DCL MINE-X SOOTFILTER<sup>®</sup> With Exhaust Pressure Logger INSTALLATION, OPERATION AND MAINTENANCE



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## TABLE OF CONTENTS

1	GENERAL	1
2	INSTALLATION	3
	2.1 Filter Installation	3
	2.2 Installation Type (a) – Direct Fit Muffler	3
	2.3 Installation Type (b) – Standard Design for Mobile Equipment	4
	2.4 Installation Type (c) – Standard Design for Genset/Stationary Engine	5
	2.5 Installation Type (d) – Installation Kit	6
	2.6 Installation Type (e) – DPF Housing	7
3	OPERATION	. 10
	3.1 Mobile/Stationary Engine Operation	10
4	MAINTENANCE	. 12
	4.1 Maintenance Requirements	12
	4.2 Manual Backpressure Checks	13
	4.3 Level 1 Cleaning	13
	4.3.1 Standard Design	13
		15
	4.3.2.1 Custom Design 1 (See Figure 4.1)	. 14
	4.3.2.2 Custom Design 2 (See Figure 4.2)	. 14
	4.4 Level 2 Cleaning	15
5	HOW IT WORKS	. 16
	5.1 General Properties	16
	5.2 Product Type Designs	16

APPENDIX A – MINE-X SOOTFILTER® Dimensions





**MINE-X SOOTFILTER<sup>®</sup>** 

### 1 GENERAL

This manual provides the instructions on installation, maintenance and operation of the MINE-X SOOTFILTER® product family.

The MINE-X SOOTFILTER<sup>®</sup> is a diesel particulate filter (DPF) that is designed to trap diesel particulates (soot) exiting the engine. Heat from the engine exhaust burns off the particulates in a continuous manner. With the DPF installed, the equipment can be operated as normal in most respects. A DCL Exhaust Pressure Monitor allows the operator to monitor the status of the DPF.

#### Product Description:

MINE-X SOOTFILTER®	Catalyzed wall-flow particulate filter
MINE-X SOOTFILTER <sup>®</sup> LT	First stage catalyzed non-blocking particulate filter; second stage catalyzed wall-flow particulate filter
MINE-X SOOTFILTER®BM	Catalyzed wall-flow particulate filter

#### Applications:

The products are suitable for most diesel engines that meet the following criteria:

- Off-road and stationary applications with medium to heavy duty cycles
- Engine certified to a minimum of Euro Stage 1 or US EPA Tier 1

Removal Efficiencies:

	MINE-X SOOTFILTER <sup>®</sup>	MINE-X SOOTFILTER®LT	MINE-X SOOTFILTER®BM
Particulate Matter - by particle count	>99%*		
Particulate Matter - by	<b>85 050/ **</b>		
mass	85-9570		
Carbon Monoxide	90%		none
Hydrocarbons / Volatile	60-80%		none
Organic Compounds			
(VOCs)			
Oxides of Nitrogen (NO <sub>x</sub> )	increase in the NO <sub>2</sub> /NO ratio may occur and has a negligible effect on NO <sub>x</sub> levels		no change in the NO <sub>2</sub> /NO ratio

\*ultra-fine and fine particles (diameter 10 - 500 nm)

\*\* ISO8178 or CARB Method 5 (front half) test conditions with fuel sulphur < 15 ppm





Fuel Sulfur Limits:

MINE-X SOOTFILTER®	< 50 ppm
MINE-X SOOTFILTER <sup>®</sup> LT	< 50 ppm
MINE-X SOOTFILTER®BM	< 500 ppm

Sound Attenuation and Silencing:

For most off-highway vehicles, the sound attenuation properties of DCL DPFs are the same or in many cases better than the original muffler. In general, the installation of a DPF on an off-highway vehicle allows the original muffler to be removed without a negative impact on exhaust noise.

Balance Point Temperatures\* (°C):

MINE-X SOOTFILTER®	300-360
MINE-X SOOTFILTER®LT	280-340
MINE-X SOOTFILTER®BM	380-420

\* Actual balance point temperature is dependant on engine model and fuel sulfur level





## **2** INSTALLATION

#### 2.1 Filter Installation

It is necessary to install the DPF as close as possible to the exhaust manifold or turbocharger of the engine due to the DPF's requirement for heat. In addition, the DPF should be mounted so that it is isolated from engine vibration and external loads from the exhaust system.

There are several different installation configurations depending upon the application on which the DPF is being installed, and the manner in which the DPF was packaged (custom vs standard). Listed below are the basic different installation cases that may arise. For each installation, please determine which installation type best describes the case at hand and follow the instructions accordingly.

#### 2.2 Installation Type (a) – Direct Fit Muffler

If technically feasible, DCL offers custom packaging of the DPF designed to act as a direct replacement of the original muffler. Please follow the instructions below to install the direct fit DPF muffler:

- 1) Remove original equipment muffler making sure to keep all installation components not attached to the original muffler.
- 2) Install the direct fit DPF muffler in same manner as if installing the original muffler. Use all existing support straps/materials to ensure a secure, stable mounted DPF muffler.
- 3) If the pipe/tubing system upstream of the DPF muffler is horizontal, install two <sup>1</sup>/<sub>4</sub>" NPT ports upstream of the filter at the 12 o'clock position for installation of the backpressure monitor. If the pipe/tubing upstream of the DPF muffler is vertical, port position is arbitrary.



Figure 2.1 – Example of a Custom Fit DPF Muffler





#### 2.3 Installation Type (b) – Standard Design for Mobile Equipment

A standard DPF is generally used when space limitations in the application exhaust envelope does not allow for replacement of the original muffler with a usually slightly larger direct fit DPF muffler. The DPF is then usually installed outside the engine compartment. Please follow the instructions below to install the standard DPF design for mobile equipment.

- 1) If the DPF is to be mounted downstream of the original equipment muffler, then remove the original muffler as it is a source of significant exhaust heat loss.
- 2) Determine a suitable space (inside or outside) the engine compartment for installation. Please take into consideration the general installation guidelines in table 2.1. Make sure that the chosen installation spot allows for horizontal installation of the DPF (i).
- 3) For designs containing quick-release clamps, support the DPF centrebody with a mounting band (ii). Ensure that vibration dampers (vi) are used to isolate the DPF centrebody from engine vibration.
- 4) Install two <sup>1</sup>/<sub>4</sub>" NPT ports upstream of the DPF at the 12 o'clock position (iii).
- 5) Use a flex to isolate the DPF from vibrations from the engine or exhaust stream (iv).
- 6) Use support brackets to mount the DPF to the vehicle frame (v).
- 7) Use vibration damping washers if mounting the DPF on a vehicle frame (vi).
- 8) Two  $\frac{1}{8}$ " test ports (vii) are provided to perform manual backpressure checks or emissions testing.
- 9) Connect the engine exhaust to the DPF using tube clamps (viii).



Figure 2.2 – Installation Example of a Standard Design DPF for a Mobile Application





#### 2.4 Installation Type (c) – Standard Design for Genset/Stationary Engine

A standard DPF design is generally used for stationary engines and gensets. The primary difference between DPFs provided for mobile equipment and DPFs provided for genset/stationary engine application is that often the DPFs for genset or stationary engines are supplied with bolted flange connectors as requested by the customer. If you have a DPF for a genset/stationary engine with slip-fit connections, please refer to section 2.3 regarding the installation of a standard DPF design on mobile equipment. Please follow the instructions below to install the standard DPF for a genset/stationary engine.

- 1) If the DPF is to be mounted downstream of the original equipment muffler, then remove the original muffler as it is a source of significant exhaust heat loss.
- 2) Determine a suitable space (inside or outside) the engine compartment for installation. Please take into consideration the general installation guidelines in table 2.1. Make sure that the chosen installation spot allows for horizontal installation of the DPF (i).
- 3) For designs containing quick-release clamps, support the DPF centrebody with a mounting band (ii). Ensure that vibration dampers are used to isolate the DPF centrebody from engine vibration.
- 4) Install two <sup>1</sup>/<sub>4</sub>" NPT ports upstream of the DPF at the 12 o'clock position (iii).
- 5) If necessary, use a flex to isolate the DPF from vibrations from the engine or exhaust stream (iv).
- 6) Use support brackets (v) to mount the DPF to the frame.
- 7) Two  $\frac{1}{8}$ , test ports (vi) are provided to perform manual backpressure checks or emissions testing.
- 8) Bolt the DPF to the existing exhaust stream using the provided flange connectors (vii).



Figure 2.3 - Installation Example of a Standard Design DPF for a Genset/Stationary Engine





#### 2.5 Installation Type (d) – Installation Kit

The installation kit was designed to provide adequate support of the DPF as well as simplify the DPF installation. The installation kit also serves to protect the filter from minor external impact. Please follow the instructions below to install the DPF using the installation kit.

- 1) If the DPF is to be mounted downstream of the original equipment muffler, then remove the original muffler as it is a source of significant exhaust heat loss.
- 2) Determine a suitable space (inside or outside) the engine compartment for installation. Please take into consideration the general installation guidelines in table 2.1.
- 3) Mount the installation kit base where previously determined using the hardware provided. Be sure to use the provided vibration damping washers (i) to help isolate the DPF from engine vibrations.
- 4) Connect the engine exhaust to the DPF cones (ii) using tube clamps.

Note: The DPF should come with the filter already installed in the mounting kit with mounting bands (iii) and touch-guard (iv) in place.



Figure 2.4 – Installation Example of a DPF and Mounting Kit





#### 2.6 Installation Type (e) – DPF Housing

A standard DPF Housing design is used for stationary engines and gensets. Please follow the instruction below to install the standard DPF Housing for a genset/stationary engine.

- 1) The DPF Housing is to be mounted upstream of the original equipment muffler.
- 2) Determine a suitable horizontal space as close as possible to the engine exhaust outlet.
- 3) Allow adequate space (~30" (762 mm)) for loading and unloading the individual filter units.
- 4) Secure the DPF Housing feet to a concrete foundation or structural steel.
- 4) Use a flex to isolate the DPF Housing from vibrations from the engine or exhaust stream.
- 5) Four  $\frac{1}{2}$ " test ports are provided to perform manual backpressure checks or emissions testing.



Figure 2.5 – Example of a DCF2X3X3 MINE-X SOOTFILTER® DPF Housing





#### 2.6.1 Installation Instruction For Filter Units

- 1) Install filter unit gasket on high pressure chamber wall.
- 2) While holding the handle, install filter unit on high pressure chamber wall by pushing it into the filter holder.
- 3) Install and fasten 14 flanged nuts on high pressure chamber wall to 50~75 ft-lb torque.
- 4) Install filter access panel gasket on low pressure chamber wall.
- 5) Install filter access panel on low pressure chamber wall.
- 6) Install and fasten flanged nuts on low pressure wall to 50~75 ft-lb torque.
- 7) Repeat steps 1-6 for the other filter units (equal numbers on each side of the housing).

#### 2.6.2 Installation Instruction For Spare Filter Unit Cover

- 1) Install filter unit gasket on the spare filter slot on the high pressure chamber wall.
- 2) Install spare filter cover on the high pressure chamber wall.
- 3) Install and fasten 14 flanged nuts on high pressure chamber wall to 50~75 ft-lb torque.
- 4) Install filter access panel gasket on low pressure chamber wall.
- 5) Install filter access panel on low pressure chamber wall.
- 6) Install and fasten flanged nuts on low pressure wall to 50~75 ft-lb torque.
- 7) Repeat step 1-6 on the opposite side of the housing.

#### 2.6.3 Installation Instruction For Rupture Disc

- 1) Install rupture disc gasket on the high pressure chamber wall.
- 2) Install rupture disc aligner on the high pressure chamber wall.
- 3) Install rupture disc on the high pressure chamber wall.
- 3) Install and fasten 14 flanged nuts on high pressure chamber wall to 50~75 ft-lb torque..
- 4) Install rupture disc access panel gasket on low pressure chamber wall.
- 5) Install rupture disc access panel on low pressure chamber wall.
- 6) Install and fasten flanged nuts on low pressure wall to 50~75 ft-lb torque.





The table below (Table 2.1) outlines some of the more general guidelines that should be considered when installing a MINE-X SOOTFILTER<sup>®</sup> DPF.

Table 2.1 – Guidelines for DPF Installation		
	For turbocharged engines, install the DPF as close as	
Location for Mounting		
	For naturally aspirated engines, install the DPF as close as	
	possible to the exhaust manifold.	
	The DPF should be mounted horizontally to reduce wear on	
	the filter. If horizontal mounting is not possible, contact	
	DCL before mounting the DPF vertically.	
	Mount the DPF according to the flow direction sticker	
Direction/Orientation	provided next to the nameplate. The manner in which the	
	filter is designed negates the ability to reverse the direction	
	of flow through the filter when reinstalling after removal	
	using the provided clamps.	
	Ensure the DPF does not support the weight of the exhaust	
Supporting the Filter	pipe or any other exhaust system components.	
	Mount the DPF so that it is isolated from external loads.	
Insulation Plankat	For some applications, DCL may recommend the	
Insulation Dialiket	installation of heat insulation around the DPF.	
Exhaust Pressure	Sag concrete instruction for installation of the DCL Exhaust	
Monitor (Required for	See separate instruction for installation of the DCL Exhaust	
Mobile Applications)	Pressure Monitor/Logger.	

If an installation case arises that does not fall under one of the above installation types, or if installation assistance is required, please contact DCL Technical Support (905) 660-6450 ext. 224 or for toll free, 1-800-872-1968 ext 224.





## **3 OPERATION**

#### 3.1 Mobile/Stationary Engine Operation

In most respects the equipment/engine can be driven/operated in the normal manner once the DPF is installed. For some equipment/engines, the requirements of the machine/engine may change over the work course resulting in exhaust temperatures that may be too low to allow for continuous regeneration of the DPF. In cases where the DPF is not regenerating regularly, backpressures may rise to a point where an alarm light from the display panel will appear. To avoid such situations, please adhere to the operation requirements outlined for mobile and stationary applications in Tables 3.1, 3.2 and 3.3 below.

Table 3.1 – Required Operating Conditions

Tuche ett Trequired operating conditions			
MINE-X SOOTFILTER®	MINE-X SOOTFILTER <sup>®</sup> LT	MINE-X SOOTFILTER®BM	
>60% load > 30% of the time	Exhaust gas temperature >300°C >30% of the time	Exhaust gas temperature > 380°C >30% of the time	

Table 3.2 – Operating Requirements for Mobile Equ	uipment
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Avoid idling the equipment.		
Whenever possible, use the equipment for jobs involving heavy loads		
(i.e. do not use the equipment for light duty work).		
Remain watchful of filter alarm lights.		
Keep the engine well maintained and operate at a low lube oil		
consumption rate.		
Use ultra-low sulfur diesel fuel.		

ruble 5.5 Operating Requirements for Stationary Equipment
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Do not operate the engine at idle or low load for longer than 1 continuous		
hour.		
Keep the engine well maintained and operate at a low lube oil		
consumption rate.		
Use ultra-low sulfur diesel fuel.		

Required hardware with each DPF includes a DCL Exhaust Pressure Monitor/Logger (See Figure 3.1). This monitor should be installed before use of the DPF to ensure safe operating conditions. The unit consists of two LED bars that illuminate to indicate whether exhaust temperature and backpressure are within normal operating range. A third LED bar labelled 'Alarm' indicates operating errors including those associated with exhaust temperatures and pressures outside of threshold values. Action(s) to be taken upon the illumination of the high-pressure alarm are found on the following page. For more information regarding the backpressure monitor and a description of all other possible alarm scenarios, please refer to the DCL Exhaust Pressure Monitor/Logger Manual.







Figure 3.1 – DCL Backpressure Monitor Display Panel

Alarm Indication: Alarm beamer flashing + pressure 8 illuminated

Alarm Description: Upper pressure limit reached

**Instructions**: If the high-pressure alarm indicator is triggered, continue normal operation for another 2 minutes. If the alarm turns off in this period, then proceed with normal operation. If the high backpressure alarm continues, reset manually by moving your finger over the alarm reset sensor. This should cause the alarm to turn off. If the alarm comes back on within 2 minutes after continuing with normal operation and remains illuminated for a continuous 2 minutes, then proceed with the following:

- 1. Apply maximum torque to the engine for a continuous period of 20 minutes at medium to high RPM\*.
- 2. Reset the alarm manually by moving your finger over the alarm reset sensor if it has not turned off automatically during this time.
- 3. Proceed with normal operation.
- 4. If within 2 minutes of resetting the alarm the alarm comes back on, remove the DPF and perform a *Level 1 Cleaning* (See section 4 Maintenance for cleaning instructions)\*\*
- 5. After reinstalling the DPF, if problems with this high backpressure alarm persist, remove the DPF and perform a *Level 2 Cleaning* (See section 4 Maintenance for cleaning instructions).

\* The high exhaust temperatures generated from high torque operation will cause the DPF to self-regenerate. At the conclusion of the regeneration process, proceed with normal operation of the equipment. Examples of how to apply high torque include driving the equipment up an incline or moving/hauling a heavy load. **Do not operate the equipment unsafely or in a manner that will cause damage to the equipment hydraulics or other components.** If uncertain how to properly conduct this operation, contact DCL and/or the equipment dealer.

\*\* Level 1 Cleaning may be omitted in preference for performing a Level 2 Cleaning in any circumstance.





## **4 MAINTENANCE**

#### **4.1 Maintenance Requirements**

The following are maintenance requirements to follow for servicing the DPF. Due to large variations in operating conditions, the maintenance schedule may change slightly depending on the specifics of the application. Below in Table 4.1, are requirements to follow for servicing the DPF.

Frequency	Action	Description
Every 50 hours of operation	Manual Backpressure Check	Operate the engine at high idle. At exhaust port upstream of DPF install manual backpressure gauge. Record results in a log sheet.
Every 200 hours of operation	Check for Leaks	Make visual check of piping, fittings, clamps and gaskets in the exhaust system for exhaust leaks. Look specifically for evidence such as soot present near connection. Repair if necessary.
Every 200 hours of operation	Check Pressure Transducer	Remove pressure transducer and apply pressure to the line. Check line for leaks. Indicator lights must illuminate at a specified backpressure.
Every 1000 hours of operation	Filter Cleaning	Conduct <i>Level 2 Cleaning</i> . (See section 4.4 below for details)
Filter Cleaning		Conduct <i>Level 1 Cleaning</i> or <i>Level 2 Cleaning</i> according to guidelines in Table 4.2 below.

Table 4.1 – Maintenance Schedule





#### 4.2 Manual Backpressure Checks

When taking manual backpressure measurements, operate the engine at high idle. At an exhaust port upstream of the DPF install a manual backpressure gauge. Record results in a log sheet.

Reading	Filter Condition	Actions
< 5" wc	DPF is damaged	Remove DPF and contact DCL for further
(<1.25 kPa)		assistance
5-25" wc	DPF is clean	No action
(2.5-6.25 kPa)		
25-40" wc	DPF is moderately loaded with soot	Level 1 or Level 2 Cleaning is required
(6.25-10 kPa)	and/or ash	within the next 50 hours of operation
>40" wc	DPF is highly loaded with soot and/or	Remove DPF immediately and conduct Level
(>10 kPa)	ash	2 Cleaning

Table 4.2 – Ma	nual Backpress	sure Check
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#### 4.3 Level 1 Cleaning

#### 4.3.1 Standard Design

- 1. Remove the DPF centrebody using the quick-release clamps. Be sure to properly support the DPF upon removal as the filters are fragile and can break if dropped. Depending on the size of the DPF this may take two people.
- 2. Attach to the filter inlet (sooted end of DPF), a vacuum which feeds into a high-efficiency particle arrestance (HEPA) filter making sure that all connections are airtight to prevent soot/ash from escaping before being forced through the HEPA filter.
- 3. Using compressed air (~80 psi), blow the particulates/ash from the outlet end of the DPF towards the inlet of the DPF, through the vacuum and through the HEPA filter. The air gun should be held a minimum of 2 inches from the surface of the DPF to prevent damage to the filter itself.
- 4. Move the air gun around to ensure that all of the DPF channels on the outlet have been exposed to the compressed air. Compressed air cleaning should be performed for an approximate duration of 10 minutes.
- 5. Remove the HEPA filter and store away for reuse or dispose of if saturated with soot/ash.
- 6. Reinstall DPF centrebody on given application and fasten securely using all applicable mounting hardware.
- 7. Perform a manual backpressure check at no load and high idle conditions to ensure that the *Level 1 Cleaning* reduced the backpressure build-up due to the soot/ash removal. Backpressure should be less than initial backpressure reading before cleaning procedure.

#### 4.3.2 Custom Design

The majority of custom DPF designs are developed to replace the original equipment muffler. The two most popular designs allowing access to the DPF for cleaning are shown in Figure 4.1 and Figure 4.2 below.









Figure 4.1 – Flanged Centrebody DPF Muffler

Figure 4.2 – Bolted End-disc DPF Muffler

#### 4.3.2.1 Custom Design 1 (See Figure 4.1)

- 1. Remove DPF muffler from application in the same manner as if removing original muffler. Be sure to properly support the DPF upon removal as the DPFs are fragile and can break if dropped. Depending on the size of the DPF muffler this may take two people.
- 2. Remove DPF from muffler centrebody by undoing the quick-release clamps or removing the bolts from the flanges in the center of the muffler.
- 3. Perform Level 1 Cleaning steps 2-5 inclusive of Standard Design cleaning instructions above.
- 4. Reinstall the DPF into the centrebody of the muffler and secure it in place by either tightening the clamps or bolting the flanges.
- 5. Reinstall muffler into application in the same manner as installing the original muffler.
- 6. Perform a manual backpressure check to ensure that the *Level 1 Cleaning* reduced the backpressure build-up due to the soot/ash removal. Backpressure should be less than initial backpressure reading before cleaning procedure.

#### 4.3.2.2 Custom Design 2 (See Figure 4.2)

- 1. Remove DPF muffler from application in the same manner as if removing original muffler. Be sure to properly support the DPF upon removal as the DPFs are fragile and can break if dropped. Depending on the size of the DPF muffler this may take two people.
- 2. Remove bolts on muffler body end-disc and remove disc from muffler exposing DPF inside.
- 3. Attach to the muffler exhaust flow inlet, a vacuum which feeds into a HEPA filter and secure around the muffler inlet pipe to prevent soot/ash from escaping before being forced through the HEPA filter.
- 4. Perform Level 1 Cleaning steps 3-5 inclusive of Standard Design cleaning instructions above.
- 5. Replace muffler end-disc onto muffler and bolt to secure.
- 6. Reinstall muffler into application in the same manner as installing the original muffler.

For other custom designs, please contact DCL for proper cleaning procedures.





#### 4.4 Level 2 Cleaning

- 1. Remove the DPF from the application. If it is a standard design, simply remove the quick-release clamps. If it is a custom designed DPF muffler such as Figure 4.1 or Figure 4.2 above, remove the DPF muffler in the same manner as the original equipment muffler. For removal of other custom designed filters, contact DCL as necessary.
- 2. Place the DPF centrebody, inside an oven or kiln ensuring that the inlet and outlet of the DPF are exposed. i.e. Do not sit the DPF vertically in the oven so that the DPF inlet or outlet filter faces are against the surface on which the DPF is resting.
- 3. Increase the temperature of the oven to  $500^{\circ}$ C over a period of 1.5 2 hours.
- 4. Retain an oven temperature of 500°C for a continuous period of 4 hours to allow complete combustion of accumulated soot in the DPF.
- 5. Decrease the temperature back down to a temperature that will allow for safe removal of the DPF by hand.
- 6. Remove the DPF from the oven and perform a *Level 1 Cleaning* to remove the noncombustible ash content.
- 7. For standard DPF designs, reinstall DPF centrebody into position on the application. For custom designs, either reassemble muffler by placing the DPF centrebody into muffler and clamping or bolting it into place, or reinstall the muffler end-disc by bolting it to the muffler.
- 8. For custom design muffler replacements, reinstall the DPF muffler back into the application in the same manner as installing the original equipment muffler.





### 5 HOW IT WORKS

#### **5.1 General Properties**

MINE-X SOOTFILTER<sup>®</sup> DPFs clean diesel exhaust by collecting the diesel particulate matter and use the heat from the engine exhaust to burn the particulates inside the DPF. All DPFs in the MINE-X SOOTFILTER<sup>®</sup> family are catalytically coated to enhance performance. The catalytic coatings allow for lower regeneration or balance temperatures which permit the use of filters on a wide range of applications. The wall-flow component of the MINE-X SOOTFILTER<sup>®</sup> DPF is a porous ceramic monolith extruded into long narrow channels, which are open at one end and blocked at the opposite end. The alternately blocked channel design forces exhaust gases to travel through the walls of the channels in order to escape (see Figure 5.1). The filter is canned in a stainless steel shell to provide protection. Please refer to Appendix A for standard dimensions of the MINE-X SOOTFILTER<sup>®</sup> BM and MINE-X SOOTFILTER<sup>®</sup>LT.

Basic Reactions:

1)  $C(soot) + O_2 \rightarrow CO_2$ 2)  $2NO_2 + C(soot) \rightarrow CO_2 + 2NO$ 3)  $CO + 1/2 O_2 \rightarrow CO_2$ 4)  $C_x H_y + O_2 \rightarrow CO_2 + H_2O$ 



Figure 5.1 – Exhaust gas flow through ceramic monolith

Since high exhaust temperatures are required for a DPF to function properly, DCL may conduct an 8 to 72 hour data logging of the engine exhaust temperatures, prior to determining whether a MINE-X SOOTFILTER<sup>®</sup> is suitable for the application.

#### **5.2 Product Type Designs**

The **MINE-X SOOTFILTER®** is a catalyzed wall-flow diesel particulate filter that uses a platinum group metal for soot regeneration.

The **MINE-X SOOTFILTER®BM** is a catalyzed wall-flow diesel particulate filter that uses a base metal coating for soot regeneration with minimal  $NO_2$  formation. This product is used in confined spaces where ambient air concentrations of  $NO_2$  are of concern such as certain underground hard-rock/soft-rock mining applications.

The **MINE-X SOOTFILTER®LT** is a two-stage filter system. The first stage filter is a non-blocking metal mesh filter comprised of rolled alternating layers of corrugated stainless steel and a stainless steel sintered metal mesh. The second stage is a wall-flow diesel particulate filter. Due to the fact that it is a two-stage filter system, the "LT" is longer than the MINE-X SOOTFILTER<sup>®</sup>. The combination of the two filtration stages allows improved particulate removal efficiencies and lower soot regeneration temperatures.



# **APPENDIX** A

## MINE-X SOOTFILTER® DPF DIMENSIONS

	DCF1	DCF2	DCF2.9	DCF3	DCF4	DCF4.9	DCF5	DCF5.5	DCF5.9	DCF6	DCF7
Max. Engine Power*	45	98	165	165	226	262	276	315	420	494	845
hp (kW)	(34)	(74)	(124)	(124)	(170)	(195)	(207)	(235)	(313)	(371)	(634)
Max. Exhaust Gas	248	540	910	910	1246	1444	1522	1737	2315	2723	4659
Flow cfm $(m^3/h)^{**}$	(422)	(917)	(1546)	(1546)	(2118)	(2454)	(2586)	(2951)	(3934)	(4627)	(7916)
Approximate Weight	11.7	13	24	29	40	45	47	55	71	78	140
lb(kg)	(5.3)	(5.9)	(10.9)	(13.1)	(18.1)	(20.4)	(21.3)	(24.9)	(32.2)	(35.4)	(63.5)
A – Filter Diameter	6.09	7.93	9.93	9.43	10.93	11.68	11.68	12.43	13.43	15.43	20.43
in (mm)	(155)	(201)	(252)	(240)	(278)	(297)	(297)	(316)	(341)	(392)	(519)
B – Filter Centre Body	6.75	8.75	10.25	12.75	12.75	12.75	14.75	15.75	17.76	15.75	15.75
Length in (mm)	(171)	(222)	(260)	(324)	(324)	(324)	(375)	(400)	(451)	(400)	(629)
C – Length Clamp –	7.15	11.43	18.25	23.00	23.00	23.00	25.00	26.00	28.01	21.67	24.80
Clamp in (mm)	(182)	(290)	(464)	(584)	(584)	(584)	(635)	(660)	(711)	(550)	(630)
D – Overall Length	14.00	19.75	26.57	31.31	31.31	31.32	33.31	34.32	36.33	30.00	33.11
in (mm)	(356)	(502)	(675)	(795)	(795)	(796)	(846)	(872)	(923)	(762)	(841)
E – Inlet Diameter											
in (mm)	CUCTOMED ODECLEIED										
F – Outlet Diameter	CUSTOMER SPECIFIED										
in (mm)											

\*The MINE-X SOOTFILTER® DPF operates on equipment with diesel engines which meet the minimum heat requirement for self-regeneration. This chart is for reference use only. Contact DCL for final DPF size determination. \*\* At 400°C



# MINE-X SOOTFILTER®BM DIMENSIONS

	DBM1	DBM2	DBM2.9	DBM3	DBM4	DBM4.9	DBM5	DBM5.5	DBM5.9	DBM6	DBM7
Max. Engine Power*	26	58	97	97	133	154	162	185	247	290	495
hp (kW)	(20)	(44)	(73)	(73)	(100)	(115)	(122)	(138)	(184)	(218)	(371)
Max. Exhaust Gas	144	319	535	535	733	849	894	1020	1362	1599	2729
Flow cfm $(m^3/h)^{**}$	(244)	(542)	(910)	(910)	(1245)	(1442)	(1519)	(1733)	(2314)	(2717)	(4637)
Approximate Weight	11.7	13	24	29	40	45	47	55	71	78	140
lb(kg)	(5.3)	(5.9)	(10.9)	(13.1)	(18.1)	(20.4)	(21.3)	(24.9)	(32.2)	(35.4)	(63.5)
A – Filter Diameter	6.09	7.93	9.93	9.43	10.93	11.68	11.68	12.43	13.43	15.43	20.43
in (mm)	(155)	(201)	(252)	(240)	(278)	(297)	(297)	(316)	(341)	(392)	(519)
B – Filter Centre Body	6.75	8.75	10.25	12.75	12.75	12.75	14.75	15.75	17.76	15.75	15.75
Length in (mm)	(171)	(222)	(260)	(324)	(324)	(324)	(375)	(400)	(451)	(400)	(629)
C – Length Clamp –	7.15	11.43	18.25	23.00	23.00	23.00	25.00	26.00	28.01	21.67	24.80
Clamp in (mm)	(182)	(290)	(464)	(584)	(584)	(584)	(635)	(660)	(711)	(550)	(630)
D – Overall Length	14.00	19.75	26.57	31.31	31.31	31.32	33.31	34.32	36.33	30.00	33.11
in (mm)	(356)	(502)	(675)	(795)	(795)	(796)	(846)	(872)	(923)	(762)	(841)
E – Inlet Diameter											
in (mm)		CUCTOMED OBCUEED									
F – Outlet Diameter	CUSTOMER SPECIFIED										
in (mm)											

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## MINE-X SOOTFILTER®LT DIMENSIONS

	DLT1	DLT2	<b>DLT2.9</b>	DLT3	DLT4	<b>DLT4.9</b>	DLT5	DLT5.5	DLT5.9	DLT6	DLT7
Max. Engine Power*	45	98	165	165	226	262	276	315	420	494	845
hp (kW)	(34)	(74)	(124)	(124)	(170)	(195)	(207)	(235)	(313)	(371)	(634)
Max. Exhaust Gas Flow	248	540	910	910	1246	1444	1522	1737	2315	2723	4659
cfm (m <sup>3</sup> /h)**	(422)	(917)	(1546)	(1546)	(2118)	(2454)	(2586)	(2951)	(3934)	(4627)	(7916)
Approximate Weight	15	20	47	45	62	74	74	87	105	116	214
lb(kg)	(6.8)	(9.1)	(21.4)	(20.4)	(28.1)	(33.6)	(33.6)	(39.5)	(47.6)	(52.6)	(97.1)
A – Filter Diameter	6.09	7.93	9.93	9.43	10.93	11.68	11.68	12.43	14.41	15.43	20.43
in (mm)	(155)	(201)	(252)	(240)	(278)	(297)	(297)	(316)	(366)	(392)	(519)
B – Filter Centre Body	11.19	13.98	19.44	21.92	21.92	21.91	23.92	24.93	36.89	24.93	24.75
Length in (mm)	(284)	(355)	(494)	(557)	(557)	(557)	(608)	(633)	(683)	(633)	(629)
C – Length Clamp –	12.30	18.08	26.13	28.87	29.81	30.41	32.50	33.43	36.74	32.68	35.57
Clamp in (mm)	(312)	(459)	(663)	(733)	(757)	(773)	(826)	(849)	(933)	(830)	(903)
D – Overall Length	19.04	26.33	34.47	37.11	38.05	38.76	40.74	41.78	45.09	40.92	43.82
in (mm)	(484)	(669)	(876)	(943)	(966)	(985)	(1035)	(1061)	(1145)	(1039)	(1113)
E – Inlet Diameter											
in (mm)					CUSTC	MED SDEC	משושר				
F – Outlet Diameter		CUSTOMER SPECIFIED									
in (mm)											
*MINE-X SOOTFILTER <sup>®</sup> operate on equipment with diesel engines which meet the minimal heat requirements for self-regeneration. This chart is for reference use											
only. Contact DCL for final DPF size determination. ** At 400 <sup>°</sup> C											

