

Nett[®] S-Series Diesel Particulate Filter Installation

1. The Nett[®] S-Series diesel particulate filter can be installed horizontally or vertically. Due to the fact that high exhaust gas temperatures are needed for efficient operation, the filter must be installed as close to the engine exhaust manifold (or turbocharger) as possible. The ideal installation location is within 300 mm (12") of the manifold flange. Make sure that the filter is installed an adequate distance from temperature sensitive parts of the application. In most cases, the original muffler can be removed and discarded since the filter will provide adequate sound attenuation. The original muffler must be retained in cases where a critical or hospital grade silencer is required.
2. Choose a straight piece of pipe in the exhaust system. Check other parts for interference. Cut out a section of pipe to accommodate the length of the filter. If the filter is to be rigidly attached to a vehicle frame, a section of the inlet pipe should be replaced with a flexible connection to compensate for vibrations.

Important: approximately 1" of pipe on each end must be retained so that it can be inserted into the filter's inlet and outlet cones. In other words, the length of pipe cut out of the exhaust system must be 2" smaller than the overall length of the filter.

3. The filter should be installed so that the 1/8" NPT back pressure port is on the inlet end. Insert prepared pipes into the inlet and outlet cones. Make sure that the pipes are inserted deep into the cones and rest on the built-in stop rings.
4. Use muffler clamps (flat band type is preferred) or weld the cone ends to the pipe to seal the inlet and outlet. When welding is necessary, use type 308 rods or electrodes. The Type 304L stainless steel used for the Nett inlet/outlet cones does not require post-weld annealing.
5. Make sure that the filter weight is supported. Some extra brackets and supports of the exhaust piping and the filter itself may be necessary. Welding to the filter center body is not permitted and will void the warranty.
6. Thermal insulation of the inlet exhaust pipe and the filter body is recommended.
7. Once the installation is complete, measure the engine exhaust back pressure using the 1/8" NPT port on the inlet end of the filter. Ensure that the readings are within the engine manufacturer's recommendations. Record this initial reading for comparison with future readings to determine when the filter requires cleaning.
8. If the unit is supplied with a Nett PTLOG™ or other temperature/pressure monitoring/control system, please follow the installation instructions included with that system. It is highly recommended that all filter installations include some form of exhaust back pressure monitoring. The Nett PTLOG system is an inexpensive, reliable method of alerting the operator to potential problems, avoiding downtime and protecting the filter.
9. Carefully inspect the installation for exhaust gas leaks and secure mounting of the filter and exhaust system. Record the date of installation in the engine maintenance log.

Nett Technologies Inc.
2-6707 Goreway Drive
Mississauga, ON
L4V 1P7 Canada
tel: 905.672.5453
fax: 905.672.5949
e-mail: sales@nett.ca
web: <http://www.nett.ca>

installation & maintenance

Filter Regeneration

Nett[®] S-Series Catalytic Diesel Filters physically trap diesel particulate matter (soot). S-Series filters are coated with a special catalyst which lowers the soot combustion temperature, thus enabling the filter to burn off (regenerate) the soot during periods with higher exhaust gas temperatures. Carbon monoxide and hydrocarbon emissions are also reduced by the catalyst. The soot load in the filter and the associated pressure drop will fluctuate depending on the duty cycle of the engine, which will vary the exhaust gas temperature. Installations with lower exhaust temperatures regenerate slower and experience higher pressure drop (back pressure) over the filter.

The accumulated soot is oxidized in the filter during operation of the engine. The exhaust temperatures must be 275-300°C (530-575°F) or above for 25-30% or more of the operating cycle to burn off the soot when ultra-low sulfur diesel (ULSD) fuel is used. The exact temperature requirements vary with engine technology, with installations on older, higher polluting engines requiring higher exhaust temperatures for regeneration. For example, filters installed on older off-highway engines with high DPM emissions (e.g., over 0.30 g/bhp-hr) may require temperatures of 325-400°C (620-750°F). Regeneration also depends on other factors, such as the engine duty cycle, filter sizing and type of diesel fuel used. Ultra-low sulfur diesel (ULSD) fuel (S < 15 ppm wt.) is now widely available and should be used whenever possible with any diesel particulate filter.

Engines operating under light duty cycles with insufficient exhaust temperatures will experience increasing accumulation of soot leading to excessive pressure drop (back pressure) and filter overload. This condition can result either in complete clogging of the filter or in an “uncontrolled regeneration”. Uncontrolled regeneration occurs when an excessive soot load ignites and burns rapidly releasing an enormous amount of heat, which can cause the filter material to crack or melt.

Maintenance

The most important maintenance that can be carried out to keep the filter operating properly is **engine maintenance**. Diesel particulate filters should never be installed on engines that are not in good working order. Filters should never continue to be operated on engines that are no longer in good working order. Wear to engine valves or rings can cause high lube oil consumption. This oil will exit the engine through the exhaust system, and it can irreversibly deactivate the catalyst and impair the regeneration. Excessive soot emissions are also detrimental to the filter and will cause increased back pressure.

Nett diesel particulate filter installations on heavy-duty, high-temperature applications are nearly maintenance free. As a means of preventive maintenance a periodic back pressure and exhaust temperature check should be performed regularly. Filters installed on light-duty and/or low-temperature applications which experience problems with regeneration and increasing back pressure must be periodically cleaned. The frequency of cleaning depends on the back pressure level and must be determined by the user. Cleaning procedures are described on the following page.

A check of engine back pressure should be performed as part of the normal engine maintenance schedule, or weekly if the engine isn't regularly maintained. The measurement should be taken with the engine operating at high-idle, recorded and compared with the initial reading taken during installation. An increase in back pressure indicates a possible problem with the filter and need for cleaning.

An exhaust gas temperature check should also be performed weekly and recorded. Care should be taken that the temperature is measured under load and always under the same engine



Nett Technologies Inc.
 2-6707 Goreway Drive
 Mississauga, ON
 L4V 1P7 Canada
 tel: 905.672.5453
 fax: 905.672.5949
 e-mail: sales@nett.ca
 web: http://www.nett.ca

installation & maintenance

conditions. A 30 second long engine stall test is suggested as the best way to measure temperature and back pressure. To automatically monitor exhaust gas temperature and engine back pressure, installation of a Nett PTLOG™150 is recommended. The Nett PTLOG™150 is supplied with an operator warning signal, which alerts the operator when maintenance is required.

Troubleshooting

The following table lists possible filter problems, their causes, and recommended solutions.

Problem	Possible Cause	Action / Comment
High back pressure	Low exhaust temperature	Move engine to a heavier duty-cycle. Avoid idling. Periodically clean the filter.
	High engine soot emissions	Conduct engine maintenance (replace air cleaner, service fuel injectors, etc.)
	Prolonged presence of engine lube oil or coolant (antifreeze) in the exhaust	Catalyst may be irreversibly deactivated. Repair valves/rings/head gasket(s).
Visible smoke	Uncontrolled regeneration	Inspect the unit. Filter may be damaged (cracked, melted).

Filter Cleaning

Nett Technologies sells both compressed air and thermal filter regeneration stations and they are the preferred methods for cleaning filters. If a filter cleaning station is not available, the filter can be cleaned using one of the following methods, but only as a last resort. Any damage caused by incorrectly performed cleaning or maintenance will void the filter warranty. All other cleaning methods are not approved, as they may cause filter damage and therefore void the warranty.

Blowing with Compressed Air

Remove the filter from the engine and place a collection container over the inlet face. Clean the unit with an air gun, passing it slowly over the outlet face of the filter at about 5 cm (2") from the face. Keep cleaning until there is no visible soot leaving the filter. Reinstall the unit and check the pressure drop. Care must be taken to ensure that workers are not exposed to soot or ash nor that the soot or ash escapes into the environment. The collection container must be sealed to the inlet face of the filter and be large enough to trap all of the air used in the cleaning process or be fitted with a HEPA filter. The collected soot and/or ash may be classified as hazardous waste requiring safe disposal according to applicable regulations for the relevant jurisdiction.

Oven Cleaning

For periodic maintenance cleaning to remove any ash deposits and excessive soot from the filter, it is recommended to clean the DPF by exposing the unit to higher temperatures than normally encountered in the engine exhaust. Remove the filter from the engine and place it in an industrial oven. Slowly ramp up the temperature to 550-600°C (1000-1100°F) and hold for about 3-4 hours. If the air circulation in the oven is poor, more time may be necessary.

Warning: Oven cleaning, when performed with overloaded filters and in ovens with high air circulation, might damage the filter and is not recommended for inexperienced users.

Nett Technologies Inc. has a corporate policy of continuous product development. Specifications are subject to change without notice. Engine maintenance and operation must be carried out as per the engine manufacturer's instructions.