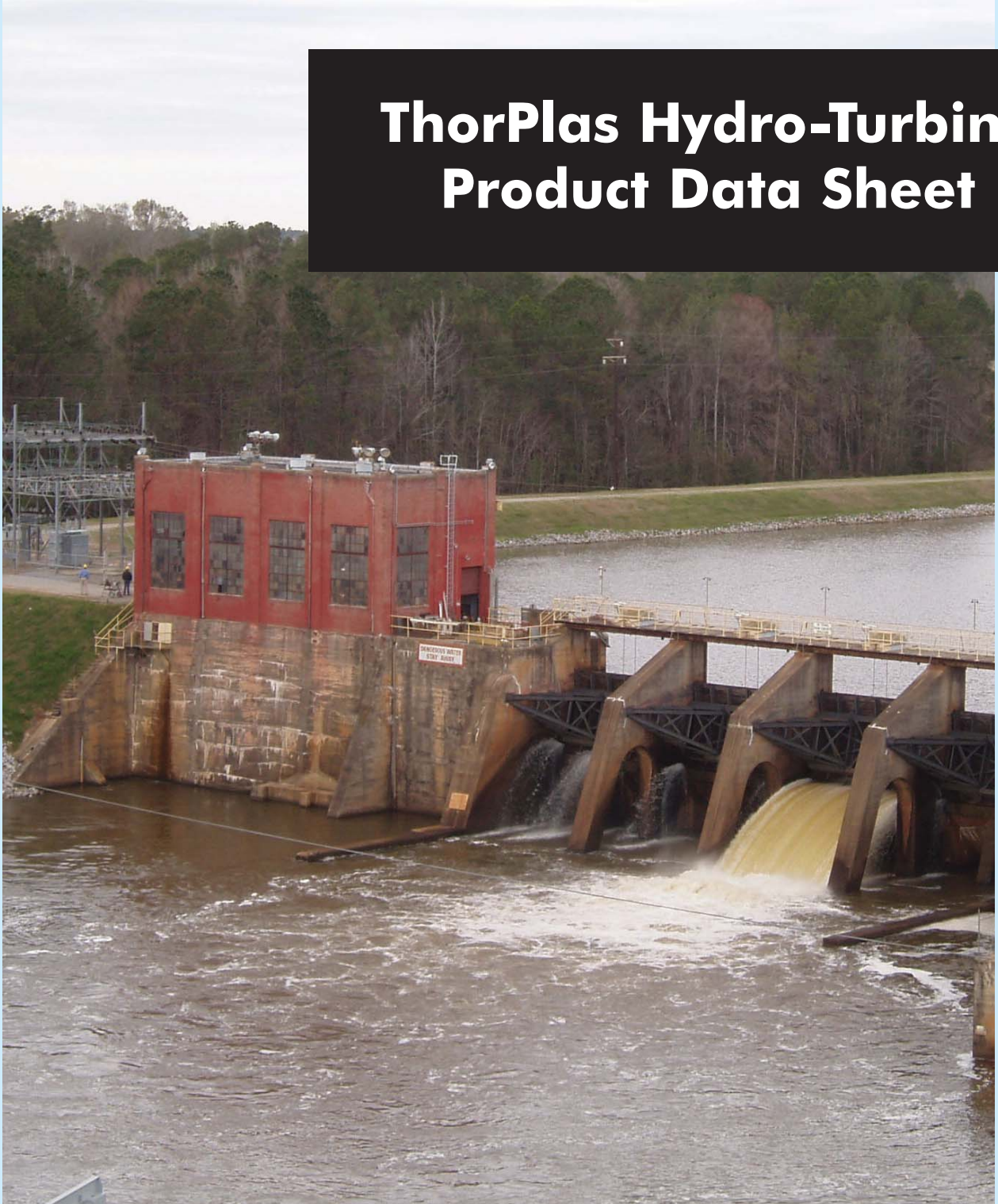


ThorPlas Hydro-Turbine Product Data Sheet



NEW THORPLAS ENGINEERED THERMOPLASTIC DEVELOPED BY THORDON BEARINGS FOR THE HYDRO-TURBINE INDUSTRY

A proprietary engineered thermoplastic, ThorPlas has been specifically formulated for use in hydro-turbine wicket gate, operating linkage and other high pressure applications. ThorPlas is a homogeneous, self-lubricating polymer bearing capable of withstanding operating pressures up to 31 MPa (4500 psi) installed in a full-form, interference-fit configuration. In recent Powertech tests, ThorPlas demonstrated exceptional wear performance particularly in the dry tests. According to Powertech there was little evidence of stress on the bearing material and no indication of damage to the journal surfaces. The coefficients of friction were at acceptable levels and the product performed well in the tests. Coincidentally, Thordon HPSXL TRAXL, a sister product, is also one of the top rated products.



While Thordon HPSXL TRAXL features a thin layer of low friction, abrasive resistant elastomer material polymerized to a bronze shell, ThorPlas is a much stiffer polymer capable of being interference-fit full form directly into the available bushing space. ThorPlas offers hydro-turbine operators, who do not require the specific performance advantages offered by HPSXL TRAXL, an alternative Thordon high performance bearing solution without the cost premium inherent to TRAXL's bronze bearing shell configuration.

Typical ThorPlas Hydro-Turbine Applications:

- Wicket gate bearings
- Operating mechanism bearings
- Linkage bearings
- Kaplan turbine runner blade trunnion bushings
- Other higher pressure bearing applications such as servo-motor and servo-links, travelling screens, wear pads and butterfly valve trunnion bearings

Note: In environments such as hydro-turbine wicket gates and operating linkages where abrasives are typically present, sealing of the ThorPlas bearings is recommended.



Formulated to complement the widely recognized range of existing Thordon elastomer bearing grades, ThorPlas offers the following benefits:

- **excellent wear performance in reasonably clean application environments**
- **self-lubricating** - homogenous polymer with lubricants to lower friction and wear formulated into the molecular structure. Once the bearing enters service and a transfer film is established between the shaft and the bearing, friction stabilizes for the life of the bearing
- **low friction** - dynamic coefficients of friction of 0.10 to 0.15 (dry) and 0.10 to 0.17 (wet)
- **no stick-slip** - ratio of static to dynamic coefficient of friction is very low at +7.5% dry and +11.5% wet
- **dry start-up** - operation dry for 3 minutes at a PV of 15MPa - m/min (7070 psi - ft/min) using a 75mm (3.0") shaft at 0.35 kg/cm² (5 psi) and 1800 rpm; or 1 minute at a PV of 22.4MPa - m/min (10,500 psi - ft/min) is possible
- **low coefficient of thermal expansion** - minimal change in installed bearing dimensions due to temperature variation (50% vs. Nylon and Delrin AF; <25% vs. UHMW/HDPE and 30% vs. Thordon SXL)
- **low water absorption rate** - minimal change in installed bearing dimensions (6% vs. Nylon; 50% vs. Delrin AF; 50% vs. Railko and 40% vs. Thordon SXL)
- **free machining** - no nuisance dust



- **reasonable abrasion resistance** - less than Thordon elastomer grades, but better than bronze, phenolics and many other common non-metallic bearing materials
- **increased strength and rigidity** - maximum pressures to 31 MPa (4500 psi) in an interference fit bearing
- **improved ability to operate at elevated temperatures** - maximum continuous service temperatures of 80°C (176°F) in water and 110°C (230°F) dry
- **improved chemical resistance in all major chemical product categories**

Size Availability:

ThorPlas® tubes up to 400mm (16") outside diameter can be supplied quickly to meet specific customer requirements.



For additional application engineering information, contact your local Thordon distributor or Thordon Bearings Inc. to obtain a copy of the ThorPlas Bearings Engineering Manual or visit www.thordonbearings.com to download a copy.

ThorPlas Typical Physical Properties - Metric and Imperial

Property	Unit	Values
Density	g.ml ⁻¹	1.40
Hardness (Shore D)	–	83
Tensile Strength at Break (D638)	MPa (psi)	67 (9,750)
Tensile Modulus of Elasticity	MPa (psi)	2930 (425,000)
Elongation at Break	%	~10
Compression Strength (D695)	MPa (psi)	105 (15,300)
Compression Stress at Yield	MPa (psi)	92 (13,400)
Compressive Young's Modulus of Elasticity	MPa (psi)	2,410 (350,000)
Compression Strain at Yield	%	~8
Minimum Notched Impact Energy (D256)	J.m ⁻¹ (Ft.lb.in. ⁻¹)	31 (0.60)
Notched Specific Impact Energy (D256)	J.m ⁻² (Ft.lb.in. ⁻²)	506 (0.24)
Coefficient of Linear Thermal Expansion (20-120°C)	°C (°F)	4.6 x 10 ⁻⁵ (2.5 x 10 ⁻⁵)
Volumetric Swell -Water, 24-h immersion (D570)	Wt%	0.034
Volumetric Swell -Water, long-term immersion	Vol%	< 0.15
Dynamic Coefficient of Friction (0.27 MPa or 40psi), dry (D3702)	–	~ 0.1
Dynamic Coefficient of Friction (>200 bar or >3000psi), dry	–	~ 0.10
Dynamic Coefficient of Friction (>200 bar or >3000psi), wet	–	0.10-0.17
Abrasive Wear (Rotary Drum Abrasion), dry (D5963)	mm ³ (in. ³)	195 (0.012)
Melting Temperature	°C (°F)	> 250 (> 480)
Max. Continuous Service Temp. in Air	°C (°F)	110 (230)
Max. Continuous Service Temp. in Water	°C (°F)	80 (176)

Note: Properties are typical values, unless otherwise noted, and may be altered to some extent by processing conditions.

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Your Local Thordon Distributor

THORDON

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