

GUARANTEED PERFORMANCE

All Inpro/Seal products are backed by an unconditional performance guarantee. See our website for complete details.

The Inpro/Seal Advantage

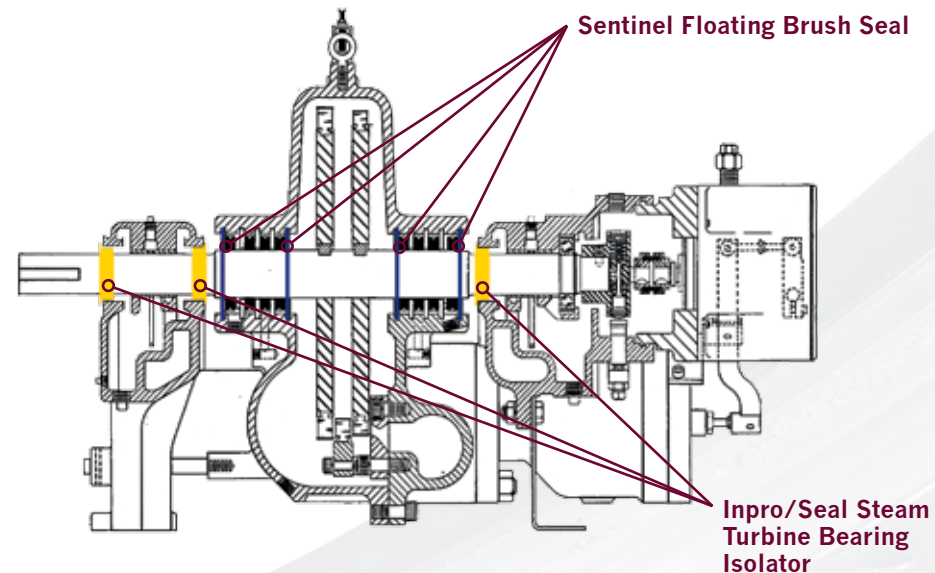
Inpro/Seal is committed to delivering innovative technology and superior customer support...standard with every solution. When you work with Inpro/Seal, you can expect:

- Custom engineered solutions for your application and operating environment.
- Knowledgeable sales network providing localized support.
- Unconditional performance guarantee on all products.
- Innovative products that provide a significant return on investment over the life of your rotating equipment.

The Ultimate Upgrade

The Sentinel™ FBS and Inpro/Seal® Steam Turbine Bearing Isolator are a complete sealing solution for your steam turbine applications. This sealing package prevents steam from escaping the casing into atmosphere and from entering the bearing housing. The Inpro/Seal Bearing Isolator also permanently seals against lubrication loss. The result is significantly reduced steam leakage, improved efficiency and uptime, and reduced maintenance costs.

No matter the size or complexity of your application, Inpro/Seal can custom engineer a complete sealing solution to meet the requirements of your steam turbine.



Experience You Can Trust

You don't need to be an expert; our knowledgeable team will help. You can count on Inpro/Seal, the leader in bearing and system protection, to maximize the uptime of your steam turbine applications. We've been the trusted source for sealing technology in rotating equipment for more than 30 years and have installed millions of bearing isolators worldwide.

READY TO GET STARTED?
Visit www.inpro-seal.com to contact your local Inpro/Seal representative or request a quote.

The Inpro/Seal® Steam Turbine Bearing Isolator and Sentinel™ FBS deliver complete protection on steam turbines across multiple industries.

The Inpro/Seal® Bearing Isolator is a custom engineered solution and some designs may be protected by one, more than one or none of the following US and/or foreign patents and/or pending patent applications including US Pat. 7,052,014; 6,419,233; 6,311,984; 6,234,489; 6,182,972; 6,062,568; 5,951,020; 5,865,441; 5,498,006; 5,378,000 and 5,335,921.



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COMPLETE STEAM TURBINE PROTECTION

Sentinel™ Floating Brush Seal and Inpro/Seal® Steam Turbine Bearing Isolator



COMPLETE PROTECTION FOR STEAM TURBINE APPLICATIONS

The Sentinel™ Floating Brush Seal

The Down Side of Carbon Seals

The steam case in a mechanical drive steam turbine has traditionally been sealed at the shaft exits by close fitting seals known as carbon rings. While carbon rings are designed with a tight radial clearance to the shaft, they tend to be weak, brittle and wear quickly. Carbon seals are also susceptible to damage due to liquid slugs, suffering from extensive cracking. As the carbon seals deteriorate, the clearance to the shaft increases resulting in steam leakage, equipment downtime and increased maintenance costs.

Enhancing Steam Turbine Performance and Efficiency

The Sentinel™ Floating Brush Seal (FBS) protects the carbon rings and enhances the performance of your steam turbine. The Sentinel FBS provides an extra layer of protection that slows down the natural wear of the carbon rings, therefore maintaining an effective seal for a longer period of time. In fact, field testing has shown that installing the Sentinel FBS on the high pressure (upstream) and low pressure (downstream) ends of the carbon rings can increase service life and reduce downtime costs more than three-fold.

Floating brush seals are resistant to slugs of liquid, so they act as a protective barrier for carbon seals. A typical carbon ring must be replaced at least once a year; when combined with a long-lasting brush seal, the maintenance cycle improves to over four years.

The auto-centering capability and light weight design of the Sentinel FBS minimizes shaft wear and heat generation. It also reduces the effects of the bristles' radial stiffness and eliminates the requirement for an elaborate alignment between the casing and the shaft. This makes the Sentinel FBS a drop-in replacement for carbon rings and allows for easy field installation.

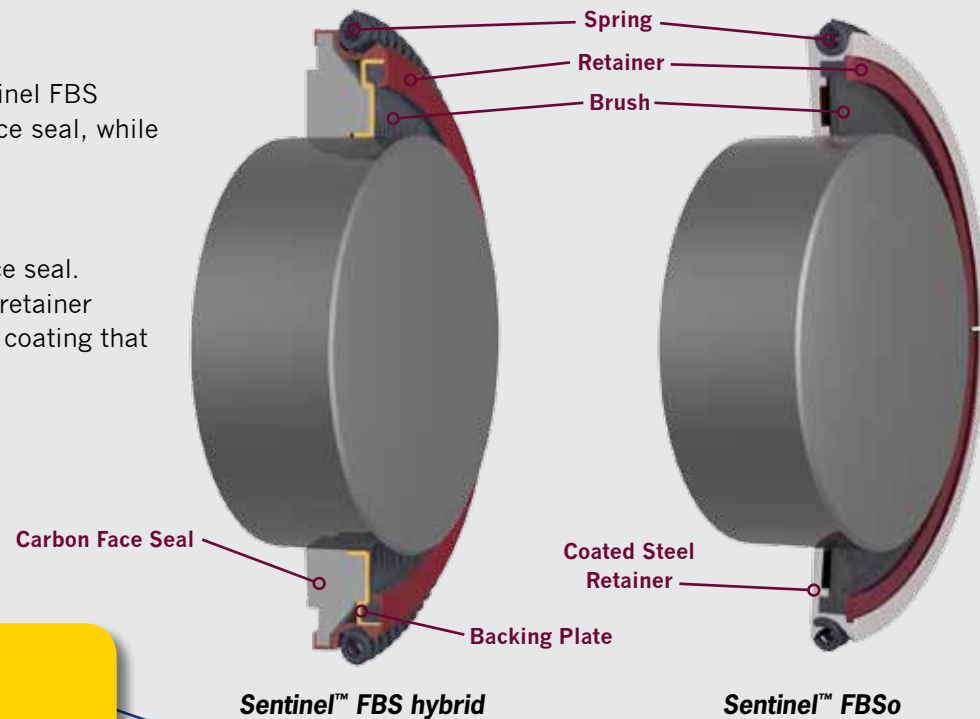
Sentinel™ FBS Design Options

Sentinel™ FBS hybrid

The most common design, the Sentinel FBS hybrid is equipped with a carbon face seal, while the brush provides radial sealing.

Sentinel™ FBSo

The Sentinel FBSo has no carbon face seal. Instead, this design includes a steel retainer with a low friction, high temperature coating that functions similar to a carbon face.



The Inpro/Seal® Steam Turbine Bearing Isolator

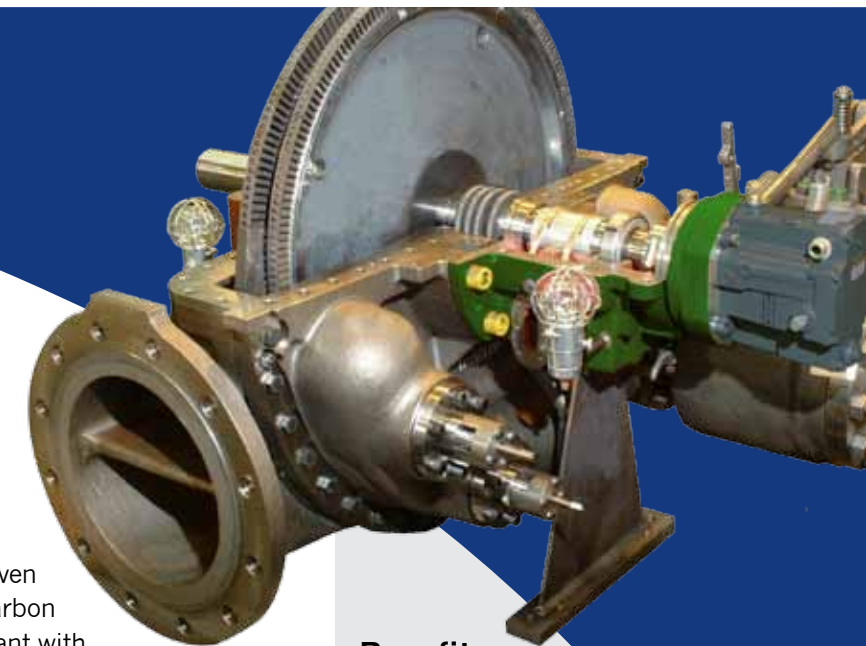
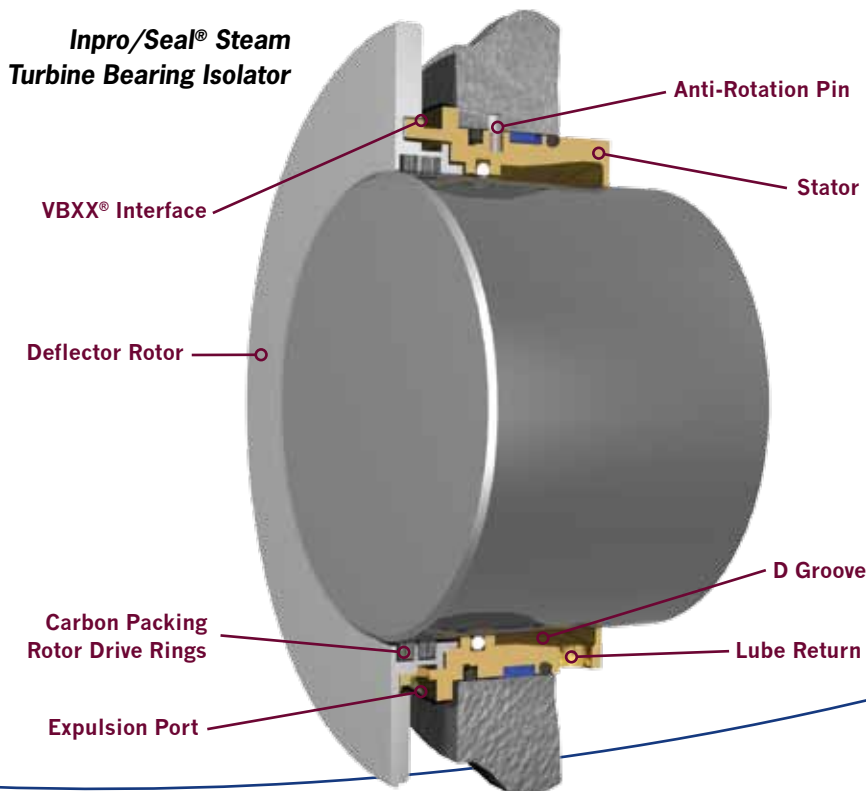
Permanent Steam Turbine Bearing Protection

Even in cases when the steam turbine is equipped with floating brush seals, there is still potential for small amounts of steam leakage. Bearings on a typical single-stage mechanical drive turbine are located just outboard of each set of carbon rings; even the smallest amount of steam escaping from the carbon rings can enter the housing, contaminate the lubricant with water and destroy the bearings. Premature bearing failure is a leading cause of unplanned downtime and increased maintenance costs.

The Inpro/Seal Steam Turbine Bearing Isolator is the ultimate safeguard against steam ingress to the bearing housing. The Inpro/Seal Bearing Isolator is a non-contacting, non-wearing compound labyrinth seal that provides permanent protection against both lubrication loss and contamination ingress. Lubricant is captured in the inner portion of the labyrinth and flows back to the bearing housing. Moisture contamination attempting to enter the bearing housing in the form of steam is deflected by the rotor – completely blocking any ingress into the bearing housing.

Inpro/Seal, the originator of the bearing isolator, has more than 30 years of experience applying this leading technology to steam turbine applications. The patented Inpro/Seal solution is specially designed to suit the needs of these high speed, high temperature applications.

Inpro/Seal® Steam Turbine Bearing Isolator



Benefits:

Sentinel™ FBS

- Designs available for most standard machines; sized from 0.5 in to 6 in shaft diameter.
- Temperature tolerances up to 1100°F (593°C) continuous; up to 1800°F (982°C) intermittent.
- Brush material is Haynes® 25, a cobalt superalloy; special materials available for process environments.
- Accommodates up to 400 psi pressure differential across each stage.
- Designed for easy field installation.

Inpro/Seal® Steam Turbine Bearing Isolator

- Patented VBXX® interface prevents contamination ingress.
- 416 stainless steel rotor accommodates high speeds and high temperatures.
- Graphite packing acts as a drive ring on the rotor, sealing the shaft/rotor interface in high speed, high temperature environments.
- Deflector provides increased protection against steam and heat ingress.
- D Groove prevents oil loss by capturing oil and returning to housing.
- Designed for easy field installation.

**SPLIT
DESIGNS AVAILABLE**