

THORNDON



**PROVEN WATER
LUBRICATED
PROPELLER SHAFT
BEARING SOLUTIONS**



Advanced Propeller Shaft Bearings from Pioneers in Water Lubricated Polymer Bearing Technology



Reliability, long wear life, superior customer service and strong technical support have made Thordon the first choice for pollution free propeller shaft bearing solutions for repair, conversion and new build requirements.

Thordon Bearings, a pioneer in the development of pollution free bearing designs, offers a choice of propeller shaft bearing systems. Open, water lubricated bearing choices include Thordon XL, SXL, Composite and COMPAC; each offering specific advantages in different water environments and operating conditions. The Thor-Lube sealed stern tube system combines proven XL bearings with Thor-Lube, a water soluble, biodegradable lubricant.

Over 25 years of experience and solid references in marine applications have earned Thordon bearings a reputation as the premiere supplier of water lubricated bearing systems. Thordon XL was a standard bearing of choice for Naval, Coast Guard and other water lubricated vessels up until the late 1980s when high performance Thordon COMPAC was introduced. During the 1990s, COMPAC replaced XL as the new build standard for many of the world's Navies and Coast Guards, however, XL and SXL still remain popular options in somewhat

abrasive water conditions. More recently, commercial owners and managers, including major cruise ship and ferry operators, have also specified COMPAC for its pollution free simplicity and reliability to replace conventional oil lubricated stern tube systems. A separate brochure outlining Thordon COMPAC systems is available. Thordon Composite continues to be Thordon's water lubricated solution of choice for operation in highly abrasive water conditions.

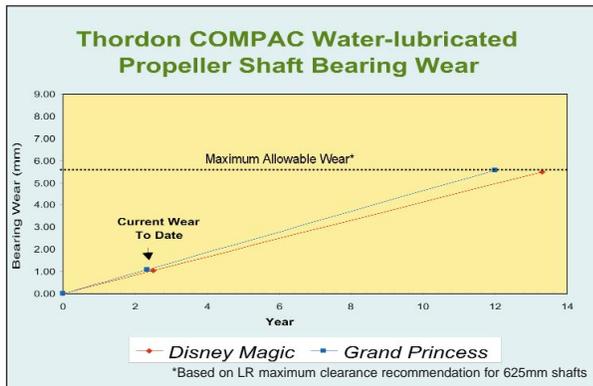
Also commercialized in the early 1990s, Thor-Lube, Thordon Bearing's environmentally friendly bearing system option for sealed stern tubes, is enjoying growing interest resulting from the global focus on pollution enforcement and subsequent liability. A separate brochure outlining Thor-Lube for conversion and new build is available.

It doesn't matter if your bearing needs are for repair, conversion, or new build; Thordon propeller shaft bearings and bearing systems deliver proven, reliable, cost-effective performance backed up by timely delivery, superior technical support and outstanding after sales service.

Thordon Water Lubricated Propeller Shaft Bearings Offer These Proven Benefits

Long Wear Life

References from over 25 years experience supplying marine propeller shaft bearings have proven that Thordon bearings provide significantly longer life compared to the bearings they replace. Thordon bearings often outlast competitive products by 50 to 100%, or more, significantly reducing overall life cycle operating costs and increasing propulsion system reliability.



Four Grades/Multiple Configurations Available

Thordon propeller shaft bearings are available in 4 different grades and multiple configurations to allow selection of the optimal bearing solution for each owner's specific application and operating profile.

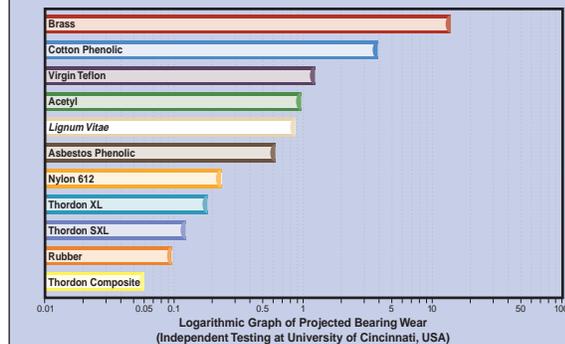
Pollution Free

Thordon water lubricated propeller shaft bearings totally eliminate the use of oil resulting in zero risk of pollution.

Corrosion Resistant

Electrically inert, Thordon bearings resist seawater corrosion at both the bearing surface and the interface between the bearing and the housing, thereby preventing a galvanic cell from forming.

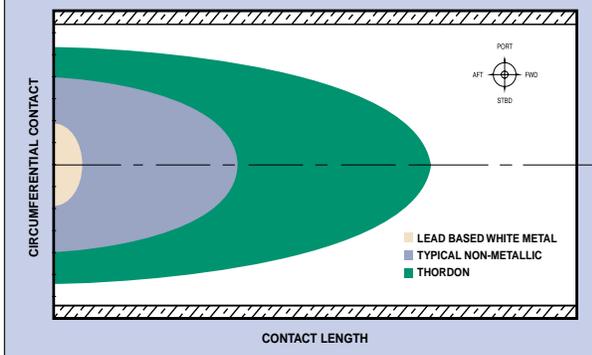
Typical Bearing Abrasive Wear Rates



High Abrasion Resistance

Due to their tough, elastomeric properties, Thordon bearings resist abrasive wear by tending to deflect, and then reject, abrasive particles allowing them to be flushed through the bearing and not become embedded.

Typical Edge Loading Profile



Accommodates Edge Loading

Under edge loading conditions caused by minor shaft misalignment, elastomeric Thordon bearings deflect slightly, effectively spreading the load and eliminating potential bearing wiping and shaft wear.

Low Friction

Thordon's static and dynamic coefficients of friction are both lower than other materials commonly used for water lubricated propeller shaft bearings. Lower friction results in reduced break away torque, longer life and elimination of stick-slip and noise.

High Resilience/Impact Resistance

Elastomeric Thordon bearings tend to absorb impact loads, increasing resistance to damage from pounding during operation or in heavy seas.

Reduced Docking Time

Thordon recognizes the need for quick response to customer needs. To ensure tight docking schedules are met, Thordon provides the following advantages for shipyards and owners.

i) Worldwide Stock Availability – With Thordon's network of distributors in over 60 countries around the world, inventory is available quickly at all major ports. When

necessary, emergency shipment from the factory within three business days is possible.

ii) Easily Machined and Fitted – Asbestos free, easily machined, and one seventh the weight of metals, Thordon bearings can be quickly installed in position by freeze fitting. Lighter rigging may be used and Thordon will not chip or crack during handling when frozen.

Extensive References

With over 25 years of experience supplying water lubricated propeller shaft bearings, Thordon has developed an extensive list of references, which is available upon request.

Full Classification Society Approvals

Thordon propeller shaft bearings are approved by all major Classification Societies and can be specified and installed with confidence.

Choose the Optimum Thordon Bearing Grade and Configuration for Your Needs



During the more than 25 years Thordon Bearings has been supplying water lubricated bearing systems to the marine industry, wide variations in water quality ranging from clean to very abrasive, have been encountered. Rather than promoting the concept that one bearing solution will work in all types of conditions, Thordon has developed four different bearing grades from which the optimal bearing solution for each specific application and vessel operating profile may be selected.

Each individual grade offers unique differences relating to friction, hydrodynamic operation and resistance to third particle abrasive wear which can be used to determine the best bearing for your vessel operating profile.



Thordon COMPAC

Thordon COMPAC is a high performance water lubricated bearing system primarily for “blue water” operating conditions. Specially formulated with a low coefficient of friction to reduce startup friction and eliminate stick-slip, COMPAC’s unique configuration is designed to promote early formation of a hydrodynamic film at lower shaft rpm. The bearing of choice for Navies, the lower (loaded) portion of the bearing is smooth, while the upper half of the bearing incorporates water grooves for lubrication and cooling. Thordon COMPAC bearings are available in either full form tubes or split carrier configuration depending on the design requirements.



Thordon XL

Our traditional standard propeller shaft bearing grade, Thordon XL is a general purpose bearing offering superior performance compared to other bearings commonly used in propeller shaft applications. XL provides good balance between long wear life, low coefficient of friction, reasonable abrasion resistance and cost effectiveness. Thordon XL is available in a wide range of sizes in both tube and stave configurations.



Thordon SXL

Thordon SXL offers a lower coefficient of friction for reduced break-away torque and smoother operation at lower shaft RPM, increased resistance to third particle abrasive wear and improved wear life compared to XL. Available in a wide range of sizes, SXL can be specified in either tube or stave configurations.



Thordon Composite

Specially formulated to provide superior wear life in very abrasive water conditions such as inland river systems, Thordon Composite bearings operating in combination with hard coated nickel-chrome-boron shaft sleeves routinely outwear rubber propeller shaft bearings by a factor of two or more. More than fifteen years experience on hundreds of push boats and other vessels operating on America’s muddy Mississippi River system confirm real-life bearing wear at between 0.010” – 0.015” (0.25mm - 0.38mm) per year. Composite bearings are available in a full range of sizes in both tube and stave configurations as well as brass backed flanged and non-flanged bearings in industry standard sizes.

Propeller Shaft Bearing Configurations

Full Form Tubes

Full form Thordon tubes are the easiest Thordon configuration to install as the entire bearing may be quickly frozen in dry ice or liquid nitrogen and quickly installed in one piece. Full form tubes are also used if a split bearing design is

desired, allowing inspection or renewal of the bearing without removing the shaft. Thordon's unique single key design, where only the non-metallic Thordon bearing halves are removed, facilitates replacement of the bearings in a few hours, even underwater.

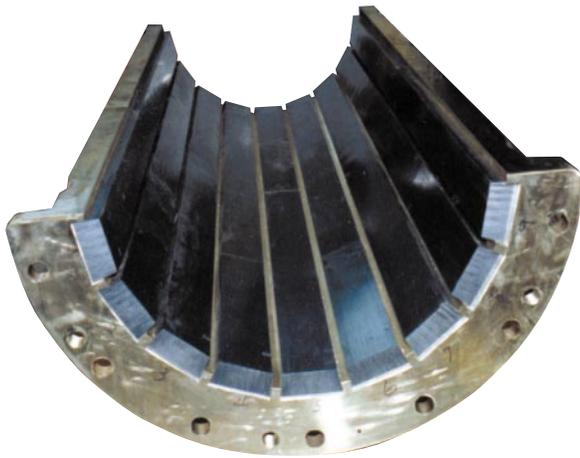


Tapered Key Carrier Design – Originally designed for Disney Cruise Lines, this design allows the bearings to be withdrawn, inspected and re-installed or replaced in a matter of hours.

THORDON Bearing Grade and Configuration Selection Chart

GRADE AND CONFIGURATION	Axial Lubrication Grooves	Typical L/D Ratio* Aft Bearing	Max. Recommended Operating Time In Abrasives
COMPAC Tube	180° - Top Only	2:1	Up to 10%
XL Tube	360°	4:1	Up to 15%
XL STAXL Staves	360°	4:1	Up to 15%
XL Dovetail Staves	360°	4:1	Up to 15%
SXL Tube	360°	4:1	Up to 20%
SXL STAXL Staves	360°	4:1	Up to 20%
SXL Dovetail Staves	360°	4:1	Up to 20%
Composite Tube	360°	4:1	Over 20%
Composite STAXL Staves	360°	4:1	Over 20%
Composite Dovetail Staves	360°	4:1	Over 20%

*L/D ratio may vary depending on actual shaft loading and the anticipated operating profile of the vessel.



Staves

Thordon XL, SXL and Composite grades are all available in a full range of metre long (39.4") STAXL and Dovetail stave configurations and can be removed with the shaft in place. The Inside Diameter chords of the STAXL staves must be machined to conform to the radius of the shaft liner, however, the lubrication grooves are moulded in place and do not require machining. The Inside Diameter of Dovetail staves must be machined, to conform to the radius of the shaft liner. Thordon staves are most easily installed by freezing in dry ice or liquid nitrogen and then interference fitting them into the housing or carrier. Custom sizes are available upon request.

Thordon STAXL Staves



THORDON CODE	SHAFT DIAMETER	HOUSING DIAMETER	THICKNESS	LENGTH
002	22.8-29.1"	25.9-31.1"	1.653"	39.4"
003	23.4-29.1"	25.9-31.1"	1.378"	39.4"
004	18.7-24.0"	21.8-25.9"	1.653"	39.4"
005	19.2-24.0"	21.8-25.9"	1.378"	39.4"
006	15.7-19.8"	18.8-21.8"	1.653"	39.4"
007	16.3-19.8"	18.8-21.8"	1.378"	39.4"
008	13.3-16.9"	16.5-18.8"	1.653"	39.4"
009	13.9-16.9"	16.5-18.8"	1.378"	39.4"
010	11.9-14.9"	14.3-16.5"	1.260"	39.4"
012	10.6-12.7"	12.5-14.3"	1.063"	39.4"
014	9.17-11.3"	10.8-12.5"	0.866"	39.4"

all measurements are in inches

Note: Ensure that the radial clearance between the shaft and housing is less than the STAXL stave thickness to allow for machining.

Thordon Dovetail Staves



US NAVY STANDARD	WIDTH OF SLOT	THICKNESS	LENGTH
001	1.687"	.875"	39.4"
002	1.812"	.875"	39.4"
003	1.937"	.938"	39.4"
004	2.062"	.938"	39.4"
005	2.187"	.938"	39.4"
006	2.312"	.938"	39.4"
007	2.750"	1.063"	39.4"
008	2.937"	1.063"	39.4"
008	3.062"	1.063"	39.4"
010	3.187"	1.063"	39.4"

all measurements are in inches



Customer Focused To Support Your Immediate and Future Needs

Supply and Service: Geared to provide quick response to customer needs, Thordon Bearings understands the importance of quick delivery and reduced down time. Thordon marine bearing systems can be designed, produced to the exact requirements of the customer and shipped quickly.

Distribution: With Thordon bearings specified all around the world, an extensive distribution network has been established in over 60 countries. Inventories of common bearing sizes are stocked by local Thordon Distributors and are backed up by large regional and head office Thordon stocks.

Application Engineering:

Thordon Bearing's engineers work closely with customers to provide innovative bearing system designs that meet or exceed the technical requirements of the application.

Manufacturing: Thordon's modern polymer processing facility is staffed with experienced and dedicated employees. Bearings up to

2.2 m (86") in diameter have been supplied and bearings up to 1.2 m (48") O.D. have been machined in-house.

Quality: Thordon Bearings Inc. is a Canadian company manufacturing to ISO 9001 Quality System requirements. With over 30 years experience in elastomeric bearing design, application engineering and manufacturing, Thordon marine bearings are recognized worldwide for both quality and performance.

Research and Development: Thordon bearings are being continuously tested by our Bearing Test Facility. The Facility evaluates new designs and applications before they are put into service. Ongoing testing not

only allows for design refinements, but ensures quality and performance after installation. Our polymer laboratory evaluates new and modified polymers in a continuing quest to improve Thordon bearing performance and search for new polymer bearing solutions.



Thordon Represented Worldwide

Your Local Thordon Distributor

Visit our web site at <http://www.thordonbearings.com>

THORDON

BEARINGS INC. A member of the Thomson-Gordon Group

3225 Mainway, Burlington, Ontario Canada L7M 1A6
Tel (905) 335-1440 Fax (905) 335-4033
E-mail info@thordonbearings.com



PSB 08/02/3000 BC



ISO 9001
CGSB
Registration #93649

Printed in Canada