



Fugesco

Power Mechanical Seals

HYDROPOWER SOLUTIONS

mechanical seals, filtration systems
and accessories

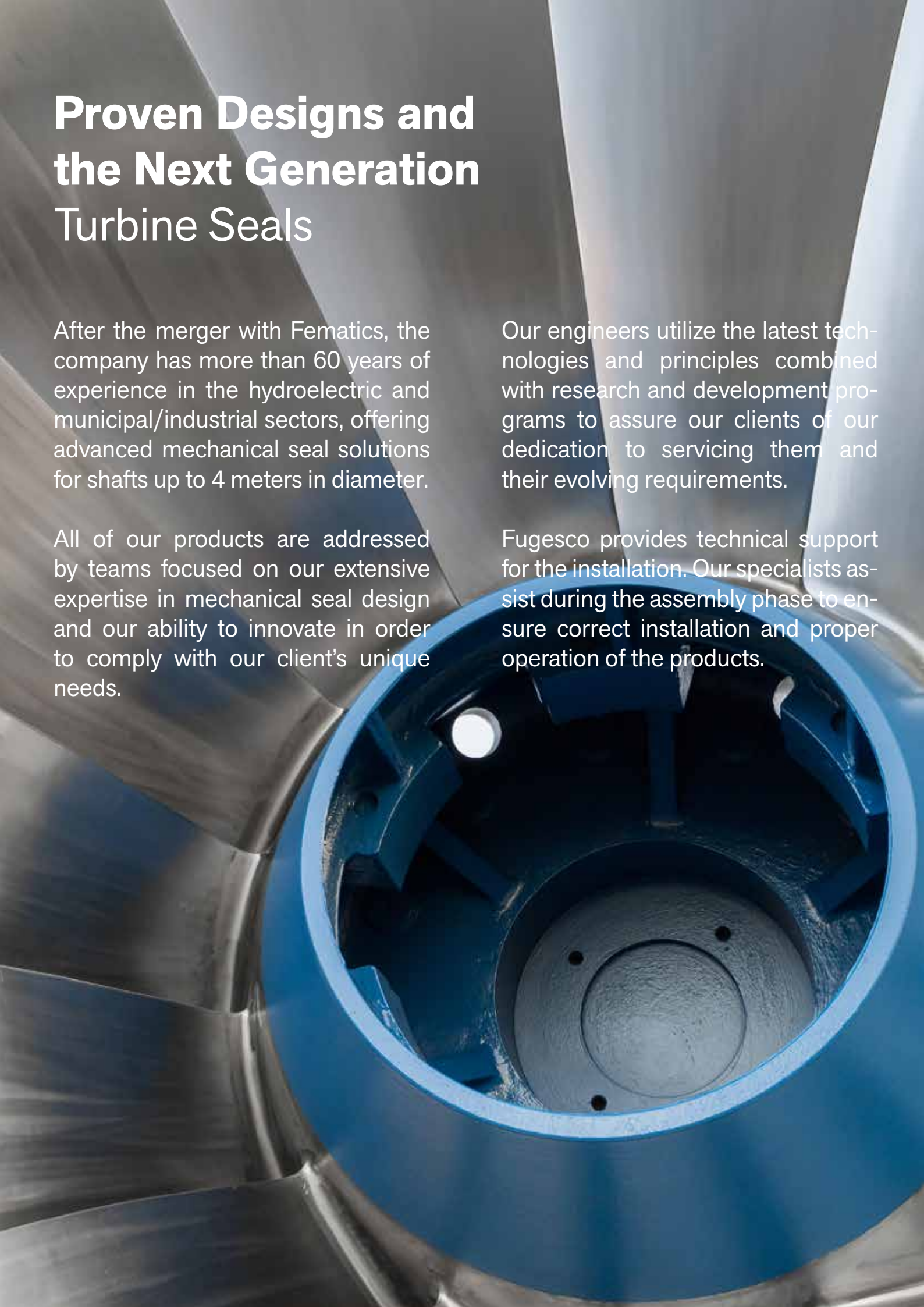
Proven Designs and the Next Generation Turbine Seals

After the merger with Fematics, the company has more than 60 years of experience in the hydroelectric and municipal/industrial sectors, offering advanced mechanical seal solutions for shafts up to 4 meters in diameter.

All of our products are addressed by teams focused on our extensive expertise in mechanical seal design and our ability to innovate in order to comply with our client's unique needs.

Our engineers utilize the latest technologies and principles combined with research and development programs to assure our clients of our dedication to servicing them and their evolving requirements.

Fugesco provides technical support for the installation. Our specialists assist during the assembly phase to ensure correct installation and proper operation of the products.



Radial Turbine Seals



Radial type seals are used in hydroelectric turbines, pump turbines and large pumps.

Radial type seals are widely used on hydroelectric turbines and pumps to create a near watertight seal between the shaft and headcover. Depending on operating conditions, one or more carbon segmented sealing rings may be required. Our seals are custom-designed to fit existing equipment, ensuring reliability, ease of installation, self-adjustment, and simplified maintenance.

We design and manufacture both split and non-split seals, along with their essential companion precision sleeves, which are mounted on the turbine shaft to enable effective sealing. These sleeves are available in various materials, selected based on service conditions and specific design requirements.

To meet customer needs, we also provide optional features such as splash guards, reservoirs, RTDs, wear indicators, and inflatable maintenance seals. Additionally, our advanced composite designs significantly reduce seal component weight, optimizing site handling and generating repeatable cost savings both at installation and during maintenance.

MODEL	2 Elements seal Type FR2 (F200, F201, F210, F211)	3 Elements seal Type FR3 (F300, F301, F310, F311)
Turbine operating pressure	172 kPa (25psi)	310 kPa (45 psi)
Recommended barrier water pressure	20-35 kPa (3-5 psi) above turbine pressure	20-35 kPa (3-5 psi) above turbine pressure
Recommended water filtration	25 microns	25 microns
Radial shaft displacement	± 1.5 mm (0.06")	± 1.5 mm (0.06")
Axial shaft displacement	No restrictions	No restrictions
Shaft /sleeve finish	0,8 µm (RMS 32 µ in)	0,8 µm (RMS 32 µ in)

Axial Turbine Seals



Our axial type seals are specifically designed for application to hydroelectric turbines and large water pumps for sewage handling, filtration and irrigation, etc.

Axial type seals are typically used at hydroelectric power stations and municipal facilities, in turbines and pumps where higher pressures and more robust conditions prevail. Their main purpose is to maintain a near water tight seal between the shaft and the headcover of the unit. The axial sealing action occurs between two mating rings, a stationary sealing ring and a seat ring that rotates with the shaft. Since the wearing surfaces of the seal reside between these two surfaces, the shaft surfaces are not exposed to wear due to the sealing action. These seals are designed to withstand demanding conditions such as high pressures and torques as well as exaggerated axial and radial shaft displacements and thrust forces. Dependant on the available space allocated for the seal, larger wear allowances are possible in order to achieve fewer maintenance outages and cost savings.

MODEL	Type FAH-FAY
Max. turbine operating pressure	1240 kPa (180 PSI)
Max. recommended barrier water pressure	20-70 kPa (3-10 psi) above turbine pressure
Recommended water filtration	25 microns
Radial shaft displacement	± 1.3 mm (0.05")
Axial shaft displacement	± 3 - 25 mm (0.125"-1")
Shaft/sleeve finish	Not applicable

FA/400 series

small/medium split mechanical seal



Operational Limits

- **Max turbine pressure:**
250 mm – 5 Bar, 400 mm – 6 Bar, 500 mm
5.8 Bar, 600 mm – 4.4 Bar
- **Max turbine speed:**
Velocity 15 m/s (250 mm – 980 RPM, 400 mm
615 rpm, 500 mm – 615 rpm, 600 mm – 430 rpm)
- **Recommended barrier pressure:**
0.2 to 0.34 Bar
- **Recommended water quality:**
Max 50 microns
- **Radial shaft dislocation:**
+/- 0.20 mm
- **Axial shaft dislocation:**
1 - 2 mm dynamic, static mode
can be adjusted according to turbine requirement

Advantages:

- No shaft wear
- Cost effective
- Floating sealing ring that ensure perfect flatness between sealing faces
- Split or non split design

Product Features

- **Sizes available:**
250 to 600 mm
- **Method of closing the faces:**
Compression springs, pre-assembled in non-split versions
- **Mechanical Wear indicators:**
As standard / no. Available as add-on
- **Drive screws for the shaft size:**
Minimum 3 to 4 set screws
- **Number of splits:**
2 segments
- **Material for the housing:**
Stainless steel



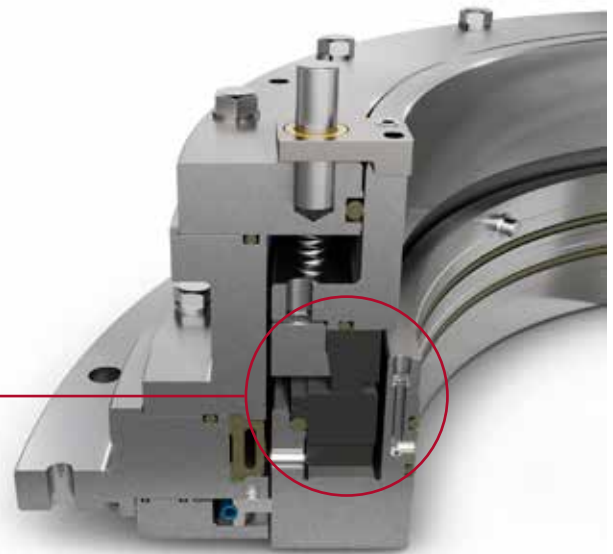
Black Diamond FX1



Unrivalled tribological properties and wear resistance Patent Pending.

Black**Diamond** FX1


Black Diamond FX1 is a fiber reinforced thermo-setting resin composite, combining high strength fibers and solid lubricants to reduce friction and wear. The material is intended for use in mechanical seals. In dry or poorl lubricated applications Black Diamond FX1 has shown in our tests a negligible temperature increase, unlike the most common PE-UHMW which had shown temperature peaks potentially compromising the integrity of the mechanical seal. Contact us now for more information on our Black Diamond FX1.



Accessories

Inflatable Seals

Air Control Panel

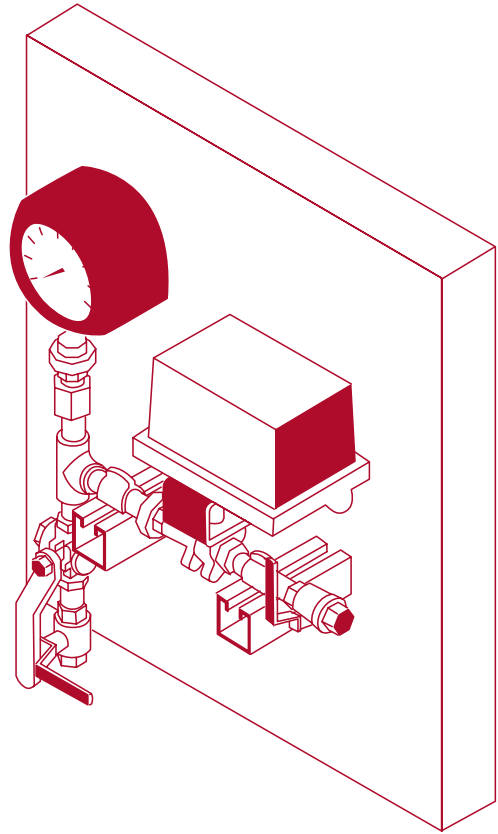
A seal air-controlled panel designed to regulate the air supply and pressure required to activate the inflatable seal.

The panel may be connected to existing controls in order to prevent accidental turbine start ups while in the inflated mode.

The panel can be remotely operated.

Stainless steel construction.

Designed to customer's requirements and specifications.



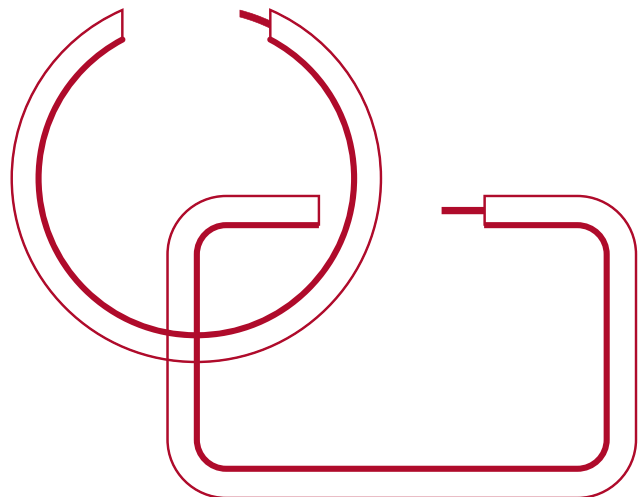
Accessories

Inflatable Seals

While we provide our standard proven designs of inflatable seals, we are also able to custom design inflatable seals for our clients' unique needs.

The basic design allows the end user to install the seal without the need for site vulcanizing. Testing of the inflatable seals is performed prior to shipment.

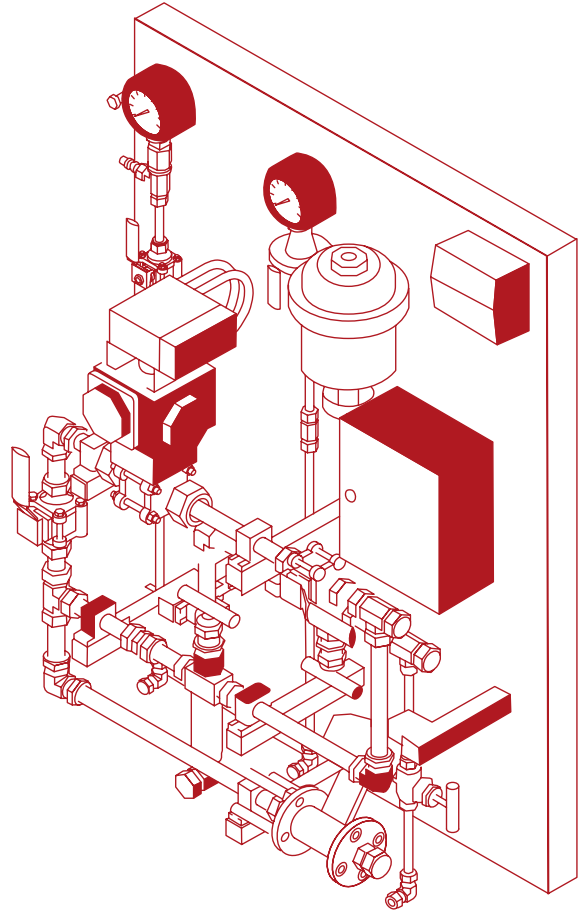
For special conditions such as odd cross sections or bridging of unusually large gaps etc. our design teams are always up to the challenge of finding the most appropriate solutions for our clients.



Accessories

Seal Water Control Panel

- This control panel is designed to regulate the Flow and pressure of water supplied to the seal;
- The water control panel can be remotely operated;
- The control system can be used to reduce operating costs by optimizing water consumption;
- Control of the lubrication and pressure aspects of the water supply to the seal will result in extended seal life;
- The control panel is designed to control the differential pressure requirements of the seal for more stable operation;
- Stainless steel construction;
- The seal water flow control system is designed to customer's requirements and specifications.



Accessories

and refurbishment

Fugesco provides any spare parts for existing turbine seals. Their engineering team analyzes current seals to retrofit technology and often enhance performance without modifying configurations or housings. Seal longevity can be improved using specialized materials suited to turbine pressures, flows, and water conditions. Some examples of refurbished parts that Fugesco can provide:

- Sliding Rings
- Sleeve
- Inflatable seal
- Housing
- Reservoir
- Labyrinth
- Base ring, Lower ring, Upper ring, Cover ring, Pressure ring, Drive ring, Retainer ring and various hardware like Sealing rings, Garter springs, Compression spring, Double stop, Single stop
- Packing Box



Accessories

High Efficiency Filtration System

SIMPLE EFFICIENT OPERATING PRINCIPLE

Our filtration systems are the result of many years of research and development, which today provides filtration 10 to 20 times finer than that of sand filters now available on the market. Designed for nominal 0.45, 2.0, 5, 10 and 25 micron(s) filtration, their high performance is due to a unique concept, which ingeniously combines centrifugal separation and surface filtration.

HOW IT WORKS

Centrifugal force creates a vortex effect in the raw water above the filtering media (sand) helping to remove suspended solids. It significantly increases the effective filter surface within the tank.

"The turbulence causes a sustained cleaning action which forces the suspended particles to accumulate on the inside walls of the tank; therefore, much finer sand can be used without any clogging problems."



The water, now largely free of impurities, is filtered through the media and highly polished for a variety of purposes. The advantage of our filter is that the majority of the contaminants remain suspended above and on the filter bed until the system needs to be backwashed requiring less water and a shorter operating time than with conventional sand filter systems. The process therefore allows longer cycles and much finer filtration levels. Backwash frequency depends on material loading, thus high solids loading will require more frequent backwashing.

HIGH-EFFICIENCY FULLY AUTOMATED FILTERS (FEATURES)

- Once installed, our filters need no attention during backwash and rinse cycles, yet they provide outstanding advantages;
- Exceptionally efficient filtration with no clogging;
- Fully-automated backwash;
- Filtration up to 100 gpm/sq.ft. (4 times greater than conventional filters);
- Longer filtration cycle than conventional filters;
- Low backwash flow rate and volume of water;
- Compact configuration for optimal space utilization.





Using clean, filtered water in the turbine seal considerably reduces the risk of premature wear of the sealing faces.

What To Do

An analysis of your water. We always recommend that you first have a sample of your water analyzed. This analysis will reveal the types of contamination as well as the size of the particles.

Choice of the filter that best meets your specific needs

Our specialists will recommend the filter with the right capacity for your needs based on the volume of water, flows, available space, all depending on the quantity of seals in your power plant.

Filters are delivered with installation specifications

The filter is delivered with an installation guide and check list facilitating installation. A FUGESCO specialist can supervise the installation upon request. The system could also be delivered pre-assembled for easy start-up.

Training

FUGESCO could supply personnel during the start up of the installed filter. In addition, we will train your operation and maintenance personnel on how to use and maintain the equipment.

All our filters are guaranteed

Filters come with a five-year warranty on the stainless steel tank and a one-year warranty on parts.

A TYPICAL SYSTEM INCLUDES

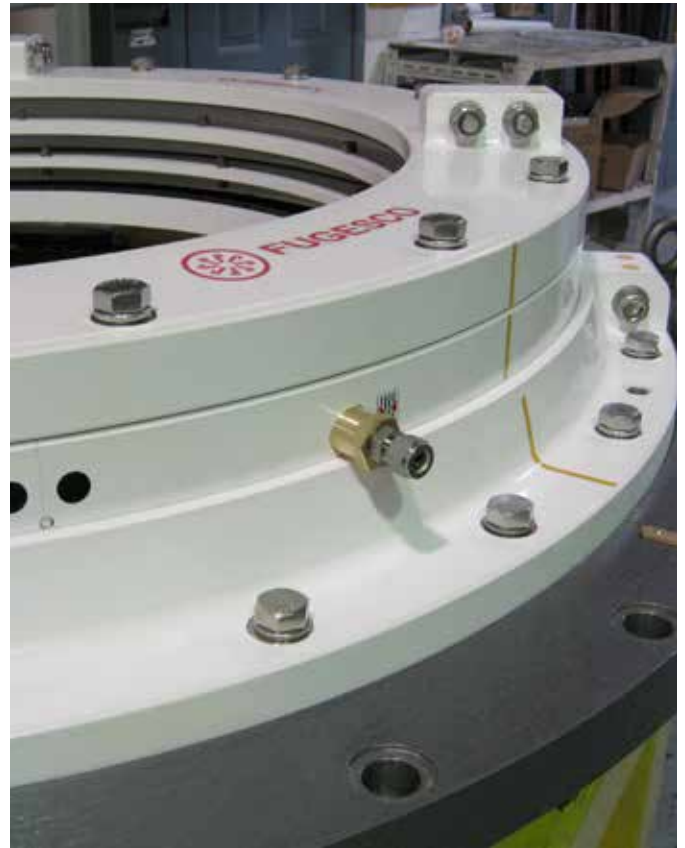
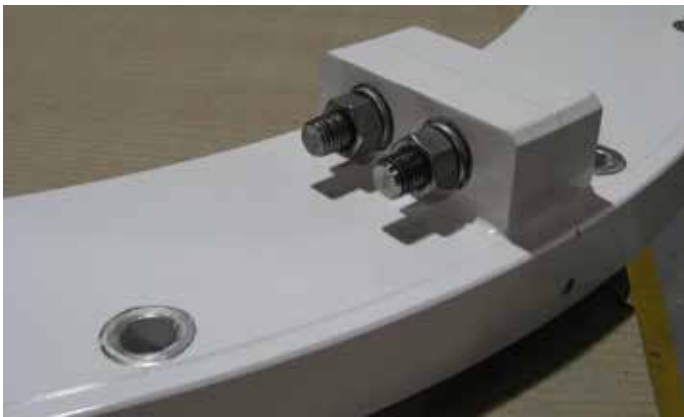
- Stainless steel 304, ASME certified vessel (316 available);
- Piping manifold assembly based upon applications;
- Clean water backwash connection with flow controller;
- Automatic backwash controlled by microprocessor.
- Our system help industrial customers recycle water to reduce costs and enhance water utilization.



Innovation

Polymer seal housing

Fugesco's polymer housings are industrial-grade components made from woven glass cloth combined with epoxy resin. This material offers low moisture absorption, excellent electrical insulation, and exceptional chemical resistance. Known for its high strength, it has been a trusted solution by Fugesco for over 15 years. Thanks to its lightweight design—approximately one-quarter the weight of stainless steel—these housings are significantly easier to handle and install. For more information, please contact Fugesco directly.







Fugesco

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*Meccanotecnica Umbra facilities



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