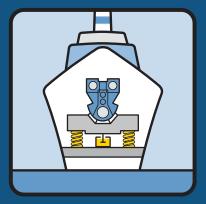


Vibration Isolation in Shipbuilding



GERB

Vibration Isolation in Shipbuilding



Spring Unit for Submarines (Compression-Tension Element)

Noise and vibration control play a significant role in ensuring safety and comfort on leisure and work vessels alike.

National and international regulations are in place to limit airborne noise and vibration levels. Should these limits be exceeded, unrestricted operation permits will not be issued for either newly built ships or ships that have been substantially overhauled.

Unlike stationary installations however, vibration control in shipbuilding predominantly concerns sufficient structure-borne noise and vibration control rather than airborne noise control. Both noisy and quiet neighboring rooms demand high isolation efficiency and helical steel springs provide all of the required properties to achieve this objective.

In addition to excellent vibration and structure-borne noise control

GERB spring elements also contain the following properties that are important for ship safety:

- Resistance to extremely high and extremely low ambient temperatures
- Fire resistant
- Non-aging
- Maintenance-free
- Corrosion resistant
- Easy to install.

To achieve an optimal insertion loss, the design of the foundations in the ship must take into account static and dynamic aspects. High impedance of foundations improves the insertion loss of the elastic support system.

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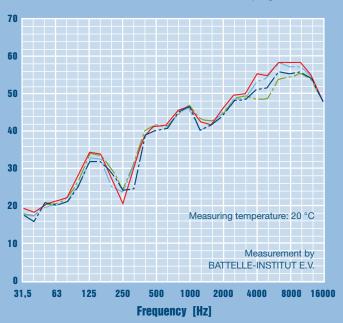
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For differing reasons, a high level of noise and vibration mitigation is required for both passenger and naval ships. Tests carried out by the Battelle Institute demonstrated that insertion loss of more than 50 decibels is possible with GERB spring elements.

Examples of typical applications for vibration isolation systems in shipbuilding include **elastically supported decks and bridges, machine control rooms, hydraulic boxes or elastically suspended containers used as berths in motor coasters.**



Special Spring Element for Ship Engines



Measured Insertion Loss of different Spring Elements



The installation of a variety of equipment on a common elastically supported base frame delivers more advantages in terms of maintenance and structure-borne noise control than the installation of separate single units.

The high temperature stability of GERB spring elements also enables the elastic support of hot equipment, such as exhaust gas systems and pipework. In such cases, no additional measures need to be taken even in cases where such equipment might be located in inaccessible areas. GERB offers a wide variety of springs elements for shipbuilding applications. These include spring units that provide easy height adjustment capabilities and viscous fluid damping via GERB Viscodampers®. Spring elements can also be provided with remote monitoring or prestressing, which allows straightforward replacement or inspection of single spring units at any time.

Special spring elements have been developed for the support of **ship motors, compressors and other components.** These are designed to provide improved structureborne noise control, the success of which has been proven by different independent technical institutes.

Luxury Yacht with Spring-Viscodamper® Combinations



Diesel Engine with Spring Support (Spring Viscodamper® Combinations)





CARADENIZ POWERSHIP IREM SULTAN

Power Ship with Spring Supported Gensets



Power Barge with Spring Supported Gensets (Source: MAN Diesel)





MS "Deutschland" with Tuned Mass Dampers (TMDs)







Shipbuilding Reference List (Excerpt)

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Double Elastic Support of a Diesel Engine

DeckhouseBodan-WerftSteamboat "LÖTSCHBERG" River Cruise ShipLux-Wert und SchiffsverftRiver Cruise ShipNeptun Stahibau GmbHTwinCruiser TM "Pall-Boat" Push Boat "Franz Haniel 12"Neptun Stahibau GmbHTwinCruiser TM "Pall-EVUE"Neptun Stahibau GmbHTwinCruiser TM "Vakolon Tapestry" Motor Cargo Vessel "Haniel Kurier 61"EngineAbeking & RasmussenMotor Yacht "MV Kalamoun" Bodan-Werft /MTU Friedrichshafen Bodan-Werft /MTU Friedrichshafen Bodan-Werft /MTU Friedrichshafen Deutz AGFerry "Kreuzlingen" Hotor Vessel "Königin Katarina" Cassens Werft GmbH Deggendorfer Werft Deggendorfer Werft Deggendorfer Werft Deggendorfer Werft Deutz AGPessearch Vessel "Marjata" Neue Germersheimer Werft Desgendorfer Werft Desgendorfer Werft Desgendorfer Werft Desgendorfer Werft Desgendorfer Werft Desgendorfer Werft Desgendorfer Werft Deutz AG Deutz AG <br< th=""><th>Type of Application</th><th>Customer / Shipyard</th><th>Type of Ship / Name of Ship</th></br<>	Type of Application	Customer / Shipyard	Type of Ship / Name of Ship
Bodan-Werft /MTU Friedrichshafen Bodensee-SchiftsbetriebeFerry "Kreuzlingen" Motor Vessel "Könija Katharina" Cassens Werft GmbH Deggendorfer Werft Hotel Ship Deutz AG HDW Nobiskrug /Deutz /MWM MTU Friedrichshafen Neue Germersheimer Werft Research Vessel "Marjata" Research Vessel "Marjata" Research Vessel "Marjata"Generator SetAlsthom, Thailand Deutz AG Ostvack Werk GmbHPower Barge Power Barge Deutsche Binnenreederei AG Deutz AG Motor Yacht "FATOOSH" MAN B&W, Nicaragua Mator Yacht "Action" Deutz AG Deutsche Binnenreederei AG Deutsche Binnenreederei AG Push Boat "SCH 2415" Deutz AG Motor Yacht "Rahinbow" Deutz AG Motor Yacht "Rahinbow" Deuts AB Dower Barge "Margarita 2" MAN B&W, Quatemala Power Barge "Margarita 2" MAN B&W, Quatemala Power Barge "Margarita 2" MAN B&W, Quatemala Power Barge "Boat" "KSP 4", "KPS 4", "KPS 5" Sabah Shipyard, Pakistan Power Sip "KPS 1", "KPS 4", "KPS 5" Subah Shipyard, Pakistan Power Barge Toat "MS 2423" DWE Kaefer Schiffsausbau GmbH Salvage Tg "Fehmarn" KD-Köln-Düsseldorfer Passenger Boat "MS Britannia" Leobersdorfer Maschinen AG Oil Porspecting Vessel Neue Jadewerft Hopper Barge "Ship "Toul Sonata"Navy Abeking +Rasmussen	Deckhouse	KSD Kölner Schiffswerft Lux-Werft und Schiffahrt GmbH Meidericher Schiffswerft Neptun Stahlbau GmbH Neptun Stahlbau GmbH Neue Ruhrorter Werft, Duisburg	River Cruise Ship Passanger Boat "Loreley Elegance" Push Boat "Franz Haniel 12" TwinCruiser TM "BELLEVUE" TwinCruiser TM "Avalon Tapestry" Motor Cargo Vessel "Haniel Kurier 61"
Deutsche Binnenreederei AGPush Badt "SCH 2415"Deutz AGMotor Yacht "Rainbow"Deutz AGKusch - Yacht IIMAN B&W, NicaraguaPower Barge "Margarita 2"MAN B&W, GuatemalaPower Barge "Esperanza"Mitsubishi, Dominican RepublicPower BargeKaradeniz Powership CompanyPower Barge H 172 BSabah Shipyard, PakistanPower Barge H 172 BTSL Power Systems, SingaporeSeismic Vessel "BGP Pioneer"Volvo Penta ABCodecasa Luxury YachtEquipmentBodan-WerftBodan-WerftPassenger Boat "Ville-De-Geneve"DWERoll-on/Roll-off Ship "Han Asparum"Kaefer Schiffsausbau GmbHSalvage Tug "Fehmarn"Kuo-Köln-DüsseldorferPassenger Boat "MS Britannia"Leobersdorfer Maschinen AGOil Prospecting VesselNeue JadewerftHopper Barge "SM-MB-1"ÖSWAG Werft Linz AGPassenger Boat "MS Zug"Reederei Peter HeilmannCruise Ship MS "Deutschland"Volkswerft StralsundRiver Cruise Ship MS 243NavyAbeking +Rasmussen Werft / MTUMine Hunter SM 343Alfa Laval, GlindeNavy VesselBremer Vulkan WerftFrigate "Augsburg"Deutz AGFD 432 Navy Service VesselFincantieri, La SpeziaSubmarine U212Lürssen LogisticsMinesweepr "Al Murjanah"MTU FriedrichshafenFrigate 123Neue Jadewerft GmbHFrigate 123Neue Jadewerft GmbHNavy Research Vessel "Planet"	Engine	Bodan-Werft/MTU Friedrichshafen Bodensee-Schiffsbetriebe Cassens Werft GmbH Deggendorfer Werft Deutz AG HDW Nobiskrug/Deutz/MWM MTU Friedrichshafen Neue Germersheimer Werft	Ferry "Kreuzlingen" Motor Vessel "Königin Katharina" General Cargo Vessel "MS Grimm" Hotel Ship Luxury Yacht "LEANDER" Luxury Yacht "TATOOSH" Research Vessel "Marjata" Research Vessel
Deutsche Binnenreederei AGPush Boat "KSS 2423"DWERoll-on/Roll-off Ship "Han Asparum"Kaefer Schiffsausbau GmbHSalvage Tug "Fehmarn"KD-Köln-DüsseldorferPassenger Boat "MS Britannia"Leobersdorfer Maschinen AGOil Prospecting VesselNeue JadewerftHopper Barge "SM-MB-1"ÖSWAG Werft Linz AGPassenger Boat "MS Zug"Reederei Peter HeilmannCruise Ship MS "Deutschland"Volkswerft StralsundRiver Cruise Ship MS "Deutschland"NavyAbeking +Rasmussen Werft / MTUMine Hunter SM 343Alfa Laval, GlindeNavy VesselBremer Vulkan WerftFrigate "Augsburg"Deutz AGFD 432 Navy Service VesselFincantieri, La SpeziaSubmarine U212Lürssen LogisticsMinesweeper "Al Murjanah"MTU FriedrichshafenFrigate 123Neue Jadewerft GmbHFrigate "Köln"Nordseewerke GmbHNavy Research Vessel "Planet"	Generator Set	Deutsche Binnenreederei AG Deutz AG Deutz AG MAN B&W, Nicaragua MAN B&W, Guatemala Mitsubishi, Dominican Republic Karadeniz Powership Company Sabah Shipyard, Pakistan TSL Power Systems, Singapore	Push Boat "SCH 2415" Motor Yacht "Rainbow" Kusch - Yacht II Power Barge "Margarita 2" Power Barge "Esperanza" Power Barge Power Ship "KPS 1", "KPS 4", "KPS 5" Power Barge H 172 B Seismic Vessel "BGP Pioneer"
Alfa Laval, GlindeNavy VesselBremer Vulkan WerftFrigate "Augsburg"Deutz AGFD 432 Navy Service VesselFincantieri, La SpeziaSubmarine U212Lürssen LogisticsMinesweeper "Al Murjanah"MTU FriedrichshafenFrigate 123Neue Jadewerft GmbHFrigate "Köln"Nordseewerke GmbHNavy Research Vessel "Planet"	Equipment	Deutsche Binnenreederei AG DWE Kaefer Schiffsausbau GmbH KD-Köln-Düsseldorfer Leobersdorfer Maschinen AG Neue Jadewerft ÖSWAG Werft Linz AG Reederei Peter Heilmann	Push Boat "KSS 2423" Roll-on/Roll-off Ship "Han Asparum" Salvage Tug "Fehmarn" Passenger Boat "MS Britannia" Oil Prospecting Vessel Hopper Barge "SM-MB-1" Passenger Boat "MS Zug" Cruise Ship MS "Deutschland"
	Navy	Alfa Laval, Glinde Bremer Vulkan Werft Deutz AG Fincantieri, La Spezia Lürssen Logistics MTU Friedrichshafen Neue Jadewerft GmbH Nordseewerke GmbH Thyssen Nordseewerke	Navy Vessel Frigate "Augsburg" FD 432 Navy Service Vessel Submarine U212 Minesweeper "Al Murjanah" Frigate 123 Frigate "Köln" Navy Research Vessel "Planet" Submarines U212



Double Elastic Support of a Diesel Engine (Frigate)





To receive a proposal for a vibration isolation system that will meet your shipbuilding requirements, simply send us the following data:

- Machine type and manufacturer
- Layout plan or assembly drawing
- Total weight and weight distribution
- Speed of machinery or exciting frequencies
- Any special requirements.

Based on this information our engineers will prepare a proposal and discuss it with you shortly.

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