats which are described as follows:

1) SXS uncoated diesel particulate filter

The **SXS** diesel particulate filter is a uncoated DPF which has no base metal and/or precious metal coating. The **SXS** diesel particulate filter is best suited for 1996 and newer light to heavy duty engine/equipment applications where continuous engine operation does not exceed 8 to 12 hours. Oversized configurations are available where continuous engine operation may exceed 24 to 36+ hours. The **SXS** uncoated DPF is usually not passive in operation and must be manually or electrically

regenerated at the appropriate time. The **SXS** diesel particulate filter can be regenerated by:

- a) Heating the filter to 550 - 600+ C degrees for 4 - 6 hours in an oven or kiln.
- b) Blowing accumulated PM out of the DPF with compressed air.
- c) Use of heated airflow to the DPF inlet cone with the optional (**SXS-E**) electrical regeneration unit.
- d) Using optional CDT diesel fuel additives (**SXS-BF/A**) mixed with diesel fuel which will reduce the oxidation temperature of DPM to 320 – 350 C degrees.

2) SXS-B base metal coated diesel particulate filter

The **SXS-B** diesel particulate filter is a base metal coated DPF which is best suited for 1996 and newer medium to heavy duty engine/equipment applications. The **SXS-B** diesel particulate filter is a passively regenerating diesel particulate filter coated with a base metal catalytic coating. The base metal catalytic coating allows for the reduction of PM and will not produce NO_2 . HC and CO are usually not reduced when using the **SXS-B** DPF. Exhaust enters the filter inlet where particulate is “trapped” by the porous filter walls. When higher exhaust gas temperatures are reached the particulate is oxidized or “burned”. The **SXS-B** DPF will initiate regeneration when engine exhaust gas temperatures exceed 370 °C to 420+ °C for 20% of engine daily operating time.

3) SXS-C and SXS-CX platinum coated diesel particulate filter

The **SXS-C** and **SXS-CX** diesel particulate filter are platinum coated DPF which are best suited for 1996 (Tier 1) and newer light to heavy duty engine/equipment applications. The **SXS-C** and **SXS-CX** diesel particulate filter are passively regenerating diesel particulate filters coated with a low load platinum metal catalytic coating. The low load platinum metal catalytic coatings allow for the reduction of PM, HC and CO while minimizing NO_2 production. The **SXS-C** and **SXS-CX** DPF will initiate regeneration when engine exhaust gas temperatures exceed 260 °C to 310 °C (for the **SXS-C**) and 290 °C to 350 °C (for the **SXS-CX**) for 20% of engine daily operating time.

4) SXS-SC platinum coated diesel particulate filter with NO_2 suppression

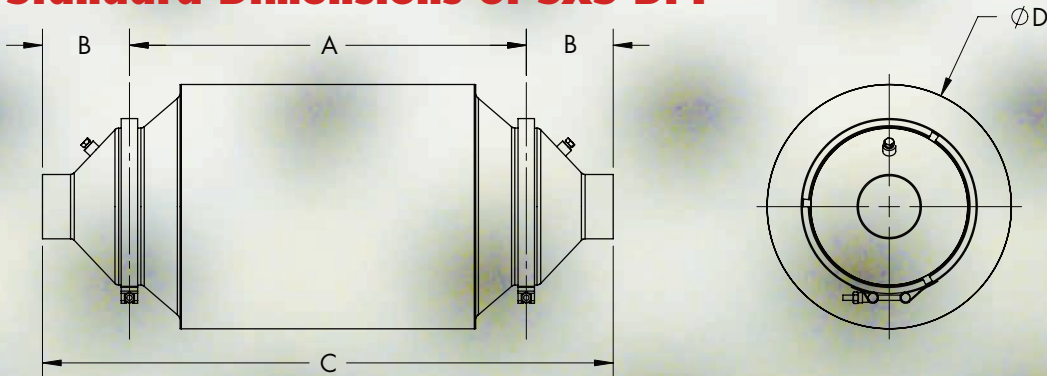
The **SXS-SC** diesel particulate filter is a platinum coated DPF which is best suited for 1996 and newer medium to heavy duty engine/equipment applications. The **SXS-SC** diesel particulate filter is a passively regenerating diesel particulate filter coated with a specially formulated high load platinum/base metal catalytic coating. The high load platinum/base metal catalytic coating allows for maximum reduction of PM, HC and CO. Production of harmful NO_2 is suppressed and is not produced by the **SXS-SC** DPF. The **SXS-SC** DPF will initiate regeneration when engine exhaust gas temperatures exceed 320 °C to 390 °C for 20% of engine daily operating time. We recommend a careful pre-evaluation of engine duty cycle and exhaust temperatures to determine if this DPF filter option is feasible.

Comparison Chart of SXS DPF Configuration Performance

SXS DPF Performance

Substrate Coatings	Conversion (PM by Particle Count)	Conversion Efficiency (PM by Mass)	Conversion Efficiency (CO)	Conversion Efficiency (HC)	Effects on NO _x	Typical Balance Point Temperature (°C)	Sulphur in Fuel (PPM)	Typical Back-pressure "H ₂ O
SXS	>99%	85-95%	0%	0%	NO ₂ /NO ratio not increased	550-600°C 320-350°C (With fuel additives)	<15 ppm required	12"- 18" H ₂ O (clean) 36"- 40" H ₂ O (full)
SXS-B	>99%	85-95%	0%	0%	NO ₂ /NO ratio not increased	370-420°C	<15 ppm required	14"- 20" H ₂ O (clean) 38"- 41" H ₂ O (full)
SXS-C SXS-CX	>99%	85-95 %	80-95%	75-85%	NO ₂ /NO ratio can increase at torque peak and hp peak	CX 290-350°C C 260-310°C	<15 ppm required	14"- 20" H ₂ O (clean) 38"- 41" H ₂ O (full)
SXS-SC	>99%	85-95+ %	90-95+%	70-95%	NO ₂ /NO ratio not increased	320-390°C	<15 ppm required	14"- 20" H ₂ O (clean) 38"- 41" H ₂ O (full)

Standard Dimensions of SXS DPF



MODEL	A	B	C	D	MAX HORSEPOWER
566SXS	7.50"	3.44"	14.38"	7.56"	40 HP
758SXS	11.50"	4.19"	19.75"	8.56"	85 HP
912SXS	16.50"	4.13"	24.75"	9.75"	150 HP
1050SXS	16.50"	4.13"	24.75"	10.75"	200 HP
1212SXS	17.50"	4.13"	25.75"	12.00"	225 HP
1214SXS	19.50"	4.13"	27.75"	12.00"	250 HP
1215SXS	20.50"	4.13"	28.75"	12.75"	300 HP
1515SXS	26.75"	4.13"	35.00"	15.75"	400 HP
2015SXS	32.00"	4.13"	40.25"	20.75"	600 HP

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