

ELASTIC SUPPORT – MADE IN GERMANY

Exhaust Pipe System



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2nd Revised Edition
New Products & Services



2 Certificates



SB Broneske is able to provide certificates for all of its products. The SB Broneske products fulfil the highest standards and requirements of all classification societies.

Extended Service: 8 Languages

SB Broneske provides the company brochure and technical offers in eight languages. Choose between English, German, Russian, Chinese, Korean, Spanish, Norwegian or Japanese. Download or order the SB Broneske company brochure "Exhaust Pipe System" in your language.



www.broneske.de/en/company-brochure-in-eight-languages



INVENTOR

Welcome to Schwingungstechnik-Broneske GmbH

In 1972, our company's founder, Erwin Broneske, introduced a revolutionary elastic support system to the German shipbuilding industry. His idea was to isolate diesel engines from the hull structure by way of applying the first modern vibration mounts for the maritime industry. During more than 40 years of existence, this idea has come a long way and today SB Broneske is an integral part of the worldwide shipbuilding industry.

The idea of taming vibrations and reducing noise levels on board of vessels and contributing to their undisturbed operation is still the heartbeat of SB Broneske and the elastic support of the exhaust pipe system remains our main focus. We consider ourselves as elastic supports specialists and our scope and experience ranges from the support of on-board machinery to various on-shore applications such as power plants and wind turbines.

We produce all of our state-of-the-art physical products in our local factory in Quickborn near Hamburg, Germany. This enables us to always meet our own as well as our customers' high quality demands. However, our business is not solely based on the unmatched quality of our equipment; it equally depends on our vast expertise in this field, which we pass on to our clients in every single project by way of free engineering services. We thus aim to accompany every project as closely as possible from as early as the design of the exhaust system to the final installation of our equipment.

Please read the following pages to find out how you and your shipbuilding projects can benefit from SB Broneske.

SB Broneske is certified according to ISO 9001:2015 by Bureau Veritas Certification.

4 SB Broneske – Doing Things Right

Maritime Labour Convention (MLC 2006)

Looking at the lifetime of a vessel it is obvious that ship operators/owners benefit most from a reliable elastic support system. Not only does it keep operational costs involved at a minimum; moreover, it plays a vital role in the overall operation of the vessel. There are many seafarers around the globe. However, employing a qualified crew is a problem frequently mentioned by shipping companies. Life at sea is not easy and qualified seafarers choose only the most comfortable vessels to work on.

In 2006 the Maritime Labour Convention set standards for working conditions of seafarers around the globe. Classification societies and seafarer unions have previously set vibration and noise guidelines at around 60 decibel throughout the accommodation, but its implementation was

not taken seriously at times.

With the MLC 2006 soon to be ratified, this situation is likely to change, and operators will face serious (financial) consequences if working conditions do not fulfil the requirements.



SB Broneske uses its expertise to comply with already existing and future noise requirements, and contributes to the successful and sustainable operation of the vessel.

Green Business is Good Business



Our goal is to provide a sustainable elastic support system for the benefit of every stakeholder involved – may it be the shipyard, the owner, the vessel's crew or even the environment. This system contributes

significantly to the undisturbed operation of the vessel and clients can be assured of the highest available standard.

Besides obvious operational and economic advantages for shipyards and owners, one may also notice a green aspect in this, as ship operators are highly unlikely to cause extraordinary CO₂ emissions by turning off/on the engine(s) while sailing in order to fix the exhaust pipe system. Furthermore, another green aspect of SB Broneske lies in our physical goods which do not contain any hazardous materials and fulfil the requirements of the green passport while also protecting the health of our own staff.

Satisfied Long-Term Customers

5



FINCANTIERI



BAE SYSTEMS



Navantia



ULSTEIN®

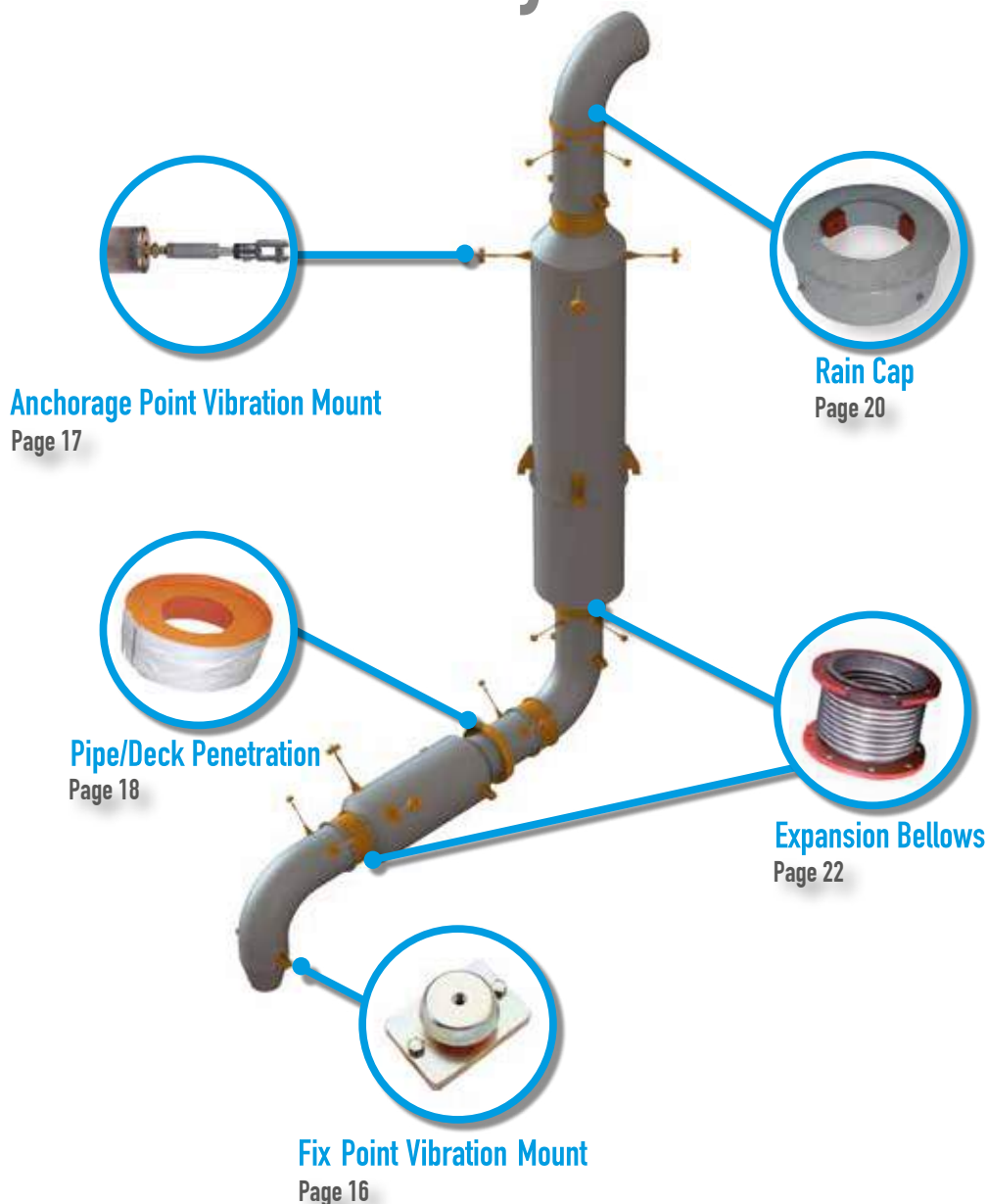


Képpel Offshore & Marine





Elastic Support – Made in Germany



Every piece of machinery on board of vessels requires elastic elements in order to prevent the transmission of vibrations into the ship's structure and consequent emergence of structure-borne noise. Due to its size and function as outlet for the big engines, the exhaust pipe system is one of the main sources of increased noise and disregarding this fact can cause different problems for shipowners and shipyards.

Ever since diesel engines replaced steam engines, labour

unions and classification societies have defined requirements for noise levels for different areas of a vessel. Outside the engine room this level is usually set at 60 decibel and below. Elastic support systems help shipyards and owners to meet these requirements. Furthermore, the SB Broneske state-of-the-art elastic support system limits the usual wear and tear of the exhaust pipe system, whereby we prevent extraordinary operational costs and contribute to the undisturbed operation of every vessel.

8 Reduce Your Overall Costs

Suppliers' Comparison

SB Broneske provides most advanced technical offers & additional services. Local suppliers provide product copies without technical/design support. SB Broneske provides products on a highest quality level, SB Broneske helps to

reduce overall costs while supporting design offices as early as during the design stage of the exhaust pipe system.

	Supplier A Local supplier of vibration mounts, no technical support	Supplier B Special supplier for vibration mounts for the maritime industry	SB Broneske Maker of vibration mounts with outstanding support for the maritime industry
Vibration mounts	●	●	●
Vibration mounts for the maritime industry	○	●	●
Layout proposal for the maritime industry	○	●	●
Technical support for the maritime industry	○	●	●
Vibration analysis for the maritime industry	○	◐	●
Design office check list	○	○	●
Installation instructions for the maritime industry	○	○	●
Labelling system for the maritime industry	○	○	●
Service around the world (sea trial and maintenance)	○	◐	●
Warehouses for spare parts on three continents	○	◐	●

SB Broneske vs Self-Contained Solution

One alternative to highly advanced SB Broneske elastic support systems are different kinds of self-contained solutions. Sometimes these solutions do not consist of more than an arrangement of steel bars. The main reason

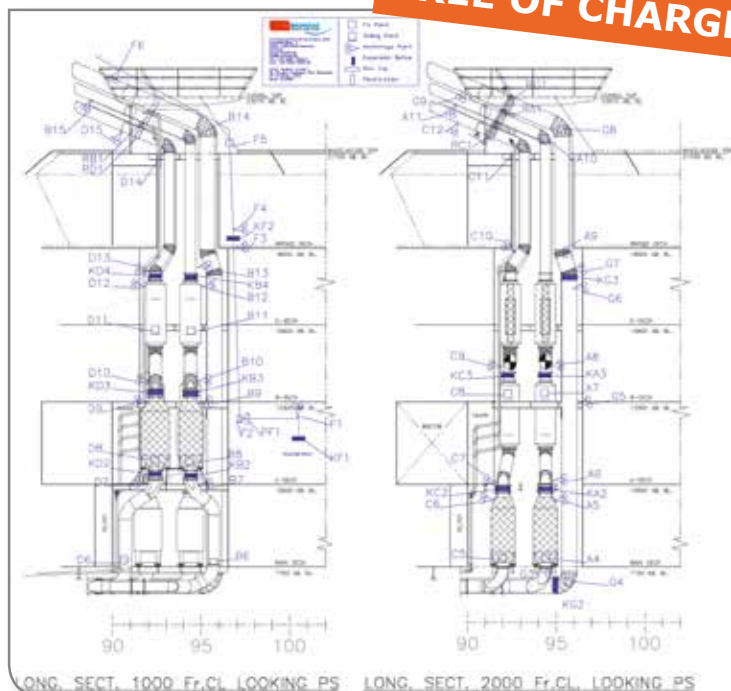
for deciding against a state-of-the-art system is money. We believe that this is a wrong assumption and we have derived the following overview in order to illustrate why we believe that SB Broneske actually reduces overall costs.

	SB Broneske	Self-contained Solution	Cost Average	
Design / Engineering	Free and fast layout proposal & vibration calculation with SB experience	Shipyard/design office needs much more time for design and especially calculations	SB Broneske	1:0
Expansion bellows	SB layout often with fewer expansion bellows; very competitive prices due to economies of scale	Expansion bellows must be installed in any case. Yard purchases far fewer expansion bellows than SB sells. Yard in most cases pays higher price to local supplier	SB Broneske	1:0
Vibration mounts – product costs	Produces more than 100,000 high quality vibration mounts every year and can give very good price	Individual solution of yard, small number of brackets, local manufacturer will most likely not be able to match SB price and quality	Draw	0:0
Vibration mounts – installation costs	Very easy welding, adjustment, and maintenance	Shipyard's own solution often more complicated and time-consuming	SB Broneske	1:0
Happy seafarer	Guaranteed low noise level protects the overall health of the crew and improves working conditions	High noise creates diseases, effects manpower	SB Broneske	1:0
Happy owner	Owner will face very low maintenance and no extraordinary operational costs	High vibration level creates cracks/damages on exhaust pipe parts and the ship's structure/decks	SB Broneske	1:0
Result	SB Broneske elastic support offers superior noise & vibration reduction for lower overall costs.			5:0

In the following, we would like to introduce SB Broneske's unique service portfolio and illustrate how we assist our clients in developing the best possible solutions for their individual projects.

Layout Proposal

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Vibration Analysis

Knowing where the individual elastic parts need to be placed does not necessarily make a reliable exhaust pipe system. In the second step of our technical support, we carry out the necessary calculations with our very own SB Broneske software. This software, an in-house development, is programmed to adjust and align different parameters such as the frequencies of pipe sections, propellers, the exhaust gas, and vibration mounts in combination with other important pipe and engine details. As a result, it not only calculates the reduction of structure-borne noise for each position in the layout proposal; moreover, it helps us to identify which one of the SB Broneske mechanical parts is the best solution for it.

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[B] Vibration analysis of the Exhaust Pipe for the Main Engine

Technical data of the device: Main Engine											
Engine Product	Caterpillar	Type	3512	Stroke	A	No. of Cylinders	12				
Power Output (kW)	1240	RPM	1800	Exhaust Gas Temp. (°C)	402						
Technical data of the exhaust pipe system of the Main Engine											
Pipe Diameter (mm)	350	Pipe Weight per Meter (kg/m)	58	Max. Exhaust pressure (kg)	29						
Arrangement Vibration Mounts and Vibration Calculation											
Pos.	Flange Number	Quantity	Product Type	Weight of Pipe Section (kg)	Direction pipe section	Load per Mount (kg)	Deflection (mm)	Natural Frequency Mount (Hz)	Exhaust Frequency (Hz)	Vibration Isolation (%)	Structure-borne Noise Reduction (dB)
0.1	F	1 x 2	SB-K002	400	Horizontal	200	1.11	15	180	99.3	43.1
0.2	A	1 x 2	SB-K001	--	Horizontal	--	3	9.13	180	99.7	51.8
0.3	A	1 x 2	SB-K001	--	Horizontal	--	3	9.13	180	99.7	51.8
0.4	A	1 x 2	SB-K001	--	Horizontal	--	3	9.13	180	99.7	51.8
0.5	A	1 x 2	SB-K001	--	Horizontal	--	3	9.13	180	99.7	51.8
0.6	F	1 x 2	SB-K002	300	Vertical	150	.83	17.3	180	99.1	48.6
0.7	A	1 x 2	SB-K001	--	Vertical	--	3	9.13	180	99.7	51.8
0.8	F	1 x 2	SB-K003	800	Vertical	400	1.33	13.7	180	99.6	44.7
0.9	A	1 x 2	SB-K002	--	Vertical	--	3	9.13	180	99.7	51.8
0.10	A	1 x 2	SB-K001	--	Vertical	--	3	9.13	180	99.7	51.8
0.11	F	1 x 2	SB-K002	650	Vertical	325	1.25	14.1	180	99.6	44.2
0.12	A	1 x 2	SB-K001	--	Vertical	--	3	9.13	180	99.7	51.8
0.13	A	1 x 2	SB-K001	--	Vertical	--	3	9.13	180	99.7	51.8
0.14	F	1 x 2	SB-K002	400	Vertical	200	1.25	14.1	180	99.6	44.2
0.15	A	1 x 2	SB-K001	--	Vertical	--	3	9.13	180	99.7	51.8
F = Fix Point, A = Anchorage Point, S = Sliding Point, AS = Both Anchorage Point											
Rain Cap with cushions SB7 for noise reduction											
Pos.	NO	Quantity	Product	Pos.	NO	Quantity	Product				
001	200	1	SB-K001	--	--	--	--				
Expansion Bellows											
Pos.	NO	Quantity	Product	Bellow Material	Flange Standard	Flange Material	Movement		EL	BL	
							axial (mm)	lateral (mm)	mm	mm	
K 0.1	400	1	SBF 40.130	1.4343	DN64004	1.0038	34	27	514	489	
K 0.2	400	1	SBF 40.100	1.4343	DN64004	1.0038	29	6	280	260	
K 0.3	400	1	SBF 40.050	1.4343	DN64004	1.0038	28	3	270	210	
K 0.4	350	1	SBF 35.050	1.4343	DN64004	1.0038	24	3	244	210	

Design Office Check List

Almost every exhaust pipe system is unique and we want its design and subsequent installation to run as smoothly as possible. We have therefore designed a so-called Design Office Check List. This check list contains many important aspects which are not solely in our hands, and should be clarified before placing a final order, in order to prevent subsequent complications. One of the questions, for example, is whether the flange of the expansion bellows matches the flange of the silencer.

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CHECK LIST DESIGN OFFICE	
Have you checked all details in this offer?	
	
(0)	Technical details checked in OVERVIEW, EXHAUST PIPE SYSTEMS (page 8-4)?
(1)	Flange standard expansion bellows matches flange standard silencer/catalyst/boiler or spark arrester?
(2)	Foundation of vibration mounts (frame and bulkhead) designed strong enough?
(3)	Have all pipe penetrations been integrated in this offer?
(4)	Number of brackets/lashes at silencer, boiler and catalyst matches offered quantities?
(5)	Stainless steel or other material required for vibration mounts, rain caps or pipe penetrations?
(6)	Distance between first fix point and turbo charger engine to be approved by engine manufacturer.
(7)	Expansion bellows at fan incinerator: Axial and lateral movement of expansion bellows at fan incinerator to be approved by fan maker.
(8)	Have you checked the correct direction of lashes of the vibration mounts anchorages (swaybraces)?

Ensure Correct Installation with Labelling System

As already mentioned, the layout proposal plays an important role during the installation phase. When our products arrive at the yard, they bear a sticker stating exactly where in the system each piece of equipment needs to be placed.



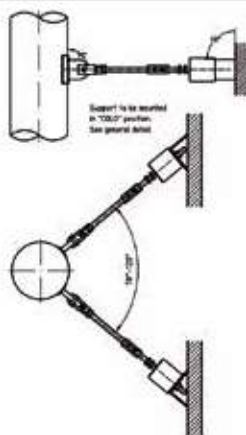
Installation Instructions

All the previous efforts would be wasted if the installation of the mechanical devices was carried out incorrectly. That is why SB Broneske provides very detailed installation instructions covering not only the right way of installing the equipment but also more basic issues like storage, handling, and safety instructions. We strongly recommend reading these manuals before installing the equipment as any deviation from these guidelines and the layout proposal may cause problems later.

If in doubt or need of clarification, our engineering team will gladly be of assistance.

3.2.1 DESIGN: ANCHORAGE POINT

Angle between deck, vibration mount and pipe



In general, the angle between SB Broneske anchorage point, the deck and the pipe should be 90°;

In general, in the horizontal pipe section, the anchorage point should be installed in vertical direction.

In general, in the vertical pipe section, the anchorage point should be installed in horizontal direction.

ATTENTION: SB Broneske indicates the exact direction of the anchorage points in the layout proposal.

If design office or production department has any questions about the direction of the anchorage points, please contact SB Broneske office to clarify details.

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Customization

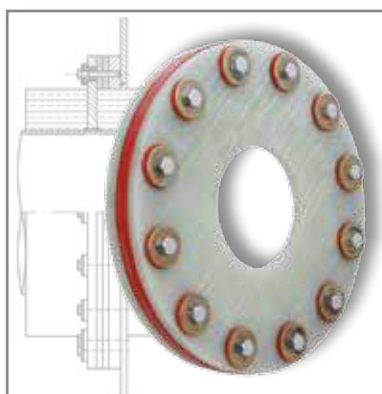


SB Broneske's goal is to provide its customers with the most efficient and reliable elastic exhaust support system. Every ship has its unique features and it is of utmost importance to attend to these very special characteristics and not provide an off-the-shelf product.

For some vessels, however, our certified standard products may not be the most ideal solution in the eyes of the SB Broneske engineering team and our valued customers. If such cases occur, we gladly take time to customize our standardized physical devices or even develop completely

new components in order to meet the specific needs of the exhaust lines.

Very common tasks for our engineering and production teams to attend to are the composition of the specially developed and heat resistant damping material or different material demands such as stainless steel, fiberglass, or even titanium. Less frequent but very common demands are developing, producing, and testing of whole new devices such as individual solutions for the funnel top and altering dimensions of deck and bulkhead penetrations.

Special requirements demand custom-made technical developments. Some examples:

		
Deck/bulkhead penetration - made of fiberglass	Vibration mount for low loads	Vibration mount for heavy loads

Design support - SB Broneske develops individual solutions to customers' ideas:

	
Turn Over Solutions	Funnel Top Solutions

Installation Drawings

13

Detail Design

Do you require detailed installation and production drawings?

Installation and production drawings are needed for producing and installing necessary substructures for the vibration mounts like pad eye brackets, doublings, brackets, stiffeners, frames or bases. SB Broneske now offers installation and production drawings for the vibration mounts for the exhaust pipe system.

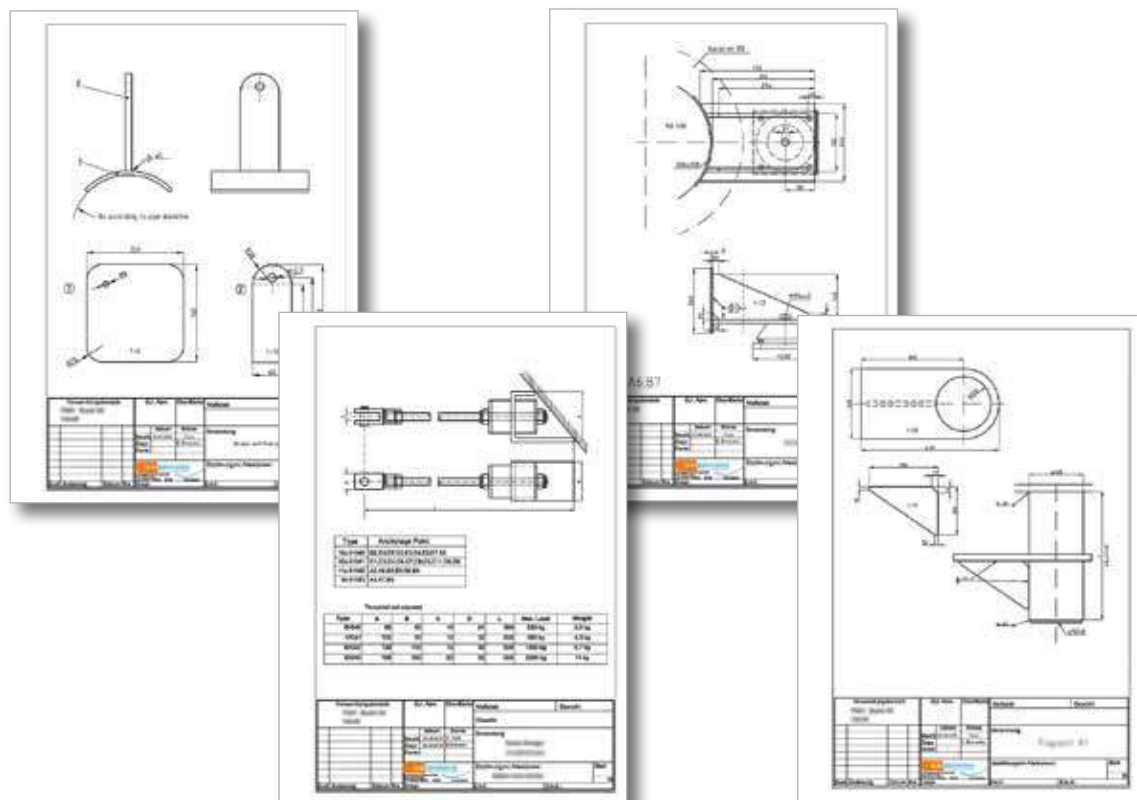
They are an additional specification, which is required in any case for design and installation. SB Broneske offers these details for additional costs:

- Design
- 3D modeling
- Connection between pipe and vibration mount
- Connection between vibration mount and frame / ship structure

Order your design for the correct ship structure directly from the maker of the vibration mounts!



Some sample drawings:



State of the Art from the Inventor

The market-leading SB Broneske product consists of two parts. Our vast expertise in the field of elastic supports is the foundation and frequently utilized in our free services. But these services would be useless if the physical equipment was not as highly advanced and reliable as it is.

Our company founder, Erwin Broneske, developed the first modern vibration mount for the (German) shipbuilding industry in 1973 and this innovative spirit helps SB Broneske to stay at the top of the industry by constantly looking for

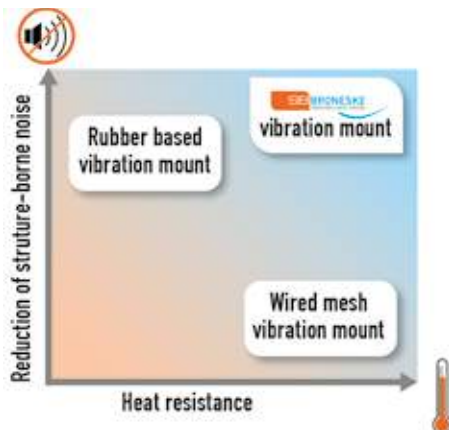
opportunities to benefit shipyards and shipowners around the world.

SB Broneske is your 1-stop solution for the elastic support of the exhaust pipe system.



Heat Resistance & Structure-Borne Noise Reduction

Rubber vibration mounts reduce structure-borne noise very effectively, stainless steel wired mesh are heat resistant, but do not reduce the structure borne noise. SB Broneske combines both: reduction of structure-borne noise and heat resistance.

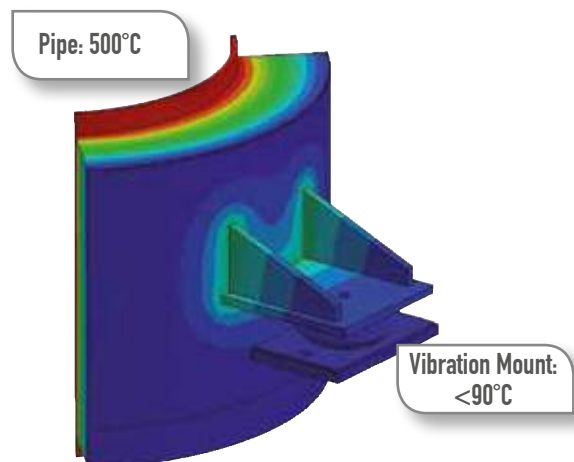


The SB Broneske vibration mounts fix points are specially designed for the exhaust pipe system of ships and produced with a special highly effective heat resistant elastomer. Because of this, they are shear-proof, fire-proof, heat resistant up to 300°C and very effective in reducing vibrations and structure-borne noise.

In a series of tests in 1990s, the company investigated the temperature at the vibration mount. The exhaust pipe sys-

tem of ships usually achieves a heat of between 290°C (two stroke engines) and 550°C (four stroke engines). Insulation material covers the exhaust pipes to protect operators and limit the heat transfer from the pipe into engine room and funnel casing.




Without insulation, the surface of the exhaust pipe would heat up to 300°C or more. With insulation, the surface of the insulation might be 150°C. Elastomeric vibration mounts with natural rubber are only heat resistant up to 80°C. If the temperature on the surface of the insulation were usually 150°C, the elastomeric rubber vibration mounts with a limit of 80°C would melt.



Basic Silent, Super Silent & Super Silent Plus

The four products groups of the elastic support are fix points, anchorage points, rain caps and pipe penetrations. These are applied to reduce vibration and consequently structure-borne noise. Different types of vessels require a different level of reduction of structure-borne noise: A luxury yacht or a passenger ferry each requires different level of reduction of structure-borne noise and vibrations

than a tanker or a container vessel. Therefore, SB Broneske has developed three product lines: Basic Silent, Super Silent and Super Silent Plus. SB Broneske and the customer choose the product line for the specific project. Please find the details of the product lines in this table and the following pages.

	BASIC SILENT	SUPER SILENT®	SUPER SILENT® PLUS
Fix points	SB 8200x 	SBB 8200x 	SBB 8201x 
Anchorage points	SBB 6104x 	SBB 6100x 	SBB 6100x 
Rain caps	Stainless steel cushions SB7VA 	Special design for most effective reduction of noise/vibrations 	Special design for most effective reduction of noise/vibrations 
Pipe penetrations	Fixed pipe penetration 	Fixed or flexible pipe penetration 	Flexible pipe penetration 
Reduction of vibration and noise	● ● ●	● ● ● ●	● ● ● ● ●
Designed for exhaust pipe temperature	600°C	600°C	600°C
Life time	6-8 years	>12 years	>12 years
Number of revisions	Limited	Unlimited	Unlimited
Fulfills MLC 2006	With design support	Yes 	Yes 
Typical application	Cargo vessels: • Container vessels • Bulk carriers • Tankers • LNG Tankers	All kinds of vessels: • Cruise vessels • Offshore vessels • Seismic vessels • Tugs • Dredgers • Research vessels • River cruise • Cargo vessels: container, bulk, tanker • and many others	Yachts: • Mega yachts • Super yachts • Cruise vessels • Luxury yachts

16 Vibration Mounts

Fix Points

Fix points effectively reduce vibrations and structure-borne noise while keeping the pipe in position. The SB Broneske fix points are heat resistant up to 300°C and withstand a

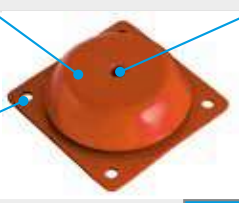
maximum exhaust pipe temperature of 600°C. They are delivered ready for installation.

BASIC SILENT

Covered standard rubber for longer life time

Centre bolt

Bore hole for bolting



	SB 82001	SB 82002	SB 82003	SB 82004
Load	600 N - 2000 N (~60 kg - 200 kg)	1000 N - 4000 N (~100 kg - 400 kg)	2000 N - 7500 N (~200 kg - 750 kg)	5000 N - 15000 N (~500 kg - 1500 kg)

SUPER SILENT®


Very effective rubber

Covered rubber for long life time

Centre bolt

Welding plate for easy installation

Premounted/bolted



	SBB 82001	SBB 82002	SBB 82003	SBB 82004
Load	600 N - 2000 N (~60 kg - 200 kg)	1000 N - 4000 N (~100 kg - 400 kg)	2000 N - 7500 N (~200 kg - 750 kg)	5000 N - 15000 N (~500 kg - 1500 kg)

SUPER SILENT® PLUS


Galvinised

Covered - highly effective rubber - for long life time

Centre bolt

Welding plate for easy installation

Premounted/bolted



	SBB 82011	SBB 82012	SBB 82013	SBB 82014
Load	600 N - 2000 N (~60 kg - 200 kg)	1000 N - 4000 N (~100 kg - 400 kg)	2000 N - 7500 N (~200 kg - 750 kg)	5000 N - 15000 N (~500 kg - 1500 kg)


Anchorage Points

The SB Broneske anchorage points are very effective in reducing vibrations and structure-borne noise. They are designed for very easy installation with fork crown and turn

buckle for adjustment of the pipe of the last millimetres. The SB Broneske anchorage points are designed for a very long life time.

BASIC SILENT

Angled steel for welding to deck Threaded rod (please, shorten to individual installation length) Fork crown or eye bolt for cost-effective and safe installation




Premounted Rubber for good reduction of vibrations and structure-borne noise

	SBB 61040	SBB 61041	SBB 61042	SBB 61043
Load	500 N - 2000 N (~50 kg - 200 kg)	1750 N - 3500 N (~175 kg - 350 kg)	3000 N - 10000 N (~300 kg - 1000 kg)	10000 N - 30000 N (~1000 kg - 3000 kg)

SUPER SILENT®

Casing for long life time Turn buckle for fast and cost-effective adjustment Threaded rod (shorten to individual length) for easy installation Fork crown for cost-effective and safe installation




Special rubber inside for very effective reduction of vibrations and structure-borne noise

	SBB 61000	SBB 61001	SBB 61002	SBB 61003
Load	500 N - 2000 N (~50 kg - 200 kg)	1750 N - 3500 N (~175 kg - 350 kg)	3000 N - 10000 N (~300 kg - 1000 kg)	10000 N - 30000 N (~1000 kg - 3000 kg)

SUPER SILENT® PLUS

Galvanised casing for long life time Turn buckle for fast and cost-effective adjustment Threaded rod (shorten to individual length) for easy installation Fork crown for cost-effective and safe installation



Special soft rubber inside for most effective reduction of vibrations and structure borne noise

	SBB 61000	SBB 61001	SBB 61002	SBB 61003
Load	500 N - 1500 N (~50 kg - 150 kg)	800 N - 3300 N (~80 kg - 330 kg)	2000 N - 5600 N (~200 kg - 560 kg)	4000 N - 14000 N (~400 kg - 1400 kg)

18 Deck / Bulkhead Penetration — Special Heat & Vibration Insulation

Pipes often lead through decks or bulkheads. For this case, SB Broneske has developed special penetrations that are

either gas-, water-, or fire-proof while transferring little to no vibrations.

Fixed Penetration

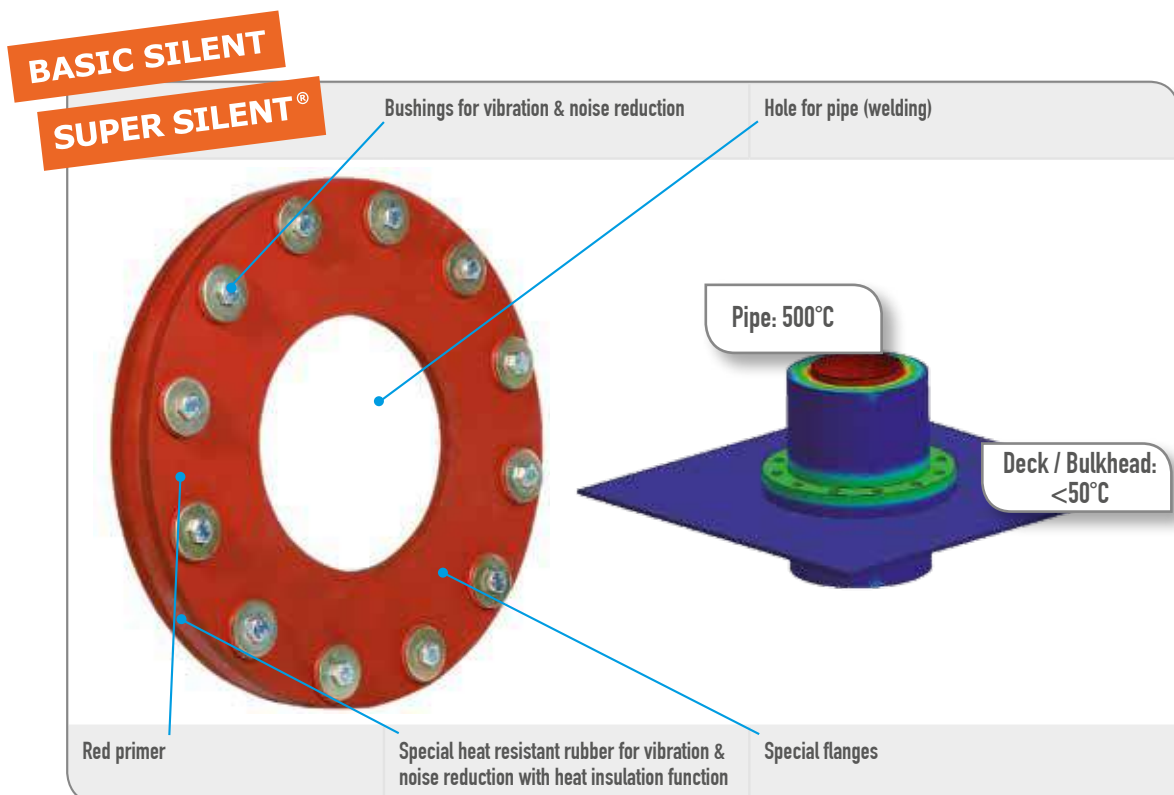
This penetration can be produced to be fire-, gas-, or water-proof and comes ready for installation with gaskets, bushings, and screws. It works like a fix point. The flanges

are made of mild steel and the bushings and the gaskets are made of a special type of rubber. Individual sizes and materials are available on request.

Heat Insulation

Special tight material prevents the heat transfer in exhaust pipe systems into the ship's structure. The exhaust gas

temperature can be up to 550°C. At higher requirements, the design of the penetration could be customized.



Flexible Penetration

The SB Broneske flexible deck and bulkhead pipe penetration is the world's first penetration that is water- and fire-proof and does not transfer any vibration into the ship's structure. It is fire-proof for 60 minutes (A-60) at 1000°C and water-proof for 30 minutes (6 metres, 0.6 bar).

It is certified with an European MED-A-60, US Coast-guard, Lloyd's Register Type Approvals, DNV GL Type Approval, ABS Design Approval and Bureau Veritas Type Approval.

It is especially popular with all kinds of passenger vessels and luxury yachts.



SUPER SILENT®

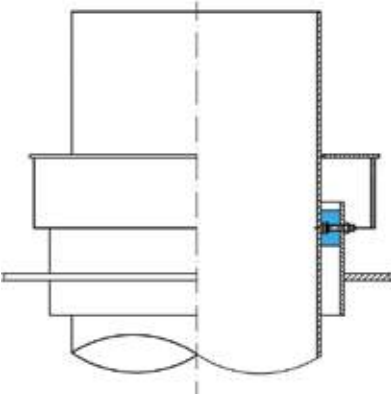
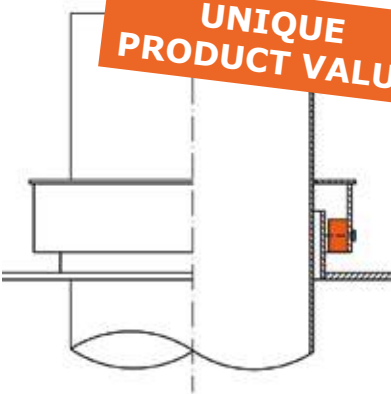
SUPER SILENT® PLUS



Rain Caps

The funnel and its casing should be protected against rain and splash water. For this purpose, SB Broneske has designed a very smart rain cap that allows for the circulation of oxygen while also reducing vibrations very effectively.

As an alternative to our ready-for-installation rain cap, SB Broneske offers steel mesh cushions and a design proposal. Please read on to learn more about the pros and cons of both solutions.

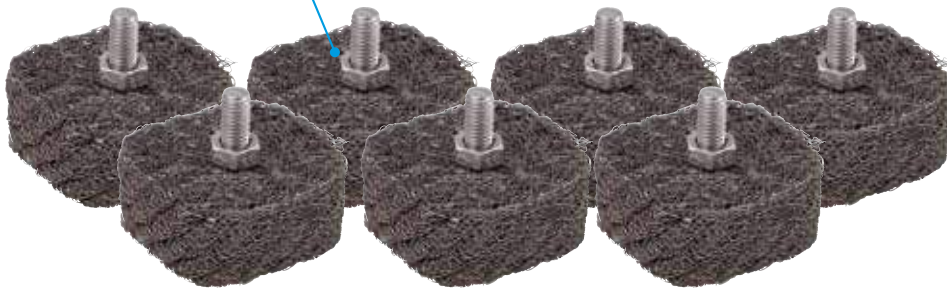
Rain caps comparison	<div>BASIC SILENT</div> <div>SUPER SILENT®</div> <div>SUPER SILENT® PLUS</div>	
	Rain caps with stainless steel cushions	SB Broneske rain caps Special elastomer cushions
		 <div>UNIQUE PRODUCT VALUE</div>
Location of cushions	Between pipe and inner ring	Between inner ring and rain cap
Protection rain & splash water	●	●
Reduction of vibration	●	●
Reduction of structure-borne noise	●	●
Forces on cushions	● (cushion will be pressed together if overloaded)	● (guiding in sea condition, no forces allowed on silicone cushions)
Additional pair of anchorage/sway braces required to guide rain cap	○	●
Remarks	Pipe presses together stainless steel cushion: No vibration and structure-borne noise reduction	Cushions not to be installed directly to hot pipe
Low noise/vibration level at bridge & captain cabin	○	●
Max. exhaust gas pipe temperature	600°C	600°C

We offer a solution by providing stainless steel mesh cushions and instructions for the in-house production of the water protection. However, this solution has some limitations

regarding sustainable vibration and noise reduction. When constantly overloaded, conductivity of the cushions will decrease while structure-borne noise increases.

BASIC SILENT

SB7VA stainless steel cushion with bolt



Shipyards produce rain caps with SB Brosses cushions

The most advanced and durable solution of the maritime industry against rain and splash water is SB Brosses's self-produced and ready-for-installation rain cap. It consists of inner and outer ring(s), and highly effective and

heat resistant rubber cushions placed between the two rings. While these have a guiding function on the open sea, they absorb the vibrations permanently.

SUPER SILENT®

SUPER SILENT® PLUS

State-of-the-art and most effective rain cap of maritime industry

Highly effective and heat resistant rubber cushions



Hole for pipe

Premounted/ready for installation

22 Expansion Bellows

Stainless Steel Expansion Bellows

Hot exhaust gas causes pipes to expand. In order to absorb this expansion and protect the piping system against costly cracks that may damage the engine, it is essential to install expansion bellows.

The high quality SB Broneske standard expansion bellows have multiple layers, are pre-stressed, and come with two mild steel flanges (DIN 86044). Other flange materials and dimensions are available on request.

Our expansion bellows are type approved by Germanischer Lloyd/(Det Norske Veritas). If certification from a different class is requested, it usually poses no significant problem to obtain this at additional cost.

Please note that SB Broneske does not stock expansion bellows as it is our engineering philosophy to always produce them according to our in-house engineering specifications

with regard to lengths as well as axial and lateral movements.

The calculations / designs for the stainless steel expansion bellows are supplied free of charge.

Type Approval Certificate		Germanischer Lloyd
This is to certify that the underlisted product(s) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.		
Certificate No.	SAB1907 104	
Company	Schwingungstechnik-Broneske GmbH Emel-Aden-Str. 8 20481 Quickborn, GERMANY	
Product Description	Exhaust Gas Compensators	
Type	SBF AN	
Environmental Category	None	
Technical Data / Range of Application	TECHNICAL DATA: Material: 1.4541, 1.4571 Bellows: Carbon steel acc. to DIN 86044 Flange: 10 to 12 Pressure range: up to size 1250 Size range: up to + 800°C Temperature range: Lowest flange with bending collar End connection:	
Test Standard	RANGE OF APPLICATION: The compensator type SBF AN is type approved for the use in exhaust gas piping systems downstream of the exhaust gas turbocharger.	
Documents	REMARKS: For the use at operating temperatures above 50°C the appropriate movement / pressure reduction factors specified by the manufacturer are to be observed. Regulations for the Performance of Type Tests, Part 6: Test Requirements for Mechanical Components and Equipment: 1996, EAMA, 1998 - Test reports of conducted pressure tests and endurance tests - Drawings - Bellows calculation of pressure strength and cyclic life acc. to EAMA - Referenced GL-cert. 1.441/2020/000, 4.441/2020/000	
Remarks	In order to ensure traceability to the type approval certificate each compensator is to be marked at least with manufacturer name, type, size and nominal pressure.	
Valid until	2019-02-05	
Page	1 of 1	Type Approval Symbol 
File No.	82-06	
Hamburg	2013-02-11	
Germanischer Lloyd Harropeter Raschke Plamen Delov <small>The certificate is issued on the basis of Regulation for the Performance of Type Tests, Part 6: Procedure</small>		



SB Broneske stainless steel expansion bellows for exhaust pipe system compensate the heat expansion of the exhaust pipe sections.



SB Broneske produces any type of flanges for the exhaust pipe system. Any combination of material and design or standard is possible.



SB Broneske sells high quality German gaskets for the special pressure, high temperature environment and special exhaust gas of the exhaust pipe system.

Rubber Expansion Bellows


Exhaust lines are not the only pipes facing wear and tear issues on board a vessel. Other piping systems may be channeling fuel, oil, or water and are likely to require the installation of rubber expansion bellows.

SB Broneske therefore offers certified rubber expansion bellows in different types. The rubber expansion bellows can be used for temperatures up to 90°C, 100°C or 130°C. The maximum temperature depends on the media.

SB Broneske rubber expansion bellows are suitable for coolant, sea water, lubricating and hydraulic oils.

We can offer the expansion bellows with an inner liner of EPDM, NBR and Chloropren. SB Broneske produces any type of flanges for the piping systems. You can get any flanges. The calculations / designs for the rubber expansion bellows are supplied free of charge.

SB Broneske rubber expansion bellows for the piping systems compensate the heat expansion of the pipe sections.

Constitution and properties		
Temperature range:	-40°C to +130°C	
Inner liner:	EPDM, NBR, Chloropren	
Flanges:	Any flanges, steel, chromated	
Area of application:	Wet exhaust gas, coolant, sea water, lubricating and hydraulic oils	

Accessories

SB Broneske is your 1-stop partner when it comes to the elastic support of exhaust pipe systems. This connotes that we also offer many supplementary devices enabling and

supporting the installation of the main components. If you wish, we are able to provide the following extras:

		
Stainless steel cushion with bolt and nut	Special elastomer cushion with bolt and nut	Silicone bushing
		
Fork crown	Turn buckle	Threaded rod
		
Pad eye bracket	Doubling	Steel angle bracket

Worldwide

SB BRONESKE
VIBRATION & NOISE CONTROL

AMERICA

USA: Tampa
Morgan City

EUROPE

Germany: Hamburg
Spain: Vigo
Turkey: Istanbul
Russia: Saint Petersburg

ASIA

China: Qingdao
Singapore: Singapore
Korea: Busan
Japan: Osaka
India: Kochi
United Arab Emirates: Dubai

AUSTRALIA

Australia: Sydney

NEW ZEALAND

New Zealand: Picton

- Head Office / Factory
- China Office
- Representative
- Stock

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ISO 9001
BUREAU VERITAS
Certification

N° DE005975-1

