CUSTOMER DRIVEN DESIGN

FLUID SEALING INTERNATIONAL

1000 SERIES

ENGINEERED TO MEET AND EXCEED THE NEEDS OF OUR CUSTOMERS

FLUID SEALING INTERNATIONAL

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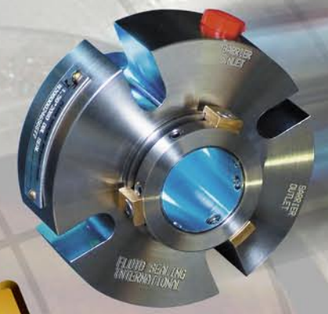
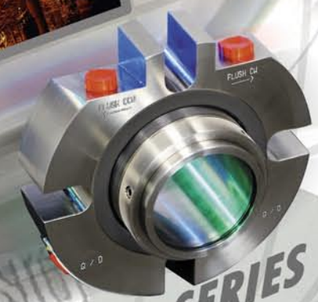
A NEW GENERATION OF INNOVATIVE SEALS

CUSTOMER DRIVEN DESIGN

3000 SERIES



2000 SERIES



6000 SERIES

Fluid Sealing International
922 Second Avenue
Coraopolis PA.
15108

Fluid Sealing International
Springs
Gauteng Province
South Africa

FLUID SEALING INTERNATIONAL

Fluid Sealing International is a mechanical seal manufacturer focused on the needs and requirements of its customers. Since 1982, the FSI policy has been to design, manufacture, provide, and service the most reliable sealing systems available to today's industries. Our goal is to make a difference in, and an impact on the global sealing marketplace.

We understand that each customer as well as each seal application is unique. From our standard product line, to a specifically engineered custom seal, we have listened to what our customers want and expect from a mechanical seal manufacturer. This has resulted in Customer - Driven Designs.

We are proud of our company, our products, and our people. We continuously strive to be our customers manufacturer of choice when it comes to fluid sealing products.

Our state-of-the-art manufacturing facilities employ the latest technology in CAD/CAM operations, along with total machining capabilities.

At FSI we are committed to producing consistent quality. This commitment is seen in our adherence to our ISO 9001 Quality Management System in place at our manufacturing facilities.

As additional manufacturing and service centers are put in place they will incorporate the same design, production, and quality guidelines observed throughout the Fluid Sealing International Organization.

A NEW GENERATION OF INNOVATIVE SEALS

FSI SEAL SELECTION GUIDE

INDUSTRY	EQUIPMENT TYPES	APPLICATIONS	FSI SEAL TYPES
Chemical Process	ANSI/DIN Process Pumps Horizontal Split Case Pumps Mixers & Reactors Rotary & Screw Pumps	Corrosive Chemicals Mild Acids Caustics Light Hydrocarbons	1030 / 1040 6030 / 6040 / 6080 2080 / 2050
Refining & Petrochemical	API Heavy Duty Process Pumps Multi-Stage & Diffuser Pumps Vacuum Pumps Horizontal Split Case Pumps	General Hydrocarbons Caustics Amine Services Crudes & Acids	1040 / 6040 / 6090 2080 / 6080 3000
Power Generation	Horizontal Split Case Pumps Multi-Stage & Diffuser Pumps Vertical Pumps Slurry Pumps	Boiler Feed Water River Water Condensate Scrubber Slurries	1010 / 1020 1030 / 1040 3000
Steel & Metals	Horizontal Split Case Pumps ANSI/DIN Process Pumps Multi-Stage Pumps Specialty Equipment	Cooling Water Chemical & Tar Transfer River Water Descaling Service	1010 / 1020 1030 / 1040 3000
Pulp & Paper	Paper Stock Pumps ANSI/DIN Process Pumps Rotary & Screw Pumps Mixers & Reactors	Paper Stock Black / White Liquor Chemical Transfer Hot Water / Condensate	1030 / 1040 3000 2050
Municipal & Water	Horizontal Split Case Pumps Sewage Handling Pumps Slurry Pumps Vertical Pumps	Sanitary Water River Water Sewage Handling Chemical Treatment	1010 / 1020 1030 / 1040 3000
Pharmaceutical & Food Processing	Mixers & Reactors ANSI/DIN Process Pumps Vacuum Pumps Specialty Equipment	Chemical Services Food Grade Requirements High Pressures/Temperatures Cryogenic & Vacuum Services	1030 / 1040 2050 3000

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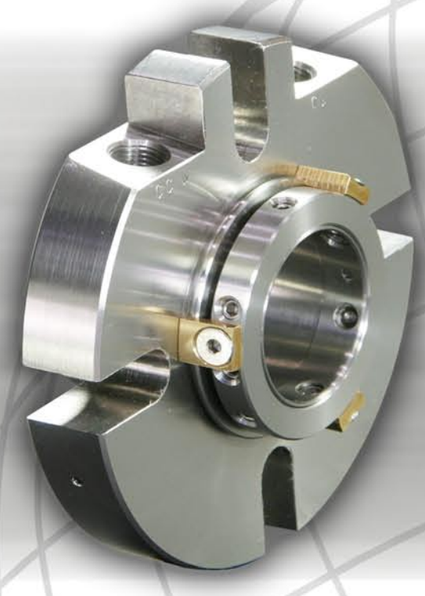
FSI SERIES 1000 SEALS

CUSTOMER DRIVEN DESIGN



1030/1040

The simple, proven, robust design of the 1030/1040 seal line makes this the foundation of the FSI product offering. A single cartridge flexible stator design, the 1030/1040 seals are found in applications in nearly all types of industry.

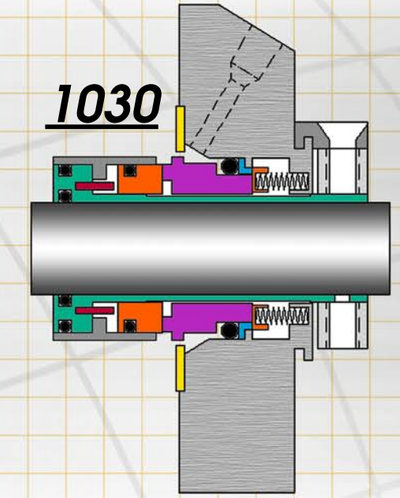
FEATURES:

- Multi-spring stationary design, more capable of handling misalignment between pump housing and shaft.
- Monolithic face design eliminates the problems associated with press fit/inserted faces.
- Springs and pins located outside the product to avoid clogging.
- Hydraulically balanced for cooler and longer running.
- Clockwise and counter-clockwise tangential ports positioned to allow unobstructed flow directly to seal faces.
- Springs are securely engaged at both ends retaining spring perpendicularity to ensure even face loading.
- Recessed gasket to eliminate extrusion.
- Rotating face shrouded in a stainless steel carrier virtually eliminates breakage under excessive conditions.

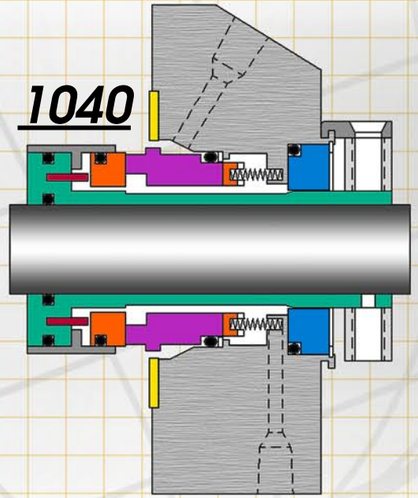
The 1030 incorporates (2) flush ports for either direction of rotation.

The 1040, in addition to the flush ports, offers quench ports in and out. The 1040 also comes standard with a carbon restriction bushing. Alternate arrangements include lip seal containment system, labyrinth bronze bushing, or die formed packing system.

1030



1040



OPERATING PARAMETERS:

Temperatures:	0 º F to 600 º F* -20 C to 300 C
Pressures:	Up to 600 psi* 40 Bar
Shaft Speeds:	Up to 3600 RPM*

MATERIALS OF CONSTRUCTION:

Metal Components:	316 SS Standard
Seal Face Materials:	Carbon, Silicon Carbide, Tungsten Carbide
Elastomers:	Fluoroelastomer, Perfluoroelastomer, Aflas, EPR/EPDM as standard o-ring materials. All other commercially available elastomers as specified.
Sizes:	From 1.00" to 5.00". Available in both inch and metric sizes.

* As always, consult your FSI representative for applications which approach or exceed these parameters. Thank You.

FSI SERIES 1000 SEALS

CUSTOMER DRIVEN DESIGN

1000 Versatility

The Series 1000 seals are available in standard sizes for all ANSI / DIN process pumps. In addition, the 1030+ and the 1040+ are designed to accommodates all big bore, taper bore, and oversized stuffing box arrangements.

Other offerings within the Series 1000 family include the following products in standard materials:

Type 1010 - Single cartridge elastomer bellows with single coil spring and one flush port.

Type 1020 - Single cartridge flexible stator with press fit faces and plain gland.

Type 1020M - Single cartridge flexible stator with monolithic faces and one flush port.

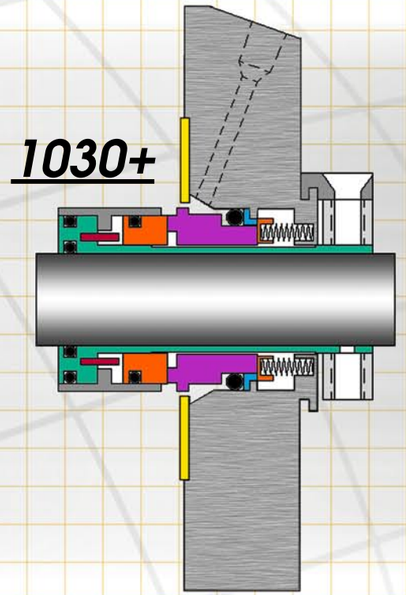
Because of our versatility in manufacturing, the FSI Series 1000 cartridge seal line is ideally suited for a variety of equipment types.....THESE WOULD INCLUDE:

- Horizontal split case pumps
- End suction centrifugal pumps
- Rotary & Screw pumps
- Progressive cavity pumps
- Slurry pumps
- Vacuum pumps
- Vertical pumps
- Specialty equipment

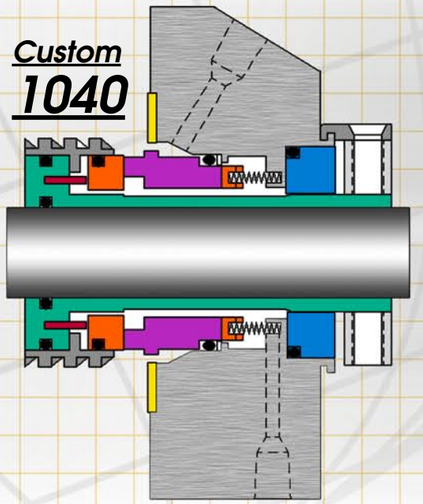
The use of modular parts for seal face configurations provides for maximum interchangeability. At the same time, the Series 1000 seals can incorporate custom manufactured glands and sleeves to accommondate all types of equipment. This is done without sacrificing seal performance, and in nearly all instances, without requiring equipment modification to accept the seal.

CUSTOM DESIGNS ARE ACTUALLY STANDARD PROCEDURE AT FSI - *CUSTOMER DRIVEN DESIGNS!*

1030+



Custom 1040



OPERATING PARAMETERS:

Temperatures:	0 º F to 600 º F* -20 C to 300 C
Pressures:	Up to 600 psi* 40 Bar
Shaft Speeds:	Up to 3600 RPM*

MATERIALS OF CONSTRUCTION:

Metal Components:	316 SS Standard (Alloy 20, Titanium, Hastelloy available)
Seal Face Materials:	Carbon, Silicon Carbide, Tungsten Carbide
Elastomers:	Fluoroelastomer, Perfluoroelastomer, Aflas, EPR/EPDM as standard o-ring materials. All other commercially available elastomers as specified.
Sizes:	Up to 6.00" Available in both inch and metric sizes.

* As always, consult your FSI representative for applications which approach or exceed these parameters. Thank You.

FSI SERIES 2000 SEALS

CUSTOMER DRIVEN DESIGN

2080

The FSI 2080 is a dual cartridge pusher seal with flexible stator design. Dual seals are double balanced to provide both pressurized and non-pressurized seal options.

FEATURES:

- Incorporates both radial flow and axial flow pumping rings
- Two piece gland allows for economical bi-metal construction
- Rotating faces are shrouded in a stainless steel carrier for optimum protection
- Multi-spring stationary design with springs isolated from product
- Available in all ANSI pump sizes for both standard bore and oversize stuffing box configurations

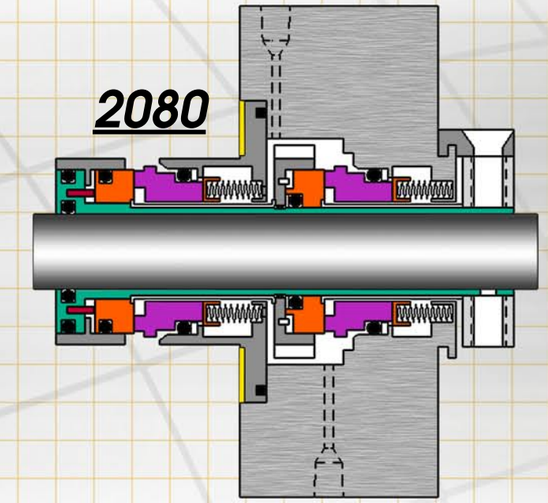
2050

The 2050 is a specifically engineered dual cartridge seal for use in mixing and agitating equipment. Designed as a true mixer seal, the FSI 2050 addresses the unique problems encountered in sealing mixers.

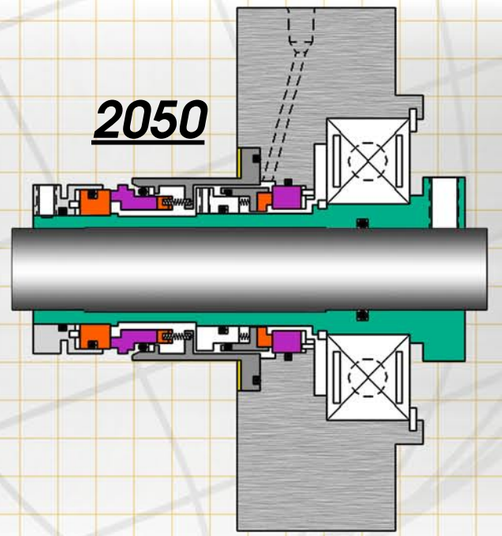
FEATURES:

- multiple spring design and large internal radial clearances enable this seal to accommondate shaft and bore run-out conditions
- Integral pumping ring for positive barrier fluid circulation
- "Double balanced inboard seal" gives the inboard seal pressure reversal capabilities and allows 2050 to perform as specified during off-design operation and possible upset conditions.
- Available external lip seal to contain and direct leakage to a safe location.
- In equipmet where excessive run-out is possible this seal can be configured with an external bearing to limit shaft deflection and radial movement
- The FSI 2050 can be custom configured to allow for contacting face dry running service utilizing nitrogen or air purge

2080



2050



OPERATING PARAMETERS 2080:

Temperatures:	0 º F to 600 º F* -20 C to 300 C
Pressures:	Up to 450 psi* 30 Bar
Shaft Speeds:	Up to 3600 RPM*

MATERIALS OF CONSTRUCTION:

Metal Components:	316 SS Standard (Alloy 20, Titanium, Hastelloy available)
Seal Face Materials:	Carbon, Silicon Carbide, Tungsten Carbide
Elastomers:	Fluoroelastomer, Perfluoroelastomer, Aflas, EPR/EPDM as standard o-ring materials. All other commercially available elastomers as specified.
Sizes:	Up to 5.00" Available in both inch and metric sizes.

OPERATING PARAMETERS 2050:

Temperatures:	Liquid Lubricated operation -40 º F to 500 º F* -40 C to 260 C Dry Running operation -40 º F to 300 º F* -40 C to 125 C
Pressures:	Liquid Lubricated operation Up to 500 psi* 35 Bar Dry Running operation Up to 125 psi* 9 Bar
Shaft Speeds:	Up to 350 RPM*
Run Out	.125"/3mm Radial F.I.M.

MATERIALS OF CONSTRUCTION:

Metal Components:	316 SS Standard (exotics available upon request)
Seal Face Materials:	Carbon, Carbon PTFE, Silicon Carbide, Tungsten Carbide
Elastomers:	All commercially available elastomers as specified.
Sizes:	1.50" to 12.00" Available in both inch and metric sizes.

* As always, consult your FSI representative for applications which approach or exceed these parameters. Thank You.

FSI SERIES 3000 SEALS

CUSTOMER DRIVEN DESIGN

3B/3B-1

The FSI 3000 Series mechanical seal is a multiple spring design available in both balanced and unbalanced configurations. The basic 3B/3B-1 can be offered for single, dual, or tandem operation. Most 3000 Series mechanical seals are custom engineered designs due to operating conditions and / or equipment type.

FEATURES:

- Normally cartridge mounted for ease of installation and equipment accommondation
- Can be used as either a rotating spring design or as a flexible stator design depending on operating parameters
- Required seal face designs and balance ratios can be calculated to ensure optimum performance
- Can be furnished with pumping ring or circulating shroud for API Plan 23 or 53 operation

TYPICAL APPLICATIONS WOULD INCLUDE:

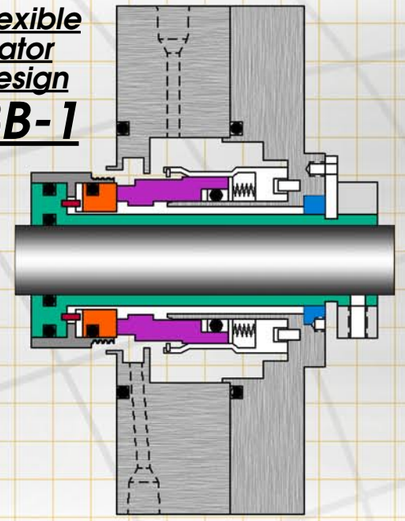
- Refinery & Petrochemical light hydrocarbon services
- High pressure multistage pumps
- Circ water & cooling water services
- Boiler Feed pump applications
- Specialty Equipment applications

SERIES 3000 ACCESSORIES:

- Close clearance restriction bushings, floating throat bushings, and lip seals for use in conjunction with API Plans 21, 23, and 32.
- A complete line of standard and custom designed seal reservoirs to support tandem and double seal operations per API Plans 52 and 53.
- Specifically sized and selected heat exchangers for proper seal cooling when using API Plans 21 and 23.
- Custom engineered bearing isolating devices for specialty equipment applications.

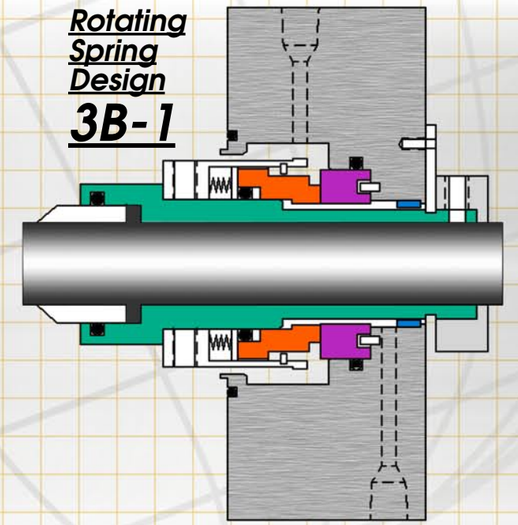
Flexible Stator Design

3B-1



Rotating Spring Design

3B-1



OPERATING PARAMETERS:

Temperatures:	0 º F to 500 º F* -20 C to 250 C
Pressures:	Up to 1200 psi* 80 Bar
Shaft Speeds:	Up to 4500 RPM*

MATERIALS OF CONSTRUCTION:

Metal Components:	316 SS Standard (exotics upon request)
Seal Face Materials:	Carbon, Silicon Carbide, Tungsten Carbide
Elastomers:	Fluoroelastomer, Perfluoroelastomer, Aflas, EPR/EPDM as standard o-ring materials. All other commercially available elastomers as specified.
Sizes:	Up to 6.00" Available in both inch and metric sizes.

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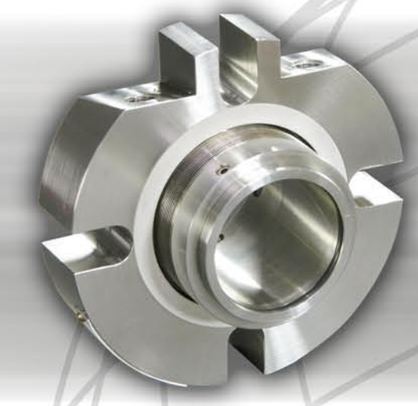
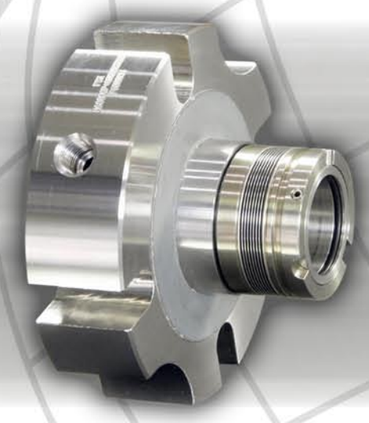
FSI SERIES 6000 SEALS

CUSTOMER DRIVEN DESIGN





6030/6040

The 6030/6040 seal line is a single cartridge rotating metal bellows seal designed for general service in refinery, petrochemical, and chemical industries.

FEATURES:

- Inherently and hydraulically balanced
- Centralized face loading ensures even face loading (flatness) throughout all temperature and pressure ranges
- Tangential porting to maximize flush effectiveness
- All o-rings are static; no dynamic o-rings
- Rotating bellows design are self cleaning, through rotational expulsion of particulates
- The 6040 is provided with quench and drain ports as standard. Options include restriction bushing, lip seal or die formed graphite ring containment system.

6080

The FSI 6080 is a dual cartridge rotary metal bellows seal. The dual seals are double balanced to provide both pressurized and non-pressurized seal operation.

FEATURES:

- Incorporates radial flow pumping ring for positive circulation
- All O-rings are static; no dynamic O-rings
- Two piece gland allows for economical bi-metal construction
- Centralized face loading ensures even face loading (flatness) throughout all temperature and pressure ranges
- Available in all ANSI pump sizes for both standard bore and over size stuffing box configurations

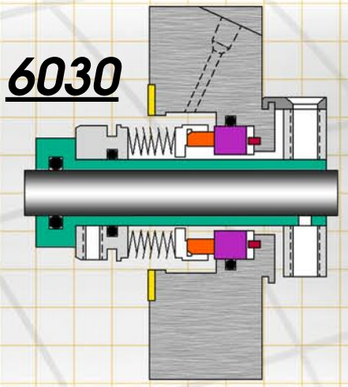
6090

The type 6090 seal is a heat treated high temperature rotating metal bellows design. It is available as either a component seal or a cartridge mounted assembly. It has the same inherent features as our other metal bellows seals.

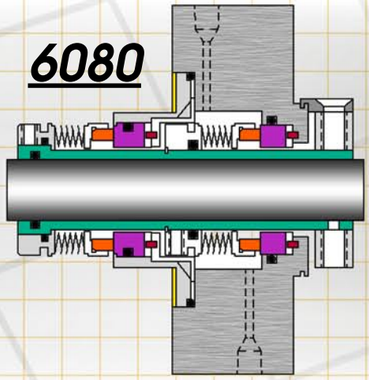
FEATURES:

- Graphoil secondary seals for high temperature service
- Flush, quench, and drain gland available with carbon or bronze restriction bushing
- Available steam purge bushing for hot hydrocarbon services

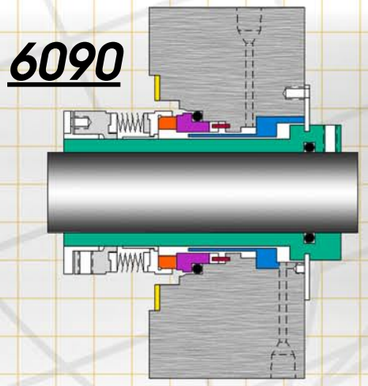
6030



6080



6090



OPERATING PARAMETERS:

Temperatures:	0 º F to 750 º F* -20 C to 380 C
Pressures:	Up to 300 psi* 20 Bar
Shaft Speeds:	Up to 3600 RPM*

MATERIALS OF CONSTRUCTION:

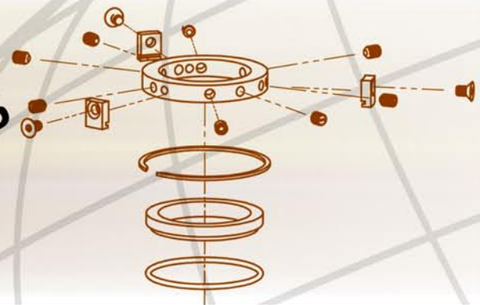
Metal Components:	316 SS, AM350 SS, Inconel 718 as Standard
Seal Face Materials:	Carbon, Silicon Carbide, Tungsten Carbide
Elastomers:	Fluoroelastomer, Perfluoroelastomer, Aflas, EPR/EPDM as standard o-ring materials. All other commercially available elastomers as specified. Type 6090 utilizes Graphoil secondary seals for high temperature applications.
Sizes:	Up to to 5.00″. Available in both inch and metric sizes.

* As always, consult your FSI representative for applications which approach or exceed these parameters. Thank You.

FLUID SEALING INTERNATIONAL

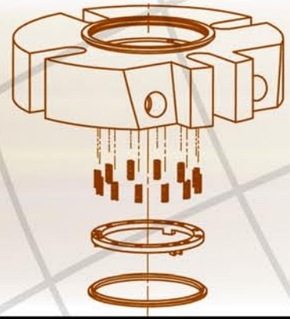
CUSTOMER DRIVEN DESIGN

TECHNICAL RESOURCES



At FSI we believe that the proper selection and the expected performance of a mechanical seal rely heavily on accurate equipment dimensional information as well as detailed operating conditions. We work closely with our customers and distributors to ensure that this information is recorded using mechanical seal data sheets for documentation. The equipment type and service conditions are then used to determine the proper environmental controls and API piping plans This information makes each FSI seal a customer, equipment, and service specific design. Any changes are reviewed and noted to assure all parties that the most reliable mechanical seal has been selected.

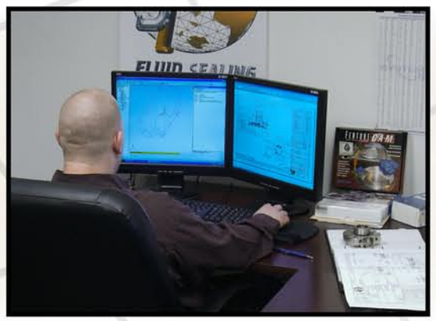
SEAL ANALYSIS AND REPAIR



Additional services provided by Fluid Sealing International include Mechanical Seal Analysis (MSA) and complete repair of mechanical seals. As a seal is disassembled all parts are inspected to determine their condition with respect to original specifications. It is during the MSA procedure that a failure mode can be identified and recommendations can be determined. These may include changes required in equipment operation, suggested environmental controls for improved performance, upgrades in seal materials, or even a change in seal design.

Once an inspection has been completed all major parts are cleaned and replaced, where necessary, to complete the repair. All repaired components are held to original new part tolerances. Following assembly each and every repaired seal is pressure tested prior to being returned to the customer. Our repair program not only helps in improving seal life through the MSA procedure, it also has proven to be a significant cost savings for our customers.

MANUFACTURING CAPABILITIES



The use of the latest technology in CAD/CAM operations at FSI enables us to take our mechanical seals from the design stage to the finished product in a timely and cost effective manner. This manufacturing process contributes to the quality of our products and ensures consistency in production. In addition, this valuable resource gives us the flexibility and versatility required to manufacture custom engineered mechanical seals to meet the needs of our customers.

Our Engineering and Manufacturing operations work in unison to create a Quality Control Program, which adheres to strict step by step checks of all components used in our finished products. We employ a 20 step procedure on all assembled mechanical seals prior to release for delivery to our customers. Part of this procedure is a pressure test in complete accordance with API standards and specifications for mechanical seals.

SERVICES

Our Customer Service staff stands ready to assist with all of our customer's fluid sealing requirements. The FSI Distributor network offers round the clock service and their personnel have extensive experience on mechanical seals, support systems, and pumping equipment. From the mechanical seal design concept to the finished product, FSI is committed to providing and servicing the most reliable sealing systems available to today's industries.

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