



THORDON

GREASE-FREE
RUDDER BEARINGS

PROVEN RUDDER BEARING DURABILITY AND GUARANTEED PERFORMANCE FROM THE PIONEERS IN POLYMER BEARING TECHNOLOGY

Reliability, long wear life and superior customer service have made Thordon the first choice in pollution free rudder bearing applications for over 35 years. Thordon SXL self lubricating bearings have set the standard in rudder bearing technology and are recognized internationally as the proven choice for value, performance and complete freedom from water pollution concerns for both new construction and conversions.

For newbuildings, Thordon Bearings offers a 15 year bearing wear life guarantee unmatched by any other rudder bearing supplier. Ship owners and managers that specify Thordon SXL rudder bearings understand total life cycle cost is much more important than initial purchase price. With a worldwide distribution network from Seattle to Halifax to Portugal to Dubai to Shanghai, Thordon rudder bearings can be delivered fast to any ship repair facility in the world.

Once customers have experienced the performance of the product, technical support and after-sales service from Thordon Bearings and their extensive distribution network, they stay with Thordon.

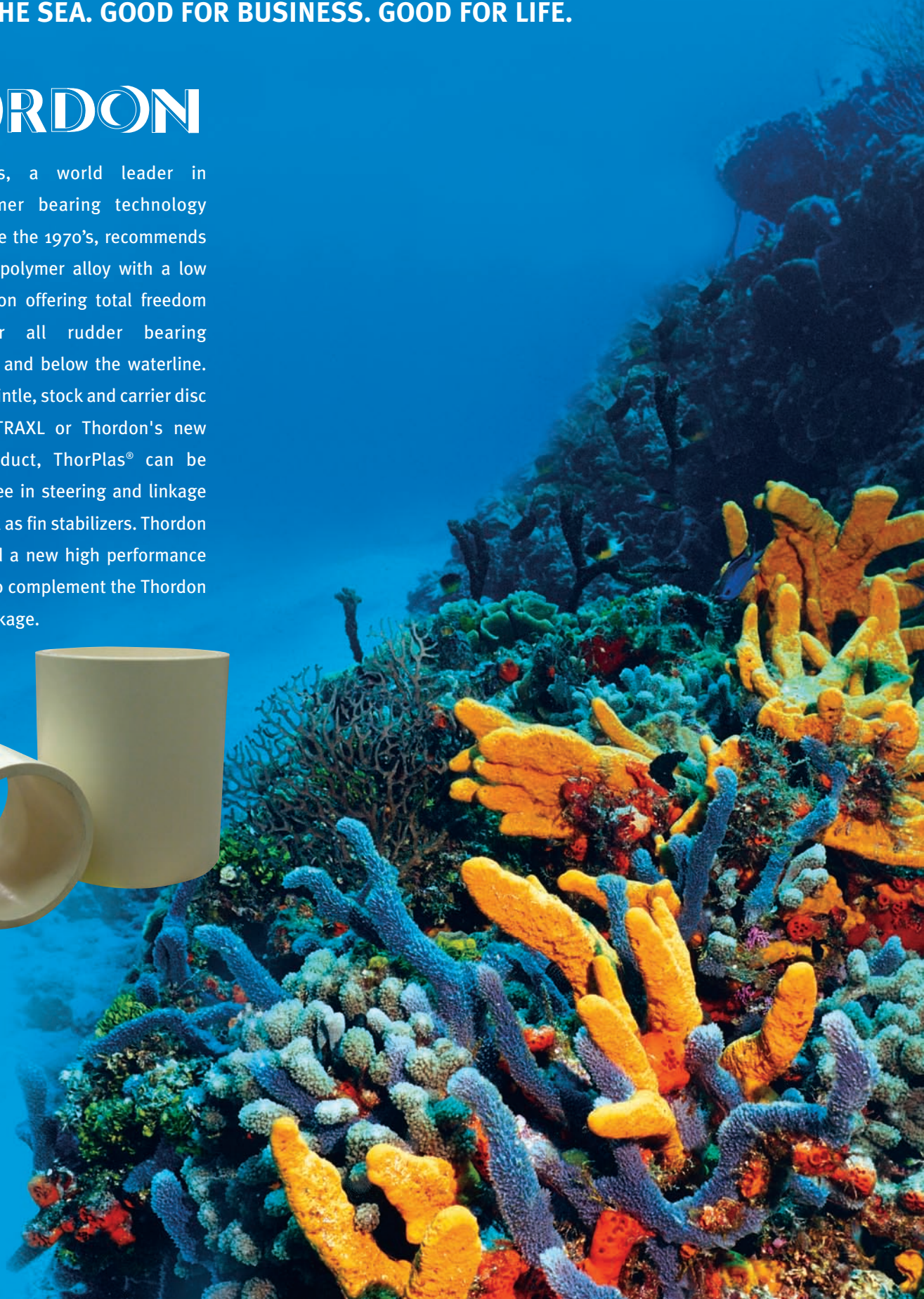
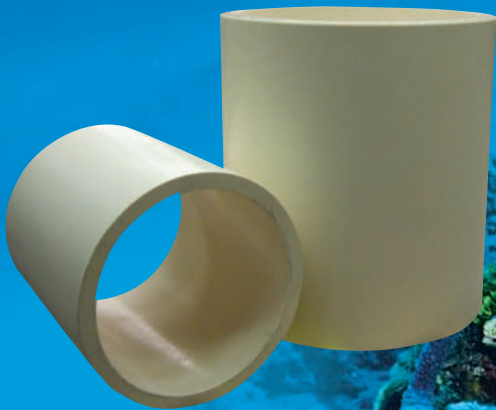


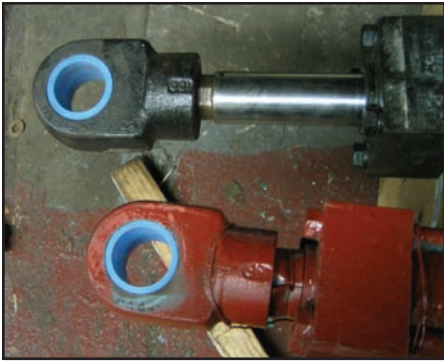
15 YEAR
BEARING GUARANTEE

GOOD FOR THE SEA. GOOD FOR BUSINESS. GOOD FOR LIFE.

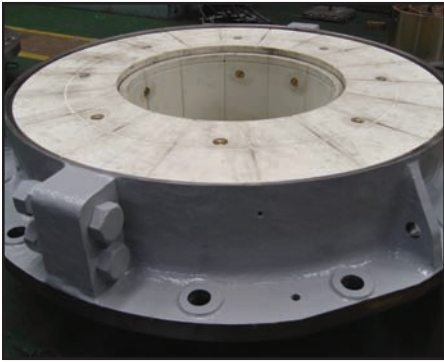
THORDON

Thordon Bearings, a world leader in elastomeric polymer bearing technology advancements since the 1970's, recommends SXL, an advanced polymer alloy with a low coefficient of friction offering total freedom from grease for all rudder bearing applications above and below the waterline. In addition to SXL pintle, stock and carrier disc bearings, HPSXL TRAXL or Thordon's new thermoplastic product, ThorPlas® can be specified grease-free in steering and linkage applications as well as fin stabilizers. Thordon has also developed a new high performance rudder stock seal to complement the Thordon rudder bearing package.





ThorPlas steering and linkage bearings.



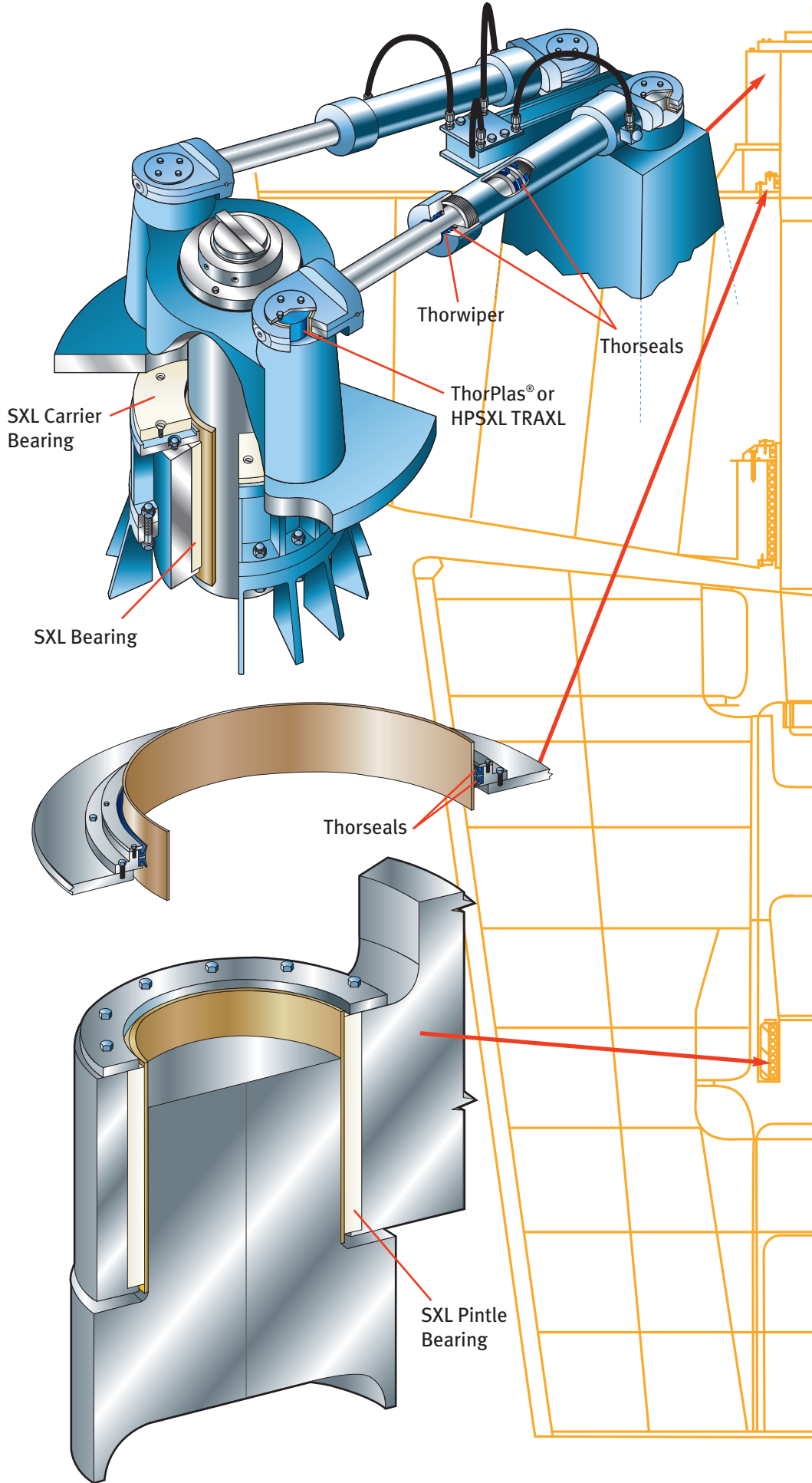
Thordon SXL rudder carrier disk bearing.

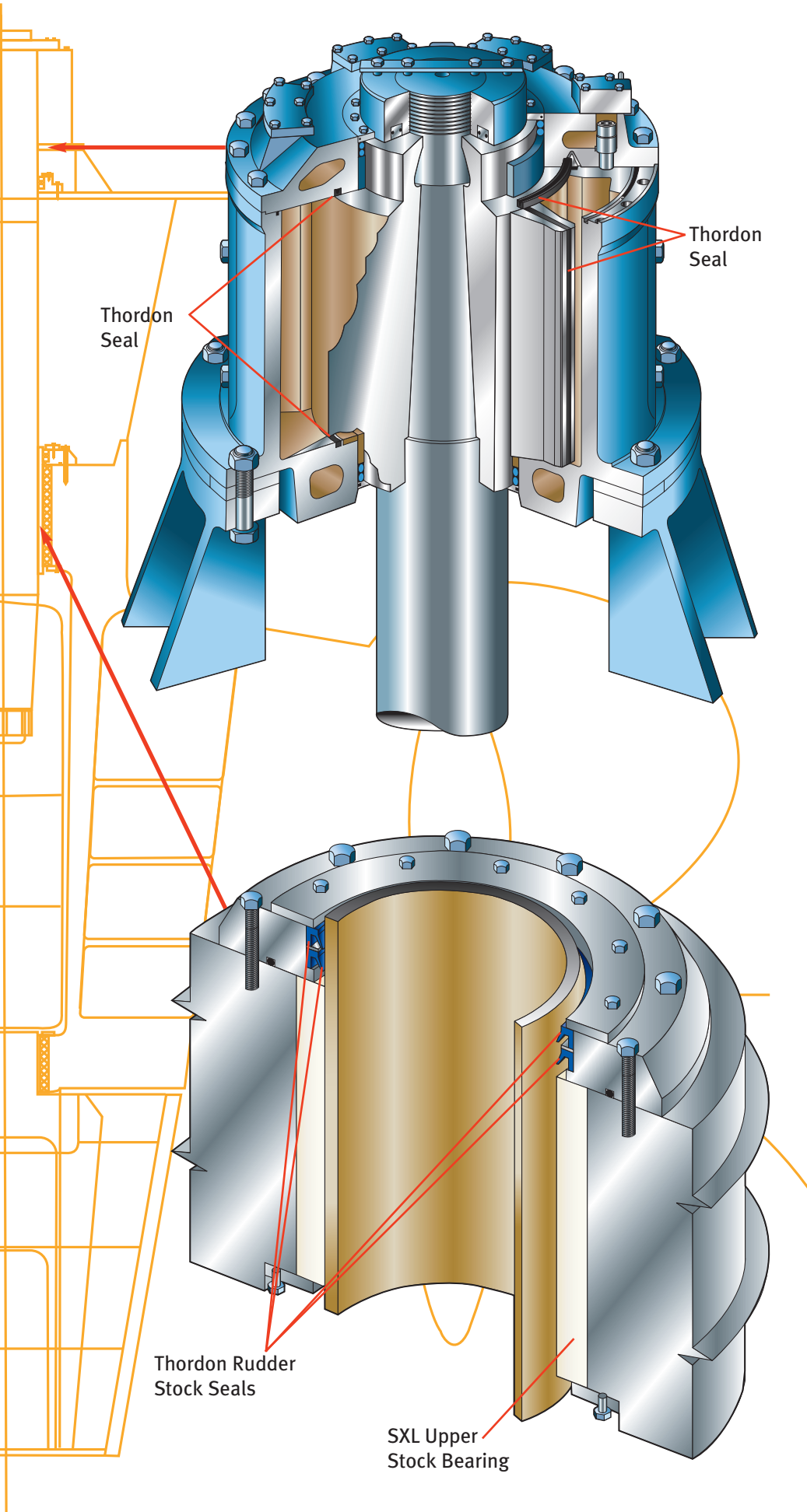


Installation of SXL bearing into housing.



Installation of keeper ring as SXL bearing warms.





ThorPlas® Steering and Linkage Bearings

ThorPlas® is a proprietary engineered thermoplastic designed to withstand radial loads as high as bronze (working pressures up to 31 MPa or 4500 psi) in dry or wet applications. ThorPlas® offers reduced wear, and eliminates the need for grease, when specified in place of bronze bushings in steering linkage and hydraulic cylinder yoke applications. A separate detailed brochure on ThorPlas® is available.

Thordon Rudder Stock Seals

Thordon’s high performance rudder stock lip seal is manufactured from the tough, self lubricating Thorseal polymer to complement the Thordon rudder bearing package. Thordon rudder stock seals are mounted above the rudder bearing to prevent the ingress of water into the hull. Designed to provide positive sealing and exceptional wear life these rudder stock seals take into account the larger bearing clearances and movements inherent to rudder stocks. The standard series of Thordon Rudder Stock Seals covers rudder shaft diameters from 200mm (8 in.) to 1200mm (47 in.). Special designs are available for small rudder stocks or where space is restricted. Thordon Rudder Seals can also be incorporated into fin stabilizers.

Thorseal Hydraulic Seals

Thorseals are tough, high performance, polymer lip seals that offer positive sealing over a pressure range from 0 to 100 MPa (15,000 psi). Manufactured from a tough self lubricating polymer, Thorseals provide long wear life with no need for periodic adjustments, resists tearing and extrusion and, as a result of built-in lubricants, operate with less drag and reduced cylinder wear. Custom sizes up to 1.5m (60”) diameter can be produced quickly from factory stock tubes.



WHAT MAKES THORDON DIFFERENT SXL OFFERS THESE OWNER BENEFITS:

GUARANTEED LONG BEARING WEAR LIFE

Thordon SXL has the longest bearing wear life for newbuild vessels and proves it by offering a 15 year bearing wear life guarantee for all newbuild vessels. The guarantee is based on 35 years experience of bearings typically lasting the life of the vessel. Thordon is the only manufacturer to offer this guarantee.

Thordon is an elastomer. When operating in water with abrasives present, SXL tends to deflect and then reject abrasive particles allowing them to pass through the bearing without being embedded or gouging (as can be the case with phenolic laminates or bronze bearings), thus bearing wear is minimized. In conversion applications, Thordon SXL rudder bearings are guaranteed to meet Class wear specifications for twice the life of a non-Thordon bearing being replaced, up to a maximum of 10 years.

15 YEAR RUDDER BEARING WEAR LIFE GUARANTEE*

Thordon's 15 Year Rudder Bearing Wear Life Guarantee ensures provision of a replacement if a Thordon SXL rudder bearing wears out and requires renewal before the 15-year period.

The guarantee covers pintle, rudder stock and carrier disc bearings above and below the waterline in newbuild Classed vessels. The 15-Year Rudder Bearing Wear Life Guarantee applies to the original owner of the ship and is non-transferable. Engineering details such as Classification Society, vessel name, ship owner's name the guarantee will apply to, rudder specifications etc. will be required prior to issuing the guarantee.

Thordon continues to offer its repair/conversion guarantee as well. In conversion pintle, stock or carrier applications, Thordon SXL rudder bearings are guaranteed to meet Classification Society wear specifications for twice the life of the non-Thordon bearing replaced, up to a maximum of ten years, or Thordon Bearings will supply a new rudder bearing free of charge.

** The guarantee is subject to prior approval by Thordon Bearings Inc. and limited to the supply of replacement bearing(s).*

DSME (DAEWOO SHIPBUILDING AND MARINE ENGINEERING CO., LTD.) has fitted Thordon SXL rudder bearings to new ships since 1984 and has never had a customer claim.

DUBAI DRYDOCKS, the world's largest tanker repair yard, has been fitting Thordon SXL rudder bearings in repair for more than 20 years. They fit more Thordon rudder bearings than any other material. In the 20 years that Dubai Drydocks have been working with Thordon, they have never encountered a worn out Thordon bearing.

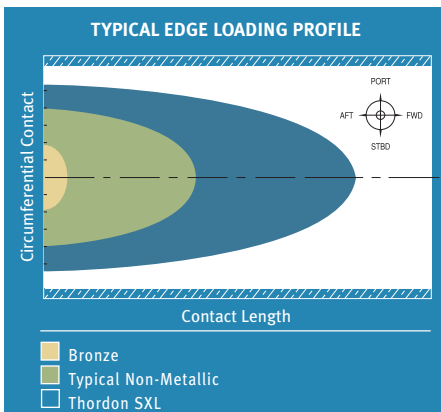


HIGH SHOCK ABSORPTION

SXL absorbs impact loads making it much more resistant to damage from pounding during operation in heavy seas than stiffer materials such as phenolic laminates or bronze. Feedback from shock tests by the U.S. Navy (CVN Aircraft Carriers) showed that Thordon SXL was deemed a superior product compared to phenolic laminates. The inherent impact resistance of the material also means that it is almost impossible to damage during shipping and installation.

TOLERANCE TO EDGE LOADING

Under shaft bending or misalignment conditions, Thordon SXL will better accept edge loading than phenolic laminates or bronze. During edge loading, Thordon SXL will deform slightly, due to its visco-elastic properties, conforming to the shaft thereby preventing binding. Stresses on the bearing and shaft are reduced compared to a harder stiffer material, such as a phenolic laminate or bronze.



TECHNICAL AND CUSTOMER SUPPORT

Thordon has experienced Technical and After-sales Service departments as well as a global network of 70+ factory trained distributors to assist customers with any pre- or post-sales concerns. Most shipyards in the world are familiar with Thordon and comfortable working with it.

EASY MACHINING AND HANDLING

Thordon SXL machines cleanly and produces no machining dust. It is more forgiving of small machining errors than more rigid materials. SXL is lighter than bronze and phenolic laminates and can be fitted quickly and easily by freezing in liquid nitrogen.

SELF LUBRICATING = ZERO POLLUTION RISK

Grease or other lubricants are not required to lower the coefficient of friction or to reduce the wear rate of a Thordon SXL bearing. In rudder stock applications, even when the bearing is out of the water and completely dry, Thordon SXL can operate without

lubrication. Thordon SXL rudder bearings ensure ship owners and operators that there will be no environmental violations from leaking rudder lubricants.

AVAILABILITY

By combining an extensive stocking distributor network and strategically located corporate stocking points, Thordon can provide rudder bearings quickly to any ship repair facility in the world.

DIMENSIONING

Thordon has an easy to use computer based dimensioning program which is available to yards or owners on request.

EXTENSIVE REFERENCES

Since the first Thordon rudder bearing installation in 1970, Thordon has been supplying rudder bearings to the world fleet amassing over 35,000 vessel-years of rudder bearing experience.

CLASSIFICATION SOCIETY APPROVALS

Thordon SXL rudder bearings are approved by most Classification Societies. Approved pressure is in the range of 10-12 MPa (1450-1740psi).



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 fast 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 customer service network has been established in over 70 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 1.5 m (60") O.D. can be machined in-house.



QUALITY: Thordon Bearings Inc. is a Canadian company manufacturing to ISO 9001:2000 Quality System requirements. With over 35 years experience in elastomeric bearing design, application engineering and manufacturing, Thordon marine bearing systems 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 searches for new polymer bearing solutions.

Your local Thordon Distributor

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