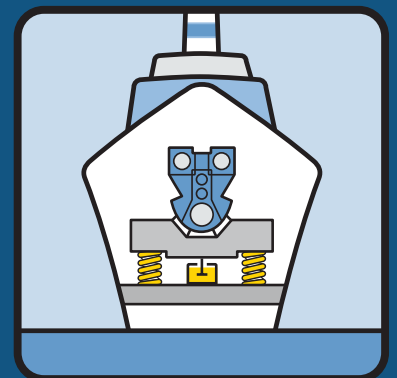
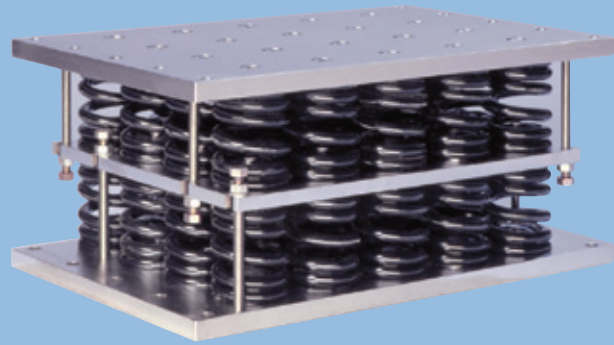


Vibration Isolation in Shipbuilding





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

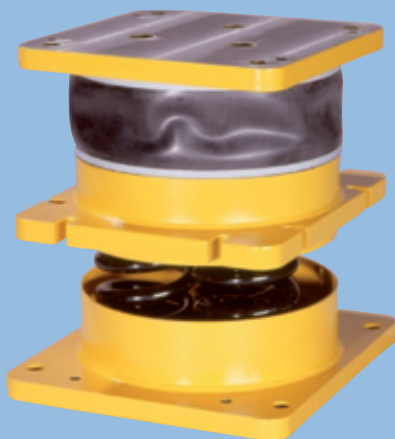
GERB spring elements also contain the following properties that are important for ship safety:

- **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.

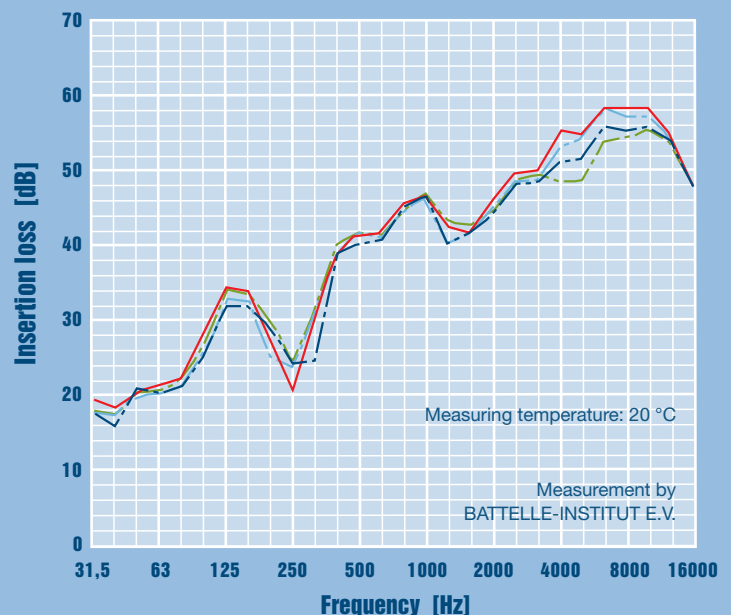
For differing reasons, a high level of noise and vibration mitigation is required for both passenger and naval ships. Tests carried out by the Battelle Institute demonstrated that insertion loss of more than 50 decibels is possible with GERB spring elements.

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

Measured Insertion Loss of different Spring Elements





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.

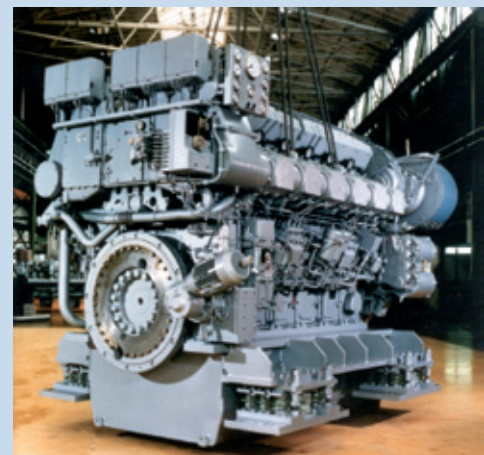
The high temperature stability of GERB spring elements also enables the elastic support of hot equipment, such as exhaust gas systems and pipework. In such cases, no additional measures need to be taken even in cases where such equipment might be located in inaccessible areas.

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 structure-borne noise control, the success of which has been proven by different independent technical institutes.



Diesel Engine with Spring Support (Spring Viscodamper® Combinations)



Twin Cruiser with Spring Supported Cabins



Power Ship with Spring Supported Gensets



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

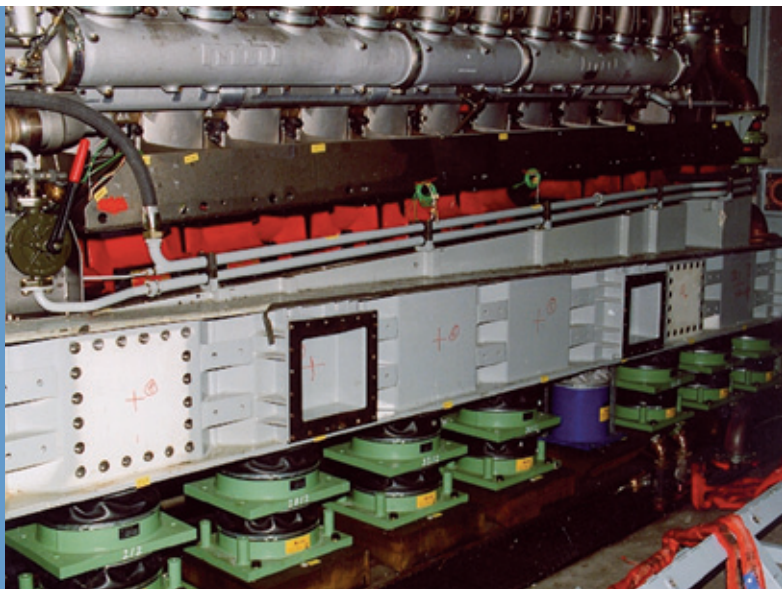


MS "Deutschland" with Tuned Mass Dampers (TMDs)



Double Elastic Support of a Diesel Engine

Type of Application	Customer / Shipyard	Type of Ship / Name of Ship
Deckhouse	Bodan-Werft	Steamboat "LÖTSCHBERG"
	KSD Kölner Schiffswerft	River Cruise Ship
	Lux-Werft und Schifffahrt GmbH	Passanger Boat "Loreley Elegance"
	Meidericher Schiffswerft	Push Boat "Franz Haniel 12"
	Neptun Stahlbau GmbH	TwinCruiser TM "BELLEVUE"
	Neptun Stahlbau GmbH	TwinCruiser TM "Avalon Tapestry"
	Neue Ruhrorter Werft, Duisburg	Motor Cargo Vessel "Haniel Kurier 61"
Engine	ÖSWAG Werft Linz AG	Backhoe "Baikal"
	Abeking & Rasmussen	Motor Yacht "MY Kalamoun"
	Bodan-Werft / MTU Friedrichshafen	Ferry "Kreuzlingen"
	Bodensee-Schiffsbetriebe	Motor Vessel "Königin Katharina"
	Cassens Werft GmbH	General Cargo Vessel "MS Grimm"
	Deggendorfer Werft	Hotel Ship
	Deutz AG	Luxury Yacht "LEANDER"
	HDW Nobiskrug / Deutz / MWM	Luxury Yacht "TATOOSH"
	MTU Friedrichshafen	Research Vessel "Marjata"
	Neue Germersheimer Werft	Research Vessel
	ÖSWAG Werft Linz AG	Passenger Ship "Graf Zeppelin"
Generator Set	Alsthom, Thailand	Power Barge
	Deutsche Binnenreederei AG	Push Boat "SCH 2415"
	Deutz AG	Motor Yacht "Rainbow"
	Deutz AG	Kusch - Yacht II
	MAN B&W, Nicaragua	Power Barge "Margarita 2"
	MAN B&W, Guatemala	Power Barge "Esperanza"
	Mitsubishi, Dominican Republic	Power Barge
	Karadeniz Powership Company	Power Ship "KPS 1", "KPS 4", "KPS 5"
	Sabah Shipyard, Pakistan	Power Barge H 172 B
	TSL Power Systems, Singapore	Seismic Vessel "BGP Pioneer"
Equipment	Volvo Penta AB	Codecasa Luxury Yacht
	Bodan-Werft	Passenger Boat "Ville-De-Geneve"
	Deutsche Binnenreederei AG	Push Boat "KSS 2423"
	DWE	Roll-on/Roll-off Ship "Han Asparum"
	Kaefer Schiffsausbau GmbH	Salvage Tug "Fehmarn"
	KD-Köln-Düsseldorfer	Passenger Boat "MS Britannia"
	Leobersdorfer Maschinen AG	Oil Prospecting Vessel
	Neue Jadewerft	Hopper Barge "SM-MB-1"
	ÖSWAG Werft Linz AG	Passenger Boat "MS Zug"
	Reederei Peter Heilmann	Cruise Ship MS "Deutschland"
	Volkswerft Stralsund	River Cruise Ship "TUI Sonata"
Navy	Abeking + Rasmussen Werft / MTU	Mine Hunter SM 343
	Alfa Laval, Glinde	Navy Vessel
	Bremer Vulkan Werft	Frigate "Augsburg"
	Deutz AG	FD 432 Navy Service Vessel
	Fincantieri, La Spezia	Submarine U212
	Lürssen Logistics	Minesweeper "Al Murjanah"
	MTU Friedrichshafen	Frigate 123
	Neue Jadewerft GmbH	Frigate "Köln"
	Nordseewerke GmbH	Navy Research Vessel "Planet"
Thyssen Nordseewerke	Submarines U212	



Double Elastic Support
of a Diesel Engine
(Frigate)

GERB

worldwide



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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