ELASTIC SUPPORT — MADE IN GERMANY

Exhaust Pipe System

4th Revised Edition
New Products & Services

SB Broneske meets noise requirements
2 Certificates

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

Extended Service: 11 Languages

SB Broneske provides the company brochure and the technical offer in eleven languages. Choose between English, Italian, French, Spanish, Norwegian, Turkish, Russian, Chinese, Korean, Japanese or German. Download or order our company brochure "Exhaust Pipe System" in your language.
Welcome to Schwingungstechnik-Broneske GmbH

In 1972 our company founder Erwin Broneske introduced a revolutionary elastic support system to German shipbuilding. His idea was to isolate diesel engines from the hull structure by using the first modern vibration mounts for shipping. In more than 45 years 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 our state-of-the-art physical products in our local factory in Quickborn near Hamburg, Germany. This enables us to meet both our own and our customers’ high quality standards at all times. However, our business is not only based on the unique quality of our equipment, but also on our vast expertise in this field, which we pass on to our customers as part of our free engineering services for each single project. It is therefore our aim to assist every project as closely as possible, from the design of the exhaust system to the final assembly of our systems. On the following pages you can find out more about how you can benefit from SB Broneske.

Please note that we have expanded our 2017 product portfolio to include LNG components for LNG piping systems.
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

- MEYER WERFT
- FINCANTIERI
- HYUNDAI
- IRVING
- ULSTEIN
- VARD
- Képpel Offshore & Marine
- Blohm+Voss
- REMONTOWA
- MEYER TURKU
- DSME
- BAE SYSTEMS
- NAVANTIA
- KLEVEN
- Huntington Ingalls Industries
- ST Marine
- Ferrostaal
- arctech
- SY
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.
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.

<table>
<thead>
<tr>
<th>Supplier A</th>
<th>Supplier B</th>
<th>SB Broneske</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration mounts, no technical support</td>
<td>Special supplier for vibration mounts for the maritime industry</td>
<td>Maker of vibration mounts with outstanding support for the maritime industry</td>
</tr>
<tr>
<td>Vibration mounts for the maritime industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Layout proposal for the maritime industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical support for the maritime industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration analysis for the maritime industry</td>
<td></td>
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</tr>
<tr>
<td>Design office check list</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Installation instructions for the maritime industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labelling system for the maritime industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service around the world (sea trial and maintenance)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warehouses for spare parts on three continents</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>SB Broneske</th>
<th>Self-contained Solution</th>
<th>Cost Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design / Engineering</td>
<td>Free and fast layout proposal &amp; vibration calculation with SB experience</td>
<td>Shipyard/design office needs much more time for design and especially calculations</td>
</tr>
<tr>
<td>Expansion bellows</td>
<td>SB layout often with fewer expansion bellows; very competitive prices due to economies of scale</td>
<td>Expansion bellows must be installed in any case. Yard purchases for fewer expansion bellows than SB sells. Yard in most cases pays higher price to local supplier</td>
</tr>
<tr>
<td>Vibration mounts – product costs</td>
<td>Produces more than 100,000 high quality vibration mounts every year and can give very good price</td>
<td>Individual solution of yard, small number of brackets, local manufacturer will most likely not be able to match SB price and quality</td>
</tr>
<tr>
<td>Vibration mounts – installation costs</td>
<td>Very easy welding, adjustment, and maintenance</td>
<td>Shipyard’s own solution often more complicated and time-consuming</td>
</tr>
<tr>
<td>Happy seafarer</td>
<td>Guaranteed low noise level protects the overall health of the crew and improves working conditions</td>
<td>High noise creates diseases, effects manpower</td>
</tr>
<tr>
<td>Happy owner</td>
<td>Owner will face very low maintenance and no extraordinary operational costs</td>
<td>High vibration level creates cracks/damages on exhaust pipe parts and the ship’s structure/decks</td>
</tr>
<tr>
<td>Result</td>
<td>SB Broneske elastic support offers superior noise &amp; vibration reduction for lower overall costs.</td>
<td></td>
</tr>
</tbody>
</table>
When it comes to vibration mounts and expansion bellows, shipyards and shipowners can choose from a variety of suppliers. Some are local while others are not even based on the same continent. So why is it that some suppliers operate globally while others only sell to the local shipbuilder?

The answer is most likely connected to the standards and capabilities of the suppliers. Besides manufacturing specifically developed equipment for the shipbuilding industry, SB Broneske utilizes its vast experience and expertise in the field of elastic support to benefit its customers through a range of free services enabling us to follow any project from as early as the design of the system to the installation.

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

The first step on the way to a reliable exhaust pipe system is a drawing (2-D) or model (3-D) of the exhaust pipe arrangement. From the given specifications, our engineers derive the technical configuration of the elastic support system in close collaboration with the shipyard’s technical staff. Our experience shows that shipyards having previously done this work on their own can not only save a lot of time but also some money, as SB Broneske in many cases comes up with a system consisting of less mechanical equipment.

This layout proposal also plays an important role during the installation phase as all devices are already drawn into the pipe arrangement and installation engineers can easily identify the different installation positions and the corresponding equipment.
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.

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.
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.
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**
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:
Mechanical Products

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 system 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.
# Product Lines

## Basic Silent, Super Silent & Super Silent Plus

The four product groups of the elastic support are fixed 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.

<table>
<thead>
<tr>
<th></th>
<th><strong>Basic Silent</strong></th>
<th><strong>Super Silent</strong></th>
<th><strong>Super Silent Plus</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed points</strong></td>
<td>SB 8200x</td>
<td>SB 8200x</td>
<td>SB 8201x</td>
</tr>
<tr>
<td><strong>Anchorage points</strong></td>
<td>SBB 6104x</td>
<td>SBB 6100x</td>
<td>SBB 6100x</td>
</tr>
<tr>
<td><strong>Rain caps</strong></td>
<td>Stainless steel cushions SBB7VA</td>
<td>Special design for most effective reduction of noise/vibrations</td>
<td>Special design for most effective reduction of noise/vibrations</td>
</tr>
<tr>
<td><strong>Pipe penetrations</strong></td>
<td>Fixed pipe penetration</td>
<td>Fixed or flexible pipe penetration</td>
<td>Flexible pipe penetration</td>
</tr>
<tr>
<td><strong>Reduction of vibration and noise</strong></td>
<td>[ ][ ][ ][ ][ ]</td>
<td>[ ][ ][ ][ ][ ][ ]</td>
<td>[ ][ ][ ][ ][ ][ ][ ]</td>
</tr>
<tr>
<td><strong>Designed for exhaust pipe temperature</strong></td>
<td>600°C</td>
<td>600°C</td>
<td>600°C</td>
</tr>
<tr>
<td><strong>Life time</strong></td>
<td>6–8 years</td>
<td>&gt;12 years</td>
<td>&gt;12 years</td>
</tr>
<tr>
<td><strong>Number of revisions</strong></td>
<td>Limited</td>
<td>Unlimited</td>
<td>Unlimited</td>
</tr>
<tr>
<td><strong>Fulfils MLC 2006</strong></td>
<td>With design support</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
| **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 |
Vibration Mounts

Fixed Points

Fixed points effectively reduce vibrations and structure-borne noise while keeping the pipe in position. The SB Broneske fixed 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

**SUPER SILENT***

Very effective rubber

Covered rubber for long life time

Centre bolt

Welding plate for easy installation

Premounted/bolted

**SUPER SILENT***

Very effective rubber

Covered rubber for long life time

Centre bolt

Welding plate for easy installation

Premounted/bolted

**HEAVY LOADS**

Very effective rubber

Covered rubber for long life time

Centre bolt

Welding plate for easy installation

Premounted/bolted

**SUPER SILENT***

Galvanised

Covered — highly effective rubber — for long life time

Centre bolt

Welding plate for easy installation

Premounted/bolted
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

<table>
<thead>
<tr>
<th>SBB 61040</th>
<th>SBB 61041</th>
<th>SBB 61042</th>
<th>SBB 61043</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500 N - 2000 N</td>
<td>1750 N - 2500 N</td>
<td>3000 N - 10000 N</td>
<td>10000 N - 20000 N</td>
</tr>
<tr>
<td>(50 kg - 200 kg)</td>
<td>(175 kg - 250 kg)</td>
<td>(300 kg - 1000 kg)</td>
<td>(1000 kg - 2000 kg)</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>SBB 61000</th>
<th>SBB 61001</th>
<th>SBB 61002</th>
<th>SBB 61003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500 N - 2000 N</td>
<td>1750 N - 2500 N</td>
<td>3000 N - 10000 N</td>
<td>10000 N - 20000 N</td>
</tr>
<tr>
<td>(50 kg - 200 kg)</td>
<td>(175 kg - 250 kg)</td>
<td>(300 kg - 1000 kg)</td>
<td>(1000 kg - 2000 kg)</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>SBB 61004</th>
<th>SBB 61005</th>
<th>SBB 61006</th>
<th>SBB 61007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15000 N - 45000 N</td>
<td>50000 N - 75000 N</td>
<td>125000 N</td>
<td>100000 N - 200000 N</td>
</tr>
<tr>
<td>(1500 kg - 4500 kg)</td>
<td>(5000 kg - 7500 kg)</td>
<td>(12500 kg)</td>
<td>(10000 kg - 20000 kg)</td>
</tr>
</tbody>
</table>

**SUPER SILENT**

- 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

<table>
<thead>
<tr>
<th>SBB 61000</th>
<th>SBB 61001</th>
<th>SBB 61002</th>
<th>SBB 61003</th>
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<tr>
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<td></td>
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<tr>
<td>500 N - 2000 N</td>
<td>1750 N - 2500 N</td>
<td>3000 N - 10000 N</td>
<td>10000 N - 20000 N</td>
</tr>
<tr>
<td>(50 kg - 200 kg)</td>
<td>(175 kg - 250 kg)</td>
<td>(300 kg - 1000 kg)</td>
<td>(1000 kg - 2000 kg)</td>
</tr>
</tbody>
</table>
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 Coastguard, 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.
## Rain Caps and More

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

<table>
<thead>
<tr>
<th>Location of cushions</th>
<th>Between pipe and inner ring</th>
<th>Between inner ring and rain cap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection rain &amp; splash water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction of vibration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction of structure-borne noise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forces on cushions</td>
<td>(cushion will be pressed together if overloaded)</td>
<td>(guiding in sea condition, no forces allowed on silicone cushions)</td>
</tr>
<tr>
<td>Additional pair of anchorage/braces required to guide rain cap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remarks</td>
<td>Pipe presses together stainless steel cushion: No vibration and structure-borne noise reduction</td>
<td>Cushions not to be installed directly to hot pipe</td>
</tr>
<tr>
<td>Low noise/vibration level at bridge &amp; captain cabin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. exhaust gas pipe temperature</td>
<td>600°C</td>
<td>600°C</td>
</tr>
</tbody>
</table>

### SB Broneske Rain Caps

- **Special elastomer cushions**
- **SB Broneske rain caps**

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© Schwingungstechnik-Broneske GmbH, January 2020
The most advanced and durable solution of the maritime industry against rain and splash water is SB Broneske’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.

In addition we offer a new solution. Only special designed rain caps for horizontal installation effectively protect the funnel against rain and splash water.

Furthermore our stainless steel exhaust gas flaps protect the ship’s engine and the exhaust pipe system against corrosive influences of rain and snow.
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 DNV GL. 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.

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 pipes are not the only piping systems that are subject to wear and tear on board a ship. Other piping systems may be channeling fuel, oil or water and are likely to require the installation of rubber expansion bellows. However, as an elastic support specialist in exhaust pipe systems, we only offer rubber expansion bellows for exhaust pipes.

SB Broneske 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 is media dependent.

SB Broneske rubber expansion bellows are especially suitable for wet exhaust gas. We can offer the compensators with an inner line 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.

<table>
<thead>
<tr>
<th>Constitution and properties</th>
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</thead>
<tbody>
<tr>
<td>Temperature range:</td>
</tr>
<tr>
<td>Inner liner:</td>
</tr>
<tr>
<td>Flanges:</td>
</tr>
<tr>
<td>Area of application:</td>
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</tbody>
</table>

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
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