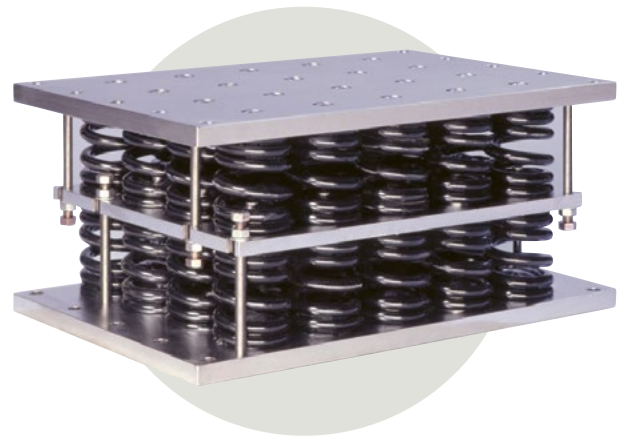


SHIPBUILDING



VIBRATION ISOLATION IN SHIPBUILDING

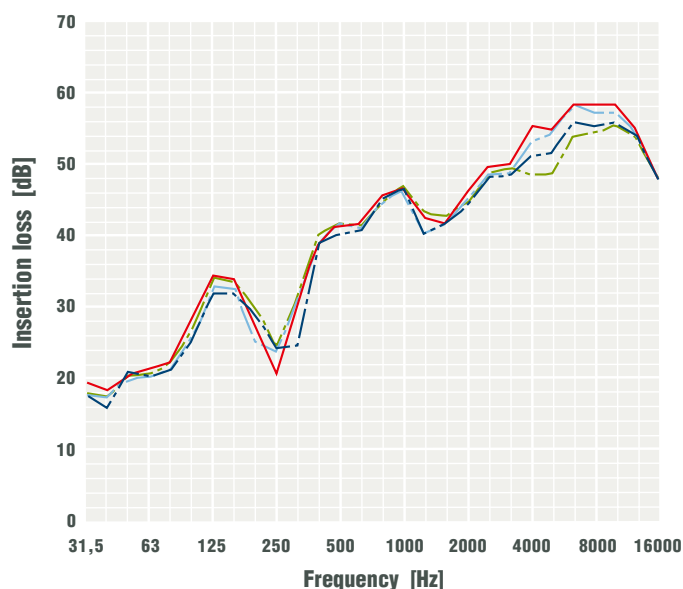


Spring Unit for Submarines
(Compression-Tension Element)

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. 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.



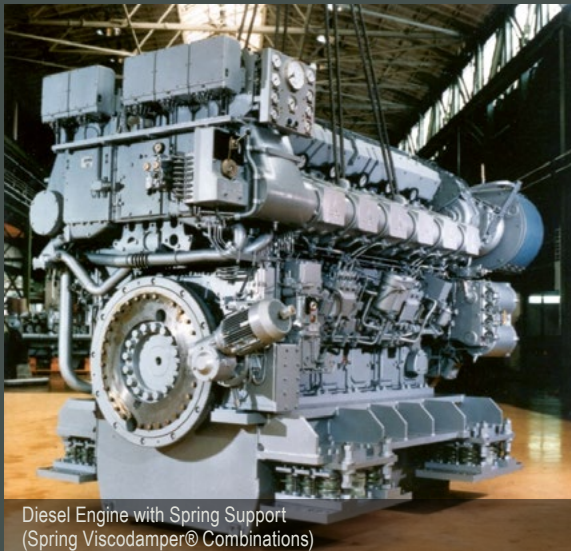
Special Spring Element for Ship Engines



Luxury Yacht with Spring-Viscodamper® Combinations



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.



Diesel Engine with Spring Support
(Spring Viscodamper® Combinations)

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.



Twin Cruiser with Spring Supported Cabins

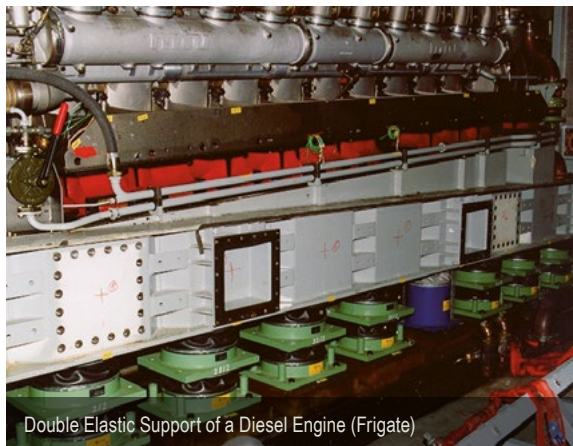
Special spring elements have been developed for the support of ship motors, compressors and other components. These are designed to provide improved structure-borne noise control, the success of which has been proven by different independent technical institutes.



Reference List (Selection)

Elastic Support of Presses

Type of Application	Customer / Shipyard	Type of Ship / Name of Ship
Deckhouse	Bodan-Werft KSD Kölner Schiffswerft Lux-Werft und Schifffahrt GmbH Meidericher Schiffswerft Neptun Stahlbau GmbH Neptun Stahlbau GmbH Neue Ruhrtor Werft, Duisburg	Steamboat "LÖTSCHBERG" 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"
ÖSWAG Werft Linz AG	Backhoe "Baikal"	
Engine	Abeking & Rasmussen Bodan-Werft / MTU Friedrichshafen Bodensee-Schiffsbetriebe Cassens Werft GmbH Deggendorfer Werft Deutz AG HDW Nobiskrug/Deutz/MWm MTU Friedrichshafen Neue Germersheimer Werft ÖSWAG Werft Linz AG	Motor Yacht "MY Kalamoun" Ferry "Kreuzlingen" Motor Vessel "Königin Katharina" General Cargo Vessel "MS Grimm" Hotel Ship Luxury Yacht "LEANDER" Luxury Yacht "TATOOSH" Research Vessel "Marjata" Research Vessel Passenger Ship "Graf Zeppelin"
Generator Set	Alsthom, Thailand 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 Volvo Penta AB	Power Barge 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" Codecasa Luxury Yacht
Equipment	Bodan-Werft Deutsche Binnenreederei AG DWE Kaefer Schiffsausbau GmbH KD-Köln-Düsseldorfer Leobersdorfer Maschinen AG Neue Jadewerft ÖSWAG Werft Linz AG Reederei Peter Heilmann Volkswerft Stralsund	Passenger Boat "Ville-De-Geneve" 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" River Cruise Ship "TUI Sonata"
Navy	Abeking +Rasmussen Werft / MTU Alfa Laval, Glinde Bremer Vulkan Werft Deutz AG Fincantieri, La Spezia Lürssen Logistics MTU Friedrichshafen Neue Jadewerft GmbH Nordseewerke GmbH Thyssen Nordseewerke	Mine Hunter SM 343 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)



Double Elastic Support of a Diesel Engine





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**VIBRATIONS CAN BE CONTROLLED
– WHEREVER THEY OCCUR**

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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