

SILENTOR

MORE POWER - LESS EMISSIONS - CLEANER ENERGY



SILENTOR
Patented technology since 1972

MAIN OFFICE DENMARK SILENTOR A/S
SUDERBOVEJ 22 | DK-9900 FREDERIKSHAVN
TEL.: +45 46 55 00 55 | FAX: +45 46 55 00 50
SILENTOR@SILENTOR.COM | WWW.SILENTOR.COM

**HIGH PERFORMANCE EXHAUST SILENCERS
FOR DIESEL AND GAS ENGINES**



**SILENTOR
– A DANISH
HIGH-TECH
COMPANY**

Silentor is a well-established company focusing on development, production and sales of exhaust silencers mainly for diesel and gas engines.

Through more than 30 years of research and development into silencing, Silentor have created unique silencer principles that offer superior performance in crucial areas:

- *Effective noise reduction*
- *Especially in the low frequency area*
- *Low backpressure*
- *Flexible shapes using limited space*

Whether the solution can be found in our wide range of standard designs or a unique, custom engineered silencer solution, the customer's specific needs and requirements are always the basis of our work.

*The SCR combined units installed in this Coast Guard vessel consist of an ultra-compact silencer and an SCR reactor for noise attenuation of 45 dBA.
Produced by Silentor.*

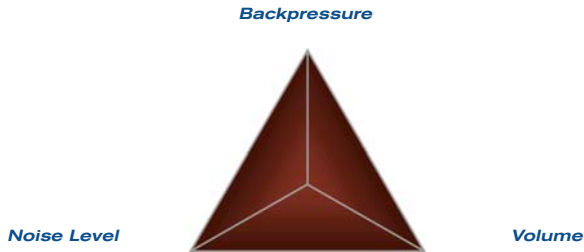
PATENTED PRINCIPLES

Silentor's patented principles for exhaust noise attenuation combines absorptive and reflective attenuation with advanced aerodynamics in such a way that the Silentor silencers have proven to be superior to conventional silencers in terms of:

- **Noise Attenuation**
- **Backpressure**
- **Use of space**

Any of these parameters can be optimised as illustrated by the smaller triangles e.g. more effective noise attenuation or lower back pressure within a given volume. It is also possible to optimise any combination of the parameters e.g. decrease a given volume and back pressure while still maintaining the original noise attenuation.

BASIC PARAMETERS

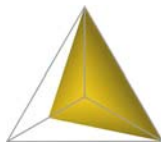


OPTIMISING AS REQUIRED

REDUCED BACKPRESSURE



REDUCED NOISE LEVEL



REDUCED VOLUME



COMBINATION



Special low-frequency attenuation

Compared to other silencers, Silentor silencers provide superior attenuation at all frequencies audible to the human ear – including low-frequency noise, where conventional silencers have minimal impact. This low frequency noise, which depends on the speed of rotation of the engine and the number of cylinders, is very often not only irritating but also a critical hindrance to achieving an acceptable overall noise level.

Fuel saving

Silentor pressure-recovering diffusers and other aerodynamic elements ensure substantial noise reduction with only limited accompanying pressure-losses. Reduced back pressure can be translated into either reduced fuel consumption or increased momentum and engine power.

Limited size

The Silentor principles for attenuation make it possible to achieve noise reduction according to specifications even when the space available is so limited and irregular that installation of a conventional silencer is impossible.

Longer life span

Silentor silencers are designed and built for reliability and durability. The construction itself is well proven and solid as a "semi-pressurised" vessel. In addition, the absorptive material is specially positioned and shielded within the silencer, ensuring that Silentor silencers maintain their capacity for attenuation during their entire lifespan.

Internal design and outer dimensions

When the necessary engine parameters, installation restrictions and desired level of attenuation are known, an optimised design is produced using computer simulation and comprehensive calculations. With this information, the effectiveness of the solution can be guaranteed.

Additional calculations regarding noise and pressure in the connecting pipework can also be carried out by Silentor.

Ready made

Apart from being able to create custom silencer solutions, Silentor also stocks a wide range of standard silencers from 3" to 12" covering different demands for attenuation.

SPARK ARRESTOR



*All our spark arrestors
are approved by
Det Norske Veritas.*



*All of our production sites
are ISO 9001 and
ISO14001 approved.*

CHIMNEY INTEGRATED SILENCER

Very often space is limited when engine installations are built. All the components in the exhaust system must therefore be as small as possible.

A Silentor silencer solution is the logical choice when space is limited. Due to its patented attenuation principles, Silentor is capable of creating silencers with less volume than other conventional silencer solutions.

Furthermore – by implementing Silentor's extremely flexible silencer technology, the silencer solution can be customized for installation in the chimney. This offers obvious space savings in the engine room.

Another advantage of integrating the silencer in the chimney is that this allows completion of the engine installation before mounting the silencer in the chimney, making it possible to determine the actual emitted exhaust noise from the chimney top by simple noise measurement. This means that the silencer solution can be optimised according to the actual need for attenuation. It may be the case that other components in the exhaust system such as catalysers and heat exchangers attenuate the exhaust noise so much that it is not necessary to insert a silencer in the chimney afterwards.

In order to achieve the optimal solution we recommend our involvement in the project at an early stage.



LOGISTICS

Silentor has many years of experience in the transportation of silencers and this is a great advantage to our customers, making it even easier to do business with Silentor. We are able to offer you a good package deal when buying a Silentor Silencer Solution, by including transport of the silencer and delivery to any address according to your wishes.

Silentor has great experience in handling fast and reliable transportation and deliveries inside and outside the EU, for example: Norway, Turkey, Ukraine, Russia and United Arab Emirates. Our prices are highly competitive and if you choose to let us handle the transportation of your silencer, we will also take care of all the required papers and documents needed for export etc. – Making it very convenient for you, and yet another good reason to do business with Silentor.

Silentor is capable of handling special packing instructions according to your wishes, e.g. ISPM15, and in the case of overseas transportation are also able to provide seaworthy packing of your silencer.

If you need cargo insurance for the transportation just ask us, and we will be happy to include it in our offer.

Silentor is pleased to be able to offer this all-inclusive package solution for the benefit of our customers.



SILENCER ATTENUATION REQUIREMENTS

One of the most important issues related to attenuation of noise generated by engines is the determination of how much the various noise sources need to be attenuated. Typically, it is necessary to attenuate both mechanical noise and exhaust noise from a combustion engine.

Mechanical noise can be attenuated by encapsulation of the noise source. Exhaust noise is attenuated by leading the airborne noise through an exhaust silencer. It may also be necessary, depending on attenuation demands, to insulate the exhaust pipe between the engine and silencer, in order to prevent exhaust noise passing through the pipe wall from adding to the overall noise level.

In order to achieve efficient overall attenuation of a combustion engine, it is typically necessary to determine both the unsilenced mechanical noise as well as the unsilenced exhaust noise independently of each other.

Mechanical noise can be determined by a noise measurement taken close to the engine while the contribution from the exhaust can be reduced by leading an insulated pipe far from the engine. The exhaust noise can be determined close to the exhaust outlet for the engine combined with encapsulation of the mechanical noise.

If mechanical and exhaust noise cannot be separated, there is the risk of attenuating the wrong noise source, i.e. the non-dominant/non-contributing source, leading to poor overall attenuation of the engine.

We recommend that the determination of the various noise sources is carried out by an independent noise specialist such as an acoustical consultant.

Silentor is also capable of determining noise levels from various engine noise sources, provided clearly defined noise sources have been determined.

ACCESSORIES



EXHAUST RAIN CAP

To complete any vertical exhaust system, Silentor offers Rain Caps, also known as Rain Flaps.

These high-quality caps are specially designed to include a polyimide bush to help eliminate cap slap noise while in use.



Available in
AISI 430
Stainless steel.

FLEXIBLE SUSPENSION

Stabilisers / hanging and standing fixed points
The stabilisers are sized and positioned to allow maximum thermal expansion of the exhaust system between the fixed point in the exhaust and the stainless steel bellows. It is necessary to place the stabilisers at an angle of approx. 90° for flexible support of the exhaust piping in the required directions. If necessary, the length of the stabiliser can be reduced by one-third of its length.



ACCESSORIES

FLEXIBLE SUSPENSION *(continued)*

The hanging fixed points support the exhaust system and control the dynamic forces which occur in the system while the vessel is in operation. The fixed points control the direction of thermal expansion within the exhaust system.

The standing fixed points support the exhaust system and control the dynamic forces which occur in the system while the vessel is in operation. The fixed points control the direction of thermal expansion within the exhaust system.

COMPENSATORS

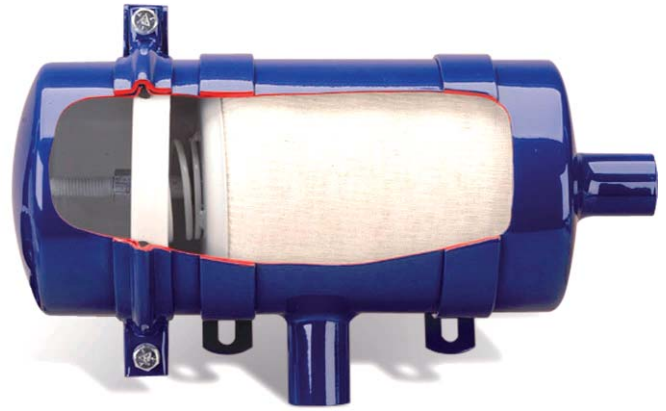


All exhaust pipelines are always exposed to thermal expansion, vibration, pressure thrust forces and foundation settlement. These factors result in movement in the pipeline, requiring installation of flexible parts to absorb these movements and hence prevent them from causing damage to the pipeline. If it is not possible to design the pipeline so that it can absorb these movements itself, for instance via a loop expansion joint, a steel compensator is the optimum solution. The compensator functions as the flexible element in the pipeline that allows movements in the pipeline because these are absorbed by the compensator.

EcoVENT™

The EcoVent™ Recirculator removes oil mist coming from the engine crankcase vent.

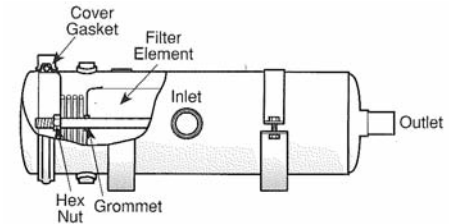
This contributes to a cleaner, healthier and safer environment. Engine room maintenance costs are also reduced.



Cleaner Environment

The EcoVent™ Recirculator removes 99% of oil mist and airborne particles. This makes it possible to duct the now clean blow-by fumes into the air cleaner for a completely sealed crankcase ventilation system.

The sealed system removes 100% of blow-by mists and gases from the atmosphere without danger to the engine.



Reduced Oil Consumption

After oil droplets are removed from the gasses, they pass through an absorbent depth medium, which cleans them so they can safely be returned to the oil sump.

FINLAND

Tapimec OY
Palopellonkatu 1
FIN-04250 Kerava
Tel: +358 9 289 600
Fax: +358 9 274 65 315
E-mail: arto.rautiainen@tapimec.fi

GREECE

Technava S.A.
6, Loudovikou Sq.
185 31 Piraeus
Greece
Tel: +30 210 4113916
Fax: +30 210 4122450
E-mail: info@technava.gr

NORWAY

TVTrading AS
Kløverveien 5B
4326 Sandnes, Norway
Tel: +47 90195853
E-mail: tv@tvtrading.no
Web: www.tvtrading.no

SWEDEN

Björllins
Skeppsbron 5
SE-411 21 Göteborg
Tel: +46 31 774 10 25
Fax: +46 31 774 20 65
E-mail: info@bjorllins.se

UNITED KINGDOM

GenCat Ltd.
Unit 16
The Edge Business Centre
Humber Road
London NW2 6EW
Tel: +44 (0)20 8450 6160
Fax: +44 (0)20 8452 2822
E-mail: info@gencat.co.uk

Main office**DENMARK**

SILENTOR A/S
Suderbovej 22
DK-9900 Frederikshavn
Tel: +45 46 55 00 55
Fax: +45 46 55 00 50
E-mail: silentor@silentor.com

