



THORDON

BEARINGS FOR
INDUSTRIAL APPLICATIONS

HIGH PERFORMANCE SELF-LUBRICATING INDUSTRIAL BEARINGS

With over 40 years experience supplying non-metallic bearings across a variety of industries, Thordon Bearings designs and manufactures the most complete line of oil and grease free self-lubricating journal bearings and wear pads.

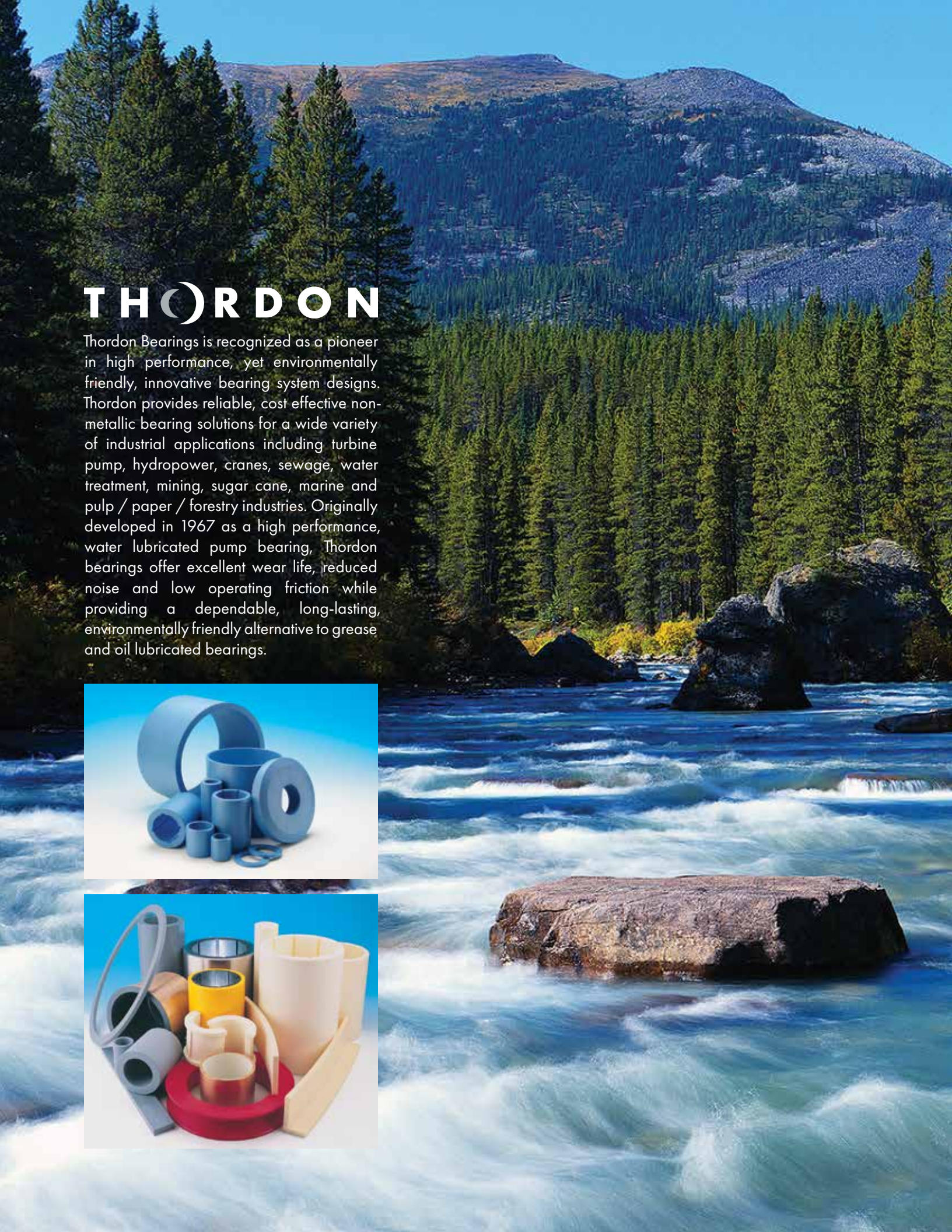
Superior technical support and customer service provide customers with bearing solutions that meet, or exceed their expectations in many industrial applications. Depending on the application demands, the optimum bearing may be selected from among several Thordon grades and configurations.

Thordon XL, SXL, HPSXL and Composite (GM2401) are Thordon's elastomeric bearing grades that offer exceptional wear life, low friction and excellent performance in wet or dry (except Composite) environments. Thor-Flex is a tough, highly abrasion resistant non-bearing grade elastomer formulated without internal lubricants.

ThorPlas-Blue is an engineered thermoplastic bearing material introduced by Thordon for demanding, high pressure applications. ThorPlas-Blue has significantly expanded the range of industrial applications where Thordon bearings can be specified while still maintaining many of the recognized Thordon performance advantages.

THORDON

Thordon Bearings is recognized as a pioneer in high performance, yet environmentally friendly, innovative bearing system designs. Thordon provides reliable, cost effective non-metallic bearing solutions for a wide variety of industrial applications including turbine pump, hydropower, cranes, sewage, water treatment, mining, sugar cane, marine and pulp / paper / forestry industries. Originally developed in 1967 as a high performance, water lubricated pump bearing, Thordon bearings offer excellent wear life, reduced noise and low operating friction while providing a dependable, long-lasting, environmentally friendly alternative to grease and oil lubricated bearings.



PROVEN BENEFITS FOR PLANT SUPERVISORS AND MAINTENANCE ENGINEERS

Thordon non-metallic bearings have been used in a wide range of industries and various applications such as in pumps, pivot points, screw conveyors, hydro turbine wicket gates, agitators, and flocculator paddles.

Thordon bearings are designed to work under the most extreme conditions: abrasive, corrosive, high impact, high load, high humidity, and infrequent maintenance periods.

TYPICAL INDUSTRIAL APPLICATIONS:

• WASTE WATER & SEWAGE TREATMENT

(aerators, traveling screens, drum screens, scum collectors, conveyors)

• GRAPPLES OR GRABS

(pivot linkage bushings)

• VERTICAL PUMP BEARINGS

• HYDRO TURBINE BEARINGS

(operating mechanism bearings, wicket gate bearings, main guide bearings)

• MINING

(crushers and feeders, materials handling bearings, mine car rocker arm and wheel bearings, skip pivots)

• BUTTERFLY VALVES

• LOCK & DAM GATE BEARINGS

• AGRICULTURE

(conveyor shaft bearings, sugar cane harvesting and processing equipment bearings, fish farm bearings)

• PULP & PAPER/FORESTRY

(doctor bushings, mixer bushings, grapple bearings, roller chain bushings, boom heel bushings, king pin bushings)

• CRANES AND HOISTS

(boom slides, sheave wheel bushings)

• STACKERS

• RECLAIMERS & BUCKET SCOOPS

• GATE & DOOR BUSHINGS

• MARINE DECK EQUIPMENT BEARINGS

SELF-LUBRICATING

With a low inherent coefficient of friction, Thordon bearings typically do not require grease lubrication. This results in reduced maintenance costs and safety issues. Environmental and product contamination concerns associated with grease lubrication are eliminated. Thordon bearings are homogeneous polymers with built-in lubricants. The lubricants, being dispersed throughout the bearing material, continue to provide low friction throughout the life of the bearings.



CORROSION RESISTANCE

Thordon's corrosion resistance is superior to metallic bearing materials commonly used in industrial applications. As an electrical insulator, Thordon Bearings will not participate in a galvanic reaction.

LONG WEAR LIFE

Based on over 40 years experience supplying bearings to industry, Thordon bearings have been proven to provide longer wear life than the bearings they replace. Longer life in any one specific application may be the result of Thordon's low friction, superior abrasion resistance, high resilience and impact resistance or a combination of several of the above. The end result, however, is the same... improved reliability and reduced life cycle costs.



NOISE REDUCTION

A quieter workplace can be one of the added bonuses of specifying Thordon bearings. Thordon bearings dampen and reduce operating noise compared to metallic bearings, which can transmit, and amplify, noise.

HIGH RESILIENCE & IMPACT RESISTANCE

Elastomeric Thordon bearings exhibit a Modulus of Resilience many times that of bronze. As a result, Thordon elastomeric bearings can absorb impact or shock loads encountered during operation without permanent deformation to a much greater degree than bronze or other nonmetallic bearings.

LOW OPERATING FRICTION

Thordon bearings have lower static and dynamic coefficients of friction than most other materials commonly used for industrial bearings. This is the case whether the bearing is dry or submerged in liquid. A low bearing coefficient of friction is important in minimizing adhesive bearing wear and providing smooth, stick-slip free start-up and operation.

HIGH TEMPERATURE & IMPROVED CHEMICAL RESISTANCE

ThorPlas-Blue bearings can be used in industrial applications with water temperatures up to 80°C (176°F) extending the temperature range from other Thordon grades. ThorPlas-Blue has improved chemical resistance versus Thordon elastomers and performs well where minimal initial running clearances are required.

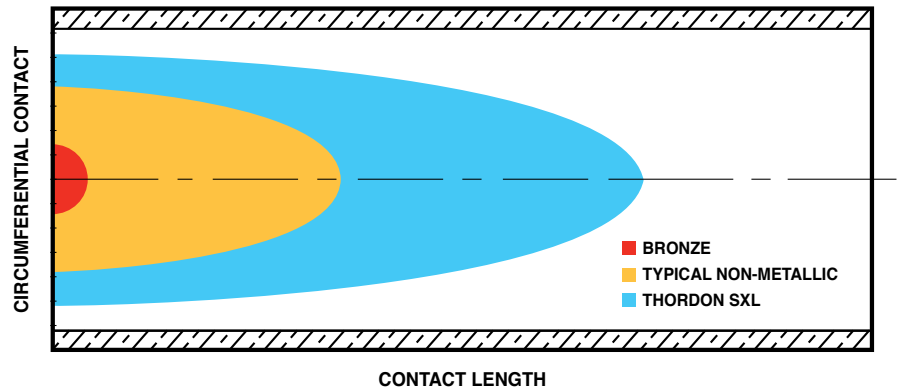
EASILY MACHINED TO SIZE

Thordon bearings can be easily machined to exact finished dimensions in the field. Costly sleeve or shaft replacement can often be avoided by machining the bearing to compensate for existing wear or damage. This is not possible with many competitive bearings that are moulded to 'standard' sizes and do not provide overbuild for machining on site as required.



Plant and Maintenance Managers find that machining bearings to size from pre-grooved or standard Thordon tubes reduces their industrial bearing inventory and repair turn around times. The Thordon Bearing Sizing Calculation Program offers easy computer-based dimension calculations.

TYPICAL EDGE LOADING PROFILE:



HIGH ABRASION RESISTANCE

When operating in abrasives, Thordon's elastomeric grades offer superior wear life due to their elastomeric nature. Thordon rejects abrasive particles allowing them to pass through the running clearance between the shaft and the bearing without becoming embedded. Wear of the bearing and shaft due to third particle abrasion is minimal. For severely abrasive applications, Thordon Composite operating with continuous lubrication is recommended. It will often outlast other bearings by a factor of two or more.

ACCOMMODATES EDGE LOADING

Edge loading conditions often occur as a result of minor misalignment or shaft deflection. Thordon elastomeric grades deflect slightly, effectively spreading the load. The localized bearing pressure is reduced as a result, and wiping of the bearing, a common occurrence with more rigid bearing materials, is eliminated.



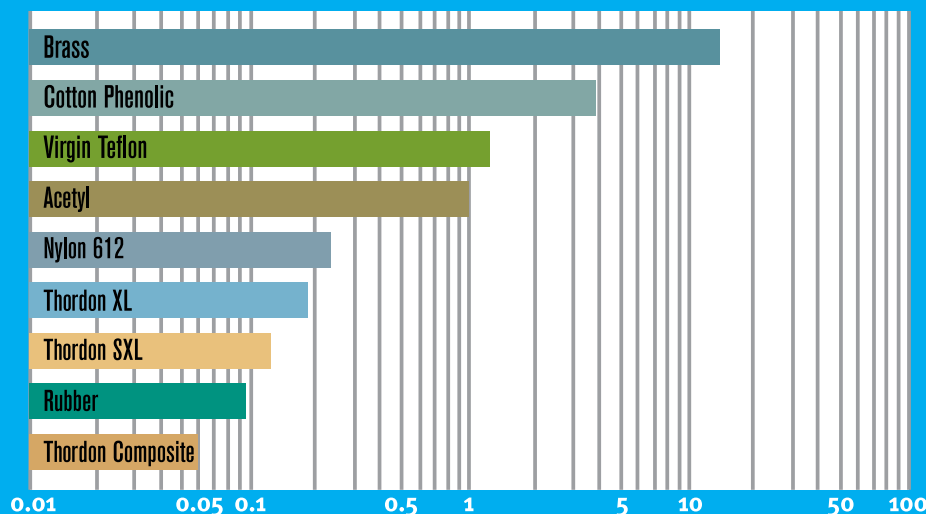
CONVERSION OF EXISTING BEARINGS

Worn metallic or metal backed bearings can be re-lined with Thordon elastomeric bearings. Field bonding Thordon into the metal shell of the worn bearing can often reduce cost. Fitting of the re-lined bearing remains unchanged.

EASILY INSTALLED

After machining to the proper dimensions for an interference fit, Thordon bearings can be easily fit into place by press or freeze fitting. Thordon elastomeric bearings may be cooled in dry ice or liquid nitrogen. ThorPlas-Blue bearings may be cooled with dry ice, but must not be immersed in liquid nitrogen. Once the bearings are placed in position and warm they will assume the design interference fit. Expensive and labour intensive pressing equipment and fixtures are not necessary.

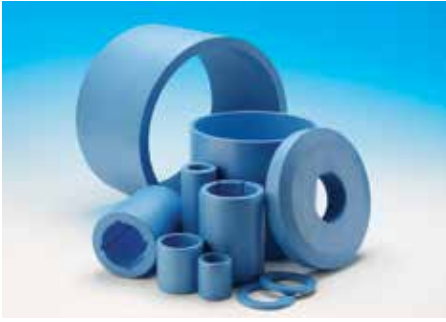
TYPICAL BEARING ABRASIVE WEAR RATES



Projected Bearing Wear by Volume (cc/24 Hours)
(Independent Testing at University of Cincinnati, USA)

NOTE: Wet third particle abrasion.
Shaft material: carbon steel; Bearing I.D.: 2.5cm (1 in.); Abrasive slurry mixture: 2% bentonite, 6% sand, 6% clay, 86% water.

THORDON GRADES AND CONFIGURATIONS



ThorPlas® (blue) is a non-elastomeric, homogeneous material developed by Thordon specifically as a full form high pressure bearing.

- capable of design pressures up to 45.0 MPa (6527 psi)
- easily machined without affecting low coefficient of friction (typically 0.10 – 0.17)
- very low wear in non-abrasive environments
- maximum continuous service temperatures of 80°C (176°F) in water and 110°C (230°F) dry
- excellent dry start capability as a vertical pump bearing
- reasonable abrasion resistance - less than Thordon elastomer grades, but better than bronze, epoxy phenolics and many other non-metallic bearing materials
- improved chemical resistance in most chemical product categories compared to elastomeric grades



Thordon SXL (off-white) has excellent dry start capability and a lower coefficient of friction than the other Thordon elastomeric grades.

- low coefficient of friction (typically 0.10-0.20)
- higher dry PV (Pressure Velocity) rating than XL
- higher resistance to abrasion than XL in wet applications; good abrasion resistance operating dry
- dry start-up capability as a vertical pump bearing
- high resistance to shock loading and vibration

NOTE: When SXL is used in vertical pumps where dry startup is a consideration, consult with Thordon Bearings regarding bearing design. Thordon will recommend a maximum dry running time based on the peripheral velocity of the shaft and the load on the bearing.



Thordon XL (black) is used in a variety of industrial applications and has similar abrasion resistance compared to SXL.

- low coefficient of friction (typically 0.20-0.25)
- high resistance to abrasion in dry applications
- high resistance to shock loading and vibration



Thordon HPSXL (grey) is designed for higher pressure applications as the bearing component in HPSXL TRAXL bearings (HPSXL bonded in a metallic shell).

- maximum dynamic working pressure to 15.0 MPa (2175 psi) in limited motion as a homogeneous material
- HPSXL TRAXL has maximum dynamic working pressure to 55.0 MPa (8000 psi) in limited motion
- lowest coefficient of friction (typically 0.06-0.12)
- moderately abrasion resistant (lower abrasion resistance than XL or SXL)
- high resistance to shock loading and vibration



Thordon Composite (yellow shell, black wear surface is GM2401) is a two-component bearing formulated specifically for use in very abrasive environments.

- used in rotating applications in abrasive water conditions such as pump and dredge bearings
- outstanding abrasion resistance - two or more times that of rubber
- significantly lower coefficient of friction than rubber
- higher resilience and stiffness than rubber
- available with either yellow polymer or metal bearing shells

APPLICATION AND DESIGN INFORMATION

The success of any bearing application depends not only on the selection of superior products but also on the correct design and use of such materials for each specific application. A set of guidelines, found in the table below, has been prepared to assist designers in choosing the best Thordon material for the application at hand. Some of the application and design considerations to take into account when specifying Thordon for any industrial bearings include:

FLUID COMPATIBILITY

Thordon bearings can be used in a wide range of chemicals and process products that would typically affect metallic bearings. A comprehensive chemical compatibility chart for both Thordon elastomeric and thermoplastic materials is available to determine the best bearing product for the application.

TEMPERATURE

For Thordon elastomeric grades, the maximum operating temperature in water is 60°C (140°F). The thermoplastic ThorPlas-Blue material has an operating limit of 80°C (176°F) in water.

ENVIRONMENT

The choice of material and the configuration of the bearing are highly dependent on the operating conditions to which the bearing is exposed. All Thordon bearings (except Composite) can be installed with or without axial grooves (all Composite bearings are grooved). The grooves are recommended whenever a bearing is operating in a flow of liquid (as in a vertical pump). Grooves facilitate flow of the fluid through the bearing to provide cooling and removal of abrasive particles, thus extending life of both bearing and shaft. Grooves are not required when there is no flow of fluid past the bearing. For high pressure bearings which may be exposed to dirty environments, especially those with oscillating motion and no flow of fluid, Thordon recommends the use of tough Thorseal lip seals in recessed grooves near the ends of the bearing to prevent abrasive ingress. Other environmental factors such as intermittent exposure to higher temperatures, chemicals, restriction on flow, dry running, etc. should also be considered when designing a Thordon bearing.

BEARING DESIGN

Engineering manuals and a computer-based bearing sizing calculation program are available to assist in the design of Thordon bearings. The input information required, whether using manual calculations or the computer program, includes housing diameter (maximum & minimum), shaft diameter, operating temperatures (maximum, minimum and machine shop ambient), type of lubrication, shaft RPM and the duration for dry start period for vertical pump bearings, if applicable. Accurate input information ensures that the final bearing design is optimal. Some of the bearing parameters to consider during the design stages include:

- **Minimum Installed Clearances**

This value is the sum of the bearing running clearance (based on shaft diameter), the thermal allowance and absorption allowance. The latter two are dependent on wall thickness. Minimum installed clearances can be reduced by using different grades of Thordon or by choosing a bonded

bearing configuration that allows reduction of the wall thickness. The Thordon Bearing Sizing Program can be used to determine which configuration achieves the required installed clearance.

- **L/D Ratios** Typical ratios for length to diameter when using Thordon bearings can range from 1 to 1.5. The bearing length can be reduced by up to 50% compared to rubber bearings because Thordon grades have a higher load carrying capability.
- **Type of Installation** Thordon bearings can be freeze or press fitted. Elastomeric grades may be bonded to the clean surface of an existing or new metal shell. Where possible, bonded installations can reduce the bearing wall thickness allowing for tighter installed clearances. *NOTE: For more detailed information on bearing design parameters, please refer to the Thordon Engineering Manual or the ThorPlas Bearing Engineering Manual.*

THORDON MATERIAL SELECTION GUIDE FOR INDUSTRIAL APPLICATIONS

LUBRICATION/ OPERATING PRESSURE	RECOMMENDED THORDON GRADES		
	★★★★★	★★★★	★★★
DRY (sealed or minimal abrasives)			
0-10 MPa (0-1450 psi)	SXL	ThorPlas-Blue	
10-15 MPa (1450-2175 psi)	HPSXL	ThorPlas-Blue	
15-45 MPa (2175-6525 psi)	ThorPlas-Blue	HPSXL TRAXL	
45-55 MPa (6525-8000 psi)	HPSXL TRAXL		
DRY (abrasives present)			
0-5.5 MPa (0-800 psi)	XL	SXL	ThorPlas-Blue
5.5-10 MPa (800-1450 psi)	SXL	ThorPlas-Blue	
10-15 MPa (1450-2175 psi)	HPSXL	ThorPlas-Blue	
15-45 MPa (2175-6525 psi)	ThorPlas-Blue		
WET (sealed or minimal abrasives)			
0-10 MPa (0-1450 psi)	SXL	ThorPlas-Blue	
10-15 MPa (1450-2175 psi)	HPSXL	ThorPlas-Blue	
15-45 MPa (2175-6525 psi)	ThorPlas-Blue	HPSXL TRAXL	
45-55 MPa (6525-8000 psi)	HPSXL TRAXL		
WET (abrasives present)			
0-3 MPa (0-500 psi)	GM2401	SXL	ThorPlas-Blue
3-10 MPa (500-1450 psi)	SXL	ThorPlas-Blue	
10-15 MPa (1450-2175 psi)	HPSXL	ThorPlas-Blue	
15-45 MPa (2175-6525 psi)	ThorPlas-Blue		

NOTE: The maximum pressures given for the various products are based on maximum dynamic working pressures for intermittent, limited motion. For applications involving continuous rotary motion, PV limits of the materials will significantly reduce the maximum allowable pressures stated above. This is a general guide for technical reference only. Other critical applications that are close to pressure or temperature limits, or subjected to non-standard environments should also be reviewed and approved by Thordon Bearings.

CUSTOMER FOCUSED TO QUICKLY MEET YOUR NEEDS

Quick and Responsive Service

It takes quality products to be globally successful in the bearing and shaft seal industry.
It also takes great service to keep customers coming back.

Thordon Bearings Inc. is geared to respond quickly to supply high performance bearing solutions.
Thordon bearings arrive quickly, fit correctly and they last!

Extensive Distribution Network

Thordon Bearings has an extensive distribution network of more than 75 distributors to supply and service our global customer base.
Non-standard requests are met with responsive design, quick machining and speedy delivery.

Application Engineering

Thordon engineers work closely with customers to provide innovative bearing and shaft seal system designs and solutions. We offer in-house design, CAD and the proprietary Thordon Bearing Sizing Calculation Program to help correctly size our bearings.
Our decades of experience mean that we offer the right technical support during design, machining, installation and operation.

Manufacturing Quality

Thordon Bearings Inc. is a family-owned company founded in 1911 that operates a state-of-the-art polymer processing plant, machine shop and new product development facilities in Burlington, Ontario, Canada.

In addition, we own a leading edge machining and polymer production plant in Slupsk, Poland.

We manufacture to ISO 9001:2008 Quality System requirements. Contact us for our installation references.

High Performance Bearings; Industry-Leading Service

Thordon Bearings is an industry leader in the design, manufacture, supply and installation of high performance, pollution-free, bearing and shaft seal systems.

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