

# Wärtsilä Water Lubricated Shaft Line Solutions





# A history of engineering excellence

Seawater is the oldest form of lubrication for propeller shaft stern tube systems. Water lubrication was first replaced by oil systems in 1886 and by the 1940s, oil lubrication became the standard. The only exception to this was naval vessels.

The sole reason behind selecting oil instead of water as a lubrication solution was discovered in the late 1880s, as it was noted that oil had better capability of protecting the bearings and the shaft from damage, as well as shielding the shaft from corrosion.

However, Wärtsilä has provided an innovative solution with its current water lubrication systems. These offer equal, or better-quality services, for protecting the shaft when compared to oil lubrication systems. At the same time, they answer the need for an environmentally sound, reliable solution for lubrication.

## **The experience to make it happen**

With over 100 years' experience in the shaft line solutions business and over 60 years in the water lubrication market, Wärtsilä has a long marine engineering history with a global customer base. When it comes to water lubricated solutions, Wärtsilä has a comprehensive product and services portfolio, and a proven track record for providing customers with flexible, operationally-efficient solutions on a worldwide scale.

Our oil-free offering is fully compliant with the requirements of the 2013 US EPA Vessel General Permit. The installation of Wärtsilä's open water package removes all risk of pollution, particularly for vessels operating in environmentally sensitive areas. It reduces lifecycle costs by extending the operational life of shaft line equipment. Whatever the environment, our water lubricated solutions bring benefits of operational efficiency for all vessel types.





# Wärtsilä Shaft Line Solutions

## A name that means **business**

Wärtsilä Shaft Line Solutions is an industry-leading marine propulsion provider, delivering a portfolio of end-to-end services and integrated solutions for the marine markets. We pride ourselves on our core values of: lifecycle efficiency, risk reduction, environmental leadership and design excellence.

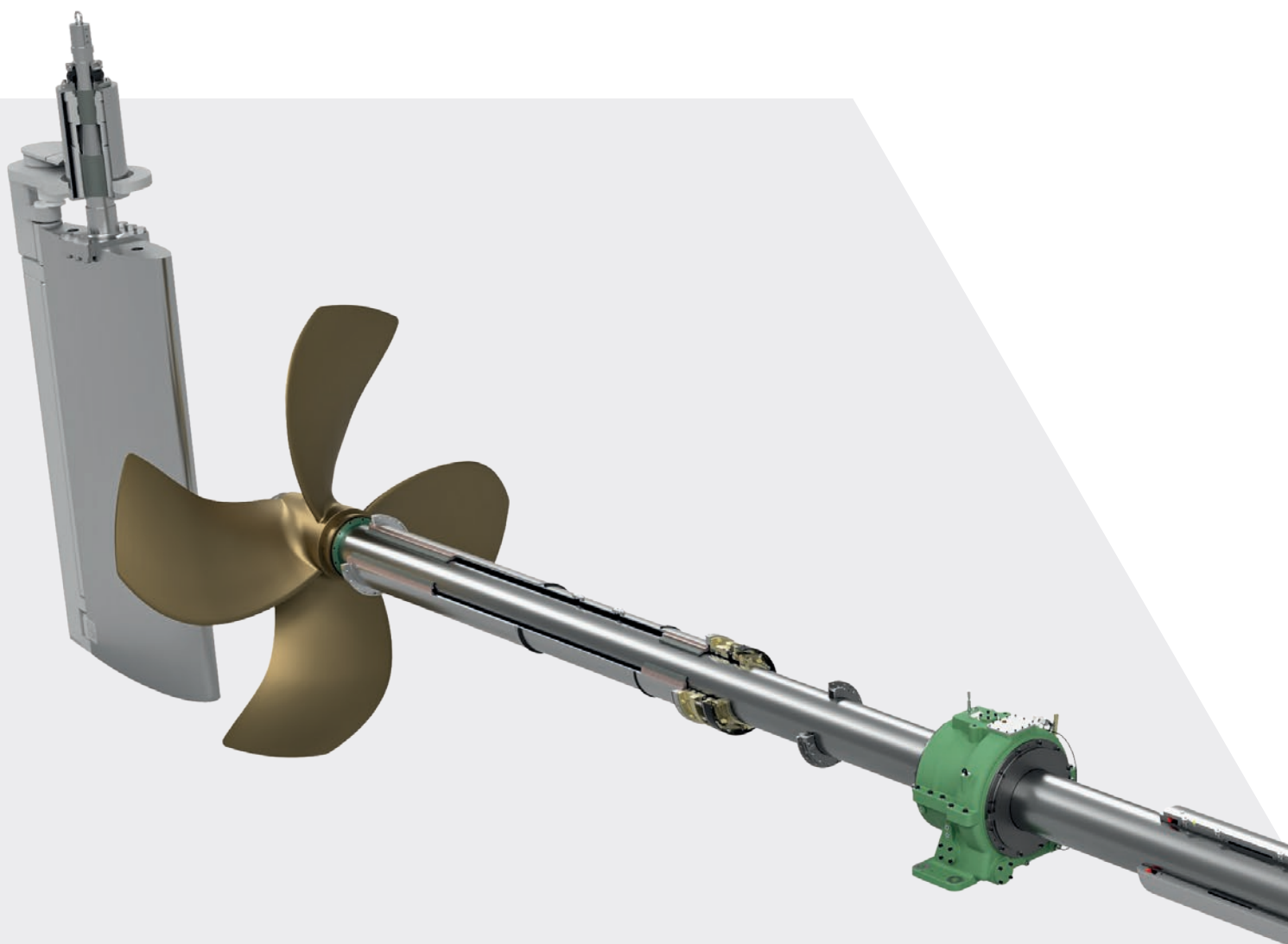
By working closely with Wärtsilä, customers have the benefit of an end-to-end comprehensive product and service provider. By integrating our shaft line solutions, we can ensure all shaft line components work together, optimising vessel performance. And this is backed up by our proven history and engineering expertise.

As an original equipment manufacturer operating in 75 countries, we are able to support customers on a truly global scale. Our enhanced field and underwater service teams are able to reach customers across the globe while our support team remains on standby 24/7 to provide any assistance that's needed.

## Delivering above expectations

With a focus on research and development, Wärtsilä Shaft Line Solutions continues to strengthen its position as a technology leader. In delivering advanced new products and services with an emphasis on reliability, flexibility and lifecycle efficiency, our competitive edge in the global marine market is evident. Product excellence is supported by our commitment to meeting ISO9001:2015 and OHSAS 18001 and ISO14001:2015 standards. Our testing process is extensive and exceeds the required stipulations. We have a strong track record in producing innovative, efficient and environmentally compliant solutions, reinforced by a focus on digitalisation to maximise customer value.





# The **right choice** for the environment

Single barrier oil lubricated seals can leak. And with stern tube spillages regularly monitored by port authorities, a leak could incur significant costs and endanger the environment. A water lubricated system solves this problem.

Legislators tend to favour water lubricated propulsion systems, mainly for their environmental benefits, namely the elimination of oil contamination into the sea.

## **Wärtsilä water lubricated package solutions**

We have two package solutions available.

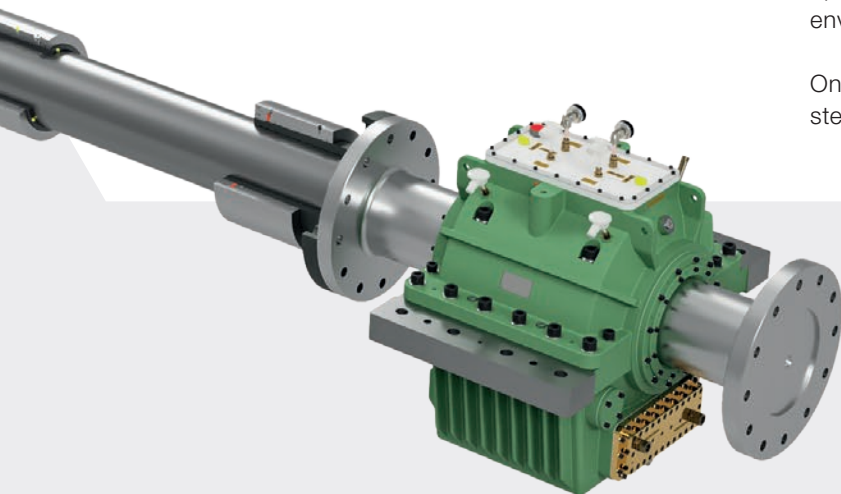
**CAPEX solution.** Includes stern tube assembly, including non-split aft and forward bearings, and forward seals. Optional extras include shaft journals, Wärtsilä Water Quality System, intermediate shaft bearings, electronic wear down gauge, shaft coating and installation of complete package.

**OPEX solution.** Within the standard scope, you will benefit from stern tube assembly, including non-split aft and forward bearings, forward seals, advanced Wärtsilä Water Quality System, electronic wear down gauge and shaft coatings. Optional equipment and services include shaft journals, intermediate shaft bearings, Sea-master panel and the installation of complete package.

## **Why go water lubricated?**

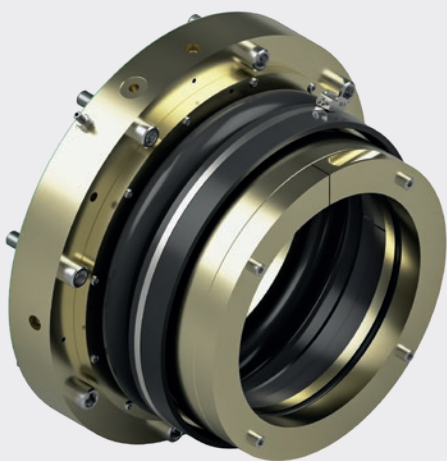
Wärtsilä water lubricated solutions bring zero risk of operational oil leakage, so vessels remain compliant with environmental legislation.

On account of these benefits, water is set to be the future of stern tube lubrication.





# Wärtsilä marine shaft seals

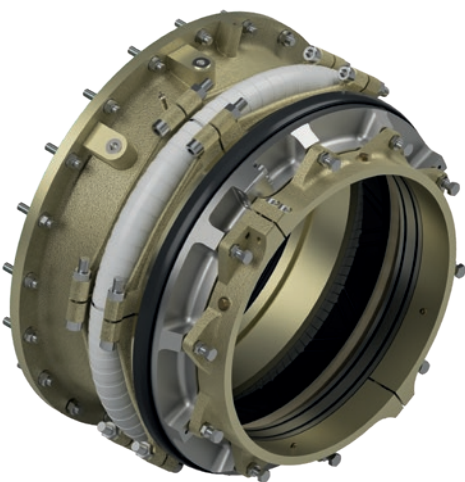
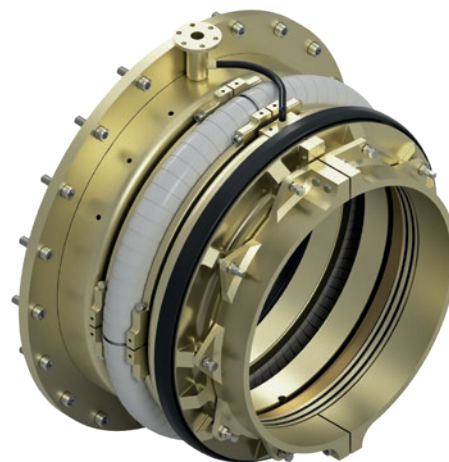


## Wärtsilä Enviroguard PSE

Available fully and partially split, the Wärtsilä Enviroguard PSE face seal is a water lubricated, environmentally compliant inboard sealing solution for vessels operating in blue-water and abrasive water conditions. With proven shock capabilities, these elastomer-bonded seals can accommodate shaft line misalignment and vibration.

## Wärtsilä Enviroguard M

Wärtsilä Enviroguard M offers minimal leakage, low lifecycle costs and exceptional performance in tough water conditions. It is adaptable, efficient and features a double inflatable emergency seal for low risk, diver-free repair and maintenance.

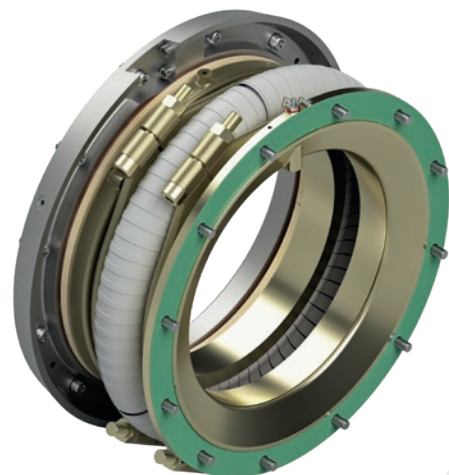


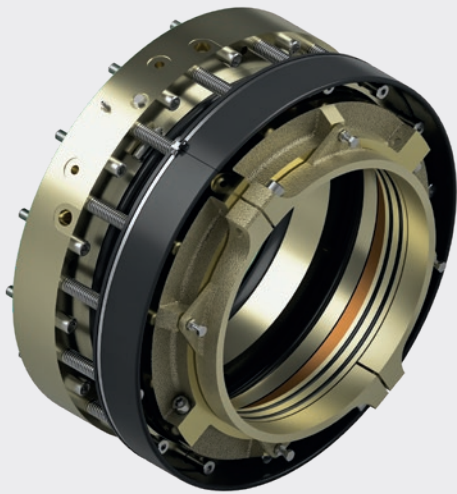
## Wärtsilä Enviroguard MB

With high wear, corrosion-resistant materials and “omega” bellows, the Wärtsilä Enviroguard MB face seal is an inboard, closed water lubricated type seal. It’s been specifically designed to withstand shock and high shaft movement to meet the demands of icebreaker applications. This face seal also facilitates in-situ overhauls and upgrades, due to its split wearing design, and can also be fitted with a double inflatable seal.

## Wärtsilä Enviroguard M4

Wärtsilä Enviroguard M4 is a closed outboard face seal designed for icebreaker applications. With “omega” bellows, this seal can withstand harsh environments where shock and high shaft movements are inevitable. It comes with partially split wearing components as standard to allow for in-situ upgrades and overhauls.



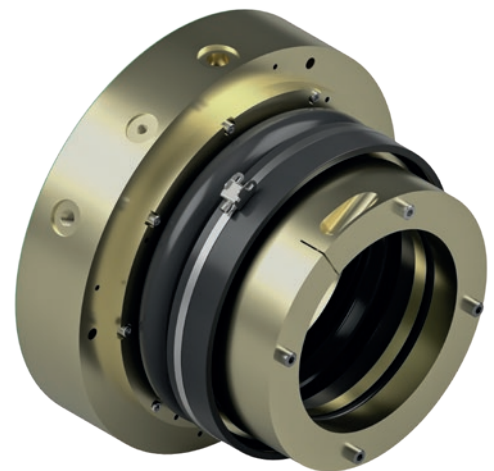


## Wärtsilä Enviroguard MG

Hard-wearing interface materials, corrosion-resistant metal components and flexible helical spring makes the Wärtsilä Enviroguard MG an ideal seal for enhancing vessel performance. Its double inflatable emergency seal enables simple repair and maintenance, while its flexible design makes it both vibration-tolerant and capable of enduring large and repeated axial shaft movements.

## Wärtsilä Jetguard PSE

The Wärtsilä Jetguard PSE face seal is able to withstand shock and pressure, making it ideal for both commercial and military vessels. Its hard-wearing, abrasion-resistant components enable it to operate in silty, sandy waters.



## Wärtsilä Floodguard

The Wärtsilä Floodguard has proven performance as a reliable bulkhead seal for military applications. With this self-activating seal in place, navies can safeguard their vessel against inter-compartmental flooding, while maintaining vessel integrity.

## Wärtsilä Steerguard E

A significant part of our product portfolio, Wärtsilä Steerguard E can be found on the rudder stocks of numerous vessels around the world. Made of neoprene rubber and high-grade cast iron, this face seal is hard-wearing and capable of operating in harsh conditions and also meets EPA VGP standards.



# Wärtsilä marine shaft bearings

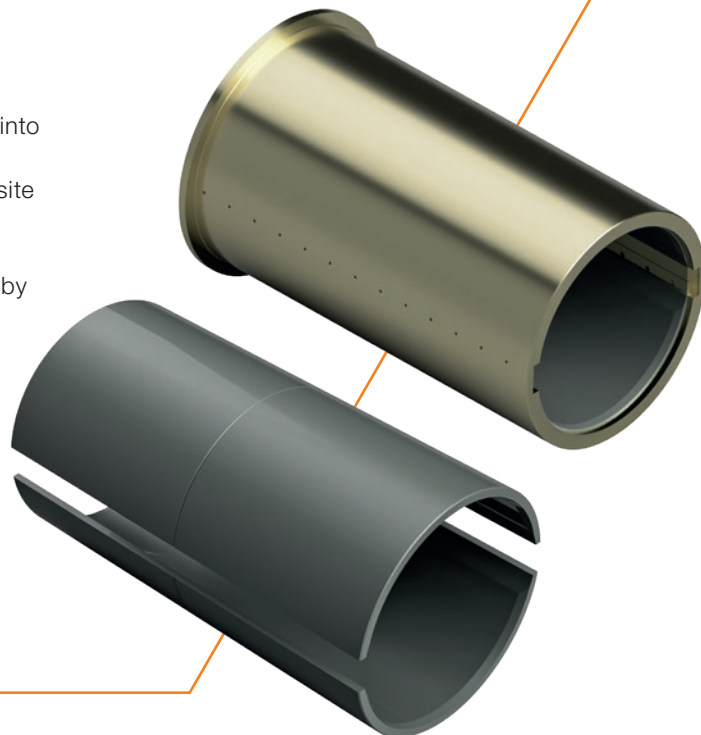


## Wärtsilä Linesafe

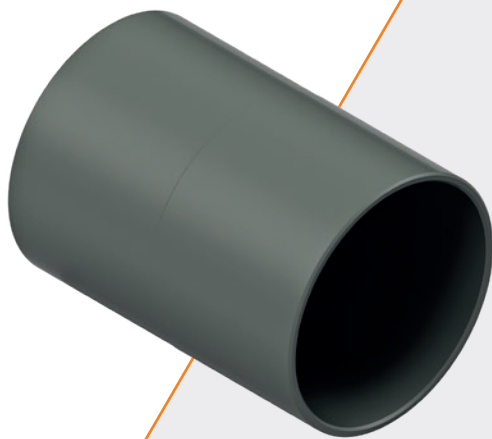
The Wärtsilä Linesafe is a fully split, hydrodynamic bearing with a self-aligning design. With its temperature sensors and transparent inspection plate as standard, it's designed to meet modern market demands and provide full visibility of equipment health to keep vessels out at sea.

## Wärtsilä Envirosafe

Years of research and development went into developing the Wärtsilä Envirosafe. Unlike like most traditional bearings, this composite bearing for stern tube applications is not only technologically-advanced, but also environmentally compliant and lubricated by seawater.





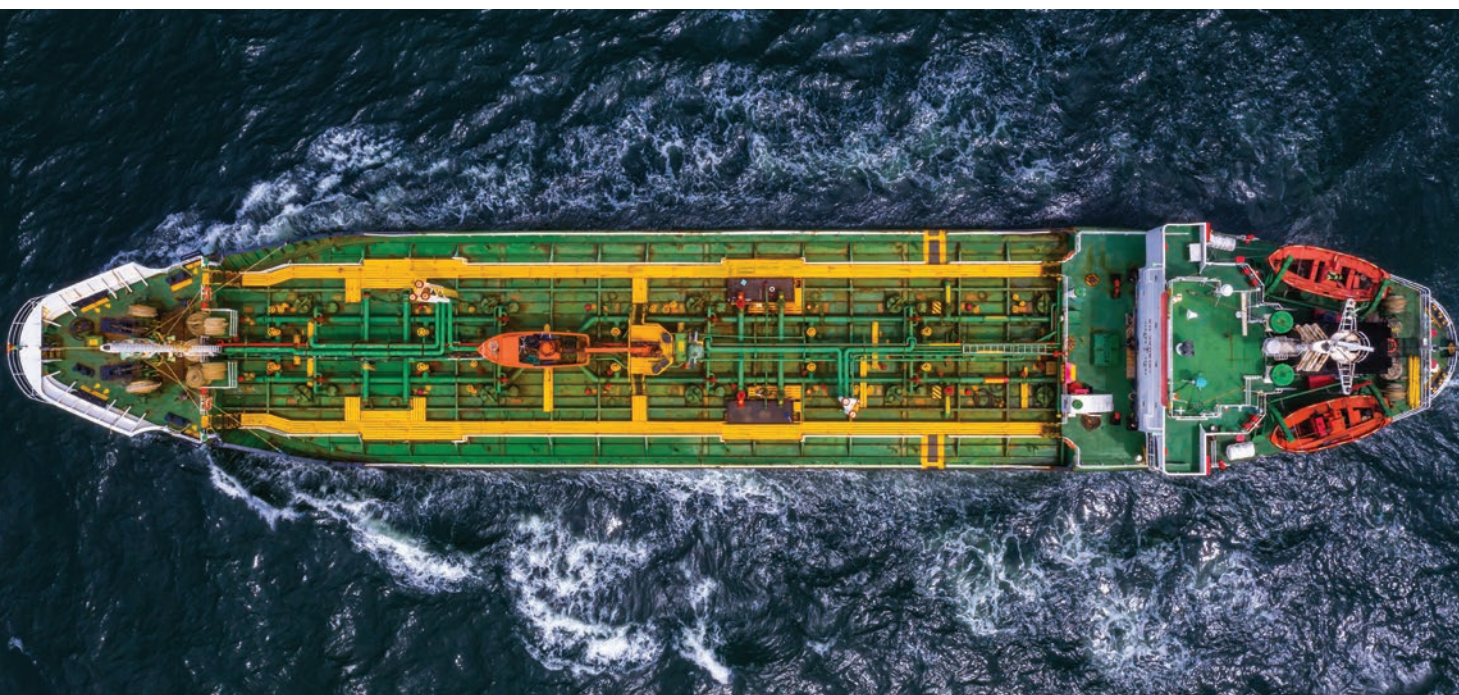
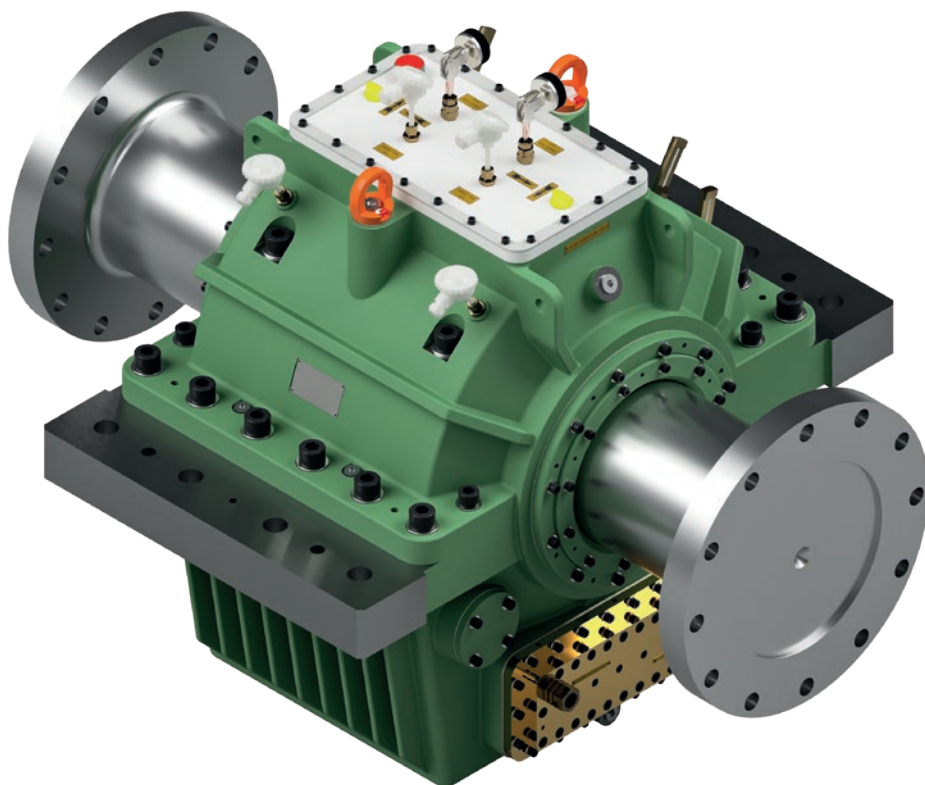


## Wärtsilä Steersafe

The Wärtsilä Steersafe bearing is designed to transfer high loads on rudders and stabilisers in extreme environments, reducing the risk of failure during service. Durable and water lubricated, this bearing is approved by all major Classification Societies and is compliant with US EPA regulations.

## Wärtsilä Thrust Bearings and Pads

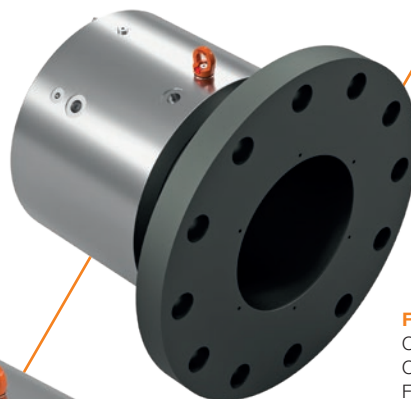
The Wärtsilä Thrust Bearing is a self-aligning, single collar unit with pivoting pads designed to carry axial loads in harsh conditions. Its adaptive design lends itself to modification, for ship owners and operators requiring an axial and radial load bearing solution. This oil-circulating and cooling system is available either as a self-lubricated system with an integrated cooler, or as an external pump and cooler unit, and comes with a remote temperature and oil flow monitoring device for lifecycle management purposes.



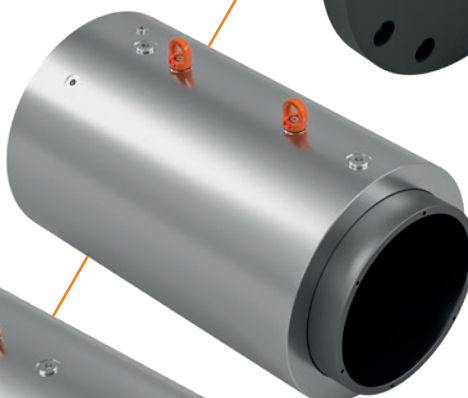
# Wärtsilä hydraulic equipment

## Wärtsilä High Friction Couplings

Over 40 years of designing and manufacturing shaft line hydraulic couplings informed the development of the Wärtsilä High Friction Coupling. Increasing torque transmission capacity and eliminating the need for keyways, tapers or thrust rings, this innovative method for connecting shafts maximises propulsion efficiency in areas where previously it had been impossible, and brings substantial cost savings along the way.



**Fig.1** Wärtsilä OHSN-VX and OHSN-VXD High Friction Couplings.



**Fig.2** Wärtsilä OHSN-X High Friction Couplings.



**Fig.3** Wärtsilä OHSN-BX High Friction Couplings.

## Wärtsilä Hydraulic Bolts

Wärtsilä Hydraulic Bolts are designed to connect marine shaft line flanges, and at the same time meet the requirements of high torque transmission.

## Wärtsilä Hydraulic Nuts

Wärtsilä Hydraulic Nuts have been designed to support the installation of heavy equipment both as a tool and as a permanent nut. Fitted using a hydraulic procedure, it provides a straightforward and trouble-free solution for vessels on the move.





# Wärtsilä stern tube solutions

## Wärtsilä Stern Tubes

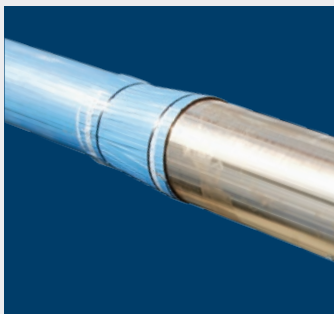
Our custom engineered stern tube solutions are made to meet individual customer specifications and come with a cast white metal coat to safeguard against harsh weather conditions. Compared to traditional methods, the installation and alignment process for our stern tube solutions is straightforward, saving time and money.



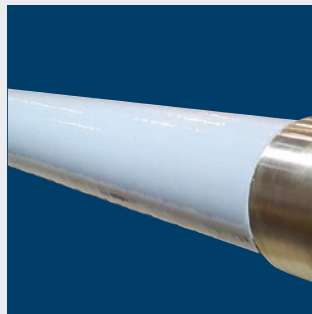
## Wärtsilä Tail Shafts, Shaft Journals and Shaft Coatings

We supply complete tail shafts with shaft journals and industry leading shaft corrosion protection. Alternatively, shaft journals and coatings are available separately, along with on-site installation support.

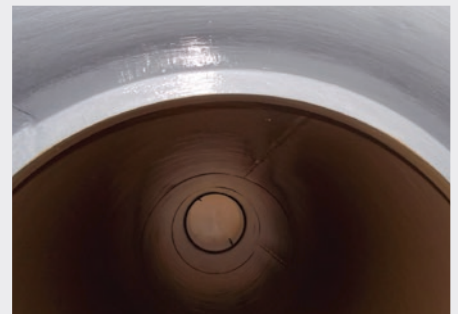
Shaft journal



Coated shaft



Coated stern tube



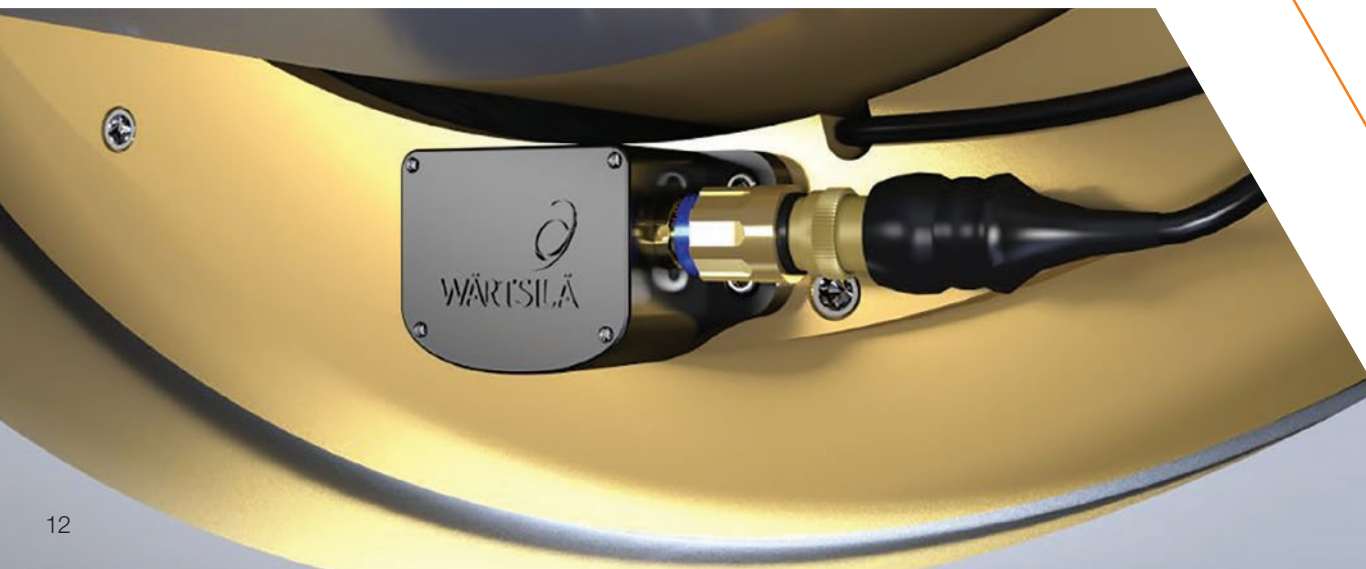
## Wärtsilä Sea-Master System

Completely transforming shaft line asset management, the Wärtsilä Sea-Master System comes with an on-board and remote digital monitoring device for tail shaft performance, delivering unprecedented levels of data. It comes with a range of support and consultancy services, which help you make informed decisions about optimising operations.

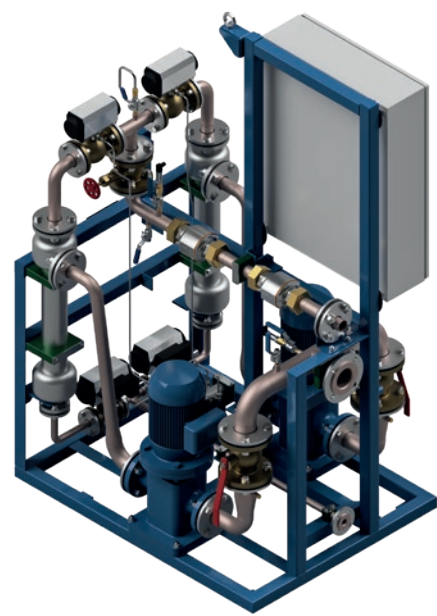
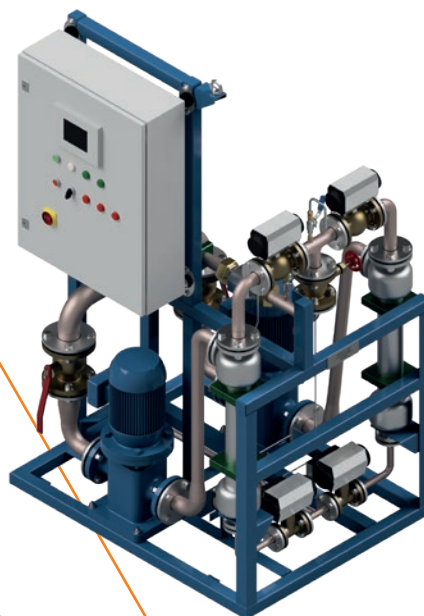
This revolutionary platform also enables you to meet modern environmental legislations. By extending the maintenance intervals for water lubricated systems, the Wärtsilä Sea-Master System provides a window into vessel health so customers can lower cost of ownership and enhance the performance of their vessel. The system is available for installed, new build and retrofit applications.

## Wärtsilä Bearing Wear Down Gauge

The Wärtsilä Bearing Wear Down Gauge remotely monitors the condition of stern tube or bracket bearings on water lubricated shaft lines by measuring the drop of the propeller shaft. The measurements are taken by a proximity sensor located in a fully potted submersive enclosure, which is mounted on the stern tube or bracket bearing keeper ring. This system can be fitted to both new build vessels and retrofitted to existing vessels with water lubricated shaft lines.







## Wärtsilä Water Quality System

The Wärtsilä Water Quality System provides conditioned water for open lubricated stern tube systems. It increases the life of seals and bearings by filtering the water supply to required standards, with a range of filtered supply systems available. A control panel oversees the safe operation and full monitoring of the system.

# Wärtsilä Shaft Line Repair Services

## We're here to help

We know how important it is to resolve shaft line problems as quickly as possible. That's why we developed Wärtsilä Shaft Line Repair Services, a quick response service for shaft lines damaged by a major marine incident or showing common symptoms of equipment failure.



## Why Wärtsilä?

### Global expertise

You can rely on Wärtsilä for its extensive experience, technical know-how and high levels of professionalism.

### We'll come to you

Wherever you are in the world, whatever shaft line issue you have, we work fast to get your vessel operational again. Our Wärtsilä Shaft Line Repair Services team has field service engineers located around the world, handling every step of the way, so customers get the right people at the right time.

### Project management made simple

The driving force behind Wärtsilä Shaft Line Repair Services is the project manager. Your one point of call, the project manager is responsible for communications, driving production, overseeing logistics, preparing documentation, and much more. Having one point of contact communicating with experts and managing the delivery and installation of spare parts makes the process more streamlined and means that customers can focus on operations.





## Help with any shaft line issue

Potential signs of shaft line failure can vary from noise and vibration to high temperatures and leaking seals. They often occur as a result of wear and tear or a major incident, like a fire, flooding, breakdown, collision or grounding. When the unexpected arises, we are here to help – wherever you are in the world.

## How we can help

We're recognised as a leading supplier of marine propulsion systems. Our all-encompassing portfolio brings customers the necessary services and innovations for getting a vessel's shaft line back to good health.

The benefits we provide include, but are not limited to:

- technical support, advice and consultancy;
- complete condition and failure investigations;
- measurement, calculation and analysis of alignment, torsional vibration and whirling;
- specialist, patented alignment tools and software including 4D gyro laser, strain gauge measurement, digital jack-up, etc;
- realignment and modifications to shaft line systems and associated equipment;
- dynamic alignment and vibration services;
- monitoring and alarm solutions;
- underwater class and measurement surveys, and NDT/MPI, hull (fouling), grounding and spot inspections;
- shaft line and stern tube equipment replacement, upgrades and overhauls (seals, bearings, couplings, line shaft bearings, liners, propeller repair, straightening, polishing);
- underwater shaft seal, bow thruster, stabilizer fine repair and exchange, and underwater rudder repair, removal and installation;
- ship husbandry: propeller polishing, hull cleaning, anodes renewal, blankings, and ICCP and cofferdam installations;
- specialist in-situ machining and welding services and supervision, including underwater welding repairs and weld repair plans;
- shaft repair, straightening and replacement (including removal and installation underwater);
- rudder, nozzle and underwater machinery/components repair and replacement; and
- project management, consultancy and support in handling class and insurance cases.

## The right specialist when you need them

Behind our project managers is a team of multi-disciplined experts. From onsite superintendents to skilled engineers, our team works together to remedy any shaft line issue. Their expertise in alignment and measurement, and their access to the necessary equipment and machinery for performing precise investigations, allows the team to identify the problem and correct it as quickly and as accurately as possible.

## Get your parts sooner

When you need replacement parts, we can help. Our factories around the globe have been designed to meet the demands of the marine market. Having the ability to produce almost any shaft line component in-house means that we bypass any processing problems and external parties to get parts to you sooner.



Green Award certifies ships that are ultra-clean and ultra-safe. Ships with a Green Award certificate secure various fiscal and non-fiscal advantages. By fulfilling high safety and environmental standards in shipping, the Green Award makes the highest standards of ship operation economically more attractive. Wärtsilä is an incentive provider for the Green Award. Our water lubricated offering has the Green Award stamp of approval and ensures your vessel's shaft line will be compliant with the regulations of this governing body. This guarantees that your vessel qualifies for all the benefits of being a part of the Green Award organisation.

## Wärtsilä's total lifecycle solutions

An industry leader in shaft line components Wärtsilä Shaft Line Solutions delivers a portfolio of end-to-end services and integrated solutions for the marine markets that builds on our core values: lifecycle efficiency, risk reduction, environmental leadership and design excellence. As an original equipment manufacturer operating in 75 countries, we have the capabilities to support customers on a global scale, and remain committed to providing in-country and round-the-clock expertise.

**[wartsila.com/shaft-line-solutions](https://wartsila.com/shaft-line-solutions)**

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