EXILATOR

Installation Manual

ExiLencer™ System

2022

Contents

1 Exilator's Award Winning ExiLencer™ System

The ExiLencer™ system is a passive system, without any supplementary mechanical equipment or use of additives and chemical substances.

The system consists of 4 sections:

1. The inlet section ("1" in figure 1)
2. The DPF section ("2" in figure 1)
3. The NO2/NOx reduction section ("3" in figure 1) - Optional
4. The outlet ("4" in figure 2)

Depending on the engine size there exist two designs:

1) Squared design: The system is modular and the building blocks (ExiBlock™) are HxWxL: 289 mm x 289 mm x 381 mm
   The squared design is usually for engine sizes larger than 200 kW.

2) Round design: The round design exists in 3 variants and is suited for diesel gen-sets, covering following engine sizes.
   - ExiLencer™ Micro, for up to 50 kW
   - ExiLencer™ Mini, for up to 100 kW
   - ExiLencer™ Standard, for up to 200 kW

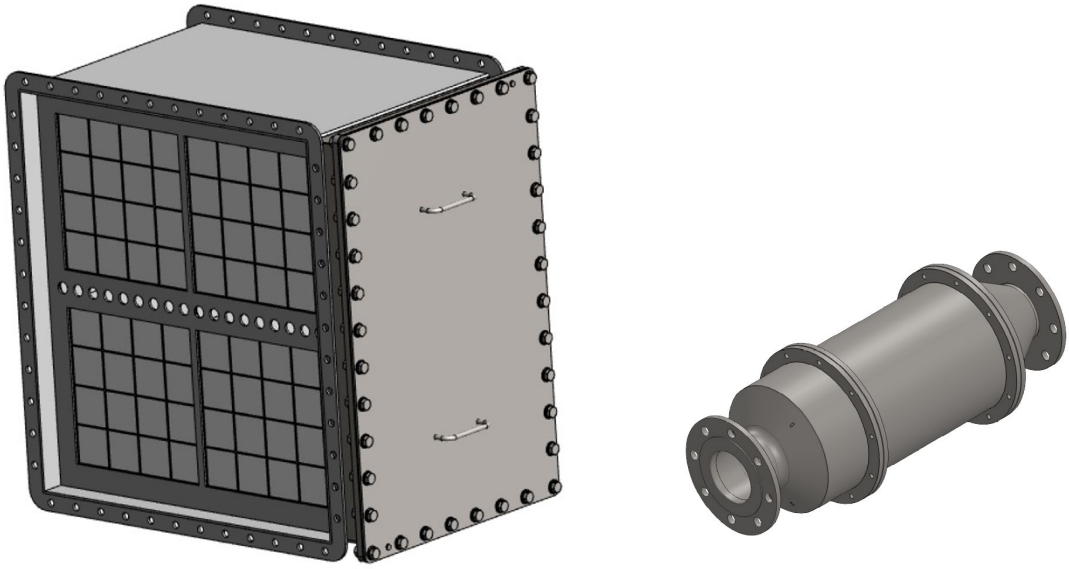


Figure 1: Shows the a squared 2x2 ExiBlock system (to the left) and the ExiLencer™ Mini (to the right)

1.1 Process Flow

The system needs to be installed in right direction. Figure 1 presents the process flow of the exhaust gas with 1 being the inlet and 4 being the outlet. The exhaust gas flows from the engine through the diffusor (1), and the exhaust gas distributes evenly across the whole of the first section.

The exhaust gas flows from the first section into the ExiBlock™'s (2), where the filtering of particulate matter occurs.

The exhaust gas flows from the ExiBlock™'s (2) and through to the NO_2-reduction catalyst (3)- OPTIONAL

The NO_2-reduction catalyst is the last part of the system, and from that section, the exhaust gas flows directly in to the last section of the system (4), where the exhaust gas has a soft exit to the stack (the rest of the exhaust pipe).

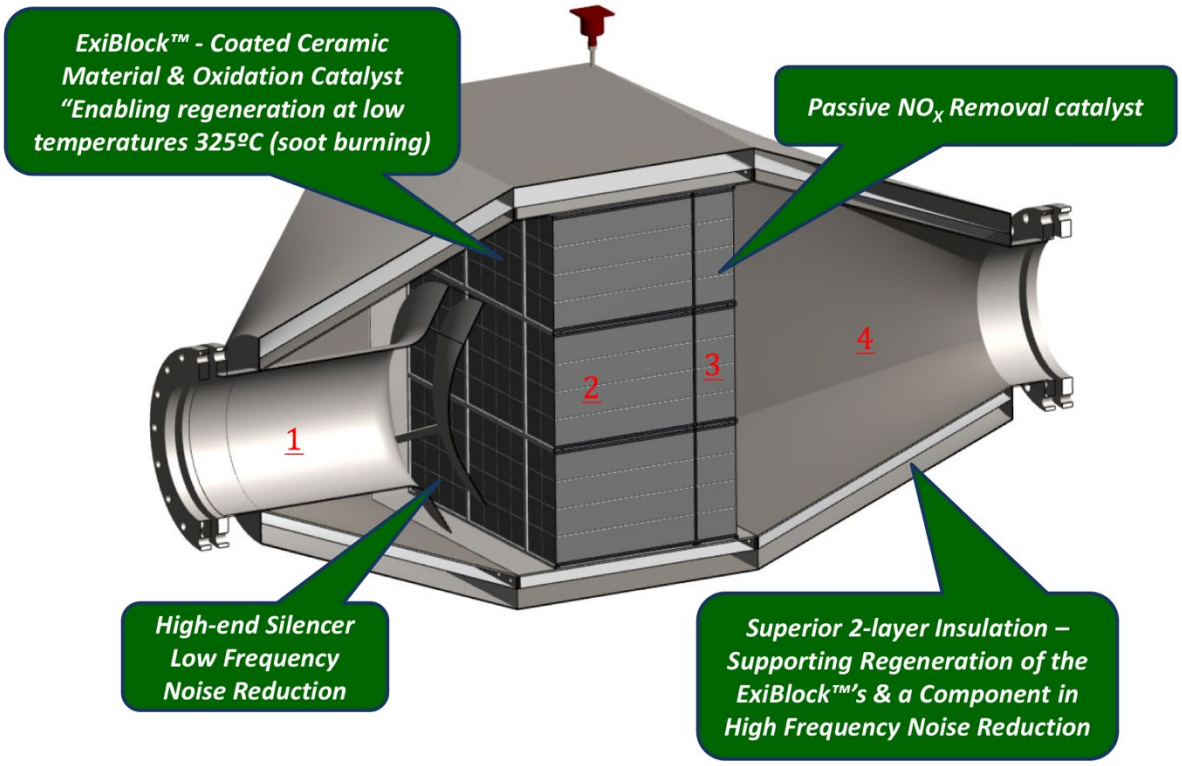


Figure 2 Overview of the filter system. Each section ends to the right of the number, except section 3 it ends at the end, and starts after compartment 2

1.2 Scope of Supply (Materials and Parts)

The filter system consists of the materials and parts listed beneath.

- Coated ExiBlock™'s (squared or round) of recrystallized silicon carbide (R-SiC)
- Casing (squared or round)
- Ceramic mats, when squared ExiBlock™
- Flanges
- Gasket, bolts and insulation tape (for square units only)
- Diffuser/Silencer
- 2 Analogue back pressure gauges with fittings
- 1 Thermometer with probe
- OPTIONAL
    - For the round ExiLencer™ a round hollow spacer/adapter can be supplied for inserting when cleaning or for emergency
    - Electronic Datalogger or Transmitters

1.3 The Squared ExiLencer™

The casing is made of stainless steel type AISI 321.

The squared ExiBlock™ dimensions are:

- Weight: 32 kg
- Volume: 29 liters
- Length: 0.381 m
- Height: 0.289 m
- Width: 0.289 m

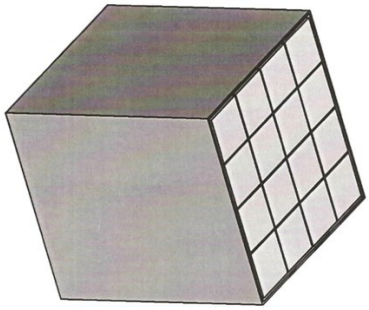
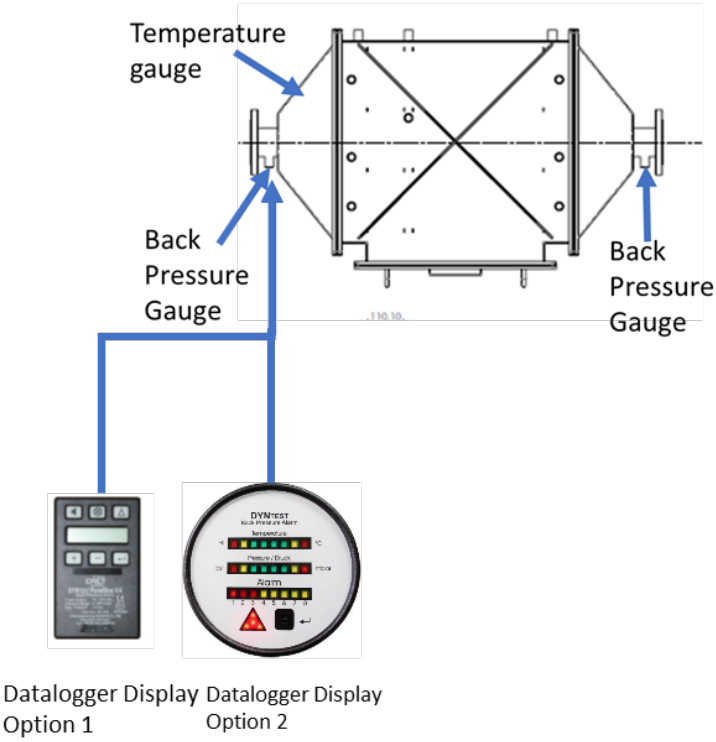


Figure 3 Example - squared ExiBlock™

The system will be delivered in 4 main parts, plus knots & bolts, and internal insultation, and gauges if ordered.

Inlet, outlet, midsection and a hatch.

MUST BE INSTALLED AS CLOSE THE EXHAUST MANIFOLD AS POSSIBLE.



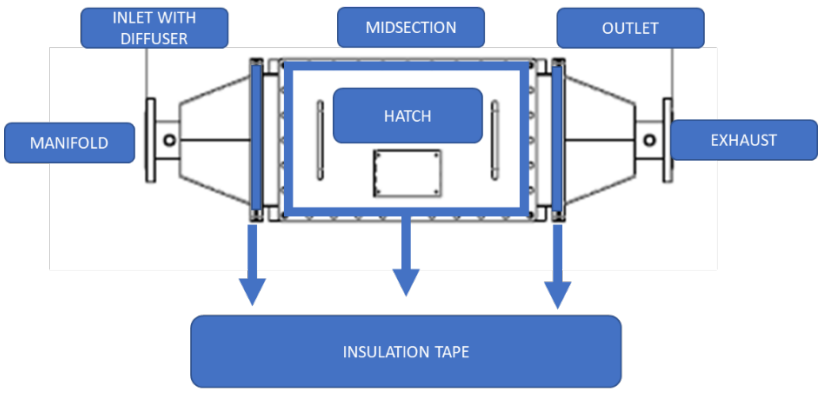
Datalogger Display Option 1

Datalogger Display Option 2

The analogue gauges are inserted into the pre-drilled holes (1/2 inch)

The optional datalogger only has one probe (measures temperature and backpressure), and is inserted on the inlet side only.

Please not only dataloggers & transmitters provide alarms in case of too high backpressure.



Insulation "tape" (glue on one side) is delivered un-cut, but easy to cut to fit.

"Tape" is cut and added 3 places –
"Inlet – Midsection",
"Midsection – Outlet"
"Inside of the hatch"

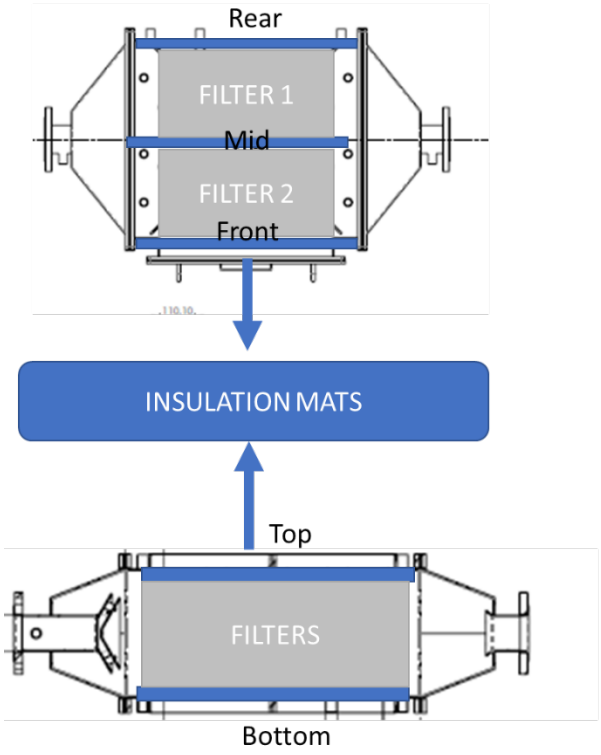
Make sure it is completely tight (end must meet)

Step 1:
Measure total length of "tape" needed

Step 2
Cut "tape

Step 3
Remove paper from backside of tape, and glue on surface

NOTE: Filters will be ruined if in contact with water : Filters should therefore always be installed above the water line, and if any existing water sprayer (for wet exhasust systems) should be installed in such a way that water cannot flow backwards and harm the filter.



Insulations "mats" are delivered cut, so it should be easy to insert.

Insulation must cover all sides of the filter except, inlet and outlet side.

The "mats" are used to avoid any exhaust leakage, and will expand when heated.

Step 1:
Insert 3 mats "mats" : Rear, Top and Bottom

Step 2
Slide in filter 1 – push to Rear wall

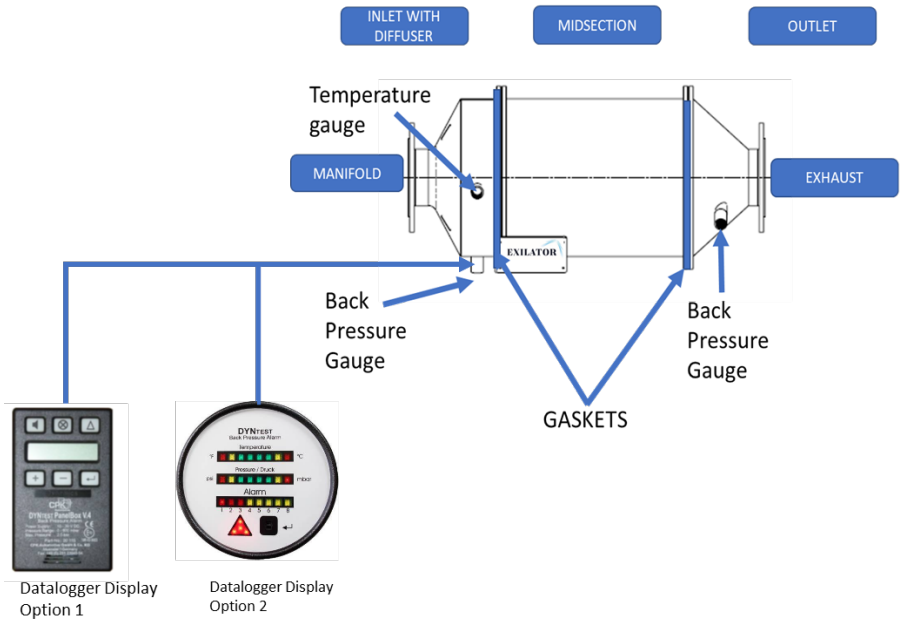
Step 3
Insert "Mid Mat"

Step 4
Slide in filter 2

Step 5
Insert "Front Mat"

Step 5
Add hatch

1.4 The Round ExiLencer™



Datalogger Display Option 1

Datalogger Display Option 2

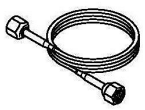
For easy installation, choose the optional hollow mid-section, and replace with catalyst when system properly fitted – see drawing on the left.

The analogue gauges are inserted into the pre-drilled holes (1/2 inch)

The optional datalogger only has one probe (measures temperature and backpressure), and is inserted on the inlet side only.

Please not only dataloggers & transmitters provide alarms in case of too high backpressure.

Analogue gauge: The distance from predrilled hole to backpressure gauge should be minimum 50 cm with the use of max 1 mm capillary steel pipe. Gauge should be placed above the filter to avoid condensation.



1.5 Sensor(s)/Dataloggers and Heatjackets – See separate manuals

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2 Testing the System

NOTE: If original exhaust pipe system is not cleaned prior to the test or operation of the system, it should be expected, that the exhaust will contain soot residues for several hours of operation.

2.1 Leakage Test

A leakage test has been carried out before the ExiLencer™ system is shipped from factory. This is part of the standard quality procedure, prior to shipment.

If a leakage test needs to be carried out on-board, the following procedure should be followed:

1. Blind both inlet and outlet flanges.
2. Connect pressurized air of 500 mbar to the system.
3. When the system is pressurised it must withstand 500 mbar for 15 minutes.

2.2 Test of Alarm Signal and Crew Notification (Only if Datalogger or Transmitter is Supplied)

Follow the manual for the Datalogger or Transmitter.

2.3 Back Pressure Build-up, Soot Loading and verification of Balance Point (Optional)

The first test is a test where back and differential pressures are recorded at various loads, starting at 100% load.

The purpose is to identify setting for the pressure build-up test,

2.3.1 0% (Idle), 100%, 75%, 50%, 25% & 0% (Idle) Load Build Test

Record load, exhaust gas temperature, back pressure and differential pressure at:

1. 100% engine load
2. 75% engine load
3. 50% engine load
4. 25% engine load
5. 0% engine load (idle identify potential soot load from test)

2.3.2 Soot Loading

The soot loading can take hours or even a whole day, depending on engine and operation, however, important is:

- That the soot loading is carried out at a load not providing more than 300°C, as a positive regeneration of the system must be avoided.
- That the initial conditions at start and end of the test is recorded.
- That the engine runs for sufficient hours to build up a soot cake not exceeding the 60% maximum allowed back pressure. Please evaluate the 100% load test to determine the available operational margin.

Please view and use the test Table in Section 2.3.4.

As initial system alarm setting there are two situations:

1. Water cooled system:
    a. The recommended setting of back pressure (BP) alarm threshold/limit is 80% of the maximum allowed back pressure, regardless round or squared ExiLencer™ systems.
    b. The recommended setting of the differential (ΔP) alarm threshold/limit is 40% of the maximum allowed back pressure
2. Not water cooled systems:
    a. The recommended setting of back pressure (BP) alarm threshold/limit is 80% of the maximum allowed back pressure, regardless round or squared ExiLencer™ systems.
    b. There should be no differential pressure measurement for not water cooled systems, and consequently no setting needed.

2.3.3 Load Build & Verification of Regeneration Point – Optional

This test is similar to the initial load build test, as described earlier in Section 2.3.1. Here it is important that the soot load is significant to start regeneration, therefore, the balance point test is often carried out as a continuation of the the load build test.

Even it is a repetition of the first load build test, there is however, 4 to 5 additional recordings to be made and the test sequence is starting at low load going to high load. We have the following test points:

1. 0% engine load (idle & reference)
2. 25% engine load
3. At 310 deg. C, remember to note corresponding load
4. At 320 deg. C, remember to note corresponding load
5. At 330 deg. C, remember to note corresponding load
6. At 340 deg. C, remember to note corresponding load
7. At 350 deg. C, remember to note corresponding load
8. 50% engine load
9. 75% engine load
10. 100% engine load
11. 0% engine load (idle identify potential soot load from test)

2.3.4 Table for Measurements (Used for Test) – System Reference

Below Table should be used during commissioning or harbour/sea acceptance test (HAT/SAT) of the ExiLencer™ system.

The Table should be stored as reference for the installed system and a print can be included in acceptance documentation.

When the test has been carried out, you can contact Exilator and we can help you to work out the correct alarm setting for the back pressure and differential pressure.

Measurement Table:

Engine Information							
Date		Comments					
Engine Type/Model		Maximum allowable Back Pressure (Limit) [kPa]					
Filter size (e.g. 1x2 ExiBlock's)		Wet or dry system	Yes/No?	Wet system BP [kPa]			
Load build up							
Engine Load [%]	Corresponding to [kW]	Temperature [C]	Time passed to stable BP [Min]	Backpressure [kPa]		Diff. Pressure [kPa]	
		At stable BP		After 1 minute	When stable	After 1 minute	When stable
0 (first initial run = reference)							
100							
75							
50							
25							
0 (+BP => soot build during test)							
Soot loading							
Temperature [C]	Time passed [hours:min]	Engine Load [%]	Corresponding to [kW]	Backpressure [kPa]		Diff. Pressure [kPa]	
Exhaust temperature must initially be less than 290 deg. C	Since start of test						
e.g. 290	At start						
	4 hours						
	8 hours						
End Test							
	xx hours						
Load Build & Regeneration Point							
Temperature [C]	Engine Load [%]	Corresponding to [kW]	Time passed to stable BP [Min]	Backpressure [kPa]		Diff. Pressure [kPa]	
Preferred values at stable BP				After 1 minute	When stable	After 1 minute	When stable
?	0 (Reference)						
?	25						
310	?						
320	?						
330	?						
340	?						
?	50						
?	75						
?	100						
?	0						

TO BE FILLED BEFORE INSULATION ADDED

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DATE	EXILATOR SERIAL NUMBER (SEE SIDE OF FILTER)	ENGINE BRAND	SERIAL NUMBER