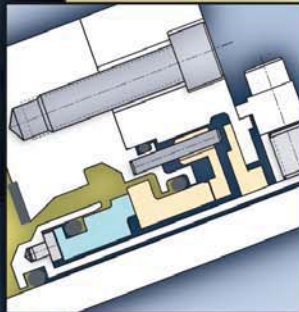
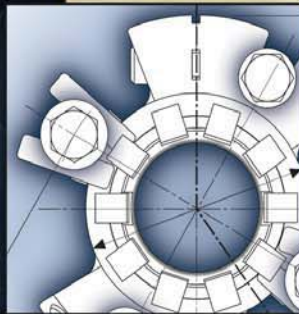
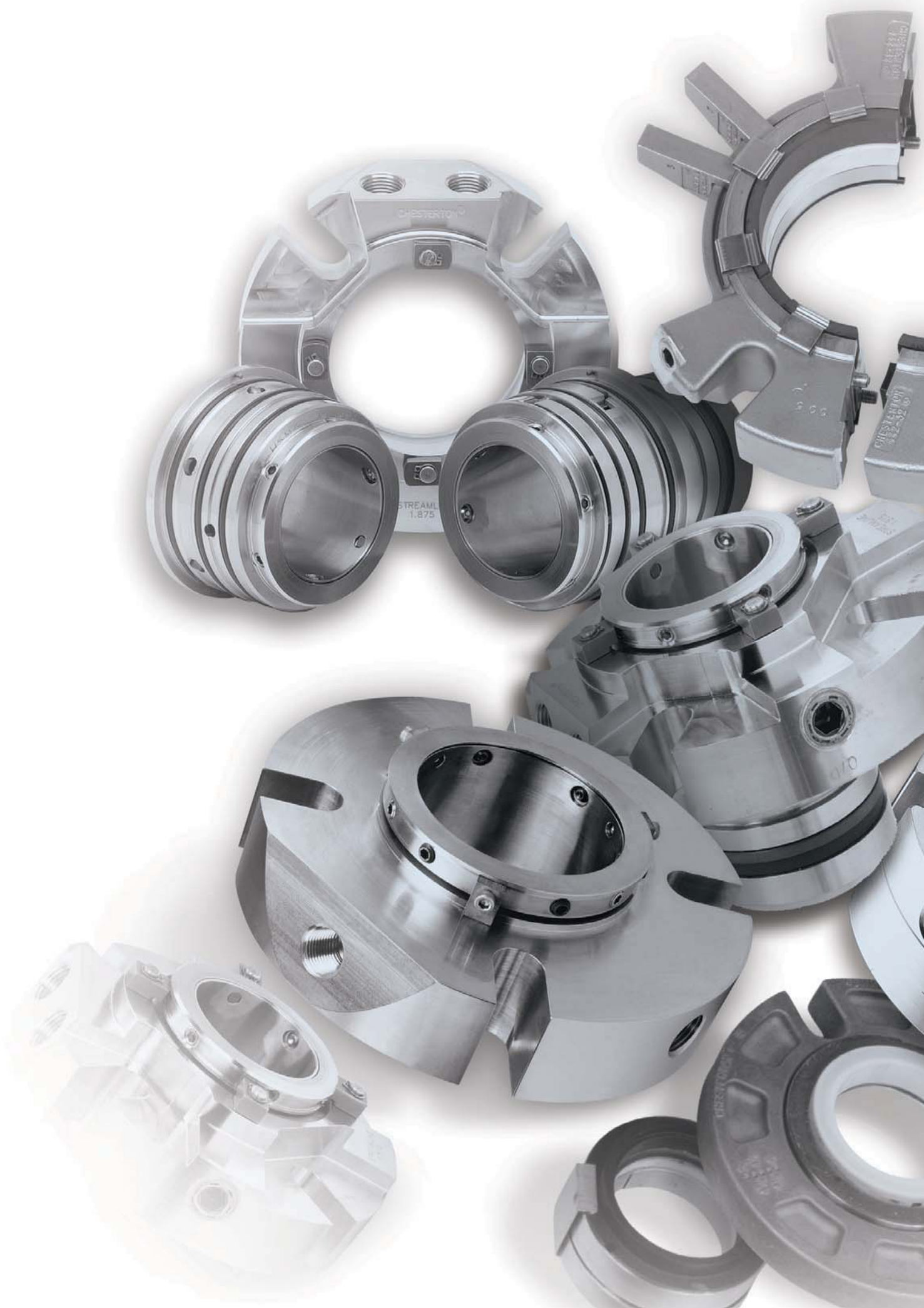


# MECHANICAL SEAL CATALOG





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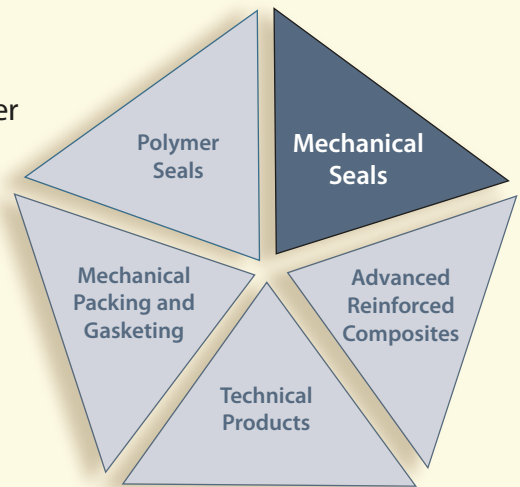


# CHESTERTON®

Providing value to industry since 1884

A.W. Chesterton Company is a leading international manufacturer and distributor of five distinct product lines. Each product line is positioned to provide value-driven solutions to meet industry needs.

Since 1884 we have worked closely with our customers to provide solutions that help them operate more reliably, efficiently, and economically.



*A.W. Chesterton Company is ISO 9001/14001 and MRP II Class-A certified.*

## Global Solutions

Chesterton has been providing value-driven solutions around the globe, with documented success and recognition, by using high performance materials and designs to solve your toughest sealing needs.



## Local Service

The expertise of your local Chesterton Technical Specialist and the support of our engineering staff will enable you to significantly reduce operating costs, increase reliability, and realize years of trouble-free service.

---

## MECHANICAL SEAL CATALOG

The Chesterton Mechanical Seal Catalog is a starter reference source to help users identify standard mechanical seal recommendations. This comprehensive catalog includes product overviews, installation data, seal recommendations by fluid, environmental control plans, and technical reference sections.

### Section I

*Product Overviews* covers the key benefits of our core product line of mechanical seals and seal support systems and includes cutaway and cross-sectional views of each.

### Section II

*Mechanical Seal Installation Data* includes seal and installation dimensional data and drawings.

### Section III

*Environmental Control Plans* outlines the general sealing plan recommendations and configurations. Properly choosing a seal plan can be accomplished by using the general seal plan recommendations, and can also be supplemented through user knowledge, customer requirements and the assistance of Chesterton Application Engineering.

### Section IV

*Seal Recommended by Fluid* lists over 1000 commercial fluids with respective seal recommendations. Seal recommendations apply only to the published fluid concentration and temperature. Due to variances in commercial and technical requirements, alternative compatible seal materials are listed and can be substituted under the user's discretion.

### Section V

*Technical Reference* contains useful technical formulas and conversion tables.

## SEAL SELECTION CHECKLIST

### BEFORE APPLYING A CHESTERTON MECHANICAL SEAL ALWAYS CHECK THE FOLLOWING:

#### Mechanical

- Pump Condition
- Pump Design
- Pump Dimensions
- Motor Requirements

#### Fluids

- Concentration
- Carrier Fluids
- Cleaning Fluids
- Fluid Additives
- Percent Solids

#### Parameters

- Pressures
- Temperatures
- Shaft Speed
- Shaft Size

#### System

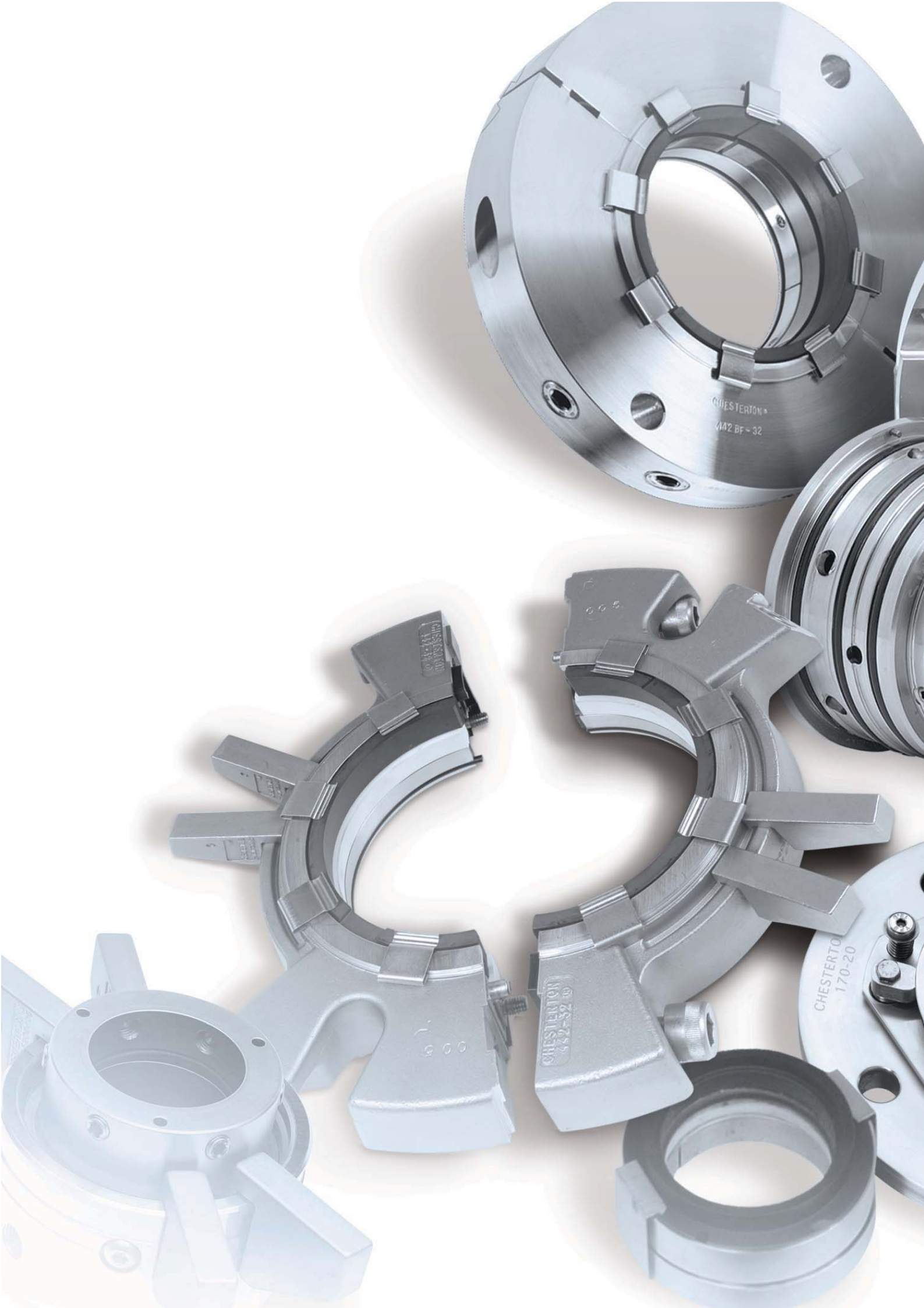
- Batch Operation
- Continuous
- Environmental Controls

#### CAUTION: PLEASE READ CAREFULLY

This catalog is intended for use solely by fully trained CHESTERTON Specialists who are also experienced and familiar with the wide range of operating conditions and the wide variety of applications into which fluid sealing devices are or may be placed.

This seal catalog is not an operations or safety manual. Users should rely on their own training and experience in taking all precautions necessary when working around or making decisions about the materials, chemicals, temperatures, and pressures referred to herein. Hazard information reflects only the classifications published by European Council Directive 96/54/EC and the International Agency for Research on Cancer (IARC), Groups 1, 2A, or 2B. This information is provided only as one reference point and is not intended to be an exhaustive listing of all potential hazards. Likewise, the fact that there is no European Council Directive 96/54/EC or the International Agency of Research on Cancer (IARC), Groups 1, 2A, or 2B hazard reference for some materials should not be taken to mean that there are no hazards whatsoever associated with the material. As above, for operations and safety purposes, you should rely on your own training, experience, or careful further inquiry.

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SECTION I

# PRODUCT OVERVIEWS

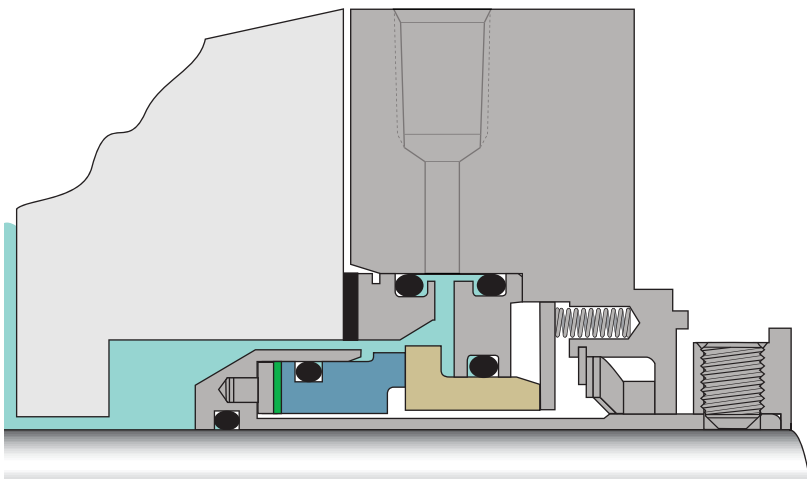
# 180™

## Heavy Duty Single Seal

*Offering maximum reliability in a wide application range*

The 180 compact chassis is designed to fit ANSI and API610 pumps with no modifications for ease of use. Advanced design features combined with a rigorous testing regime have yielded this “next step” single seal technology.

Testing to ISO standards has shown the 180 to be a top performer for emissions control. Using finite element analysis, face designs have proven the dynamic emissions to be extremely low. The full featured gland provides quench and drain capability.



### Maximum performance for demanding, high-torque applications

- Cushioned, high strength drives
- Rugged, high torque monolithic seal faces

### Reliable sealing of slurries

- Micropolished O-ring surfaces eliminate O-ring hang-up
- Stationary springs
- Narrow rotating face prevents wiping of solids

### Suited for the broadest range of applications

- Full featured gland with quench/drain and floating bushing
- Special metals available for corrosive services
- Multi-port flush injection providing optimized cooling

#### SPECIFICATIONS

##### Operating Parameters

<b>Sizes</b>	25 mm to 120 mm 1.00" to 4.75"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 40 bar g / 600 psig*
<b>Temperature</b>	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
<b>Speed</b>	25 m/s or 5000 fpm

##### Applicable Standards and Approvals

ISO-3069C, ASME B73.1, B73.2

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

##### Materials of Construction

<b>Rotary Faces</b>	Carbon Sintered Silicon Carbide Tungsten Carbide
<b>Stationary Faces</b>	Sintered Silicon Carbide Tungsten Carbide
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Alloy C-276 / EN 2.4819

#### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
180	Shaft diameter	CB / SSC	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 52 - 55

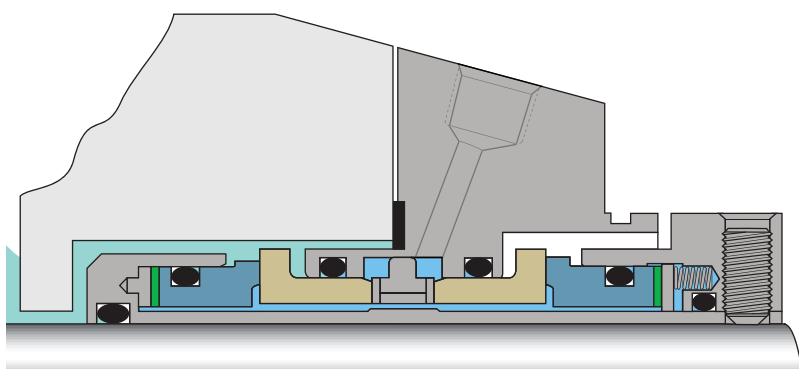


# 280™ Heavy Duty Dual Seal

*A dual seal design for severe duty and greatest reliability in difficult applications*

The 280 is ideal for sealing viscous fluids and tough slurry applications such as paint, coatings, and black liquor—as well as heavy slurries in mineral/ore processing and raw material manufacturing.

The 280 incorporates all the latest design advancements in mechanical sealing technology. Its geometric double-balanced design makes it the ideal choice for plant-wide standardization because it accepts process pressure reversals. Unified Seal Face Alignment™ provides extended axial play capabilities and accommodates thermal expansion in equipment with long shafts. An efficient integral pumping device with tangential internal cut-waters allows for efficient heat removal.



**Superior performance for demanding, high-torque applications**

- Cushioned, high strength drives
- Rugged, high torque monolithic seal faces

**High-reliability sealing**

- High-flow pumping ring dissipates heat away from the faces
- Large clearance barrier channel optimizes heat dissipation
- Self-Centering Lock Ring™ eliminates misalignment

**Maximum slurry handling capability**

- Micropolished O-ring surfaces eliminate O-ring hang-up
- Narrow rotating face prevents wiping of solids

**SPECIFICATIONS**

**Operating Parameters**

<b>Sizes</b>	25 mm to 120 mm 1.00" to 4.75"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 40 bar g / 600 psig* 17 bar g / 250 psig outboard*
<b>Temperature</b>	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
<b>Speed</b>	20 m/s or 4000 fpm

**Applicable Standards and Approvals**

ATEX, ISO-3069C, ASME B73.1, B73.2

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

**Materials of Construction**

<b>Rotary Faces</b>	Carbon Sintered Silicon Carbide Tungsten Carbide
<b>Stationary Faces</b>	Sintered Silicon Carbide Tungsten Carbide
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Alloy C-276 / EN 2.4819

**QUICK ORDER REFERENCE EXAMPLE**

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
280	Shaft diameter	CB / SSC / SSC / CB	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 56 - 61

# 155™

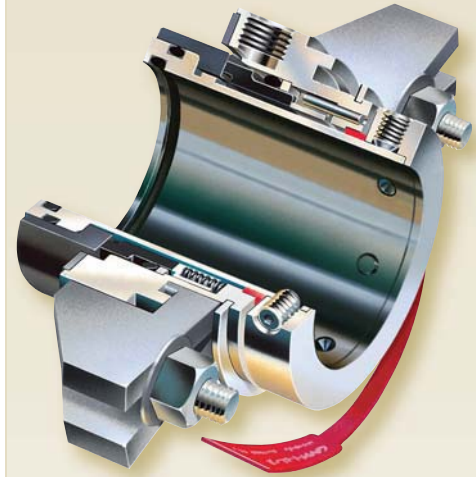
## Standard Single Seal

*A single seal designed for plant-wide flexibility and ease of use*

The 155 low heat generation capability allows it to excel in a wide range of industrial sealing applications ranging from non-lubricating fluids to corrosive chemical environments.

Low profile seal faces generate low heat, providing the best solution to non-lubricating fluids. Its simple design and broad range of materials offer the greatest means of repair and plant standardization.

The innovative adjustable hub gland is more flexible for installations where space is restricted.

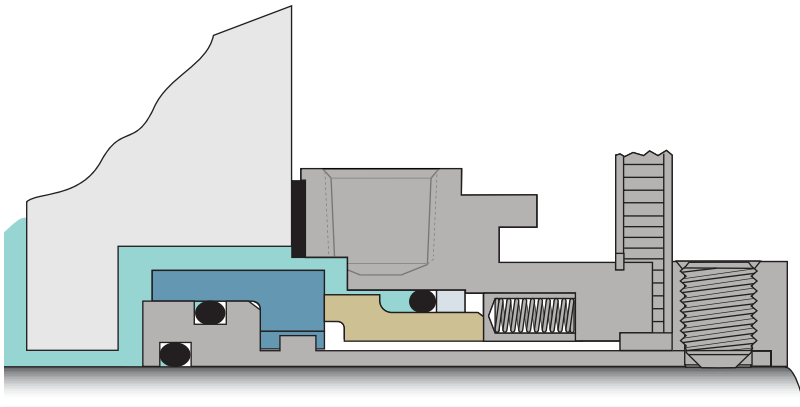


**Versatile in fit and easy to install**

- Adjustable/removable gland tabs
- 360 degree flush port rotation
- Quick release centering strap
- Available in special alloys

**Reliable sealing for a broad range of fluids**

- Dynamically stress relieved narrow profile faces
- Low heat generation monolithic faces
- Self-Centering Lock Ring™ eliminates misalignment
- Stationary springs



**SPECIFICATIONS**

**Operating Parameters**

<b>Sizes</b>	25 mm to 120 mm 1.00" to 4.75"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 40 bar g / 600 psig*
<b>Temperature</b>	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
<b>Speed</b>	25 m/s or 5000 fpm

**Applicable Standards and Approvals**

ISO-3069C, ASME B73.1, B73.2

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

**Materials of Construction**

<b>Rotary Faces</b>	Sintered Silicon Carbide Tungsten Carbide
<b>Stationary Faces</b>	Carbon Sintered Silicon Carbide Tungsten Carbide
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Alloy C-276 / EN 2.4819

**QUICK ORDER REFERENCE EXAMPLE**

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
155	Shaft diameter	SSC / CB	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

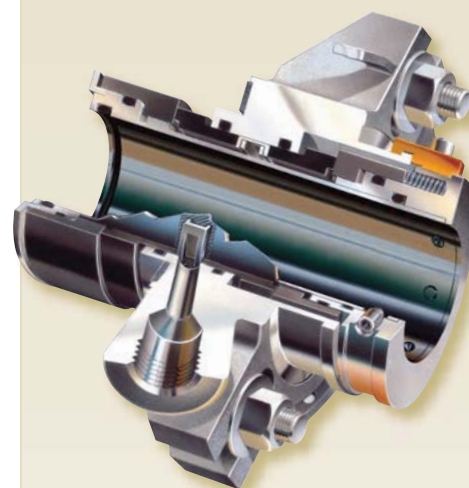
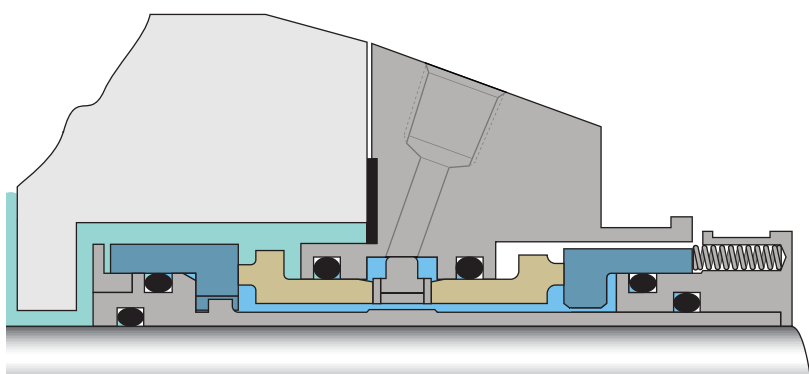
For dimensional information see page 62 - 65

# 255™ Standard Dual Seal

**A proven design and versatile performer providing reliable dual sealing capability in a wide variation of process and barrier fluids**

The 225 low profile seal faces generate low heat providing the best solution for heat sensitive fluids. This dual seal is ideal for corrosive services requiring high alloy materials. Designed with simplicity in mind, seal repair is easy and economical.

Its geometric double-balanced design accepts pressure reversals easily in challenging chemical pump applications. Its integral pumping device is efficient and optimizes cooling to the seal faces. Unified Seal Face Alignment™ provides extended axial play capabilities and accommodates thermal expansion in equipment with long shafts.



**All around performer that handles process variations reliably**

- Geometric double balance eliminates shifting O-rings
- High flow pumping device
- Monolithic seal faces
- Self-Centering Lock Ring™ eliminates misalignment

**Capable of handling large axial motion in operation**

- Unified Seal Face Alignment™

## SPECIFICATIONS

### Operating Parameters

<b>Sizes</b>	25 mm to 120 mm 1.00" to 4.75"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 40 bar g / 600 psig* 17 bar g / 250 psig outboard*
<b>Temperature</b>	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
<b>Speed</b>	20 m/s or 4000 fpm

### Applicable Standards and Approvals

ISO-3069C, ASME B73.1, B73.2

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

### Materials of Construction

<b>Rotary Faces</b>	Sintered Silicon Carbide Tungsten Carbide
<b>Stationary Faces</b>	Carbon Sintered Silicon Carbide Tungsten Carbide
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Alloy C-276 / EN 2.4819

## QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
255	Shaft diameter	SSC / CB / CB / SSC	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 66 - 69

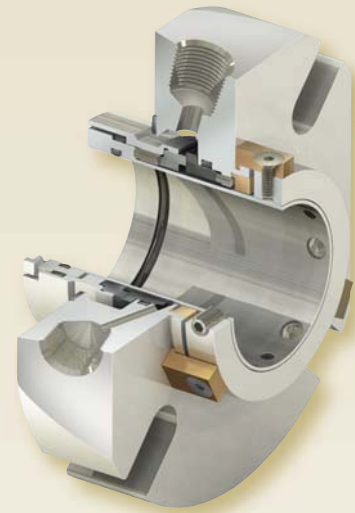
# 150

## General Purpose Single Seal

*This seal is a value leader in its class*

The 150 is designed for baseline applications and for upgrading packed or component-sealed equipment. The cartridge design minimizes installation error, delivering higher reliability and improved housekeeping.

When packed equipment can't deliver the life cycle expected in a sealing solution, the 150 mechanical seal will increase reliability and address housekeeping concerns associated with packing. When component seals are used, the 150 cartridge design will improve the seal replacement process by making it easier and faster while eliminating installation error that is commonly associated with component seals.

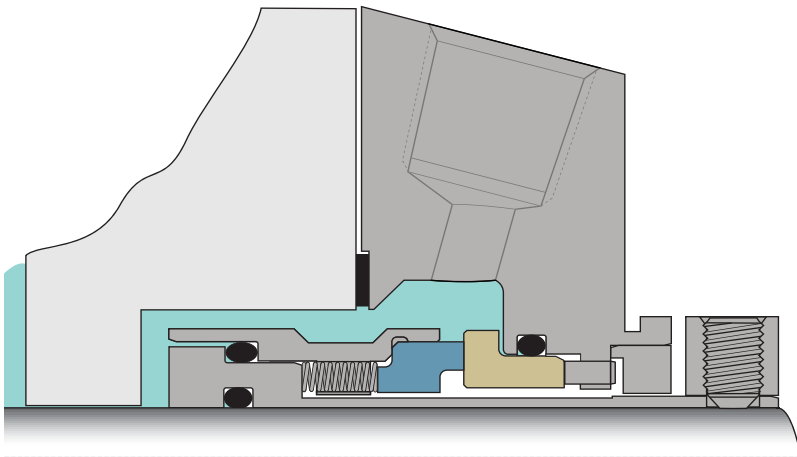


### Simple upgrade to reduce plant maintenance costs

- Prevents shaft fretting and O-ring damage
- Eliminates measuring, minimizing installation error
- Eliminates leakage associated with packed pumps
- Easy to repair with kits

### Reliable cartridge design that increases seal life

- Enhanced torque capability
- Innovative cooling annulus
- Self-cleaning, non clogging
- Advanced face geometrics



#### SPECIFICATIONS

##### Operating Parameters

Sizes	25 mm to 120 mm 1.00" to 4.75"
Pressure	711 mm or 28" Hg Vacuum to 20 bar g / 300 psig*
Temperature	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
Speed	20 m/s or 4000 fpm

##### Applicable Standards and Approvals

ISO-3069C, ASME B73.1, B73.2

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

##### Materials of Construction

Rotary Faces	Carbon Sintered Silicon Carbide
Stationary Faces	Sintered Silicon Carbide
Elastomers	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
Metal Parts	316 Stainless Steel / EN 1.4401
Springs	Alloy C-276 / EN 2.4819

#### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following criteria ready

MODEL	SIZE	FACES	ELASTOMERS	METALS
150	Shaft diameter	CB / SSC	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 70 - 71

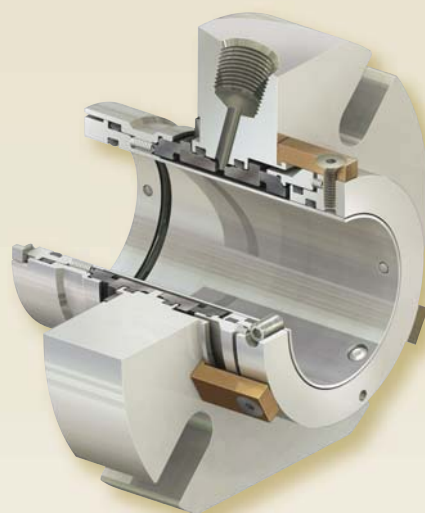
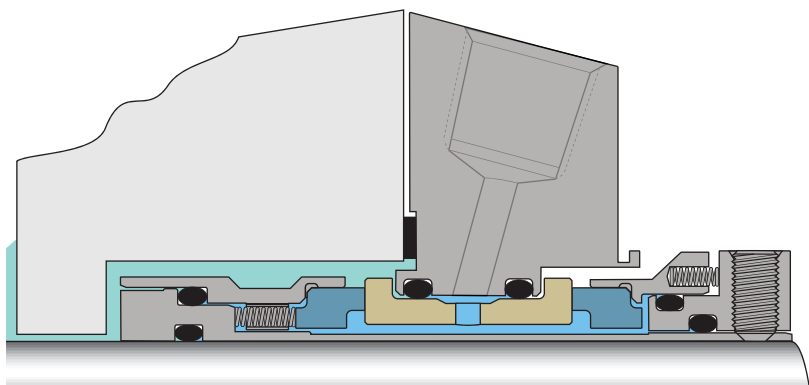
# 250

## General Purpose Dual Seal

*This dual seal is a value leader in its class*

The 250 is designed for cost-effective upgrading from packing and underperforming single seals—further increasing plant reliability. The 250 is an ideal choice for baseline applications where the need for special alloys doesn't exist.

The off-set gland design is very efficient in barrier fluid exchange when compared to most other cartridge seals in its class. This design has improved heat removal. Seal face geometrics are optimized to ensure reliable sealing under varying temperature and pressure changes.



**Provides sealing security that conventional single seals cannot match**

- Eliminates leakage associated with single seal failures
- Back-up seal provides opportunity for scheduled maintenance

**Reliable cartridge design that increases seal life**

- Self-cleaning, non clogging
- Advanced face geometrics
- High torque capability
- Enhanced barrier fluid circulation
- Double balanced

### SPECIFICATIONS

#### Operating Parameters

<b>Sizes</b>	25 mm to 120 mm 1.00" to 4.75"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 20 bar g / 300 psig* 10 bar g / 150 psig outboard*
<b>Temperature</b>	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
<b>Speed</b>	20 m/s or 4000 fpm

#### Applicable Standards and Approvals

ISO-3069C, ASME B73.1, B73.2

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

#### Materials of Construction

<b>Rotary Faces</b>	Carbon Sintered Silicon Carbide
<b>Stationary Faces</b>	Sintered Silicon Carbide
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Alloy C-276 / EN 2.4819

### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following criteria ready

MODEL	SIZE	FACES	ELASTOMERS	METALS
250	Shaft diameter	CB / SSC / SSC / CB	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 72 - 74

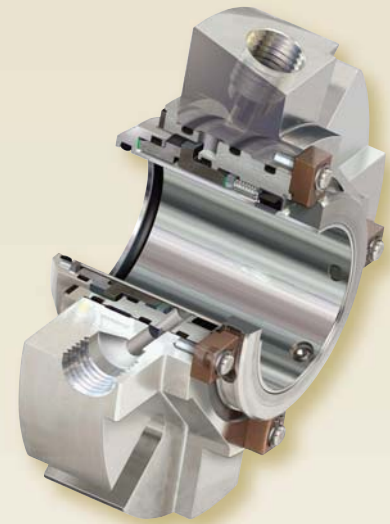
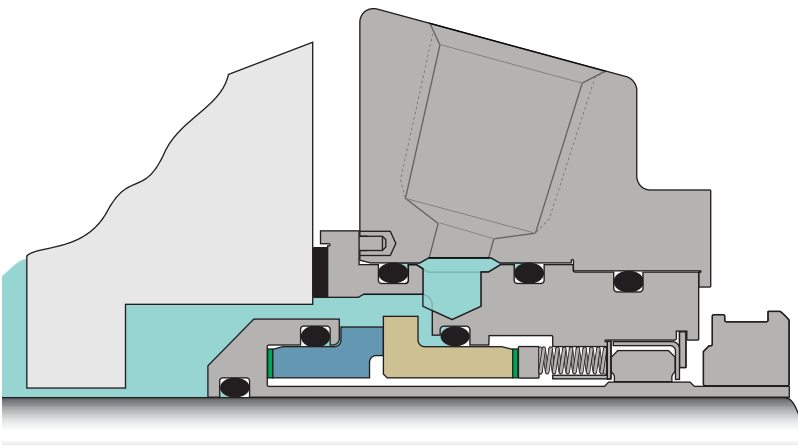
# S10

## High Performance Single Seal

*Unique modular cassette that combines advanced seal technology with flexibility in maintenance and repair*

In the Streamline series of seals, all the wearing parts are contained in a single, replaceable cassette unit. Single and dual cassettes share a common universal gland. Repair becomes a matter of exchanging cassettes, making it faster and easier, while significantly reducing cost associated with repair.

The S10 Streamline seal incorporates Chesterton advanced seal technology into the cassette feature. The extremely stable seal faces are cooled effectively with an advanced multi-port design, while the full-featured gland design incorporates a quench/drain option and floating bushing. The two-step installation is made possible with automatic centering.



### High performance sealing

- High torque capability
- Self-Centering Lock Ring™ eliminates misalignment
- Advanced monolithic face design
- Micropolished O-ring surfaces eliminate O-ring hang-up

### One optimized sealing concept for plant-wide standardization

- Innovative interchangeable cassettes
- Universal glands for single and dual seals
- Standard quench and drain with floating bushing
- Multiport flush
- Reduces physical seal inventory and associated costs
- Eliminates seal “scrap” rate

### Easy to maintain

- Two-step installation
- Quick to repair

#### SPECIFICATIONS

##### Operating Parameters

Sizes	25 mm to 120 mm 1.00" to 4.75"
Pressure	711 mm or 28" Hg Vacuum to 31 bar g / 450 psig*
Temperature	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
Speed	25 m/s or 5000 fpm

##### Applicable Standards and Approvals

ISO-3069C, ASME B73.1, B73.2

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

#### Materials of Construction

Rotary Faces	Carbon Sintered Silicon Carbide Tungsten Carbide
Stationary Faces	Sintered Silicon Carbide Tungsten Carbide
Elastomers	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
Metal Parts	316 Stainless Steel / EN 1.4401
Springs	Alloy C-276 / EN 2.4819

#### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
S10	Shaft diameter	CB / SSC	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 75 - 78

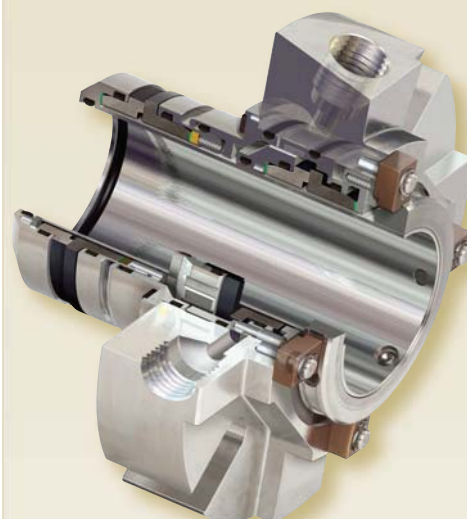
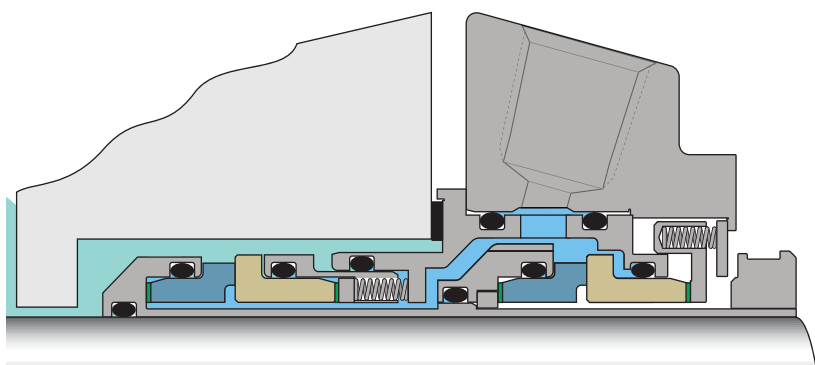
# S20

## High Performance Dual Seal

*Unique modular cassette that combines advanced seal technology with flexibility in maintenance and repair*

In the Streamline series of seals, all the wearing parts are contained in a single, replaceable cassette unit. Single and dual cassettes share a common universal gland. Repair is a matter of exchanging cassettes, making it fast and easy, while significantly reducing cost associated with repair.

The S20 Streamline seal incorporates Chesterton advanced seal technology into the cassette feature. The in-series oriented seal face arrangement with independently mounted springs delivers a higher pressure tandem design. Geometric balance with low heat generation is achieved with the innovative piston design. The two-step installation is made possible with an automatic centering feature. The S20 utilizes a high-flow pumping device, which assists in efficient heat removal.



### Advanced sealing performance

- Tandem configuration for high pressure sealing
- High flow pumping ring
- High torque capability
- Self-Centering Lock Ring™ eliminates misalignment
- Advanced monolithic face design
- Micropolished O-ring surfaces eliminate O-ring hang-up

### One optimized sealing concept for plant-wide standardization

- Innovative interchangeable cassettes
- Universal glands for single and dual seals
- Reduces physical seal inventory and associated costs
- Eliminates seal “scrap” rate

### Easy to maintain

- Two-step installation
- Quick to repair

### SPECIFICATIONS

#### Operating Parameters

<b>Sizes</b>	25 mm to 120 mm 1.00" to 4.75"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 31 bar g / 450 psig* 17 bar g / 250 psig inboard differential*
<b>Temperature</b>	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
<b>Speed</b>	25 m/s or 5000 fpm

#### Applicable Standards and Approvals

ISO-3069C, ASME B73.1, B73.2

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

#### Materials of Construction

<b>Rotary Faces</b>	Carbon Sintered Silicon Carbide Tungsten Carbide
<b>Stationary Faces</b>	Sintered Silicon Carbide Tungsten Carbide
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Alloy C-276 / EN 2.4819

### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
S20	Shaft diameter	CB / SSC / CB / SSC	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 79 - 82

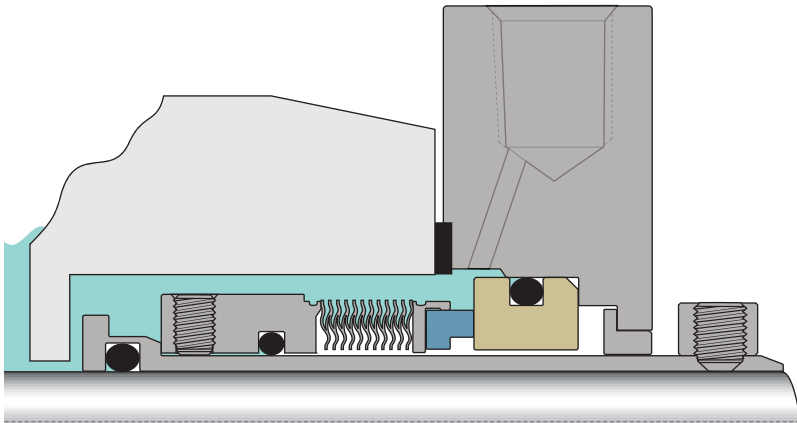
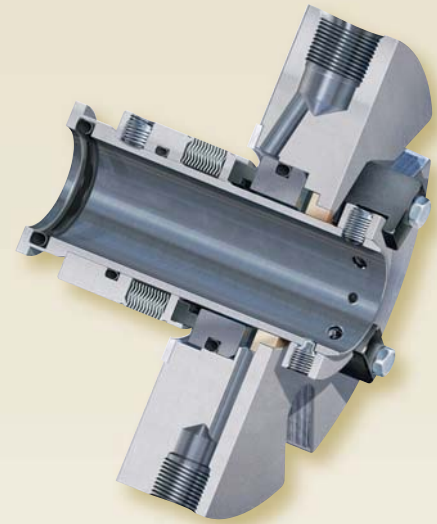
# 186

## Bellows Cartridge Single Seal

*Suited for harsh chemical services that can cause difficulty with other seals*

The 186 welded metal rotary bellows can enhance reliability in some applications by minimizing O-ring concerns. This seal is used primarily in the chemical and petrochemical industries.

The high strength, low spring rate bellows core delivers low heat generation and reliable sealing performance. The self-cleaning rotary bellows design will reduce the clogging associated with sealing fluids and solids in suspension.



**Advanced bellows technology for enhanced reliability**

- High-strength bellows core
- Optimized spring rate

**Ideal for chemical slurries**

- Corrosion resistant Hastelloy® C bellows
- Self-cleaning rotating bellows
- Quench and drain facility

**Fits wide range of pumps and other rotating equipment**

- Slotted gland
- Face gasket design

**SPECIFICATIONS**

**Operating Parameters**

<b>Sizes</b>	25 mm to 60 mm 1.00" to 2.5"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 10 bar g / 150 psig*
<b>Temperature</b>	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
<b>Speed</b>	20 m/s or 4000 fpm

**Applicable Standards and Approvals**

ISO-3069C, ASME B73.1, B73.2

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

**Materials of Construction**

<b>Rotary Faces</b>	Carbon Tungsten Carbide
<b>Stationary Faces</b>	Sintered Silicon Carbide
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Bellows</b>	Alloy C-276 / EN 2.4819

**QUICK ORDER REFERENCE EXAMPLE**

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
186	Shaft diameter	CB / SSC	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 83



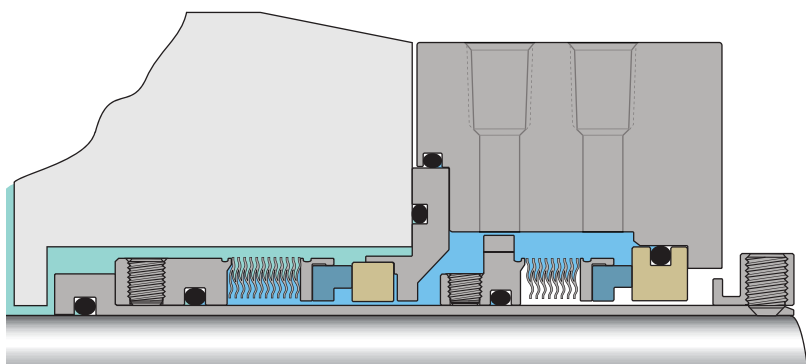
# 286

## Bellows Cartridge Dual Seal

*Meets the most stringent sealing requirements for sealing emissions and toxic and other hazardous fluids*

The 286 seal is a proven performer that is used primarily in the chemical and petrochemical industries.

The high strength, low spring rate bellows core delivers low heat generation and reliable sealing performance. The self-cleaning rotary bellows design eliminates the clogging associated with sealing fluids and solids in suspension. The tandem bellows arrangement provides maximum pressure capability and safety performance.



### Advanced bellows technology for enhanced reliability

- High-strength bellows core
- Optimized spring rate

### Proven performance sealing emissions, toxic and other hazardous fluids

- High efficiency cooling
- Self-cleaning rotating bellows
- Tandem design
- Helical barrier fluid flow
- Corrosion resistant Hastelloy® C bellows

#### SPECIFICATIONS

##### Operating Parameters

Sizes	25 mm to 60 mm 1.00" to 2.5"
Pressure	711 mm or 28" Hg Vacuum to 10 bar g / 150 psig* 10 bar g / 150 psig inboard differential*
Temperature	See back page for actual material limits by type of elastomer
Speed	20 m/s or 4000 fpm

##### Applicable Standards and Approvals

ISO-3069C, ASME B73.1, B73.2

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

##### Materials of Construction

Rotary Faces	Carbon Tungsten Carbide
Stationary Faces	Sintered Silicon Carbide
Elastomers	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
Metal Parts	316 Stainless Steel / EN 1.4401
Bellows	Alloy C-276 / EN 2.4819

#### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
286	Shaft diameter	CB / SSC / CB / SSC	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 84

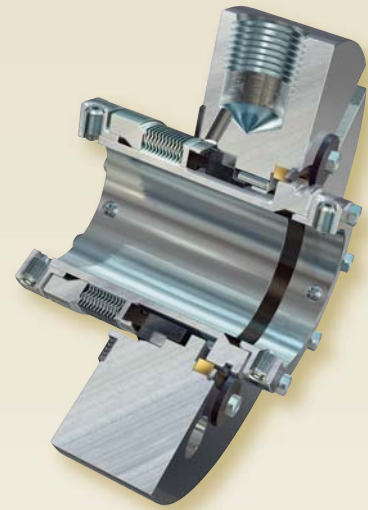
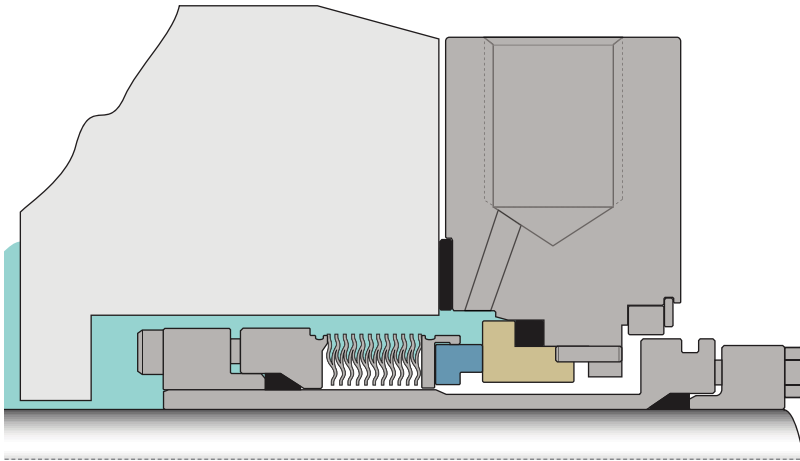
# 186HT

## Bellows Cartridge Single Seal

*Designed for high temperature services related to petrochemical and chemical plant processes*

This high temperature version of the 186 seal is built with AM 350 bellows material as standard, and 718 Inconel® offered as optional.

Graphite secondary seals take the place of O-rings for high temperature services. The high strength, low spring rate bellows core delivers low heat generation and reliable sealing performance. A self-cleaning rotary bellows design will reduce the clogging associated with sealing fluids and solids in suspension.



**Advanced high temperature bellows technology for enhanced reliability**

- Proven heat treated AM 350 bellows construction
- Optimized spring rate

**Proven performance in high temperature hydrocarbon services**

- Grafoil® secondary seals
- Self-cleaning rotating bellows
- Blister-resistant carbon

**Fits majority of pumps found in high temperature applications**

- Slotted gland
- Quench and drain capability
- Fits both ISO/ANSI seal chambers
- Small cross section
- Face gasket design

**SPECIFICATIONS**

**Operating Parameters**

<b>Sizes</b>	25 mm to 65 mm 1.00" to 2.625"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 10 bar g / 150 psig*
<b>Temperature</b>	400°C / 750°F
<b>Speed</b>	20 m/s or 4000 fpm

**Applicable Standards and Approvals**

ISO-3069C, ASME B73.1, B73.2

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

**Materials of Construction**

<b>Rotary Faces</b>	Blister-resistant Carbon Tungsten Carbide
<b>Stationary Faces</b>	Sintered Silicon Carbide Tungsten Carbide
<b>Secondary Seal</b>	Grafoil®
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Bellows</b>	AM 350 Heat Treated (standard) 718 Inconel® (optional)

**QUICK ORDER REFERENCE EXAMPLE**

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
186HT	Shaft diameter	CB / SSC	Grafoil®	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 85 - 86

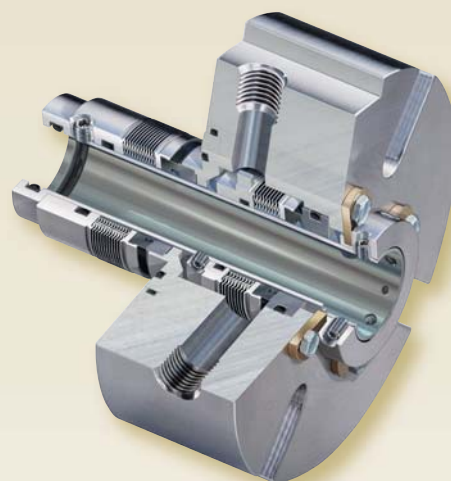
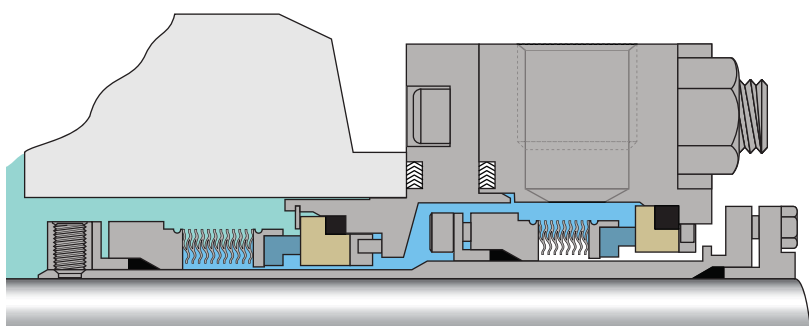
# 286HT

## Bellows Cartridge Dual Seal

**Meets the most stringent high temperature requirements for sealing emissions, toxic and other hazardous fluids**

The 286HT is a proven performer used primarily in the chemical and petrochemical industries. The 286HT is built with AM 350 bellows material as standard, and 718 Inconel® as optional.

Graphite secondary seals take the place of O-rings for high temperature services related to petrochemical and chemical plant processes. The high strength, low spring rate bellows core delivers low heat generation and reliable sealing performance. The self-cleaning rotary bellows design will reduce the clogging associated with sealing fluids and solids in suspension. The tandem bellows arrangement provides maximum pressure capability and safety performance.



### Advanced high temperature bellows technology for enhanced reliability

- Proven heat treated AM 350 bellows construction
- Optimized spring rate

### Reliable performance for all high temperature emissions, as well as toxic and other hazardous services

- Grafoil® secondary seals
- Self-cleaning rotating bellows
- Blister-resistant carbon
- Tandem design
- High efficiency pumping vanes
- Bi-directional barrier fluid ports

#### SPECIFICATIONS

##### Operating Parameters

Sizes	25 mm to 65 mm 1.00" to 2.625"
Pressure	711 mm or 28" Hg Vacuum to 14 bar g / 200 psig* 14 bar g / 150 psig outboard*
Temperature	400°C / 750°F
Speed	20 m/s or 4000 fpm

##### Applicable Standards and Approvals

ISO-3069C, ASME B73.1, B73.2

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

##### Materials of Construction

Rotary Faces	Blister-resistant Carbon Tungsten Carbide
Stationary Faces	Sintered Silicon Carbide Tungsten Carbide
Secondary Seal	Grafoil®
Metal Parts	316 Stainless Steel / EN 1.4401
Bellows	AM 350 Heat Treated (standard) 718 Inconel® (optional)

#### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
286HT	Shaft diameter	CB / SSC / CB / SSC	Grafoil®	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

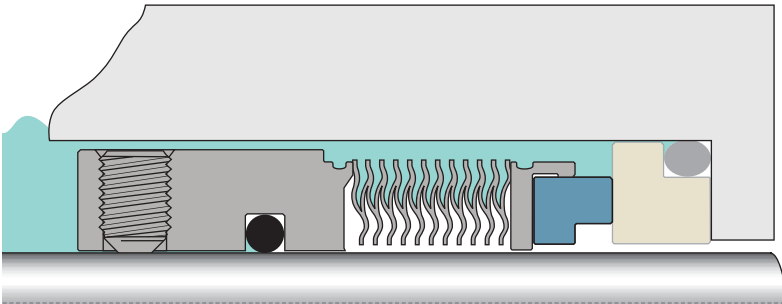
# 886

## Rotary Bellows Seal

*Designed for the replacement of non-cartridge, low technology direct shaft mounted seals*

The 886 standard corrosion-resistant Hastelloy® C bellows core is ideal for sealing a wide range of chemical services.

This bellows core design has more convolutions, providing optimized spring rates. The rugged welded metal bellows design with static O-rings will provide an upgrade, eliminating O-ring concerns. The 886 is designed not to result in fretting damage to the equipment shaft/sleeve.



### Advanced bellows technology for enhanced reliability

- High strength bellows core
- Optimized spring rate
- Non-fretting design
- No dynamic O-rings

### Suitable for a wide range of chemical services

- Corrosion-resistant Hastelloy® C bellows
- Self-cleaning rotating bellows

#### SPECIFICATIONS

##### Operating Parameters

<b>Sizes</b>	25 mm to 60 mm 1.00" to 2.5"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 10 bar g / 150 psig*
<b>Temperature</b>	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
<b>Speed</b>	20 m/s or 4000 fpm

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

##### Materials of Construction

<b>Rotary Faces</b>	Carbon Tungsten Carbide
<b>Optional Stationary Faces</b>	Sintered Silicon Carbide Tungsten Carbide
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Bellows</b>	Alloy C-276 / EN 2.4819

#### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
886	Shaft diameter	CB / SSC	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 87

# 886HT

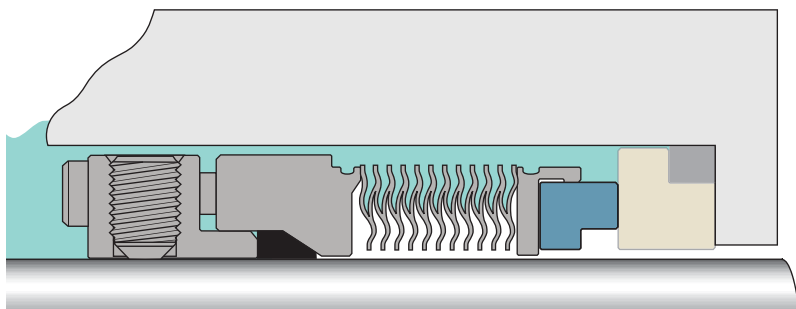
## Rotary Bellows Seal

**High temperature design for the replacement of non-cartridge, low technology direct shaft mounted seals**

The 886HT standard AM 350 bellows core is well suited for mild corrosives and higher temperature environments.

Graphite secondary seals take the place of O-rings for high temperature services related to petrochemical and chemical plant processes.

The 886HT is designed to avoid fretting damage to the equipment shaft/sleeve.



**Advanced high temperature bellows technology for enhanced reliability**

- Optimized spring rate
- Low heat generation
- Self-cleaning rotating bellows
- Non fretting design

**Suitable for majority of high temperature services**

- Grafoil® secondary seals
- Blister-resistant carbon
- Proven heat treated AM 350 bellows construction

**SPECIFICATIONS**

**Operating Parameters**

<b>Sizes</b>	25 mm to 65 mm 1.00" to 2.625"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 14 bar g / 200 psig*
<b>Temperature</b>	400°C / 750°F
<b>Speed</b>	20 m/s or 4000 fpm

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

**Materials of Construction**

<b>Rotary Faces</b>	Blister-resistant Carbon Tungsten Carbide
<b>Optional Stationary Faces</b>	Sintered Silicon Carbide Tungsten Carbide
<b>Secondary Seals</b>	Grafoil®
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Bellows</b>	AM 350 Heat Treated (standard) 718 Inconel® (optional)

**QUICK ORDER REFERENCE EXAMPLE**

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
886HT	Shaft diameter	CB / SSC	Grafoil®	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

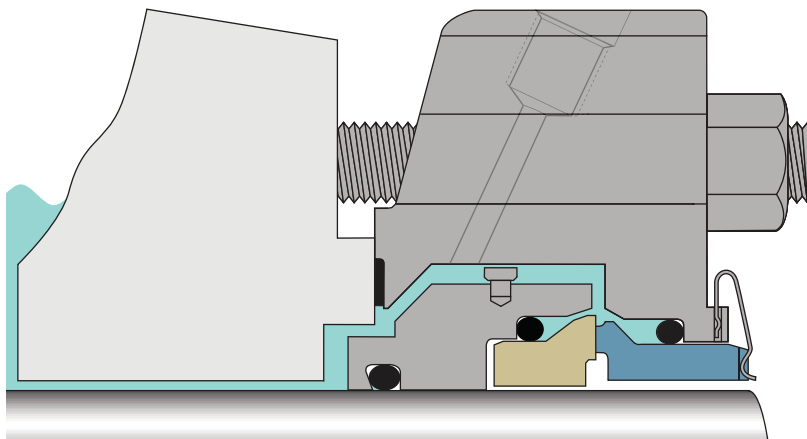
For dimensional information see page 88 - 89

# 442™ Split Mechanical Seal

*Eliminates the need for equipment disassembly during seal installation and reduces maintenance costs*

The 442 split seal is ideal for equipment that is difficult and time consuming to disassemble, such as large pumps, vertical pumps and horizontal split case pumps. This proven compact design can be used in a wide variety of equipment and process fluids.

The patented high performance split technology allows the 442 to operate from vacuum to high pressures. Its compact design allows for easy installation and a fit advantage on most equipment. Split, low cost repair kits reduce ongoing maintenance costs even further. Designed with the installer in mind, the ball-and-socket O-rings provide a quick and easy leak-free seal without the use of adhesives. Captive screws cannot fall out, making installation straightforward and reliable.



### Easy and fast to install without equipment disassembly

- Fully split mechanical seal
- Ball-and-socket O-rings
- Adjustable gland tabs
- Patented automatic centering
- Patented captive fasteners

### The proven design with superior performance

- Patented full vacuum capability
- Engineered for high pressure
- Non-clog external springs
- Non-fretting to equipment
- Dry run capable

### Fits majority of rotating equipment

- Compact design
- Adjustable gland tabs
- Integral dual flushport

#### SPECIFICATIONS

##### Operating Parameters

Sizes	20 mm to 610 mm 0.75" to 24.00"
Pressure	711 mm or 28" Hg Vacuum to 31 bar g / 450 psig*
Temperature	120°C / 250°F
Speed	20 m/s or 4000 fpm

##### Applicable Standards and Approvals

ATEX, ISO-3069S, ASME B73.1, B73.2

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

##### Materials of Construction

Rotary Faces	Silicon Carbide Ceramic
Stationary Faces	Carbon Silicon Carbide
Elastomers	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene
Metal Parts	316 Stainless Steel (CF8M) / EN 1.4401
Springs	Elgiloy™

#### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
442	Shaft diameter	SSC / CB	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 90 - 92

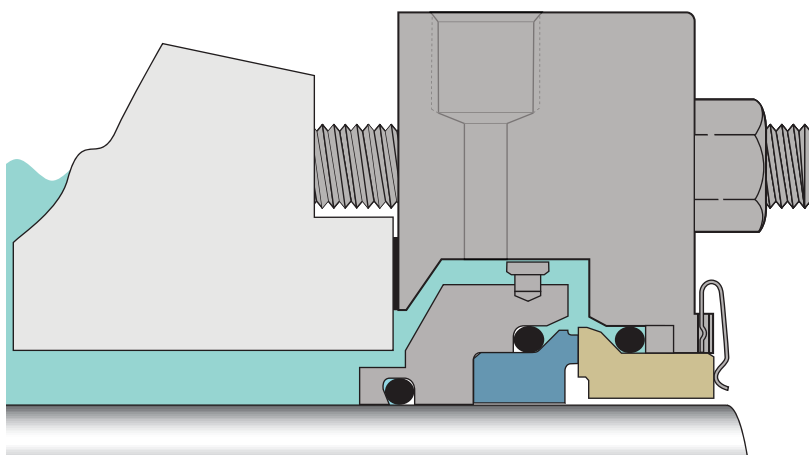
# 442M

## Split Mixer Seal

**Eliminates the need for equipment disassembly during seal installation and reduces maintenance costs**

The 442 split technology includes vacuum-to-positive pressure capability, which is especially beneficial in process vessel material mixing.

It accommodates large radial and axial shaft motion associated with mixers, agitators, reactors, and blenders. Installation is made easy with patented automatic centering. The 442M uses many patented features, allowing for easy and cost-effective field repair. The unique ball-and-socket O-rings are the easiest to install and leak free without the use of adhesives. Captive screws cannot fall out, making installation straightforward and reliable.



**Easy and fast to install without equipment disassembly**

- Ball-and-socket O-rings
- Patented automatic centering
- Patented captive fasteners that won't fall out

**The proven reliability with extended motion capability**

- Large axial and radial motion handling capability
- Full vacuum and high pressure sealing
- Non-clog external springs
- Non-fretting to equipment
- Dry run capable

**Fits majority of large rotating equipment**

- Compact design
- Integral dual flushport

**SPECIFICATIONS**

**Operating Parameters**

<b>Sizes</b>	20 mm to 305 mm 0.75" to 12.00"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 31 bar g / 450 psig*
<b>Temperature</b>	120°C / 250°F
<b>Speed</b>	20 m/s or 4000 fpm

**Applicable Standards and Approvals**

ATEX

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

**Materials of Construction**

<b>Rotary Faces</b>	Silicon Carbide Ceramic
<b>Stationary Faces</b>	Carbon Silicon Carbide
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Elgiloy™

**QUICK ORDER REFERENCE EXAMPLE**

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
442M	Shaft diameter	SC / CB	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 93 - 96

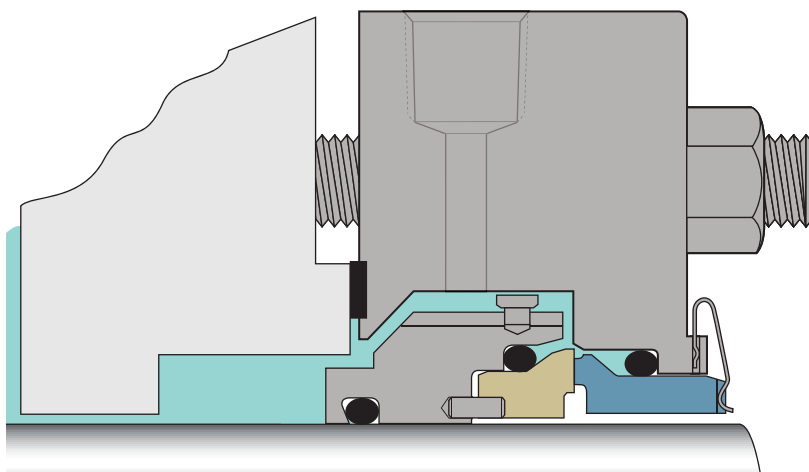
# 442PR

## Split Pumping Ring Seal

*Eliminates the need for equipment disassembly during seal replacement*

The 442 split design significantly reduces down-time and overall maintenance costs. This seal is ideal for hot heater drain and boiler feed equipment where cooling to a single seal must be provided.

The high capacity pumping ring provides for maximum heat removal and reliability in hot water services. Coolest running seal faces include premium high graphite seal face material combined with a silicon carbide primary face. The 442PR delivers the lowest cost of ownership from its ease of installation, low cooling, cost, and reliability.



### Split performance for boiler feed and hot water circulation pumps

- High flow pumping device
- Designed for API Plan 23
- Engineered for high pressure
- High strength external springs
- Non-fretting to equipment
- Premium high graphite carbon face

### Easy and fast to install without equipment disassembly

- Ball-and-socket O-rings
- Patented automatic centering

#### SPECIFICATIONS

##### Operating Parameters

<b>Sizes</b>	20 mm to 200 mm 0.75" to 8.00"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 31 bar g / 450 psig*
<b>Temperature</b>	120°C / 250°F
<b>Speed</b>	20 m/s or 4000 fpm

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

##### Materials of Construction

<b>Rotary Faces</b>	Silicon Carbide Ceramic
<b>Stationary Faces</b>	Carbon Silicon Carbide
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Elgiloy™

#### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
442PR	Shaft diameter	SC / CB	EP	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 97

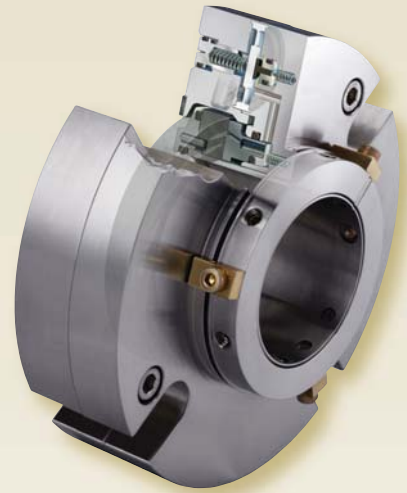
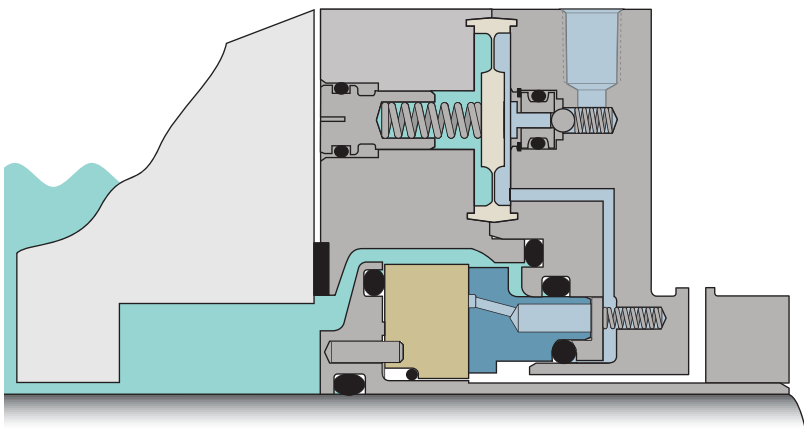


# 4400 Gas Seal

*Advanced technology made simple in a gas seal design*

The 4400 is a seal for all purposes and provides for an easy gas seal upgrade option. It is an ideal choice for upgrading underperforming liquid lubricated seals to high performance, non-contacting operation.

The 4400 Gas Seal outperforms with no need for complex gas panels. The In-Gland Control System (IGCS) automatically regulates barrier gas pressure, eliminating the need and expense of a gas panel. No manual barrier gas pressure adjustment is needed. The elaborate support systems and the heavy maintenance associated with conventional liquid lubricated dual seals are also eliminated. The 4400 can operate in liquid contacting and non-contacting gas regimes.



**Delivers low cost-of-ownership for a broad range of applications**

- No heat generation
- Reverse pressure capability
- In-Gland Control System (IGCS)
- Dual gas and liquid lubricated capability
- Reduced gas consumption
- Variable speed capable
- Dry run capable

**Advanced technology that is easy to install and operate**

- Compact design
- Fits pumps without modification
- Requires no elaborate support systems
- Stationary design
- No maintenance required

**SPECIFICATIONS**

**Operating Parameters**

<b>Sizes</b>	25 mm to 90 mm 1.00" to 3.625"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 20 bar g / 300 psig*
<b>Temperature</b>	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
<b>Speed</b>	25 m/s or 5000 fpm

**Applicable Standards and Approvals**

ASME B73.1, B73.2

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

**Materials of Construction**

<b>Rotary Faces</b>	Sintered Silicon Carbide
<b>Stationary Faces</b>	Premium Carbon Silicon Carbide
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Alloy C-276 / EN 2.4819

**QUICK ORDER REFERENCE EXAMPLE**

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
4400	Shaft diameter	SSC / CB	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 98 - 99

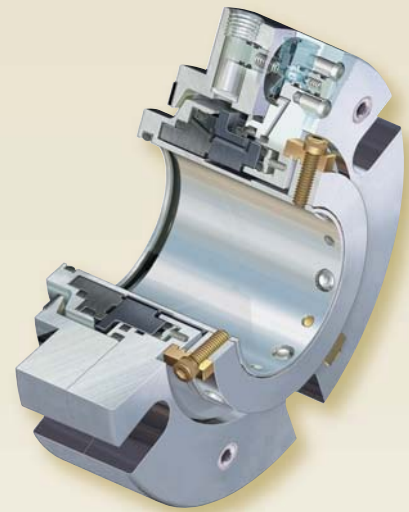
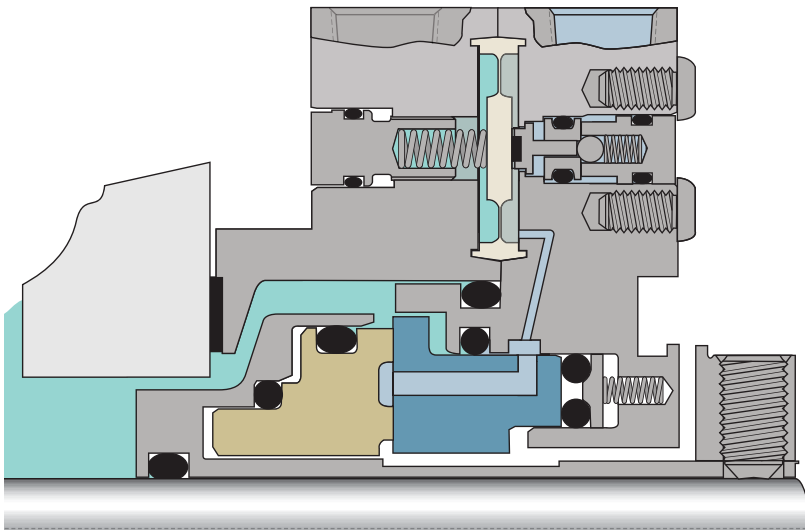
# 4410

## Slow Speed Gas Seal

**Advanced gas seal technology for slow speed sealing applications**

The 4410 is ideal for use in high value batch operations where contamination is a concern. The 4410 is bi-directional and provides a safe alternative to liquid dual sealing.

The 4410 Gas Seal outperforms other seals with no need for complex gas panels or liquid barrier systems. The In-Gland Control System (IGCS) automatically regulates barrier gas pressure, eliminating the need and expense of a gas panel. Elaborate support systems and liquid barrier leakage associated with conventional liquid lubricated dual seals are also eliminated. The 4410 can operate in liquid contacting and gas non-contacting regimes.



### Advanced gas seal technology for mixer and reactors

- No heat generation
- Reverse pressure capability
- Motion tolerant
- Bi-directional
- Dual gas and liquid lubricated capability
- Built-in control system
- Slow speed capable

### Advanced technology that is easy to install and operate

- Compact design
- Fits without modification
- Requires no elaborate support systems
- Stationary design
- Eliminates batch contamination

#### SPECIFICATIONS

##### Operating Parameters

<b>Sizes</b>	65 mm to 200 mm 2.625" to 8.00"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 10 bar g / 150 psig*
<b>Temperature</b>	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
<b>Speed</b>	8 m/s or 1500 fpm

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations.  
For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

##### Materials of Construction

<b>Rotary Faces</b>	Carbon Sintered Silicon Carbide
<b>Stationary Faces</b>	Sintered Silicon Carbide
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Alloy C-276 / EN 2.4819

#### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
4410	Shaft diameter	CB / SSC	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 100 - 101

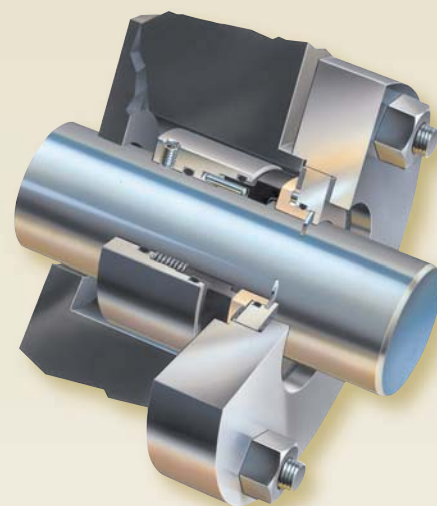
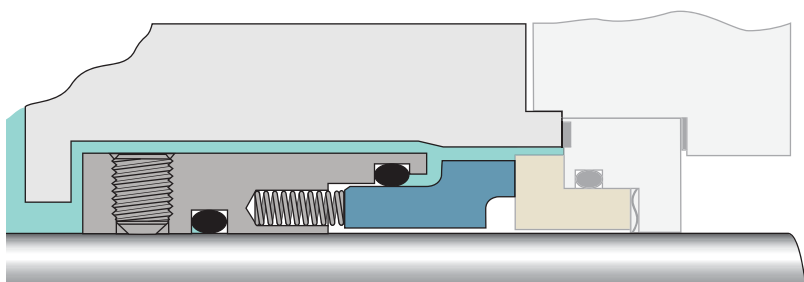
# 891™

## Rotary Pusher Single Seal

*Designed for the replacement of low technology component seals, resulting in overall reliability increase and maintenance efficiency*

The 891 seal design provides an upgrade to standard original equipment component seal installations.

The 891 is designed not to damage or fret the equipment shaft/sleeve, because the dynamic O-ring is positioned on a replaceable component surface. This balanced, high-pressure monolithic seal design will provide a reliable upgrade to standard, unbalanced designs. The seal can be easily rebuilt in the field using low-cost rebuild kits.



### Reliable upgrade from original equipment seals

- Monolithic seal faces
- Balanced
- High pressure capable
- Non-clog, isolated springs

### Designed not to fret shaft or sleeves

- Dynamic O-ring is positioned on a replaceable component surface

### Simple and inexpensive to repair

- Minimized wearing components
- Easy to repair with kits

#### SPECIFICATIONS

##### Operating Parameters

Sizes	16 mm to 200 mm .75" to 8.00"
Pressure	711 mm or 28" Hg Vacuum to 40 bar g / 600 psig*
Temperature	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
Speed	20 m/s or 4000 fpm

##### Applicable Standards and Approvals

ISO-3069S, ASME B73.1, B73.2

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

##### Materials of Construction

<b>Rotary Faces</b>	Carbon Reaction Bonded Silicon Carbide Tungsten Carbide
<b>Optional Stationary Faces</b>	Sintered Silicon Carbide Tungsten Carbide Reaction Bonded Silicon Carbide Ceramic
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Alloy C-276 / EN 2.4819

#### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
891	Shaft diameter	CB	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 102 - 103

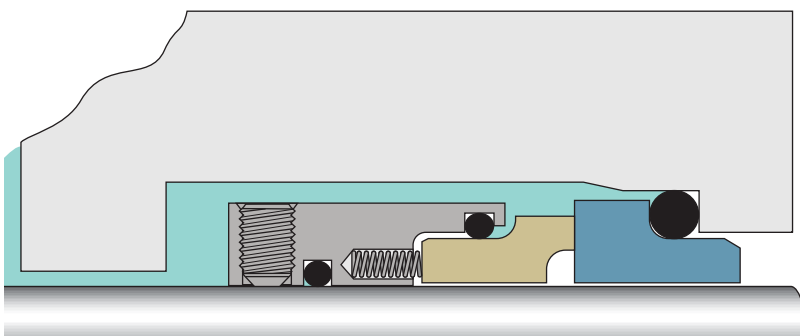
# 491

## DIN Rotary Pusher Single Seal

*Designed for the replacement of low technology component seals, resulting in overall reliability increase and maintenance efficiency*

The 491 is designed in accordance with EN12756 to fit the short length installation requirements.

The 491 is designed not to damage or fret the equipment shaft/sleeve because the dynamic O-ring is positioned on a replaceable component surface. This balanced, high pressure monolithic seal design will provide a performance upgrade to standard, original equipment component seals. The seal can be easily rebuilt in the field using low-cost rebuild kits.



**Reliable upgrade from original equipment seals**

- Monolithic seal faces
- Balanced
- Non-clog isolated springs

**Designed not to fret shaft or sleeves**

- Dynamic O-ring is positioned on a replaceable component surface

**Short axial length**

- Fits EN12756 L1K dimension

**SPECIFICATIONS**

**Operating Parameters**

<b>Sizes</b>	16 mm to 110 mm 0.625" to 4.375"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 10 bar g / 150 psig*
<b>Temperature</b>	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
<b>Speed</b>	20 m/s or 4000 fpm

**Applicable Standards and Approvals**

ATEX†, EN12756, ISO-3069S

† Must use VDMA with pin drive  
\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations.  
For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

**Materials of Construction**

<b>Rotary Faces</b>	Carbon Sintered Silicon Carbide Tungsten Carbide
<b>Stationary Faces</b>	Sintered Silicon Carbide Tungsten Carbide Ceramic
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Alloy C-276 / EN 2.4819

**QUICK ORDER REFERENCE EXAMPLE**

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
491	Shaft diameter	CB / SSC	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 104

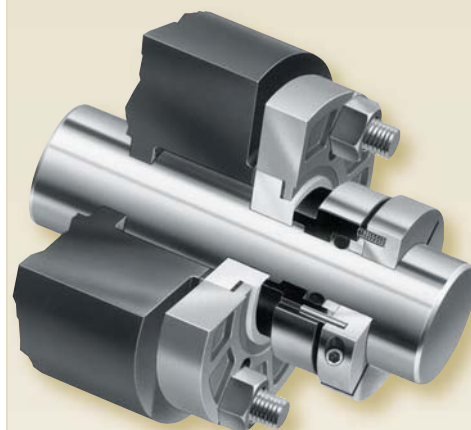
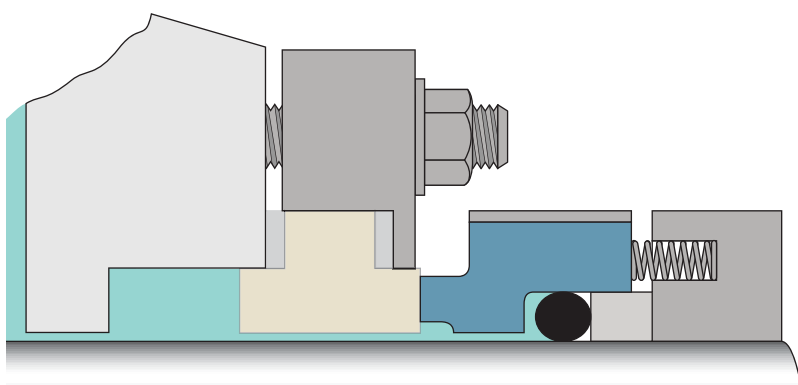
# 440

## Non-Metallic External Single Seal

*Designed for use in aggressive chemical applications*

The 440 external design is used in general chemical applications where there are corrosives and other aggressive chemicals that attack standard seal materials, and where special, high-cost alloys are required.

All wetted parts are sacrificial and easily replaced in a repair program. No metal parts contact the process fluid. The 440 is a low-cost replacement for seals made from expensive alloy materials.



**Low-cost and reliable sealing for a wide range of corrosive liquids**

- Non-metallic design
- Balanced
- Multi-coil springs

**Non damaging to glass-lined shafts**

- Clamp drive, no set screws

### SPECIFICATIONS

#### Operating Parameters

<b>Sizes</b>	25 mm to 115 mm 0.937" to 4.5"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 10 bar g / 150 psig*
<b>Temperature</b>	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
<b>Speed</b>	20 m/s or 4000 fpm

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

#### Materials of Construction

<b>Rotary Faces</b>	Carbon PTFE
<b>Optional Stationary Faces</b>	Sintered Silicon Carbide Tungsten Carbide Reaction Bonded Silicon Carbide Ceramic
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Alloy C-276 / EN 2.4819

### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
440	Shaft diameter	CB	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

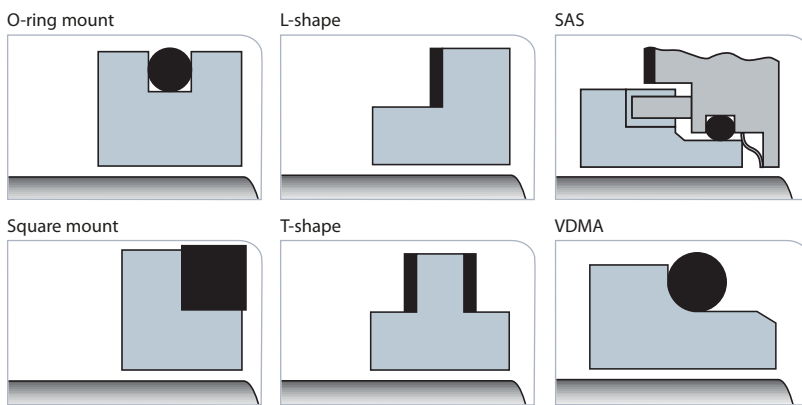
For dimensional information see page 105 - 106

# Stationary Seal Rings

*Versatile stationary seal rings primarily used with component seal designs*

Various stationary seal ring designs can be assembled with Chesterton rotary units to make one complete, reliable replacement seal of the component design. These seal rings are designed to accommodate popular ANSI and DIN specifications.

Chesterton stationary replacement seal rings come in an array of designs and sizes. Chesterton seal rings are not plated, nor are they combined with other inferior materials. They are all manufactured with high quality monolithic materials, which result in greater reliability.



**SPECIFICATIONS**

Model No.	Seal Design	Material
732	O-ring Mount	Tungsten Carbide Solid
755	O-ring Mount, Slotted	Tungsten Carbide Solid
773	O-ring Mount	Silicon Carbide
782	O-ring Mount	Ceramic
414	T-shaped	Ceramic
725	Square Mount	Ceramic
714	L-shaped	Ceramic/Silicon Carbide/TC
723	L-shaped, Small OD	Ceramic
777	L-shaped, ISO	Ceramic
VDMA	DIN O-ring Mount	Ceramic
SAS	Self Aligning Stationary	Ceramic

**QUICK ORDER REFERENCE EXAMPLE**

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	GASKET
VDMA	Shaft diameter	CR	FKM	

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 107 - 114

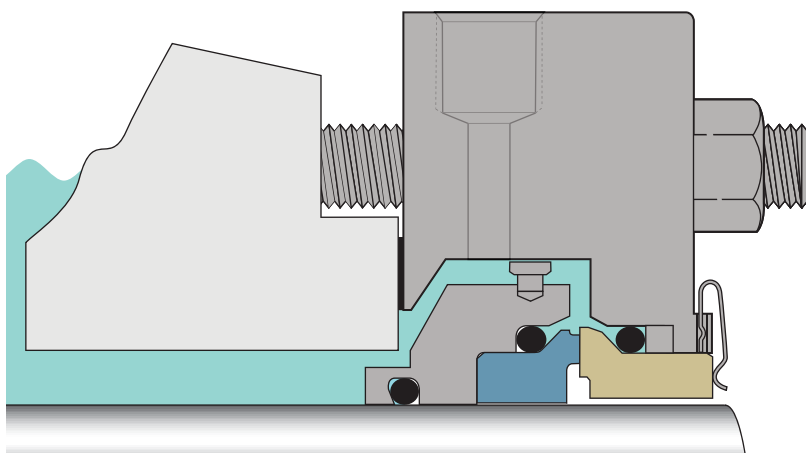
# 442M

## Split Mixer Seal

**Eliminates the need for equipment disassembly during seal installation and reduces maintenance costs**

The 442 split technology includes vacuum-to-positive pressure capability, which is especially beneficial in process vessel material mixing.

It accommodates large radial and axial shaft motion associated with mixers, agitators, reactors, and blenders. Installation is made easy with patented automatic centering. The 442M uses many patented features, allowing for easy and cost-effective field repair. The unique ball-and-socket O-rings are the easiest to install and leak free without the use of adhesives. Captive screws cannot fall out, making installation straightforward and reliable.



### Easy and fast to install without equipment disassembly

- Ball and socket O-rings
- Patented automatic centering
- Patented captive fasteners that won't fall out

### The proven reliability with extended motion capability

- Large axial and radial motion handling capability
- Full vacuum and high pressure sealing
- Non-clog external springs
- Non-fretting to equipment
- Dry run capable

### Fits majority of large rotating equipment

- Compact design
- Integral dual flushport

#### SPECIFICATIONS

##### Operating Parameters

Sizes	20 mm to 305 mm 0.75" to 12.00"
Pressure	711 mm or 28" Hg Vacuum to 31 bar g / 450 psig*
Temperature	120°C / 250°F
Speed	20 m/s or 4000 fpm

##### Applicable Standards and Approvals

ATEX

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

##### Materials of Construction

Rotary Faces	Silicon Carbide Ceramic
Stationary Faces	Carbon Silicon Carbide
Elastomers	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene
Metal Parts	316 Stainless Steel / EN 1.4401
Springs	Elgiloy™

#### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
442M	Shaft diameter	SC / CB	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 93 - 96

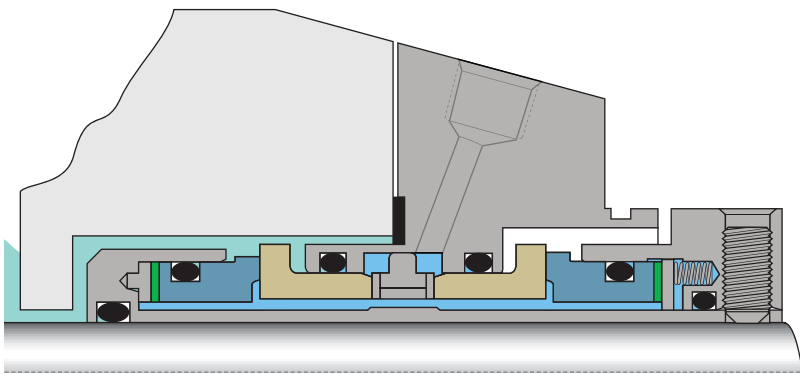
# 280M

## Heavy Duty Mixer Dual Seal

*A dual seal design for severe duty and greatest reliability in difficult mixer applications.*

The 280M is an ideal solution for the replacement of canister-type designs, because its cartridge design requires no measuring or assembly of seal parts. Installation concerns on critical equipment are minimized.

The 280M has superior motion capabilities within a cartridge design. It incorporates all the latest design advancements in mechanical sealing technology. Its geometric, double-balanced design makes it the ideal choice for mixer standardization because it accepts process pressure reversals. Its non-fretting design will not damage shafts/sleeves.



### Superior performance for demanding mixer applications

- Extended motion capability
- Designed for pressure reversal
- Rugged, high torque monolithic seal faces
- Cushioned, high strength drives
- Direct centering

### Maximum solids handling capability

- Narrow rotating face prevents wiping of solids
- Micropolished O-ring surfaces eliminate O-ring hang-up

### SPECIFICATIONS

#### Operating Parameters

<b>Sizes</b>	25 mm to 120 mm 1.00" to 4.75"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 40 bar g / 600 psig* 17 bar g / 250 psig outboard*
<b>Temperature</b>	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
<b>Speed</b>	20 m/s or 4000 fpm

#### Applicable Standards and Approvals

ATEX, ISO-3069C

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

#### Materials of Construction

<b>Rotary Faces</b>	Carbon Sintered Silicon Carbide Tungsten Carbide
<b>Stationary Faces</b>	Sintered Silicon Carbide Tungsten Carbide
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Alloy C-276 / EN 2.4819

### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
280M	Shaft diameter	CB / SSC / SSC / CB	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 58 - 61



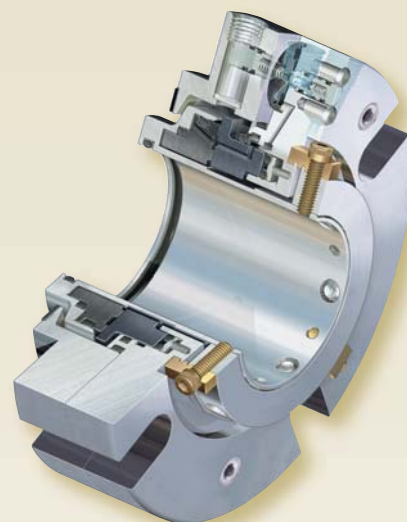
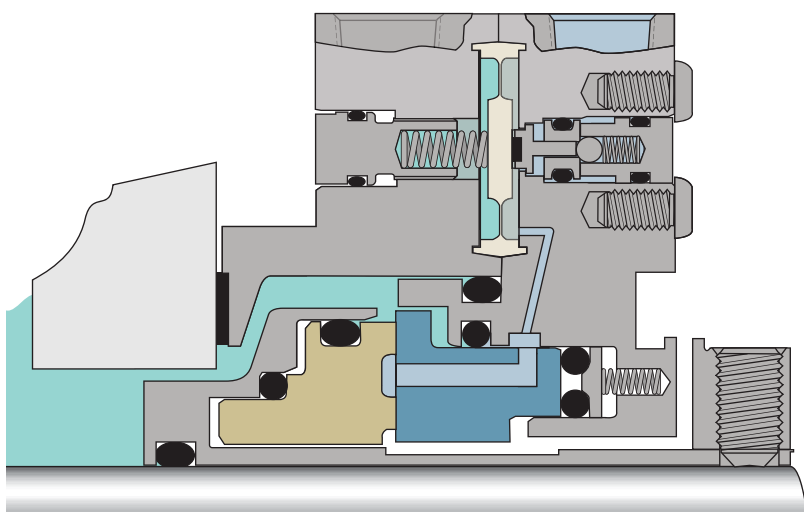
# 4410

## Slow Speed Gas Seal

**Advanced gas seal technology for slow speed sealing applications**

The 4410 is ideal for use in high value batch operations where contamination is a concern. The 4410 is bi-directional and provides a safe alternative to liquid dual sealing.

The 4410 Gas Seal outperforms other seals with no need for complex gas panels or liquid barrier systems. The In-Gland Control System (IGCS) automatically regulates barrier gas pressure, eliminating the need and expense of a gas panel. Elaborate support systems and liquid barrier leakage associated with conventional liquid lubricated dual seals are also eliminated. The 4410 can operate in liquid contacting and gas non-contacting regimes.



### Advanced gas seal technology for mixer and reactors

- No heat generation
- Reverse pressure capability
- Motion tolerant
- Bi-directional
- Dual gas and liquid lubricated capability
- Built-in control system
- Slow speed capable

### Advanced technology that is easy to install and operate

- Compact design
- Fits without modification
- Requires no elaborate support systems
- Stationary design

#### SPECIFICATIONS

##### Operating Parameters

<b>Sizes</b>	65 mm to 200 mm 2.625" to 8.00"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 10 bar g / 150 psig*
<b>Temperature</b>	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
<b>Speed</b>	8 m/s or 1500 fpm

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

##### Materials of Construction

<b>Rotary Faces</b>	Carbon Sintered Silicon Carbide
<b>Stationary Faces</b>	Sintered Silicon Carbide
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Alloy C-276 / EN 2.4819

#### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
4410	Shaft diameter	CB / SSC	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 100 - 101

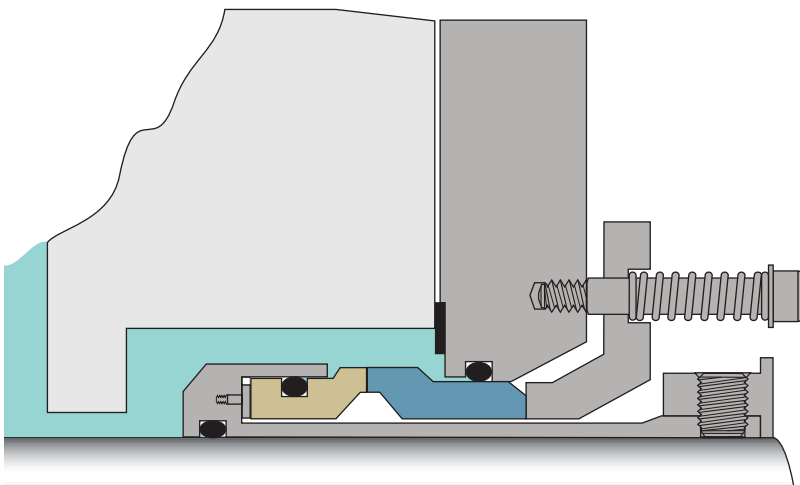
# 170

## Slurry Cartridge Single Seal

*Engineered to operate in harsh, heavy consistency slurry environments and eliminate costly external seal flushes in the majority of applications*

The 170 is designed for sealing mineral-based process materials such as ores, limestone, coal, sugar, and phosphates. The innovative, non-clog design utilizes a unique coil spring design where the springs are located entirely outside the seal.

Throughout slurry processing industries, seals must accept greater movement, shaft deflection, and accommodate for increased tolerances. The 170 has large clearance and rugged components designed to resist the effects of heavy slurry environments. Plant optimization can be achieved through reduced product dilution and higher production rates.



**Runs longer in heavy abrasive slurries without the need for flush or quench water**

- Non-clog design
- Innovative pressure plate design
- Springs entirely outside the seal

**Reliable design that deals with real life slurry pumping conditions**

- Micropolished O-ring surfaces eliminate O-ring hang-up
- Optimal balance for slurries
- Line-to-line slurry faces
- Stationary springs
- High strength drives

**Easy to maintain**

- Integrated centering tabs
- Washable in-service
- In-field repairable
- No quench and drain needed

### SPECIFICATIONS

#### Operating Parameters

<b>Sizes</b>	25 mm to 228 mm 1.00" to 9.00"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 17 bar g / 250 psig*
<b>Temperature</b>	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
<b>Speed</b>	11 m/s or 2200 fpm

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations.  
For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

#### Materials of Construction

<b>Rotary Faces</b>	Sintered Silicon Carbide Tungsten Carbide
<b>Stationary Faces</b>	Sintered Silicon Carbide Tungsten Carbide
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Alloy C-276 / EN 2.4819

### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
170	Shaft diameter	TC / SSC	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 117 - 118

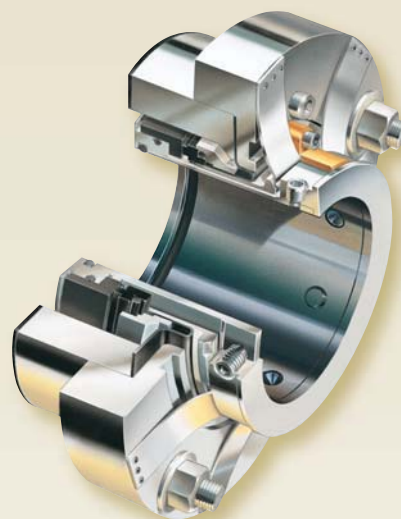
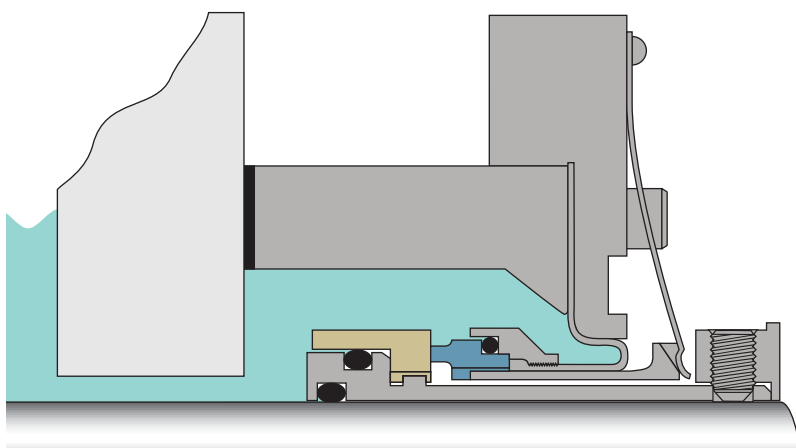
# 156™

## Slurry Single Seal

*Designed to perform reliably in light to medium consistency slurries reducing flush rates in the majority of applications*

The 156 is designed for particulate and fibrous slurries. The innovative, non-clog diaphragm design utilizes unique finger springs which are located entirely outside the seal.

Throughout slurry processing industries, seals must accept greater movement, shaft deflection, and accommodate for increased tolerances. The 156 has large clearances and a rugged diaphragm design with built-in flexibility. The diaphragm eliminates the need for a sliding, dynamic O-ring. Plant optimization can be achieved through reduced product dilution and higher production rates.



**Runs longer in light to medium particulate and fibrous slurries**

- Non-clog design
- Cool running faces
- Patented Self-Centering Lock Ring™ eliminates misalignment at installation
- No dynamic O-rings, no hang-up
- Externally mounted finger springs

**Best in class axial motion capability**

- Finger spring design
- Elastomer diaphragm

### SPECIFICATIONS

#### Operating Parameters

<b>Sizes</b>	45 mm to 200 mm 1.50" to 8.00"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 10 bar g / 150 psig*
<b>Temperature</b>	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
<b>Speed</b>	25 m/s or 5000 fpm

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

#### Materials of Construction

<b>Rotary Faces</b>	Sintered Silicon Carbide Tungsten Carbide
<b>Stationary Faces</b>	Sintered Silicon Carbide Tungsten Carbide
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Elgiloy™

### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
156	Shaft diameter	SSC / CB	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 119 -120

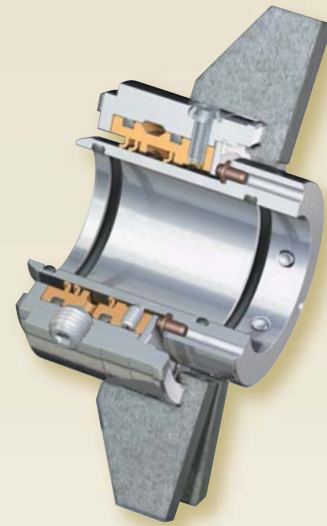
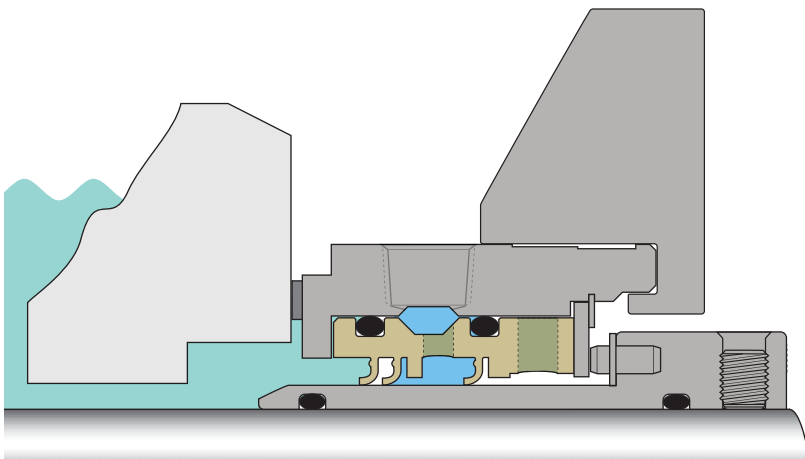
# HVS

## High Viscosity Seal

*Designed for applications that exceed the performance limitations of conventional face seals*

The HVS uses an engineered polymer sealing element that can withstand the torque, shear, and frictional heat common when pumping viscous products.

Triple contact sealing surfaces are molded into a rugged, single piece sealing element that provides reliable sealing in viscous fluids. This one-piece sealing element can be easily replaced in the field. The standard sealing materials are self-lubricating and chemically resistant.



**Reliable technology that exceeds the limits of face seals in viscous fluids**

- Triple contact advanced polymer sealing element
- High torque capable
- Shear resistant
- Capable of dry running

**Simple to install and repair**

- One piece polymer sealing element
- Two step installation
- Automatic centering
- Easy field repair
- Designed to fit Viking pumps
- Compact adjustable gland
- Removable bolt tabs

**Versatile in application**

- Suited for both oil- and water-based liquids
- FDA sealing element available

**SPECIFICATIONS**

**Operating Parameters**

<b>Sizes</b>	28 mm to 90 mm 1.125" to 3.5"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 10 bar g / 150 psig*
<b>Temperature</b>	120°C / 250°F
<b>Speed</b>	28 m/s or 550 fpm

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

**Materials of Construction**

<b>Sealing Elements</b>	AWC 100—Oil Based Fluids AWC 400—Water Based Fluids AWC 510—FDA Fluids
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401

**QUICK ORDER REFERENCE EXAMPLE**

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	ELEMENT	ELASTOMERS	METALS
HVS	Shaft diameter	AWC 100	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 121 - 122

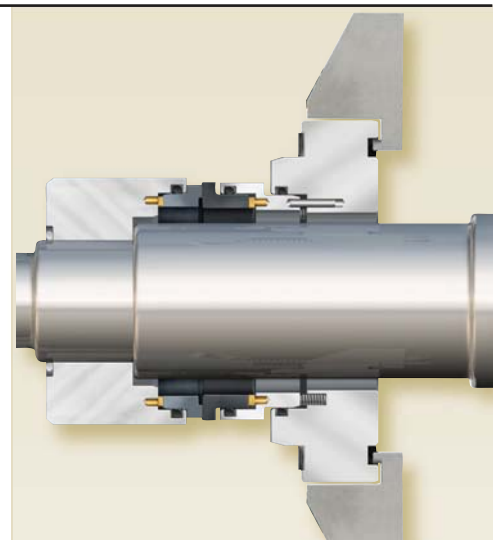
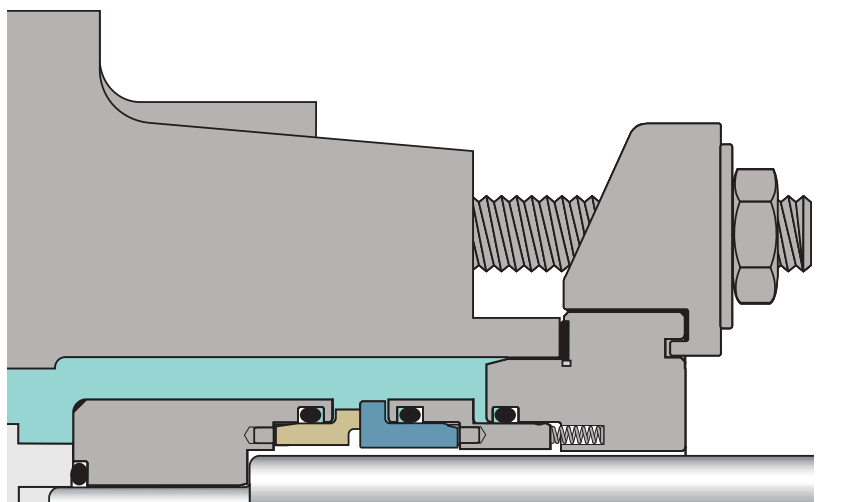
# DFS

## DirectFit™ Single Seal

**Mechanical seals designed to fit the Sulzer™ APP/APT and NPP/NPT series process pumps\***

The DirectFit line of mechanical seals provides an easy and convenient upgrade in sealing performance without modification to the pump. Available both as single seal and dual seal.

Installation errors are eliminated because DirectFit seals mount directly to the pump shaft against the shaft shoulder with no measurements needed or centering clips to remove. Spring pressure and face alignment is pre-determined. Seals are centered automatically.



### Upgrade to advanced monolithic seal face technology for Sulzer\* pumps

- High-torque monolithic seal faces

### Easy to install

- Designed to fit Sulzer\* APP/APT and NPP/NPT pumps
- Adjustable barrier/buffer fluid ports
- Automatic centering

### Simple and quick to repair

- Field repair capable
- Repair kits available

\*Sulzer is in no way associated or affiliated with A.W. Chesterton Company. This reference to Sulzer pumps is intended solely to identify products of this other manufacturer for which A.W. Chesterton Company designed its DirectFit seals to be compatible.

### SPECIFICATIONS

#### Operating Parameters

<b>Sizes</b>	30 mm to 90 mm 1.18" to 3.5"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 20 bar g / 300 psig*
<b>Temperature</b>	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
<b>Speed</b>	25 m/s or 5000 fpm

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

#### Materials of Construction

<b>Rotary Faces</b>	Carbon Sintered Silicon Carbide Tungsten Carbide
<b>Stationary Faces</b>	Sintered Silicon Carbide Tungsten Carbide
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Alloy C-276 / EN 2.4819

### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
DFS	Shaft diameter	CB / SSC	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 123 - 124

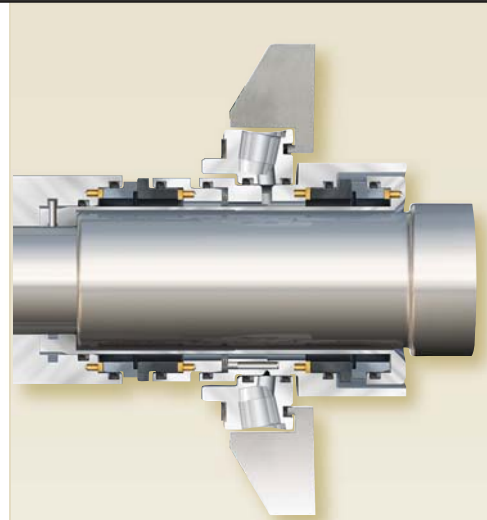
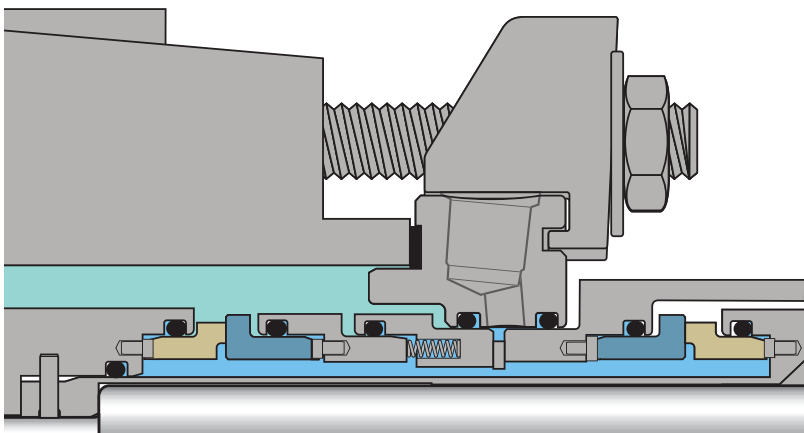
# DFD

## DirectFit™ Dual Seal

**Mechanical seals designed to fit the Sulzer™ APP/APT and NPP/NPT series process pumps\***

The DirectFit line of mechanical seals provides an easy and convenient upgrade in sealing performance without modification to the pump. Available both as single seal and dual seal.

Installation errors are eliminated because DirectFit seals mount directly to the pump shaft against the shaft shoulder with no measurements needed or centering clips to remove. Spring pressure and face alignment is pre-determined. The dual seal design eliminates set screw fastening common to the OEM design and features a single piece drop-in unit for ease of installation.



### Upgrade to advanced monolithic seal face technology for Sulzer\* pumps

- High-torque monolithic seal faces
- Double balanced dual seal

### Easy to install

- Designed to fit Sulzer\* APP/APT and NPP/NPT pumps
- Adjustable barrier/buffer fluid ports
- Automatic centering

### Simple and quick to repair

- Field repair capable
- Repair kits available

\*Sulzer is in no way associated or affiliated with A.W. Chesterton Company. This reference to Sulzer pumps is intended solely to identify products of this other manufacturer for which A.W. Chesterton Company designed its DirectFit seals to be compatible.

### SPECIFICATIONS

#### Operating Parameters

<b>Sizes</b>	30 mm to 90 mm 1.18" to 3.5"
<b>Pressure</b>	711 mm or 28" Hg Vacuum to 40 bar g / 600 psig* 14 bar g / 200 psig outboard*
<b>Temperature</b>	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
<b>Speed</b>	25 m/s or 5000 fpm

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

#### Materials of Construction

<b>Rotary Faces</b>	Carbon Sintered Silicon Carbide Tungsten Carbide
<b>Stationary Faces</b>	Sintered Silicon Carbide Tungsten Carbide
<b>Elastomers</b>	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
<b>Metal Parts</b>	316 Stainless Steel / EN 1.4401
<b>Springs</b>	Alloy C-276 / EN 2.4819

### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
DFD	Shaft diameter	CB / SSC / SSC / CB	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

For dimensional information see page 125 - 126

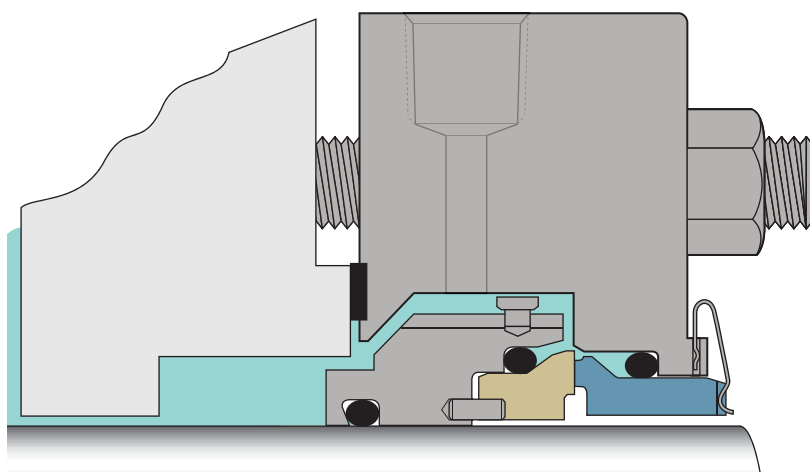
# 442PR

## Split Pumping Ring Seal

*Eliminates the need for equipment disassembly during seal replacement*

The 442 split design significantly reduces down-time and overall maintenance costs. This seal is ideal for hot heater drain and boiler feed equipment where cooling to a single seal must be provided.

The high capacity pumping ring provides for maximum heat removal and reliability in hot water services. Coolest running seal faces include premium high graphite seal face material combined with a silicon carbide primary face. The 442PR delivers the lowest cost of ownership from its ease of installation, low cooling cost, and reliability.



### Split performance for boiler feed and hot water circulation pumps

- High flow pumping device
- Designed for API Plan 23
- Engineered for high pressure
- High strength external springs
- Non-fretting to equipment
- Premium high graphite carbon face

### Easy and fast to install without equipment disassembly

- Ball-and-socket O-rings
- Patented automatic centering

#### SPECIFICATIONS

##### Operating Parameters

Sizes	20 mm to 200 mm 0.75" to 8.00"
Pressure	711 mm or 28" Hg Vacuum to 31 bar g / 450 psig*
Temperature	120°C / 250°F w/o cooling
Speed	20 m/s or 4000 fpm

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

##### Materials of Construction

Rotary Faces	Silicon Carbide Ceramic
Stationary Faces	Carbon Silicon Carbide
Elastomers	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene
Metal Parts	316 Stainless Steel / EN 1.4401
Springs	Elgiloy™

#### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
442PR	Shaft diameter	SC / CB	EP	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

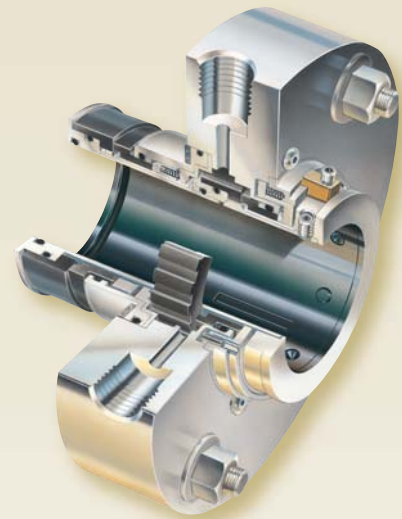
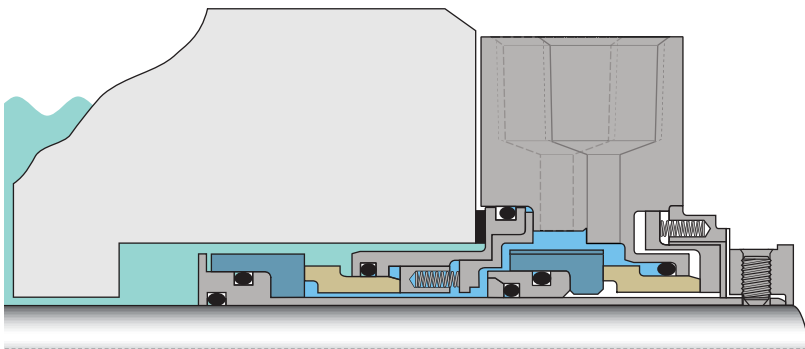
For dimensional information see page 97

# 225™ Tandem Cartridge Dual Seal

*A versatile proven performer providing reliable dual sealing capability in a wide variety of industrial processes*

A high performance tandem arrangement used primarily in refining and chemical applications. This seal is ideal for non-lubricating fluids—light hydrocarbon services requiring low heat generation. It is designed with simplicity in mind—so seal repair is easy and economical.

This simple tandem orientation provides higher pressure capabilities in light hydrocarbon refining applications. The outboard seal face serves as a high efficiency pumping ring and provides maximum cooling capability in the most demanding services. Seal faces are interchangeable with the 155 and 255 seals.



### Advanced technology, high-pressure capable dual seal

- Tandem configuration for highest pressures
- Narrow seal faces for lowest heat generation
- Fully vented gland
- Stationary springs
- Self-Centering Lock Ring™ eliminates misalignment

### Efficient cooling system with integrated pumping

- High flow pumping ring
- Bi-directional barrier fluid ports to accommodate double ended pumps

#### SPECIFICATIONS

##### Operating Parameters

Sizes	25 mm to 120 mm 1.00" to 4.75"
Pressure	711 mm or 28" Hg Vacuum to 40 bar g / 600 psig* 17 bar g / 250 psig inboard differential*
Temperature	-55°C to 300°C / -67°F to 570°F See back page for actual material limits by type of elastomer
Speed	25 m/s or 5000 fpm

##### Applicable Standards and Approvals

ISO-3069C, ASME B73.1, B73.2

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

##### Materials of Construction

Rotary Faces	Sintered Silicon Carbide Tungsten Carbide
Stationary Faces	Carbon Sintered Silicon Carbide Tungsten Carbide
Elastomers	Fluorocarbon Ethylene Propylene Tetra-ethylene Propylene ChemLast™
Metal Parts	316 Stainless Steel / EN 1.4401
Springs	Alloy C-276 / EN 2.4819

#### QUICK ORDER REFERENCE EXAMPLE

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	FACES	ELASTOMERS	METALS
225	Shaft diameter	SSC / CB / SSC / CB	FKM	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)



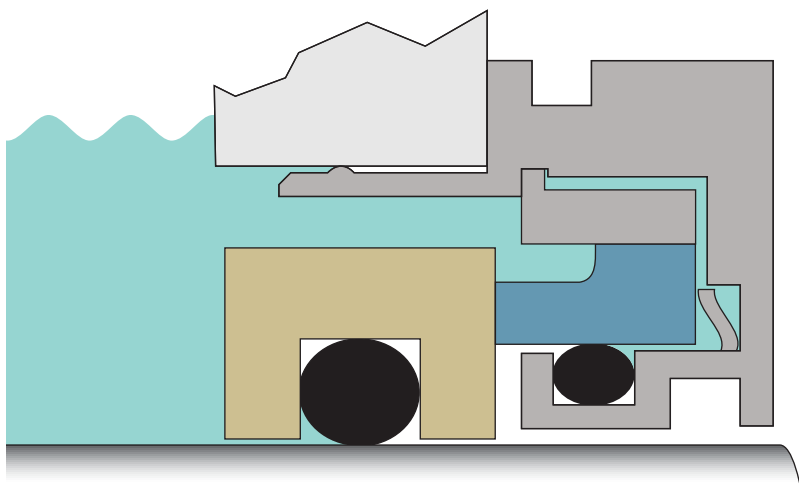
# GBS

## General Bearing Seal

*Specifically designed to provide total bearing protection against failure due to contamination*

Severe duty industrial applications require a positive means to protect bearings against humidity and dirt. Installs like a cartridge seal.

The General Bearing Seal is a positive face seal that relies on seal face contact to isolate the bearing environment from outside contaminants. Normal bearing operation can produce a heating and cooling environment, which develops a vacuum effect in the bearing housing. This vacuum effect can draw in humidity and atmospheric contaminants. Positive contacting face seals minimize atmospheric contaminants from migrating into the housing area.



### Advanced bearing sealing that locks out contaminants and moisture

- Positive face seal
- Non-fretting to equipment
- Moisture resistant
- No vacuum concerns
- Self-lubricating
- Easy installation
- Anodized corrosion protection

#### SPECIFICATIONS

##### Operating Parameters

Sizes	25 mm to 100 mm 0.750" to 4.50"
Pressure	1 bar g / 15 psig*
Temperature	120°C / 250°F
Speed	3600 RPM

##### Materials of Construction

Rotary Faces	Tungsten Carbide
Stationary Face	Carbon
Elastomers	Fluorocarbon
Metal Parts	Anodized Aluminum
Springs	Alloy C-276 / EN 2.4819

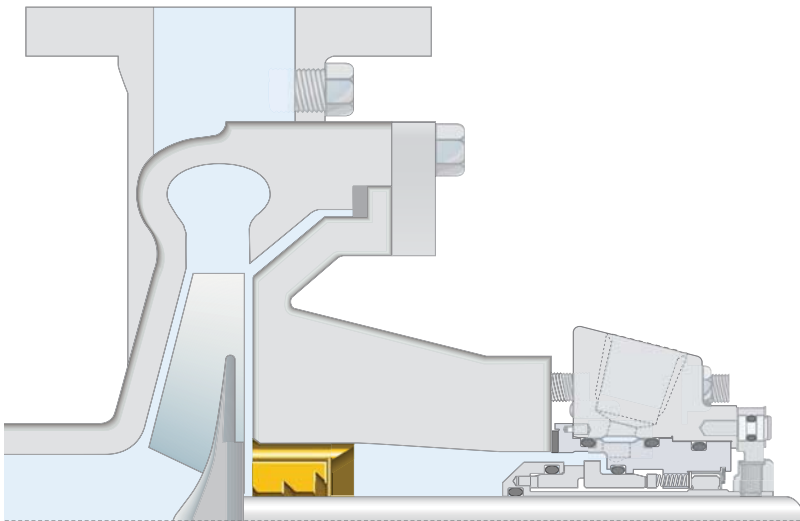
\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

# SpiralTrac™ Environmental Controllers

*Environmental controllers have revolutionized the sealing environment in stuffing boxes*

When used with Chesterton mechanical seals, SpiralTrac™ Environmental Controllers reduce the flush fluid required and further enhance seal reliability. SpiralTrac promotes seal cavity circulation and solids removal, improving seal reliability and contributing to production efficiencies

There is a SpiralTrac Environmental Controller for every application, from split designs, designed specifically for the 442 split seal, to solid stainless steel designs for conventional cartridge seal installations. SpiralTrac Environmental Controllers can be customized for specific stuffing box/back cover arrangements.



*SpiralTrac is a registered trademark of Enviroseal Engineering Products Ltd.*



**Extends seal reliability in most rotating equipment applications**

- Removes solids from the seal chamber
- Minimizes seal clogging
- Improves cooling
- Automatic venting of the seal chamber

**Reduces cost of flushing in abrasive applications**

- Active and continuous removal of solids
- Eliminates or reduces the need for flush

**Fits to all rotating equipment**

- Standard designs
- Split versions available
- Customizable
- Broad range of materials

**SPECIFICATIONS**

**Operating Parameters**

**Versions**

F	Greatly reduced flush
N	Reduced/No flush in non fibrous fluids
D	Reduced/No flush in fibrous fluids
P	Use with packing only

**Arrangements**

Type A	Counter bore fit
Type B	Bore fit
Type S	Axial split
Type I	Impeller side installation
Type E	Externally Keyed

**Materials of Construction**

316 Stainless Steel / EN 1.4401
416 Stainless Steel
PTFE - Glass Filled
PTFE - Carbon Graphite Filled
Bronze
Ti / EN 3.7035
AWC 800 - Red Polymer
Monel K400 / EN 2.4360

*For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.*

**QUICK ORDER REFERENCE EXAMPLE**

For quick and easy ordering please have the following information ready for your service representative.

MODEL	SIZE	VERSION	ARRANGEMENT	MATERIAL
SpiralTrac	Shaft diameter	F	Type A	316 SS

For additional information: [www.chesterton.com](http://www.chesterton.com)

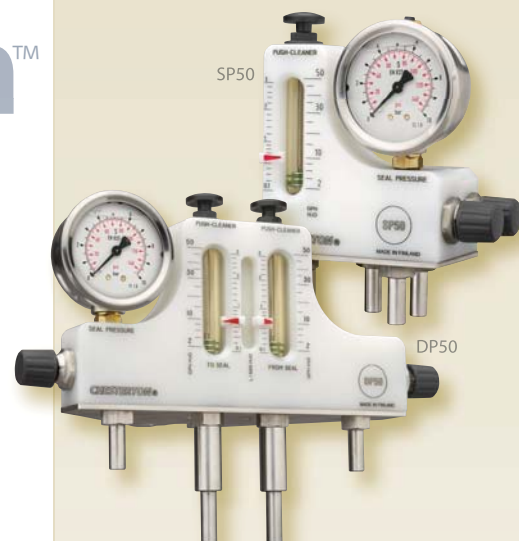
For dimensional information see page 129

# Flow Guardian™ Flow Meters

*Specifically designed to supply uninterrupted, regulated seal flush water and deliver operational efficiency to the pump population*

Managing flow rates while regulating important pressure differentials is possible. Costly seal failures are reduced while assisting in plant water conservation initiatives.

There is a Flow Guardian for every application. The DP50 Dual Flow Guardian is designed to measure flow entering and exiting a dual seal installation. This capability allows for early detection of leakage into the process stream as a result of inboard seal failure. The SP50 Single Flow Guardian can also regulate flow and pressure and is ideal for single seal installations, or when inboard seal failure detection is of less importance.



**Extends seal performance by delivering uninterrupted regulated seal flush water**

- Built-in pressure regulator
- Innovative plunger cleaner
- Oil filled pressure gauge
- Rugged, compact design
- Tamper proof locking system
- Alarm sensor-ready
- Excellent corrosion resistance
- Rebuild kits available
- Optional barb or compression fittings



### SPECIFICATIONS

#### Operating Parameters

Flow Rate	0,1 - 3 liters/min / 2 - 50 US gallons per hour
Pressure Limits	10 bar g / 145 psig*
Temperature Limits	100°C / 212°F

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

#### Materials of Construction

Flowmeter Tubes	Polysulfone (PSU)
Body of Unit	Polyoxymethylene (POM)
O-rings	Fluorocarbon (FKM)
Pressure Gauge	Oil filled with 316SS Stainless Steel Case and Wetted Parts, 1/4" - NPT Bronze fitting
Pressure Regulating Valve	316 Stainless Steel / EN 1.4401
Flow Rate Regulating Valve	316 Stainless Steel / EN 1.4401
Clean-out Plugs	320 - 3/8" Tube Fittings (for compression connections) 316 - Optional Barb Fittings
Mounting Bracket	316 Stainless Steel / EN 1.4401

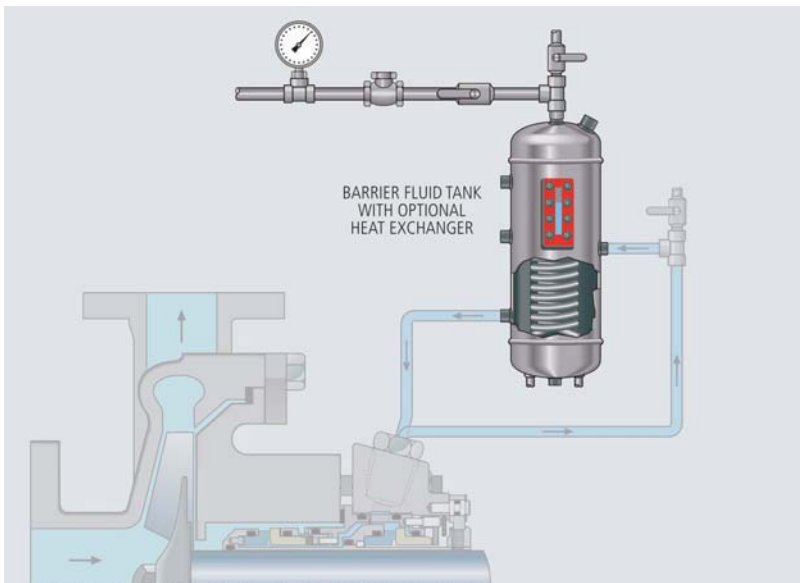
For additional information: [www.chesterton.com](http://www.chesterton.com)

# High Capacity Support Tanks

**Support systems are the lifeline to dual, liquid-lubricated mechanical seals**

By providing a dedicated lubrication system, mechanical seal performance will be optimized; other less efficient systems will compromise seal performance and reliability goals.

Chesterton's standard support tank is built without compromise. This tank is constructed from corrosion-resistant 304 Stainless Steel and has a five-gallon capacity. The tank delivers 50% greater volume, as compared to other tanks, which delivers more fluid for cooling. This results in greater seal reliability. These tanks are manufactured to ASME Section VIII, Division I—meeting pressure vessel codes and providing safety and security to the installation—standards.



## High-capacity pressure vessel ASME-certified barrier fluid tank

- UM stamp certified
- Cross-flow design for optimal cooling
- 19 liter/5 gallon capacity
- High-pressure elliptical heads
- High-quality armor weld pad level gauge
- High-capacity cooling

### SPECIFICATIONS

Capacity	19 liters / 5 US gallons
Operating Limits	24 bar g / 350 psig* @ 177°C (350°F)
Tank NPT Connections	1/2" Seal Connections 1/2" Vent and Drain 1/2" Cooling Coil Connections 3/4" High/Low Level Connections 1" Fill Connection Heavy Duty Tank Mounting Couplings, 1/2" - 13unc

### Applicable Standards and Approvals

ASME Section VIII, Division I, PED, Cat. 1

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

### Materials of Construction

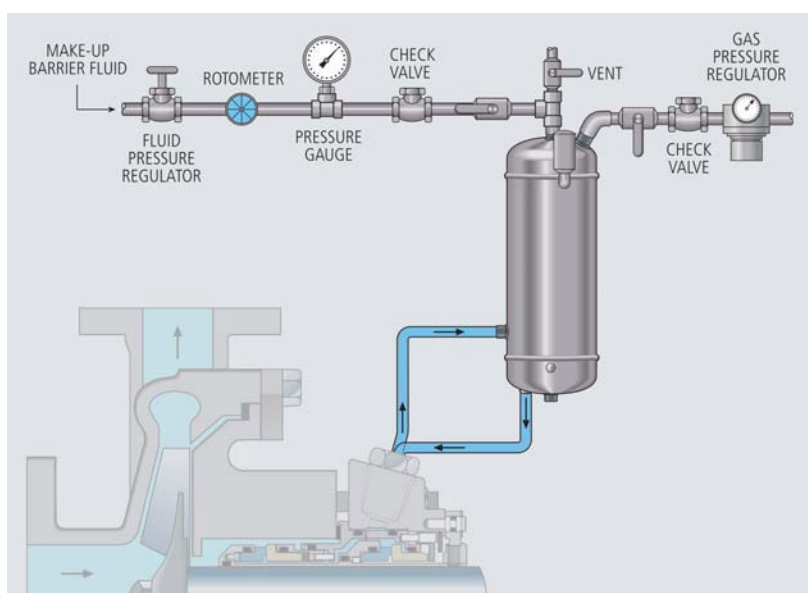
Tank Material	304 Stainless Steel / EN 1.430 — bead blasted
Standard Level Gauge	Carbon Steel Cover (standard) - 304 SS (optional) B7 Zinc Plated Bolts (standard) - SS (optional)
Options	Sight Pad Level Gauge Prismatic Glass 304 SS/EN 1.430 Cooling Coil Mounting Stand

# Closed Loop Tank System

*Delivers all the essentials for proper dual seal operation while eliminating the need for wasteful flow through supply-to-drain*

Dual seal performance expectations are met by delivering a clean, pressurized liquid to the seal faces for lubrication. This system is maintenance free and automatically compensates for potential loss of barrier fluid in a closed system.

## Automatic leak detection and fluid make-up



### Maintenance-free cooling system with automatic refill

- Fully assembled
- 13.3 liter/3.5 gallon capacity
- 304 Stainless Steel
- Maintenance free
- Installs easily

#### SPECIFICATIONS

Capacity	13.3 liters / 3.5 US gallons
Tank Connections	.500" NPT for top or side entry
Max. System Pressure	8,6 bar g* @ 100°C / 125 psig* @ 212°F

#### Materials of Construction

Tank Material	304 Stainless Steel / EN 1.430 — bead blasted
Supply Hose	1/2" nylon polymer
Check Valve	Brass
Pressure Regulator	Brass
Flow Indicator	Brass
Air Vent	Brass
Miscellaneous Valves and Fittings	Brass

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.

For additional information: [www.chesterton.com](http://www.chesterton.com)

# Intelli-Flow™

## T-30 Water Saver

*Features a thermally activated valve that automatically drains hot barrier fluid only when necessary to keep dual seals running cool and reliably*

With Intelli-Flow, over 90% water savings are achievable compared to traditional flow-through seal water supply systems commonly found in industry.

The T-30 is specifically designed to work with Chesterton® dual mechanical seals and plugs straight into the barrier port of the seal. There are no additional external hoses to be connected or modification requirements. Existing seal installations can, therefore, be easily upgraded to the T-30 Intelli-Flow.

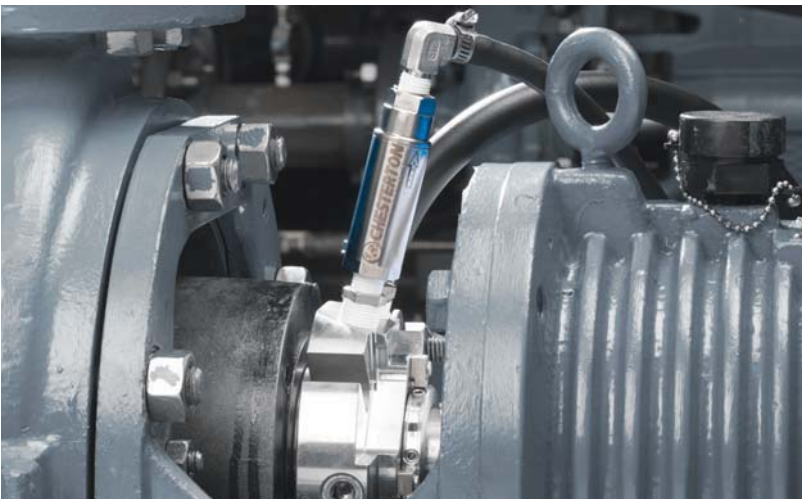


### Greatly saves on barrier fluid water—reducing costs

- 90% savings compared to open barrier fluid supply
- Reliable, non-clog design
- For water-intensive industries

### Maintenance free

- Automatic operation
- No modifications required
- Easy to install
- Optional flush housing available



### SPECIFICATIONS

Pressure	20.7 bar g / 300 psig*
Temperature	120°C / 250°F
Connections	1/4" NPT

### Materials of Construction

Body	303 Stainless Steel / EN 1.4305
Bushing	316 Stainless Steel / EN 1.4401
Hose Barb Fitting	316 Stainless Steel / EN 1.4401

\* Seal pressure capabilities are dependent on the fluid sealed, temperature, speed, and seal face combinations. For operation outside the limits and additional materials consult Chesterton Mechanical Seal Engineering.



MECHANICAL SEALS

# SERVICE AND PERFORMANCE

*Unparalleled in the Industry*

Our high service levels are delivered by combining both industry and product knowledge with our experience to implement best available techniques. At Chesterton, we place strong emphasis on working together as partners to provide real solutions. Our worldwide reach and local service capabilities enable Chesterton to be responsive to our client's needs.

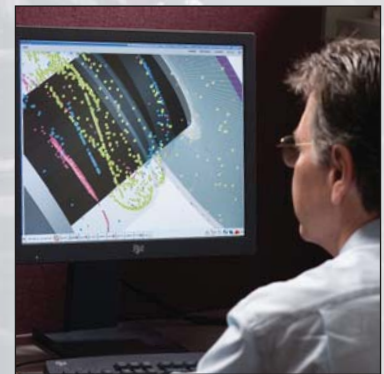




## Reliability through innovation

To be a full service provider takes a wide array of quality, engineered sealing products that will address the sealing needs of our clients. Innovative, high performance products are at the core of Chesterton's offerings as a premier sealing solution provider. Some of our standard offerings are:

- Cartridge seals
- Split seals
- Engineered solutions
- Cassette seals
- Gas seals
- Bellows seals



## Improving productivity with high impact programs

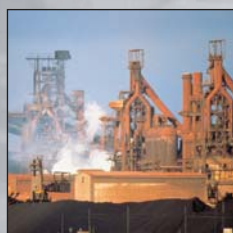
In today's global economy, our clients are faced with increased profitability pressures. Chesterton can assist users in achieving their productivity goals by improving asset reliability and lowering the total cost of ownership. Our programs are easily customized for each plant to:

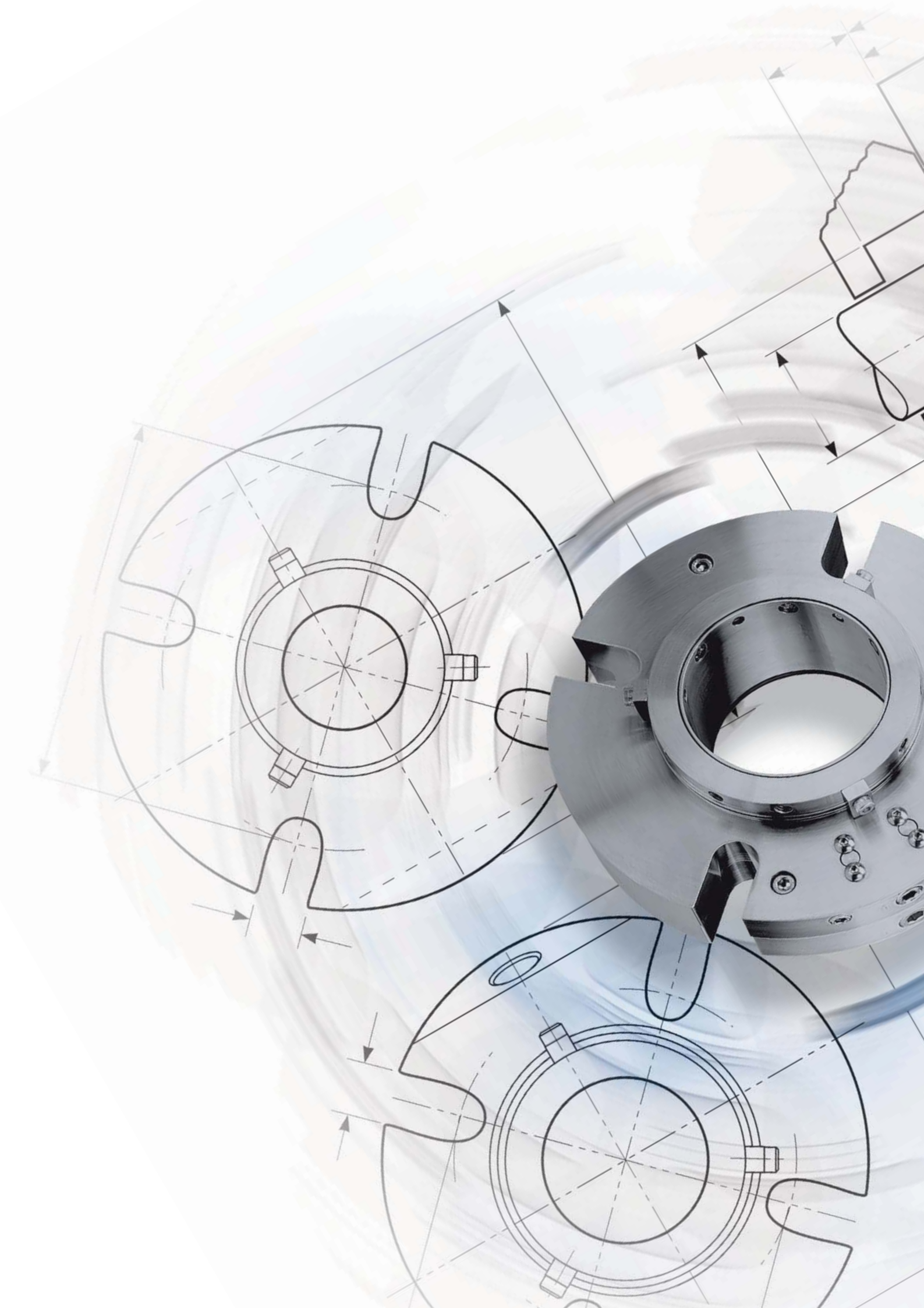
- Improve equipment availability
- Increase process throughput
- Lower total cost of ownership

## Delivering results for industry

Meeting industry needs requires a thorough knowledge and understanding of the key drivers specific to the plant. Chesterton's depth of experience allows us to deliver results such as:

- Increased equipment reliability
- Reduced environmental emissions
- Reduced water consumption
- Increased energy efficiency



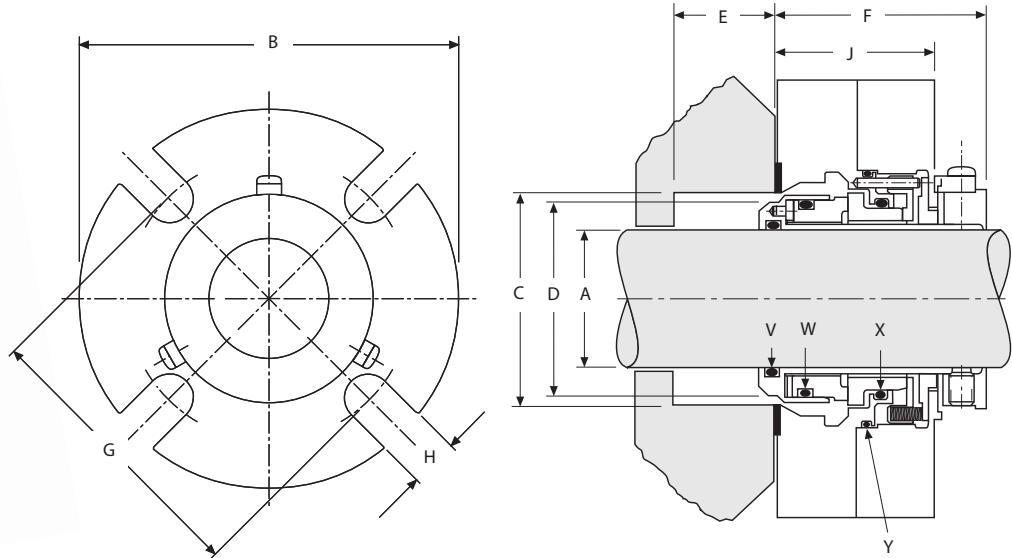




SECTION II

# MECHANICAL SEAL INSTALLATION DATA

# 180™ EXTRA SMALL SINGLE SEAL – Dimensional Data/Metric



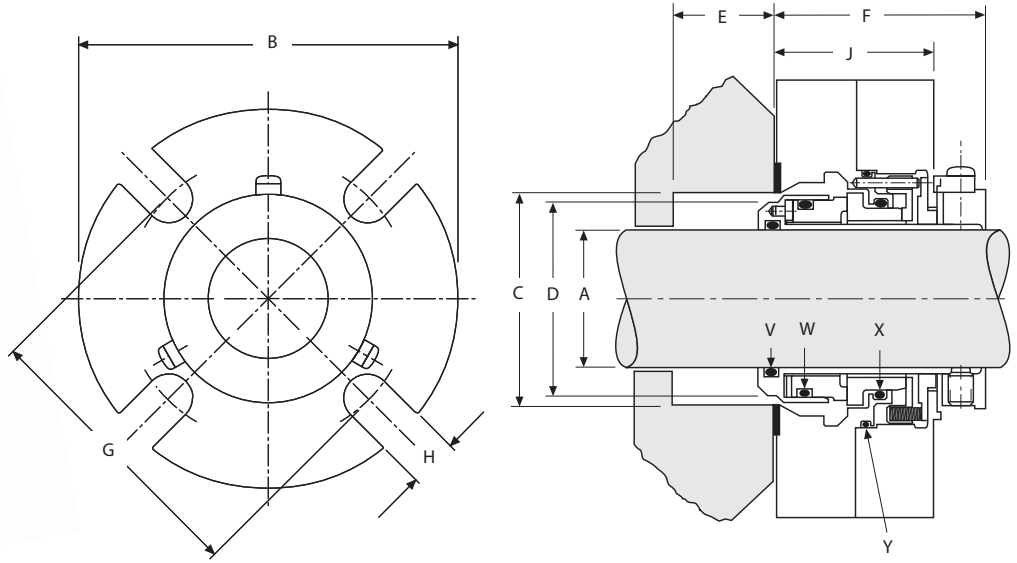
**180 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Inboard Seal Diameter
- E – Required Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- J – Gland Width
- V – Shaft O-ring
- W – Rotary Seal O-ring
- X – Stationary Seal O-ring
- Y – Gland O-ring

A	B MAX	C MIN	C MAX	D MAX	E MIN	F MAX	G MIN 10 mm 12 mm 16 mm	H	J MAX	V	W	X	Y		
25	104	41	51	39	6	54	73	–	–	11	41	120	126	127	033
28	104	44	52	42	6	54	73	–	–	11	41	122	128	129	034
30	104	46	57	44	6	54	78	–	–	11	41	123	129	130	035
32	104	48	58	46	6	54	80	–	–	11	41	124	130	131	035
33	113	49	59	47	6	54	81	83	–	14	41	125	131	132	036
35	111	51	59	49	6	54	80	82*	–	14	41	126	132	133	036
38	114	54	61	52	6	54	85	87	–	14	41	128	134	135	037
40	127	56	68	54	6	54	90	92	–	13	41	129	135	136	038
42	127	58	66	56	6	54	88	90	–	13	41	130	136	137	039
43	127	59	69	57	6	54	91	93	–	13	41	131	137	138	039

\*Requires socket head cap screws or D shaped washers.

# 180™ EXTRA SMALL SINGLE SEAL – Dimensional Data/Inch



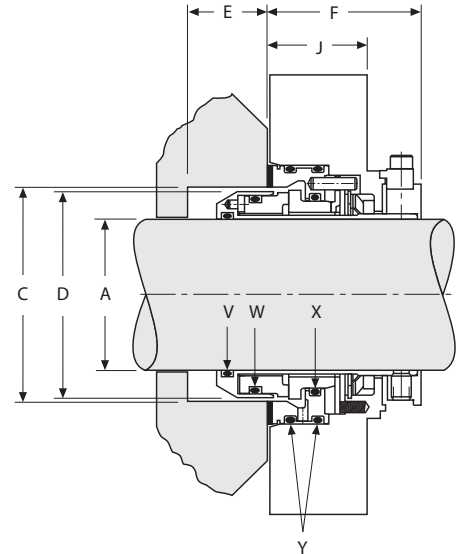
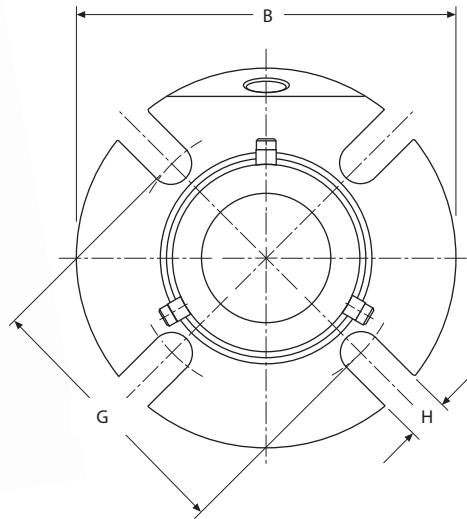
**180 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Inboard Seal Diameter
- E – Required Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- J – Gland Width
- V – Shaft O-ring
- W – Rotary Seal O-ring
- X – Stationary Seal O-ring
- Y – Gland O-ring

A	B MAX	C MIN	C MAX	D MAX	E MIN	F MAX	3/8"	G MIN 1/2"	5/8"	H	J MAX	V	W	X	Y
1.000	4.11	1.63	2.01	1.55	0.22	2.11	2.88	–	–	0.44	1.62	120	126	127	033
1.125	4.11	1.75	2.04	1.67	0.22	2.11	2.88	–	–	0.44	1.62	122	128	129	034
1.125 OS	4.48	2.50	2.75	1.82	0.40	1.93	3.71	–	–	0.44	1.44	122	128	129	150
1.250	4.11	1.88	2.27	1.80	0.22	2.11	3.14	–	–	0.44	1.62	124	130	131	035
1.375	4.36	2.00	2.33	1.92	0.22	2.11	3.13	3.25*	–	0.57	1.62	126	132	133	036
1.375 OS	5.40	2.68	3.00	2.07	0.40	1.93	4.03	–	–	0.44	1.44	126	132	133	151
1.500	4.49	2.13	2.44	2.05	0.22	2.11	3.33	3.45	–	0.57	1.62	128	134	135	037
1.625	4.99	2.25	2.69	2.17	0.22	2.11	3.52	3.65	–	0.57	1.62	130	136	137	038

\*Requires socket head cap screws or D shaped washers.

# 180™ SMALL and LARGE SINGLE SEAL – Dimensional Data/Metric



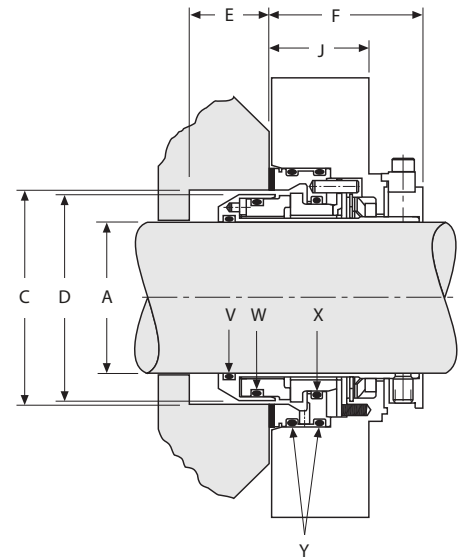
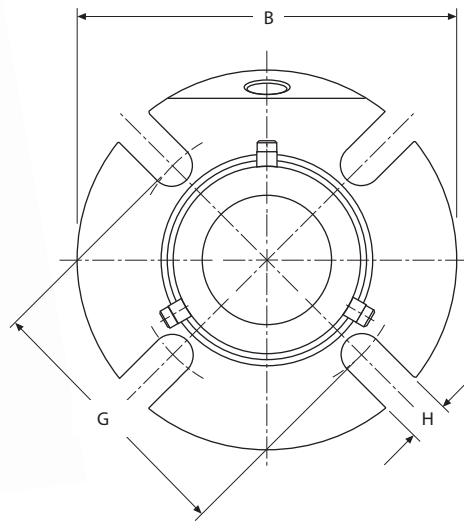
**180 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Inboard Seal Diameter
- E – Required Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- J – Gland Width
- V – Shaft O-ring
- W – Rotary Seal O-ring
- X – Stationary Seal O-ring
- Y – Gland O-rings

A	B MAX	C MIN	C MAX	D MAX	E MIN	F MAX	G MIN			H	J MAX	V	W	X	Y
							10 mm	12 mm	16 mm						
45	139	64	73	63	18	49	95	97	–	13	43	133	139	140	150
48	139	67	73	66	18	49	95*	97*	–	13	43	134	141	142	151
50	139	69	78	68	18	49	100	102	–	13	43	136	142	143	151
53	152	73	87	72	18	49	109	111	115	17	43	137	144	145	153
55	152	74	83	73	18	49	105	107	111	17	43	139	145	146	152
58	152	80	91	78	18	49	114	116	120	17	43	140	148	149	153
60	152	80	91	78	18	49	114	116	120	17	43	142	148	149	153
							12 mm	16 mm	20 mm						
65	164	92	103	90	22	64	127	131	–	17	45	231	235	236	242
70	196	96	111	93	22	64	137	141	–	17	45	232	236	237	245
75	202	102	119	100	22	64	143	147	–	17	45	234	238	239	247
80	203	106	122	103	22	64	150	154	–	17	45	236	239	240	248
85	211	111	128	109	22	64	152	156	161	20	45	237	241	242	250
90	214	116	132	113	22	64	160	164	168	20	45	239	242	243	251
95	221	121	137	119	22	64	161	165	170	20	45	240	244	245	253
100	228	127	144	125	22	64	168	172	177	20	45	242	246	247	255
110	237	137	154	134	22	64	178	182	186	20	45	245	249	250	258
120	266	146	164	144	22	64	187	191	195	20	45	248	252	253	259

\*Requires socket head cap screws or D shaped washers.

# 180™ SMALL and LARGE SINGLE SEAL – Dimensional Data/Inch



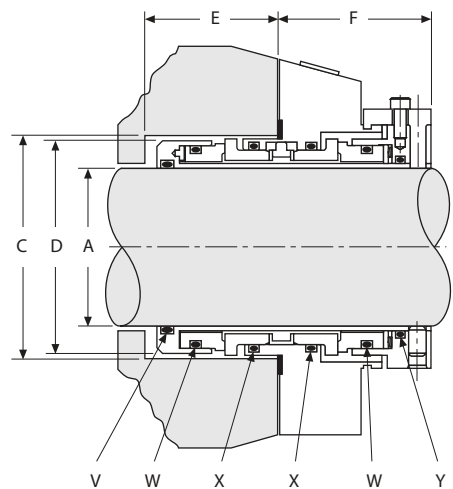
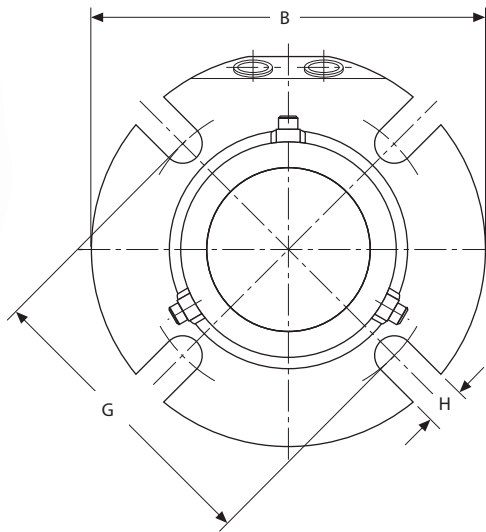
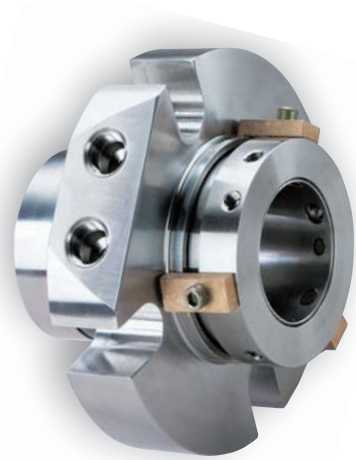
**180 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Inboard Seal Diameter
- E – Required Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- J – Gland Width
- V – Shaft O-ring
- W – Rotary Seal O-ring
- X – Stationary Seal O-ring
- Y – Gland O-rings

A	B MAX	C MIN	C MAX	D MAX	E MIN	F MAX	3/8"	G MIN 1/2"	5/8"	H	J MAX	V	W	X	Y
1.750	5.49	2.50	2.81	2.44	0.69	1.91	3.62	3.75*	–	0.57	1.27	132	138	139	150
1.750 OS	6.64	3.50	3.75	2.44	0.69	1.91	5.21	5.33	5.46	0.57	1.44	132	138	139	151
1.875	5.49	2.63	2.94	2.57	0.69	1.91	3.75	3.87*	–	0.57	1.27	134	140	141	151
1.875 OS	5.99	3.56	3.81	2.57	0.69	1.91	–	5.00	–	0.57	1.44	134	140	141	152
2.000	5.49	2.75	3.19	2.69	0.69	1.91	4.00	4.13	–	0.57	1.27	136	142	143	152
2.125	5.99	2.88	3.44	2.82	0.69	1.91	4.25	4.38	4.50	0.69	1.27	138	144	145	153
2.125 OS	6.99	3.88	4.25	2.82	0.69	1.91	–	–	5.95	0.69	1.44	138	144	145	153
2.250	5.99	3.00	3.56	2.94	0.69	1.91	4.37	4.50	4.62	0.69	1.27	140	146	147	153
2.375	5.99	3.13	3.59	3.07	0.69	1.91	4.43	4.56	4.68	0.69	1.27	142	148	149	153
2.375 OS	8.40	4.13	4.50	3.07	0.69	1.91	–	–	7.00	0.69	1.44	142	148	149	154
2.500	6.49	3.25	3.81	3.19	0.69	1.91	4.62	4.75	4.87	0.69	1.27	144	150	151	154
2.500 OS	7.77	4.50	4.75	3.19	0.69	1.91	–	–	6.75	0.69	1.44	144	150	151	154
							1/2"	5/8"	3/4"						
2.625	6.45	3.63	4.04	3.54	0.88	2.50	5.02	5.15	–	0.69	1.77	231	236	237	242
2.750	7.70	3.75	4.38	3.67	0.88	2.50	5.42	5.55	–	0.69	1.77	232	236	237	245
2.875	7.83	3.88	4.50	3.79	0.88	2.50	5.50	5.62	–	0.69	1.77	233	237	238	246
3.000	7.94	4.00	4.69	3.92	0.88	2.50	5.65	5.77	–	0.69	1.77	234	238	239	247
3.125	7.99	4.13	4.81	4.04	0.88	2.50	5.80	5.92	–	0.69	1.77	235	239	240	248
3.250	8.19	4.25	4.94	4.17	0.88	2.50	5.93	6.05	–	0.69	1.77	236	240	241	249
3.375	8.30	4.38	5.06	4.29	0.88	2.50	6.02	6.14	6.27	0.81	1.77	237	241	242	250
3.500	8.44	4.50	5.19	4.42	0.88	2.50	6.18	6.31	6.43	0.81	1.77	238	242	243	251
3.625	8.49	4.63	5.31	4.54	0.88	2.50	6.31	6.44	6.56	0.81	1.77	239	243	244	252
3.750	8.71	4.75	5.39	4.67	0.88	2.50	6.38	6.51	6.63	0.81	1.77	240	244	245	253
3.875	8.84	4.88	5.51	4.79	0.88	2.50	6.52	6.64	6.77	0.81	1.77	241	245	246	254
4.000	8.96	5.00	5.69	4.92	0.88	2.50	6.66	6.78	6.91	0.81	1.77	242	246	247	255
4.125	8.99	5.13	5.81	5.04	0.88	2.50	6.79	6.90	7.03	0.81	1.77	243	247	248	256
4.250	8.99	5.25	5.94	5.17	0.88	2.50	6.91	7.04	7.16	0.81	1.77	244	248	249	257
4.375	9.33	5.38	6.06	5.29	0.88	2.50	7.03	7.15	7.28	0.81	1.77	245	249	250	258
4.500	9.49	5.50	6.19	5.42	0.88	2.50	7.18	7.30	7.43	0.81	1.77	246	250	251	258
4.625	9.49	5.63	6.31	5.54	0.88	2.50	7.28	7.40	7.53	0.81	1.77	247	251	252	259
4.750	10.49	5.75	6.47	5.67	0.88	2.50	7.40	7.53	7.65	0.81	1.77	248	252	253	259

\*Requires socket head cap screws or D shaped washers.

# 280™ HEAVY DUTY DUAL SEAL – Dimensional Data/Metric



**280 KEY**

- A** – Shaft Size
- B** – Maximum Gland Diameter
- C** – Seal Chamber Bore
- D** – Seal Diameter in Seal Chamber
- E** – Minimum Seal Chamber Bore Depth
- F** – Outboard Seal Length
- G** – Minimum Bolt Circle by Bolt Size
- H** – Slot Width
- V** – Shaft O-ring
- W** – Rotary O-ring
- X** – Stationary O-ring
- Y** – Lock Ring O-ring

A	B MAX	C MIN	C MAX	D MAX	E MIN	F MAX	10 mm	G MIN 12 mm	16 mm	20 mm	H	V	W	X	Y
25	104	45	51	44	40	54	74	-	-	-	11	120	126	127	121
28	104	48	52	47	40	54	74	-	-	-	11	122	128	129	123
30	104	50	56	49	40	54	78	-	-	-	11	123	129	130	125
32	104	52	57	51	40	54	80	-	-	-	11	124	130	131	126
33	113	53	58	52	40	54	81	83	-	-	14	125	131	132	127
35	111	54	59	53	40	54	80	82	-	-	14	126	132	133	128
38	114	58	61	57	40	54	85	87	-	-	14	128	134	135	130
40	127	60	68	59	40	54	90	92	-	-	14	129	135	136	131
43	127	61	68	62	40	54	91	93	-	-	14	131	137	138	133
45	139	65	73	64	40	54	95	97	-	-	14	133	139	140	134
48	139	68	73	67	40	54	96	98	-	-	14	134	141	142	136
50	139	70	78	69	40	54	100	102	-	-	14	136	142	143	137
55	152	75	83	74	40	54	105	107	111	-	18	139	145	146	140
60	152	80	91	79	40	54	114	116	120	-	18	142	148	149	143
65	164	92	100	91	52	64	-	127	131	-	18	231	235	236	148
70	196	96	113	95	52	64	-	137	141	-	18	232	236	237	151
75	202	102	119	101	52	64	-	143	147	-	18	234	238	239	5-557
80	203	106	122	105	52	64	-	147	151	-	18	236	239	240	153
85	211	111	129	110	52	64	-	152	156	160	21	237	241	242	153
90	214	116	132	115	52	64	-	160	164	168	21	239	242	243	154
95	221	121	138	120	52	64	-	161	165	169	21	240	244	245	155
100	228	127	144	126	52	64	-	168	172	176	21	242	246	247	5-883
110	237	137	154	136	52	64	-	178	182	186	21	245	249	250	157
120	266	146	163	145	52	64	-	187	191	195	21	248	252	253	5-403



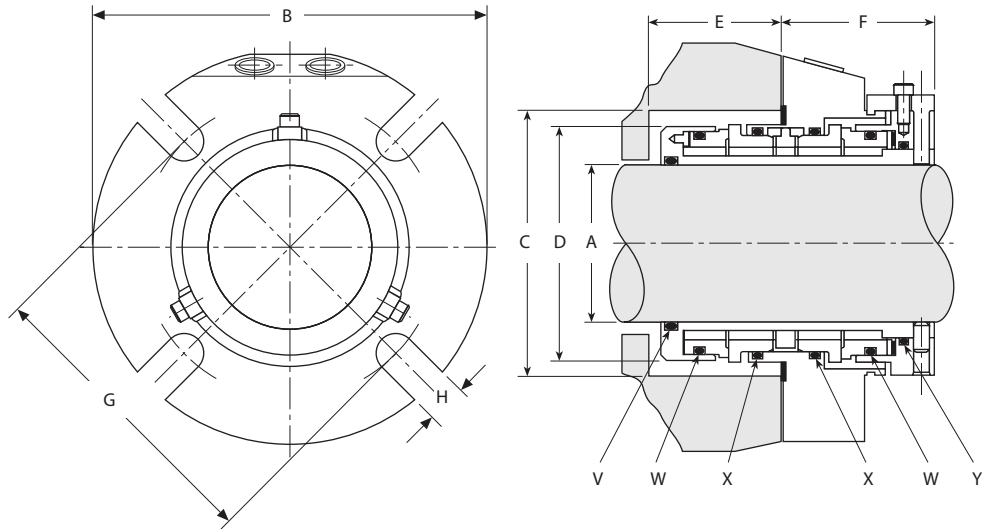
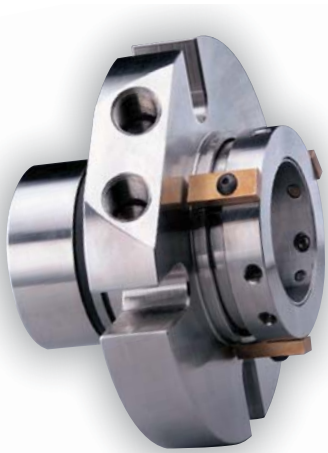
# 280™ HEAVY DUTY DUAL SEAL – Dimensional Data/Inch

**280 KEY**

<b>A</b> – Shaft Size	<b>D</b> – Seal Diameter in Seal Chamber	<b>G</b> – Minimum Bolt Circle by Bolt Size	<b>W</b> – Rotary O-ring
<b>B</b> – Maximum Gland Diameter	<b>E</b> – Minimum Seal Chamber Bore Depth	<b>H</b> – Slot Width	<b>X</b> – Stationary O-ring
<b>C</b> – Seal Chamber Bore	<b>F</b> – Outboard Seal Length	<b>V</b> – Shaft O-ring	<b>Y</b> – Lock Ring O-ring

A	B MAX	C MIN	C MAX	D MAX	E MIN	F MAX	3/8"	1/2"	G MIN 5/8"	3/4"	7/8"	H	V	W	X	Y
1.000	4.11	1.75	2.01	1.73	1.58	2.13	2.88	-	-	-	-	0.44	120	126	127	122
1.125	4.11	1.88	2.04	1.86	1.58	2.13	2.88	-	-	-	-	0.44	122	128	129	124
1.250	4.11	2.00	2.27	1.98	1.58	2.13	3.14	-	-	-	-	0.44	124	130	131	126
1.375	4.36	2.13	2.33	2.11	1.58	2.13	3.13	3.25	-	-	-	0.57	126	132	133	128
1.375 OS	5.40	2.81	3.00	2.80	1.58	2.13	4.03	-	-	-	-	0.44	126	132	133	128
1.500	4.49	2.25	2.44	2.23	1.58	2.13	3.33	3.45	-	-	-	0.57	128	134	135	130
1.625	4.99	2.38	2.69	2.36	1.58	2.13	3.52	3.65	-	-	-	0.57	130	136	137	132
1.750	5.49	2.50	2.81	2.48	1.58	2.13	3.65	3.77	-	-	-	0.57	132	138	139	134
1.750 OS	6.64	3.50	3.75	3.48	1.58	2.13	5.37	5.49	5.62	-	-	0.57	132	138	139	134
1.875	5.49	2.63	2.94	2.61	1.58	2.13	3.78	3.90	-	-	-	0.57	134	140	141	136
1.875 OS	5.99	3.56	3.81	3.54	1.58	2.13	-	5.00	-	-	-	0.57	134	140	141	136
2.000	5.49	2.75	3.19	2.73	1.58	2.13	4.03	4.15	-	-	-	0.57	136	142	143	138
2.125	5.99	2.88	3.44	2.85	1.58	2.13	4.28	4.41	4.53	-	-	0.69	138	144	145	140
2.125 OS	6.99	3.88	4.25	3.86	1.58	2.13	-	-	6.00	-	-	0.69	138	144	145	140
2.250	5.99	3.00	3.56	2.98	1.58	2.13	4.40	4.53	4.65	-	-	0.69	140	146	147	142
2.375	5.99	3.13	3.59	3.11	1.58	2.13	4.46	4.59	4.71	-	-	0.69	142	148	149	144
2.500	6.49	3.25	3.81	3.23	1.58	2.13	4.65	4.78	4.90	-	-	0.69	144	150	151	146
2.500 OS	7.77	4.50	4.75	4.48	1.58	2.13	-	-	6.75	-	-	0.69	144	150	151	146
2.625	6.45	3.63	3.93	3.60	2.05	2.50	-	5.02	5.15	-	-	0.69	231	235	236	149
2.625 OS	6.98	4.55	4.88	4.54	2.05	2.50	-	-	6.00	-	-	0.69	231	235	236	149
2.750	7.71	3.75	4.44	3.73	2.05	2.50	-	5.42	5.55	-	-	0.69	232	236	237	151
2.750 OS	7.89	4.45	4.56	4.44	2.05	2.50	-	-	-	6.38	-	0.82	232	236	237	151
2.875	7.83	3.88	4.56	3.85	2.05	2.50	-	5.50	5.62	-	-	0.69	233	237	238	151
3.000	7.94	4.00	4.69	3.97	2.05	2.50	-	5.65	5.77	-	-	0.69	234	238	239	152
3.000 OS	8.64	4.93	5.17	4.92	2.05	2.50	-	-	7.00	7.13	7.25	0.94	234	238	239	152
3.125	7.99	4.13	4.81	4.10	2.05	2.50	-	5.80	5.92	-	-	0.69	235	239	240	152
3.250	8.19	4.25	4.94	4.22	2.05	2.50	-	5.93	6.05	-	-	0.69	236	240	241	153
3.375	8.31	4.38	5.06	4.35	2.05	2.50	-	6.02	6.14	6.27	-	0.81	237	241	242	153
3.375 OS	8.39	4.95	5.06	4.94	2.05	2.50	-	-	-	6.88	-	0.82	237	241	242	153
3.500	8.44	4.50	5.19	4.47	2.05	2.50	-	6.18	6.31	6.43	-	0.81	238	242	243	154
3.625	8.49	4.63	5.31	4.60	2.05	2.50	-	6.31	6.44	6.56	-	0.81	239	243	244	154
3.750	8.72	4.75	5.44	4.72	2.05	2.50	-	6.38	6.51	6.63	-	0.81	240	244	245	155
3.750 OS	9.76	5.97	6.18	5.94	2.05	2.50	-	-	8.25	-	-	0.69	240	244	245	155
3.875	8.84	4.88	5.56	4.85	2.05	2.50	-	6.52	6.64	6.77	-	0.81	241	246	247	156
4.000	8.96	5.00	5.69	4.97	2.05	2.50	-	6.66	6.78	6.91	-	0.81	242	246	247	156
4.125	8.99	5.13	5.81	5.10	2.05	2.50	-	6.79	6.90	7.03	-	0.81	243	247	248	157
4.125 OS	9.76	5.97	6.06	5.94	2.05	2.50	-	-	-	-	8.00	0.94	243	247	248	157
4.250	8.99	5.25	5.94	5.22	2.05	2.50	-	6.91	7.04	7.16	-	0.81	244	248	249	157
4.375	9.34	5.38	6.06	5.35	2.05	2.50	-	7.03	7.15	7.28	-	0.81	245	249	250	157
4.500	9.49	5.50	6.19	5.47	2.05	2.50	-	7.18	7.30	7.43	-	0.81	246	250	251	158
4.500 OS	12.49	6.78	7.25	6.75	2.05	2.50	-	-	-	10.73	-	0.89	246	250	251	158
4.625	9.49	5.63	6.31	5.60	2.05	2.50	-	7.28	7.40	7.53	-	0.81	247	251	252	158
4.750	10.49	5.75	6.44	5.72	2.05	2.50	-	7.40	7.53	7.65	-	0.81	248	252	253	159
4.750 OS	11.39	7.22	7.42	7.19	2.05	2.50	-	-	9.88	10.00	-	0.82	248	252	253	159

# 280™ HEAVY DUTY MIXER DUAL SEAL – Dimensional Data/Metric



**280M KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Seal Diameter in Seal Chamber
- E – Minimum Seal Chamber Bore Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- V – Shaft O-ring
- W – Rotary O-ring
- X – Stationary O-ring
- Y – Lock Ring O-ring

A	B MAX	C MIN	C MAX	D MAX	E MIN	F MAX	10 mm	G MIN 12 mm	16 mm	H	V	W	X	Y
35	114	60	62	56	40	54	91	92	–	14	126	134	135	130
38	127	63	68	59	40	54	94	95	–	14	128	136	137	132
60	165	86	97	82	40	54	122	124	128	18	142	150	151	146
							12 mm	16 mm	20 mm					
65	199	102	116	98	52	64	139	143	–	18	231	237	238	151
70	202	108	119	101	52	64	143	147	–	18	232	238	239	152
75	208	114	125	107	52	64	150	154	–	18	234	240	241	153
80	211	117	129	110	52	64	152	156	160	21	235	241	242	153
85	216	124	135	117	52	64	160	164	168	21	237	243	244	154
90	225	130	141	123	52	64	165	169	173	21	239	245	246	155
95	228	133	144	126	52	64	168	172	176	21	240	246	247	156
100	228	140	151	132	52	64	175	179	183	21	242	248	249	156
110	241	149	160	142	52	64	184	188	191	21	245	251	252	158
							20 mm	24 mm	30 mm					
120	279	171	–	162	83	104	227	230	236	–	351	359	361	253
130	292	184	–	175	83	104	239	242	248	–	355	362	363	257
140	298	191	–	181	83	104	246	249	255	–	357	363	364	259
150	311	203	–	194	83	104	258	261	267	–	361	365	366	260
160	323	216	–	207	83	104	271	274	280	–	363	367	368	262
170	330	222	–	213	83	104	277	280	286	–	364	368	369	263
180	343	235	–	226	83	104	290	293	299	–	366	370	371	265
190	349	241	–	232	83	104	296	299	305	–	367	371	372	266
200	362	254	–	245	83	104	309	312	318	–	369	373	374	268

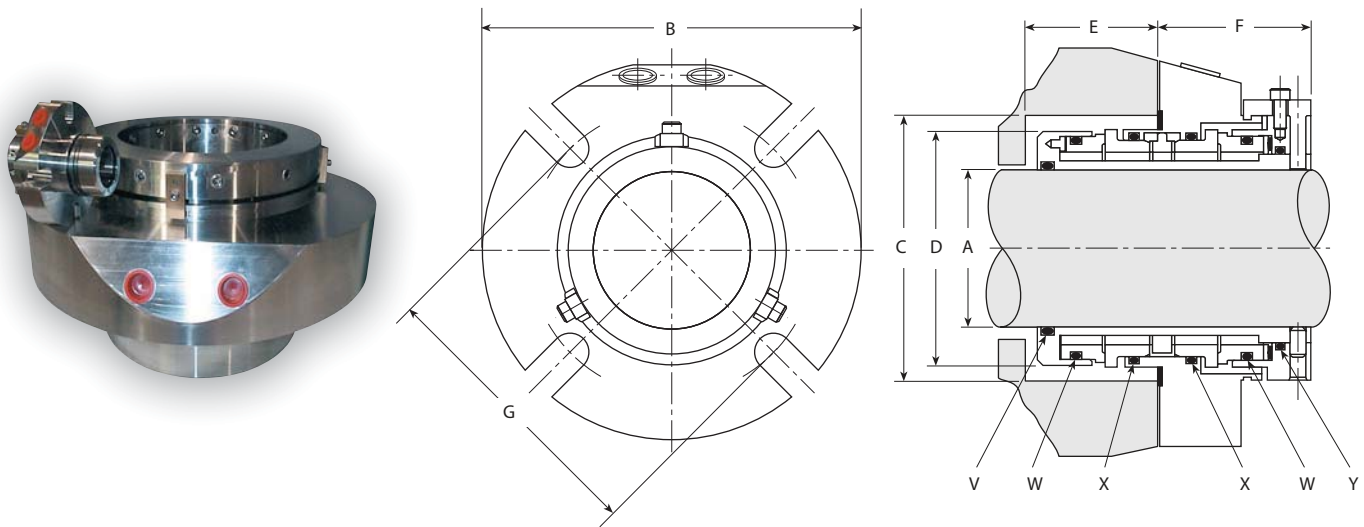
# 280™ HEAVY DUTY MIXER DUAL SEAL – Dimensional Data/Inch

**280M KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Seal Diameter in Seal Chamber
- E – Minimum Seal Chamber Bore Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- V – Shaft O-ring
- W – Rotary O-ring
- X – Stationary O-ring
- Y – Lock Ring O-ring

A	B MAX	C MIN	C MAX	D MAX	E MIN	F MAX	3/8"	G MIN 1/2"	5/8"	H	V	W	X	Y
1.000	4.11	2.00	2.04	1.85	1.58	2.13	3.14	–	–	0.44	120	128	129	124
1.125	4.11	2.12	2.27	1.98	1.58	2.13	3.14	3.26	–	0.57	122	130	131	126
1.250	4.36	2.25	2.33	2.10	1.58	2.13	3.33	3.46	–	0.57	124	132	133	128
1.375	4.49	2.37	2.44	2.23	1.58	2.13	3.53	3.66	–	0.57	126	134	135	130
1.500	4.99	2.50	2.69	2.35	1.58	2.13	3.65	3.78	–	0.57	128	136	137	132
1.625	5.49	2.62	2.81	2.48	1.58	2.13	3.78	3.91	–	0.57	130	138	139	134
1.750	5.49	2.75	2.94	2.60	1.58	2.13	4.03	4.16	–	0.57	132	140	141	136
1.875	5.49	2.87	3.19	2.73	1.58	2.13	4.28	4.41	4.53	0.69	134	142	143	138
2.000	5.99	3.00	3.44	2.85	1.58	2.13	4.40	4.53	4.65	0.69	136	144	145	140
2.125	5.99	3.12	3.56	2.98	1.58	2.13	4.46	4.59	4.71	0.69	138	146	147	142
2.250	5.99	3.25	3.62	3.10	1.58	2.13	4.65	4.78	4.90	0.69	140	148	149	144
2.375	6.49	3.37	3.81	3.23	1.58	2.13	4.77	4.90	5.02	0.69	142	150	151	146
							1/2"	5/8"	3/4"					
2.500	7.71	4.00	4.44	3.73	2.05	2.50	5.42	5.55	–	0.69	230	236	237	151
2.625	7.83	4.12	4.56	3.86	2.05	2.50	5.50	5.62	–	0.69	231	237	238	151
2.750	7.94	4.25	4.69	3.97	2.05	2.50	5.65	5.77	–	0.69	232	238	239	152
2.875	7.99	4.37	4.81	4.10	2.05	2.50	5.80	5.92	–	0.69	233	239	240	152
3.000	8.19	4.50	4.94	4.22	2.05	2.50	5.93	6.05	–	0.69	234	240	241	153
3.125	8.31	4.62	5.06	4.35	2.05	2.50	6.02	6.14	6.27	0.81	235	241	242	153
3.250	8.44	4.75	5.19	4.47	2.05	2.50	6.18	6.31	6.43	0.81	236	242	243	154
3.375	8.49	4.87	5.31	4.60	2.05	2.50	6.31	6.44	6.56	0.81	237	243	244	154
3.500	8.72	5.00	5.44	4.72	2.05	2.50	6.38	6.51	6.63	0.81	238	244	245	155
3.625	8.84	5.12	5.56	4.85	2.05	2.50	6.52	6.64	6.77	0.81	239	245	246	155
3.750	8.96	5.25	5.69	4.97	2.05	2.50	6.66	6.78	6.91	0.81	240	246	247	156
3.875	8.99	5.37	5.81	5.10	2.05	2.50	6.76	6.90	7.03	0.81	241	247	248	156
4.000	8.99	5.50	5.94	5.22	2.05	2.50	6.91	7.05	7.16	0.81	242	248	249	157
4.125	9.34	5.62	6.06	5.35	2.05	2.50	7.03	7.15	7.28	0.81	243	249	250	157
4.250	9.49	5.75	6.19	5.47	2.05	2.50	7.18	7.30	7.43	0.81	244	250	251	158
4.375	9.49	5.87	6.31	5.60	2.05	2.50	7.28	7.40	7.53	0.81	245	251	252	158
4.500	10.49	6.00	6.44	5.72	2.05	2.50	7.40	7.53	7.65	0.81	246	252	253	159
							7/8"	1"	1 1/8"					
4.750	10.99	6.75	–	6.38	3.25	4.09	8.92	9.04	9.17	–	351	359	361	253
5.000	11.24	7.00	–	6.63	3.25	4.09	9.17	9.29	9.42	–	353	361	362	255
5.250	11.49	7.25	–	6.88	3.25	4.09	9.42	9.54	9.67	–	355	362	363	257
5.500	11.74	7.50	–	7.13	3.25	4.09	9.67	9.79	9.92	–	357	363	364	259
5.750	11.99	7.75	–	7.38	3.25	4.09	9.92	10.04	10.17	–	359	364	365	260
6.000	12.24	8.00	–	7.63	3.25	4.09	10.17	10.29	10.42	–	361	365	366	261
6.250	12.49	8.25	–	7.88	3.25	4.09	10.42	10.54	10.67	–	362	366	367	262
6.500	12.74	8.50	–	8.13	3.25	4.09	10.67	10.79	10.92	–	363	367	368	263
6.750	12.99	8.75	–	8.38	3.25	4.09	10.92	11.04	11.17	–	364	368	369	264
7.000	13.24	9.00	–	8.63	3.25	4.09	11.17	11.29	11.42	–	365	369	370	265
7.250	13.49	9.25	–	8.88	3.25	4.09	11.42	11.54	11.67	–	366	370	371	266
7.500	13.74	9.50	–	9.13	3.25	4.09	11.67	11.79	11.92	–	367	371	372	267
7.750	13.99	9.75	–	9.38	3.25	4.09	11.92	12.04	12.17	–	368	372	373	268
8.000	14.24	10.00	–	9.63	3.25	4.09	12.17	12.29	12.42	–	369	373	374	269

# 280™ MIXER JUMBO DUAL SEAL – Dimensional Data/Metric

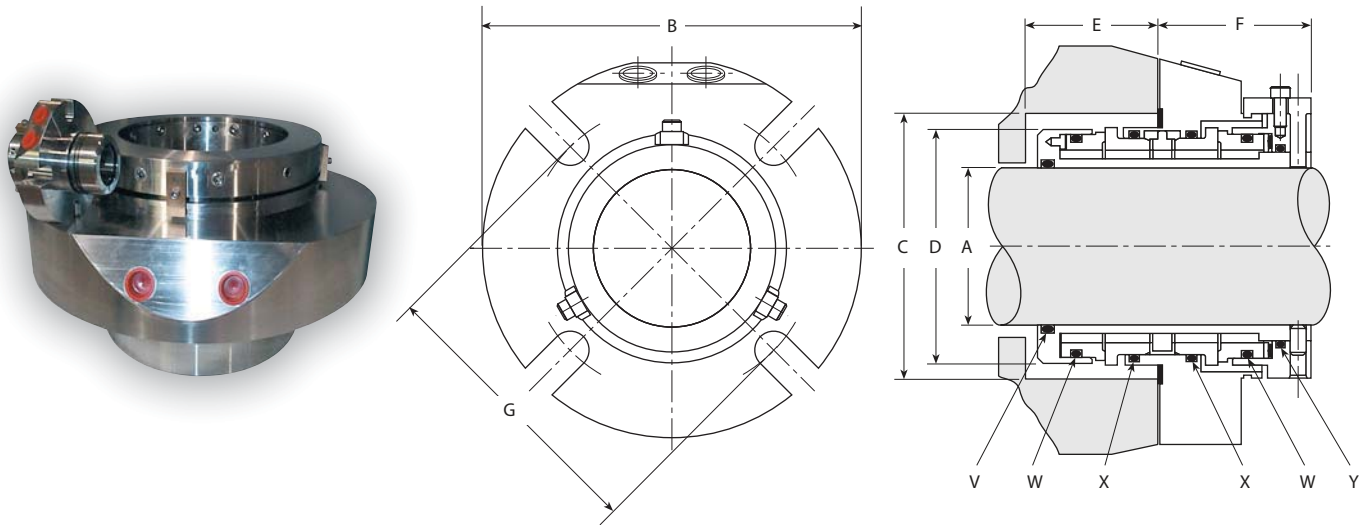


**280M JUMBO KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Seal Diameter in Seal Chamber
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- V – Shaft O-ring
- W – Rotary O-ring
- X – Stationary O-ring
- Y – Lock Ring O-ring

A	B MAX	C MIN	D MAX	E MIN	F MAX	20 mm	G MIN 24 mm	30 mm	V	W	X	Y
210	457	292	280	109	145	368	372	378	446	449	450	374
220	470	305	292	109	145	381	385	391	447	450	451	376
230	470	305	292	109	145	381	385	391	447	450	451	376
240	483	318	305	109	145	394	398	404	448	451	452	378
250	496	330	318	109	145	406	410	417	449	452	453	379
260	508	343	330	109	145	419	423	429	450	453	454	380
270	521	356	343	109	145	432	436	442	451	454	455	381
280	521	356	343	109	145	432	436	442	451	454	455	381
290	534	368	356	109	145	445	449	455	452	455	456	5-902
300	546	381	369	109	145	457	461	467	453	456	457	382

# 280™ MIXER JUMBO DUAL SEAL – Dimensional Data/Inch

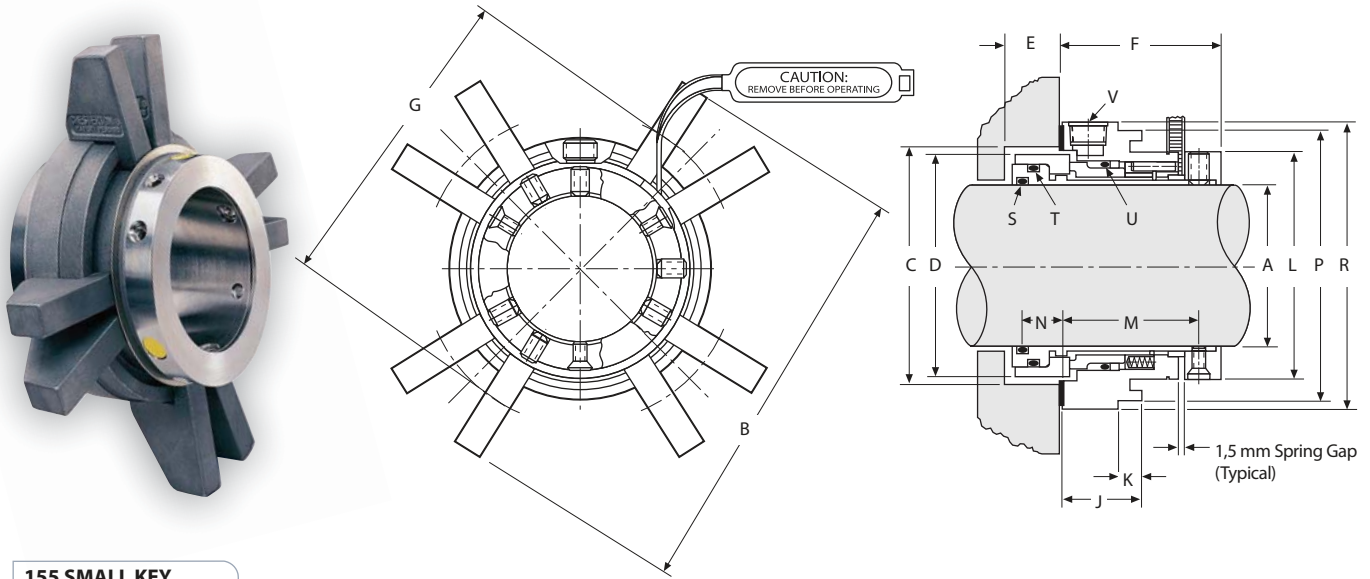


**280M JUMBO KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Seal Diameter in Seal Chamber
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- V – Shaft O-ring
- W – Rotary O-ring
- X – Stationary O-ring
- Y – Lock Ring O-ring

A	B MAX	C MIN	D MAX	E MIN	F MAX	7/8"	G MIN 1"	1 1/8"	V	W	X	Y
8.25	17.76	11.50	11.01	4.29	5.72	14.50	14.63	14.75	446	449	450	374
8.50	18.01	11.50	11.26	4.29	5.72	14.50	14.63	14.75	446	449	450	374
8.75	18.26	12.00	11.51	4.29	5.72	15.00	15.13	15.25	447	450	451	376
9.00	18.51	12.00	11.76	4.29	5.72	15.00	15.13	15.25	447	450	451	376
9.25	18.76	12.50	12.01	4.29	5.72	15.50	15.63	15.75	448	451	452	378
9.50	19.01	12.50	12.26	4.29	5.72	15.50	15.63	15.75	448	451	452	378
9.75	19.26	13.00	12.51	4.29	5.72	16.00	16.13	16.25	449	452	453	379
10.00	19.51	13.00	12.76	4.29	5.72	16.00	16.13	16.25	449	452	453	379
10.25	19.76	13.50	13.01	4.29	5.72	16.50	16.63	16.75	450	453	454	380
10.50	20.01	13.50	13.26	4.29	5.72	16.50	16.63	16.75	450	453	454	380
10.75	20.26	14.00	13.51	4.29	5.72	17.00	17.13	17.25	451	454	455	381
11.00	20.51	14.00	13.76	4.29	5.72	17.00	17.13	17.25	451	454	455	381
11.25	20.76	14.50	14.01	4.29	5.72	17.50	17.63	17.75	452	455	456	5-902
11.50	21.01	14.50	14.26	4.29	5.72	17.50	17.63	17.75	452	455	456	5-902
11.75	21.26	15.00	14.51	4.29	5.72	18.00	18.13	18.25	453	456	457	382
12.00	21.51	15.00	14.76	4.29	5.72	18.00	18.13	18.25	453	456	457	382

# 155™ SMALL STANDARD SINGLE CARTRIDGE SEAL – Dimensional Data/Metric

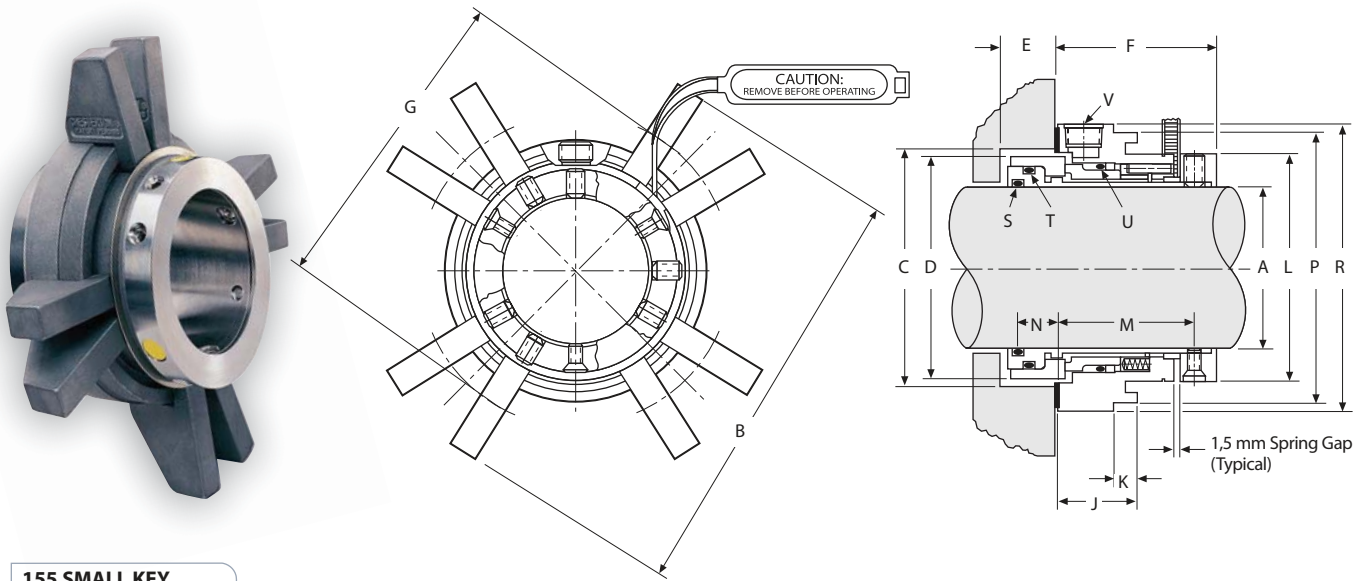


**155 SMALL KEY**

- A – Shaft Size
- B – Maximum Gland Tab Diameter
- C – Seal Chamber Bore
- D – Seal Diameter in Seal Chamber
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- J – Hub Gland Flange Width
- K – Hub Gland Slot Width
- L – Lock Ring Diameter
- M – Distance from Seal Chamber Face to Set Screws
- N – Distance from Seal Chamber Face to Shaft O-ring
- P – Hub Gland Slot Diameter
- R – Hub Gland Diameter
- S – Shaft O-ring
- T – Rotary O-ring
- U – Stationary O-ring
- V – NTP Size

A	B MAX TABS	C MIN	C MAX	D	E MIN	F	G MIN TABS			G MIN 478			H	J	K	L	M	N	P	R	S	T	U	V
							8 mm	10 mm	12 mm	8 mm	10 mm	12 mm												
25	118	44	51	43	16	48	70	72	74	71	73	-	11	24	9	44	40	12	57	62	120	124	126	1/8"
28	118	47	52	46	16	48	70	72	74	71	73	-	11	24	9	47	40	12	57	62	121	126	128	1/8"
30	124	49	57	48	16	48	76	78	80	77	79	-	11	24	9	49	40	12	60	68	123	127	129	1/8"
32	124	51	58	50	16	48	77	79	81	78	80	-	11	24	9	51	40	12	62	69	124	128	130	1/8"
33	124	52	59	51	16	48	76	78	80	78	80	-	11	24	9	52	40	12	62	69	125	129	131	1/8"
35	128	54	62	52	16	48	80	82	84	86	88	-	11	24	9	54	40	12	70	72	126	130	132	1/8"
38	133	57	67	56	16	48	85	87	89	86	88	-	11	24	9	57	40	12	70	77	128	132	134	1/8"
40	134	59	68	58	16	48	86	88	90	86	88	90	15	24	9	59	40	12	73	78	129	134	135	1/8"
43	134	62	69	61	16	48	86	88	90	86	88	90	15	24	9	62	40	12	73	78	131	135	137	1/8"
45	140	64	73	63	16	48	92	94	96	92	94	96	15	24	9	64	40	12	79	84	132	136	138	1/8"
48	139	67	74	66	16	48	91	93	95	92	94	96	15	24	9	67	40	12	79	84	134	139	140	1/8"
50	145	69	78	68	16	48	97	99	101	96	98	100	15	24	9	69	40	12	82	89	136	140	142	1/8"
55	150	74	83	73	16	48	102	104	106	112	114	116	17	24	9	74	40	12	94	94	139	143	145	1/8"
60	160	79	91	78	16	48	112	114	116	113	115	117	17	24	9	80	40	12	99	104	142	146	148	1/8"

# 155™ SMALL STANDARD SINGLE CARTRIDGE SEAL – Dimensional Data/Inch

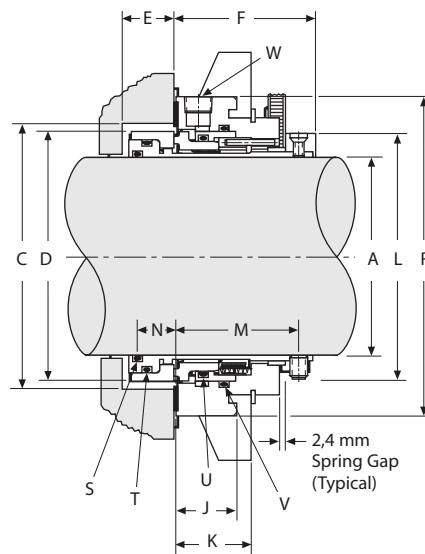
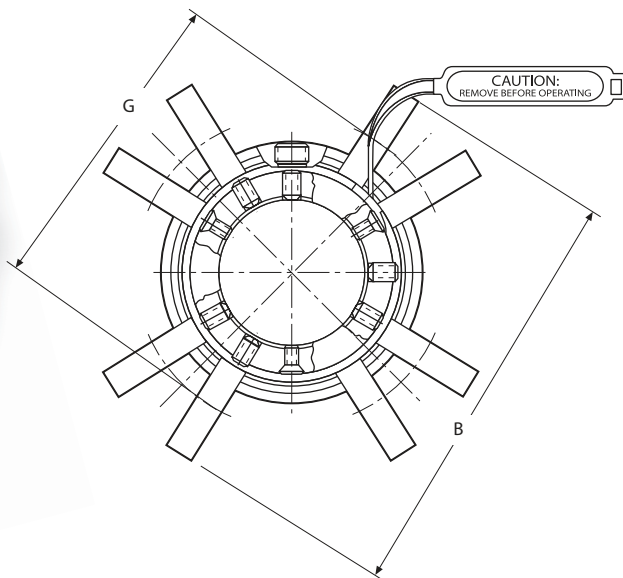


**155 SMALL KEY**

- A – Shaft Size
- B – Maximum Gland Tab Diameter
- C – Seal Chamber Bore
- D – Seal Diameter in Seal Chamber
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- J – Hub Gland Flange Width
- K – Hub Gland Slot Width
- L – Lock Ring Diameter
- M – Distance from Seal Chamber Face to Set Screws
- N – Distance from Seal Chamber Face to Shaft O-ring
- P – Hub Gland Slot Diameter
- R – Hub Gland Diameter
- S – Shaft O-ring
- T – Rotary O-ring
- U – Stationary O-ring
- V – NTP Size

A	B MAX TABS	C MIN	C MAX	D	E MIN	F	G MIN TABS			G MIN 478			H	J	K	L	M	N	P	R	S	T	U	V
							3/8"	1/2"	5/8"	3/8"	1/2"	5/8"												
1.000	4.65	1.75	2.00	1.69	0.63	1.89	2.88	3.01	3.13	2.90	–	–	0.44	0.93	0.37	1.76	1.58	0.47	2.25	2.45	120	124	126	1/8"
1.125	4.69	1.88	2.03	1.82	0.63	1.89	2.92	3.05	3.17	2.90	–	–	0.44	0.93	0.37	1.89	1.58	0.47	2.25	2.48	122	126	128	1/8"
1.250	4.90	2.00	2.26	1.94	0.63	1.89	3.13	3.26	3.38	3.21	–	–	0.44	0.93	0.37	2.01	1.58	0.47	2.43	2.70	124	128	130	1/8"
1.375	5.04	2.13	2.42	2.07	0.63	1.89	3.27	3.40	3.52	3.52	–	–	0.44	0.93	0.37	2.14	1.58	0.47	2.75	2.84	126	130	132	1/8"
1.500	5.23	2.25	2.62	2.19	0.63	1.89	3.46	3.59	3.71	3.52	–	–	0.44	0.93	0.37	2.26	1.58	0.47	2.75	3.03	128	132	134	1/8"
1.625	5.29	2.38	2.68	2.32	0.63	1.89	3.52	3.65	3.77	3.51	3.63	–	0.58	0.93	0.37	2.39	1.58	0.47	2.87	3.08	130	134	136	1/8"
1.750	5.41	2.50	2.80	2.44	0.63	1.89	3.64	3.77	3.89	3.74	3.86	–	0.58	0.93	0.37	2.51	1.58	0.47	3.12	3.21	132	136	138	1/8"
1.875	5.53	2.63	2.93	2.57	0.63	1.89	3.76	3.89	4.01	3.90	4.02	–	0.58	0.93	0.37	2.64	1.58	0.47	3.25	3.33	134	138	140	1/8"
2.000	5.74	2.75	3.18	2.69	0.63	1.89	3.97	4.10	4.22	4.15	4.27	–	0.58	0.93	0.37	2.76	1.58	0.47	3.50	3.54	136	140	142	1/8"
2.125	6.04	2.88	3.43	2.82	0.63	1.89	4.27	4.40	4.52	4.53	4.66	4.78	0.69	0.93	0.37	2.89	1.58	0.47	3.75	3.84	138	142	144	1/8"
2.250	6.14	3.00	3.55	2.94	0.63	1.89	4.38	4.51	4.63	4.56	4.69	4.81	0.69	0.93	0.37	3.01	1.58	0.47	3.87	3.94	140	144	146	1/8"
2.375	6.29	3.13	3.59	3.07	0.63	1.89	4.52	4.65	4.77	4.56	4.69	4.81	0.69	0.93	0.37	3.14	1.58	0.47	3.90	4.08	142	146	148	1/8"
2.500	6.41	3.25	3.80	3.19	0.63	1.89	4.65	4.78	4.90	4.79	4.92	5.04	0.69	0.93	0.37	3.26	1.58	0.47	4.12	4.21	144	148	150	1/8"

# 155™ LARGE STANDARD SINGLE CARTRIDGE SEAL – Dimensional Data/Metric



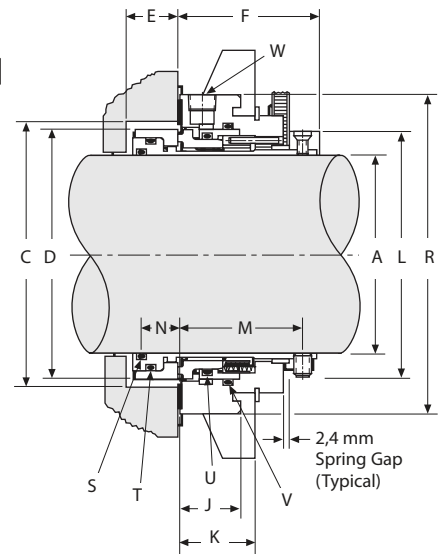
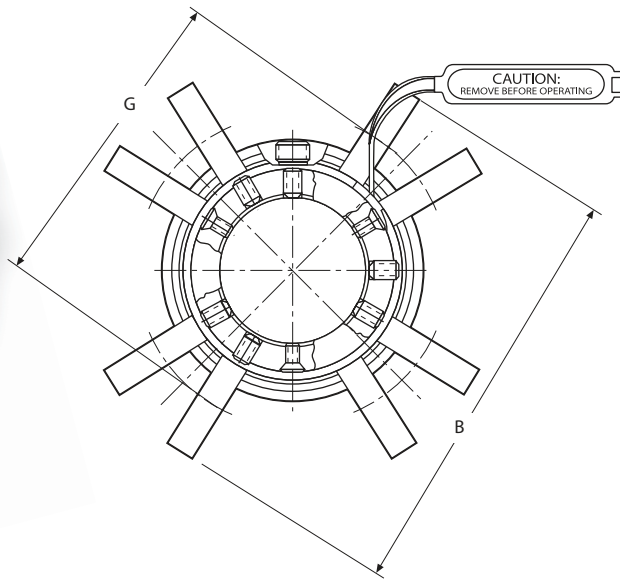
**155 LARGE KEY**

- A** – Shaft Size
- B** – Maximum Gland Tab Diameter
- C** – Seal Chamber Bore
- D** – Seal Diameter in Seal Chamber
- E** – Minimum Seal Chamber Depth
- F** – Outboard Seal Length
- G** – Minimum Bolt Circle by Bolt Size
- J** – Hub Gland Flange Width
- K** – Distance from Seal Chamber Face to Back of Tab
- L** – Lock Ring Diameter
- M** – Distance from Seal Chamber Face to Set Screws
- N** – Distance from Seal Chamber Face to Shaft O-ring
- R** – Hub Gland Diameter
- S** – Shaft O-ring
- T** – Rotary O-ring
- U** – Stationary O-ring
- V** – Gland O-ring (applies only to large sizes)
- W** – NTP Size

A	B MAX	C MIN	C MAX	D	E MIN	F	G MIN			J	K	L	M	N	R	S	T	U	V	W
							10 mm	12 mm	16 mm											
65	194	92	102	90	22	64	132	134	138	27	34	89	56	17	122	231	234	236	239	1/4"
70	197	95	105	93	22	64	135	137	141	27	34	92	56	17	125	232	235	237	240	1/4"
75	203	100	113	99	22	64	141	143	147	27	34	98	56	17	131	234	237	239	242	1/4"
80	207	105	116	103	22	64	144	146	150	27	34	102	56	17	134	236	238	240	243	1/4"
85	213	110	122	109	22	64	151	153	157	27	34	108	56	17	141	237	240	242	245	1/4"
90	216	115	125	113	22	64	154	156	160	27	34	112	56	17	144	239	241	243	246	1/4"
95	222	120	131	118	22	64	160	162	166	27	34	117	56	17	150	240	243	245	248	1/4"
100	229	127	138	125	22	64	167	169	173	27	34	123	56	17	157	242	245	247	250	1/4"
110	236	136	148	134	22	64	174	176	180	27	34	133	56	17	164	245	248	250	253	1/4"
120	248	145	158	144	22	64	186	188	192	27	34	142	56	17	176	248	251	253	256	1/4"



# 155™ LARGE STANDARD SINGLE CARTRIDGE SEAL – Dimensional Data/Inch

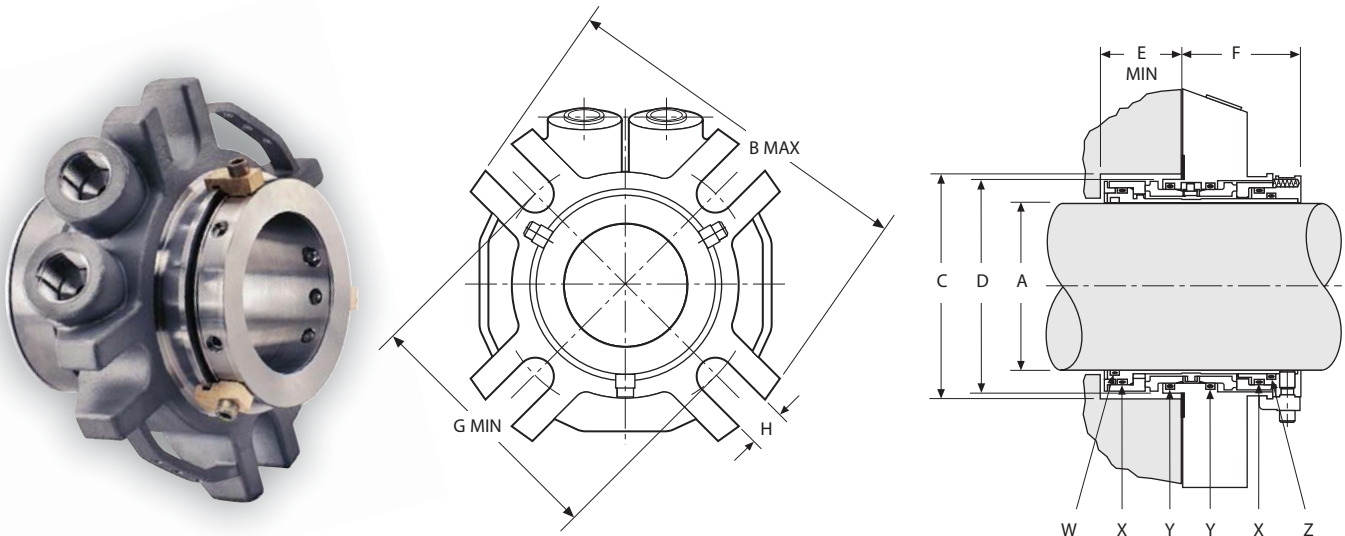


**155 LARGE KEY**

- A – Shaft Size
- B – Maximum Gland Tab Diameter
- C – Seal Chamber Bore
- D – Seal Diameter in Seal Chamber
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- J – Hub Gland Flange Width
- K – Distance from Seal Chamber Face to Back of Tab
- L – Lock Ring Diameter
- M – Distance from Seal Chamber Face to Set Screws
- N – Distance from Seal Chamber Face to Shaft O-ring
- R – Hub Gland Diameter
- S – Shaft O-ring
- T – Rotary O-ring
- U – Stationary O-ring
- V – Gland O-ring (applies only to large sizes)
- W – NTP Size

A	B MAX	C MIN	C MAX	D	E MIN	F	G MIN			J	K	L	M	N	R	S	T	U	V	W
							1/2"	5/8"	3/4"											
2.625	7.63	3.63	4.00	3.54	0.88	2.50	5.35	5.48	5.60	1.08	1.33	3.49	2.22	0.68	4.79	231	234	236	239	1/4"
2.750	7.76	3.75	4.13	3.67	0.88	2.50	5.48	5.60	5.73	1.08	1.33	3.61	2.22	0.68	4.92	232	235	237	240	1/4"
2.875	7.88	3.88	4.25	3.79	0.88	2.50	5.60	5.73	5.85	1.08	1.33	3.74	2.22	0.68	5.04	233	236	238	241	1/4"
3.000	8.01	4.00	4.44	3.92	0.88	2.50	5.73	5.85	5.98	1.08	1.33	3.86	2.22	0.68	5.17	234	237	239	242	1/4"
3.125	8.13	4.13	4.55	4.04	0.88	2.50	5.85	5.98	6.10	1.08	1.33	3.99	2.22	0.68	5.29	235	238	240	243	1/4"
3.250	8.26	4.25	4.69	4.17	0.88	2.50	5.98	6.10	6.23	1.08	1.33	4.11	2.22	0.68	5.42	236	239	241	244	1/4"
3.375	8.38	4.38	4.80	4.29	0.88	2.50	6.10	6.23	6.35	1.08	1.33	4.24	2.22	0.68	5.54	237	240	242	245	1/4"
3.500	8.51	4.50	4.94	4.42	0.88	2.50	6.23	6.35	6.48	1.08	1.33	4.36	2.22	0.68	5.67	238	241	243	246	1/4"
3.625	8.63	4.63	5.05	4.54	0.88	2.50	6.35	6.48	6.60	1.08	1.33	4.49	2.22	0.68	5.79	239	242	244	247	1/4"
3.750	8.76	4.75	5.14	4.67	0.88	2.50	6.48	6.60	6.73	1.08	1.33	4.61	2.22	0.68	5.92	240	243	245	248	1/4"
3.875	8.88	4.88	5.26	4.79	0.88	2.50	6.60	6.73	6.85	1.08	1.33	4.74	2.22	0.68	6.04	241	244	246	249	1/4"
4.000	9.01	5.00	5.44	4.92	0.88	2.50	6.73	6.85	6.98	1.08	1.33	4.86	2.22	0.68	6.17	242	245	247	250	1/4"
4.125	9.13	5.13	5.55	5.04	0.88	2.50	6.85	6.98	7.10	1.08	1.33	4.99	2.22	0.68	6.29	243	246	248	251	1/4"
4.250	9.18	5.25	5.69	5.17	0.88	2.50	6.89	7.02	7.14	1.08	1.33	5.11	2.22	0.68	6.33	244	247	249	252	1/4"
4.375	9.30	5.38	5.81	5.29	0.88	2.50	7.02	7.14	7.27	1.08	1.33	5.24	2.22	0.68	6.46	245	248	250	253	1/4"
4.500	9.43	5.50	5.94	5.42	0.88	2.50	7.14	7.27	7.39	1.08	1.33	5.36	2.22	0.68	6.58	246	249	251	254	1/4"
4.625	9.56	5.63	6.06	5.54	0.88	2.50	7.27	7.39	7.52	1.08	1.33	5.49	2.22	0.68	6.71	247	250	252	255	1/4"
4.750	9.76	5.75	6.22	5.67	0.88	2.50	7.47	7.60	7.72	1.08	1.33	5.61	2.22	0.68	6.91	248	251	253	256	1/4"

# 255™ SMALL STANDARD DUAL CARTRIDGE SEAL – Dimensional Data/Metric

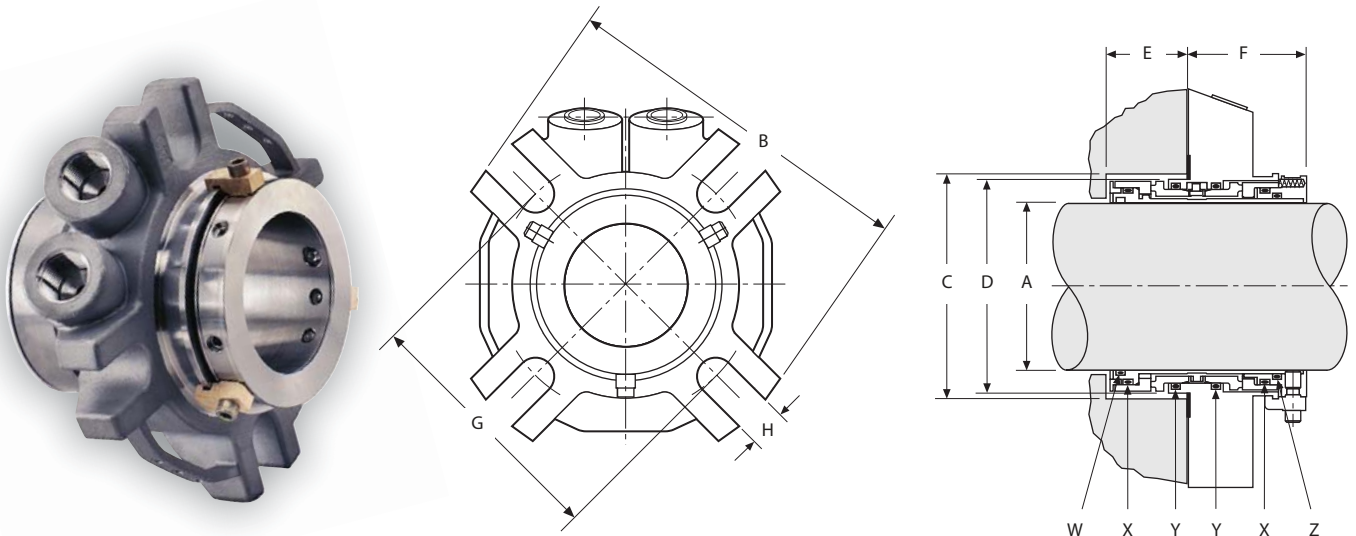


**255 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Seal Diameter in Seal Chamber
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- W – Shaft O-ring
- X – Rotary Seal O-ring (2)
- Y – Stationary Seal O-ring (2)
- Z – Sleeve O-ring

A	B MAX	C MIN	C MAX	D MAX	E MIN	F MAX	8 mm	G MIN 10 mm	12 mm	H	W	X	Y	Z
25	105	44	46	43	35	55	70	72	74	14	120	124	126	121
28	105	47	49	46	35	55	73	75	77	14	121	126	128	123
30	105	49	51	48	35	55	76	78	80	14	123	127	129	125
32	105	51	52	50	35	55	77	79	81	14	124	128	131	126
33	114	54	58	53	35	55	78	80	82	14	125	129	131	127
35	111	54	59	53	35	55	80	82	84	14	126	130	132	128
38	114	57	62	57	35	55	83	85	87	14	128	132	134	130
40	127	59	61	58	35	55	86	88	90	14	129	134	136	131
43	127	64	69	63	35	55	89	91	93	14	131	135	137	133
45	140	64	66	63	35	55	93	95	97	14	132	137	139	134
48	140	69	74	68	35	55	94	96	98	14	134	139	141	136
50	140	69	71	68	35	55	98	100	102	14	136	140	142	137
55	153	74	76	73	35	55	–	103	105	17	139	143	145	140
60	153	79	85	79	35	55	–	113	115	17	142	146	148	144

# 255™ SMALL STANDARD DUAL CARTRIDGE SEAL – Dimensional Data/Inch

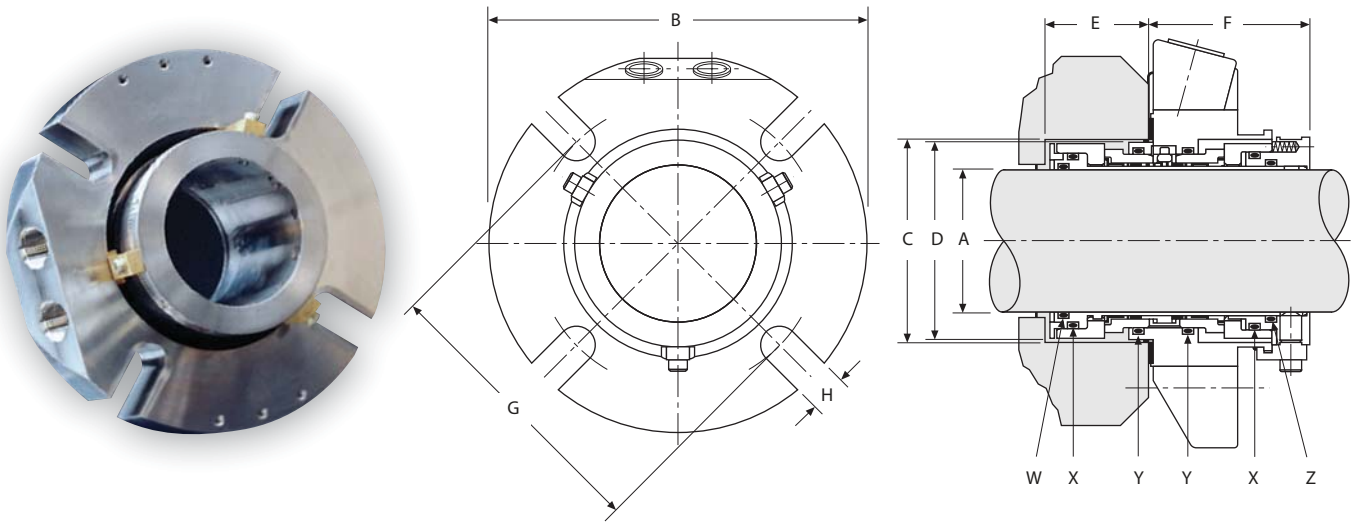


**255 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Seal Diameter in Seal Chamber
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- W – Shaft O-ring
- X – Rotary Seal O-ring (2)
- Y – Stationary Seal O-ring (2)
- Z – Sleeve O-ring

A	B MAX	C MIN	C MAX	D MAX	E MIN	F MAX	3/8"	G MIN 1/2"	5/8"	H	W	X	Y	Z
1.000	4.12	1.75	1.81	1.73	1.36	2.16	2.81	2.94	–	0.57	120	124	126	121
1.125	4.12	1.88	1.94	1.85	1.36	2.16	2.95	3.08	–	0.57	122	126	128	124
1.125 OS	4.49	2.63	2.94	2.62	1.48	1.98	3.77	–	–	0.44	122	126	128	124
1.250	4.12	2.00	2.06	1.98	1.36	2.16	3.08	3.21	–	0.57	124	128	130	126
1.375	4.37	2.13	2.31	2.10	1.36	2.16	3.21	3.34	–	0.57	126	130	132	128
1.375 OS	5.40	2.82	2.99	2.80	1.48	1.98	4.02	–	–	0.44	126	130	132	128
1.500	4.50	2.25	2.44	2.23	1.36	2.16	3.33	3.46	–	0.57	128	132	134	130
1.625	5.00	2.38	2.56	2.35	1.36	2.16	3.45	3.58	–	0.56	130	134	136	132
1.750	5.50	2.50	2.81	2.48	1.36	2.16	3.66	3.79	–	0.56	132	136	138	134
1.750 OS	6.64	3.51	3.74	3.48	1.30	2.16	5.21	5.34	5.46	0.75	132	136	138	134
1.875	5.50	2.63	2.94	2.60	1.36	2.16	3.78	3.91	–	0.56	134	138	140	136
1.875 OS	5.99	3.57	3.80	3.54	1.30	2.16	–	4.94	–	0.63	134	138	140	136
2.000	5.50	2.75	3.19	2.73	1.36	2.16	4.03	4.16	–	0.56	136	140	142	138
2.125	6.01	2.88	3.44	2.85	1.36	2.16	4.29	4.42	4.54	0.68	138	142	144	140
2.125 OS	6.99	3.89	4.24	3.87	1.30	2.16	–	–	5.89	0.75	138	142	144	140
2.250	6.01	3.00	3.56	2.98	1.36	2.16	4.41	4.54	4.66	0.68	140	144	146	142
2.375	6.01	3.13	3.59	3.10	1.36	2.16	4.44	4.57	4.69	0.68	142	146	148	144
2.500	6.51	3.25	3.81	3.23	1.36	2.16	4.66	4.79	4.91	0.68	144	148	150	146
2.500 OS	7.77	4.51	4.74	4.49	1.30	2.16	–	–	6.70	0.75	144	148	150	146

# 255™ LARGE STANDARD DUAL CARTRIDGE SEAL – Dimensional Data/Metric

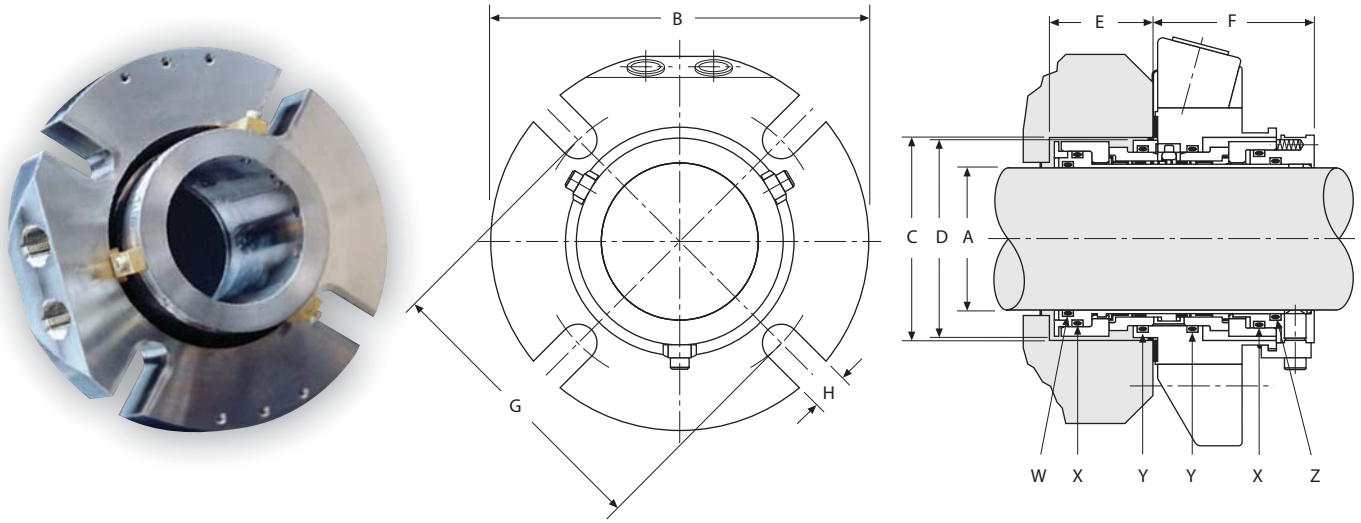


**255 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Seal Diameter in Seal Chamber
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- W – Shaft O-ring
- X – Rotary Seal O-ring (2)
- Y – Stationary Seal O-ring (2)
- Z – Sleeve O-ring

A	B MAX	C MIN	C MAX	D MAX	E MIN	F MAX	12 mm	GMIN 16 mm	20 mm	H	W	X	Y	Z
65	164	92	93	91	42	64	127	131	–	17	231	234	236	232
70	196	95	105	95	42	64	137	141	–	17	232	235	237	234
75	202	102	112	101	42	64	143	147	–	17	234	237	239	235
80	203	105	115	104	42	64	147	151	–	17	235	238	240	237
85	211	111	121	110	42	64	152	156	160	21	237	240	242	238
90	214	114	124	114	42	64	156	160	164	21	238	241	243	240
95	221	121	131	120	42	64	161	165	169	21	240	243	245	241
100	228	127	137	126	42	64	168	172	176	21	242	245	247	243
110	237	137	147	136	42	64	177	181	185	21	245	248	250	246
120	266	146	156	145	42	64	187	191	195	21	248	251	253	249

# 255™ LARGE STANDARD DUAL CARTRIDGE SEAL – Dimensional Data/Inch

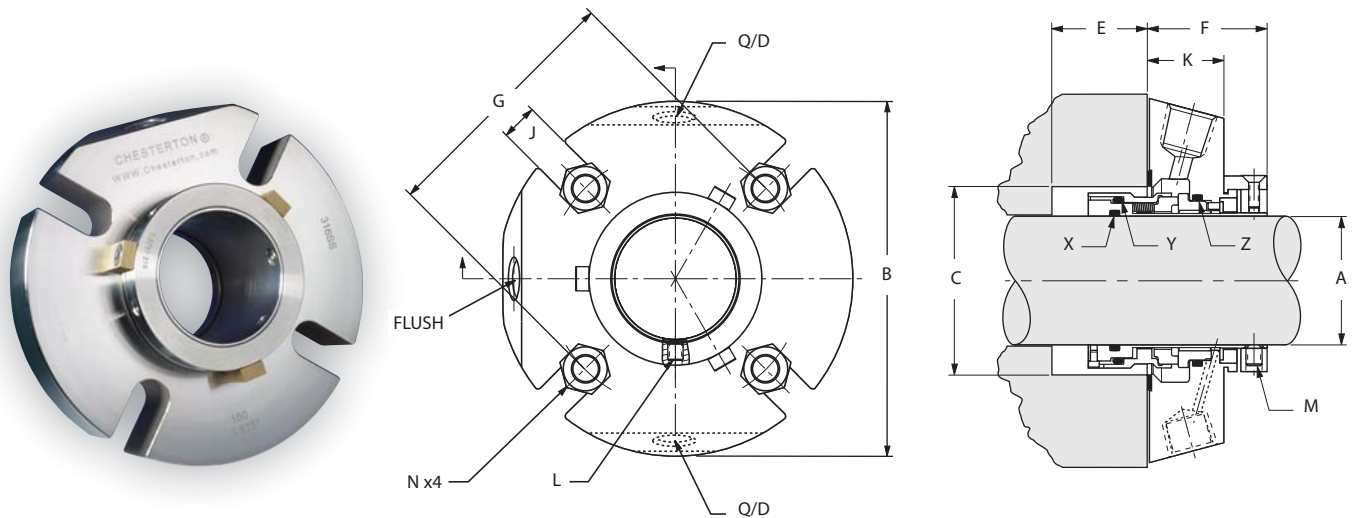


**255 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Seal Diameter in Seal Chamber
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- W – Shaft O-ring
- X – Rotary Seal O-ring (2)
- Y – Stationary Seal O-ring (2)
- Z – Sleeve O-ring

A	B MAX	C MIN	C MAX	D MAX	E MIN	F MAX	1/2"	G MIN 5/8"	3/4"	H	W	X	Y	Z
2.625	6.45	3.63	3.69	3.60	1.64	2.52	5.02	5.15	–	0.68	231	234	236	233
2.750	7.71	3.75	4.19	3.72	1.64	2.52	5.42	5.55	–	0.68	232	235	237	234
2.875	7.83	3.88	4.32	3.85	1.64	2.52	5.50	5.63	–	0.68	233	236	238	235
3.000	7.94	4.00	4.44	3.97	1.64	2.52	5.65	5.78	–	0.68	234	237	239	236
3.125	7.99	4.13	4.57	4.10	1.64	2.52	5.80	5.93	–	0.68	235	238	240	237
3.250	8.19	4.25	4.69	4.22	1.64	2.52	5.93	6.06	–	0.68	236	239	241	238
3.375	8.31	4.38	4.82	4.35	1.64	2.52	6.00	6.13	6.26	0.81	237	240	242	239
3.500	8.44	4.50	4.94	4.47	1.64	2.52	6.16	6.29	6.42	0.81	238	241	243	240
3.625	8.49	4.63	5.07	4.60	1.64	2.52	6.29	6.42	6.55	0.81	239	242	244	241
3.750	8.72	4.75	5.19	4.72	1.64	2.52	6.36	6.49	6.62	0.81	240	243	245	242
3.875	8.84	4.88	5.32	4.85	1.64	2.52	6.50	6.63	6.76	0.81	241	244	246	243
4.000	8.96	5.00	5.44	4.97	1.64	2.52	6.64	6.77	6.90	0.81	242	245	247	244
4.125	8.99	5.13	5.57	5.10	1.64	2.52	6.76	6.89	7.02	0.81	243	246	248	245
4.250	8.99	5.25	5.69	5.22	1.64	2.52	6.89	7.02	7.15	0.81	244	247	249	246
4.375	9.34	5.38	5.82	5.35	1.64	2.52	7.01	7.14	7.27	0.81	245	248	250	247
4.500	9.49	5.50	5.94	5.47	1.64	2.52	7.16	7.29	7.42	0.81	246	249	251	248
4.625	9.49	5.63	6.07	5.60	1.64	2.52	7.26	7.39	7.52	0.81	247	250	252	249
4.750	10.49	5.75	6.19	5.72	1.64	2.52	7.38	7.51	7.64	0.81	248	251	253	250

# 150 SINGLE CARTRIDGE SEAL – Dimensional Data/Metric



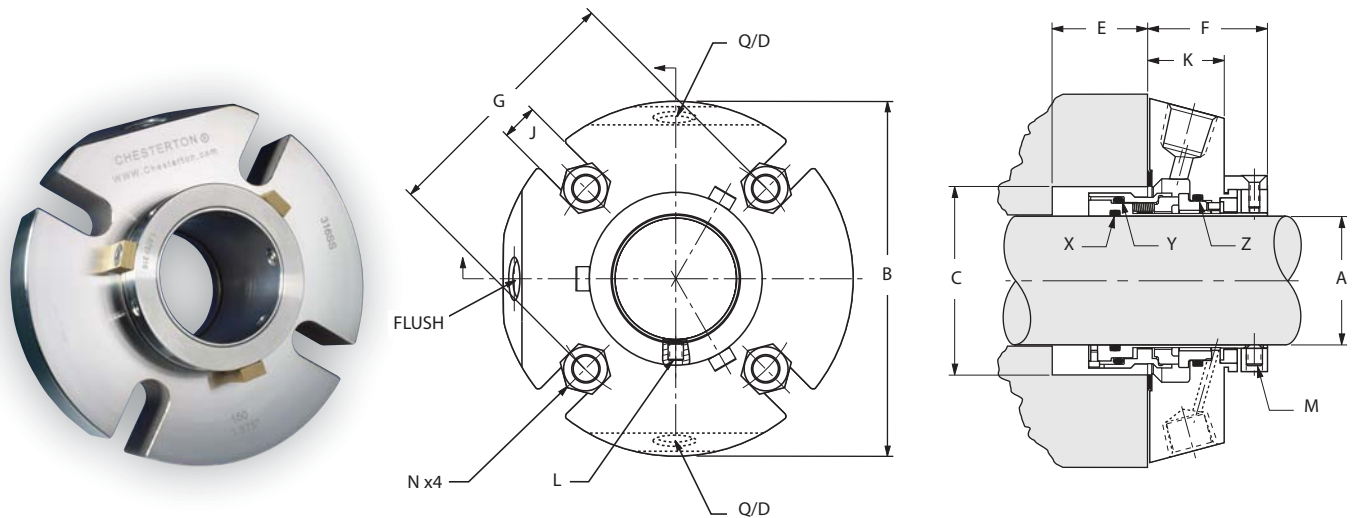
**150 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- J – Slot Width
- K – Gland Width
- X – Shaft O-ring
- Y – Rotary Seal O-ring
- Z – Stationary Seal O-ring

A	B	C MIN	C MAX	E MIN	F	G MIN				J	K	X	Y	Z
						10 mm	12 mm	16 mm	20 mm					
25	104	41	51	19,8	46,0	73	-	-	-	11,2	28	120	027	126
28	104	44	52	19,8	46,0	73	-	-	-	11,2	28	122	028	128
30	104	46	57	19,8	46,0	78	-	-	-	11,2	28	123	029	129
32	104	48	58	19,8	46,0	80	-	-	-	11,2	28	124	029	130
33	113	49	59	19,8	46,0	81	83	-	-	14,5	28	125	030	131
35	111	51	59	19,8	46,0	80	82*	-	-	14,5	28	126	030	132
38	114	57	67	23,4	44,5	85	87	-	-	14,5	28	128	134	135
40	126	59	68	23,4	44,5	90	92	-	-	13,6	28	129	135	137
43	126	62	69	23,4	44,5	91	93	-	-	13,6	28	131	137	139
45	139	64	73	23,4	44,5	95	97	-	-	13,6	28	133	138	140
48	139	67	73	23,4	44,5	95	97	-	-	13,6	28	134	140	142
50	139	69	78	23,4	44,5	100	102	-	-	13,6	28	136	142	143
53	152	73	87	23,4	44,5	109	111	115	-	17,5	28	138	144	145
55	152	74	83	23,4	44,5	105	107	111	-	17,5	28	139	145	146
58	152	80	91	23,4	44,5	114	116	120	-	17,5	28	141	148	149
60	152	80	91	23,4	44,5	114	116	120	-	17,5	28	142	148	149
63	165	83	97	23,4	44,5	119	121	125	-	17,5	28	144	150	151
65	164	86	100	23,4	44,5	125	127	131	-	17,5	28	145	151	151
68	165	86	100	23,4	44,5	125	127	131	-	17,5	28	147	151	152
70	196	96	111	35,1	57,1	-	137	141	-	17,5	37	232	236	238
75	202	102	119	35,1	57,1	-	143	147	-	17,5	37	234	238	240
80	203	106	122	35,1	57,1	-	147	151	-	17,5	37	236	239	241
85	211	111	128	35,1	57,1	-	152	156	160	20,6	37	237	241	243
90	214	116	132	35,1	57,1	-	156	160	164	20,6	37	239	242	244
95	221	121	137	35,1	57,1	-	161	165	169	20,6	37	240	244	246
100	228	127	144	35,1	57,1	-	168	172	176	20,6	37	242	246	248
105	228	131	148	35,1	57,1	-	172	176	180	20,6	37	243	247	249
110	237	137	154	35,1	57,1	-	177	181	185	20,6	37	245	249	251
115	241	143	160	35,1	57,1	-	182	186	190	20,6	37	247	251	253
120	266	146	164	35,1	57,1	-	187	191	195	20,6	37	248	252	254

\* Minimum Bolt Circle requires D Washers.

# 150 SINGLE CARTRIDGE SEAL – Dimensional Data/Inch



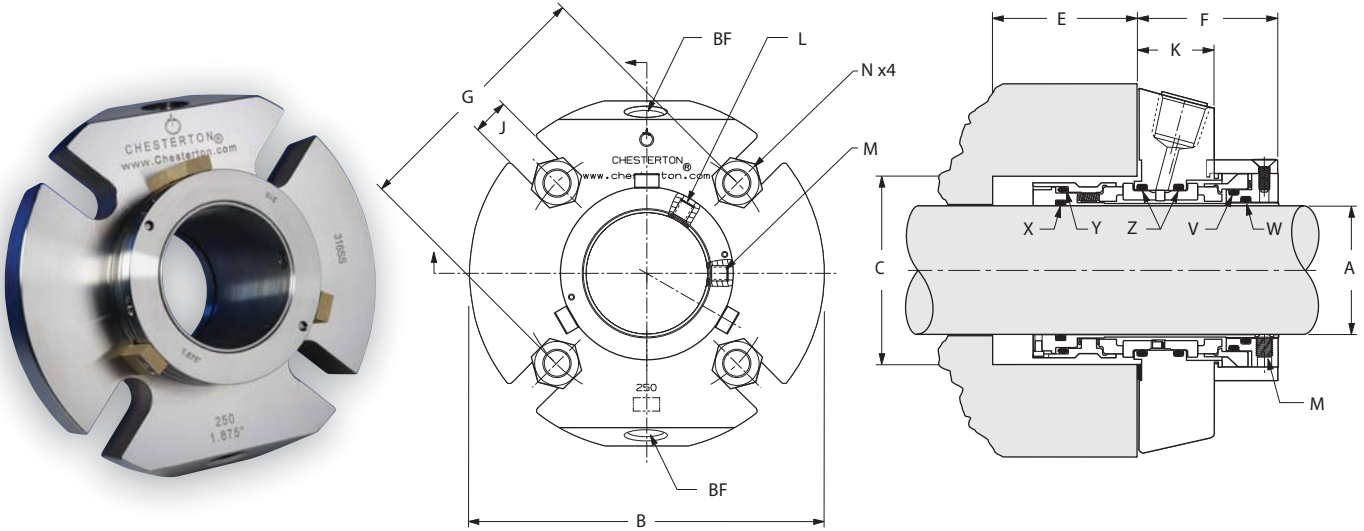
**150 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- J – Slot Width
- K – Gland Width
- X – Shaft O-ring
- Y – Rotary Seal O-ring
- Z – Stationary Seal O-ring

A	B	C MIN	C MAX	E MIN	F	G MIN				J	K	X	Y	Z
						3/8"	1/2"	5/8"	3/4"					
0.938	4.11	1.63	2.01	0.78	1.81	2.88	-	-	-	0.44	1.12	119	027	126
1.000	4.11	1.63	2.01	0.78	1.81	2.88	-	-	-	0.44	1.12	120	027	126
1.063	4.11	1.75	2.04	0.78	1.81	2.88	-	-	-	0.44	1.12	121	028	128
1.125	4.11	1.75	2.04	0.78	1.81	2.88	-	-	-	0.44	1.12	122	029	128
1.125 OS	4.49	2.50	2.75	0.78	1.81	3.71	-	-	-	0.44	1.12	122	029	128
1.188	4.11	1.88	2.27	0.78	1.81	3.12	-	-	-	0.44	1.12	123	029	130
1.250	4.11	1.88	2.27	0.78	1.81	3.12	-	-	-	0.44	1.12	124	029	130
1.313	4.36	2.00	2.33	0.78	1.81	3.13	3.25	-	-	0.57	1.12	125	030	132
1.375	4.36	2.00	2.33	0.78	1.81	3.13*	3.25*	-	-	0.57	1.12	126	030	132
1.375 OS	5.39	2.68	3.00	0.78	1.81	4.03	-	-	-	0.44	1.12	126	030	132
1.438	4.49	2.25	2.62	0.86	1.75	3.33	3.45	-	-	0.57	1.12	128	134	135
1.500	4.49	2.25	2.62	0.86	1.75	3.33	3.45	-	-	0.57	1.12	128	134	135
1.563	4.99	2.38	2.68	0.86	1.75	3.52	3.65	-	-	0.57	1.12	129	135	137
1.625	4.99	2.38	2.68	0.86	1.75	3.52	3.65	-	-	0.57	1.12	130	136	137
1.688	5.49	2.50	2.81	0.86	1.75	3.62	3.75	-	-	0.57	1.12	131	137	139
1.750	5.49	2.50	2.81	0.86	1.75	3.62	3.75	-	-	0.57	1.12	132	138	139
1.750 OS	6.64	3.37	3.75	0.86	1.75	5.21	5.33	-	-	0.57	1.12	132	138	139
1.813	5.49	2.63	2.94	0.86	1.75	3.75	3.87	-	-	0.57	1.12	134	140	141
1.875	5.49	2.63	2.94	0.86	1.75	3.75*	3.87*	-	-	0.57	1.12	134	140	141
1.875 OS	5.99	3.42	3.81	0.86	1.75	-	4.80	-	-	0.57	1.12	134	140	141
1.938	5.49	2.75	3.19	0.86	1.75	4.00	4.13	-	-	0.57	1.12	136	142	143
2.000	5.49	2.75	3.19	0.86	1.75	4.00	4.13	-	-	0.57	1.12	136	142	143
2.063	5.99	2.88	3.44	0.86	1.75	4.25	4.38	4.50	-	0.69	1.12	138	144	145
2.125	5.99	2.88	3.44	0.86	1.75	4.25	4.38	4.50	-	0.69	1.12	138	144	145
2.125 OS	6.99	3.75	4.25	0.86	1.75	-	-	5.37	-	0.69	1.12	138	144	145
2.188	5.99	3.00	3.56	0.86	1.75	4.37	4.50	4.62	-	0.69	1.12	140	146	147
2.250	5.99	3.00	3.56	0.86	1.75	4.37	4.50	4.62	-	0.69	1.12	140	146	147
2.313	5.99	3.13	3.59	0.86	1.75	4.43	4.56	4.68	-	0.69	1.12	142	148	149
2.375	5.99	3.13	3.59	0.86	1.75	4.43	4.56	4.68	-	0.69	1.12	142	148	149
2.375 OS	8.40	4.13	4.50	0.86	1.75	-	-	5.62	-	0.69	1.12	142	148	149
2.438	6.49	3.25	3.81	0.86	1.75	4.62	4.75	4.87	-	0.69	1.12	144	150	151
2.500	6.49	3.25	3.81	0.86	1.75	4.62	4.75	4.87	-	0.69	1.12	144	150	151
2.500 OS	7.77	4.37	4.75	0.86	1.75	-	-	6.37	-	0.69	1.12	144	150	151
2.563	6.45	3.38	3.94	0.86	1.75	4.90	5.02	5.15	-	0.69	1.12	146	151	151
2.625	6.45	3.38	3.94	0.86	1.75	4.90	5.02	5.15	-	0.69	1.12	146	151	151
2.625 OS	6.98	4.38	4.78	0.86	1.75	-	-	5.90	-	0.69	1.12	146	151	151

\* Minimum Bolt Circle requires D Washers.

# 250 DUAL CARTRIDGE SEAL – Dimensional Data/Metric



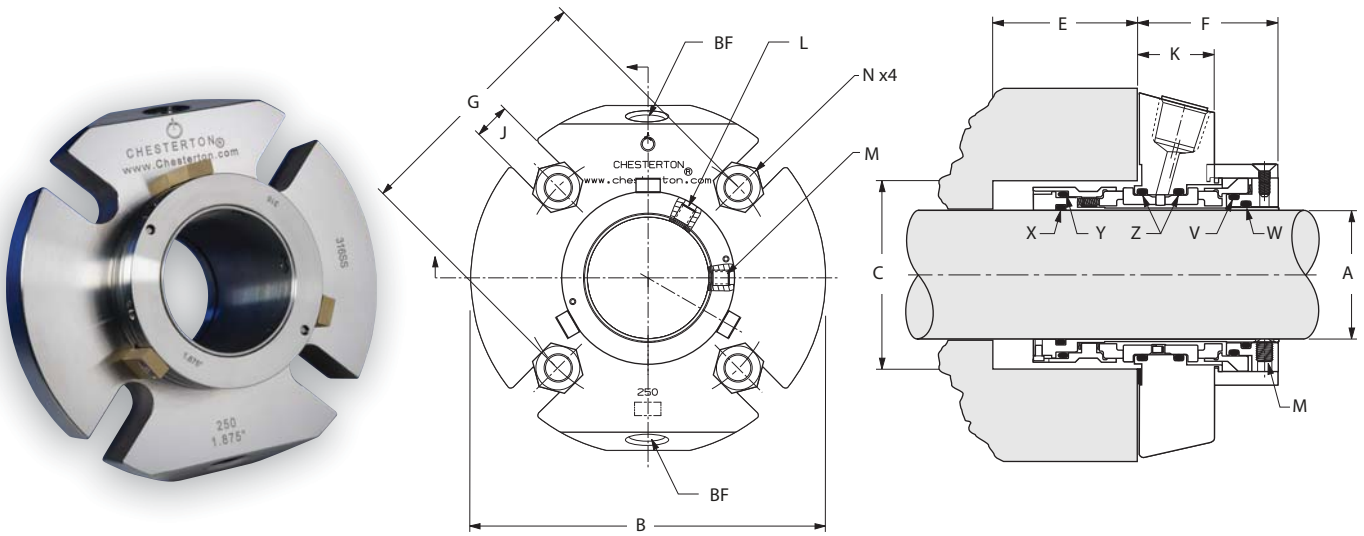
**250 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- J – Slot Width
- K – Gland Width
- X – Shaft O-ring
- Y – Rotary Seal O-ring (2)
- Z – Stationary Seal O-ring (2)
- W – Sleeve O-ring

A	B	C MIN	C MAX	E MIN	F	G MIN			J	K	V	W	X	Y	Z
						10 mm	12 mm	16 mm							
25	104	41	51	36.6	52.3	73	-	-	11.2	28	123	122	120	027	126
28	104	44	52	36.6	52.3	73	-	-	11.2	28	125	123	122	028	128
30	104	46	57	36.6	52.3	78	-	-	11.2	28	126	125	123	029	129
32	104	48	58	36.6	52.3	80	-	-	11.2	28	127	126	124	029	130
33	113	49	59	36.6	52.3	81	83	-	14.5	28	128	127	125	030	131
35	111	51	59	36.6	52.3	80	82	-	14.5	28	129	128	126	030	132
38	114	57	67	38.8	52.3	85	87	-	14.5	29	133	130	128	134	135
40	126	59	68	38.8	52.3	90	92	-	13.6	29	134	131	129	135	137
43	126	62	69	38.8	52.3	91	93	-	13.6	29	136	133	131	137	139
45	139	64	73	38.8	52.3	95	97	-	13.6	29	137	134	133	138	140
48	139	67	73	38.8	52.3	95	97	-	13.6	29	139	136	134	140	142
50	139	69	78	38.8	52.3	100	102	-	13.6	29	140	137	136	142	143
53	152	73	87	38.8	52.3	109	111	115	17.5	29	143	140	138	144	145
55	152	74	83	38.8	52.3	105	107	111	17.5	29	143	141	139	145	146
58	152	80	91	38.8	52.3	114	116	120	17.5	29	147	144	141	148	149
60	152	80	91	38.8	52.3	114	116	120	17.5	29	147	144	142	148	149
63	165	83	97	38.8	52.3	119	121	125	17.5	29	149	146	144	150	151
65	164	86	100	38.8	52.3	125	127	131	17.5	29	150	148	145	151	151
68	165	86	100	38.8	52.3	125	127	131	17.5	29	151	149	147	151	152
						12 mm	16 mm	20 mm							
70	196	96	111	58.2	63.5	137	141	-	17.5	35.8	235	234	232	236	238
75	202	102	119	58.2	63.5	143	147	-	17.5	35.8	237	236	234	238	240
80	203	106	122	58.2	63.5	147	151	-	17.5	35.8	238	237	236	239	241
85	211	111	128	58.2	63.5	152	156	160	20.6	35.8	240	239	237	241	243
90	214	116	132	58.2	63.5	156	160	164	20.6	35.8	241	240	239	242	244
95	221	121	137	58.2	63.5	161	165	169	20.6	35.8	243	242	240	244	246
100	228	127	145	58.2	63.5	168	172	176	20.6	35.8	245	244	242	246	248
105	228	131	148	58.2	63.5	172	176	180	20.6	35.8	246	245	243	247	249
110	237	137	154	58.2	63.5	177	181	185	20.6	35.8	248	247	245	249	251
115	241	143	160	58.2	63.5	182	186	190	20.6	35.8	250	249	247	251	253
120	266	146	164	58.2	63.5	187	191	195	20.6	35.8	251	250	248	252	254



# 250 DUAL CARTRIDGE SEAL – Dimensional Data/Inch

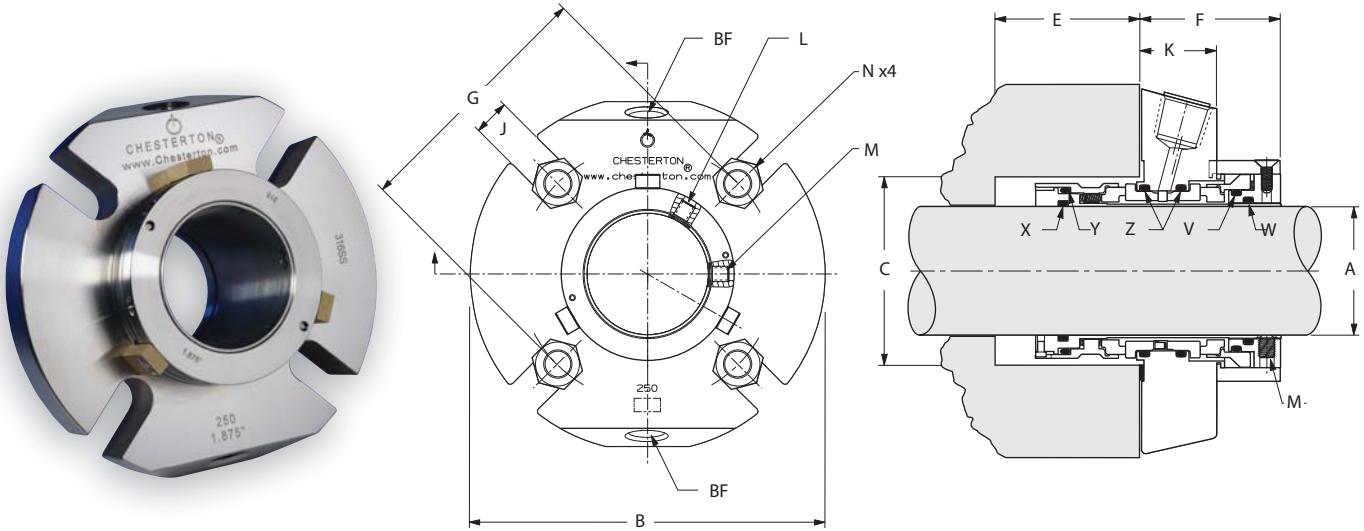


**250 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- J – Slot Width
- K – Gland Width
- X – Shaft O-ring
- Y – Rotary Seal O-ring (2)
- Z – Stationary Seal O-ring (2)
- W – Sleeve O-ring

A	B	C MIN	C MAX	E MIN	F	3/8"	G MIN 1/2"	5/8"	J	K	V	W	X	Y	Z
0.938	4.11	1.63	2.01	1.44	2.06	2.88	-	-	0.44	1.12	123	122	119	027	126
1.000	4.11	1.63	2.01	1.44	2.06	2.88	-	-	0.44	1.12	123	122	120	027	126
1.063	4.11	1.75	2.04	1.44	2.06	2.88	-	-	0.44	1.12	125	123	121	028	128
1.125	4.11	1.75	2.04	1.44	2.06	2.88	-	-	0.44	1.12	125	124	122	028	128
1.125 OS	4.49	2.50	2.75	1.44	2.06	3.71	-	-	0.44	1.12	125	124	122	028	128
1.188	4.11	1.88	2.27	1.44	2.06	3.12	-	-	0.44	1.12	127	126	123	029	130
1.250	4.11	1.88	2.27	1.44	2.06	3.12	-	-	0.44	1.12	127	126	124	029	130
1.313	4.36	2.00	2.33	1.44	2.06	3.13	3.25	-	0.57	1.12	129	128	125	030	132
1.375	4.36	2.00	2.33	1.44	2.06	3.13	3.25	-	0.57	1.12	129	128	126	030	132
1.375 OS	5.39	2.68	3.00	1.44	2.06	4.03	-	-	0.44	1.12	129	128	126	030	132
1.438	4.49	2.25	2.62	1.53	2.06	3.33	3.45	-	0.57	1.12	133	130	128	134	135
1.500	4.49	2.25	2.62	1.53	2.06	3.33	3.45	-	0.57	1.12	133	130	128	134	135
1.563	4.99	2.38	2.68	1.53	2.06	3.52	3.65	-	0.57	1.12	134	131	129	135	137
1.625	4.99	2.38	2.68	1.53	2.06	3.52	3.65	-	0.57	1.12	135	132	130	136	137
1.688	5.49	2.50	2.81	1.53	2.06	3.62	3.75	-	0.57	1.12	136	133	131	137	139
1.750	5.49	2.50	2.81	1.53	2.06	3.62	3.75	-	0.57	1.12	137	134	132	138	139
1.750 OS	6.64	3.37	3.75	1.53	2.06	4.63	4.75	-	0.57	1.12	137	134	132	138	139
1.813	5.49	2.63	2.94	1.53	2.06	3.75	3.87	-	0.57	1.12	138	136	134	140	141
1.875	5.49	2.63	2.94	1.53	2.06	3.75	3.87	-	0.57	1.12	138	136	134	140	141
1.875 OS	5.99	3.42	3.81	1.53	2.06	-	4.80	-	0.57	1.12	138	136	134	140	141
1.938	5.49	2.75	3.19	1.53	2.06	4.00	4.13	-	0.57	1.12	140	137	136	141	143
2.000	5.49	2.75	3.19	1.53	2.06	4.00	4.13	-	0.57	1.12	141	138	136	142	143
2.063	5.99	2.88	3.44	1.53	2.06	4.25	4.38	4.50	0.69	1.12	143	140	138	144	145
2.125	5.99	2.88	3.44	1.53	2.06	4.25	4.38	4.50	0.69	1.12	143	140	138	144	145
2.125 OS	6.99	3.75	4.25	1.53	2.06	-	-	5.37	0.69	1.12	143	140	138	144	145
2.188	5.99	3.00	3.56	1.53	2.06	4.37	4.50	4.62	0.69	1.12	145	142	140	146	147
2.250	5.99	3.00	3.56	1.53	2.06	4.37	4.50	4.62	0.69	1.12	145	142	140	146	147
2.313	5.99	3.13	3.59	1.53	2.06	4.43	4.56	4.68	0.69	1.12	147	144	142	148	149
2.375	5.99	3.13	3.59	1.53	2.06	4.43	4.56	4.68	0.69	1.12	147	144	142	148	149
2.375 OS	8.40	4.13	4.50	1.53	2.06	-	-	5.62	0.69	1.12	147	144	142	148	149
2.438	6.49	3.25	3.81	1.53	2.06	4.62	4.75	4.87	0.69	1.12	149	146	144	150	151
2.500	6.49	3.25	3.81	1.53	2.06	4.62	4.75	4.87	0.69	1.12	149	146	144	150	151
2.500 OS	7.77	4.37	4.75	1.53	2.06	-	-	6.37	0.69	1.12	149	146	144	150	151
2.563	6.45	3.38	3.94	1.53	2.06	4.90	5.02	5.15	0.69	1.12	150	148	146	151	152
2.625	6.45	3.38	3.94	1.53	2.06	4.90	5.02	5.15	0.69	1.12	150	148	146	151	152
2.625 OS	6.98	4.38	4.78	1.53	2.06	-	-	5.90	0.69	1.12	150	148	146	151	152

# 250 DUAL CARTRIDGE SEAL – Dimensional Data/Inch

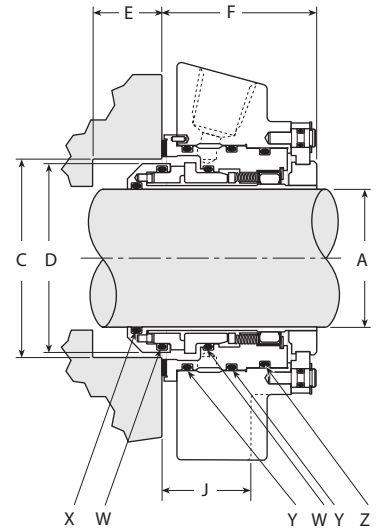
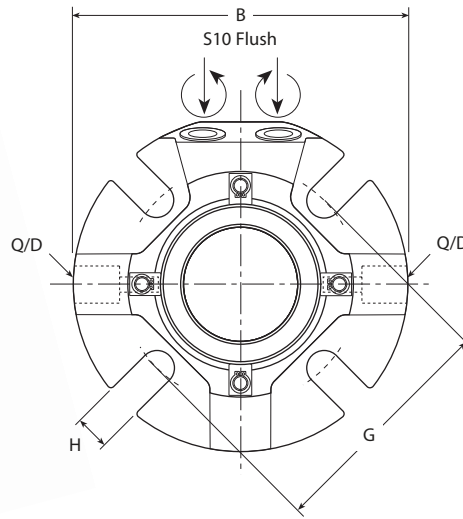


**250 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- J – Slot Width
- K – Gland Width
- X – Shaft O-ring
- Y – Rotary Seal O-ring (2)
- Z – Stationary Seal O-ring (2)
- W – Sleeve O-ring

A	B	C MIN	C MAX	E MIN	F	G MIN			J	K	V	W	X	Y	Z
						1/2"	5/8"	3/4"							
2.688	7.70	3.75	4.38	2.29	2.50	5.42	5.55	–	0.69	1.41	235	234	232	236	238
2.750	7.70	3.75	4.38	2.29	2.50	5.42	5.55	–	0.69	1.41	235	234	232	236	238
2.813	7.83	3.88	4.50	2.29	2.50	5.50	5.62	–	0.69	1.41	236	235	233	237	239
2.875	7.83	3.88	4.50	2.29	2.50	5.50	5.62	–	0.69	1.41	236	235	233	237	239
2.938	7.94	4.00	4.69	2.29	2.50	5.65	5.77	–	0.69	1.41	237	236	234	238	240
3.000	7.94	4.00	4.69	2.29	2.50	5.65	5.77	–	0.69	1.41	237	236	234	238	240
3.000 OS	8.64	4.93	5.39	2.29	2.50	6.88	7.00	7.13	0.94	1.41	237	236	234	238	240
3.063	7.99	4.13	4.81	2.29	2.50	5.80	5.92	–	0.69	1.41	238	237	235	239	241
3.125	7.99	4.13	4.81	2.29	2.50	5.80	5.92	–	0.69	1.41	238	237	235	239	241
3.188	8.19	4.25	4.94	2.29	2.50	5.93	6.05	–	0.69	1.41	239	238	236	240	242
3.250	8.19	4.25	4.94	2.29	2.50	5.93	6.05	–	0.69	1.41	239	238	236	240	242
3.313	8.30	4.38	5.06	2.29	2.50	6.02	6.14	6.27	0.81	1.41	240	239	237	241	243
3.375	8.30	4.38	5.06	2.29	2.50	6.02	6.14	6.27	0.81	1.41	240	239	237	241	243
3.438	8.44	4.50	5.19	2.29	2.50	6.18	6.31	6.43	0.81	1.41	241	240	238	242	244
3.500	8.44	4.50	5.19	2.29	2.50	6.18	6.31	6.43	0.81	1.41	241	240	238	242	244
3.563	8.49	4.63	5.31	2.29	2.50	6.31	6.44	6.56	0.81	1.41	242	241	239	243	245
3.625	8.49	4.63	5.31	2.29	2.50	6.31	6.44	6.56	0.81	1.41	242	241	239	243	245
3.688	8.71	4.75	5.39	2.29	2.50	6.38	6.51	6.63	0.81	1.41	243	242	240	244	246
3.750	8.71	4.75	5.39	2.29	2.50	6.38	6.51	6.63	0.81	1.41	243	242	240	244	246
3.750 OS	9.76	5.08	6.40	2.29	2.50	8.13	8.25	–	0.69	1.41	243	242	240	244	246
3.813	8.84	4.88	5.51	2.29	2.50	6.52	6.64	6.77	0.81	1.41	244	243	241	245	247
3.875	8.84	4.88	5.51	2.29	2.50	6.52	6.64	6.77	0.81	1.41	244	243	241	245	247
3.938	8.96	5.00	5.69	2.29	2.50	6.66	6.78	6.91	0.81	1.41	245	244	242	246	248
4.000	8.96	5.00	5.69	2.29	2.50	6.66	6.78	6.91	0.81	1.41	245	244	242	246	248
4.063	8.99	5.13	5.81	2.29	2.50	6.78	6.91	7.03	0.81	1.41	246	245	243	247	249
4.125	8.99	5.13	5.81	2.29	2.50	6.78	6.91	7.03	0.81	1.41	246	245	243	247	249
4.188	8.99	5.25	5.94	2.29	2.50	6.91	7.04	7.16	0.81	1.41	247	246	244	248	250
4.250	8.99	5.25	5.94	2.29	2.50	6.91	7.04	7.16	0.81	1.41	247	246	244	248	250
4.313	9.33	5.38	6.06	2.29	2.50	7.03	7.15	7.28	0.81	1.41	248	247	245	249	251
4.375	9.33	5.38	6.06	2.29	2.50	7.03	7.15	7.28	0.81	1.41	248	247	245	249	251
4.438	9.49	5.50	6.19	2.29	2.50	7.18	7.30	7.43	0.81	1.41	249	248	246	250	252
4.500	9.49	5.50	6.19	2.29	2.50	7.18	7.30	7.43	0.81	1.41	249	248	246	250	252
4.563	9.49	5.63	6.31	2.29	2.50	7.28	7.40	7.53	0.81	1.41	250	249	247	251	253
4.625	9.49	5.63	6.31	2.29	2.50	7.28	7.40	7.53	0.81	1.41	250	249	247	251	253
4.688	10.49	5.75	6.47	2.29	2.50	7.40	7.53	7.65	0.81	1.41	251	250	248	252	254
4.750	10.49	5.75	6.47	2.29	2.50	7.40	7.53	7.65	0.81	1.41	251	250	248	252	254

# S10 EXTRA SMALL SINGLE CASSETTE SEAL – Dimensional Data/Metric



**S10 KEY**

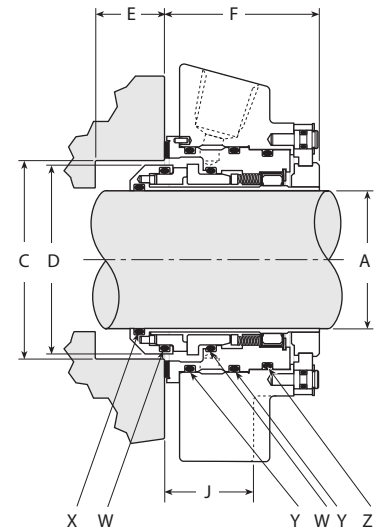
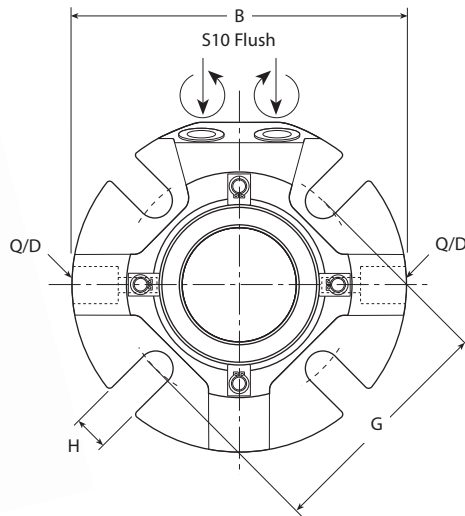
- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Seal Outside Diameter
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- J – Seal Chamber to Bolt Surface
- W – Rotary and Stationary O-rings
- X – Shaft O-ring
- Y – IB & OB Cassette O-rings
- Z – Quench O-ring

A	B MAX	C MIN	C MAX	D	E MIN	F	G MIN			H	J	X	W †	Y	Z
							10 mm	12 mm	16 mm						
25	104	41,0	51,1	39,9	13,0	52	73,0**	–	–	11,5	30,4	120	028	133	133
28	104	44,0	51,8	42,4	13,0	52	73,0	–	–	13,5	30,4	122	029	135	135
30	104	46,0	56,6	44,5	13,0	52	78,0	–	–	13,5	30,4	123	030	136	136
32	104	48,0	57,7	46,5	13,0	52	80,0	–	–	13,5	30,4	124	030	138	137
33	113	49,0	58,8	47,4	13,0	52	80,0	83,0**	–	15,0	30,4	125	031	138	138
35	111	51,0	59,2	49,4	13,0	52	82,0	83,7**	–	15,0	30,4	126	031	139	139

\*\* Minimum Bolt Circle requires D Washers.

† The S10 uses a quantity of 2 O-rings and the S20 uses a quantity of 4 O-rings.

# S10 EXTRA SMALL SINGLE CASSETTE SEAL – Dimensional Data/Inch



**S10 KEY**

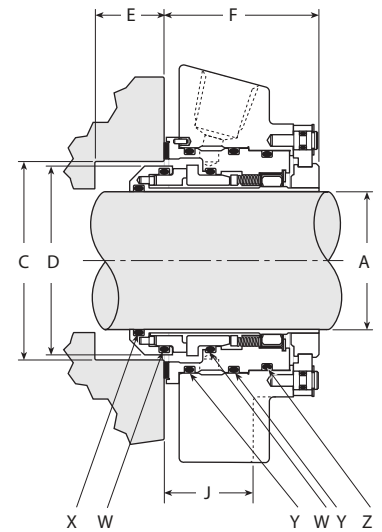
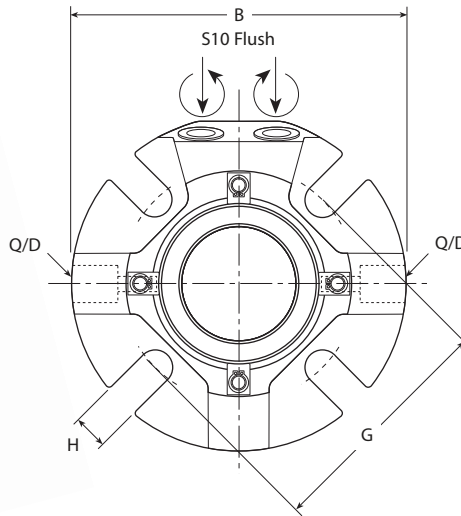
- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Seal Outside Diameter
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- J – Seal Chamber to Bolt Surface
- W – Rotary and Stationary O-rings
- X – Shaft O-ring
- Y – IB & OB Cassette O-rings
- Z – Quench O-ring

A	B MAX	C MIN	C MAX	D	E MIN	F	3/8"	G MIN 1/2"	5/8"	H	J	X	W †	Y	Z
1.000	4.10	1.63	2.01	1.57	0.51	2.05	2.88	–	–	0.44	1.20	120	028	133	133
1.125	4.10	1.75	2.04	1.69	0.51	2.05	2.88**	–	–	0.44	1.20	122	029	135	135
1.125 OS	4.50	2.63	2.94	1.69	0.51	2.05	3.71	–	–	0.44	1.20	122	029	135	135
1.250	4.10	1.88	2.27	1.83	0.51	2.05	3.13	–	–	0.44	1.20	124	030	138	137
1.375	4.40	2.00	2.33	1.94	0.51	2.05	3.14**	3.33**	–	0.57	1.20	126	031	139	139
1.375 OS	5.40	2.81	3.00	1.94	0.51	2.05	4.03	–	–	0.44	1.21	126	031	139	139

\*\* Minimum Bolt Circle requires D Washers.

† The S10 uses a quantity of 2 O-rings and the S20 uses a quantity of 4 O-rings.

# S10 SMALL SINGLE CASSETTE SEAL – Dimensional Data/Metric



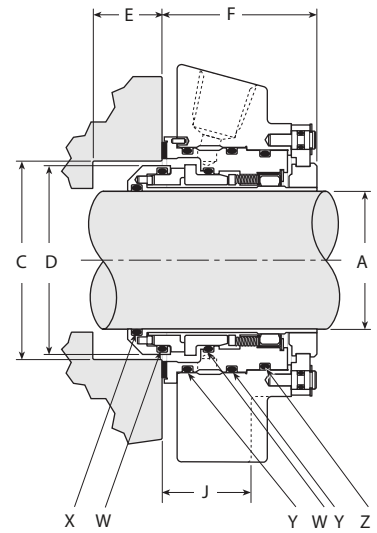
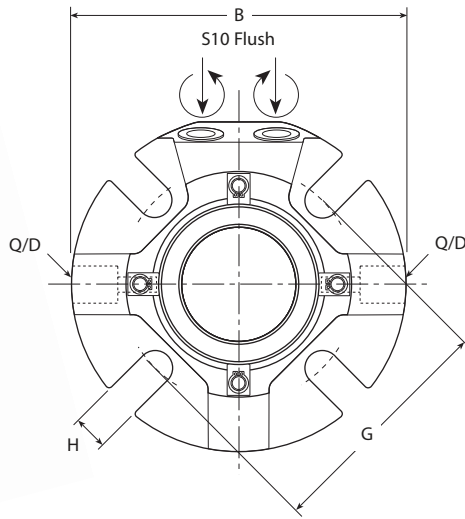
**S10 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Seal Outside Diameter
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- J – Seal Chamber to Bolt Surface
- W – Rotary and Stationary O-rings
- X – Shaft O-ring
- Y – IB & OB Cassette O-rings
- Z – Quench O-ring

A	B MAX	C MIN	C MAX	D	E MIN	F	G MIN			H	J	X	W †	Y	Z
							10 mm	12 mm	16 mm						
38	114	57,2	62,0	55,6	13,5	54	84,0	89,9**	–	13,5	30,4	128	135	143*	142*
40	127	60,0	68,3	57,5	13,5	54	89,2	91,7**	–	13,5	30,4	129	136	144*	143*
43	127	63,0	68,8	60,5	13,5	54	91,9	94,7**	–	13,5	30,4	131	138	146*	145*
45	140	65,0	73,4	62,5	13,5	54	94,2	96,8**	–	13,5	30,4	133	140	147*	146*
48	140	68,0	73,8	65,5	13,5	54	97,0	99,8**	–	13,5	30,4	134	142	149*	148*
50	140	70,0	78,5	67,5	13,5	54	99,3	101,9**	–	17,5	30,4	136	143	150*	149*
53	153	75,0	83,6	72,5	13,5	54	104,4	106,4**	112,0**	17,5	30,4	137	146	152	151
55	153	75,0	83,6	72,5	13,5	54	104,4	106,4**	112,0**	17,5	30,4	139	146	152	151
60	153	80,0	92,2	77,8	13,5	54	112,8	114,8	118,9**	17,5	30,4	142	149	153	152
65	164	88,9	100,1	84,2	13,5	54	124,0	126,0	129,8	17,5	30,4	145	5-557	154	153
							12 mm	16 mm	20 mm						
70	196	95	110	93	21	63	137	141**	–	17	41	232	237	242	241
75	202	104	119	99	21	63	143	147**	–	17	41	234	239	244	243
80	203	109	122	103	21	63	150	154**	–	17	41	236	240	245	244
85	211	114	128	109	21	63	152	156**	161	20	41	237	242	247	246
90	214	119	132	113	21	63	160	164	168	20	41	239	244	248	247
95	221	124	137	118	21	63	161	165**	170	20	41	240	245	250	249
100	228	129	144	125	21	63	168	172**	177	20	41	242	247	252	251
110	237	137	154	134	21	63	178	182**	186	20	41	245	250	255	254
120	266	146	164	144	21	63	187	191**	196	20	41	248	253	257	256

\* Use next size larger for Style 76 O-rings  
 \*\* Minimum Bolt Circle requires D Washers.  
 † The S10 uses a quantity of 2 O-rings and the S20 uses a quantity of 4 O-rings.

# S10 SMALL SINGLE CASSETTE SEAL – Dimensional Data/Inch



**S10 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Seal Outside Diameter
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- J – Seal Chamber to Bolt Surface
- W – Rotary and Stationary O-rings
- X – Shaft O-ring
- Y – IB & OB Cassette O-rings
- Z – Quench O-ring

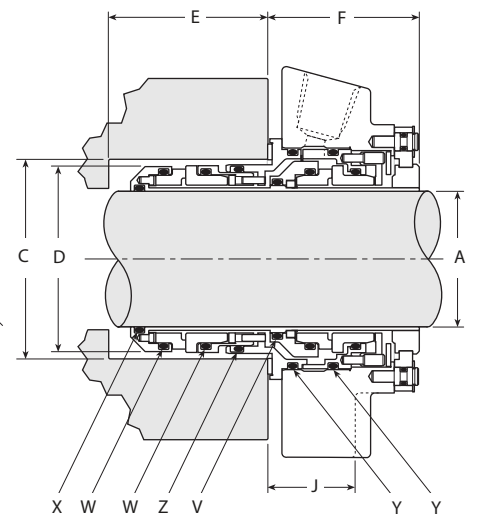
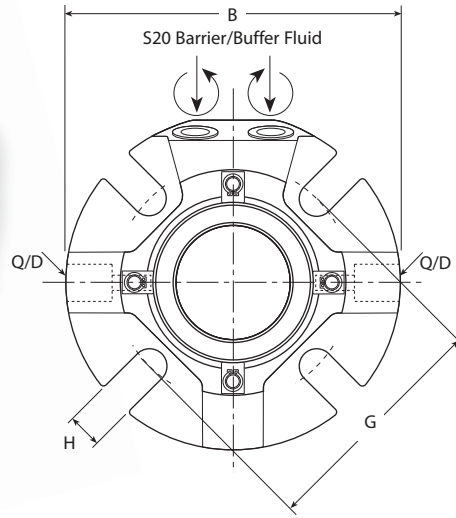
A	B MAX	C MIN	C MAX	D	E MIN	F	G MIN			H	J	X	W †	Y	Z
							3/8"	1/2"	5/8"						
1.500	4.50	2.25	2.44	2.19	0.53	2.11	3.31**	3.55**	–	0.57	1.20	128	135	143*	142*
1.625	5.00	2.38	2.70	2.31	0.53	2.11	3.49**	3.68**	–	0.57	1.20	130	137	145*	144*
1.750	5.50	2.50	2.81	2.44	0.53	2.11	3.61**	3.80**	–	0.57	1.20	132	139	147*	146*
1.750 OS	6.64	3.50	3.75	2.44	0.53	2.11	5.38	5.50	–	0.57	1.20	132	139	147*	146*
1.875	5.50	2.63	2.94	2.56	0.53	2.11	3.74**	3.93**	–	0.57	1.20	134	141	149*	148*
1.875 OS	5.99	3.56	3.81	2.56	0.53	2.11	–	5.00	–	0.57	1.20	134	141	149*	148*
2.000	5.50	2.75	3.19	2.69	0.53	2.11	3.99	4.12**	–	0.57	1.20	136	143	150*	149*
2.125	6.00	2.88	3.44	2.81	0.53	2.11	4.24	4.37	4.49**	0.69	1.20	138	145	152	151
2.125 OS	6.99	3.88	4.25	2.81	0.22	2.42	–	4.49	5.25	0.69	1.51	138	145	152	151
2.250	6.00	3.00	3.56	2.94	0.53	2.11	4.36	4.49	4.61**	0.69	1.20	140	147	152	151
2.375	6.00	3.13	3.62	3.06	0.53	2.11	4.42	4.55	4.68**	0.69	1.20	142	149	153	152
2.500	6.50	3.25	3.81	3.19	0.53	2.11	4.61	4.74	4.86**	0.69	1.20	144	151	153	152
2.500 OS	7.77	4.50	4.75	3.19	0.53	2.11	–	6.63	6.75**	0.69	1.20	144	151	153	152
2.625	6.50	3.38	3.94	3.31	0.53	2.11	4.86	4.99	5.11	0.69	1.20	146	5-557	154	153
2.625 OS	6.99	4.55	4.88	3.31	0.53	2.11	–	5.88	6.00	0.69	1.20	146	5-557	154	153

\* Use next size larger for Style 76 O-rings

\*\* Minimum Bolt Circle requires D Washers.

† The S10 uses a quantity of 2 O-rings and the S20 uses a quantity of 4 O-rings.

# S20 EXTRA SMALL DUAL CASSETTE SEAL – Dimensional Data/Metric



**S20 KEY**

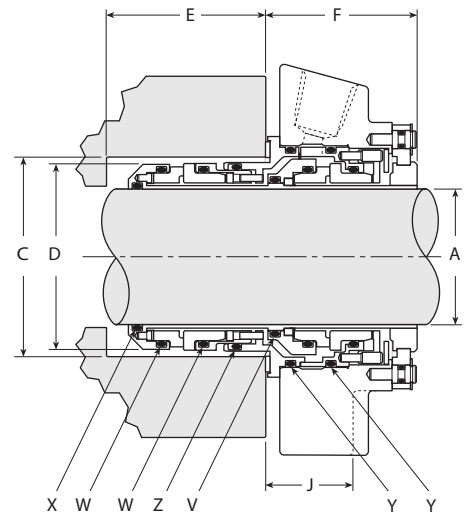
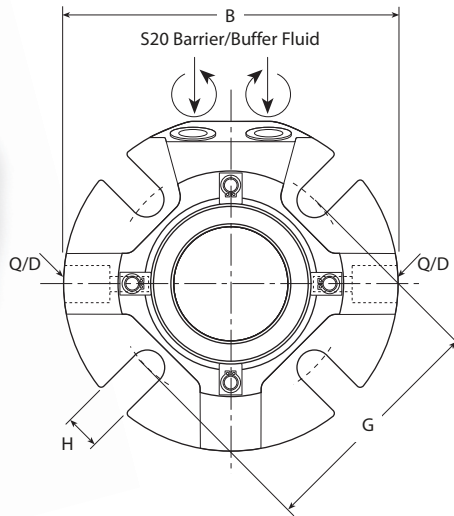
- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Seal Outside Diameter
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- J – Seal Chamber to Bolt Surface
- V – Rotary Holder
- W – Rotary and Stationary O-rings
- X – Shaft O-ring
- Y – IB & OB Cassette O-rings
- Z – Inboard Housing

A	B MAX	C MIN	C MAX	D	E MIN	F	G MIN	10 mm	12 mm	16 mm	H	J	V	W †	X	Y	Z
25	104	41,0	51,1	39,9	48	52	73,0**	-	-	-	11,5	30,4	025	028	120	133	029
28	104	44,0	51,8	42,4	48	52	73,0	-	-	-	13,5	30,4	027	029	122	135	030
30	104	46,0	56,6	44,5	48	52	78,0	-	-	-	13,5	30,4	028	030	123	136	030
32	104	48,0	57,7	46,5	48	52	80,0	-	-	-	13,5	30,4	029	030	124	138	031
33	113	49,0	58,8	47,4	48	52	80,0	83,0**	-	-	15,0	30,4	029	031	125	138	031
35	111	51,0	59,2	49,4	48	52	82,0	83,7**	-	-	15,0	30,4	030	031	126	139	032

\*\* Minimum Bolt Circle requires D Washers.

† The S10 uses a quantity of 2 O-rings and the S20 uses a quantity of 4 O-rings.

# S20 EXTRA SMALL DUAL CASSETTE SEAL – Dimensional Data/Inch



**S20 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Seal Outside Diameter
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- J – Seal Chamber to Bolt Surface
- V – Rotary Holder
- W – Rotary and Stationary O-rings
- X – Shaft O-ring
- Y – IB & OB Cassette O-rings
- Z – Inboard Housing

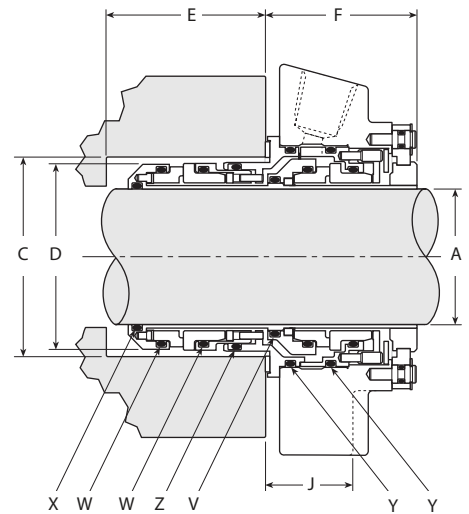
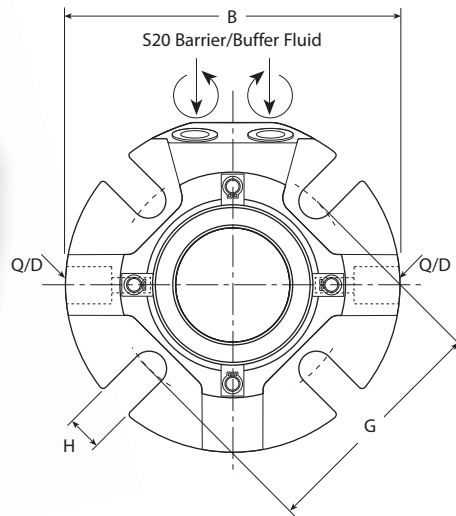
A	B MAX	C MIN	C MAX	D	E MIN	F	G MIN			H	J	V	W †	X	Y	Z
							3/8"	1/2"	5/8"							
1.000	4.10	1.63	2.01	1.57	1.88	2.05	2.88	–	–	0.44	1.20	025	028	120	133	029
1.125	4.10	1.75	2.04	1.69	1.88	2.05	2.88**	–	–	0.44	1.20	027	029	122	135	030
1.125 OS	4.50	2.63	2.94	1.69	1.82	2.05	3.71	–	–	0.44	1.20	027	029	122	135	030
1.250	4.10	1.88	2.27	1.83	1.88	2.05	3.13	–	–	0.44	1.20	029	030	124	138	031
1.375	4.40	2.00	2.33	1.94	1.88	2.05	3.14**	3.33**	–	0.57	1.20	030	031	126	139	032
1.375 OS	5.40	2.81	3.00	1.94	1.82	2.05	4.03	–	–	0.44	1.21	030	031	126	139	032

\*\* Minimum Bolt Circle requires D Washers.

† The S10 uses a quantity of 2 O-rings and the S20 uses a quantity of 4 O-rings.



# S20 SMALL DUAL CASSETTE SEAL – Dimensional Data/Metric



**S20 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Seal Outside Diameter
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- J – Seal Chamber to Bolt Surface
- V – Rotary Holder
- W – Rotary and Stationary O-rings
- X – Shaft O-ring
- Y – IB & OB Cassette O-rings
- Z – Inboard Housing

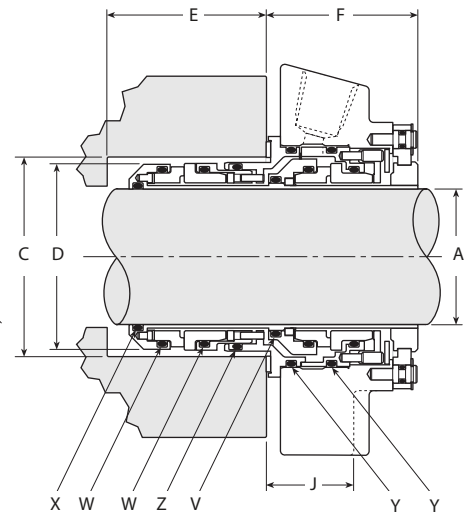
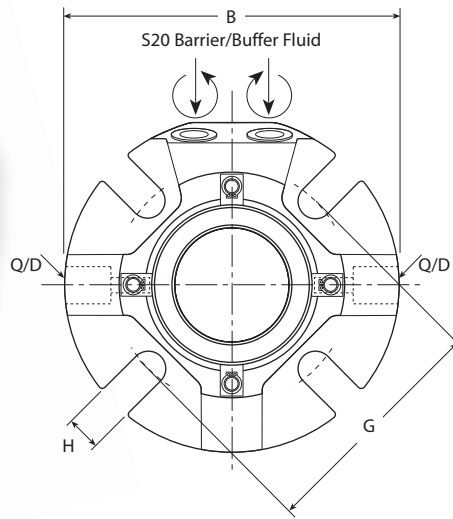
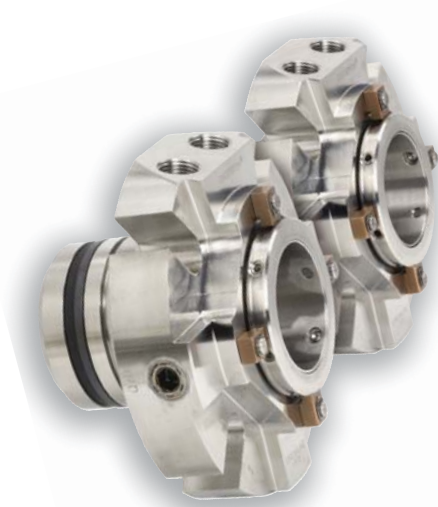
A	B MAX	C MIN	C MAX	D	E MIN	F	G			H	J	V	W †	X	Y	Z
							10 mm	12 mm	16 mm							
38	114	57,2	62,0	55,6	50	54	84,0	89,9**	–	13,5	30,4	130	135	128	143*	136
40	127	60,0	68,3	57,5	50	54	89,2	91,7**	–	13,5	30,4	131	136	129	144*	137
43	127	63,0	68,8	60,5	50	54	91,9	94,7**	–	13,5	30,4	133	138	131	146*	139
45	140	65,0	73,4	62,5	50	54	94,2	96,8**	–	13,5	30,4	135	140	133	147*	141
48	140	68,0	73,8	65,5	50	54	97,0	99,8**	–	13,5	30,4	136	142	134	149*	143
50	140	70,0	78,5	67,5	50	54	99,3	101,9**	–	17,5	30,4	138	143	136	150*	144
53	153	75,0	83,6	72,5	50	54	104,4	106,4**	112,0**	17,5	30,4	141	146	137	152	147
55	153	75,0	83,6	72,5	50	54	104,4	106,4**	112,0**	17,5	30,4	141	146	139	152	147
60	153	80,0	92,2	77,8	50	54	112,8	114,8	118,9**	17,5	30,4	144	149	142	153	150
65	164	88,9	100,1	84,2	50	54	124,0	126,0	129,8	17,5	30,4	148	5-557	145	154	5-557
70	196	95	110	93	63	63	137	141**	–	17	41	234	237	232	242	238
75	202	104	119	99	63	63	143	147**	–	17	41	236	239	234	244	239
80	203	109	122	103	63	63	150	154**	–	17	41	238	240	236	245	241
85	211	114	128	109	63	63	152	156**	161	20	41	239	242	237	247	243
90	214	119	132	113	63	63	160	164	168	20	41	240	244	239	248	244
95	221	124	137	118	63	63	161	165**	170	20	41	242	245	240	250	246
100	228	129	144	125	63	63	168	172**	177	20	41	244	247	242	252	248
110	237	137	154	134	63	63	178	182**	186	20	41	247	250	245	255	251
120	266	146	164	144	63	63	187	191**	196	20	41	250	253	248	257	254

\* Use next size larger for Style 76 O-rings

\*\* Minimum Bolt Circle requires D Washers.

† The S10 uses a quantity of 2 O-rings and the S20 uses a quantity of 4 O-rings.

# S20 SMALL DUAL CASSETTE SEAL – Dimensional Data/Inch



**S20 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- D – Seal Outside Diameter
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- J – Seal Chamber to Bolt Surface
- V – Rotary Holder
- W – Rotary and Stationary O-rings
- X – Shaft O-ring
- Y – IB & OB Cassette O-rings
- Z – Inboard Housing

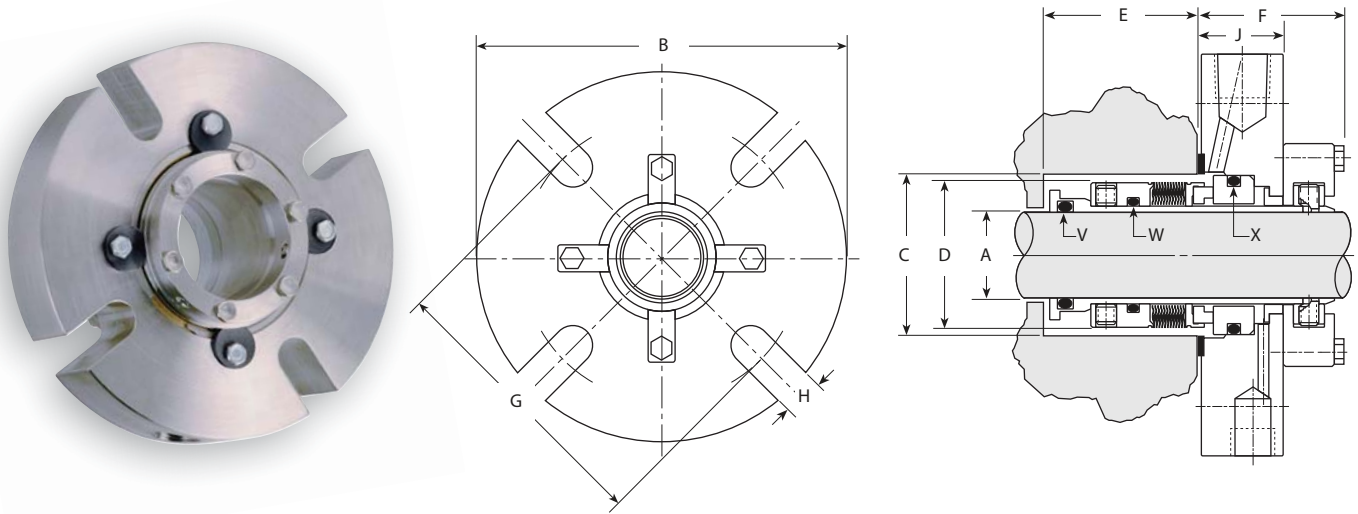
A	B MAX	C MIN	C MAX	D	E MIN	F	G MIN			H	J	V	W †	X	Y	Z
							3/8"	1/2"	5/8"							
1.500	4.50	2.25	2.44	2.19	1.97	2.11	3.31**	3.55**	–	0.57	1.20	130	135	128	143*	136
1.625	5.00	2.38	2.70	2.31	1.97	2.11	3.49**	3.68**	–	0.57	1.20	132	137	130	145*	138
1.750	5.50	2.50	2.81	2.44	1.97	2.11	3.61**	3.80**	–	0.57	1.20	134	139	132	147*	140
1.750 OS	6.64	3.50	3.75	2.44	1.97	2.11	5.38	5.50	–	0.57	1.20	134	139	132	147*	140
1.875	5.50	2.63	2.94	2.56	1.97	2.11	3.74**	3.93**	–	0.57	1.20	136	141	134	149*	142
1.875 OS	5.99	3.56	3.81	2.56	1.97	2.11	–	5.00	–	0.57	1.20	136	141	134	149*	142
2.000	5.50	2.75	3.19	2.69	1.97	2.11	3.99	4.12**	–	0.57	1.20	138	143	136	150*	144
2.125	6.00	2.88	3.44	2.81	1.97	2.11	4.24	4.37	4.49**	0.69	1.20	140	145	138	152	146
2.125 OS	6.99	3.88	4.25	2.81	1.66	2.42	–	4.49	5.25	0.69	1.51	140	145	138	152	146
2.250	6.00	3.00	3.56	2.94	1.97	2.11	4.36	4.49	4.61**	0.69	1.20	142	147	140	152	148
2.375	6.00	3.13	3.62	3.06	1.97	2.11	4.42	4.55	4.68**	0.69	1.20	144	149	142	153	150
2.500	6.50	3.25	3.81	3.19	1.97	2.11	4.61	4.74	4.86**	0.69	1.20	146	151	144	153	151
2.500 OS	7.77	4.50	4.75	3.19	1.97	2.11	–	6.63	6.75**	0.69	1.20	146	151	144	153	151
2.625	6.50	3.38	3.94	3.31	1.97	2.11	4.86	4.99	5.11	0.69	1.20	148	5-557	146	154	5-557
2.625 OS	6.99	4.55	4.88	3.31	1.97	2.11	–	5.88	6.00	0.69	1.20	148	5-557	146	154	5-557

\* Use next size larger for Style 76 O-rings

\*\* Minimum Bolt Circle requires D Washers.

† The S10 uses a quantity of 2 O-rings and the S20 uses a quantity of 4 O-rings.

# 186 BELLOWS CARTRIDGE SINGLE SEAL – Dimensional Data/Inch

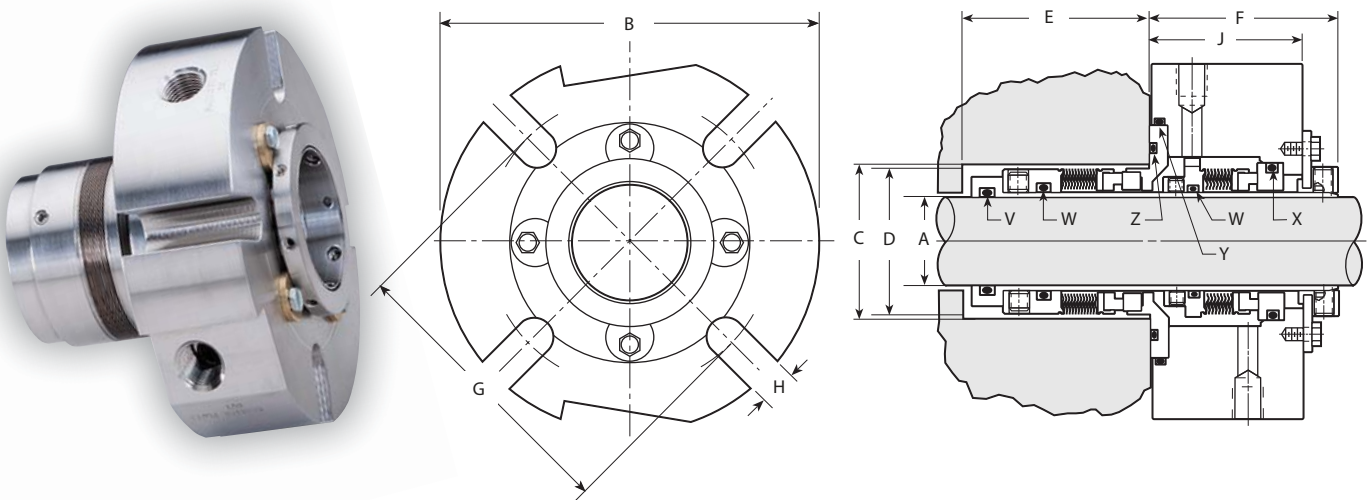


**186 KEY**

- A – Shaft Size
- B – Gland Outside Diameter
- C – Seal Chamber Bore
- D – IB Seal Diameter
- E – Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- J – Gland Width
- V – Shaft O-ring
- W – Rotary O-ring
- X – Stationary O-ring

A	B MAX	C MIN	C MAX	D MAX	E MIN	F	G/MIN			H MAX	J MAX	V	W	X
							3/8"	1/2"	5/8"					
1.000	4.25	1.75	1.86	1.69	1.45	1.79	2.81	–	–	0.44	1.03	214	122	222
1.125	4.25	1.75	2.11	1.69	1.51	1.79	2.90	–	–	0.44	1.03	216	124	223
1.250	4.25	2.00	2.23	1.94	1.63	1.79	3.02	–	–	0.44	1.03	218	126	224
1.375	4.25	2.00	2.36	1.94	1.63	1.79	3.15	–	–	0.44	1.03	220	128	225
1.500	4.50	2.25	2.61	2.19	1.70	1.79	3.39	3.51	–	0.56	1.03	222	130	227
1.625	5.00	2.38	2.74	2.31	1.76	1.79	3.51	3.64	–	0.56	1.03	223	132	228
1.750	5.50	2.50	2.86	2.44	1.82	1.79	3.62	3.75	–	0.56	1.03	224	134	229
1.875	5.50	2.63	2.98	2.56	1.82	1.79	3.75	3.88	–	0.56	1.03	225	226	230
2.000	5.50	2.75	3.24	2.69	1.82	1.85	4.00	4.13	4.25	0.56	1.09	226	138	232
2.125	6.00	2.88	3.36	2.81	1.88	1.85	4.13	4.25	4.38	0.69	1.09	227	140	233
2.250	6.25	3.00	3.48	2.94	1.88	1.91	4.25	4.38	4.50	0.69	1.16	228	142	234
2.375	6.25	3.25	3.61	3.19	1.98	1.91	4.38	4.50	4.63	0.69	1.16	229	144	235
2.500	6.50	3.38	3.61	3.31	2.04	1.98	4.38	4.50	4.63	0.69	1.22	230	146	235

# 286 BELLOWS CARTRIDGE DUAL SEAL – Dimensional Data/Inch

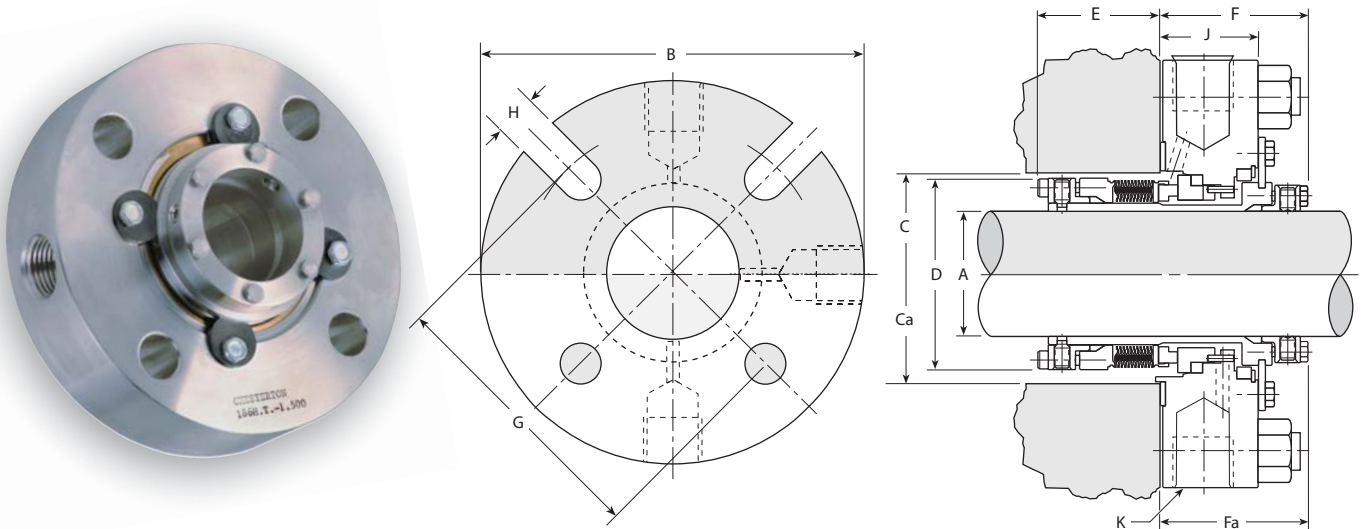


**286 KEY**

- A – Shaft Size
- B – Gland Outside Diameter
- C – Seal Chamber Bore
- D – IB Seal Diameter
- E – Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- J – Gland Width
- V – Shaft O-ring
- W – Rotary O-ring
- X – Stationary O-ring
- Y – Gland O-ring
- Z – Seal Chamber O-ring

A	B MAX	C MIN	C MAX	D MAX	E MIN	F	G/MIN			H MAX	J MAX	V	W	X	Y	Z
							3/8"	1/2"	5/8"							
1.000	4.13	1.75	1.88	1.69	2.03	2.06	2.90	-	-	0.44	1.70	214	122	222	139	135
1.125	4.25	1.75	1.88	1.69	2.03	2.06	2.90	-	-	0.44	1.70	216	124	223	139	135
1.250	4.25	2.00	2.13	1.94	2.06	2.13	3.02	-	-	0.44	1.76	218	126	224	141	139
1.375	4.25	2.00	2.19	1.94	2.06	2.03	3.25	-	-	0.44	1.67	126	128	225	144	140
1.500	4.50	2.25	2.38	2.19	2.25	2.13	3.50	3.63	-	0.56	1.75	222	130	227	148	143
1.625	5.00	2.38	2.50	2.31	2.21	2.13	3.56	3.69	-	0.56	1.76	223	132	228	149	145
1.750	5.50	2.50	2.56	2.44	2.34	2.13	3.63	3.75	-	0.56	1.76	224	134	229	150	146
1.875	5.50	2.63	2.69	2.56	2.34	2.13	3.75	3.88	-	0.56	1.76	225	136	230	151	148
2.000	5.50	2.75	2.94	2.69	2.34	2.13	4.01	4.13	-	0.56	1.76	226	138	232	152	151
2.125	6.00	3.00	3.19	2.81	2.40	2.13	4.25	4.38	4.50	0.69	1.76	227	140	233	153	152
2.250	6.25	3.13	3.19	2.94	2.40	2.13	4.25	4.38	4.50	0.69	1.76	228	142	234	153	152
2.375	6.25	3.25	3.44	3.19	2.31	2.25	4.38	4.50	4.63	0.69	1.88	229	144	235	153	153
2.500	6.50	3.38	3.44	3.31	2.41	2.19	4.56	4.81	4.81	0.69	1.77	230	146	235	154	153

# 186HT BELLOWS CARTRIDGE SINGLE SEAL – Dimensional Data/Metric



**186HT KEY**

- A – Shaft Size
- B – Gland Outside Diameter
- C – Seal Chamber Bore
- D – IB Seal Diameter
- E – Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- J – Gland Width
- K – NPT Size

A	B MAX	C MIN	Ca* MIN	D MAX	E MIN	F MAX	Fa** MAX	10 mm	G MIN 12 mm	16 mm	H MAX	J MAX	K
25	1,08	48	54	46	42	49	52	76	78	–	13	32	3/8"
30	1,08	51	57	49	42	49	52	79	82	–	13	32	3/8"
32	1,14	57	60	55	43	49	52	81	99	–	13	32	3/8"
35	1,21	60	67	58	43	50	54	89	92	–	14	34	3/8"
38	1,33	64	70	61	43	50	54	92	95	–	14	34	1/2"
40	1,40	67	73	65	43	50	54	95	98	–	14	34	1/2"
42	1,40	67	73	65	43	50	54	95	98	–	14	34	1/2"
45	1,46	70	76	68	43	50	54	98	101	–	14	34	1/2"
50	1,59	76	80	74	46	52	55	108	111	114	18	35	1/2"
55	1,59	79	89	77	46	52	55	111	114	117	18	35	1/2"
60	1,65	86	92	84	46	54	57	114	117	120	18	37	1/2"
65	1,65	89	95	87	46	54	57	117	120	123	18	37	1/2"

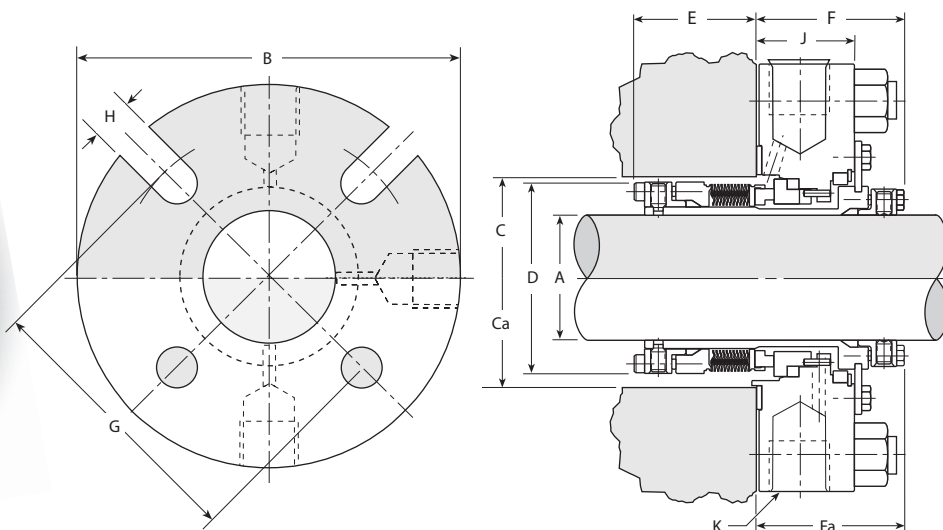
\* Minimum Bore Diameter Ca for ID Pilot

\*\* API OB Length Fa with Pilot design and metallic face gasket

† Note: Bore to be opened from 1.750 => 1.875 for Durco MK II & III Gr I Pumps

†† Note: Bore to be opened from 2.000 => 2.125 for Goulds 3196 ST Pumps

# 186HT BELLOWS CARTRIDGE SINGLE SEAL – Dimensional Data/Inch



**186HT KEY**

- A – Shaft Size
- B – Gland Outside Diameter
- C – Seal Chamber Bore
- D – IB Seal Diameter
- E – Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- J – Gland Width
- K – NPT Size

A	B MAX	C MIN	Ca* MIN	D MAX	E MIN	F MAX	Fa**	3/8"	G MIN 1/2"	5/8"	H MAX	J MAX	K
1.125	4.25	2.00	2.25	1.94	1.64	1.92	2.05	3.12	3.24	–	0.50	1.26	3/8"
1.125-X	4.25	1.88†	2.13	0.81	1.58	1.92	2.05	2.87	–	–	0.44	1.26	3/8"
1.250	4.50	2.25	2.38	2.17	1.68	1.92	2.05	3.19	3.31	–	0.50	1.26	3/8"
1.375	4.75	2.38	2.63	2.30	1.68	1.99	2.11	3.49	3.62	–	0.56	1.32	3/8"
1.375 OS	5.25	2.88	3.00	2.30	1.68	1.99	2.11	3.92	–	–	0.44	1.32	1/2"
1.375-X	4.25	2.13††	2.38	2.06	1.64	1.92	2.05	3.24	–	–	0.44	1.26	3/8"
1.500	5.25	2.50	2.75	2.42	1.68	1.99	2.11	3.62	3.74	–	0.56	1.32	1/2"
1.625	5.50	2.63	2.88	2.55	1.68	1.99	2.11	3.74	3.87	–	0.56	1.32	1/2"
1.750	5.75	2.75	3.00	2.67	1.68	1.99	2.11	3.87	3.99	–	0.56	1.32	1/2"
1.750 OS	6.50	3.50	3.63	2.67	1.68	1.99	2.11	4.92	5.04	5.17	0.69	1.32	1/2"
1.875	6.00	2.88	3.25	2.80	1.80	2.05	2.17	4.12	4.24	–	0.56	1.38	1/2"
1.875 OS	6.00	3.63	3.75	2.80	1.38	2.47	2.60	4.79	4.92	–	0.56	1.81	1/2"
2.000	6.25	3.00	3.38	2.92	1.80	2.05	2.17	4.24	4.37	4.49	0.69	1.38	1/2"
2.125	6.25	3.13	3.50	3.05	1.80	2.05	2.17	4.37	4.49	4.62	0.69	1.38	1/2"
2.125 OS	7.25	3.88	4.00	3.05	1.80	2.05	2.17	4.92	5.04	5.17	0.69	1.38	1/2"
2.250	6.50	3.25	3.63	3.19	1.80	2.05	2.17	4.49	4.62	4.74	0.69	1.38	1/2"
2.375	6.50	3.38	3.63	3.31	1.80	2.11	2.24	4.49	4.62	4.74	0.69	1.45	1/2"
2.500	6.50	3.50	3.75	3.44	1.80	2.11	2.24	4.62	4.74	4.87	0.69	1.45	1/2"
2.500 OS	8.00	4.75	4.88	3.44	1.80	2.11	2.24	6.42	6.54	6.67	0.69	1.45	1/2"
2.625	6.75	3.75	4.00	3.63	1.83	2.11	2.24	4.87	4.99	5.12	0.69	1.45	1/2"
2.625 OS	7.00	4.63	4.75	3.63	1.83	2.11	2.24	5.79	5.92	–	0.56	1.45	1/2"

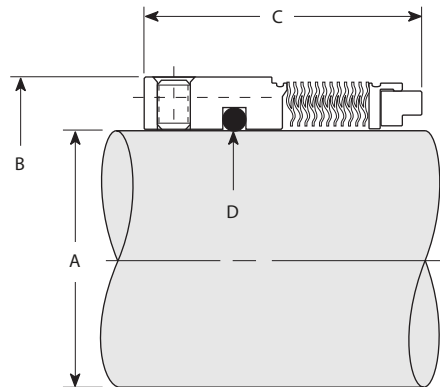
\* Minimum Bore Diameter Ca for ID Pilot

\*\* API OB Length Fa with Pilot design and metallic face gasket

† Note: Bore to be opened from 1.750 => 1.875 for Durco MK II & III Gr I Pumps

†† Note: Bore to be opened from 2.000 => 2.125 for Goulds 3196 ST Pumps

# 886 ROTARY BELLOWS SINGLE SEAL – Dimensional Data/Inch



**886 KEY**

A – Shaft Size

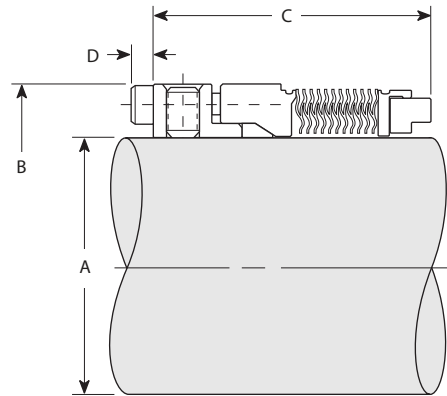
B – Seal Diameter

C – Operating Length

D – O-ring

A	B	C	D
0.750	1.457	1.250	116
0.875	1.457	1.250	118
1.000	1.457	1.250	120
1.125	1.687	1.250	123
1.250	1.812	1.312	124
1.250 OS	1.694	1.312	124
1.375	1.937	1.437	126
1.500	2.062	1.437	128
1.500 OS	1.944	1.437	128
1.625	2.187	1.437	130
1.750	2.312	1.437	132
1.875	2.497	1.500	134
2.000	2.562	1.500	226
2.125	2.687	1.500	138
2.250	2.812	1.562	140
2.375	2.937	1.562	142
2.500	3.187	1.562	144
2.625	3.312	1.625	146
2.750	3.437	1.625	148
2.875	3.625	1.687	150
3.000	3.750	1.687	151
3.125	3.875	1.750	235
3.250	4.000	1.750	236
3.375	4.125	1.750	237
3.500	4.250	1.875	238
3.625	4.375	1.875	239
3.750	4.500	1.875	240
3.875	4.625	1.875	244
4.000	4.750	1.875	242
4.125	5.125	1.875	243
4.250	5.125	1.875	244
4.375	5.375	1.875	245
4.500	5.375	1.875	246
4.625	5.625	1.875	247
4.750	5.625	1.875	248

# 886HT ROTARY BELLOWS SINGLE SEAL – Dimensional Data/Metric



**886HT KEY**

A – Shaft Size

B – Seal Diameter

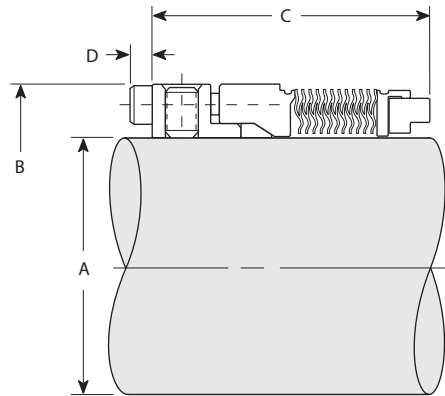
C – Operating Length

D – Screw Head Protrusion

A	B	C	D
25	39,7	42,8	3,2
28	42,8	39,7	3,2
30	46,0	42,8	3,2
32	46,0	42,8	3,2
33	49,2	44,5	3,2
35	49,2	44,5	3,2
38	55,1	44,5	4,2
40	58,3	44,5	4,2
43	61,5	44,5	4,2
45	62,3	44,5	4,2
48	64,6	44,5	4,2
50	67,8	44,5	4,2
53	71,1	44,5	4,2
55	74,2	47,6	4,2
60	77,3	47,6	4,2
63	80,9	47,6	4,2
65	84,1	47,6	4,2



# 886HT ROTARY BELLOWS SINGLE SEAL – Dimensional Data/Inch



**886HT KEY**

A – Shaft Size

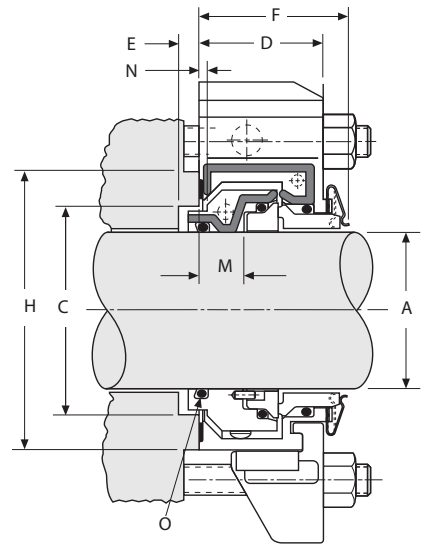
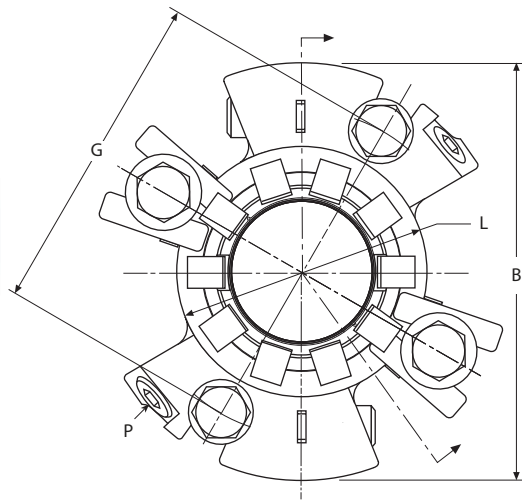
B – Seal Diameter

C – Operating Length

D – Screw Head Protrusion

A	B	C	D
1.000	1.562	1.687	0.125
1.125	1.687	1.562	0.125
1.250	1.812	1.562	0.125
1.375	1.937	1.750	0.125
1.500	2.170	1.750	0.164
1.625	2.295	1.750	0.164
1.750	2.420	1.750	0.164
1.875	2.545	1.750	0.164
2.000	2.670	1.750	0.164
2.250	2.920	1.875	0.164
2.375	3.045	1.875	0.164
2.500	3.187	1.875	0.164
2.625	3.312	1.875	0.164

# 442™ SPLIT SINGLE SEAL – Dimensional Data/Metric



**442 KEY**

A – Shaft Size  
 B – Maximum Gland Diameter  
 C – Min/Max Seal Chamber Bore  
 D – Gland Length

E – Minimum Seal Chamber Depth  
 F – Outboard Length Required  
 G – Minimum Bolt Circle by Bolt Size

H – Minimum Seal Chamber Face Outside Diameter  
 L – Hub Gland  
 M – Holder Bore from Box (Pg 92)

N – Installation Dimension (Pg 92)  
 O – Shaft O-ring Number  
 P – NPT Size (Pg 92)

A	B MAX	C MIN	C MAX	D	E MIN	F	G MIN							H MIN	L MAX	O	
							8 mm	10 mm	12 mm	14 mm	16 mm	18 mm	20 mm	22 mm			
32	125,5	47,2	53,3	37,6	4,3	45,2	79,8	81,8	83,8	85,8	87,8	-	-	-	59,9	70,9	-219
33	125,5	47,2	53,3	37,6	4,3	45,2	79,8	81,8	83,8	85,8	87,8	-	-	-	59,9	70,9	-220
35	127,4	49,3	60,5	37,6	4,3	45,2	81,8	83,8	85,8	87,8	89,8	-	-	-	66,8	72,8	-221
38	130,5	52,3	63,5	37,6	4,3	45,2	85,0	87,0	89,0	91,0	93,0	-	-	-	69,9	76,0	-223
40	133,6	55,6	66,8	37,6	4,3	45,2	87,4	89,4	91,4	93,4	95,4	-	-	-	73,2	79,0	-223
43	136,8	58,7	70,0	37,6	4,3	45,2	90,5	92,5	94,5	96,5	98,5	-	-	-	76,2	82,0	-224
45	136,8	58,7	70,0	37,6	4,3	45,2	90,5	92,5	94,5	96,5	98,5	-	-	-	76,2	82,0	-225
48	140,0	62,0	73,2	37,6	4,3	45,2	97,7	95,7	97,7	99,7	101,7	-	-	-	79,5	85,2	-226
50	143,2	65,0	76,2	37,6	4,3	45,2	98,4	100,4	102,4	104,4	106,4	-	-	-	82,6	88,4	-226
55	146,3	68,3	79,2	37,6	4,3	45,2	101,6	103,6	105,6	107,6	109,6	-	-	-	85,9	91,5	-228
60	152,6	74,7	85,6	37,6	4,3	45,2	107,8	109,8	111,8	113,8	115,8	-	-	-	92,2	97,9	-230
65	197,5	85,1	108,0	46,7	6,6	56,9	-	-	140,6	142,6	144,6	-	-	-	120,7	126,9	-231
70	197,5	85,1	108,0	46,7	6,6	56,9	-	-	140,6	142,6	144,6	-	-	-	120,7	126,9	-233
75	203,8	91,4	114,3	46,7	6,6	56,9	-	-	146,2	148,2	150,2	-	-	-	127,0	133,2	-234
80	210,2	97,8	120,7	46,7	6,6	56,9	-	-	154,8	156,8	158,8	160,8	-	-	133,4	139,5	-236
85	216,5	104,1	127,0	46,7	6,6	56,9	-	-	158,9	160,9	162,9	164,9	166,9	-	139,7	145,9	-237
90	216,5	104,1	127,0	46,7	6,6	56,9	-	-	158,9	160,9	162,9	164,9	166,9	-	139,7	145,9	-239
95	222,9	110,5	133,4	46,7	6,6	56,9	-	-	165,3	167,3	169,3	171,3	173,3	-	146,1	152,3	-241
100	229,2	116,8	139,7	46,7	6,6	56,9	-	-	171,6	173,6	175,6	177,6	179,6	-	152,4	158,6	-242
110	241,9	129,5	152,4	46,7	6,6	56,9	-	-	184,3	186,3	188,3	190,3	192,3	-	165,1	171,3	-245
115	241,9	129,5	152,4	46,7	6,6	56,9	-	-	184,3	186,3	188,3	190,3	192,3	-	165,1	171,3	-247
120	248,3	135,9	158,8	46,7	6,6	56,9	-	-	190,6	192,6	194,6	196,6	198,6	-	171,5	177,7	-248
125	286,4	150,1	177,8	73,9	7,4	87,6	-	-	-	-	-	214,5	216,5	218,5	190,5	196,5	-354
130	292,8	155,1	184,2	73,9	7,4	87,6	-	-	-	-	-	220,9	222,9	224,9	196,9	202,9	-355
135	299,1	160,1	190,5	73,9	7,4	87,6	-	-	-	-	-	227,3	229,3	231,3	203,2	209,3	-356
140	299,1	165,2	190,5	73,9	7,4	87,6	-	-	-	-	-	227,3	229,3	231,3	203,2	209,3	-358
145	305,5	170,2	196,9	73,9	7,4	87,6	-	-	-	-	-	233,7	235,7	237,7	209,6	215,7	-360
150	311,8	175,2	203,2	73,9	7,4	87,6	-	-	-	-	-	240,1	242,1	244,1	215,9	222,1	-361
155	318,2	180,1	209,6	73,9	7,4	87,6	-	-	-	-	-	246,4	248,4	250,4	222,3	228,4	-362
160	324,5	185,1	215,9	73,9	7,4	87,6	-	-	-	-	-	252,8	254,8	256,8	228,6	234,8	-363
165	324,5	190,1	215,9	73,9	7,4	87,6	-	-	-	-	-	259,2	261,2	263,2	228,6	234,8	-364
170	330,9	195,1	222,3	73,9	7,4	87,6	-	-	-	-	-	259,2	261,2	263,2	235,0	241,2	-364
175	337,2	200,2	228,6	73,9	7,4	87,6	-	-	-	-	-	265,6	267,6	269,6	241,3	247,6	-365
180	337,2	205,2	228,6	73,9	7,4	87,6	-	-	-	-	-	272,0	274,0	276,0	247,7	247,6	-366
185	343,6	210,2	235,0	73,9	7,4	87,6	-	-	-	-	-	272,0	274,0	276,0	247,7	254,0	-367
190	349,9	215,1	241,3	73,9	7,4	87,6	-	-	-	-	-	278,4	280,4	282,4	254,0	260,4	-368
195	356,3	220,1	247,7	73,9	7,4	87,6	-	-	-	-	-	284,8	286,8	288,8	260,4	266,8	-368

# 442™ SPLIT SINGLE SEAL – Dimensional Data/Inch

**442 KEY**

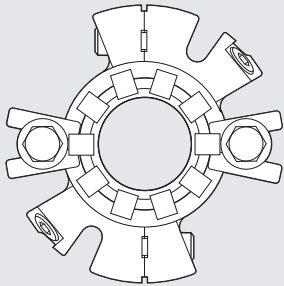
A – Shaft Size	E – Minimum Seal Chamber Depth	H – Minimum Seal Chamber Face Outside Diameter	N – Installation Dimension (Pg 92)
B – Maximum Gland Diameter	F – Outboard Length Required	L – Hub Gland	O – Shaft O-ring Number
C – Min/Max Seal Chamber Bore	G – Minimum Bolt Circle by Bolt Size	M – Holder Bore from Box (Pg 92)	P – NPT Size (Pg 92)
D – Gland Length			

A	B MAX	C MIN	C MAX	D	E MIN	F	3/8"	1/2"	G MIN 5/8"	3/4"	7/8"	H MIN	L MAX	O
1.250	4.94	1.86	2.10	1.48	0.17	1.78	3.20	3.33	3.45	-	-	2.35	2.79	-219
1.375	5.02	1.94	2.38	1.48	0.17	1.78	3.28	3.40	3.53	-	-	2.63	2.87	-221
1.500	5.14	2.06	2.50	1.48	0.17	1.78	3.40	3.53	3.65	-	-	2.75	2.99	-223
1.625	5.26	2.19	2.63	1.48	0.17	1.78	3.50	3.63	-	-	-	2.87	3.11	-224
1.750	5.39	2.31	2.75	1.48	0.17	1.78	3.63	3.75	-	-	-	3.00	3.23	-225
1.875	5.51	2.44	2.88	1.48	0.17	1.78	3.75	3.88	-	-	-	3.12	3.35	-226
2.000	5.64	2.56	3.00	1.48	0.17	1.78	3.94	4.06	-	-	-	3.25	3.48	-227
2.125	5.76	2.69	3.12	1.48	0.17	1.78	4.06	4.19	4.31	-	-	3.37	3.60	-228
2.250	5.88	2.81	3.25	1.48	0.17	1.78	4.19	4.31	4.44	-	-	3.50	3.73	-229
2.375	6.01	2.94	3.37	1.48	0.17	1.78	4.31	4.43	4.56	-	-	3.62	3.85	-230
2.500	6.13	3.06	3.75	1.48	0.17	1.78	4.57	4.70	4.82	-	-	4.00	4.23	-231
2.625	7.77	3.35	4.25	1.84	0.26	2.24	5.44	5.56	5.69	-	-	4.75	5.00	-232
2.750	7.77	3.35	4.25	1.84	0.26	2.24	5.44	5.56	5.69	-	-	4.75	5.00	-233
2.875	8.02	3.60	4.50	1.84	0.26	2.24	5.66	5.78	5.91	-	-	5.00	5.25	-234
3.000	8.02	3.60	4.50	1.84	0.26	2.24	5.66	5.78	5.91	-	-	5.00	5.25	-235
3.125	8.27	3.85	4.75	1.84	0.26	2.24	6.00	6.12	6.25	-	-	5.25	5.49	-236
3.250	8.27	3.85	4.75	1.84	0.26	2.24	6.00	6.12	6.25	-	-	5.25	5.49	-237
3.375	8.51	4.10	5.00	1.84	0.26	2.24	6.16	6.28	6.41	6.53	6.66	5.50	5.75	-238
3.500	8.51	4.10	5.00	1.84	0.26	2.24	6.16	6.28	6.41	6.53	6.66	5.50	5.75	-239
3.625	8.77	4.35	5.25	1.84	0.26	2.24	6.41	6.53	6.66	6.78	6.91	5.75	6.00	-240
3.750	8.77	4.35	5.25	1.84	0.26	2.24	6.41	6.53	6.66	6.78	6.91	5.75	6.00	-241
3.875	9.02	4.60	5.50	1.84	0.26	2.24	6.66	6.78	6.91	7.03	7.16	6.00	6.25	-242
4.000	9.02	4.60	5.50	1.84	0.26	2.24	6.66	6.78	6.91	7.03	7.16	6.00	6.25	-243
4.125	9.27	4.85	5.75	1.84	0.26	2.24	6.91	7.03	7.16	7.28	7.41	6.25	6.50	-244
4.250	9.27	4.85	5.75	1.84	0.26	2.24	6.91	7.03	7.16	7.28	7.41	6.25	6.50	-245
4.375	9.52	5.10	6.00	1.84	0.26	2.24	7.16	7.28	7.41	7.53	7.66	6.50	6.75	-246
4.500	9.52	5.10	6.00	1.84	0.26	2.24	7.16	7.28	7.41	7.53	7.66	6.50	6.75	-247
4.625	9.77	5.35	6.25	1.84	0.26	2.24	7.41	7.53	7.66	7.78	7.91	6.75	7.00	-248
4.750	9.77	5.35	6.25	1.84	0.26	2.24	7.41	7.53	7.66	7.78	7.91	6.75	7.00	-249
4.875	11.28	5.87	7.00	2.91	0.29	3.45	-	-	8.41	8.53	8.66	7.50	7.74	-353
5.000	11.28	5.99	7.00	2.91	0.29	3.45	-	-	8.41	8.53	8.66	7.50	7.74	-354
5.125	11.53	6.12	7.25	2.91	0.29	3.45	-	-	8.66	8.78	8.91	7.75	7.99	-355
5.250	11.53	6.24	7.25	2.91	0.29	3.45	-	-	8.66	8.78	8.91	7.75	7.99	-356
5.375	11.78	6.37	7.50	2.91	0.29	3.45	-	-	8.91	9.03	9.16	8.00	8.24	-357
5.500	11.78	6.49	7.50	2.91	0.29	3.45	-	-	8.91	9.03	9.16	8.00	8.24	-358
5.625	12.03	6.62	7.75	2.91	0.29	3.45	-	-	9.16	9.28	9.41	8.25	8.49	-359
5.750	12.03	6.74	7.75	2.91	0.29	3.45	-	-	9.16	9.28	9.41	8.25	8.49	-360
5.875	12.28	6.87	8.00	2.91	0.29	3.45	-	-	9.41	9.54	9.66	8.50	8.74	-361
6.000	12.28	6.99	8.00	2.91	0.29	3.45	-	-	9.41	9.54	9.66	8.50	8.74	-362
6.125	12.53	7.12	8.25	2.91	0.29	3.45	-	-	9.66	9.79	9.91	8.75	8.99	-362
6.250	12.53	7.24	8.25	2.91	0.29	3.45	-	-	9.66	9.79	9.91	8.75	8.99	-363
6.375	12.78	7.37	8.50	2.91	0.29	3.45	-	-	9.91	10.04	10.16	9.00	9.25	-363
6.500	12.78	7.49	8.50	2.91	0.29	3.45	-	-	9.91	10.04	10.16	9.00	9.25	-364
6.625	13.03	7.62	8.75	2.91	0.29	3.45	-	-	10.17	10.29	10.42	9.25	9.50	-364
6.750	13.03	7.74	8.75	2.91	0.29	3.45	-	-	10.17	10.29	10.42	9.25	9.50	-365
6.875	13.28	7.87	9.00	2.91	0.29	3.45	-	-	10.42	10.54	10.67	9.50	9.75	-365
7.000	13.28	7.99	9.00	2.91	0.29	3.45	-	-	10.42	10.54	10.67	9.50	9.75	-366
7.125	13.53	8.12	9.25	2.91	0.29	3.45	-	-	10.67	10.79	10.92	9.75	10.00	-366
7.250	13.53	8.24	9.25	2.91	0.29	3.45	-	-	10.67	10.79	10.92	9.75	10.00	-367
7.375	13.78	8.37	9.50	2.91	0.29	3.45	-	-	10.92	11.04	11.17	10.00	10.25	-367
7.500	13.78	8.49	9.50	2.91	0.29	3.45	-	-	10.92	11.04	11.17	10.00	10.25	-368
7.625	14.03	8.62	9.75	2.91	0.29	3.45	-	-	11.17	11.29	11.42	10.25	10.50	-368
7.750	14.03	8.74	9.75	2.91	0.29	3.45	-	-	11.17	11.29	11.42	10.25	10.50	-369

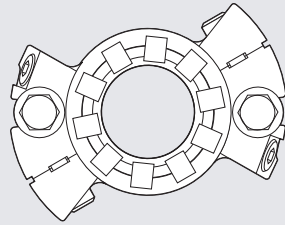
# 442™ SPLIT SINGLE SEAL – Dimensional Data/Metric and Inches - Sizes 32 mm to 195 mm (1.250" to 7.750")

## EQUIPMENT BOLT PATTERNS

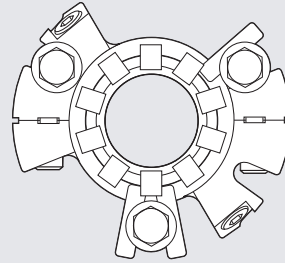
Shaft Sizes: 40 mm to 120 mm (1.625" to 4.750")



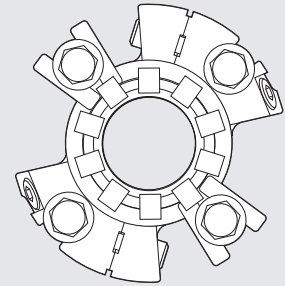
2 BOLTS



2 BOLTS

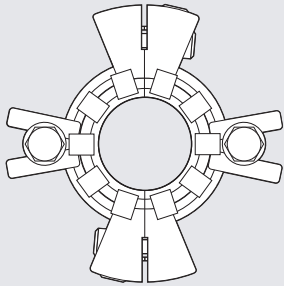


3 BOLTS

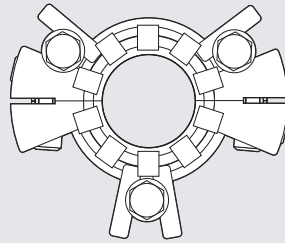


4 BOLTS

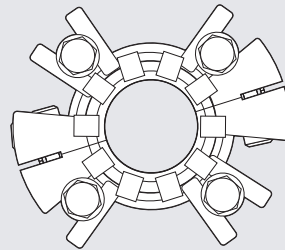
All Other Shaft Sizes



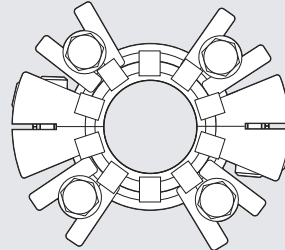
2 BOLTS



3 BOLTS



4 BOLTS



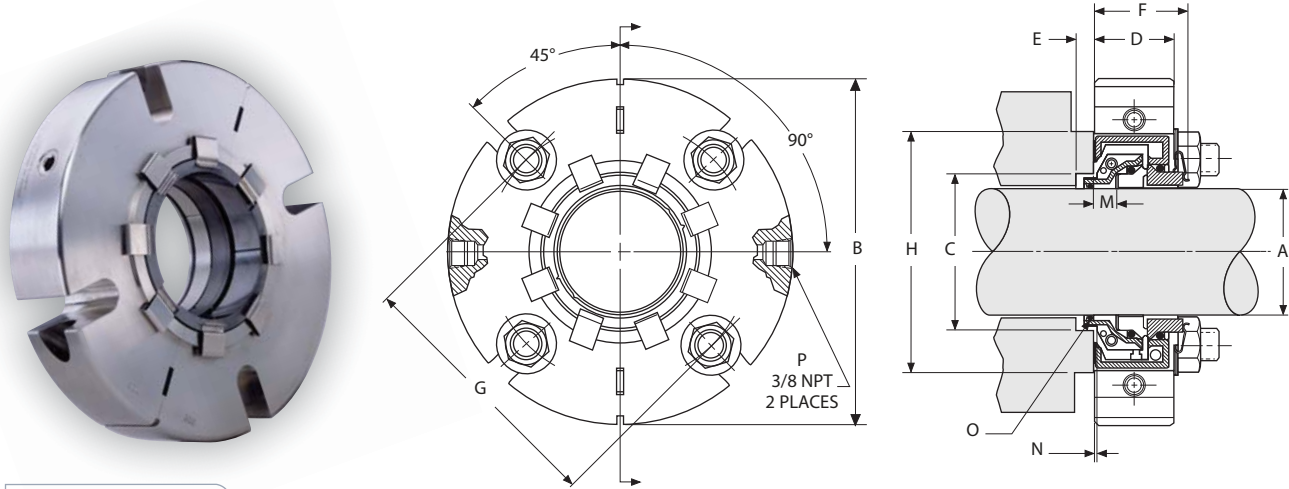
4 BOLTS

### 442 KEY

A – Shaft Size  
M – Holder ID from Box  
N – Installation Diameter  
P – NPYT Size

SIZE	M	N	P (NPT)	SIZE	M	N	P (NPT)
32 mm to 38 mm	13,5	2,4	1/4"	1.250" to 1.500"	0.53	0.094	1/4"
40 mm to 120 mm	13,5	2,4	3/8"	1.625" to 4.750"	0.53	0.094	3/8"
125 mm to 195 mm	26,0	4,8	1/2"	4.875" to 7.750"	1.03	0.188	1/2"

# 442M SPLIT MIXER SINGLE SEAL – Dimensional Data/Metric – Sizes 38 mm to 120 mm



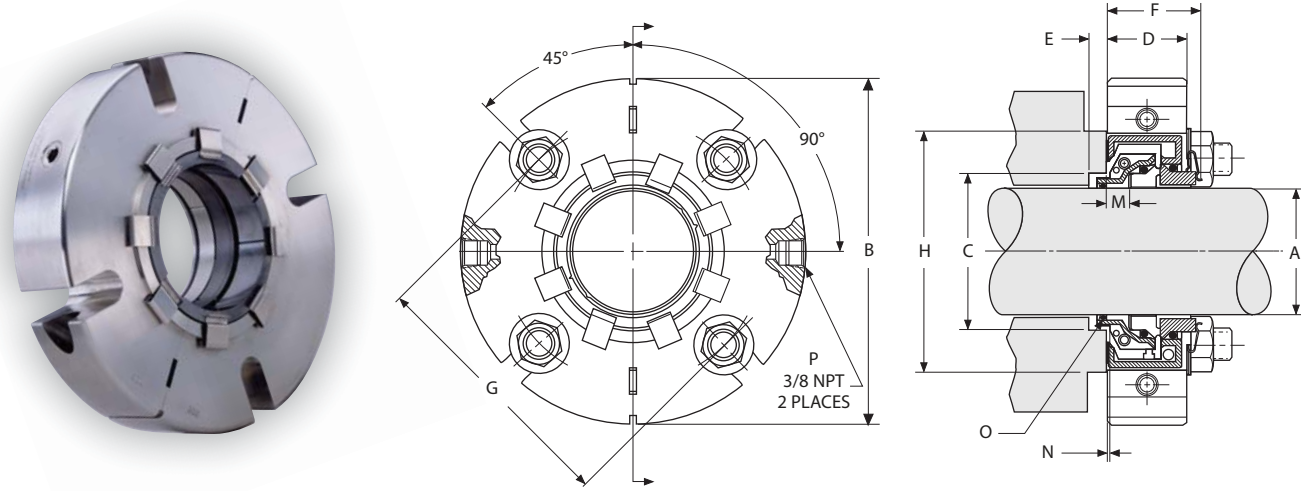
**442M KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Min/Max Seal Chamber Diameter
- D – Gland Length
- E – Minimum Seal Chamber Depth
- F – Outboard Space Required
- G – Minimum Bolt Circle by Bolt Size
- H – Minimum Seal Chamber Face Outside Diameter
- M – Holder Inside Diameter from Box
- N – Installation Dimension
- O – Shaft O-ring Number

SIZE	M	N	P (NPT)
up to 38 mm	13,5	2,4	1/4"
up to 120 mm	13,5	2,4	3/8"
up to 195 mm	26,0	4,8	1/2"

A	B MAX	C MIN	C MAX	D	E MIN	F	G MIN						H	O
							8 mm	10 mm	12 mm	14 mm	16 mm	18 mm		
38	134,1	53,6	67,4	37,6	4,3	45,2	90,6	92,6	94,6	-	-	-	73,8	223
40	137,3	56,8	70,2	37,6	4,3	45,2	93,0	95,0	97,0	-	-	-	76,2	223
43	140,5	60,0	73,4	37,6	4,3	45,2	96,1	98,1	100,1	-	-	-	79,2	224
45	140,5	60,0	73,4	37,6	4,3	45,2	96,1	98,1	100,1	-	-	-	79,2	25
48	143,6	63,1	76,6	37,6	4,3	45,2	99,4	101,4	103,4	-	-	-	82,6	226
50	146,8	66,3	80,3	37,6	4,3	45,2	104,5	106,5	108,5	110,5	-	-	86,4	226
55	150,0	69,5	83,3	37,6	4,3	45,2	107,8	109,8	111,8	113,8	-	-	89,7	228
60	156,3	75,8	94,1	37,6	4,3	45,2	119,7	121,7	123,7	125,7	-	-	101,6	230
65	204,1	87,9	115,1	46,7	6,6	56,9	145,9	147,9	149,9	151,9	-	-	127,8	231
70	204,1	87,9	115,1	46,7	6,6	56,9	145,9	147,9	149,9	151,9	-	-	127,8	233
75	210,4	94,2	121,4	46,7	6,6	56,9	152,2	154,2	156,2	158,2	-	-	134,1	234
80	216,8	100,6	127,8	46,7	6,6	56,9	157,6	159,6	161,6	163,6	165,6	167,6	140,5	236
85	223,1	106,9	134,1	46,7	6,6	56,9	164,0	166,0	168,0	170,0	172,0	174,0	146,8	237
90	223,1	106,9	134,1	46,7	6,6	56,9	164,0	166,0	168,0	170,0	172,0	174,0	146,8	239
95	229,5	113,3	140,5	46,7	6,6	56,9	170,3	172,3	174,3	176,3	178,3	180,3	153,2	241
100	235,8	119,6	146,8	46,7	6,6	56,9	176,7	178,7	180,7	182,7	184,7	186,7	159,5	242
110	248,5	132,3	159,5	46,7	6,6	56,9	189,4	191,4	193,4	195,4	197,4	199,4	172,2	245
115	248,5	132,3	159,5	46,7	6,6	56,9	189,4	191,4	193,4	195,4	197,4	199,4	172,2	247
120	254,9	138,7	159,5	46,7	6,6	56,9	189,4	191,4	193,4	195,4	197,4	199,4	172,2	248

# 442M SPLIT MIXER SINGLE SEAL – Dimensional Data/Inch – Size 1.500" to 4.750"



**442 KEY**

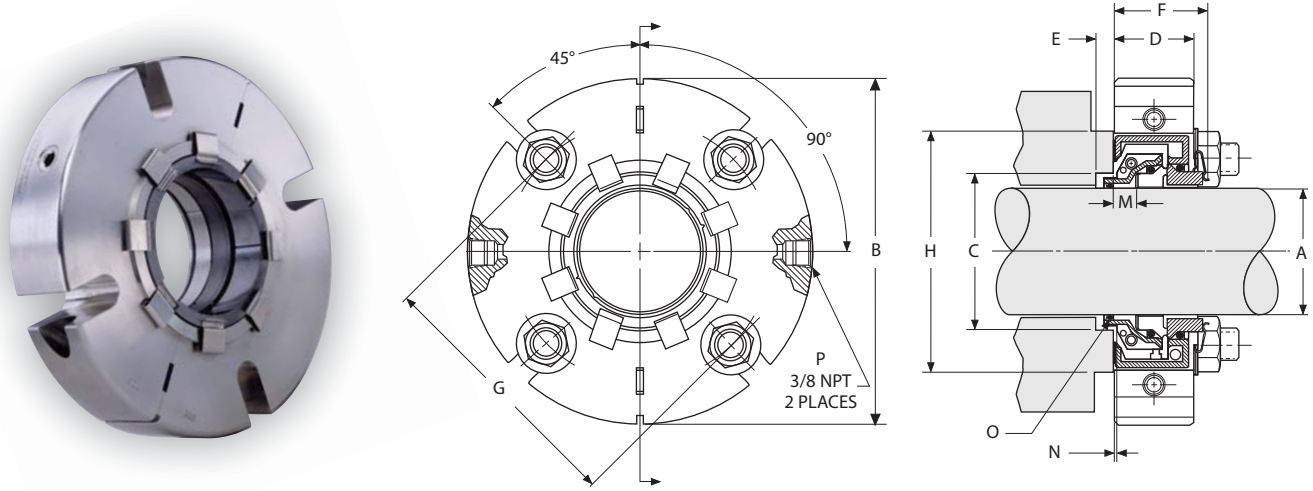
- A – Shaft Size
- B – Maximum Gland Diameter
- C – Min/Max Seal Chamber Diameter
- D – Gland Length
- E – Minimum Seal Chamber Depth
- F – Outboard Space Required

- G – Minimum Bolt Circle by Bolt Size
- H – Minimum Seal Chamber Face Outside Diameter
- M – Holder Inside Diameter from Box
- N – Installation Dimension
- O – Shaft O-ring Number

SIZE	M	N	P (NPT)
up to 38 mm	13,5	2,4	1/4"
up to 120 mm	13,5	2,4	3/8"
up to 195 mm	26,0	4,8	1/2"

A	B MAX	C MIN	C MAX	D	E MIN	F	3/8"	1/2"	G MIN	5/8"	3/4"	H	O
1.500	5.28	2.11	2.66	1.48	0.17	1.78	3.60	3.73	–	–	–	2.91	223
1.625	5.41	2.24	2.77	1.48	0.17	1.78	3.70	3.82	–	–	–	3.00	224
1.750	5.53	2.36	2.89	1.48	0.17	1.78	3.82	3.94	–	–	–	3.12	225
1.875	5.66	2.49	3.02	1.48	0.17	1.78	3.95	4.07	–	–	–	3.25	226
2.000	5.78	2.61	3.16	1.48	0.17	1.78	4.10	4.23	4.35	–	–	3.40	227
2.125	5.91	2.74	3.28	1.48	0.17	1.78	4.23	4.36	4.48	–	–	3.53	228
2.250	6.03	2.86	3.42	1.48	0.17	1.78	4.35	4.48	4.60	–	–	3.65	229
2.375	6.16	2.99	3.71	1.48	0.17	1.78	4.70	4.83	4.95	–	–	4.00	230
2.500	6.28	3.11	3.71	1.48	0.17	1.78	4.70	4.83	4.95	–	–	4.00	231
2.625	8.03	3.46	4.53	1.84	0.26	2.24	5.73	5.86	5.98	–	–	5.03	232
2.750	8.03	3.46	4.53	1.84	0.26	2.24	5.73	5.86	5.98	–	–	5.03	233
2.875	8.28	3.71	4.78	1.84	0.26	2.24	5.98	6.11	6.23	–	–	5.28	234
3.000	8.28	3.71	4.78	1.84	0.26	2.24	5.98	6.11	6.23	–	–	5.28	235
3.125	8.53	3.96	5.03	1.84	0.26	2.24	6.23	6.35	6.48	6.60	–	5.53	236
3.250	8.53	3.96	5.03	1.84	0.26	2.24	6.23	6.35	6.48	6.60	–	5.53	237
3.375	8.78	4.21	5.28	1.84	0.26	2.24	6.48	6.60	6.73	6.85	–	5.78	238
3.500	8.78	4.21	5.28	1.84	0.26	2.24	6.48	6.60	6.73	6.85	–	5.78	239
3.625	9.03	4.46	5.53	1.84	0.26	2.24	6.73	6.85	6.98	7.10	–	6.03	240
3.750	9.03	4.46	5.53	1.84	0.26	2.24	6.73	6.85	6.98	7.10	–	6.03	241
3.875	9.28	4.71	5.78	1.84	0.26	2.24	6.98	7.10	7.23	7.35	–	6.28	242
4.000	9.28	4.71	5.78	1.84	0.26	2.24	6.98	7.10	7.23	7.35	–	6.28	243
4.125	9.53	4.96	6.03	1.84	0.26	2.24	7.23	7.35	7.48	7.60	–	6.53	244
4.250	9.53	4.96	6.03	1.84	0.26	2.24	7.23	7.35	7.48	7.60	–	6.53	245
4.375	9.78	5.21	6.28	1.84	0.26	2.24	7.48	7.60	7.73	7.85	–	6.78	246
4.500	9.78	5.21	6.28	1.84	0.26	2.24	7.48	7.60	7.73	7.85	–	6.78	247
4.625	10.03	5.46	6.28	1.84	0.26	2.24	7.48	7.60	7.73	7.85	–	6.78	248
4.750	10.03	5.46	6.28	1.84	0.26	2.24	7.48	7.60	7.73	7.85	–	6.78	249

# 442M SPLIT MIXER SINGLE SEAL – Dimensional Data/Metric – Sizes 125 mm to 190 mm



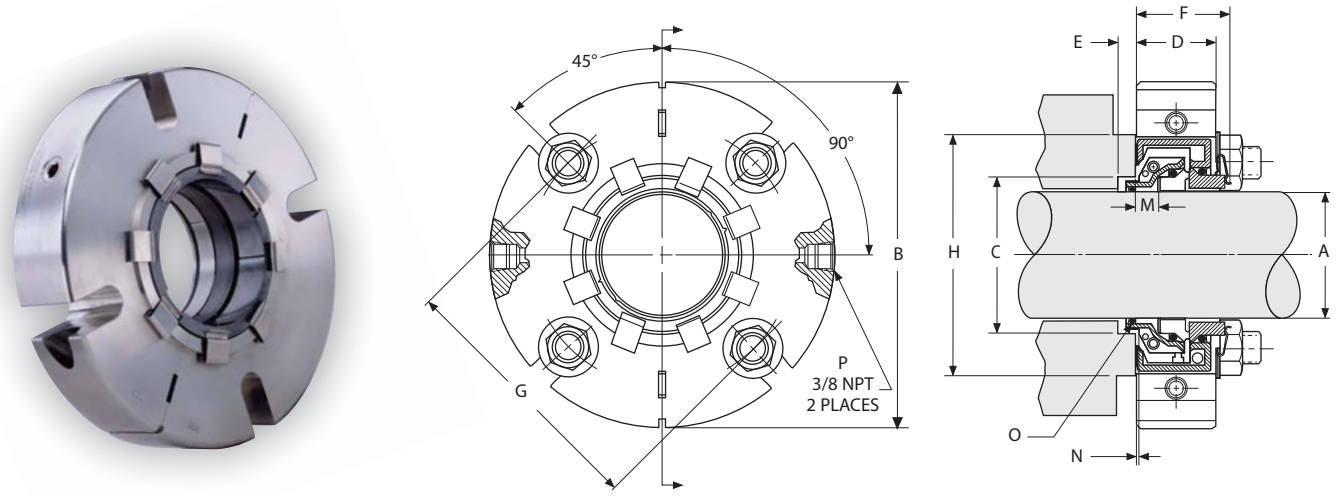
**442 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Min/Max Seal Chamber Diameter
- D – Gland Length
- E – Minimum Seal Chamber Depth
- F – Outboard Space Required
- G – Minimum Bolt Circle by Bolt Size
- H – Minimum Seal Chamber Face Outside Diameter
- M – Holder Inside Diameter from Box
- N – Installation Dimension
- O – Shaft O-ring Number

SIZE	M	N	P (NPT)
up to 38 mm	13,5	2,4	1/4"
up to 120 mm	13,5	2,4	3/8"
up to 195 mm	26,0	4,8	1/2"

A	B MAX	C MIN	C MAX	D	E MIN	F	18 mm	G MIN 20 mm	22 mm	H	L MAX	O
125,0	292,8	153,7	181,6	73,9	7,4	87,6	221,4	223,4	225,4	196,9	202,9	354
130,0	299,2	156,8	188,0	73,9	7,4	87,6	227,8	229,8	231,8	203,2	209,3	355
135,0	305,6	163,2	194,3	73,9	7,4	87,6	234,1	236,1	238,1	209,6	215,7	356
140,0	305,6	166,4	194,3	73,9	7,4	87,6	234,1	236,1	238,1	209,6	215,7	358
145,0	312,0	172,7	200,7	73,9	7,4	87,6	240,5	242,5	244,5	215,9	222,1	359
150,0	318,3	179,1	207,0	73,9	7,4	87,6	246,8	248,8	250,8	222,3	228,4	361
155,0	324,7	182,2	213,4	73,9	7,4	87,6	253,2	255,2	257,2	228,6	234,8	362
160,0	331,1	188,6	219,7	73,9	7,4	87,6	259,5	261,5	263,5	235,0	241,2	363
165,0	331,1	191,8	219,7	73,9	7,4	87,6	259,5	261,5	263,5	235,0	241,2	364
170,0	337,5	198,1	226,1	73,9	7,4	87,6	265,9	267,9	269,9	241,3	247,6	364
175,0	343,9	201,3	232,4	73,9	7,4	87,6	272,2	274,2	276,2	247,7	254,0	365
180,0	350,2	207,6	238,8	73,9	7,4	87,6	278,6	280,6	282,6	254,0	260,4	366
185,0	350,2	210,8	238,8	73,9	7,4	87,6	278,6	280,6	282,6	254,0	260,4	367
190,0	356,6	217,2	245,1	73,9	7,4	87,6	284,9	286,9	288,9	260,4	266,8	368

# 442M SPLIT MIXER SINGLE SEAL – Dimensional Data/Inch – Sizes 4.875" to 7.500"



**442 KEY**

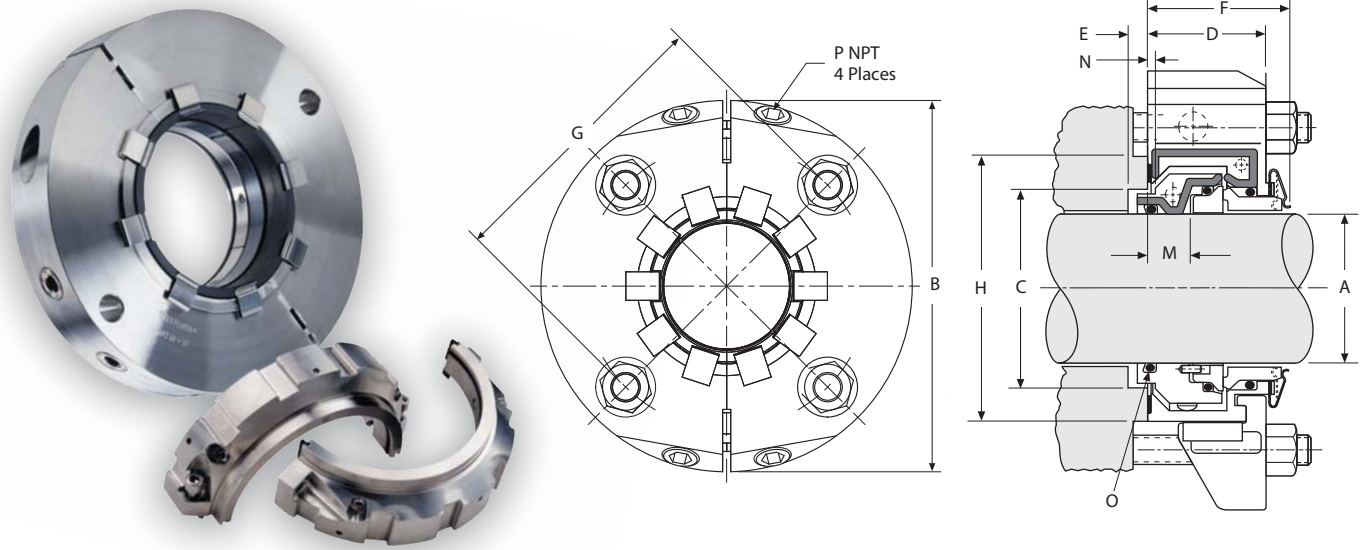
- A – Shaft Size
- B – Maximum Gland Diameter
- C – Min/Max Seal Chamber Diameter
- D – Gland Length
- E – Minimum Seal Chamber Depth
- F – Outboard Space Required
- G – Minimum Bolt Circle by Bolt Size
- H – Minimum Seal Chamber Face Outside Diameter
- M – Holder Inside Diameter from Box
- N – Installation Dimension
- O – Shaft O-ring Number

SIZE	M	N	P (NPT)
up to 38 mm	13,5	2,4	1/4"
up to 120 mm	13,5	2,4	3/8"
up to 195 mm	26,0	4,8	1/2"

A	B MAX	C MIN	C MAX	D	E	F	5/8"	G MIN 3/4"	7/8"	H	L MAX	O
4.875	11.53	5.93	7.15	2.91	0.29	3.45	8.63	8.75	8.88	7.75	7.99	353
5.000	11.53	6.05	7.15	2.91	0.29	3.45	8.63	8.75	8.88	7.75	7.99	354
5.125	11.78	6.18	7.40	2.91	0.29	3.45	8.88	9.00	9.13	8.00	8.24	355
5.250	11.78	6.30	7.40	2.91	0.29	3.45	8.88	9.00	9.13	8.00	8.24	356
5.375	12.03	6.43	7.65	2.91	0.29	3.45	9.13	9.25	9.38	8.25	8.49	357
5.500	12.03	6.55	7.65	2.91	0.29	3.45	9.13	9.25	9.38	8.25	8.49	358
5.625	12.28	6.68	7.90	2.91	0.29	3.45	9.38	9.50	9.63	8.50	8.74	359
5.750	12.28	6.80	7.90	2.91	0.29	3.45	9.38	9.50	9.63	8.50	8.74	360
5.875	12.53	6.93	8.15	2.91	0.29	3.45	9.63	9.75	9.88	8.75	8.99	361
6.000	12.53	7.05	8.15	2.91	0.29	3.45	9.63	9.75	9.88	8.75	8.99	362
6.125	12.78	7.18	8.40	2.91	0.29	3.45	9.88	10.00	10.13	9.00	9.25	362
6.250	12.78	7.30	8.40	2.91	0.29	3.45	9.88	10.00	10.13	9.00	9.25	363
6.375	13.03	7.43	8.65	2.91	0.29	3.45	10.13	10.25	10.38	9.25	9.50	363
6.500	13.03	7.55	8.65	2.91	0.29	3.45	10.13	10.25	10.38	9.25	9.50	364
6.625	13.29	7.68	8.90	2.91	0.29	3.45	10.38	10.50	10.63	9.50	9.75	364
6.750	13.29	7.80	8.90	2.91	0.29	3.45	10.38	10.50	10.63	9.50	9.75	365
6.875	13.54	7.93	9.15	2.91	0.29	3.45	10.63	10.75	10.88	9.75	10.00	365
7.000	13.54	8.05	9.15	2.91	0.29	3.45	10.63	10.75	10.88	9.75	10.00	366
7.125	13.79	8.18	9.40	2.91	0.29	3.45	10.88	11.00	11.13	10.00	10.25	366
7.250	13.79	8.30	9.40	2.91	0.29	3.45	10.88	11.00	11.13	10.00	10.25	367
7.375	14.04	8.43	9.65	2.91	0.29	3.45	11.13	11.25	11.38	10.25	10.50	367
7.500	14.04	8.55	9.65	2.91	0.29	3.45	11.13	11.25	11.38	10.25	10.50	368



# 442PR SPLIT PUMPING RING SEAL – Dimensional Data/Inch



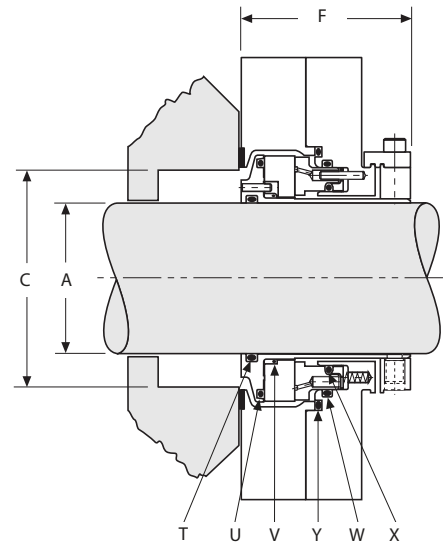
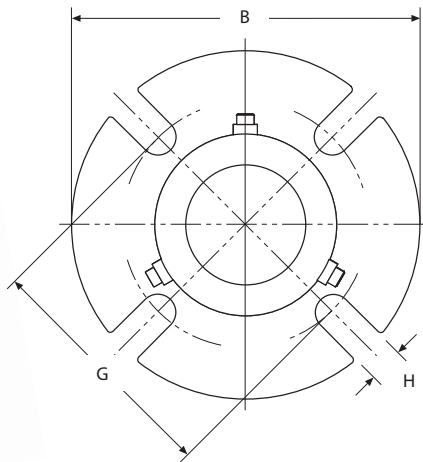
**442PR KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Min/Max Seal Chamber Diameter
- D – Gland Length
- E – Minimum Seal Chamber Depth
- F – Outboard Space Required
- G – Minimum Bolt Circle by Bolt Size
- H – Minimum Seal Chamber Face Outside Diameter
- M – Holder Inside Diameter from Box
- N – Installation Dimension
- O – Shaft O-ring Number
- P – NPT Size

SIZE	M	N	P (NPT)
up to -12	0.53	0.094	1/4"
up to -38	0.53	0.094	3/8"

A	B MAX	C MIN	C MAX	D MAX	E	F	3/8"	1/2"	G MIN 5/8"	3/4"	7/8"	H MIN	O
1.250	4.91	1.86	2.10	1.48	0.17	1.78	3.17	3.29	3.42	3.54	3.67	2.35	219
1.375	5.01	1.94	2.38	1.48	0.17	1.78	3.25	3.38	3.50	3.63	3.75	2.63	221
1.500	5.13	2.06	2.50	1.48	0.17	1.78	3.38	3.50	3.62	3.75	3.87	2.75	223
1.625	5.26	2.19	2.63	1.48	0.17	1.78	3.50	3.62	3.75	3.87	4.00	2.87	224
1.750	5.38	2.31	2.75	1.48	0.17	1.48	3.63	3.75	3.87	4.00	4.12	3.00	225
1.875	5.50	2.44	2.88	1.48	0.17	1.78	3.75	3.87	4.00	4.12	4.25	3.12	226
2.000	5.63	2.56	3.00	1.48	0.17	1.78	3.88	4.00	4.12	4.25	4.37	3.25	227
2.125	5.76	2.69	3.12	1.48	0.17	1.78	4.00	4.12	4.25	4.37	4.50	3.37	228
2.250	5.88	2.81	3.25	1.48	0.17	1.78	4.13	4.25	4.37	4.50	4.62	3.50	229
2.375	6.01	2.94	3.37	1.48	0.17	1.78	4.25	4.37	4.50	4.62	4.75	3.62	230
2.500	6.13	3.06	3.75	1.48	0.17	1.78	4.63	4.75	4.87	5.00	5.12	4.00	231
2.625	7.76	3.35	4.25	1.84	0.26	2.24	5.38	5.50	5.63	5.75	5.88	4.75	232
2.750	7.76	3.35	4.25	1.84	0.26	2.24	5.38	5.50	5.63	5.75	5.88	4.75	233
2.875	8.01	3.60	4.50	1.84	0.26	2.24	5.63	5.75	5.88	6.00	6.13	5.00	234
3.000	8.01	3.60	4.50	1.84	0.26	2.24	5.63	5.75	5.88	6.00	6.13	5.00	235
3.125	8.26	3.85	4.75	1.84	0.26	2.24	5.88	6.00	6.13	6.25	6.38	5.25	236
3.250	8.26	3.85	4.75	1.84	0.26	2.24	5.88	6.00	6.13	6.25	6.38	5.25	237
3.375	8.51	4.10	5.00	1.84	0.26	2.24	6.13	6.25	6.38	6.50	6.63	5.50	238
3.500	8.51	4.10	5.00	1.84	0.26	2.24	6.13	6.25	6.38	6.50	6.63	5.50	239
3.625	8.77	4.35	5.25	1.84	0.26	2.24	6.38	6.50	6.63	6.75	6.88	5.75	240
3.750	8.77	4.35	5.25	1.84	0.26	2.24	6.38	6.50	6.63	6.75	6.88	5.75	241
3.875	9.02	4.60	5.50	1.84	0.26	2.24	6.63	6.75	6.88	7.00	7.13	6.00	242
4.000	9.02	4.60	5.50	1.84	0.26	2.24	6.63	6.75	6.88	7.00	7.13	6.00	243
4.125	9.27	4.85	5.75	1.84	0.26	2.24	6.88	7.00	7.13	7.25	7.38	6.25	244
4.250	9.27	4.85	5.75	1.84	0.26	2.24	6.88	7.00	7.13	7.25	7.38	6.25	245
4.375	9.52	5.10	6.00	1.84	0.26	2.24	7.13	7.25	7.38	7.50	7.63	6.50	246
4.500	9.52	5.10	6.00	1.84	0.26	2.24	7.13	7.25	7.38	7.50	7.63	6.50	247
4.625	9.77	5.35	6.25	1.84	0.26	2.24	7.38	7.50	7.63	7.75	7.88	6.75	248
4.750	9.77	5.35	6.25	1.84	0.26	2.24	7.38	7.50	7.63	7.75	7.88	6.75	249

# 4400 GAS SEAL – Dimensional Data/Metric

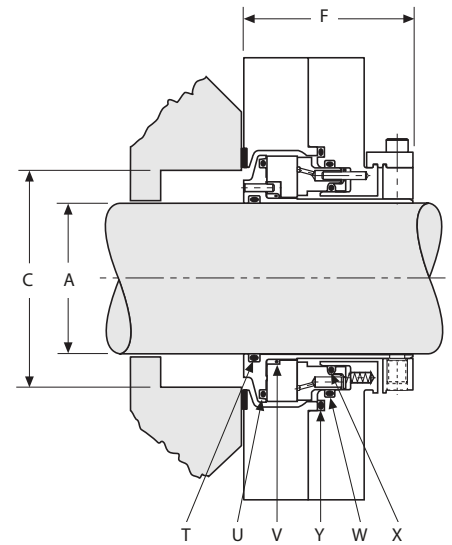
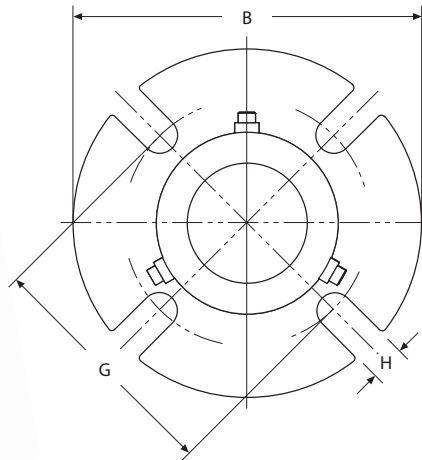


**4400 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- T – Shaft O-ring
- U – Rotary Seal O-ring
- V – Rotary Cushion O-ring
- W – Stationary Seal O-ring Outside Diameter
- X – Stationary Seal O-ring Inside Diameter
- Y – Gland Adapter

A	B MAX	C MAX	F MAX	G MIN				H	T	U	V	W	X	Y
				10 mm	12 mm	16 mm	20 mm							
25	102	52	54	73	-	-	-	11	-120	-134	-024	-134	-124	-139
28	102	52	54	76	-	-	-	11	-122	-136	-026	-136	-126	-141
30	102	58	54	80	-	-	-	11	-123	-138	-028	-138	-128	-143
32	111	62	54	83	85	-	-	14	-124	-140	-029	-140	-130	-145
35	111	62	54	83	85	-	-	14	-126	-140	-029	-140	-130	-145
38	114	67	54	86	88	-	-	14	-128	-142	-030	-142	-132	-147
40	127	69	54	89	91	-	-	14	-129	-144	-031	-144	-134	-149
43	139	72	54	92	94	-	-	14	-131	-146	-032	-146	-136	-150
45	139	75	54	95	97	-	-	14	-133	-148	-033	-148	-138	-151
48	139	82	54	101	103	-	-	14	-134	-150	-034	-150	-140	-152
50	139	82	54	101	103	-	-	14	-136	-150	-034	-150	-140	-152
55	152	91	54	111	113	117	-	18	-139	-151	-036	-152	-144	-153
60	152	92	54	112	114	118	-	18	-142	-152	-037	-152	-146	-153
65	164	103	57	123	125	129	-	18	-145	-153	-040	-154	-151	-155
70	196	113	64	-	135	139	-	18	-232	-242	-151	-242	-235	-246
75	202	119	64	-	141	145	-	18	-234	-244	-152	-244	-237	-248
80	208	125	64	-	149	152	-	18	-236	-246	-153	-246	-239	-250
85	211	129	64	-	151	155	159	21	-237	-247	-153	-247	-240	-251
90	216	135	64	-	158	162	166	21	-239	-249	-154	-249	-242	-253

# 4400 GAS SEAL – Dimensional Data/Inches

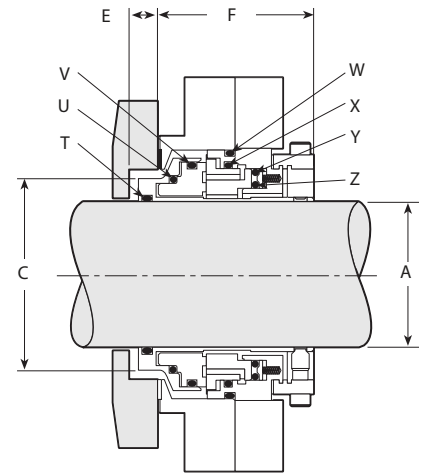
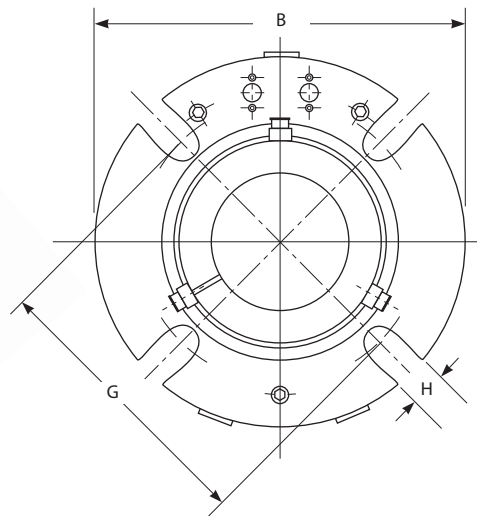
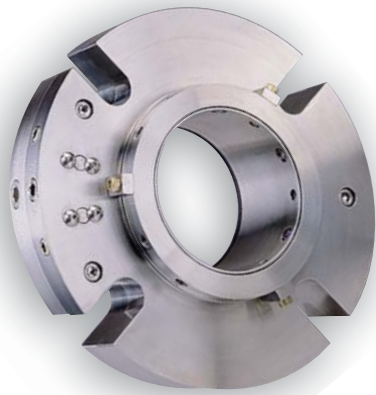


**4400 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- T – Shaft O-ring
- U – Rotary Seal O-ring
- V – Rotary Cushion O-ring
- W – Stationary Seal O-ring Outside Diameter
- X – Stationary Seal O-ring Inside Diameter
- Y – Gland Adapter

A MAX	B MAX	C MAX	F	G MIN				H	T	U	V	W	X	Y
				3/8"	1/2"	5/8"	3/4"							
1.000	4.000	2.03	2.125	2.86	-	-	-	0.44	-120	-134	-024	-134	-124	-139
1.125	4.000	2.06	2.125	2.99	-	-	-	0.44	-122	-136	-026	-136	-126	-141
1.250	4.000	2.29	2.125	3.11	-	-	-	0.44	-124	-138	-028	-138	-128	-143
1.375	4.360	2.45	2.125	3.24	3.36	-	-	0.57	-126	-140	-029	-140	-130	-145
1.500	4.485	2.65	2.125	3.36	3.49	-	-	0.57	-128	-142	-030	-142	-132	-147
1.625	4.985	2.71	2.125	3.49	3.61	-	-	0.57	-130	-144	-031	-144	-134	-149
1.750	5.485	2.83	2.125	3.61	3.74	-	-	0.57	-132	-146	-032	-146	-136	-150
1.875	5.485	2.96	2.125	3.74	3.86	-	-	0.57	-134	-148	-033	-148	-138	-151
2.000	5.485	3.21	2.125	3.97	4.10	-	-	0.57	-136	-150	-034	-150	-140	-152
2.125	5.985	3.46	2.125	4.22	4.34	4.47	-	0.69	-138	-151	-035	-151	-142	-152
2.250	5.985	3.58	2.125	4.35	4.48	4.60	-	0.69	-140	-151	-036	-152	-144	-153
2.375	5.985	3.61	2.125	4.41	4.53	4.66	-	0.69	-142	-152	-037	-152	-146	-153
2.500	6.485	3.83	2.125	4.59	4.72	4.84	-	0.69	-144	-152	-038	-153	-148	-154
2.625	6.445	4.06	2.227	4.85	4.98	5.10	-	0.69	-146	-153	-040	-154	-151	-155
1.375 OS	5.385	3.27	2.125	3.98	4.11	-	-	0.44	-126	-140	-029	-140	-130	-150
1.750 OS	6.635	3.90	2.125	5.36	5.48	5.61	-	0.57	-132	-146	-032	-146	-136	-153
1.875 OS	5.985	3.96	2.125	4.86	4.98	5.11	-	0.57	-134	-148	-033	-148	-138	-153
2.125 OS	6.985	4.40	2.125	5.74	5.86	5.99	-	0.69	-138	-151	-035	-151	-142	-154
2.500 OS	7.760	5.40	2.125	6.49	6.61	6.74	-	0.69	-144	-152	-038	-153	-148	-157
2.625 OS	6.980	4.92	2.227	5.73	5.86	5.98	-	0.69	-146	-153	-040	-154	-151	-157
2.750	7.710	4.46	2.500	-	5.37	5.50	-	0.69	-232	-242	-151	-242	-235	-246
2.875	7.830	4.59	2.500	-	5.47	5.60	-	0.69	-233	-243	-151	-243	-236	-247
3.000	7.940	4.71	2.500	-	5.60	5.73	-	0.69	-234	-244	-152	-244	-237	-248
3.125	7.990	4.84	2.500	-	5.75	5.87	-	0.69	-235	-245	-152	-245	-238	-249
3.250	8.190	4.96	2.500	-	5.87	6.01	-	0.69	-236	-246	-153	-246	-239	-250
3.375	8.310	5.09	2.500	-	5.97	6.10	6.22	0.81	-237	-247	-153	-247	-240	-251
3.500	8.440	5.21	2.500	-	6.14	6.25	6.38	0.81	-238	-248	-154	-248	-241	-252
3.625	8.490	5.34	2.500	-	6.27	6.38	6.52	0.81	-239	-249	-154	-249	-242	-253

# 4410 SLOW SPEED GAS SEAL – Dimensional Data/Metric



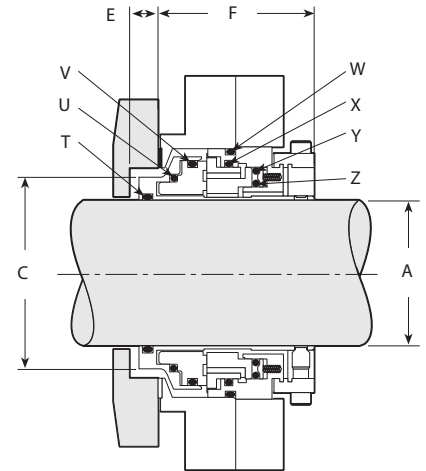
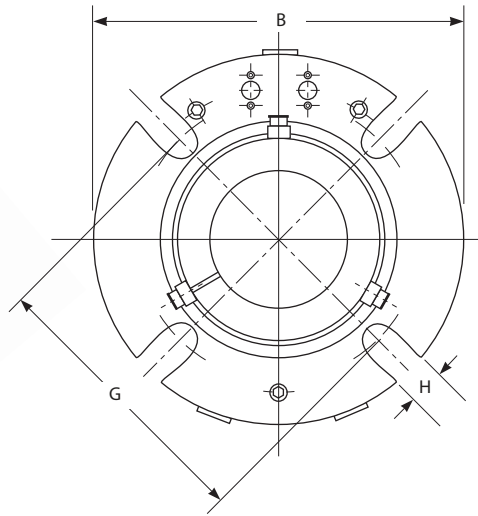
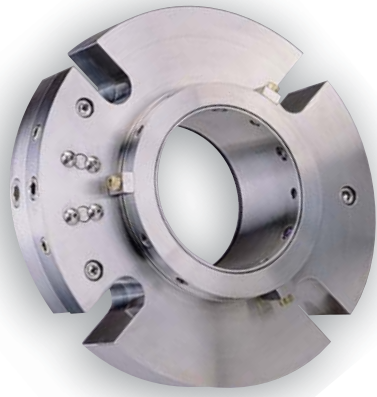
**4410 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- E – Required Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- T – Sleeve O-ring
- U – Rotary Support O-ring
- V – Rotary Outside Diameter O-ring
- W – Inter Gland O-ring
- X – Stationary O-ring
- Y – Gland Adapter O-ring
- Z – Pusher Inside Diameter O-ring

A	B MAX	C MIN	C MAX	E MIN	F MAX	G			H	T	U	V	R	X	Y	W
						12 mm	16 mm	20 mm								
65	180	91	106	10	71	133	136	–	18	-230	-236	-240	-244	-241	-238	-235
70	183	95	109	10	71	137	140	–	18	-232	-237	-241	-245	-242	-239	-236
75	190	101	116	10	71	144	148	–	18	-234	-239	-243	-247	-244	-241	-238
80	196	107	122	10	71	151	154	–	18	-236	-241	-245	-249	-246	-243	-240
85	199	111	125	10	71	153	157	160	21	-237	-242	-246	-250	-247	-244	-241
90	206	117	132	10	71	160	163	166	21	-239	-244	-248	-252	-249	-246	-243
95	209	120	135	10	71	162	165	168	21	-240	-245	-249	-253	-250	-247	-244
100	215	126	141	10	71	170	173	176	21	-242	-247	-251	-255	-252	-249	-246
110	225	136	151	10	71	179	182	186	21	-245	-250	-254	-258	-255	-252	-249
120	234	145	161	10	71	189	193	196	21	-248	-253	-257	-260	-258	-255	-252
						22 mm	24 mm	28 mm								
125	283	160	192	15	102	233	236	239	†	-353	-361	-363	-263	-364	-362	-360
130	289	167	198	15	102	239	242	246	†	-354	-362	-364	-264	-365	-363	-361
135	296	173	204	15	102	246	249	252	†	-356	-363	-365	-265	-366	-364	-362
140	296	173	204	15	102	246	249	252	†	-358	-363	-365	-265	-366	-364	-362
145	302	179	211	15	102	252	255	258	†	-359	-364	-366	-266	-367	-365	-363
150	309	186	217	15	102	258	261	265	†	-361	-365	-367	-267	-368	-366	-364
155	315	192	224	15	102	265	268	271	†	-362	-366	-368	-268	-369	-367	-365
160	321	199	230	15	102	271	274	277	†	-362	-367	-369	-269	-370	-368	-366
165	321	199	230	15	102	271	274	277	†	-363	-367	-369	-269	-370	-368	-366
170	328	205	236	15	102	277	281	284	†	-364	-368	-370	-270	-371	-369	-367
175	334	211	243	15	102	284	287	290	†	-365	-369	-371	-271	-372	-370	-368
180	340	218	249	15	102	290	293	296	†	-366	-370	-372	-272	-373	-371	-369
185	347	224	255	15	102	296	300	303	†	-366	-371	-373	-273	-374	-372	-370
190	347	224	255	15	102	296	300	303	†	-367	-371	-373	-273	-374	-372	-370
195	353	230	262	15	102	303	306	309	†	-368	-372	-374	-274	-375	-373	-371
200	359	237	268	15	102	309	312	315	†	-369	-373	-375	-274	-376	-374	-372

† Bolt Circle Manufactured to Customer Specifications

# 4410 SLOW SPEED GAS SEAL – Dimensional Data/Inch



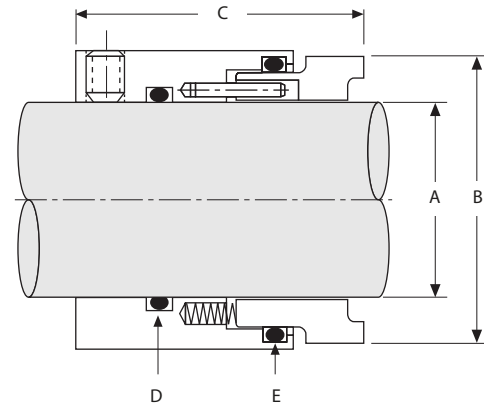
**4410 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Seal Chamber Bore
- E – Required Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Slot Width
- T – Sleeve O-ring
- U – Rotary Support O-ring
- V – Rotary Outside Diameter O-ring
- W – Inter Gland O-ring
- X – Stationary O-ring
- Y – Gland Adapter O-ring
- Z – Pusher Inside Diameter O-ring

A	B MAX	C MIN	C MAX	E MIN	F MAX	1/2"	G MIN 5/8"	3/4"	H	T	U	V	R	X	Y	W
2.625	7.10	3.60	4.16	0.40	2.80	5.25	5.37	-	0.69	-231	-236	-240	-244	-241	-238	-235
2.750	7.22	3.73	4.29	0.40	2.80	5.38	5.50	-	0.69	-232	-237	-241	-245	-242	-239	-236
2.875	7.35	3.85	4.41	0.40	2.80	5.49	5.62	-	0.69	-233	-238	-242	-246	-243	-240	-237
3.000	7.47	3.98	4.57	0.40	2.80	5.69	5.81	-	0.69	-234	-239	-243	-247	-244	-241	-238
3.125	7.60	4.10	4.68	0.40	2.80	5.80	5.92	-	0.69	-235	-240	-244	-248	-245	-242	-239
3.250	7.72	4.23	4.82	0.40	2.80	5.94	6.06	-	0.69	-236	-241	-245	-249	-246	-243	-240
3.375	7.85	4.35	4.93	0.40	2.80	6.04	6.17	6.29	0.81	-237	-242	-246	-250	-247	-244	-241
3.500	7.97	4.48	5.07	0.40	2.80	6.18	6.31	6.43	0.81	-238	-243	-247	-251	-248	-245	-242
3.625	8.10	4.60	5.19	0.40	2.80	6.29	6.42	6.54	0.81	-239	-244	-248	-252	-249	-246	-243
3.750	8.22	4.73	5.30	0.40	2.80	6.38	6.51	6.63	0.81	-240	-245	-249	-253	-250	-247	-244
3.875	8.35	4.85	5.41	0.40	2.80	6.50	6.62	6.75	0.81	-241	-246	-250	-254	-251	-248	-245
4.000	8.47	4.98	5.57	0.40	2.80	6.68	6.81	6.93	0.81	-242	-247	-251	-255	-252	-249	-246
4.125	8.60	5.10	5.69	0.40	2.80	6.79	6.92	7.04	0.81	-243	-248	-252	-256	-253	-250	-247
4.250	8.72	5.23	5.82	0.40	2.80	6.93	7.05	7.18	0.81	-244	-249	-253	-257	-254	-251	-248
4.375	8.85	5.35	5.94	0.40	2.80	7.05	7.18	7.30	0.81	-245	-250	-254	-258	-255	-252	-249
4.500	8.97	5.48	6.07	0.40	2.80	7.18	7.30	7.43	0.81	-246	-251	-255	-259	-256	-253	-250
4.625	9.10	5.60	6.19	0.40	2.80	7.30	7.43	7.55	0.81	-247	-252	-256	-260	-257	-254	-251
4.750	9.22	5.73	6.33	0.40	2.80	7.46	7.59	7.71	0.81	-248	-253	-257	-261	-258	-255	-252
						7/8"	1"	1 1/8"								
5.000	11.15	6.32	7.55	0.60	4.00	9.17	9.30	9.42	†	-353	-361	-363	-263	-364	-362	-360
5.250	11.40	6.57	7.80	0.60	4.00	9.42	9.55	9.67	†	-355	-362	-364	-264	-365	-363	-361
5.500	11.65	6.82	8.05	0.60	4.00	9.67	9.80	9.92	†	-357	-363	-365	-265	-366	-364	-362
5.750	11.90	7.07	8.30	0.60	4.00	9.92	10.05	10.17	†	-359	-364	-366	-266	-367	-365	-363
6.000	12.15	7.32	8.55	0.60	4.00	10.17	10.30	10.42	†	-361	-365	-367	-267	-368	-366	-364
6.250	12.40	7.57	8.80	0.60	4.00	10.42	10.55	10.67	†	-362	-366	-368	-268	-369	-367	-365
6.500	12.65	7.82	9.05	0.60	4.00	10.67	10.80	10.92	†	-363	-367	-369	-269	-370	-368	-366
6.750	12.90	8.07	9.30	0.60	4.00	10.92	11.05	11.17	†	-364	-368	-370	-270	-371	-369	-367
7.000	13.15	8.32	9.55	0.60	4.00	11.17	11.30	11.42	†	-365	-369	-371	-271	-372	-370	-368
7.250	13.40	8.57	9.80	0.60	4.00	11.42	11.55	11.67	†	-366	-370	-372	-272	-373	-371	-369
7.500	13.65	8.82	10.05	0.60	4.00	11.67	11.80	11.92	†	-367	-371	-373	-273	-374	-372	-370
7.750	13.90	9.07	10.30	0.60	4.00	11.92	12.05	12.17	†	-368	-372	-374	-274	-375	-373	-371
8.000	14.15	9.32	10.55	0.60	4.00	12.17	12.30	12.42	†	-369	-373	-375	-274	-376	-374	-372

† Bolt Circle Manufactured to Customer Specifications

# 891™ ROTARY INSIDE SINGLE SEAL – Dimensional Data/Metric



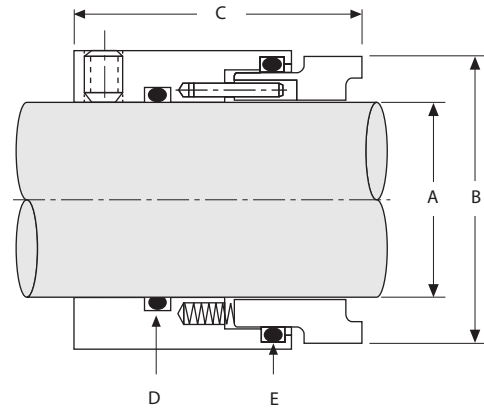
**891 KEY**

A – Inner Diameter      B – Seal Diameter      C – Operating Length      D – Static O-ring      E – Dynamic O-ring

SHAFT SIZE	A	B	C	D	E
16	16,10	30,45	35,00	115	120
18	18,11	32,28	35,00	116	121
20	20,11	34,29	35,00	117	122
22	22,11	36,30	35,00	118	123
24	24,11	38,30	35,00	119	125
25	25,11	39,29	35,00	120	125
28	28,11	42,29	35,00	122	127
30	30,11	44,30	35,00	123	128
32	32,11	46,30	44,45	124	130
33	33,11	47,90	44,45	125	131
35	35,11	49,48	44,45	126	132
38	38,11	54,28	44,45	128	134
40	40,11	56,08	44,45	129	135
43	43,11	59,08	44,45	131	137
45	45,11	61,09	44,45	133	139
48	48,11	64,11	44,45	134	141
50	50,11	66,09	44,45	136	142
55	55,11	71,07	44,45	139	145
60	60,11	77,14	44,45	142	148
65	65,11	83,01	44,45	145	151
70	70,11	86,08	44,45	148	152
75	75,11	98,43	50,80	234	238
80	80,11	104,78	50,80	236	240

SHAFT SIZE	A	B	C	D	E
85	85,11	107,95	50,80	237	241
90	90,11	114,30	50,80	239	243
95	95,11	117,48	50,80	240	244
100	100,11	123,83	50,80	242	246
110	110,11	133,35	50,80	246	249
120	120,19	152,40	92,07	351	356
125	125,19	158,75	92,07	353	358
130	130,19	165,10	92,07	354	360
135	135,19	171,45	92,07	356	362
140	140,19	171,45	92,07	357	362
145	145,19	177,80	92,07	359	363
150	150,19	184,15	92,07	361	364
155	155,19	190,50	92,07	361	365
160	160,19	196,85	92,07	363	366
165	165,19	196,85	92,07	363	366
170	170,19	203,20	92,07	364	367
175	175,19	209,55	92,07	365	368
180	180,19	215,90	92,07	366	369
185	185,19	215,90	92,07	366	369
190	190,19	222,25	92,07	367	370
195	195,19	228,60	92,07	368	371
200	200,19	234,95	92,07	369	372

# 891™ ROTARY INSIDE SINGLE SEAL – Dimensional Data/Inch



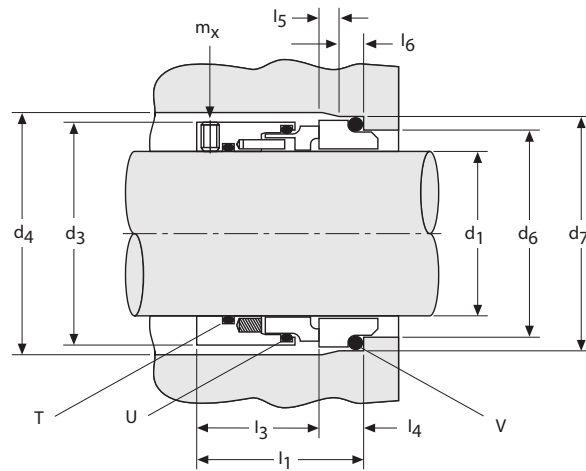
**891 KEY**

A – Inner Diameter      B – Seal Diameter      C – Operating Length      D – Static O-ring      E – Dynamic O-ring

SHAFT SIZE	A	B	C	D	E
0.750	0.754	1.323	1.375	116	122
0.875	0.879	1.448	1.375	118	124
1.000	1.004	1.573	1.375	120	126
1.125	1.129	1.698	1.375	122	128
1.250	1.254	1.823	1.750	124	130
1.375	1.379	1.948	1.750	126	132
1.500	1.504	2.143	1.750	128	134
1.625	1.629	2.268	1.750	130	136
1.750	1.754	2.393	1.750	132	138
1.875	1.879	2.518	1.750	134	140
2.000	2.004	2.643	1.750	136	142
2.125	2.129	2.768	1.750	138	144
2.250	2.254	2.893	1.750	140	146
2.375	2.379	3.018	1.750	142	148
2.500	2.504	3.143	1.750	144	150
2.625	2.629	3.268	1.750	146	151
2.750	2.754	3.625	2.000	232	236
2.875	2.879	3.750	2.000	233	237
3.000	3.004	3.875	2.000	234	238
3.125	3.129	4.000	2.000	235	239
3.250	3.254	4.125	2.000	236	240
3.375	3.379	4.250	2.000	237	241
3.500	3.504	4.375	2.000	238	242

SHAFT SIZE	A	B	C	D	E
3.625	3.629	4.500	2.000	239	243
3.750	3.754	4.625	2.000	240	244
3.875	3.879	4.750	2.000	241	245
4.000	4.004	4.875	2.000	242	246
4.125	4.129	5.000	2.000	243	247
4.250	4.254	5.125	2.000	244	248
4.375	4.379	5.250	2.000	245	249
4.500	4.504	5.375	2.000	246	250
4.750	4.758	6.000	3.625	351	356
5.000	5.008	6.250	3.625	353	358
5.250	5.258	6.500	3.625	355	360
5.500	5.508	6.750	3.625	357	362
5.750	5.758	7.000	3.625	359	363
6.000	6.008	7.250	3.625	361	364
6.250	6.258	7.500	3.625	362	365
6.500	6.508	7.750	3.625	363	366
6.750	6.758	8.000	3.625	364	367
7.000	7.008	8.250	3.625	365	368
7.250	7.258	8.500	3.625	366	369
7.500	7.508	8.750	3.625	367	370
7.750	7.758	9.000	3.625	368	371
8.000	8.008	9.250	3.625	369	372

# 491 DIN ROTARY INSIDE SINGLE SEAL – Dimensional Data/Metric



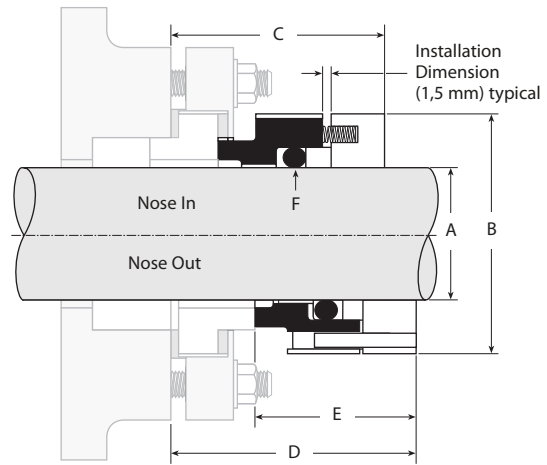
**491 KEY**

- d1** – Shaft Diameter
- d3** – Seal Diameter
- d4** – Seal Chamber Bore Diameter
- d6** – Bore Diameter
- d7** – Static Sealing Diameter
- l1** – Axial Static O-ring Location (1)
- l3** – Rotary Operating Length
- l4** – Axial Static O-ring Location (2)
- l5** – Chamfer Length
- l6** – Static Sealing Surface Length
- mx** – Set Screw Size
- T** – Static Shaft O-ring
- U** – Dynamic O-ring
- V** – Static Stationary O-ring

d1	d3	d4	d6	d7	l1	l3	l4	l5	l6	mx	T	U	V
16	28,9	31	23	27	35,0	30,0	5,0	1,5	4	M4	-016	-022	21,89 x 2,62 (-188)
18	32,3	34	27	33	37,5	30,0	7,5	2,0	5	M4	-017	-023	26,58 x 3,53 (-215)
20	34,3	36	29	35	37,5	30,0	7,5	2,0	5	M4	-018	-024	28,17 x 3,53 (-216)
22	36,3	38	31	37	37,5	30,0	7,5	2,0	5	M4	-020	-025	29,74 x 3,53 (-217)
24	38,4	40	33	39	37,5	30,0	7,5	2,0	5	M4	-021	-027	31,34 x 3,53 (-218)
25	39,3	41	34	40	37,5	30,0	7,5	2,0	5	M4	-022	-027	32,92 x 3,53 (-219)
28	42,3	44	37	43	42,5	35,0	7,5	2,0	5	M5	-122	-127	36,09 x 3,53 (-221)
30	44,3	46	39	45	42,5	35,0	7,5	2,0	5	M5	-123	-128	37,69 x 3,53 (-222)
32	46,4	48	42	48	42,5	35,0	7,5	2,0	5	M5	-124	-130	40,87 x 3,53 (-223)
33	48,0	49	42	48	42,5	35,0	7,5	2,0	5	M5	-125	-131	40,87 x 3,53 (-223)
35	49,5	51	44	50	42,5	35,0	7,5	2,0	5	M5	-126	-132	44,04 x 3,53 (-224)
38	54,3	58	49	56	44,0	35,0	9,0	2,0	6	M5	-128	-134	48,00 x 4,00
40	56,1	60	51	58	44,0	35,0	9,0	2,0	6	M5	-129	-135	50,00 x 4,00
43	59,1	63	54	61	44,0	35,0	9,0	2,0	6	M5	-131	-137	53,00 x 4,00
45	61,1	65	56	63	44,0	35,0	9,0	2,0	6	M5	-133	-139	55,00 x 4,00
48	64,2	68	59	66	44,0	35,0	9,0	2,0	6	M5	-134	-141	58,00 x 4,00
50	66,1	70	62	70	44,5	35,0	9,5	2,5	6	M5	-136	-142	61,00 x 4,50
53	69,1	73	65	73	46,0	35,0	11,0	2,5	6	M5	-137	-144	65,00 x 4,50
55	71,1	75	67	75	46,0	35,0	11,0	2,5	6	M5	-139	-145	65,00 x 4,50
60	76,1	85	72	80	46,0	35,0	11,0	2,5	6	M5	-142	-148	71,00 x 4,50
65	81,1	90	77	85	46,0	35,0	11,0	2,5	6	M5	-145	-151	76,00 x 4,50
68	86,1	93	81	90	46,3	35,0	11,3	2,5	7	M5	-147	-152	80,00 x 5,00
70	86,1	95	83	92	46,3	35,0	11,3	2,5	7	M5	-148	-152	82,00 x 5,00
75	98,6	104	88	97	59,3	48,0	11,3	2,5	7	M6	-234	-238	87,00 x 5,00
80	104,2	109	95	105	60,0	48,0	12,0	3,0	7	M6	-236	-240	95,00 x 5,00
85	108,1	114	100	110	60,0	48,0	12,0	3,0	7	M6	-237	-241	100,00 x 5,50
90	114,0	119	105	115	62,0	48,0	14,0	3,0	7	M6	-239	-243	105,00 x 5,50
100	117,6	129	115	125	62,0	48,0	14,0	3,0	7	M6	-242	-246	115,00 x 5,50
110	133,5	139	125	135	62,0	48,0	14,0	3,0	7	M6	-246	-249	125,00 x 5,50



# 440 EXTERNAL SINGLE SEAL – Dimensional Data/Metric

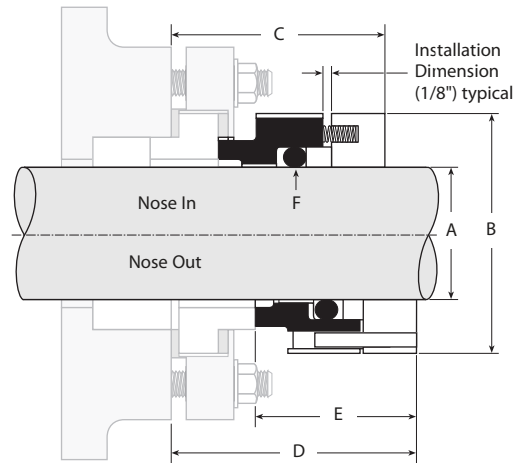


**440 KEY**

- A – Shaft Size
- B – Seal Diameter
- C – Distance to First Obstruction L-shape Nose In
- D – Distance to First Obstruction L-shape Nose Out
- E – Installed Length of Rotary Seal
- F – O-ring

A	B	C	D	E	F
24	49,2	49	55,5	38	317
25	50,0	49	55,5	38	318
28	54,0	49	55,5	38	320
30	57,2	49	55,5	38	321
32	57,2	49	55,5	38	322
35	60,3	49	55,5	38	324
38	63,5	49	55,5	38	325
40	66,7	49	55,5	38	326
42	69,9	49	55,5	38	326
45	69,9	49	55,5	38	327
48	73,0	49	55,5	38	328
50	76,2	49	55,5	38	329
55	79,4	49	55,5	38	331
60	85,7	49	55,5	38	332
65	92,1	49	55,5	38	334
70	98,0	62	68,5	41,5	335
75	104,4	62	68,5	41,5	337
80	108,2	62	68,5	41,5	338
85	113,8	62	68,5	41,5	340
90	118,1	62	68,5	41,5	342
95	123,4	62	68,5	41,5	343
100	128,3	62	68,5	41,5	345
110	139,2	62	68,5	41,5	348

# 440 EXTERNAL SINGLE SEAL – Dimensional Data/Inch



**440 KEY**

A – Shaft Size  
B – Seal Diameter

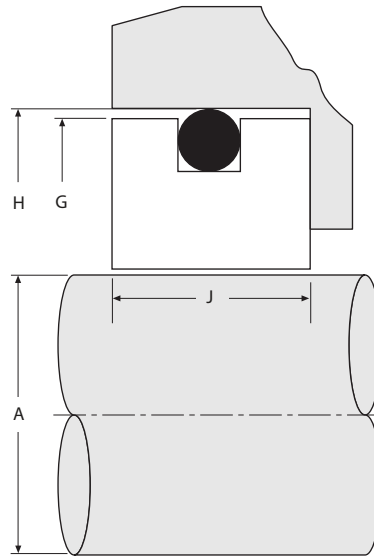
C – Distance to First Obstruction  
L-shape Nose In

D – Distance to First Obstruction  
L-shape Nose Out

E – Installed Length of Rotary Seal  
F – O-ring

A	B	C	D	E	F
0.937	1.937	1.937	2.187	1.500	317
1.000	2.000	1.937	2.187	1.500	318
1.125	2.125	1.937	2.187	1.500	320
1.250	2.250	1.937	2.187	1.500	322
1.375	2.375	1.937	2.187	1.500	324
1.437	2.500	1.937	2.187	1.500	325
1.500	2.500	1.937	2.187	1.500	325
1.625	2.625	1.937	2.187	1.500	326
1.750	2.750	1.937	2.187	1.500	327
1.875	2.875	1.937	2.187	1.500	328
2.000	3.000	1.937	2.187	1.500	329
2.125	3.125	1.937	2.187	1.500	330
2.250	3.250	1.937	2.187	1.500	331
2.375	3.375	1.937	2.187	1.500	332
2.500	3.500	1.937	2.187	1.500	333
2.625	3.625	1.937	2.187	1.500	334
2.750	3.850	2.437	2.687	1.625	335
2.875	3.980	2.437	2.687	1.625	336
3.000	4.110	2.437	2.687	1.625	337
3.125	4.230	2.437	2.687	1.625	338
3.250	4.360	2.437	2.687	1.625	339
3.375	4.480	2.437	2.687	1.625	340
3.500	4.610	2.437	2.687	1.625	341
3.625	4.730	2.437	2.687	1.625	342
3.750	4.860	2.437	2.687	1.625	343
3.875	4.980	2.437	2.687	1.625	344
4.000	5.110	2.437	2.687	1.625	345
4.125	5.230	2.437	2.687	1.625	346
4.250	5.360	2.437	2.687	1.625	347
4.375	5.480	2.437	2.687	1.625	348
4.500	5.610	2.437	2.687	1.625	349

# O-RING MOUNT STATIONARY SEAL RING – Dimensional Data/Inch



**O-RING MOUNT KEY**

A – Shaft Size

G – Seal Diameter

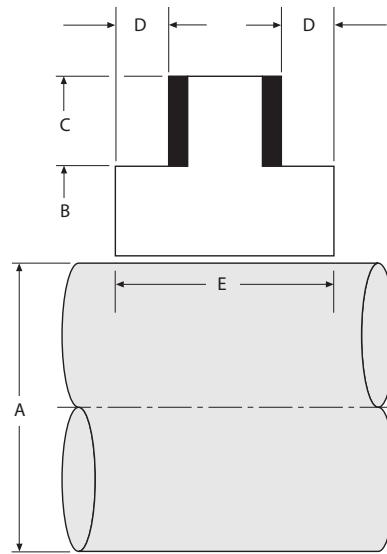
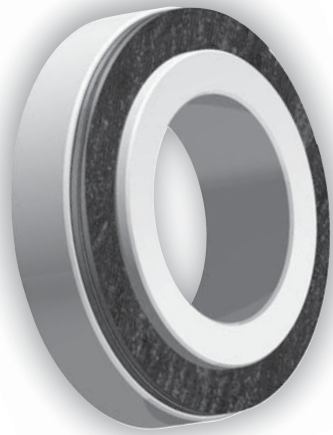
H – Bore Diameter

J – Seal Face Length

A	G	H	J
0.625*	1.235	1.250	0.416
0.750*	1.360	1.375	0.416
0.875*	1.485	1.500	0.416
1.000	1.610	1.625	0.439
1.125	1.735	1.750	0.439
1.250	1.860	1.875	0.439
1.375	1.985	2.000	0.439
1.500	2.110	2.125	0.439
1.625	2.360	2.375	0.502
1.750	2.485	2.500	0.502
1.875	2.610	2.625	0.502
2.000	2.735	2.750	0.502
2.125	2.985	3.000	0.564
2.250	3.110	3.125	0.564
2.375	3.235	3.250	0.564
2.500	3.360	3.375	0.564
2.625	3.360	3.375	0.627
2.750	3.485	3.500	0.627
2.875	3.735	3.750	0.627
3.000	3.860	3.875	0.627
3.125	3.985	4.000	0.783
3.250	4.110	4.125	0.783
3.375	4.235	4.250	0.783
3.500	4.360	4.375	0.783
3.625	4.485	4.500	0.783
3.750	4.610	4.625	0.783
3.875	4.735	4.750	0.783
4.000	4.860	4.875	0.783
4.250	5.235	5.250	0.783
4.500	5.485	5.500	0.783
4.750	5.735	5.750	0.783
5.000	5.985	6.000	0.783
5.250	6.235	6.250	0.783
5.500	6.485	6.500	0.783
5.750	6.735	6.750	0.783
6.000	6.985	7.000	0.783

\*These sizes available only in ceramic.

# T-SHAPE STATIONARY SEAL RING – Dimensional Data/Inch

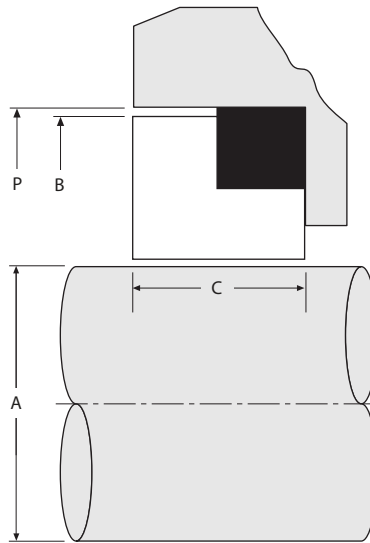


**T-SHAPE KEY**

A – Shaft Size      B – Bore Diameter      C – Seal Face Diameter      D – Bore Depth      E – Seal Face Length

A	B	C	D	E
0.625	–	1.63	–	–
0.750	–	1.75	–	–
0.875	–	1.88	–	–
0.938	1.557	1.94	0.19	0.75
1.000	1.620	2.09	0.25	0.88
1.125	1.745	2.22	0.25	0.88
1.188	–	2.44	0.25	0.88
1.250	1.870	2.34	0.25	0.88
1.375	1.995	2.41	0.25	0.88
1.438	2.166	2.56	–	–
1.500	2.245	2.72	0.25	0.88
1.625	2.370	2.84	0.25	0.88
1.750	2.495	3.09	0.25	0.88
1.875	2.620	3.22	0.25	0.88
2.000	2.745	3.47	0.25	0.88
2.125	2.870	3.72	0.25	0.88
2.250	2.995	3.84	0.25	0.88
2.375	3.057	3.88	0.25	0.88
2.500	3.245	4.09	0.25	0.88
2.625	3.370	4.22	0.25	0.88

# SQUARE MOUNT STATIONARY SEAL RING – Dimensional Data/Inch



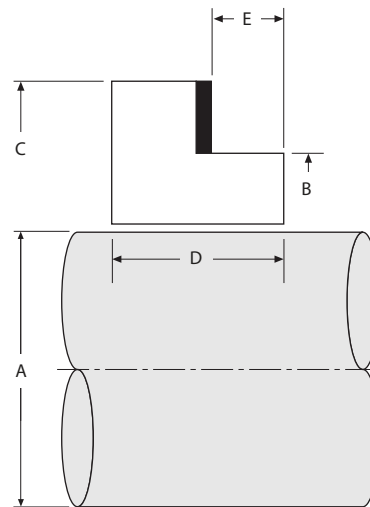
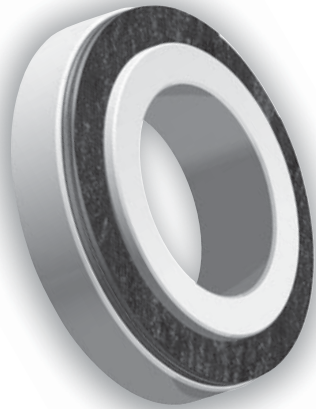
**SQUARE MOUNT KEY**

A – Shaft Size                      B – Seal Face Diameter                      C – Seal Face Length                      P – Seal Chamber Bore

A	B	BORE DIAMETER *									C
		P DIA	P DIA	P DIA	P DIA	P DIA	P DIA	P DIA	P DIA	P DIA	
1.000	1.613	1.625	1.688	1.750	1.812	1.875	2.000	2.062	–	0.437	
1.125	1.738	1.750	1.791	1.796	1.812	1.875	1.937	2.062	–	0.437	
1.250	1.863	1.875	1.937	2.000	2.032	2.062	2.250	–	–	0.437	
1.375	1.988	2.000	2.031	2.062	2.125	2.110	2.143	2.375	2.406	0.437	
1.500	2.113	2.125	2.156	2.188	2.250	2.312	2.625	–	–	0.437	
1.625	2.363	2.375	2.437	2.468	2.500	2.625	2.750	–	–	0.485	
1.750	2.488	2.500	2.578	2.625	3.312	–	–	–	–	0.485	
1.875	2.613	2.625	2.660	2.750	2.875	3.000	–	–	–	0.485	
2.000	2.738	2.750	2.875	2.937	3.000	3.060	–	–	–	0.485	
2.125	2.800	2.812	2.844	2.875	3.000	3.143	3.250	–	–	0.485	
2.250	3.113	3.125	3.375	–	–	–	–	–	–	0.485	
2.375	3.238	3.250	3.375	–	–	–	–	–	–	0.485	
2.500	3.363	3.375	3.406	3.500	3.625	3.750	–	–	–	0.485	
2.625	3.363	3.375	3.500	3.625	3.750	–	–	–	–	0.485	

\* P – Is the bore diameter required for various stationary boots.

# L-SHAPE STATIONARY SEAL RING – Dimensional Data/Metric

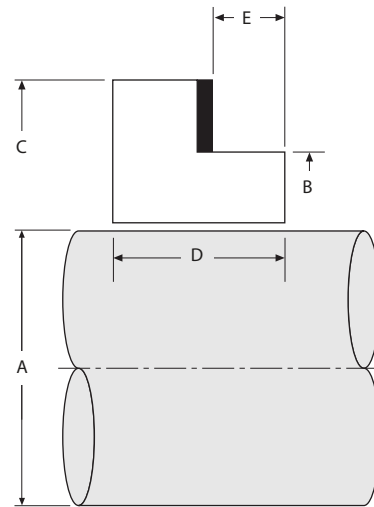
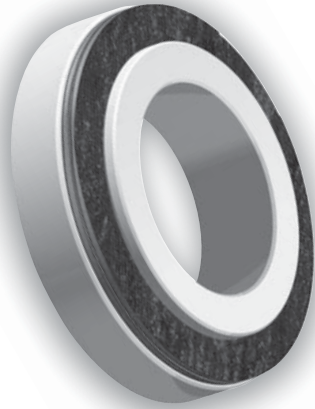


**L-SHAPE KEY**

- A – Shaft Size
- B – Seal Face Minor Diameter
- C – Seal Face Major Diameter
- D – Seal Face Length
- E – Nose Length

A	B	C	D	E
18	33,9	46,0	17	6,6
20	35,9	48,0	17	6,6
22	37,9	50,0	17	6,6
24	39,9	53,2	17	6,6
25	40,9	53,2	17	6,6
28	43,9	56,4	17	6,6
30	45,9	59,5	17	6,6
32	47,9	59,5	17	6,6
33	48,9	59,5	17	6,6
35	50,9	61,1	17	6,6
38	57,9	68,9	17	6,6
40	59,9	72,1	17	6,6
42	61,9	72,1	17	6,6
43	62,9	78,5	17	6,6
45	64,9	78,5	17	6,6
48	67,9	81,6	17	6,6
50	69,9	81,6	17	6,6
53	72,9	88,0	17	6,6
55	74,9	94,3	17	6,6
60	84,9	98,2	20	6,6
65	89,9	106,9	20	6,6
70	94,9	110,7	25	6,6
75	103,9	115,5	25	6,6
80	108,9	123,4	25	6,6
85	113,9	126,6	25	6,6
90	118,9	133,0	25	6,6
95	123,9	136,1	25	6,6
100	128,9	142,5	25	6,6
110	138,9	155,2	25	6,6

# L-SHAPE STATIONARY SEAL RING – Dimensional Data/Inch

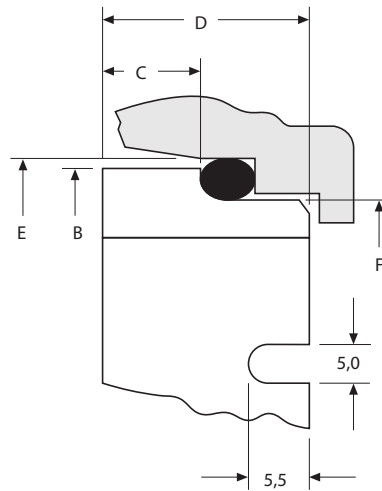
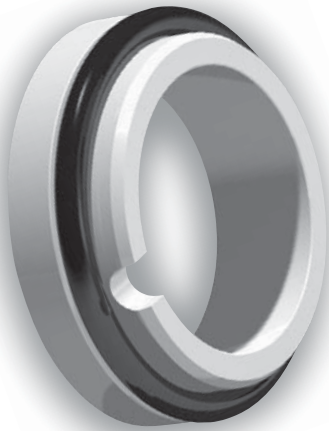


**L-SHAPE KEY**

- A – Shaft Size
- B – Seal Face Minor Diameter
- C – Seal Face Major Diameter
- D – Seal Face Length
- E – Nose Length

A	B	C	D	E
0.625	–	1.63	0.500	0.25
0.750	–	1.75	0.500	0.25
0.875	–	1.88	0.500	0.25
0.938	1.557	1.94	0.625	0.25
1.000	1.620	2.09	0.625	0.25
1.125	1.745	2.22	0.625	0.25
1.188	1.870	2.44	0.625	0.25
1.250	1.870	2.34	0.625	0.25
1.375	1.995	2.41	0.625	0.25
1.438	2.166	2.56	0.625	0.25
1.500	2.245	2.72	0.625	0.25
1.625	2.370	2.84	0.625	0.25
1.750	2.495	3.09	0.625	0.25
1.875	2.620	3.22	0.625	0.25
2.000	2.745	3.47	0.625	0.25
2.125	2.870	3.72	0.62	0.25
2.250	2.995	3.84	0.625	0.25
2.375	3.057	3.88	0.625	0.25
2.500	3.245	4.09	0.625	0.25
2.625	3.370	4.22	0.625	0.25
2.750	3.615	4.38	1.000	0.25
2.875	3.740	4.50	1.000	0.25
3.000	3.865	4.56	1.000	0.25
3.125	3.990	4.69	1.000	0.25
3.250	4.115	4.88	1.000	0.25
3.375	4.240	5.00	1.000	0.25
3.500	4.365	5.13	1.000	0.25
3.625	4.490	5.25	1.000	0.25
3.750	4.615	5.38	1.000	0.25
3.875	4.750	5.50	1.000	0.25
4.000	4.865	5.63	1.000	0.25
4.125	4.990	5.75	1.000	0.25
4.250	5.115	5.88	1.000	0.25
4.375	5.240	6.00	1.000	0.25
4.500	5.365	6.13	1.000	0.25

# VDMA STATIONARY SEAL RING – Dimensional Data/Inch



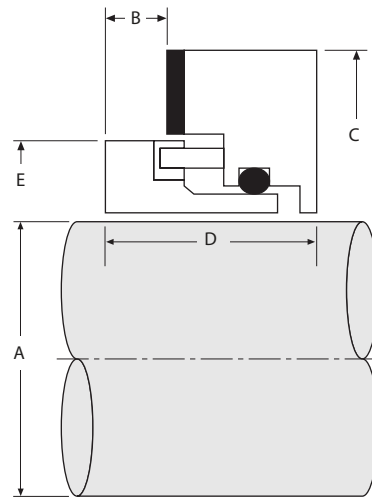
**VDMA KEY**

- A – Shaft Size
- B – Seal Face Diameter
- C – Seal Face Nose Length
- D – Seal Face Length
- E – Static Sealing Diameter
- F – Seal Face Minor Diameter

A	B	C	D	O-RING	E	F
18	32,6	6,5	17,0	26,58 x 3,53	33	26,5
20	34,6	6,5	17,0	28,17 x 3,53	35	28,5
22	36,6	6,5	17,0	29,74 x 3,53	37	30,5
24	38,6	6,5	17,0	31,94 x 3,53	39	32,5
25	39,6	6,5	17,0	32,92 x 3,53	40	33,5
28	42,6	6,5	17,0	36,09 x 3,53	43	36,5
30	44,6	6,5	17,0	37,69 x 3,53	45	38,5
32	47,6	6,5	17,0	40,87 x 3,53	48	41,5
33	47,6	6,5	17,0	40,87 x 3,53	48	41,5
35	49,6	6,5	17,0	44,04 x 3,53	50	43,5
38	55,6	7,0	18,0	48,00 x 4,00	56	48,5
40	57,6	7,0	18,0	50,00 x 4,00	58	50,5
43	60,6	7,0	18,0	52,00 x 4,00	61	53,5
45	62,6	7,0	18,0	55,00 x 4,00	63	55,5
48	65,6	7,0	18,0	58,00 x 4,00	66	58,5
50	69,6	8,5	20,0	60,00 x 4,50	70	61,5
55	74,6	8,5	20,0	65,00 x 4,50	75	66,5
60	79,5	8,5	20,0	70,00 x 4,50	80	71,5
65	85,4	8,5	20,0	75,00 x 4,50	85	76,5
70	91,4	10,0	22,0	82,00 x 5,00	92	82,5
75	96,4	10,0	22,0	87,00 x 5,00	97	87,5
80	104,3	10,0	22,5	95,00 x 5,50	105	94,5
85	109,3	10,0	22,5	100,00 x 5,50	110	99,5
90	114,3	10,0	22,5	105,00 x 5,50	115	104,5
95	119,3	10,0	22,5	110,00 x 5,50	120	109,5
100	124,3	10,0	22,5	115,00 x 5,50	125	114,5
110	134,3	10,0	22,5	120,00 x 5,50	135	124,5



# SAS STATIONARY SEAL RING – Dimensional Data/Metric

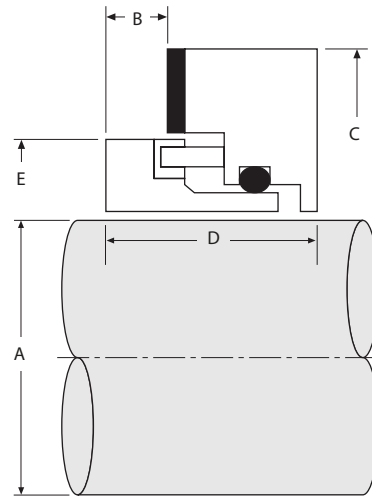


**SAS KEY**

A – Shaft Size      B – Nose Length      C – Holder Diameter      D – Seal Face Length      E – Seal Face Diameter

A	B	C	D	E
25	6,4	53,2	16,0	40,0
28	6,4	56,4	16,0	43,0
30	6,4	59,5	16,0	45,0
32	6,4	59,4	16,0	47,2
33	6,4	59,5	16,0	48,0
35	6,4	61,2	16,0	50,4
38	6,4	69,1	16,0	56,8
40	6,4	72,2	16,0	59,0
42	6,4	72,2	16,0	61,0
43	6,4	78,6	16,0	62,0
45	6,4	78,6	16,0	64,0
48	6,4	81,8	16,0	67,0
50	6,4	81,8	16,0	69,0
53	6,4	88,1	16,0	72,0
55	6,4	94,5	16,0	74,0
60	6,4	98,4	16,0	77,4
65	6,4	107,2	16,0	85,3
70	6,4	111,1	25,4	87,3
75	6,4	115,8	25,4	93,6
80	6,4	123,8	25,4	100,0
85	6,4	127,0	25,4	103,2
90	6,4	138,1	25,4	109,5
95	6,4	136,5	25,4	112,7
100	6,4	142,9	25,4	119,0
110	6,4	155,6	25,4	131,7

# SAS STATIONARY SEAL RING – Dimensional Data/Inch

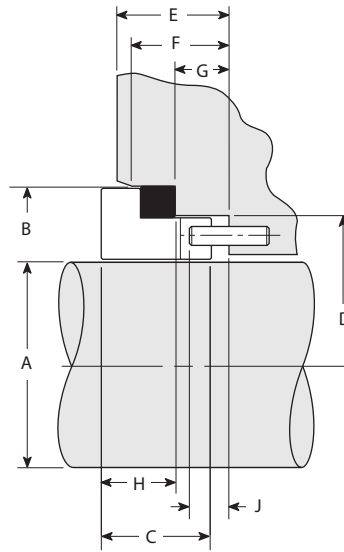


**SAS KEY**

**A** – Shaft Size      **B** – Seal Depth      **C** – Holder Diameter      **D** – Seal Face Length      **E** – Seal Face Diameter

A	B	C	D	E
0.625	0.25	1.63	0.500	–
0.750	0.25	1.75	0.500	–
0.875	0.25	1.88	0.500	–
0.938	0.25	1.94	0.625	–
1.000	0.25	2.09	0.625	1.610
1.125	0.25	2.22	0.625	1.735
1.188	0.25	2.44	0.625	–
1.250	0.25	2.34	0.625	1.860
1.375	0.25	2.41	0.625	1.985
1.438	0.25	2.56	0.625	–
1.500	0.25	2.72	0.625	2.235
1.625	0.25	2.84	0.625	2.360
1.750	0.25	3.09	0.625	2.485
1.875	0.25	3.22	0.625	2.610
2.000	0.25	3.47	0.625	2.735
2.125	0.25	3.72	0.625	2.800
2.250	0.25	3.84	0.625	2.985
2.375	0.25	3.88	0.625	3.047
2.500	0.25	4.09	0.625	3.325
2.625	0.25	4.22	0.625	3.360
2.750	0.25	4.38	1.000	3.437
2.875	0.25	4.50	1.000	3.562
3.000	0.25	4.56	1.000	3.687
3.125	0.25	4.69	1.000	3.812
3.250	0.25	4.88	1.000	3.937
3.375	0.25	5.00	1.000	4.062
3.500	0.25	5.13	1.000	4.187
3.625	0.25	5.25	1.000	4.312
3.750	0.25	5.38	1.000	4.437
3.875	0.25	5.50	1.000	4.562
4.000	0.25	5.63	1.000	4.687
4.125	0.25	5.75	1.000	4.937
4.250	0.25	5.88	1.000	4.937
4.375	0.25	6.00	1.000	5.062
4.500	0.25	6.13	1.000	5.187

# 886HT STATIONARY SEAL RING – Dimensional Data/Metric



**886HT KEY**

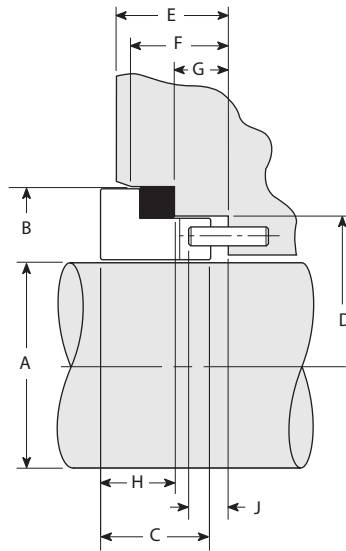
A – Shaft Size  
 B – Gland Bore Diameter  
 C – Seal Length

D – Cavity Step Diameter  
 E – Cavity Depth  
 F – Bore Depth

G – Cavity Step Depth  
 H – Nose Length  
 J – Pin Extrusion

A	B	C	D	E	F	G	H	J
25	41,2	11,1	35,1	14,0	9,9	6,1	6,6	3,1
28	44,4	11,1	38,3	14,0	9,9	6,1	6,6	3,1
30	47,6	11,1	41,5	14,0	9,9	6,1	6,6	3,1
32	47,6	11,1	41,5	14,0	9,9	6,1	6,6	3,1
35	50,8	11,1	44,6	14,0	9,9	6,1	6,6	3,1
38	53,9	11,1	47,8	14,0	9,9	6,1	6,6	3,1
40	60,3	12,7	54,2	15,0	10,9	6,3	7,9	3,1
42	63,5	12,7	57,3	15,0	10,9	6,3	7,9	3,1
45	66,6	12,7	60,5	15,0	10,9	6,3	7,9	3,1
48	69,8	12,7	63,7	15,0	10,9	6,3	7,9	3,1
50	76,2	14,2	70,0	16,2	12,1	7,6	8,7	3,9
55	79,3	14,2	73,2	16,2	12,1	7,6	8,7	3,9
60	82,5	14,2	76,4	16,2	12,1	7,6	8,7	3,9
65	85,7	15,8	79,6	17,3	13,2	8,6	9,6	4,3

# 886HT STATIONARY SEAL RING – Dimensional Data/Inch

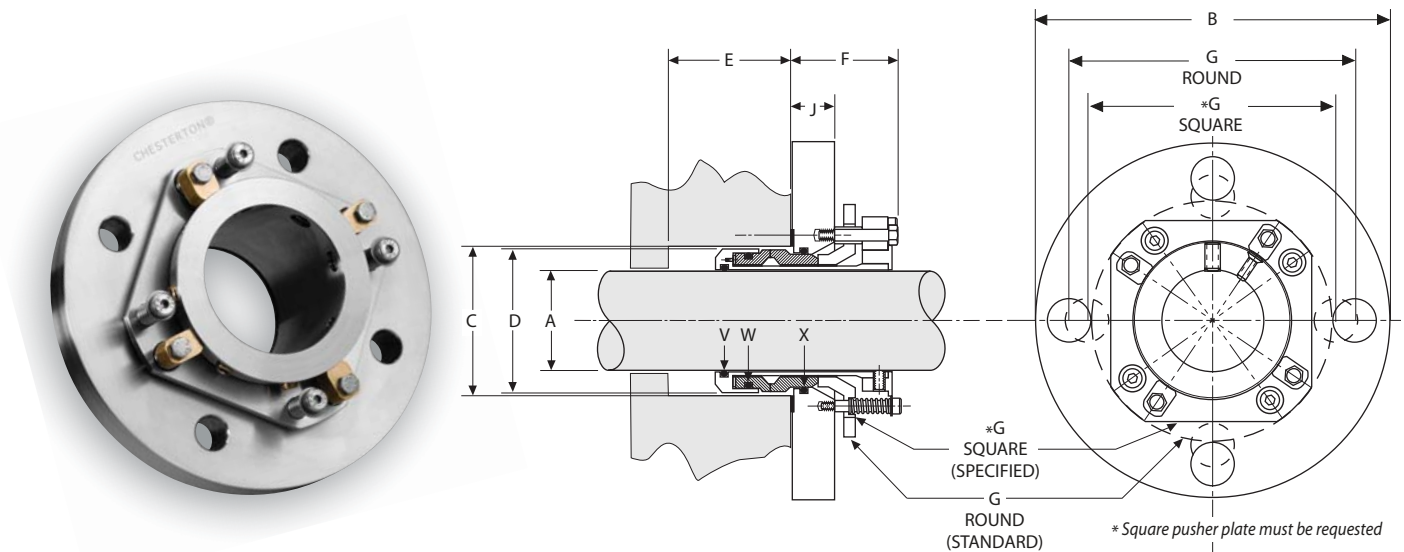


**886HT KEY**

- A – Shaft Size
- B – Gland Bore Diameter
- C – Seal Length
- D – Cavity Step Diameter
- E – Cavity Depth
- F – Bore Depth
- G – Cavity Step Depth
- H – Nose Length
- J – Pin Extrusion

A	B	C	D	E	F	G	H	J
1.000	1.625	.437	1.384	.551	.390	.240	.261	.125
1.125	1.750	.437	1.509	.551	.390	.240	.261	.125
1.250	1.875	.437	1.634	.551	.390	.240	.261	.125
1.375	2.000	.437	1.759	.551	.390	.240	.261	.125
1.500	2.125	.437	1.884	.551	.390	.240	.261	.125
1.625	2.375	.500	2.134	.592	.431	.251	.314	.125
1.750	2.500	.500	2.259	.592	.431	.251	.314	.125
1.875	2.625	.500	2.384	.592	.431	.251	.314	.125
2.000	2.750	.500	2.509	.592	.431	.251	.314	.125
2.125	3.000	.562	2.759	.641	.480	.300	.346	.156
2.250	3.125	.562	2.884	.641	.480	.300	.346	.156
2.375	3.250	.562	3.009	.641	.480	.300	.346	.156
2.500	3.375	.562	3.134	.641	.480	.300	.346	.156
2.625	3.375	.625	3.134	.682	.521	.341	.379	.170

# 170 SLURRY CARTRIDGE SINGLE SEAL – Dimensional Data/Metric



**170 KEY**

- A** – Shaft Size
- B** – Maximum Gland Diameter
- C** – Minimum Seal Chamber Bore
- D** – Maximum Inboard Seal Diameter
- E** – Minimum Seal Chamber Depth
- F** – Outboard Length Required
- G** – Minimum Bolt Circle by Bolt Size
- J** – Gland Width (Including Gasket)
- V** – Shaft O-ring
- W** – Rotary Seal O-ring
- X** – Stationary Seal O-ring

A	B MAX	C MIN	D MAX	E MIN	F MAX	J MAX	SQUARE	ROUND	SQUARE	ROUND	SQUARE	ROUND	SQUARE	ROUND	V	W	X		
							PUSHER	PUSHER	PUSHER	PUSHER	PUSHER	PUSHER	PUSHER	PUSHER				G MIN SEE BELOW	
							10 mm	10 mm	12 mm	12 mm	16 mm	16 mm	24 mm	24 mm	30 mm	30 mm			
38	139.2	62.8	60.1	34.1	49.5	22.4	99.4	118.5	102.8	122.0	-	-	-	-	-	128	137	227	
40	151.9	64.7	62.0	34.1	49.5	22.4	101.3	120.4	104.7	123.9	-	-	-	-	-	129	138	228	
43	151.9	67.7	65.0	34.1	49.5	22.4	104.3	123.4	107.7	126.9	-	-	-	-	-	131	140	229	
45	164.6	69.7	67.0	34.1	49.5	22.4	106.3	125.4	109.7	128.9	-	-	-	-	-	133	141	229	
48	164.6	72.7	70.0	34.1	49.5	22.4	109.3	128.4	112.7	131.9	-	-	-	-	-	134	143	230	
50	164.6	74.8	72.0	34.1	49.5	22.4	111.3	130.5	114.7	133.9	-	-	-	-	-	136	144	231	
55	177.3	79.7	77.0	34.1	49.5	22.4	116.3	135.4	119.7	138.9	126.6	145.8	-	-	-	139	147	232	
60	177.3	85.1	82.3	34.1	49.5	22.4	121.6	140.8	125.0	144.2	132.0	151.2	-	-	-	142	150	234	
65	206.0	97.8	93.8	43.7	64.0	29.7	141.0	170.3	148.0	177.2	-	-	-	-	-	231	236	237	
70	209.3	101.2	97.1	43.7	64.0	29.7	144.4	173.6	151.3	180.5	-	-	-	-	-	232	237	238	
75	215.5	107.4	103.3	43.7	64.0	29.7	150.6	179.8	157.5	186.7	-	-	-	-	-	234	239	240	
80	219.3	111.2	107.1	43.7	64.0	29.7	154.4	183.6	161.3	190.5	-	-	-	-	-	236	240	241	
85	225.0	116.9	112.8	43.7	64.0	29.7	160.1	189.3	167.0	196.2	174.0	203.2	-	-	-	237	242	243	
90	229.3	121.2	117.1	43.7	64.0	29.7	164.4	193.6	171.3	200.5	178.3	207.5	-	-	-	239	243	245	
95	234.6	126.4	122.4	43.7	64.0	29.7	169.6	198.8	176.6	205.8	183.5	212.7	-	-	-	240	245	246	
100	234.3	147.3	141.8	43.7	76.8	36.6	176.0	212.3	182.9	219.2	189.9	226.2	-	-	-	345	351	353	
110	243.8	156.8	151.3	43.7	76.8	36.6	185.5	221.8	192.4	228.8	199.4	235.7	-	-	-	348	354	356	
120	253.4	166.3	160.8	61.7	76.8	36.6	195.0	231.3	202.0	238.3	208.9	245.2	215.8	252.1	227.4	263.7	351	357	359
130	266.1	179.0	173.5	61.7	76.8	36.6	-	-	214.7	251.0	221.6	257.9	228.5	264.8	240.1	276.4	354	361	362
140	272.7	185.7	180.2	61.7	76.8	36.6	-	-	221.3	257.6	228.3	264.6	235.2	271.5	246.7	283.0	357	362	363
145	278.8	191.7	186.2	61.7	76.8	36.6	-	-	227.4	263.7	234.3	270.6	241.2	277.5	252.8	289.1	359	363	364
150	285.1	198.1	192.6	61.7	76.8	36.6	-	-	233.7	270.0	240.7	277.0	247.6	283.9	259.1	295.4	361	364	365
160	292.7	205.7	200.2	61.7	76.8	36.6	-	-	241.3	277.6	248.3	284.6	237.6	255.2	303.0	266.7	363	365	367
170	304.2	217.1	211.6	61.7	76.8	36.6	-	-	252.8	289.1	259.7	296.0	249.0	266.6	314.5	278.2	364	367	368
180	312.7	225.7	220.2	61.7	76.8	36.6	-	-	261.3	297.6	268.3	304.6	257.6	275.2	323.0	286.7	366	368	370

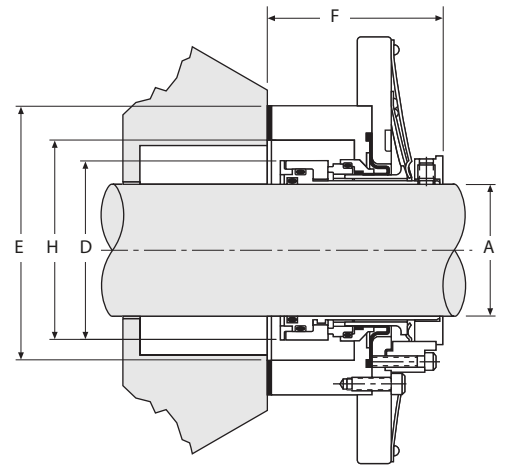
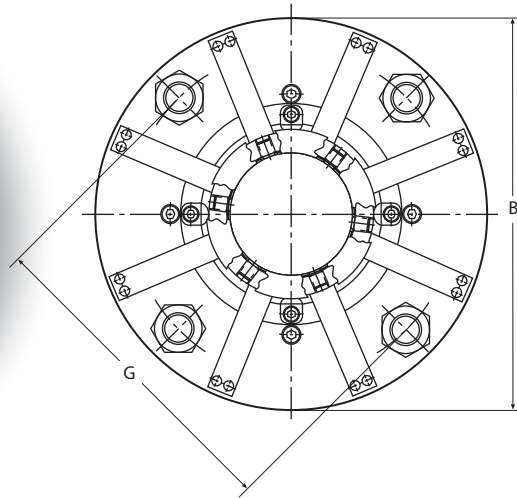
# 170 SLURRY CARTRIDGE SINGLE SEAL – Dimensional Data/Inch

**170 KEY**

- A – Shaft Size
- B – Maximum Gland Diameter
- C – Minimum Seal Chamber Bore
- D – Maximum Inboard Seal Diameter
- E – Minimum Seal Chamber Depth
- F – Outboard Length Required
- G – Minimum Bolt Circle by Bolt Size
- J – Gland Width (Including Gasket)
- V – Shaft O-ring
- W – Rotary Seal O-ring
- X – Stationary Seal O-ring

A	B MAX	C MIN	D MAX	E MIN	F MAX	J MAX	SQUARE PUSHER	ROUND PUSHER	SQUARE PUSHER	ROUND PUSHER	SQUARE PUSHER	ROUND PUSHER	SQUARE PUSHER	ROUND PUSHER	V	W	X	
							G		G MIN		G		G MIN					
							3/8"	3/8"	1/2"	1/2"	5/8"	5/8"	SEE BELOW					
1.500	5.48	2.47	2.37	1.34	1.95	0.88	3.88	4.64	4.10	4.85	-	-	-	-	128	137	227	
1.625	5.98	2.60	2.49	1.34	1.95	0.88	3.96	4.71	4.17	4.93	-	-	-	-	130	139	228	
1.750	6.48	2.72	2.62	1.34	1.95	0.88	4.01	4.76	4.22	4.98	-	-	-	-	132	141	229	
1.875	6.48	2.85	2.74	1.34	1.95	0.88	4.07	4.83	4.29	5.04	-	-	-	-	134	143	230	
2.000	6.48	2.97	2.87	1.34	1.95	0.88	4.13	4.89	4.35	5.10	-	-	-	-	137	145	231	
2.125	6.98	3.10	2.99	1.34	1.95	0.88	4.15	4.91	4.37	5.12	4.94	5.69	-	-	138	147	232	
2.250	6.98	3.22	3.12	1.34	1.95	0.88	4.26	5.01	4.47	5.23	4.98	5.73	-	-	140	149	233	
2.375	6.98	3.35	3.24	1.34	1.95	0.88	4.27	5.03	4.49	5.24	5.06	5.82	-	-	142	150	234	
2.500	7.48	3.47	3.37	1.34	1.95	0.88	4.35	5.10	4.57	5.32	5.19	5.94	-	-	144	151	235	
							1/2"	1/2"	5/8"	5/8"	3/4"	3/4"	7/8"	7/8"				
2.625	8.11	3.85	3.69	1.72	2.52	1.17	5.60	6.75	5.82	6.97	-	-	-	-	231	236	237	
2.750	8.24	3.98	3.82	1.72	2.52	1.17	5.73	6.88	5.95	7.10	-	-	-	-	232	237	238	
2.875	8.36	4.10	3.94	1.72	2.52	1.17	5.85	7.00	6.07	7.22	-	-	-	-	233	238	239	
3.000	8.49	4.23	4.07	1.72	2.52	1.17	5.98	7.13	6.19	7.34	-	-	-	-	234	239	240	
3.125	8.61	4.35	4.19	1.72	2.52	1.17	6.10	7.25	6.32	7.47	5.99	7.14	6.11	7.26	235	240	241	
3.250	8.74	4.48	4.32	1.72	2.52	1.17	6.23	7.38	6.44	7.59	6.11	7.26	6.24	7.39	236	241	242	
3.375	8.86	4.60	4.44	1.72	2.52	1.17	6.35	7.50	6.57	7.72	6.24	7.39	6.36	7.51	237	242	243	
3.500	8.99	4.73	4.57	1.72	2.52	1.17	6.48	7.63	6.69	7.84	6.36	7.51	6.49	7.64	238	243	244	
3.625	9.11	4.85	4.69	1.72	2.52	1.17	6.60	7.75	6.82	7.97	6.49	7.64	6.61	7.76	329	244	245	
3.750	9.24	4.98	4.82	1.72	2.52	1.17	6.73	7.88	6.94	8.09	6.61	7.76	6.74	7.89	240	245	246	
3.875	9.36	5.10	4.94	1.72	2.52	1.17	6.85	8.00	7.07	8.22	6.74	7.89	6.86	8.01	241	246	247	
4.000	9.23	5.80	5.58	2.43	3.05	1.44	6.98	8.41	7.19	8.62	7.41	8.84	7.63	9.06	345	351	353	
4.125	9.35	5.92	5.71	2.43	3.05	1.44	7.10	8.53	7.32	8.75	7.53	8.96	7.75	9.18	346	352	354	
4.250	9.48	6.05	5.83	2.43	3.05	1.44	7.23	8.66	7.44	8.87	7.66	9.09	7.88	9.31	347	353	355	
4.375	9.60	6.17	5.96	2.43	3.05	1.44	7.35	8.78	7.57	9.00	7.78	9.21	8.00	9.43	348	354	356	
4.500	9.73	6.30	6.08	2.43	3.05	1.44	7.48	8.91	7.69	9.12	7.91	9.34	8.13	9.56	349	355	357	
							3/4"	3/4"	7/8"	7/8"	1"	1"	1 1/8"	1 1/8"				
4.625	9.85	6.42	6.21	2.43	3.05	1.44	8.03	9.46	8.25	9.68	-	-	-	-	350	356	358	
4.750	9.98	6.55	6.33	2.43	3.05	1.44	7.61	9.04	7.74	9.17	8.59	10.02	8.72	10.15	351	357	359	
5.000	10.23	6.80	6.58	2.43	3.05	1.44	8.41	9.84	8.63	10.06	8.84	10.27	8.97	10.40	353	359	361	
5.250	10.48	7.05	6.83	2.43	3.05	1.44	8.66	10.09	8.88	10.31	9.09	10.52	9.22	10.65	355	361	362	
5.500	10.74	7.31	7.09	2.43	3.05	1.44	8.92	10.35	9.14	10.57	9.35	10.78	9.48	10.91	357	362	363	
5.750	10.98	7.55	7.33	2.43	3.05	1.44	-	-	8.74	10.17	9.59	11.02	9.72	11.15	359	363	364	
6.000	11.23	7.80	7.58	2.43	3.05	1.44	-	-	8.99	10.42	9.84	11.27	9.97	11.40	361	364	365	
6.250	11.52	8.10	7.88	2.43	3.05	1.44	-	-	9.93	11.36	10.14	11.57	10.27	11.70	362	365	367	
6.500	11.73	8.30	8.08	2.43	3.05	1.44	-	-	10.13	11.56	10.34	11.77	10.47	11.90	363	366	367	
6.750	11.98	8.55	8.33	2.43	3.05	1.44	-	-	10.38	11.81	10.59	12.02	10.72	12.15	364	367	368	
7.000	12.31	8.89	8.67	2.43	3.05	1.44	-	-	10.07	11.50	10.93	12.36	11.06	12.49	365	368	370	

# 156™ SLURRY SINGLE SEAL – Dimensional Data/Metric



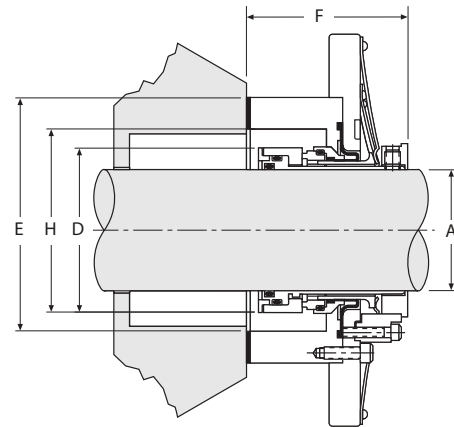
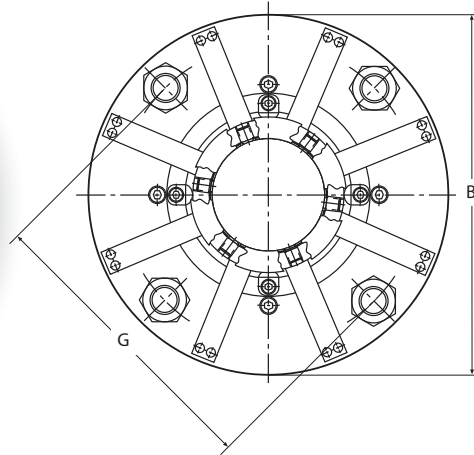
**156 KEY**

- A – Shaft Size
- B – Minimum Retainer Diameter\*
- D – Seal Diameter in Seal Chamber
- E – Gland Outside Diameter
- F – Outboard Seal Length\*\*
- G – Minimum Bolt Circle By Bolt Size
- H – Gland Inside Diameter
- J – O-ring
- K – O-ring
- L – O-ring

A	B MIN	D	E	F MAX	G MIN					H	J	K	L
					8 mm	10 mm	12 mm	16 mm	20 mm				
45	158	63	105	68	95	99	102	-	-	79	-132	-136	-140
48	161	69	108	68	98	102	105	-	-	82	-134	-139	-142
50	163	68	110	68	100	104	107	-	-	84	-136	-140	-143
55	168	73	115	68	105	109	112	-	-	89	-139	-143	146
60	173	78	120	68	110	114	117	-	-	94	-142	-146	149
65	191	90	143	85	-	120	124	127	-	105	-231	-234	-236
70	195	93	146	85	-	124	127	130	-	108	-232	-235	-237
75	201	100	152	85	-	130	133	136	-	114	-234	-237	239
80	207	106	159	85	-	136	140	143	-	121	-236	-239	-241
85	210	109	162	85	-	139	143	146	-	124	-237	-240	-242
90	217	115	168	85	-	146	149	152	-	130	-239	-242	-244
95	220	119	171	85	-	149	152	155	-	133	-240	-243	-245
100	226	125	178	85	-	155	159	162	-	140	-242	-245	-247
110	236	134	187	85	-	165	168	171	-	149	-245	-248	-250
120	245	144	197	85	-	174	178	181	-	159	-248	-251	-253
125	260	162	215	117	-	-	200	203	206	176	-353	-358	-360
135	273	175	227	117	-	-	213	216	219	189	-357	-361	-362

\* Retainer diameter can be made larger for larger bolt circles.  
 \*\* Outboard length can be shortened by machining the gland and putting the seal in the seal chamber.

# 156™ SLURRY SINGLE SEAL – Dimensional Data/Inch



**156 KEY**

A – Shaft Size  
 B – Minimum Retainer Diameter\*  
 D – Seal Diameter in Seal Chamber

E – Gland Outside Diameter  
 F – Outboard Seal Length\*\*  
 G – Minimum Bolt Circle By Bolt Size

H – Gland Inside Diameter  
 J – O-ring  
 K – O-ring  
 L – O-ring

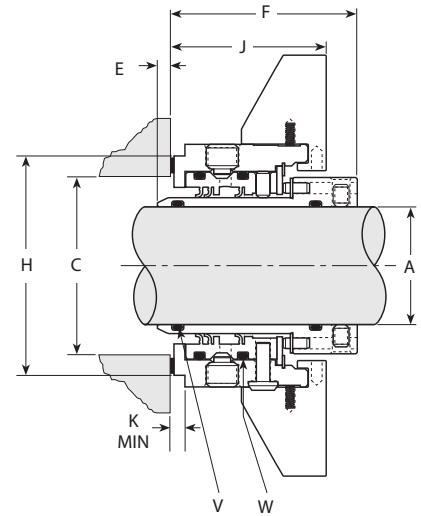
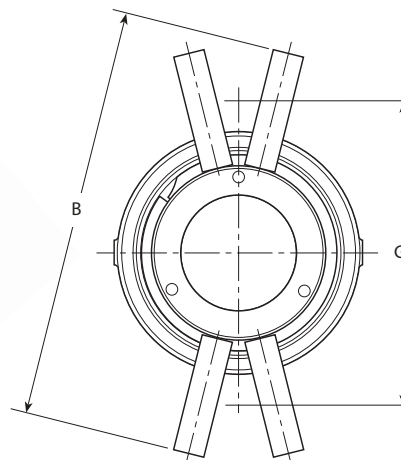
A	B MIN	D	E	F MAX	3/8"	1/2"	G MIN			H	J	K	L
							5/8"	3/4"					
1.750	6.20	2.45	4.10	2.67	3.69	3.88	–	–	3.08	-132	-136	-139	
1.875	6.33	2.57	4.23	2.67	3.81	4.00	–	–	3.21	-134	-138	-141	
2.000	6.45	2.70	4.35	2.67	3.94	4.12	4.25	–	3.33	-136	-140	-143	
2.125	6.58	2.82	4.48	2.67	4.06	4.25	4.38	–	3.46	-138	-142	-145	
2.250	6.70	2.95	4.60	2.67	4.19	4.38	4.50	–	3.58	-140	-144	-147	
2.375	6.83	3.07	4.73	2.67	4.31	4.50	4.62	–	3.71	-142	-146	-149	
2.500	6.95	3.20	4.85	2.67	4.44	4.62	4.75	–	3.83	-144	-148	-151	
2.625	7.53	3.54	5.62	3.37	–	4.75	4.88	5.00	4.12	-231	-234	-236	
2.750	7.66	3.67	5.75	3.37	–	4.88	5.00	5.12	4.25	-232	-235	-237	
2.875	7.78	3.79	5.88	3.37	–	5.00	5.12	5.25	4.38	-233	-236	-238	
3.000	7.91	3.92	6.00	3.37	–	5.12	5.25	5.38	4.50	-234	-237	-239	
3.125	8.03	4.04	6.12	3.37	–	5.25	5.38	5.50	4.62	-235	-238	-240	
3.250	8.16	4.17	6.25	3.37	–	5.38	5.50	5.62	4.75	-236	-239	-241	
3.375	8.28	4.29	6.38	3.37	–	5.50	5.62	5.75	4.88	-237	-240	-242	
3.500	8.41	4.42	6.50	3.37	–	5.62	5.75	5.88	5.00	-238	-241	-243	
3.625	8.53	4.54	6.62	3.37	–	5.75	5.88	6.00	5.12	-239	-242	-244	
3.750	8.66	4.67	6.75	3.37	–	5.88	6.00	6.12	5.25	-240	-243	-245	
3.875	8.78	4.79	6.88	3.37	–	6.00	6.12	6.25	5.38	-241	-244	-246	
4.000	8.91	4.92	7.00	3.37	–	6.12	6.25	6.38	5.50	-242	-245	-247	
4.125	9.03	5.04	7.12	3.37	–	6.25	6.38	6.50	5.62	-243	-246	-248	
4.250	9.16	5.17	7.25	3.37	–	6.38	6.50	6.62	5.75	-244	-247	-249	
4.375	9.28	5.29	7.38	3.37	–	6.50	6.62	6.75	5.88	-245	-248	-250	
4.500	9.41	5.42	7.50	3.37	–	6.62	6.75	6.88	6.00	-246	-249	-251	
4.625	9.53	5.54	7.62	3.37	–	6.75	6.88	7.00	6.12	-247	-250	-252	
4.750	9.66	5.67	7.75	3.37	–	6.88	7.00	7.12	6.25	-248	-251	-253	
5.000	10.23	6.38	8.45	4.61	–	7.88	8.00	8.12	6.94	-353	-358	-360	
5.250	10.48	6.63	8.70	4.61	–	8.12	8.25	8.38	7.19	-355	-360	-361	
5.375	10.61	6.75	8.83	4.61	–	8.25	8.38	8.50	7.32	-356	-361	-362	
5.500	10.73	6.88	8.95	4.61	–	8.38	8.50	8.62	7.44	-357	-361	-362	
5.750	10.98	7.13	9.20	4.61	–	8.62	8.75	8.88	7.69	-359	-362	-363	
6.000	11.23	7.38	9.45	4.61	–	8.88	9.00	9.12	7.94	-361	-362	-364	
6.250	11.48	7.63	9.70	4.61	–	9.12	9.25	9.38	8.19	-362	-363	-365	
6.500	11.73	7.88	9.95	4.61	–	9.38	9.50	9.62	8.44	-363	-363	-366	
6.750	11.98	8.13	10.20	4.61	–	9.62	9.75	9.88	8.69	-364	-364	-367	
7.000	12.23	8.38	10.45	4.61	–	9.88	10.00	10.12	8.94	-365	-364	-368	
7.250	12.48	8.63	10.70	4.61	–	10.12	10.25	10.38	9.19	-366	-365	-369	
7.500	12.73	8.88	10.95	4.61	–	10.38	10.50	10.62	9.44	-367	-365	-370	
7.750	12.98	9.13	11.20	4.61	–	10.62	10.75	10.88	9.69	-368	-366	-371	
8.000	13.23	9.38	11.45	4.61	–	10.88	11.00	11.12	9.94	-369	-366	-372	

\* Retainer diameter can be made larger for larger bolt circles.

\*\* Outboard length can be shortened by machining the gland and putting the seal in the seal chamber.



# HIGH VISCOSITY CARTRIDGE SEAL – Dimensional Data/Metric



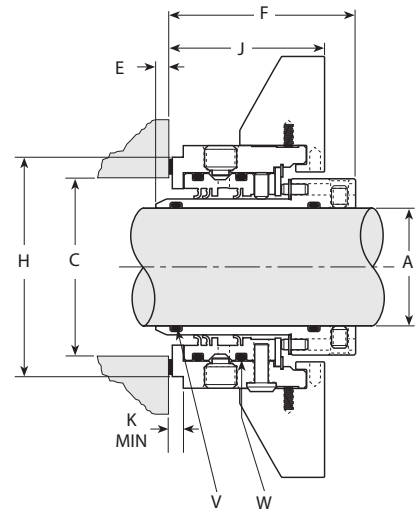
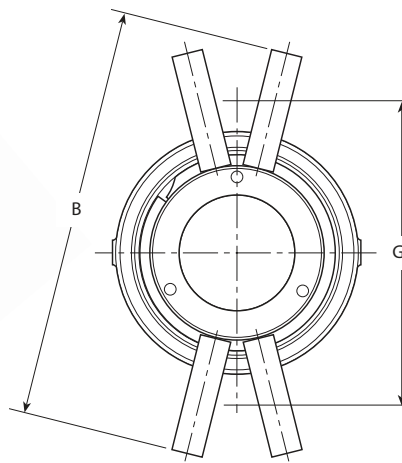
**HVS KEY**

- A – Shaft Size
- B – Gland Bolt Tab Minimum Diameter
- C – Seal Chamber Bore
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Gland Thickness
- J – Distance from Seal Chamber Face to Tab Face
- K – Gland Step
- M – Gland OD
- V – Shaft O-ring
- W – Sealing Element O-ring

A	B MAX	C MIN	C MAX	E MIN	F	8 mm	10 mm	G MIN 12 mm	16 mm	20 mm	H	J	K	M	V	W
25	120,8	37,7	40,6	3,6	58,0	72,8	74,8	76,8	-	-	59,9	52,2	0,18	64,2	119	130
28	124,7	40,8	49,8	3,6	58,0	76,4	78,4	80,4	-	-	63,7	52,2	0,18	67,8	122	133
30	124,7	40,8	49,8	3,6	58,0	76,4	78,4	80,4	-	-	63,7	52,2	0,18	67,8	025	133
32	128,1	44,2	54,4	4,9	63,0	79,8	81,8	83,8	87,8	-	67,1	52,2	0,18	71,1	124	135
35	131,0	40,8	56,4	4,9	63,0	82,7	84,7	86,7	90,7	-	70,0	52,2	0,18	74,1	127	137
40	125,5	52,2	57,9	4,9	63,0	87,8	89,8	91,8	95,8	99,8	71,8	52,2	0,18	79,1	129	140
45	130,5	57,2	62,9	4,9	63,0	92,8	94,8	96,8	100,8	104,8	76,8	52,2	0,18	84,1	132	143
50	147,2	63,1	66,8	4,9	63,0	98,6	100,6	102,6	106,6	110,6	82,6	52,2	0,18	89,9	136	147
53	150,1	66,2	84,1	4,9	63,0	101,8	103,8	105,8	109,8	113,8	85,8	52,2	0,18	93,2	137	149
55	156,9	69,4	75,4	4,9	63,0	104,9	106,9	135,1	137,1	141,1	89,0	52,2	0,18	96,5	140	150
60	172,6	74,1	93,9	4,9	63,0	124,4	126,4	128,4	132,4	136,4	110,4	54,1	0,18	115,8	142	151
65	176,4	77,2	91,9	4,9	63,0	127,5	129,5	131,5	135,5	139,5	105,6	53,5	0,18	118,8	145	152
70	181,2	81,9	96,8	4,9	63,0	-	-	136,4	140,4	144,4	110,4	53,5	0,18	123,6	148	152
75	188,4	89,2	115,7	4,9	63,0	-	-	143,5	147,5	151,5	131,0	52,4	0,00	131,0	234	239
80	193,4	94,2	120,9	4,9	63,0	-	-	148,5	152,5	156,5	136,0	52,4	0,00	135,8	235	241
85	215,0	100,8	113,8	4,9	63,0	-	-	156,8	160,8	164,8	143,3	52,4	0,00	143,0	238	243
100	214,9	115,8	141,1	4,9	63,0	-	-	170,1	174,1	178,1	157,6	52,4	0,00	157,5	242	247

Piping connections: 1/8 inch NPT

# HIGH VISCOSITY CARTRIDGE SEAL – Dimensional Data/Inch



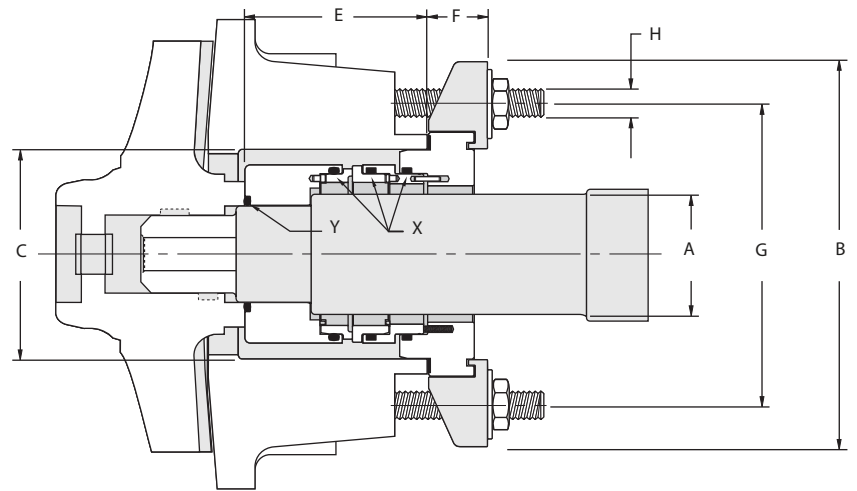
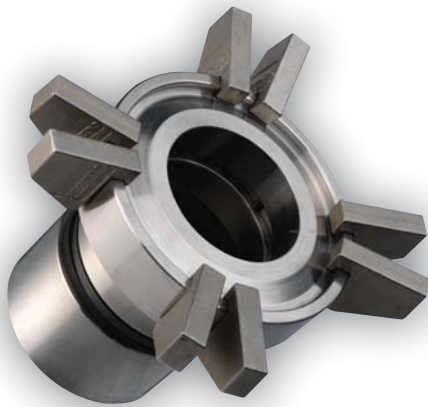
**HVS KEY**

- A – Shaft Size
- B – Gland Bolt Tab Minimum Diameter
- C – Seal Chamber Bore
- E – Minimum Seal Chamber Depth
- F – Outboard Seal Length
- G – Minimum Bolt Circle by Bolt Size
- H – Gland Thickness
- J – Distance from Seal Chamber Face to Tab Face
- K – Gland Step
- M – Gland OD
- V – Shaft O-ring
- W – Sealing Element O-ring

A	B MAX	C MIN	C MAX	E MIN	F	G MIN				H	J	K	M	V	W	
						5/16"	7/16"	1/2"	5/8"							3/4"
0.750	4.54	1.21	1.48	.30	2.186	2.641	2.766	-	-	-	2.133	2.06	0.15	2.30	116	127
1.125	4.92	1.58	1.82	.30	2.186	3.016	3.141	-	-	-	2.510	2.06	0.15	2.67	122	133
1.375	5.17	1.83	2.06	.30	2.405	3.266	3.391	-	-	-	2.758	2.06	0.15	2.92	126	137
1.437	5.23	1.89	2.10	.30	2.405	3.328	3.453	-	-	-	2.690	2.06	0.15	2.99	127	138
1.500	5.29	1.96	2.11	.30	2.405	3.391	3.516	-	-	-	2.753	2.06	0.15	3.05	128	139
1.625	5.42	2.08	2.23	.30	2.405	3.516	3.641	3.703	-	-	2.878	2.06	0.15	3.17	130	141
1.750	5.54	2.21	2.36	.30	2.405	3.641	3.766	3.828	-	-	3.003	2.06	0.15	3.30	132	143
1.812	5.60	2.27	2.29	.30	2.405	3.703	3.828	3.890	-	-	3.065	2.06	0.15	3.36	133	144
1.875	5.67	2.33	2.45	.30	2.405	3.766	3.891	3.953	-	-	3.128	2.06	0.15	3.128	134	145
2.125	5.92	2.58	2.80	.30	2.405	-	-	4.203	4.328	4.453	3.378	2.06	0.15	3.67	138	149
2.250	6.04	2.71	2.81	.30	2.405	-	-	4.328	4.453	4.578	3.503	2.06	0.15	3.80	140	150
2.437	6.81	2.89	3.23	.30	2.465	-	-	5.095	5.220	5.345	4.034	2.06	0.15	4.57	143	151
2.500	6.87	2.96	3.41	.30	2.465	-	-	5.158	5.283	5.408	4.097	2.06	0.15	4.63	144	151
2.750	7.12	3.21	3.65	.30	2.406	-	-	5.408	5.533	5.658	4.347	2.06	0.15	4.88	148	152
2.875	7.93	3.41	3.98	.30	2.406	-	-	5.611	5.736	5.861	5.080	2.06	0.00	5.08	233	238
2.953	8.01	3.49	3.98	.30	2.406	-	-	5.689	5.814	5.939	5.160	2.06	0.00	5.16	234	239
3.437	8.50	3.97	4.48	.30	2.406	-	-	6.173	6.298	6.423	5.640	2.06	0.00	5.64	238	243
3.500	8.56	4.03	4.48	.30	2.406	-	-	6.236	6.361	6.486	5.710	2.06	0.00	5.71	238	243
4.000	9.06	4.53	4.98	.30	2.406	-	-	6.736	6.861	6.986	6.210	2.06	0.00	6.21	242	247

Piping connections: 1/8 inch NPT

# DIRECTFIT™ SINGLE SEAL – Dimensional Data/Metric



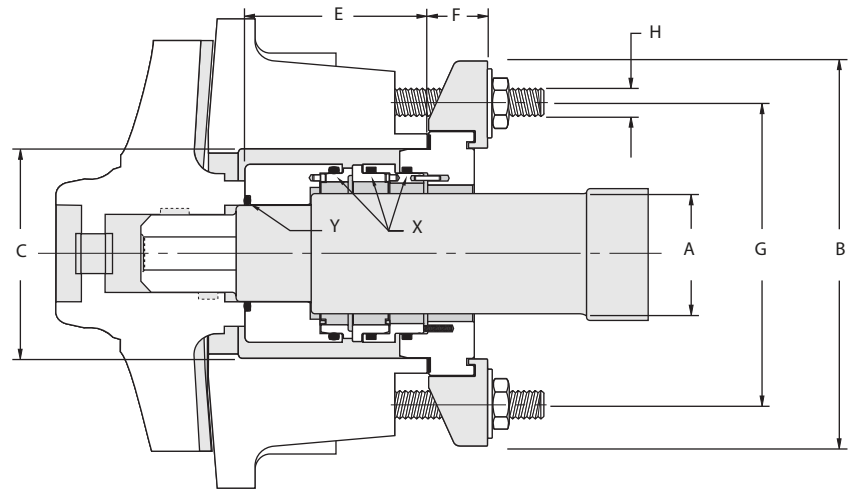
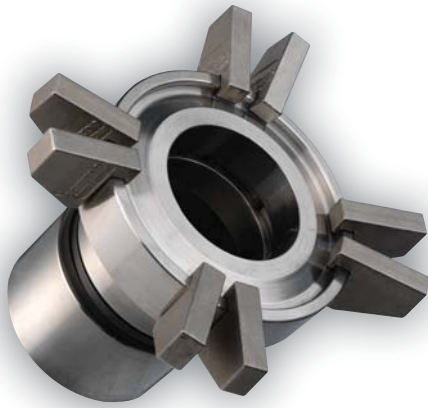
**DIRECTFIT KEY**

A – Shaft Size      C – Seal Chamber Bore Diameter      F – Outboard Seal Length      H – Stud Diameter      Y – Impeller Hub O-ring  
 B – Tab Diameter      E – Inboard Seal Length      G – Bolt Circle      X – Seal Face O-rings

**DFS APP**

FRAME	A	B	C MIN	C MAX	E	F	G	H APP	X	Y
1	30	135,6	60	60,05	60,0	31,1	95,0	M10	031	119
2	40	143,8	70	70,05	60,0	31,1	105,0	M10	138	123
3	50	161,3	85	85,05	73,1	31,1	125,0	M12	145	129
4	60	170,1	95	95,05	73,1	31,1	135,0	M12	152	132
5	80	212,1	122	122,06	92,0	31,5	170,0	M16	241	231
6	90	224,3	132	132,06	92,0	31,5	180,0	M16	244	234

# DIRECTFIT™ SINGLE SEAL – Dimensional Data/Inches



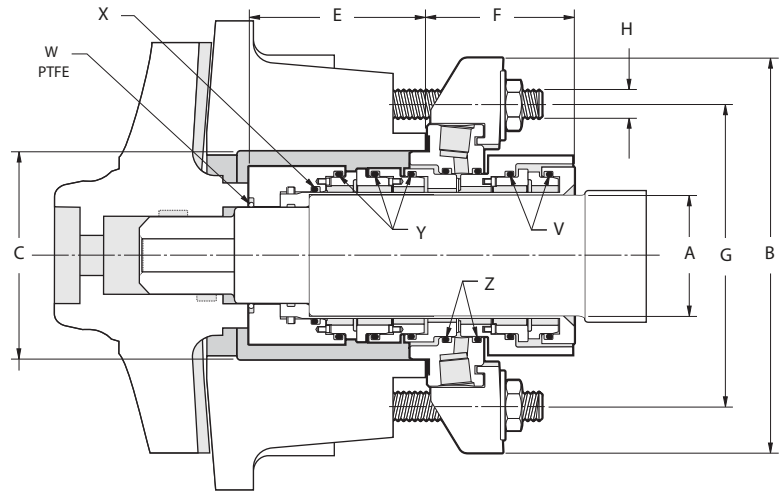
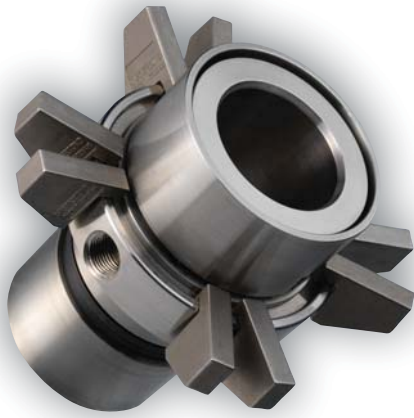
**DIRECTFIT KEY**

A – Shaft Size      C – Seal Chamber Bore Diameter      F – Outboard Seal Length      H – Stud Diameter      Y – Impeller Hub O-ring  
 B – Tab Diameter      E – Inboard Seal Length      G – Bolt Circle      X – Wetted O-rings

**DFS APT**

FRAME	A	B	C MIN	C MAX	E	F	G	H APP	X	Y
1	1.181	5.34	2.375	2.377	2.36	1.22	3.74	3/8-16	031	119
2	1.575	5.66	2.750	2.752	2.36	1.22	4.13	3/8-16	138	123
3	1.969	6.35	3.375	3.377	2.88	1.22	4.92	1/2-13	145	129
4	2.362	6.70	3.750	3.752	2.88	1.22	5.32	1/2-13	152	132
5	3.150	8.35	4.750	4.753	3.62	1.24	6.69	5/8-11	241	231
6	3.543	8.83	5.197	5.200	3.62	1.24	7.09	5/8-11	244	234

# DIRECTFIT™ DUAL SEAL – Dimensional Data/Metric



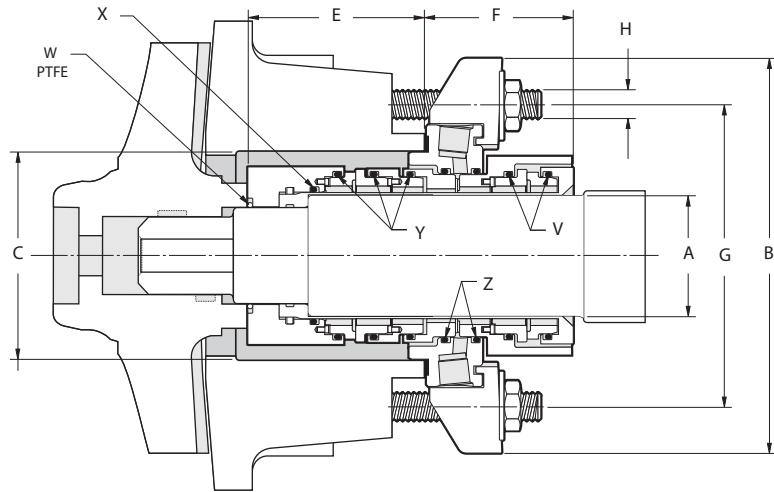
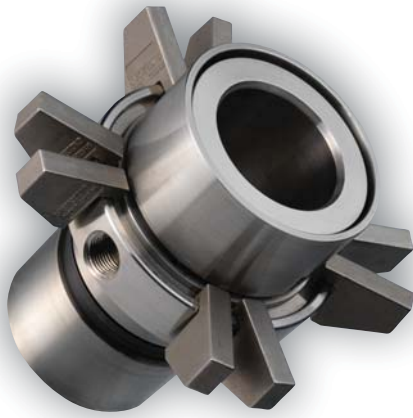
**DIRECTFIT KEY**

- |                                |                          |                         |                                |
|--------------------------------|--------------------------|-------------------------|--------------------------------|
| A – Shaft Size                 | E – Inboard Seal Length  | H – Stud Diameter       | V – Outboard Seal Face O-rings |
| B – Tab Diameter               | F – Outboard Seal Length | W – Impeller Hub O-ring | Z – Gland O-rings              |
| C – Seal Chamber Bore Diameter | G – Bolt Circle          | X – Shaft O-ring        | Y – Wetted O-rings             |

**DFD APP**

FRAME	A	B	C MIN	C MAX	E	F	G	H APP	W PTFE	X	Y / V	Z
1	30	136,6	60	60,05	60,0	60,7	95,0	M10	119	027	031	133
2	40	148,3	70	70,05	60,0	61,4	105,0	M10	123	131	138	140
3	50	164,2	85	85,05	73,0	61,5	125,0	M12	129	137	145	147
4	60	170,1	95	95,05	73,0	61,5	135,0	M12	132	144	152	152
5	80	212,1	122	122,06	92,0	69,8	170,0	M16	231	236	241	243
6	90	224,8	132	132,06	92,0	69,8	180,0	M16	234	239	244	246

# DIRECTFIT™ DUAL SEAL – Dimensional Data/Inches



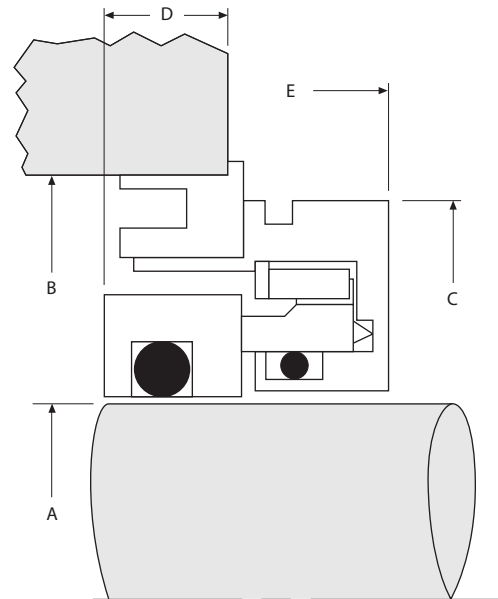
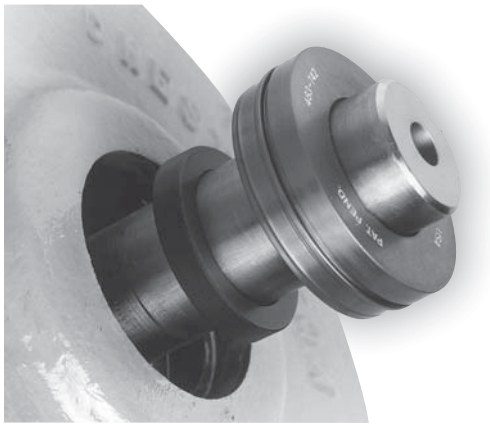
**DIRECTFIT KEY**

- |                                |                          |                         |                                |
|--------------------------------|--------------------------|-------------------------|--------------------------------|
| A – Shaft Size                 | E – Inboard Seal Length  | H – Stud Diameter       | V – Outboard Seal Face O-rings |
| B – Tab Diameter               | F – Outboard Seal Length | W – Impeller Hub O-ring | Z – Gland O-rings              |
| C – Seal Chamber Bore Diameter | G – Bolt Circle          | X – Shaft O-ring        | Y – Wetted O-rings             |

**DFD APT**

FRAME	A	B	C MIN	C MAX	E	F	G	H APT	W PTFE	X	Y / V	Z
1	1.181	5.38	2.375	2.377	2.36	2.39	3.74	3/8-16	119	027	031	133
2	1.575	5.84	2.750	2.752	2.36	2.42	4.13	3/8-16	123	131	138	140
3	1.969	6.47	3.375	3.377	2.87	2.42	4.92	1/2-13	129	137	145	147
4	2.362	6.70	3.750	3.752	2.87	2.42	5.32	1/2-13	132	144	152	152
5	3.150	8.35	4.750	4.753	3.62	2.75	6.69	5/8-11	231	236	241	243
6	3.543	8.85	5.197	5.200	3.62	2.75	7.09	5/8-11	234	239	244	246

# GENERAL BEARING SEAL – Dimensional Data/Metric



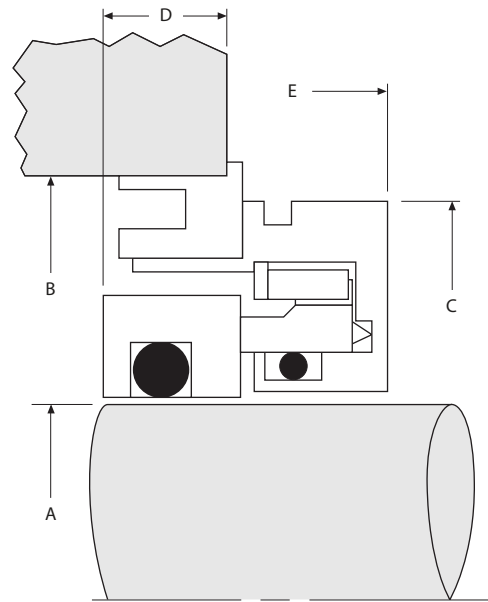
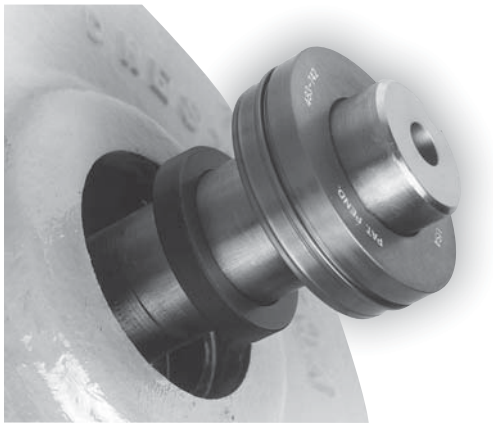
**GBS STANDARD KEY**

A – Shaft Diameter      B – Bore Diameter      C – Seal Housing Diameter      D – Bore Depth      E – Outboard Length

A	WITHOUT REDUCER	B WITH REDUCER				C	D	E*
		B1	B2	B3	B4			
25	47	52	55	56	62	49,5	6,4	8,6
30	47	52	55	56	62	52,2	6,4	8,6
35	52	56	62	-	-	57,2	6,4	8,6
38	55	60	62	-	-	60,3	6,4	8,6
40	60	-	-	-	-	63,5	8,0	8,6
42	62	72	-	-	-	66,7	8,0	8,6
45	65	72	-	-	-	69,9	8,0	8,6
50	68	72	80	-	-	73,0	8,0	8,6
55	78	85	-	-	-	80,5	8,0	8,6
60	80	85	90	-	-	82,6	8,0	8,6
65	82	88	90	95	-	87,2	11,0	10,1
70	90	100	-	-	-	93,6	11,0	10,1
75	100	105	115	-	-	102,2	11,0	10,1
80	100	105	115	-	-	103,7	11,0	10,1
85	105	110	-	-	-	109,5	11,0	10,1
100	120	125	130	135	-	123,7	11,0	10,1

\* Add 1,3 mm max when a reducer is used

# GENERAL BEARING SEAL – Dimensional Data/Inches



**GBS STANDARD KEY**

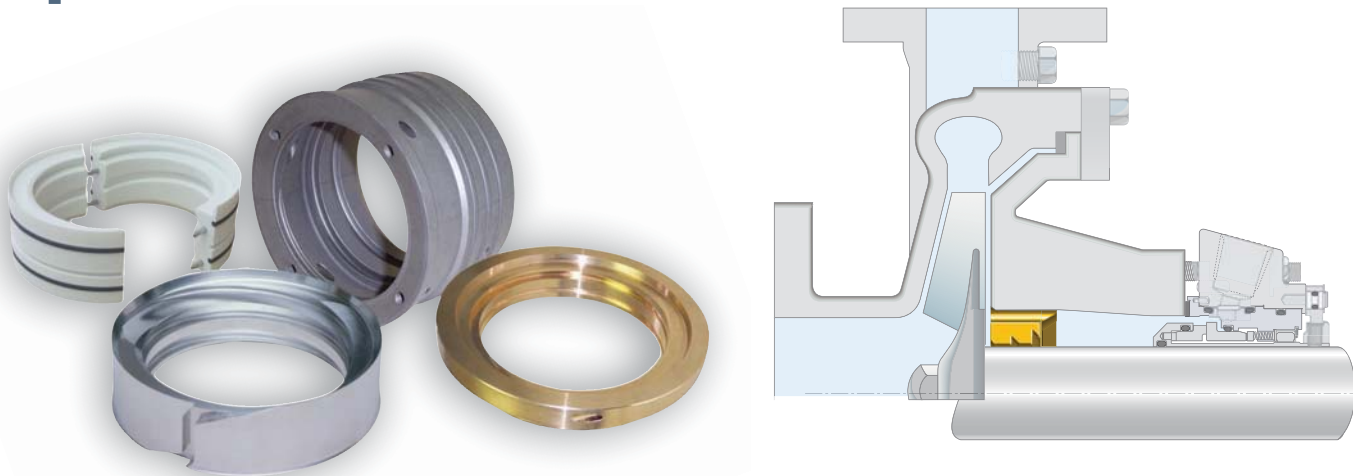
A – Shaft Diameter      B – Bore Diameter      C – Seal Housing Diameter      D – Bore Depth      E – Outboard Length

A	B					C	D	E*
	WITHOUT REDUCER	B1	WITH REDUCER B2	B3	B4			
0.875	1.500	1.625	1.750	1.875	2.000	1.750	.250	.335
1.000	1.625	1.750	1.875	2.000	2.125	1.875	.250	.335
1.125	1.750	1.875	2.000	2.125	2.250	2.000	.250	.335
1.250	1.875	2.000	2.125	2.250	2.375	2.125	.250	.335
1.375	2.000	2.125	2.250	2.375	2.500	2.250	.250	.335
1.500	2.125	2.250	2.375	2.500	2.825	2.375	.250	.335
1.625	2.250	2.375	2.500	2.625	2.750	2.500	.312	.335
1.750	2.375	2.500	2.625	2.750	2.875	2.625	.312	.335
1.875	2.500	2.625	2.750	2.875	3.000	2.750	.312	.335
2.000	2.625	2.750	2.875	3.000	3.125	2.875	.312	.335
2.125	2.750	2.875	3.000	3.125	3.250	3.000	.312	.335
2.250	2.875	3.000	3.125	3.250	3.375	3.125	.312	.335
2.375	3.000	3.125	3.250	3.375	3.500	3.250	.312	.335
2.500	3.125	3.250	3.375	3.500	3.625	3.375	.312	.335
2.625	3.375	3.500	3.625	3.750	3.875	3.560	.430	.397
2.750	3.500	3.625	3.750	3.875	4.000	3.685	.430	.397
2.875	3.625	3.750	3.875	4.000	4.125	3.810	.430	.397
3.000	3.750	3.875	4.000	4.125	4.250	3.935	.430	.397
3.250	4.000	4.125	4.250	4.375	4.500	4.185	.430	.397
3.375	4.125	4.250	3.375	4.500	4.625	4.310	.430	.397
3.750	4.500	4.625	4.750	4.875	5.000	4.685	.430	.397
4.500	5.250	5.375	5.500	5.625	5.750	5.435	.430	.397

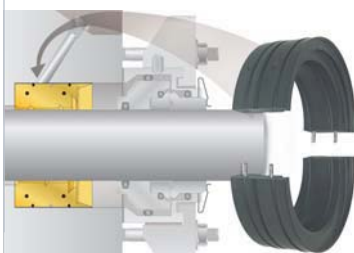
\* Add 0.05" max when a reducer is used



# SpiralTrac™ STANDARD



## Version F Type S



- Requires minimal flush
- Split for easy installation
- Ideal for use with split mechanical seals
- No modifications required to pump or seal cavity

## Version N / D Type A



- Requires minimal or no flush
- Replaces removable throat bushings
- Some machining modifications may be required to pump or seal cavity depending on application

## Version N Type E



- Requires minimal or no flush
- Enables venting of air from the seal cavity
- Designed to replace keyed throat bushings in split case pumps
- No modifications required to pump or seal cavity

## Version N Type B



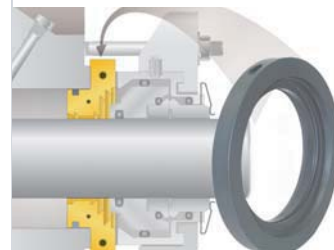
- Requires minimal flush
- Enables venting of air from the seal cavity
- Installs from the seal side of the seal cavity
- Greatly reduced flush in non-fibrous applications

## Version N / D / C Type I

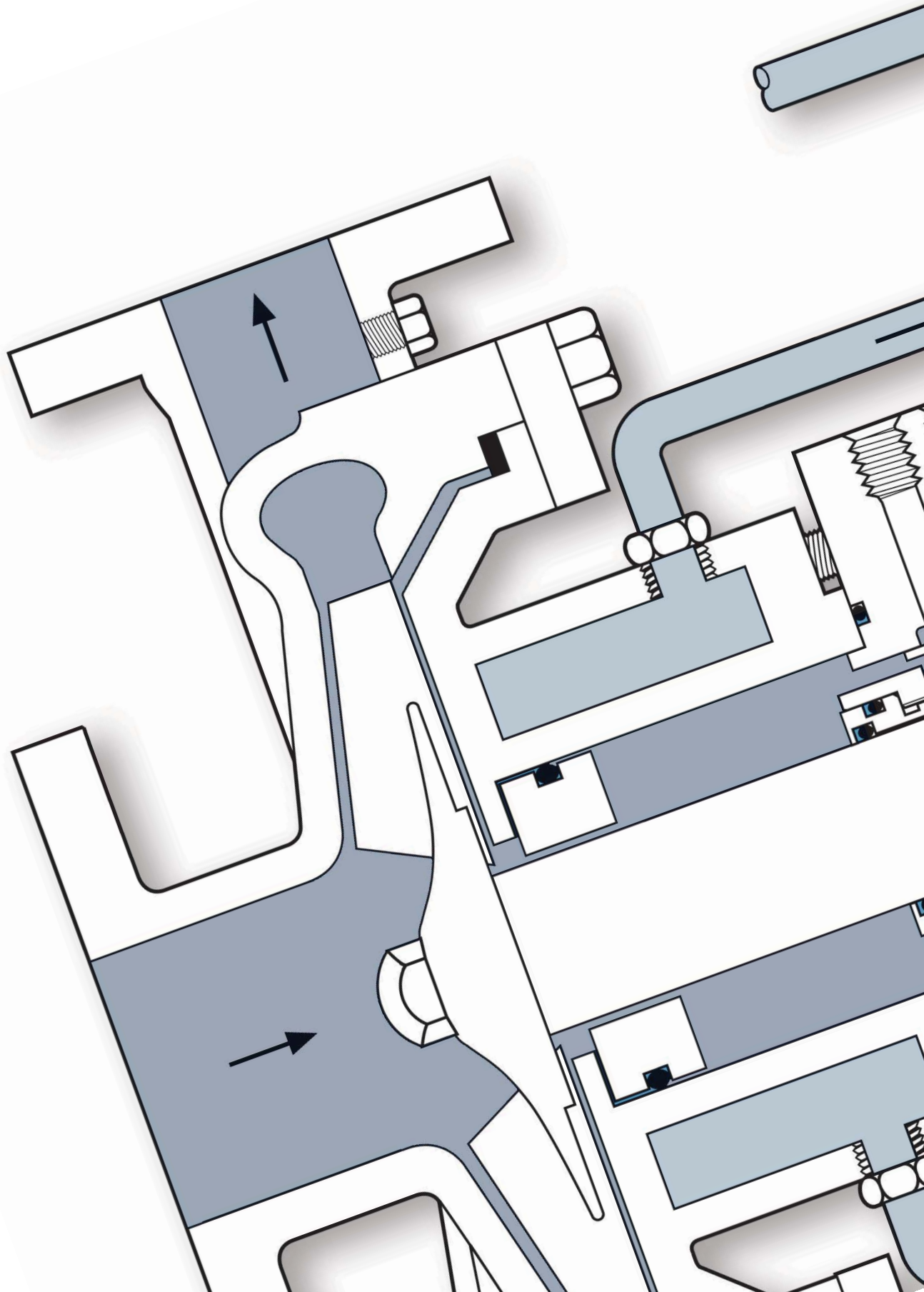


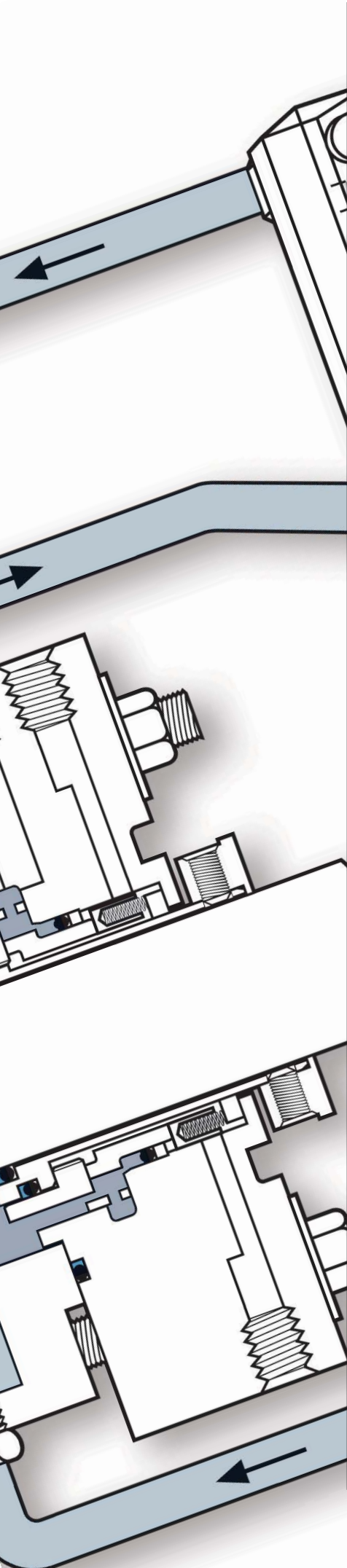
- Requires minimal or no flush
- Installs from the impeller side of the seal cavity
- Enables venting of air from the seal cavity
- Some machining modifications required to pump or seal cavity

## Adapter



- Requires minimal flush
- Split for easy installation
- Ideal for use with split mechanical seals
- No modifications required to pump or seal cavity
- Installs between the seal cavity and the mechanical seal





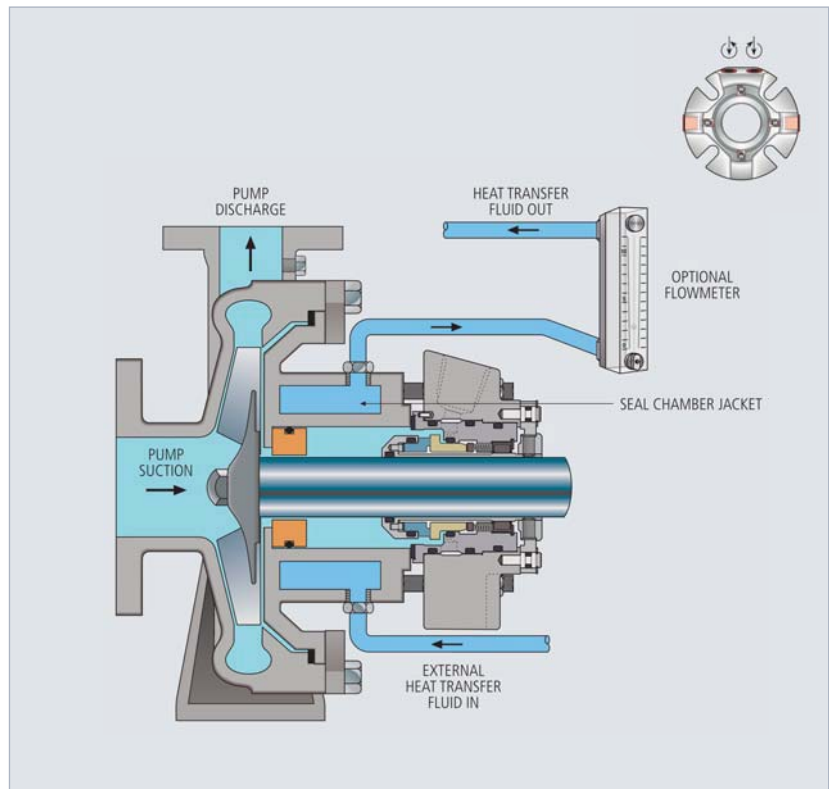
SECTION III

# ENVIRONMENTAL CONTROL PLANS

## PLAN 2

### Cooling Jacket

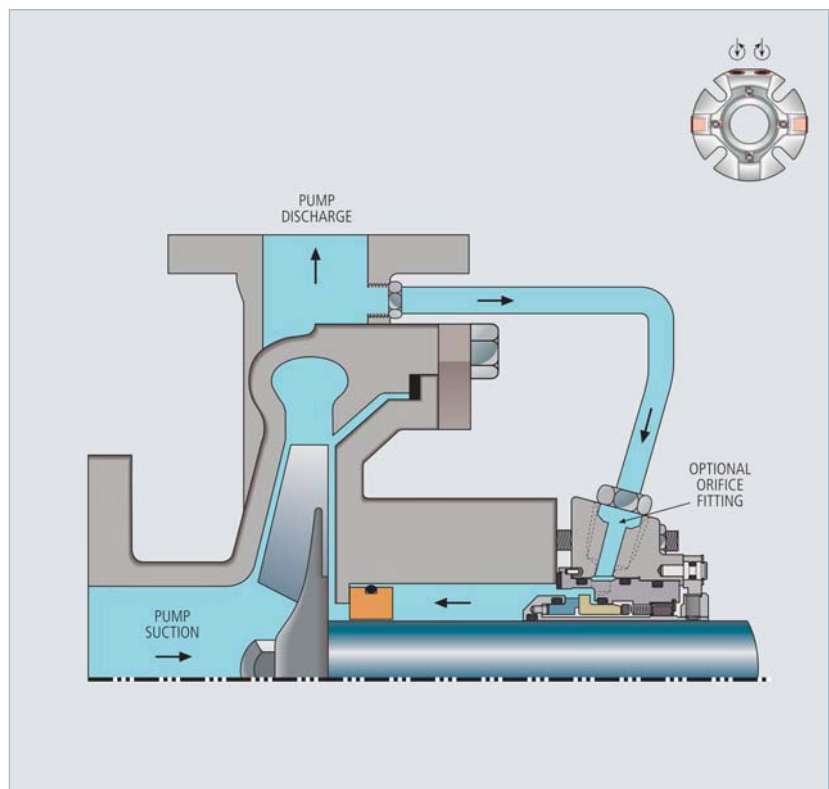
- Use with single seal or dual seal to control seal chamber temperature
- Maintains or elevates box temperature to prevent product solidification with polymers, resins, tars
- Lowers seal chamber temperature in hot environments
- Common heat transfer fluids:
  - Water
  - Thermal oils
  - Steam
- Close tolerance throat bushing is required for optimum efficiency



## PLAN 11

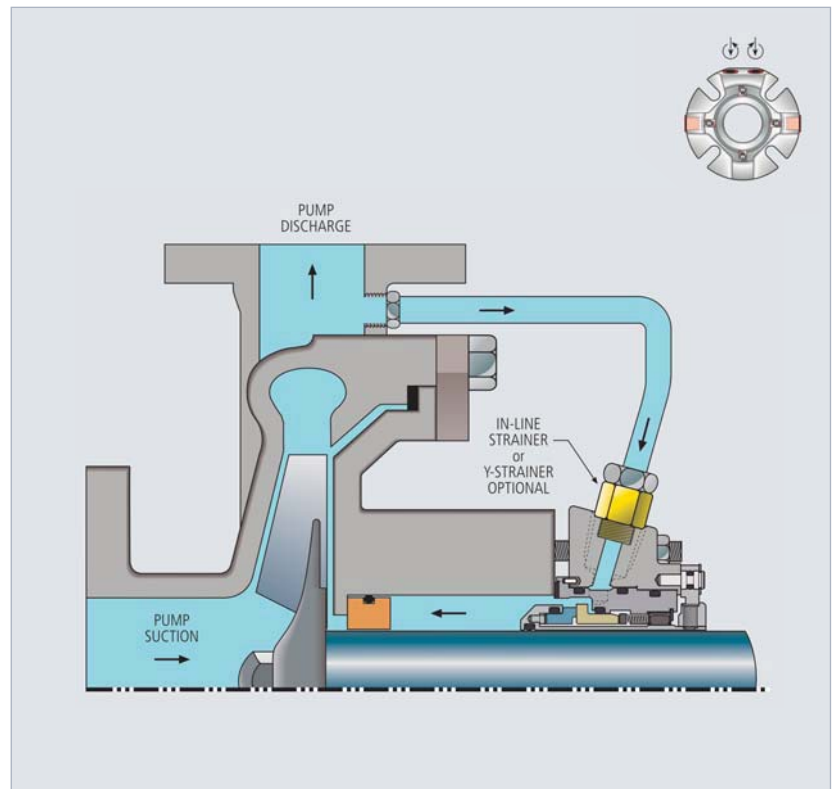
### Discharge Recirculation

- Use with single seal or dual seal
- Increases circulation
- Increases pressure in seal chamber
- Clean fluids only
  - Solids can erode seal
- An orifice can be used to reduce flow and pressure
- Close tolerance throat bushing is required for optimum efficiency, but is optional in slurry applications

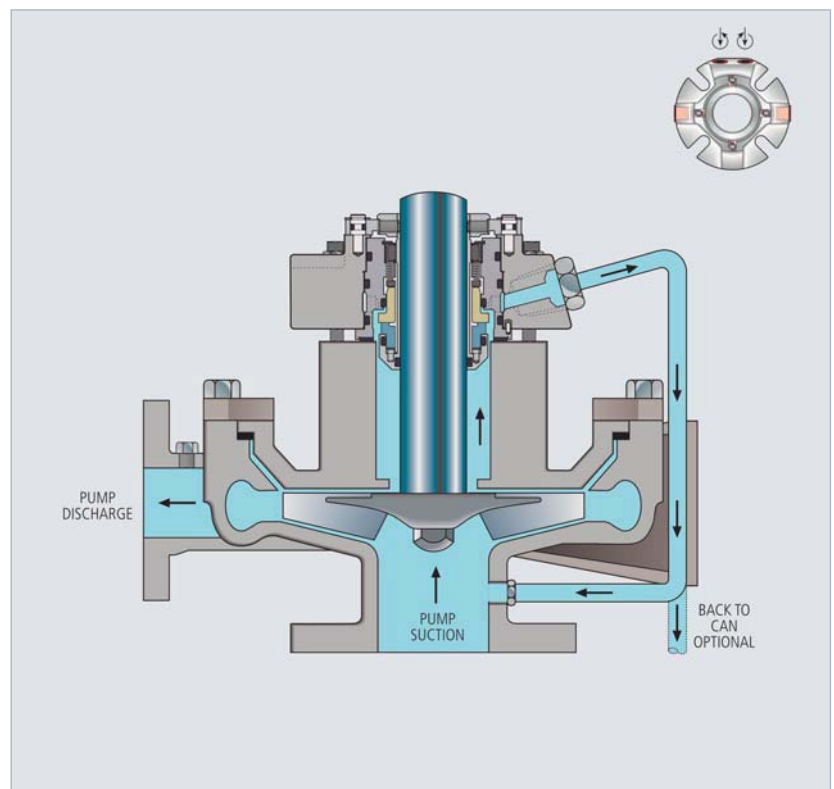


**PLAN 12****Discharge Recirculation with Strainer**

- Use with single seal
- Cools seal
- Increases pressure in seal chamber
  - Throat bushing optional
- Clean fluids only
  - Solids can erode seal
  - Solids can clog seal when bushing is used
- An orifice can be used to reduce flow and pressure

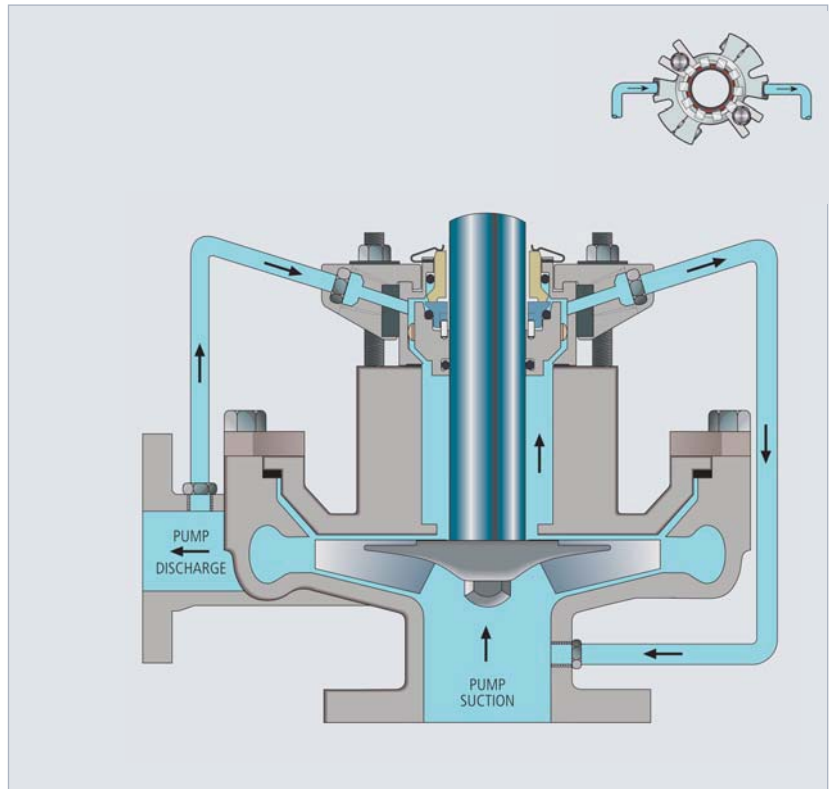
**PLAN 13****Suction Recirculation**

- Vents air and prevents dry run
- Prevents clogging
- Lowers pressure in seal chamber
- Cools seal
- Reduces seal-generated heat
- Use caution with low vapor pressure liquids

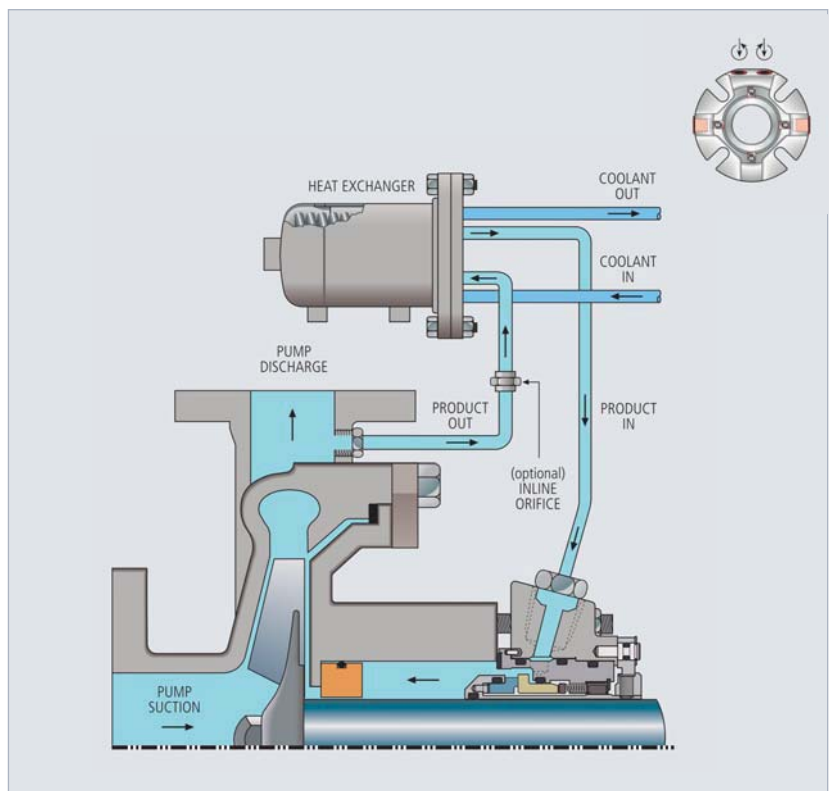


**PLAN 14****Suction and Discharge Recirculation (Vertical)**

- Vents air and prevents dry run
- Use with single seal or dual seal
- Prevents clogging
- Cools seal
- Promotes flow
- Reduces seal-generated heat
- Use caution with low vapor pressure liquids

**PLAN 21****Cooled Discharge Recirculation**

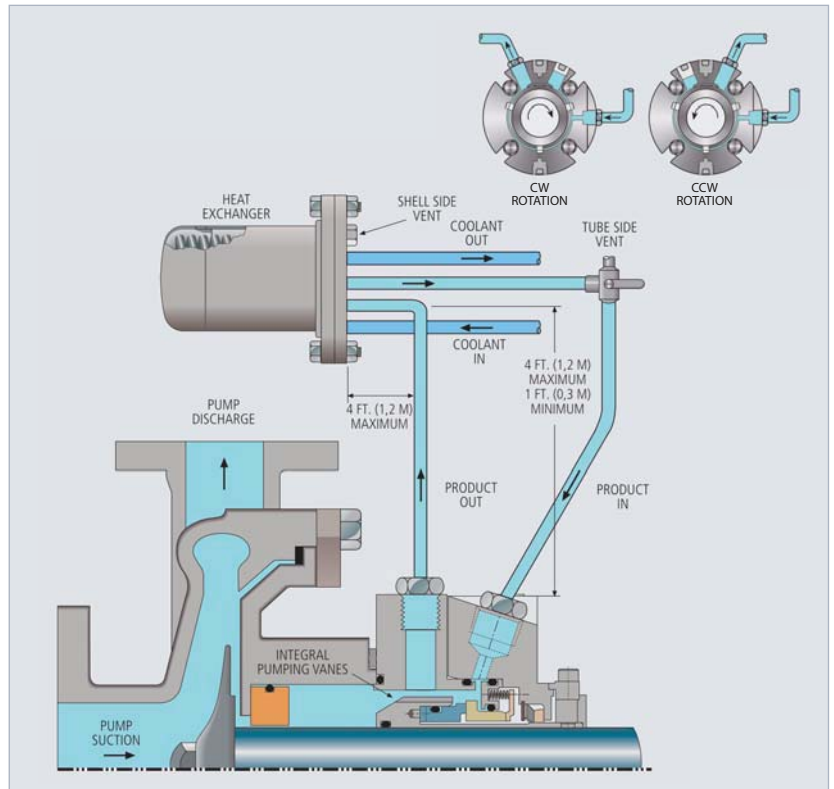
- Use with a single seal
- Cools hot, volatile fluids
- Cools seal
- Increases seal chamber pressure
- An orifice can be used to control flow and reduce pressure
- Use with close tolerance throat/restriction bushing



**PLAN 23**

**Cooled Seal Recirculation**

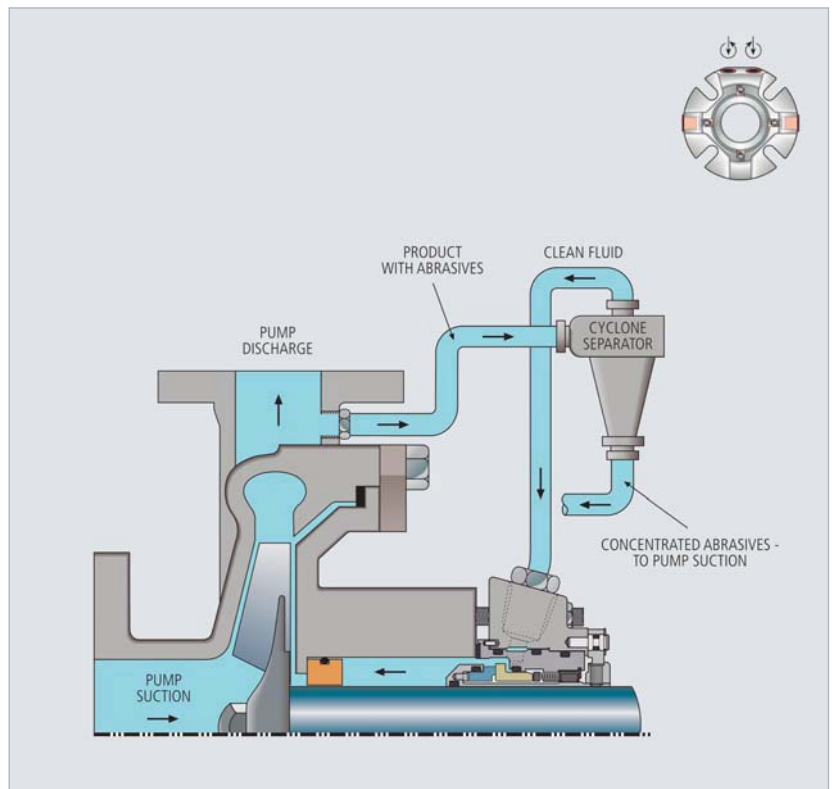
- Use with a single seal and pump mechanism
- Minimizes heat exchanger size and coolant water usage
- Cools seal while pumping hot and/or volatile fluids
- Use with close tolerance throat/restriction bushing
- Venting is important



**PLAN 31**

**Discharge Recirculation with Cyclone Separator**

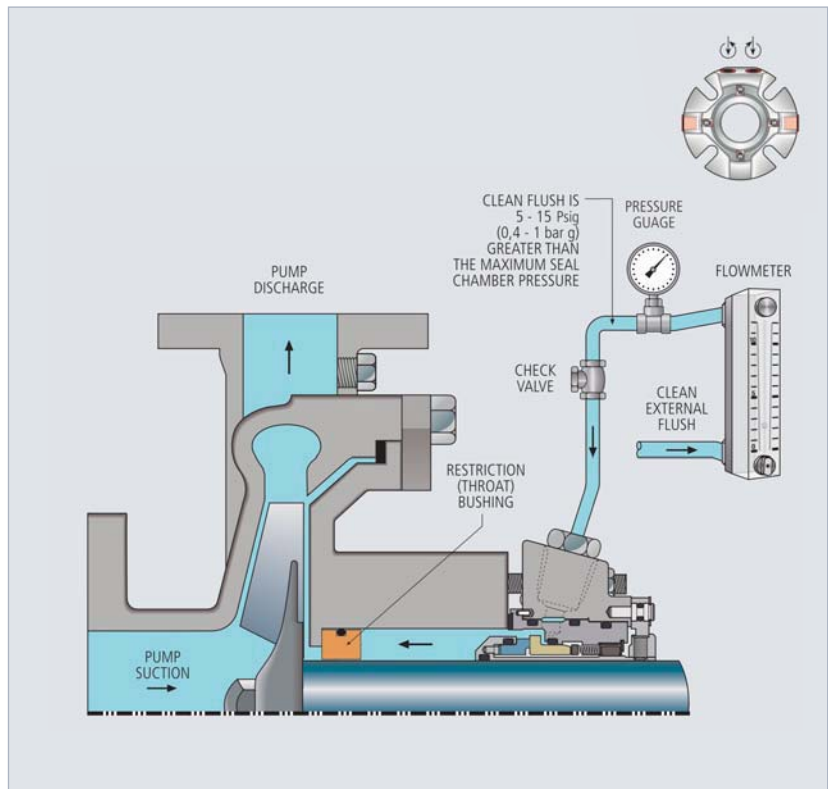
- Use with a single seal where fluid contains some abrasives
- Cools seal
- Increases seal chamber pressure
- Density of solids must be significantly greater than fluid
- Use caution with high viscosity fluids
- Requires pressure differential
- Will not remove micron-size particles



## PLAN 32

### Clean Flush

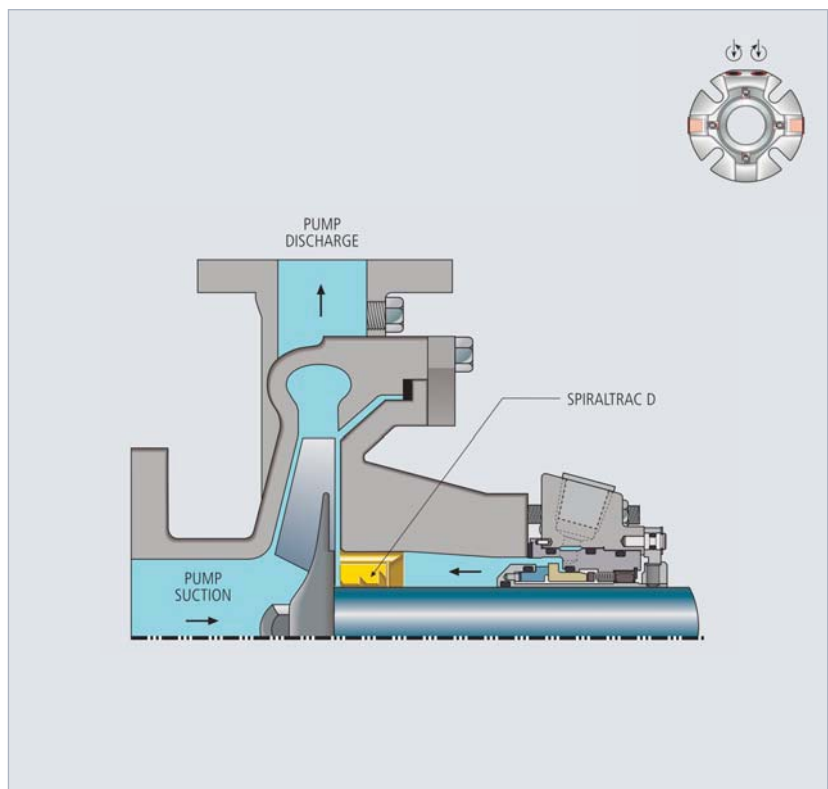
- Use with a single seal
- Provides clean fluid to seal
- Prevents clogging
- Acceptable flush fluids
  - Clean, compatible fluid
  - Water, if compatible
  - Clean product
  - Downstream additive
  - Carrier solvent



## PLAN 33H

### SpiralTrac™ Version D Type I

- Use with a single seal
- Removes solids
- Seal runs in clean fluid
- Prevents clogging
- Removes vapor from seal chamber
- Prevents dry running
- No flush required



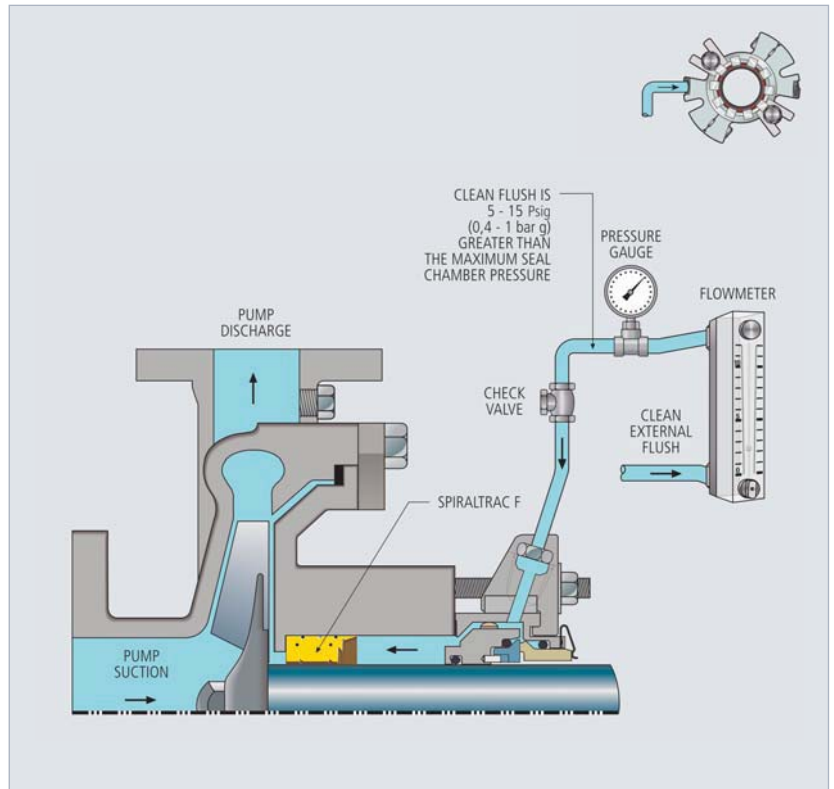
SpiralTrac is a trademark of EnviroSeal Engineering Products Limited.



**PLAN 33S**

**SpiralTrac™ Version F Type S**

- Use with a single seal
- Removes solids
- Seal runs in clean fluid
- Prevents clogging
- Prevents dry running

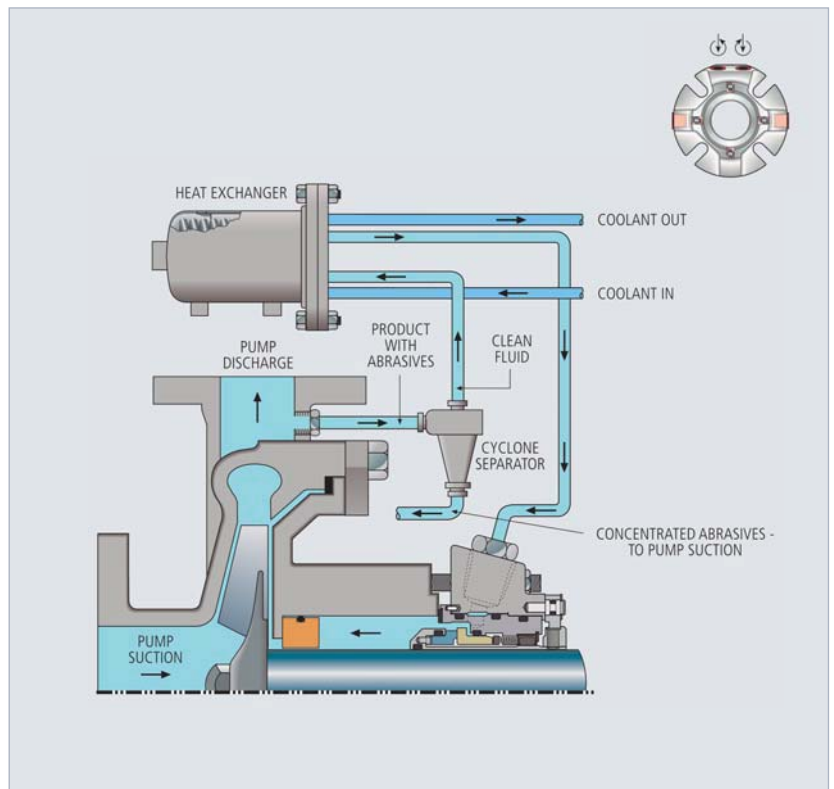


SpiralTrac is a trademark of EnviroSeal Engineering Products Limited.

**PLAN 41**

**Cooled Discharge Recirculation with Cyclone Separator**

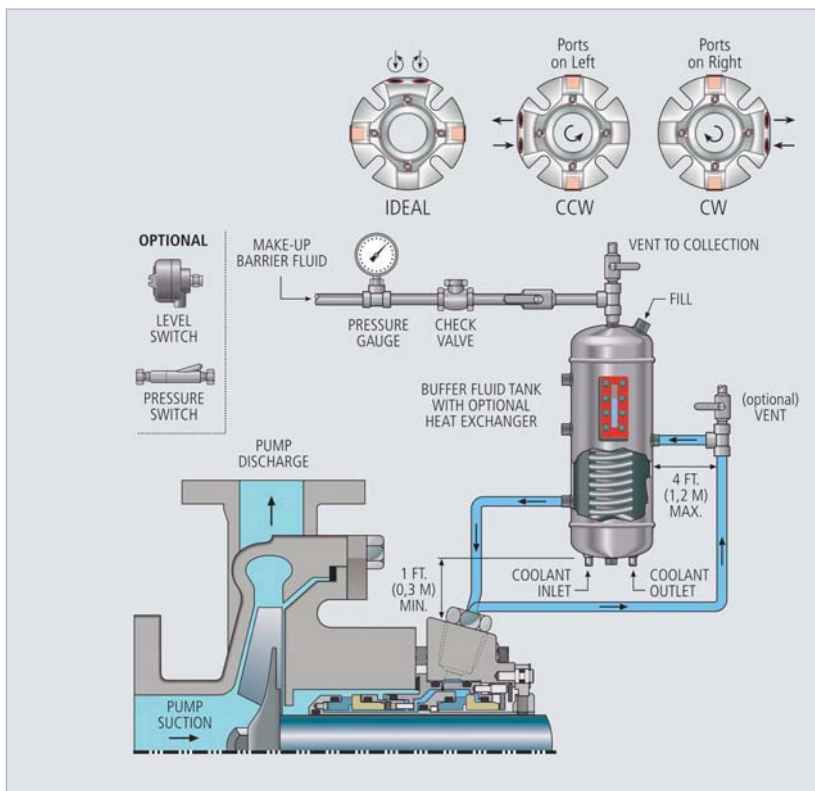
- Use with a single seal where fluid contains some abrasives
- Cools seal
- Increases seal chamber pressure
- Supplies cleaner fluid
- Reduces clogging potential
- Density of solids must be significantly greater than fluid
- Use caution with high viscosity fluids
- Requires pressure differential
- Will not remove micron-size particles



### PLAN 52

#### Circulation with External Buffer Fluid Tank

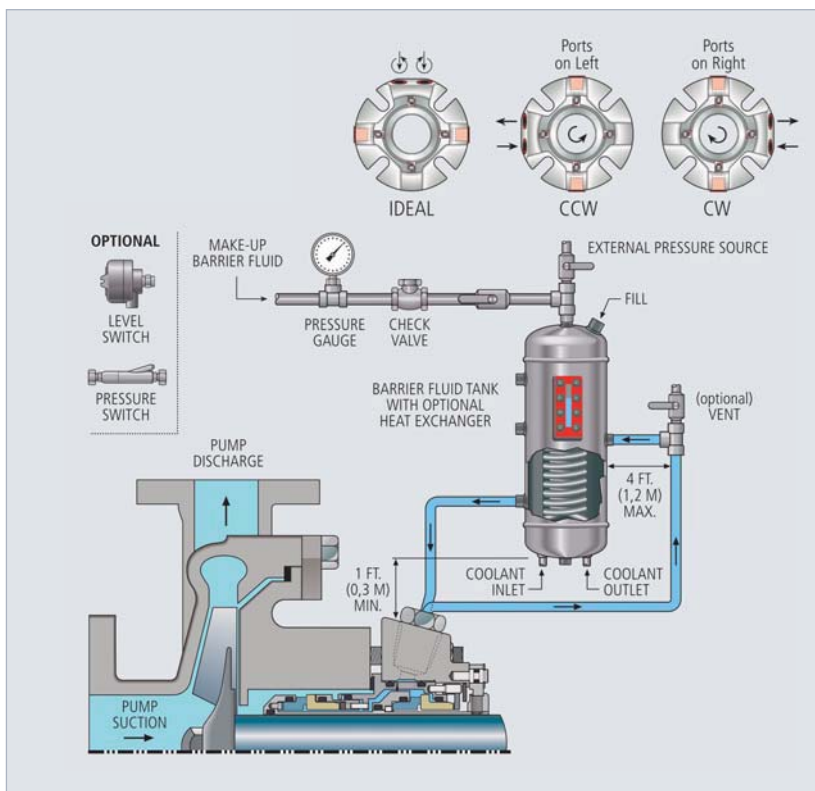
- Use with a dual seal
- Low pressure buffer fluid, 0,7 bar g (10 psig) minimum
- Buffer fluid should be clean, compatible and lubricating
- Buffer fluid pressure lower than seal chamber pressure
- Seal venting is important
- Use long sweeps in tubing bends



### PLAN 53A

#### Circulation with Pressurized External Barrier Fluid Tank

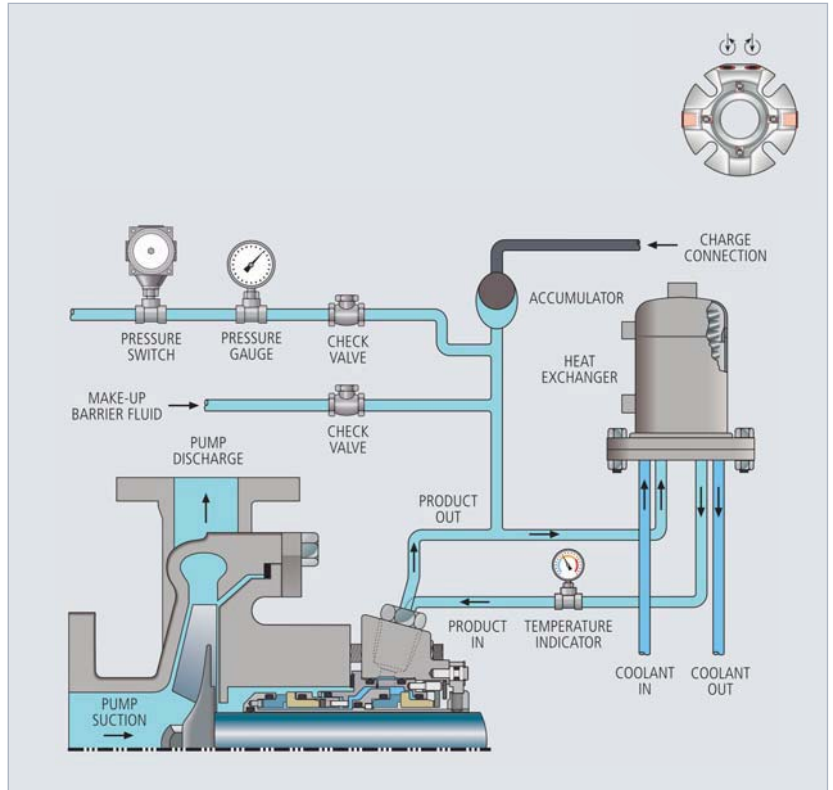
- Use with a dual seal
- Pressurize barrier fluid 1 - 2 bar g (15 - 30 psig) over maximum seal chamber pressure
- Barrier fluid should be clean, compatible and lubricating
- Provides clean fluid to the inboard seal faces
- Use long sweeps in tubing bends



**PLAN 53B**

**Closed Loop with Heat Exchanger and Accumulator**

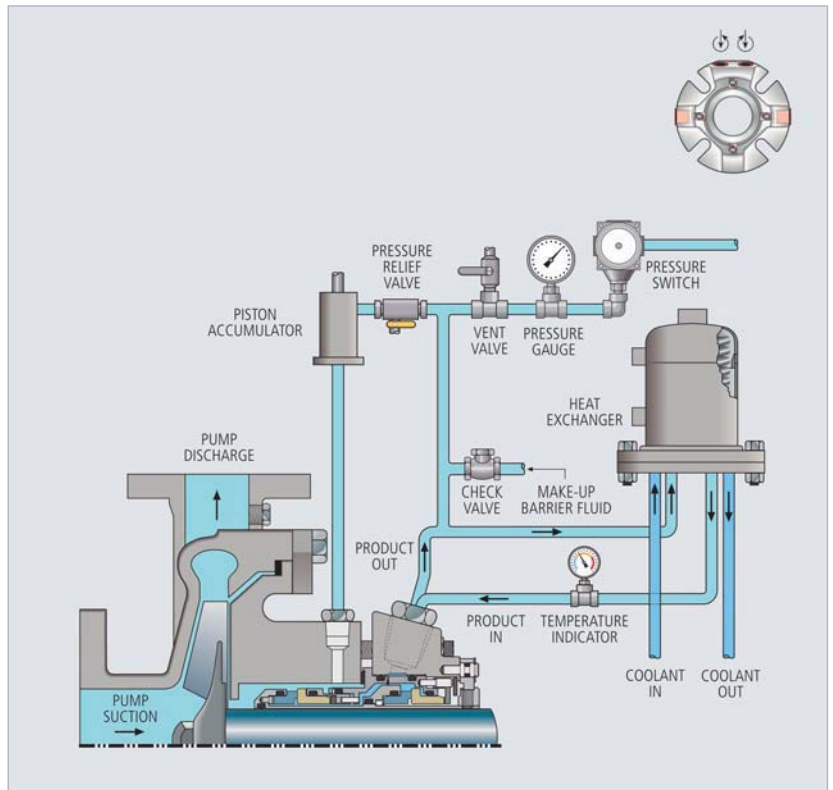
- Use with dual seals
- Optional thermocouple
- No foaming
- Heat is removed by an air-cooled or water-cooled heat exchanger
- Accumulator sizing crucial
- Maintains constant pressure on the circulation system



**PLAN 53C**

**Heat Exchanger and Piston Accumulator**

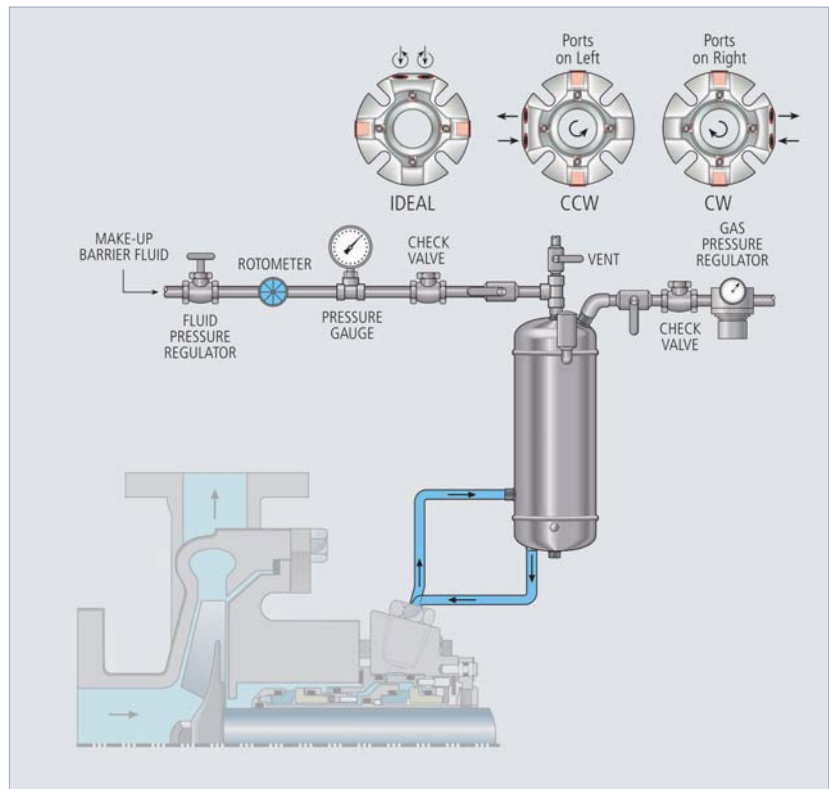
- Optional thermocouple
- No foaming
- Heat is removed by an air-cooled or water-cooled heat exchanger
- Tracks product pressure in seal chamber
- Maintains constant pressure on the circulation system



## PLAN 53P

### Circulation with Pressurized External Barrier Fluid Tank

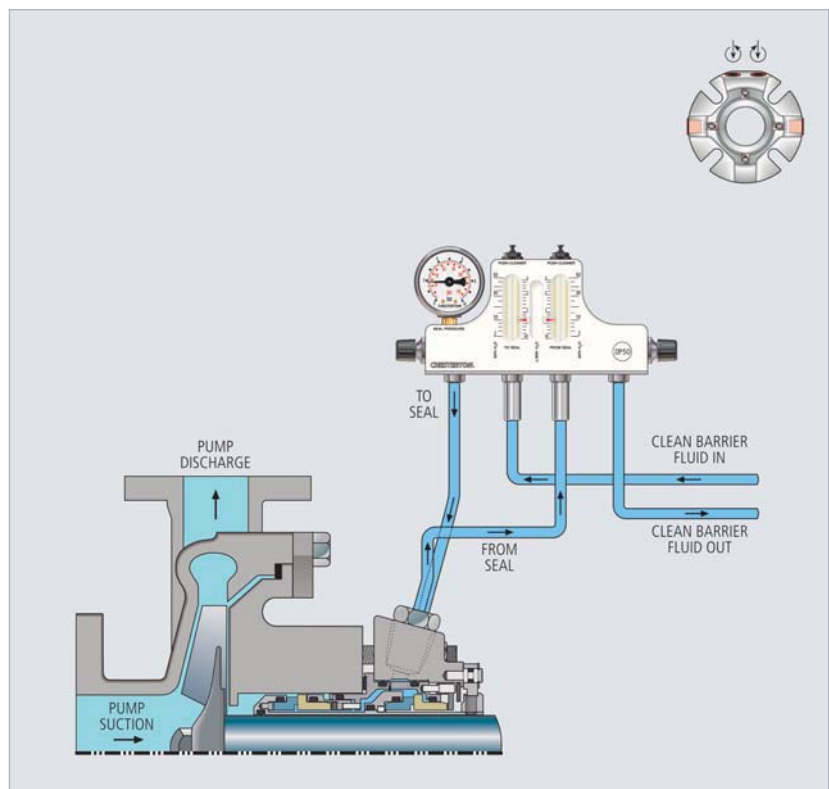
- Maintains constant pressure and liquid supply to the dual seal
- External water pressure is set at 2 bar g (30 psig) over maximum seal chamber pressure
- Initial tank level is set through the external water pressure line
- Pressurize tank to 1,7 bar g (25 psig) over maximum seal chamber pressure with a regulated gas pad, then isolate gas pressure
- Tank is then charged with regulated external water pressure
- System operates with a constant external water pressure



## PLAN 54DM

### Circulation with Pressurized External Barrier Fluid Source and Flow Guardian™ DP50

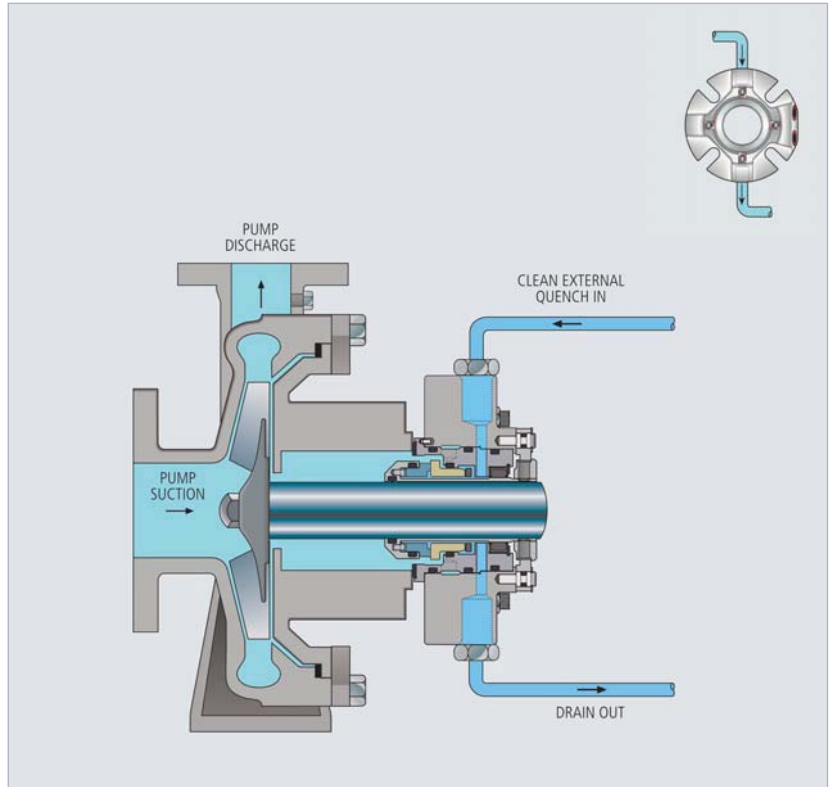
- Use with a dual seal
- Pressurize barrier fluid 15 - 30 psig (1 - 2 bar g) over maximum seal chamber pressure
- DP50 provides inboard seal leak detection, pressure regulation and flow control
- Barrier fluid should be clean, compatible and lubricating
- Provides clean fluid to inboard seal faces



**PLAN 62**

**Quench**

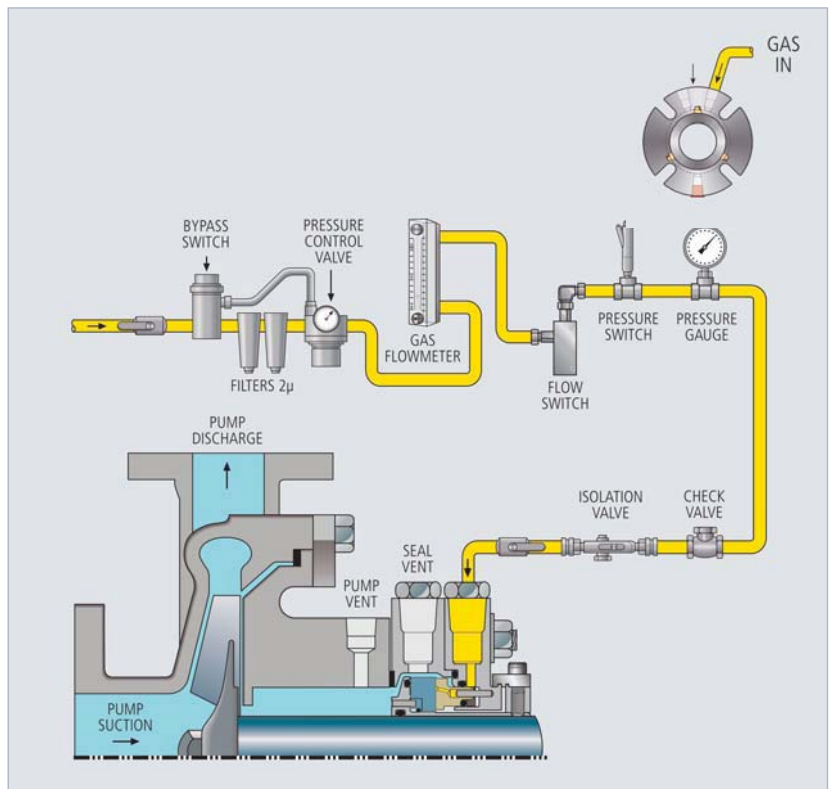
- Use with a single seal
- Prevents coking, crystallization
- Use low pressure only
- Cleans atmospheric side of seal faces
- Common quench fluids:
  - steam
  - water
  - nitrogen



**PLAN 74**

**Externally Supplied Barrier Gas**

- Use with a non-volatile gas
- Provide gas at 1,7 bar g (25 psig) above seal chamber pressure
- Venting of the seal chamber may be required prior to start-up
- Use nitrogen, carbon dioxide or compressed air
- Zero emissions and leakage to atmosphere





SECTION IV

# SEAL RECOMMENDATIONS BY FLUID



## CONCENTRATION AND TEMPERATURE RANGES

**Concentration:** Listed as a percentage of the pure component. The diluent for all non 100% entries is water unless otherwise noted. <SP indicates the seal recommendation is valid for any concentration less than the solubility point of the substance in water.

**Temperature:** Temperature or range listed in degrees Celsius (°C) and Fahrenheit (°F) for which the seal recommendation is applicable at the specified concentration.

## CAS

CAS numbers are internationally recognized and are a resource for scientists, industry, and regulatory bodies. The numbers are unique identifiers for chemical substances. A CAS Registry Number has no inherent chemical significance but provides an unambiguous way to identify a chemical substance or molecular structure when there are many possible generic, trade, or trivial names.

## NOTES ON FLUIDS LISTED

Typically, the common name of each substance is listed in alphabetical order. If the entry is followed by parenthetical text, the added text gives additional description to the substance. For example, an entry followed by (TM) indicates the name is a trademark. In some cases, where the substance's acronym may be as common as the actual name, we have listed the acronym in parenthesis. An example would be Polyvinyl Alcohol (PVA). Other primary statements include:

**Aerated** - Indicates the recommendation is for the fluid stream containing entrained air. The entrained air changes the seal material selection for the fluid in its uncontaminated state.

**Wet** - Indicates the recommendation is for the fluid stream containing a small percentage of water. The water contamination changes the seal material selection for the fluid in its uncontaminated state.

**Gas** - Indicates the stated recommendation is for the material in the gaseous phase. Recommendations without this designation are for the liquid phase.

**Phase** - Used as a general indicator of what phase the substance, undiluted or neat, is at ambient temperature and atmospheric pressure.

**L** - Solid or crystalline state: material must be dissolved or suspended in solution or heated to a liquid to be sealed.

**G** - Gas: seal recommendations for gases assume the gas is liquefied or in the liquid state unless specified. Carbon Dioxide (gas) would indicate this seal recommendation is for Carbon Dioxide in its gaseous state, not liquefied.

**L** - Liquid

**V** - Viscous liquid

## PIPING PLANS

The recommended piping plan or choice of plans to be utilized to enhance seal life and performance based on the API Auxiliary Piping Systems for mechanical seals. There is no piping plan designated for applications which typically do not require one. Where more than one plan is listed:

**Plan 1, Plan 2** (separated by a comma) Use the most appropriate plan for your application.

**Plan 1/Plan 2** (separated by a slash) Use both plans in conjunction for the application.

## HAZARD INFORMATION

With the exception of carcinogenicity, hazard classifications listed are determined according to the internationally recognized European Council Directive 96/54/EC, dealing with the classification, packaging, and labeling of dangerous substances.

Carcinogenicity classifications listed are reported using the evaluations of the International Agency for Research on Cancer (IARC), Groups 1, 2A, or 2B.

The definitions listed below illustrate the relative hazard of each group but is not the full definition as stated in each of the compilations. If the full definition is required please review the aforementioned documents.

**Code - C:** Corrosive - Substance causes burns to skin tissue when in contact with either the vapor, fluid, or solid phase of the substance.

**Code - Ca:** Carcinogen - Substance is a suspect human carcinogen.

**Code - E:** Explosive - There is a risk of an explosion when substance is subjected to shock, friction, fire, or other sources of ignition.

**Code - F+:** Extremely Flammable - Liquid substance having a flash point lower than 0°C and a boiling point lower than or equal to 35°C or gaseous substances which are flammable in contact with air at ambient temperature and pressure.

**Code - F:** Highly Flammable - Liquid substance typically having a flash point lower than 21°C.

**Code - R10:** Flammable - Liquid substance typically having a flash point equal to or greater than 21°C, and less than or equal to 55°C.

**Code - O:** Oxidizing - Substances which may, themselves, cause fire or enhance the risk of fire when in contact with combustibles.

**Code - N:** Environment - Substance which is hazardous to ecosystems.

**Code - T+:** Very Toxic - Substance which is very toxic by ingestion (LD50 oral, rat 25 mg/kg), skin contact, or by inhalation.

**Code - T:** Toxic - Substance which is toxic by ingestion (LD50 oral, rat 200 mg/kg), skin contact, or by inhalation.

**Code - Xi:** Irritant - Substance causes significant inflammation of the skin or eyes and persists for at least 24 hours.

**Code - Xn:** Harmful - Substance which is harmful by ingestion (LD50 oral, rat 2000 mg/kg), skin contact, or by inhalation.

**Code - \*:** Substance currently does not have a CAS Number listed; therefore, substance has not been classified accordingly.

**No Code:** Substance is not classified under the parameters specified in the regulations. It does not necessarily mean that there are no hazards associated with the substance.

## MATERIALS OF CONSTRUCTION - PERFORMANCE CAPABILITIES

Materials of construction are grouped by metallurgy, faces, and secondary seals. Performance capabilities of the seal materials are rated A = Acceptable and B = Alternate Choice. These ratings are based on existing published data (references), laboratory tests, and informed decisions on the part of Chesterton Engineering.

Typically, an A rating in the same group of materials will have similar performance characteristics. Materials rated B may experience changes in properties which may reduce seal life and should be considered as an alternate choice. A more definitive explanation is as follows:

### Metals:

**A** - Preferred material of construction, .002 inches per year corrosion (0.05 mm/yr.). On some rare occasions an (A) rating may exceed .002 inches per year. This material is a preferred material due to its ability to retain mechanical properties over other materials, cost constraints, material availability, and machinability.

**B** - Alternate material of construction, .020 inches per year corrosion (0.50 mm/yr.). The effect to mechanical properties may be significant enough for failure.

### Elastomers:

**A** - Volumetric swell is negligible after exposure. Under process pressure and elevated temperatures some loss of physical properties may occur.

**B** - Volumetric swell is in excess 10% after exposure. Physical property loss and material degradation may be significant enough for failure.

### Face Materials:

**A** - Material is not affected, chemically, by the pumped fluid.

**B** - The effect to physical properties may be significant enough for failure due to chemical attack of fillers, binders, and additive materials used in the manufacturing processes.

### Materials Key

**SS** — 316 Stainless Steel

**A20** — Alloy-20

**HB** — Hastelloy® B

**HC** — Hastelloy® C

**MONEL** — Monel®

**Ti** — Titanium

**CB** — Carbon

**CR** — Ceramic

**TC** — Tungsten Carbide

**SSC** — Sintered Silicon Carbide

**RSC** — Reaction Bonded Silicon Carbide

**DC** — Duplex Carbide™

**FKM** — Fluorocarbon

**EP** — Ethylene Propylene

**BUNA-N** — BUNA-N

**LD-FKM** — Acid Resistant Fluorocarbon

**NEOPRENE** — Neoprene

**TJ/FKM** — PTFE Jacketed/Fluorocarbon

**FF250** — ChemLast™ (Perfluorocarbon)

**FF550** — ChemLast™ (Perfluorocarbon)





Mechanical Seal Recommendations by Fluid												Materials of Construction Performance Capabilities										Fluid Properties																								
Fluid Information												Recommended Mechanical Seal										Secondary					Materials					Faces					Elastomers					Fluid Properties				
FLUID	PERCENT CONCENTRATION	TEMPERATURE		CAS	SEAL	MATERIAL	PIPING PLANS	SEAL	MATERIAL	PIPING PLANS	SEAL	Secondary					Materials					Faces					Elastomers					SPECIFIC GRAVITY (25°C)	VAPOR PRESSURE (25°C)	BOILING POINT (°C)	MELTING POINT (°C)	VISCOSITY (cP) (25°C) (1ATM)	HAZARD INFORMATION	NOTES								
		°C	°F									SS	HC	HB	A20	MONEL	TI	CB	FR	TC	RSC	DC	FKM	EP	BUNA-N	NEOPRENE	TI/FKM	FF50	FF50	PHASE																
Aluminum Potassium Sulfate	>5	>122	>122	10043-67-1	520	CB/SSC-CB/SSC-A20-FKM	53, 54	280	CB/SSC-CB/SSC-A20-FKM	53, 54	280	CB/SSC-CB/SSC-A20-FKM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C	1, 2							
Aluminum Potassium Sulfate	<5	<50	<122	10043-67-1	180	SSC/SSC-A20-EPDM	62	280	CB/SSC-CB/SSC-A20-EPDM	62	280	CB/SSC-CB/SSC-A20-EPDM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1						
Aluminum Sodium Sulfate	>5	<20	<68	10102-71-3	180	SSC/SSC-5-FKM	53, 54	280	SSC/SSC-5-FKM	53, 54	280	SSC/SSC-5-FKM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1, 2						
Aluminum Sulfate	<95	<60	<140	10043-01-3	520	CB/SSC-CB/SSC-5-FKM	53, 54	280	CB/SSC-CB/SSC-5-FKM	53, 54	280	CB/SSC-CB/SSC-5-FKM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1							
Aluminum Sulfate	<15	<60	<140	10043-01-3	180	CB/SSC-5-FKM	62	280	CB/SSC-5-FKM	53, 54	280	CB/SSC-5-FKM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1							
Amines, Mixed	100	<50	<122		180	CB/TC-5-Chemlast550	11, 13	891	CB/TC-5-Chemlast550	11, 13	891	CB/TC-5-Chemlast550	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	*							
Amino Benzene; See Aniline																																														
Amino Ethanol; See Ethanolamine																																														
Ammonia	100	<120	<248	7664-41-7	4400H	SSC/CB-5-Neoprene	32	280	SSC/TC/SSC-5-Neoprene	32	280	SSC/TC/SSC-5-Neoprene	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	G						
Ammonia (gas)	100	<100	<212	7664-41-7	4400H	SSC/CB-5-EPDM	32	280	SSC/CB-5-EPDM	32	280	SSC/CB-5-EPDM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	G							
Ammonia Brine; See Ammonium Chloride																																														
Ammonium Acetate	>20	<37	<98	631-61-8	180	SSC/SSC-5-EPDM	13	891	SSC/SSC-5-EPDM	13	891	SSC/SSC-5-EPDM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1						
Ammonium Bicarbonate	<10	<20	<68	1066-33-7	180	CB/SSC-5-EPDM	62	280	CB/SSC-5-EPDM	62	280	CB/SSC-5-EPDM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1						
Ammonium Bisulfide; See Ammonium Sulfide																																														
Ammonium Bromide	<40	<37	<98	12124-97-9	520	CB/SSC-CB/SSC-A20-EPDM	53, 54	280	CB/SSC-CB/SSC-A20-EPDM	53, 54	280	CB/SSC-CB/SSC-A20-EPDM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1, 2					
Ammonium Carbonate	<50	<100	<212	10361-29-2	180	SSC/SSC-5-EPDM	62	280	SSC/SSC-5-EPDM	62	280	SSC/SSC-5-EPDM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1						
Ammonium Chloride	<30	<100	<212	12125-02-9	180	SSC/SSC-HC-FKM	53, 54	280	SSC/SSC-HC-FKM	53, 54	280	SSC/SSC-HC-FKM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1							
Ammonium Fluoride	<20	<60	<140	12125-01-8	520	SSC/SSC-CB/SSC-HC-FKM	53, 54	280	SSC/SSC-CB/SSC-HC-FKM	53, 54	280	SSC/SSC-CB/SSC-HC-FKM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1						
Ammonium Hydroxide	<40	<70	<158	1336-21-6	225	SSC/CB-SSC-CB-TI-EPDM	53, 54	62	SSC/CB-SSC-CB-TI-EPDM	53, 54	62	SSC/CB-SSC-CB-TI-EPDM	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C,N							
Ammonium Hydroxide	<10	<70	<158	1336-21-6	180	CB/SSC-5-EPDM	62	891	CB/SSC-5-EPDM	62	891	CB/SSC-5-EPDM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	N,Xi						
Ammonium Nitrate	>20	<100	<212	6484-52-2	280	SSC/SSC-CB/SSC-5-Buna-N	53, 54	280	SSC/SSC-CB/SSC-5-Buna-N	53, 54	280	SSC/SSC-CB/SSC-5-Buna-N	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1							
Ammonium Nitrate	<20	<100	<212	6484-52-2	180	SSC/SSC-5-Buna-N	62	280	SSC/SSC-5-Buna-N	62	280	SSC/SSC-5-Buna-N	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1							
Ammonium Nitrate	<10	<120	<248	7790-98-9	520	SSC/SSC-CB/SSC-TI-Chemlast550	53, 54	280	SSC/SSC-CB/SSC-TI-Chemlast550	53, 54	280	SSC/SSC-CB/SSC-TI-Chemlast550	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	0						
Ammonium Persulfate	<10	<50	<122	7727-54-0	510	SSC/SSC-5-EPDM	62	520	SSC/SSC-5-EPDM	62	520	SSC/SSC-5-EPDM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	0,Xn							
Ammonium Phosphate	>40	<100	<212	7783-28-0	280	CB/SSC-CB/SSC-5-EPDM	53, 54	280	CB/SSC-CB/SSC-5-EPDM	53, 54	280	CB/SSC-CB/SSC-5-EPDM	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	1							
Ammonium Phosphate	<40	<100	<212	7783-28-0	180	SSC/SSC-5-EPDM	62	280	SSC/SSC-5-EPDM	62	280	SSC/SSC-5-EPDM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1						
Ammonium Phosphate	<70	<100	<212	7783-20-2	180	SSC/SSC-5-EPDM	62	280	SSC/SSC-5-EPDM	62	280	SSC/SSC-5-EPDM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1						
Ammonium Sulfate	<SP	<107	<224	12135-76-1	520	CB/SSC-CB/SSC-HC-EPDM	53, 54	280	CB/SSC-CB/SSC-HC-EPDM	53, 54	280	CB/SSC-CB/SSC-HC-EPDM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1, 2						
Ammonium Sulfite	<SP	<100	<212	10196-04-0	180	SSC/SSC-HC-FKM	13	280	SSC/SSC-HC-FKM	13	280	SSC/SSC-HC-FKM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1						
Ammonium Thiocyanate	<40	<80	<176	1762-95-4	180	SSC/SSC-5-EPDM	13	891	SSC/SSC-5-EPDM	13	891	SSC/SSC-5-EPDM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1						
Amyl Acetate	100	<100	<212	628-63-7	180	CB/TC-5-EPDM	11, 13	442	CB/TC-5-EPDM	11, 13	442	CB/TC-5-EPDM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	0,85						
Amyl Alcohol	100	<70	<158	71-41-0	520	CB/SSC-CB/SSC-5-EPDM	53, 54	280	CB/SSC-CB/SSC-5-EPDM	53, 54	280	CB/SSC-CB/SSC-5-EPDM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	0,81							
Amyl Chloride	100	<65	<149	543-59-9	520	CB/SSC-CB/SSC-5-FKM	53, 54	280	CB/SSC-CB/SSC-5-FKM	53, 54	280	CB/SSC-CB/SSC-5-FKM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	0,88							
Amyl Hydroxide; See Pentane,-n																																														
Amyl Nitrate	100	<100	<212	1002-16-0	520	CB/SSC-CB/SSC-5-Chemlast550	53, 54	280	CB/SSC-CB/SSC-5-Chemlast550	53, 54	280	CB/SSC-CB/SSC-5-Chemlast550	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A						
Amylum; See Starch																																														
Aniline	100	<100	<212	62-53-3	280	CB/SSC-CB/SSC-5-EPDM	53, 54	280	CB/SSC-CB/SSC-5-EPDM	53, 54	280	CB/SSC-CB/SSC-5-EPDM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1, 2					
Aniline Dyes	<100	<212			520																																									



Mechanical Seal Recommendations by Fluid												Materials of Construction Performance Capabilities						Fluid Properties																						
Fluid Information		Recommended Mechanical Seal				Secondary				Metals				Faces				Elastomers				Fluid Properties																		
FLUID	PERCENT CONCENTRATION	TEMPERATURE		CAS	SEAL	MATERIAL	PLANS	SEAL	MATERIAL	PLANS	SS	A20	HB	HC	MONEL	Ti	CB	CR	TC	RSC	SSC	DC	FKM	EP	BUNA-N	NEOPRENE	TI/FKM	FF50	FFS50	PHASE	SPECIFIC GRAVITY (25°C)	VAPOR PRESSURE (25°C)	BOILING POINT (°C)	MELTING POINT (°C)	VISCOSITY (cP) (25°C) (1ATM)	HAZARD INFORMATION	NOTES			
		°C	°F																																					
Brown Stock, See Paper Stock																																								
Bunker C Fuel Oil	100	>50	>122	68553-00-4	180	TC/SSC-S- FKM	2/62	280	TC/SSC-S- FKM	2/53	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	L								Ca, T	2		
Butadiene, 1, +3-	100	<100	<212	106-99-0	280	TC/SSC-S- FKM	53, 54				A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	G	0.62	2.77	-4.41	-108.90	0.14			Ca, F, T	3, 4, 6			
Butanal, 1;- See Butyraldehyde																																								
Butane, n-	100	<100	<212	106-97-8	225	SSC/CB-SSC/B-5- FKM	11/52	180	CB/SSC-S- FKM	11	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	G	0.57	2.40	-0.50	-138.29	0.16			F+	4, 5		
Butane, n- (gas)	100	<100	<212	106-97-8	4400H	CB/SSC-S- FKM	32				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	G	0.57	2.40	-0.50	-138.29	0.16			F+	5			
Buranol, 1;- See Butyl Alcohol, n-																																								
Butene, 2-	100	<10	<50	107-01-7	225	SSC/CB-SSC/B-5- FKM	53, 54				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	G									F+	5		
Butyl Acetate, n-	100	<200	<392	123-86-4	186	CB/SSC-S- TI/FKM	62				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	0.88	0.02	126.00	-73.50	0.68			F				
Butyl Acetate, sec-	100	<100	<212	105-46-4	186	CB/SSC-S- TI/FKM	62				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	0.87	0.03	112.00	-99.00	0.66			F				
Butyl Acetate, tert-	100	<90	<194	540-88-5	186	CB/SSC-S- TI/FKM	62				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	0.86	0.05	96.00	-58.15	0.57			F				
Butyl Acrylate, n-	100	<20	<68	141-32-2	520	TC/SSC/CB-SSC-S- Chemlast50	53, 54	280	TC/SSC/CB-SSC/B-5- Chemlast50	53, 54	53, 54	A															A	L	0.89	0.01	147.40	-64.60	0.86			Xi				
Butyl Alcohol, n-	100	<100	<212	71-36-3	180	CB/SSC-S- FKM	11, 13	442	RSC/CB-S- FKM	11, 13	11, 13	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	L	0.81	0.01	117.66	-89.30	2.53			Xn, Xi			
Butyl Alcohol, sec-	100	<90	<194	78-92-2	180	CB/SSC-S- FKM	11, 13	442	RSC/CB-S- FKM	11, 13	11, 13	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	L	0.81	0.01	117.66	-89.30	2.53			Xi			
Butyl Alcohol, tert-	100	<80	<176	75-65-0	180	CB/SSC-S- FKM	11, 13	442	RSC/CB-S- FKM	11, 13	11, 13	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	L	0.81	0.01	117.66	-89.30	2.53			Xi			
Butyl Benzate, n-	100	<20	<68	136-60-7	510	TC/SSC-TI- FKM	11, 13	891	TC/SSC-TI- FKM	11, 13	11, 13	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	L									F, Xn		
Butyl Butyrate	100	<50	<122	109-21-7	180	CB/TIC-S- FKM	32	442	RSC/CB-S- FKM	32	442	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L												
Butyl Cellosolve (TM)	100	<50	<122	111-76-2	520	CB/SSC-CB/SSC-S- Chemlast50	53, 54	280	CB/SSC-CB/SSC/B-5- Chemlast50	53, 54	280	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	0.87	0.00	165.00	-92.00	0.94			R10				
Butyl Cellosolve Acetate (TM)	100	<20	<68	111-15-9	520	CB/SSC-CB/SSC-S- Chemlast50	53, 54	280	CB/SSC-CB/SSC/B-5- Chemlast50	53, 54	280	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	0.90	0.00	171.32	-73.98	3.57			Xi, Xn				
Butyl Ether	100	<20	<68	142-96-1	520	CB/SSC-CB/SSC-S- Chemlast50	53, 54	280	CB/SSC-CB/SSC/B-5- Chemlast50	53, 54	280	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	0.97	0.00	156.30	-61.70	1.00			T, Xn				
Butyl Phthalate, n;- See Dibutyl Phthalate																																								
Butyl Stearate	100	<37	<98	123-95-5	510	TC/SSC-TI- FKM	11, 13	891	TC/SSC-TI- FKM	11, 13	891	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L												
Butyramine, n-	100	<100	<212	109-73-9	520	CB/SSC-CB/SSC-S- Chemlast50	53, 54	280	CB/SSC-CB/SSC/B-5- Chemlast50	53, 54	280	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	0.74	0.12	77.40	-49.10	0.58			C, F, Xn				
Butylene, alpha-	100	<60	<140	106-98-9	225	SSC/CB-SSC/B-5- Chemlast50	53, 54				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	0.59	2.93	-6.25	-185.35				F+	4, 5				
Butyraldehyde	100	<37	<98	123-72-8	520	CB/SSC-CB/SSC-S- Chemlast50	53, 54	280	CB/SSC-CB/SSC/B-5- Chemlast50	53, 54	280	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	0.80	0.15	74.80	-96.40	0.42			F				
Butyric Acid, n-	100	<20	<68	107-92-6	520	CB/SSC-CB/SSC-TI- Chemlast50	53, 54	280	CB/SSC-CB/SSC/B-5- Chemlast50	53, 54	280	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	0.95	0.00	163.27	-5.20	1.48			C				
Calcium Acetate	>30	<100	<212	62-54-4	520	CB/SSC-CB/SSC-TI- EPDM	53, 54	280	CB/SSC-CB/SSC/B-5- FKM	53, 54	280	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	L											
Calcium Acetate	<30	<100	<212	62-54-4	180	CB/SSC-TI- EPDM	62	280	CB/SSC-CB/SSC/B-5- FKM	53, 54	280	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	L											
Calcium Bisulfite; See Calcium Hydroxide																																								
Calcium Carbonate	<5	<120	<248	471-34-1	510	CB/SSC-S- FKM	13	442	RSC/CB-S- FKM	13	442	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	L												
Calcium Chloride	>5	<120	<248	471-34-1	180	SSC/SSC-S- FKM	13	891	RSC/SSC-S- FKM	13	891	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	L												
Calcium Chloride	<5P	<60	<140	10137-74-3	280	SSC/SSC/CB-TI- FKM	53, 54					B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	L													
Calcium Chloride	>20	<60	<140	10043-52-4	180	CB/SSC-TI- FKM	62	280	CB/SSC-CB/SSC/B-5- FKM	53, 54	280	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	L												
Calcium Chloride	<20	<60	<140	10043-52-4	180	CB/SSC-TI- FKM	13	891	CB/CR-TI- FKM	13	891	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	L												
Calcium Oxide	<5P	<20	<68	592-01-8	520	CB/SSC-CB/SSC-S- FKM	53, 54	280	CB/SSC-CB/SSC/B-5- FKM	53, 54	280	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L												
Calcium Oxide	<90	<80	<176	13780-03-5	520	CB/SSC-S- FKM	11, 13	442	RSC/CB-S- FKM	11, 13	442	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L												
Calcium Hydroxide	<50	<37	<98	12133-28-7	520	CB/SSC-CB/SSC-HC- Chemlast50	53, 54	280	CB/SSC-CB/SSC/B-5- FKM	53, 54	280	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	L												
Calcium Hydroxide	>30	>80	>176	1305-62-0	280	SSC/SSC/CB/SSC-TI- FKM	53, 54	280	SSC/SSC/CB/SSC-TI- FKM	53, 54	280	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	L												
Calcium Hydroxide	<30	<65	<149	1305-62-0	180	CB/SSC-TI- FKM	62	280	CB/SSC-CB/SSC/B-5- FKM	53, 54	280	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	2.33		1108.00									
Calcium Hydroxide	>10	<100	<212	7778-54-3	280	SSC/SSC-CB/SSC-TI- EPDM	53, 54																																	

Mechanical Seal Recommendations by Fluid																									
Fluid Information			Recommended Mechanical Seal				Materials of Construction Capabilities					Fluid Properties													
FLUID	PERCENT CONCENTRATION	TEMPERATURE		CAS	SEAL	MATERIAL	PIPING PLANS	SEAL	MATERIAL	PIPING PLANS	Faces					SPECIFIC GRAVITY (25°C)	VAPOR PRESSURE (25°C)	BOILING POINT (°C)	MELTING POINT (°C)	VISCOSITY (cP) (25°C) (1ATM)	HAZARD INFORMATION	NOTES			
		°C	°F								Metals	TC	CR	RSC	SSC								DC	FKM	EP
Calcium Sulfide	<SP	<20	>158	10257-55-3	180	CB/SSC-5-FKM	32	442	CR/CB-5-FKM	32	A	A	A	A	A	A	A	A	270.00	69.21	Xn, Xi	1,2,3,6			
Caprolactam	<100	>70		105-60-2	280	TC/SSC/SSC/CB-5-Chemlast550	53, 54																		
Carbamide; See Urea																									
Carbinol; See Methyl Alcohol																									
Carbolic Acetate (TM)	100	<20	<68	112-15-2	180	CB/SSC-5-Chemlast550	11, 13	186	CB/SSC-5-TJ/FKM	11, 13	A								0.00	0.00					
Carbolic Acid; See Phenol																									
Carbon Bisulfide; See Carbon Disulfide																									
Carbon Disulfide	100	<20	<68	124-38-9	440OH	SSC/CB-5-Buna-N	32	280	CB/SSC/SSC/CB-5-Buna-N	53, 54	A	A	A	A	A	A	A	A	63.64	-56.57		5			
Carbon Dioxide (gas)	100	<100	<212	124-38-9	520	CB/SSC/CB/SSC-5-Buna-N	53, 54	280	CB/SSC/CB-5-Buna-N	53, 54	A	A	A	A	A	A	A	A	0.71	0.06					
Carbon Disulfide	100	<40	<104	75-15-0	520	CB/SSC/CB/SSC-A20-FKM	53, 54	280	CB/SSC/CB/SSC-A20-FKM	53, 54	B	B	B	B	B	B	B	B	1.26	0.47	46.23-111.57	F, T, Xi			
Carbon Monoxide (gas)	100	<100	<212	630-08-0	520	CB/SSC/CB/SSC-5-FKM	53, 54	280	CB/SSC/CB/SSC-5-FKM	53, 54	A	A	A	A	A	A	A	A	1.58	0.15	-191.45-205.00	F+, T			
Carbon Tetrachloride	100	<65	<149	56-23-5	280	SSC/SSC/SSC/CB-5-FKM	53, 54															6			
Carbon Tetrachloride (wet)	100	<65	<149	56-23-5	280	SSC/SSC/SSC/CB-M-FKM	53, 54															6			
Carbonyl Acid	<30	<80	<176	463-79-6	510	CB/SSC-5-FKM	11, 13	442	RSC/CB-5-FKM	11, 13	B	B	B	B	B	B	B	B				Ca, T, N			
Casein	100	<100	<212	9000-71-9	280	SSC/SSC/SSC/CB-TI-FKM	53, 54															6			
Castor Oil	100	<100	<212	8001-79-4	510	TC/SSC-5-FKM	11, 13	891	TC/SSC-5-FKM	11, 13	A								0.00	0.00					
Caustic Lime; See Calcium Hydroxide																									
Caustic Potash; See Potassium Hydroxide																									
Caustic Soda; See Sodium Hydroxide																									
Cellulose 250SA (TM)	100				180	TC/SSC-5-FKM	11, 13	891	TC/RSC-5-FKM	11, 13	A											*			
China Wood Oil; See Tung Oil																									
Chloral	100	<37	<98	75-87-6	520	CB/SSC/CB/SSC-5-Chemlast550	53, 54	280	CB/SSC/CB-5-Chemlast550	53, 54	A								1.50	0.05	97.70	-57.15	1.04		
Chloric Acid	<20	<60	<140	7790-93-4	520	CB/SSC/CB/SSC-HC-EPDM	53, 54	280	CB/SSC/CB-SSC/CB-HC-EPDM	53, 54	B	A													
Chlorine	100	<30	<86	7782-50-5	280	SSC/SSC/CB-HC-Chemlast550	53, 54																4		
Chlorine	<90	<60	<140	7782-50-5	280	SSC/SSC/CB-TI-Chemlast550	53, 54																		
Chlorine Dioxide	100	<100	<212	10099-04-4	280	SSC/SSC/CB-TI-Kalrez 2037	53, 54																4		
Chlorine Trifluoride	100	<20	<68	7790-91-2	225	SSC/SSC/CB-5-Chemlast550	53, 54																4		
Chloroacetaldehyde	100	<20	<68	107-20-0	520	CB/SSC/CB/SSC-TI-EPDM	53, 54																		
Chloroacetic Acid	<SP	<60	<140	79-11-8	280	CB/SSC/CB/SSC-TI-Chemlast550	53, 54																1, 6		
Chloroacetone	100	<20	<68	78-95-5	520	CB/SSC/CB/SSC-5-EPDM	53, 54	280	Consult Chesterton Engineering	53, 54	B	B	B	B	B	B	B	B	1.24	84.85	42.50	T+, C, N			
Chlorobenzene	100	<100	<212	108-89-7	520	CB/SSC/CB/SSC-A20-FKM	53, 54	280	CB/SSC/CB-A20-FKM	53, 54	B	A	A	A	A	A	A	A	1.10	0.02	131.72	-45.20	0.76	Xn, N	6
Chlorobutadiene; See Chloroprene																									
Chloroethane; See Ethyl Chloride																									
Chloroethanoic Acid; See Chloroacetic Acid																									
Chloroethylene; See Vinyl Chloride																									
Chloroform	100	<100	<212	67-66-3	520	CB/SSC/CB/SSC-TI-Chemlast550	53, 54	280	CB/SSC/CB-TI-Chemlast550	53, 54	B	B	B	B	B	B	B	B	1.48	0.26	61.18	-63.52	0.54	Ca, Xi, Xi	6
Chloromethane; See Methyl Chloride																									
Chloronaphthalene	<100	<20	<68	90-13-1	280	CB/SSC/CB-HC-FKM	53, 54																		
Chloroprene	100	<100	<212	126-99-8	280	TC/SSC/CB-TI-FKM	53, 54																		
Chlorosulfonic Acid	>20	<50	<122	7790-94-5	180	SSC/SSC-HCS-Chemlast550	11, 13	440	GFT/RSC-5-Chemlast550	11, 13	A	A	A	A	A	A	A	A	0.95	0.29	59.40-130.00	0.48	F, Xi, Xi	C	
Chloroethene; See Dichloroethane																									
Chlorotoluene, alpha-; See Benzyl Chloride																									
Chlorox (TM); See Sodium Hypochlorite 5																									
Chocolate	100	>50	>122		180	TC/SSC-5-FKM	2/62	280	TC/SSC/CB-5-FKM	2/53	A	A	A	A	A	A	A	A					*	2, 3	
Chromic Alum; See Chromium Potassium Sulfate																									
Chromic Acid	<50	<100	<212	1333-82-0	280	SSC/SSC/CB-TI-Chemlast550	53, 54																Ca, C, O, N, T	1	

KEY - Page 144 NOTES - 1 - CRYSTALLIZING FLUID 2 - SLURRY OR ABRASIVE FLUID 3 - FLUID MAY SET UP OR HARDEN 4 - FLUID MAY FLASH 5 - NONLUBRICATING FLUID 6 - VHAP





Mechanical Seal Recommendations by Fluid																											
FLUID	PERCENT CONCENTRATION	TEMPERATURE		CAS	Recommended Mechanical Seal		Secondary		Materials of Construction Performance Capabilities									Fluid Properties				HAZARD INFORMATION	NOTES				
		°C	°F		PRIMARY	SEAL	MATERIAL	P/PLANS	SEAL	MATERIAL	P/PLANS	MATERIALS	FACES	ELASTOMERS	SPECIFIC GRAVITY (25°C)	VAPOR PRESSURE (25°C)	BOILING POINT (°C)	MELTING POINT (°C)	VISCOSITY (cP) (25°C) (1ATM)								
Diocylamine	100	<50	<122	106-20-7	520	CB/SSC-CB/SSC-S - Chemlast550	53, 54	280	CB/SSC-CB-CB-S - Chemlast550	53, 54	A	A	A	A	A	A	A	A	L	1.03	0.05	101.32	11.80	1.19	Ca, F, Xn, Xi	6	
Dioxane, 1,4-Dioxol (TM)	100	<50	<122	123-91-1	520	CB/SSC-CB/SSC-S - Chemlast550	53, 54	280	CB/SSC-CB-CB-S - Chemlast550	53, 54	A	A	A	A	A	A	A	A	L	0.98	0.00	201.90	-54.00	3.98			
Dioxyacetic Acid; See Tartaric Acid	100	<60	<140	111-90-0	520	TC/SSC-SSC/TC-S - FKM	53, 54													1.02	0.00	231.80	-40.15	83.57			
Dipropylene Glycol	100	<20	<68	25265-71-8	280	TC/SSC-SSC/TC-S - FKM	53, 54																				
Dipropylene Glycol	<55	<150	<302	1321-74-0	520	CB/SSC-CB/SSC-S - FKM	53, 54	280	CB/SSC-CB-CB-S - FKM	53, 54	A	A	A	A	A	A	A	A	L								
Dow Corning Silicone Fluid (TM)	100	<50	<122		180	CB/TC-S - FKM	11, 13	442	RSC/CB-S - FKM	11, 13	A	A	A	A	A	A	A	A	L							*	
Dowthem A (TM)	100	>175	>347	8004-13-5	186HT	TC/SSC-S - Graphite	62																				
Dowthem A (TM)	100	<175	<347	8004-13-5	180	TC/SSC-S - FKM	2/62																				
Dowthem 209 (TM)	100	<100	<212	107-98-2	186	TC/SSC-S - T/FRM	11, 13	180	TC/SSC-S - EPDM	11, 13	A	A	A	A	A	A	A	A	L							*	
Dowthem E (TM)	100	<150	<302		186	TC/SSC-S - T/FRM	62	180	TC/SSC-S - FKM	62	A	A	A	A	A	A	A	A	L							*	
Dry Cleaning Fluids; See Tetrachloroethylene																											
Dyes & Pigments	100	<20	<68		280	TC/SSC-CB-CB-S - TFE	53, 54																			*	2, 3
Eto 28-Ep Lubricant (TM)	100	<20	<68		180	TC/SSC-S - FKM	11, 13	891	RSC/TC-S - FKM	11, 13	A	A	A	A	A	A	A	A	L							*	
Epichlorohydrin	100	<50	<122	106-89-8	520	Consult Chesterton Engineering	53, 54	280	Consult Chesterton Engineering	53, 54	A	A	A	A	A	A	A	A	L	1.18	0.02	118.50	-57.20	1.07	Ca, T, C	6	
Epsom Salt; See Magnesium Sulfate																											
Ethanediamide; See Acetamide																											
Ethane	100	<60	<140	74-84-0	225	SSC/CB-SSC/CB-S - FKM	11/52																				
Ethane (gas)	100	<60	<140	74-84-0	4400H	SSC/CB-S - FKM	32																				
Ethanoic Acid; See Acetic Acid																											
Ethanoic Anhydride; See Acetic Anhydride																											
Ethanol; See Ethyl Alcohol																											
Ethandiamine	100	<100	<212	141-43-5	520	CB/SSC-CB/SSC-S - Chemlast550	53, 54	280	CB/SSC-CB-CB-S - Chemlast550	53, 54	A	A	A	A	A	A	A	A	L	1.01	0.00	170.00	10.50	20.19	Xn, Xi		
Ether	100	<50	<122	60-29-7	186	CB/SSC-S - Chemlast550	62	180	CB/SSC-S - Chemlast550	62	A	A	A	A	A	A	A	A	L	0.71	0.71	34.43	-116.30	0.23	F+, Xn		
Ethoxyethanol, 2-	100	<50	<122	110-80-5	180	CB/SSC-S - Chemlast550	11, 13	186	CB/SSC-S - T/FRM	11, 13	A	A	A	A	A	A	A	A	L	0.93	0.01	135.00	-59.00	1.92	T, Xn		
Ethyl Acetate	100	<100	<212	141-78-6	520	CB/SSC-CB/SSC-S - Chemlast550	53, 54	280	CB/SSC-CB-CB-S - Chemlast550	53, 54	A	A	A	A	A	A	A	A	L	0.89	0.12	77.06	-83.55	0.43	F, Xi		
Ethyl Acetoacetate	100	<37	<98	141-97-9	520	CB/SSC-CB/SSC-S - Chemlast550	53, 54	280	CB/SSC-CB-CB-S - Chemlast550	53, 54	A	A	A	A	A	A	A	A	L	1.02	0.00	180.80	-39.00	1.53			
Ethyl Acrylate	100	<20	<68	140-88-5	520	TC/SSC-CB/SSC-S - Chemlast550	53, 54	280	TC/SSC-CB-CB-S - Chemlast550	53, 54	A	A	A	A	A	A	A	A	L	0.92	0.05	99.50	-71.20	0.54	F, Xn, Xi	6	
Ethyl Alcohol	100	<100	<212	64-17-5	180	CB/TC-S - EPDM	11, 13	891	CB/TC-S - EPDM	11, 13	A	A	A	A	A	A	A	A	L	0.79	0.08	78.29	-114.10	1.08	F		
Ethyl Benzene	100	<65	<149	100-41-4	180	CB/SSC-S - FKM	11, 13	891	CB/RSC-S - FKM	11, 13	A	A	A	A	A	A	A	A	L	0.86	0.01	136.20	-94.95	0.64	F, Xn	5, 6	
Ethyl Benzoate	100	<20	<68	95-89-0	510	CB/SSC-S - FKM	32	442	CB/CB-S - FKM	32	A	A	A	A	A	A	A	A	L	1.04	0.00	213.40	-34.70	1.98			
Ethyl Carbonate; See Diethyl Carbonate																											
Ethyl Chloride	100	<60	<140	75-00-3	4400H	SSC/CB-S - FKM	32																				
Ethyl Formate	100	<20	<68	109-94-4	520	CB/SSC-CB/SSC-S - FKM	53, 54	280	CB/SSC-CB-CB-S - FKM	53, 54	A	A	A	A	A	A	A	A	L	0.89	1.58	12.27	-136.40	0.26	Ca, F+, Xn	4, 6	
Ethyl Mercaptan	100	<50	<122	75-08-1	520	CB/SSC-CB/SSC-M - Chemlast550	53, 54	280	CB/SSC-CB-CB-M - Chemlast550	53, 54	A	A	A	A	A	A	A	A	L	0.92	0.32	54.31	-79.60	0.38	F, Xn, Xi		
Ethyl Silicate	100	<20	<68	78-10-4	180	SSC/SSC-S - FKM	32	442	RSC/RSC-S - FKM	32	A	A	A	A	A	A	A	A	L	0.83	0.69	35.00	-147.89	0.29	F, Xn, N		
Ethylcellulose	<SP	<50	<122	9004-57-3	180	CB/SSC-S - Chemlast550	11, 13	186	CB/SSC-S - T/FRM	11, 13	A	A	A	A	A	A	A	A	L						Xn, Xi		
Ethylene	100	<25	<77	74-85-1	225	SSC/CB-SSC/CB-S - Buna-N	11/52																				
Ethylene (gas)	100	<25	<77	74-85-1	4400H	SSC/CB-S - Buna-N	32																				
Ethylene Bromide; See Ethylene Dibromide																											
Ethylene Chloride; See Ethylene Dichloride																											
Ethylene Chlorohydrin	100	<37	<98	107-07-3	520	CB/SSC-CB/SSC-S - FKM	53, 54	280	CB/SSC-CB-CB-S - FKM	53, 54	A	A	A	A	A	A	A	A	L	1.20	0.01	128.60	-67.50	2.99	T+		
Ethylene Cyanohydrin	100	<20	<68	109-78-4	520	CB/SSC-CB/SSC-TI - FKM	53, 54	280	CB/SSC-CB-CB-TI - FKM	53, 54	A	A	A	A	A	A	A	A	L	1.04	0.00	221.00	-46.00	0.70			
Ethylene Dibromide	100	<65	<149	106-93-4	520	CB/SSC-CB/SSC-S - FKM	53, 54	280	CB/SSC-CB-CB-S - FKM	53, 54	B	B	B	B	B	B	B	B	L	1.16	0.02	131.36	9.79	1.60	Ca, T, N, Xi		
Ethylene Dichloride	100	<20	<68	107-06-2	520	CB/SSC-CB/SSC-S - Chemlast550	53, 54	280	CB/SSC-CB-CB-S - Chemlast550	53, 54	A	A	A	A	A	A	A	A	L	1.25	0.10	83.44	-35.66		Ca, T, Xi	1, 6	
Ethylene Glycol	100	<37	<98	107-21-1	180	CB/TC-S - FKM	11, 13	442	RSC/CB-S - FKM	11, 13	A	A	A	A	A	A	A	A	L	1.11	0.00	197.30	-13.00	17.22	Xn	6	
Ethylene Oxide	100	<37	<98	75-21-8	4400H	SSC/CB-S - Kairrez 2085	32	280	CB/SSC-CB-CB-S - Kairrez 2085	32	A	A	A	A	A	A	A	A	L	0.87	1.73	10.45	-112.50		Ca, F+, T, Xi	6	

KEY - Page 144 NOTES - 1 - CRYSTALLIZING FLUID 2 - SLURRY OR ABRASIVE FLUID 3 - FLUID MAY SET UP OR HARDEN 4 - FLUID MAY FLASH 5 - NONLUBRICATING FLUID 6 - VHAP



Mechanical Seal Recommendations by Fluid																										
Fluid Information		Recommended Mechanical Seal				Materials of Construction Capabilities										Fluid Properties			Notes							
FLUID	PERCENT CONCENTRATION	TEMPERATURE		CAS	SEAL	Primary		Secondary		Metals			Faces			Elastomers				SPECIFIC GRAVITY (25°C)	VAPOR PRESSURE (25°C)	BOILING POINT (°C)	MELTING POINT (°C)	VISCOSITY (cP) (25°C) (1ATM)	HAZARD INFORMATION	
		°C	°F			MATERIAL	P/PLANS	MATERIAL	P/PLANS	MONEL	TI	CB	CB	TC	RSC	SSC	DC	FKM	EP							BUNA-N
Ethylendiamine	100	<50	<122	107-13-3	520	CB/SSC-CB/SSC-5-EPDM	53, 54	280	CB/SSC-CB-5-EPDM	53, 54	A	A	A	A	A	A	A	A	A	A	0.90	0.02	117.26	11.14	1.71	C, Xn
Ethylendiaminetetraacetic Acid	<SP	<20	<68	60-00-4	520	TC/SSC-CB/SSC-5-Chemlast550	53, 54	280	TC/SSC-CB/SSC-5-Chemlast550	53, 54	A	A	A	A	A	A	A	A	A	A	0.83	0.00	184.60	-70.00	7.57	
Ethylhexyl Alcohol	100	<120	<248	104-76-7	520	CB/SSC-CB/SSC-5-FKM	53, 54	280	CB/SSC-CB/SSC-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	1.17	0.30	57.30	-96.96	0.47	F, Xn, Xi
Ethylene Chloride	100	<20	<68	75-34-3	186	CB/SSC-HC-Chemlast550	11, 13	186	CB/SSC-HC-TJ/FKM	62	A	A	A	A	A	A	A	A	A	A					*	1
Fatty Acid	100	>100	>212		186	CB/SSC-5-TJ/FKM	2/62	180	CB/SSC-5-Chemlast550	2/53	A	A	A	A	A	A	A	A	A	A					*	
Fatty Acid (tallow)	100	<100	<212		180	CB/SSC-5-FKM	2/62	280	CB/SSC-CB/SSC-5-FKM	2/53	A	A	A	A	A	A	A	A	A	A					*	
Ferric Chloride	<40	<50	<122	7705-08-0	280	SSC/SSC-CB-TI-FKM	53, 54				A	A	A	A	A	A	A	A	A	A	2.90		319.00	303.85		
Ferric Hydroxide	<SP	<65	<149	18624-44-7	180	CB/SSC-5-FKM	32	442	CB/SSC-5-FKM	32	B	B	B	A	A	A	A	A	A	A						1, 2
Ferric Nitrate	<50	<100	<212	10421-46-4	180	CB/SSC-5-FKM	32	442	RSC/RSC-5-FKM	32	B	A	B	A	A	A	A	A	A	A						1
Ferric Sulfate	<30	<100	<212	10028-22-5	180	SSC/SSC-A20-Buna-N	62	280	SSC/SSC-CB-A20-Buna-N	53, 54	A	A	A	A	A	A	A	A	A	A						1
Ferrous Chloride	<50	<100	<212	7738-94-3	180	CB/SSC-HC-FKM	2/62	280	CB/SSC-CB/SSC-HC-FKM	2/53	B	B	B	B	A	A	A	A	A	A	2.99		1023.80	676.85		1
Ferrous Sulfate	<SP	<100	<212	7720-78-7	520	SSC/SSC-CB/SSC-TI-Chemlast550	53, 54	280	SSC/SSC-CB/SSC-TI-Chemlast550	53, 54	B	B	B	B	A	A	A	A	A	A						1
Ferrous Sulfide	<SP	<20	<68	1317-37-9	520	CB/SSC-5-FKM	32	442	CB/SSC-5-FKM	32	A	A	A	A	A	A	A	A	A	A						
Fluorine Gas (wet)	100	<37	<98	7782-41-4	225	SSC/SSC-CB-M-FKM	53, 54				A	A	A	A	A	A	A	A	A							F+, C
Fluorolube (TM)	100	<20	<68	9002-89-9	520	TC/SSC-5-FKM	11, 13	891	TC/SSC-5-FKM	11, 13	A	A	A	A	A	A	A	A	A	A						
Fluorosulfonic Acid; See Hydrofluorosulfonic Acid	<50	>20	>68	7789-21-1	180	CB/SSC-A20-Chemlast550	11, 13	891	CB/RSC-A20-Chemlast550	11, 13	B	A	A	A	A	A	A	A	A	A						
Fluorosulfonic Acid	100	<100	<212	50-00-0	180	CB/SSC-5-Kalrez2035	11	280	CB/SSC-CB/SSC-CB-5-Kalrez2035	53, 54	A	B	A	A	A	A	A	A	A	A	0.73	5.12	-19.10	-92.00		C, Xn
Formaldehyde	100	<100	<212	64-18-6	520	CB/SSC-CB/SSC-A20-EPDM	53, 54	280	CB/SSC-CB/SSC-A20-EPDM	53, 54	A	A	A	A	A	A	A	A	A	A	1.22	0.06	100.56	8.40	1.61	C
Formic Acid	100	<100	<212	75-69-4	520	CB/SSC-A20-Buna-N	11, 13	891	CB/SSC-A20-Buna-N	11, 13	A	A	A	A	A	A	A	A	A	A	1.48	1.05	23.82	-111.11	0.43	
Freon 11 (TM)	<100	<100	<86	76-12-0	520	CB/SSC-A20-Buna-N	11, 13	891	CB/SSC-A20-Buna-N	11, 13	A	A	A	A	A	A	A	A	A	A						
Freon 112 (TM)	<100	<120	<248	76-13-1	520	CB/SSC-A20-Buna-N	11, 13	891	CB/SSC-A20-Buna-N	11, 13	A	A	A	A	A	A	A	A	A	A						
Freon 113 (TM with refrigerant oil)	100	<120	<248	76-14-2	520	CB/SSC-A20-Buna-N	11, 13	891	CB/SSC-A20-Buna-N	11, 13	A	A	A	A	A	A	A	A	A	A						
Freon 114 (TM with refrigerant oil)	100	<120	<248	75-71-8	186	CB/SSC-5-Chemlast550	11, 13	180	CB/SSC-5-Chemlast550	11, 13	A	A	A	A	A	A	A	A	A	A	1.31	6.43	-29.79	-138.00	0.22	*
Freon 12 (TM)	100	<120	<248		225	TC/SSC-CB/SSC-5-Chemlast550	53, 54				A	A	A	A	A	A	A	A	A	A						
Freon 12 (TM with refrigerant oil)	100	<107	<224		225	TC/SSC-CB/SSC-5-Chemlast550	53, 54				A	A	A	A	A	A	A	A	A	A						
Freon 134a	100	<120	<248		225	TC/SSC-CB/SSC-5-Chemlast550	53, 54				A	A	A	A	A	A	A	A	A	A						
Freon 22 (TM with refrigerant oil)	100	<50	<122		225	TC/SSC-CB/SSC-5-Chemlast550	53, 54				A	A	A	A	A	A	A	A	A	A						
Freon 502	100	<20	<68		225	TC/SSC-CB/SSC-5-Chemlast550	53, 54				A	A	A	A	A	A	A	A	A	A						
Fruit Juice	100	<120	<248		180	CB/SSC-5-FKM	11, 13	442	RSC/CB-5-FKM	11, 13	A	A	A	A	A	A	A	A	A	A						2
Fuel Oil #1, 2, 3, 4	100	>80	>176		180	TC/SSC-5-FKM	62	891	TC/SSC-5-FKM	62	A	A	A	A	A	A	A	A	A	A						*
Fuel Oil #1, 2, 3, 4	100	<50	<122		520	TC/SSC-5-FKM	11, 13	891	TC/SSC-5-FKM	11, 13	A	A	A	A	A	A	A	A	A	A						*
Fuel Oil #6, #5	100	>120	>248		186HT	TC/SSC-5-Graphite	62				A	A	A	A	A	A	A	A	A	A						Ca, T
Fumaric Acid	<10	<100	<212	110-17-8	180	CB/SSC-5-FKM	13	442	RSC/CB-5-FKM	13	A	A	A	A	A	A	A	A	A	A	1.64	0.00	290.00	289.40		Xi
Furfural	>15	<100	<212	98-01-1	520	CB/SSC-CB/SSC-A20-Chemlast550	53, 54	280	CB/SSC-CB/SSC-A20-Chemlast550	53, 54	B	B	B	B	A	A	A	A	A	A	1.15	0.00	161.70	-36.50	1.58	Ca, T
Furfural; See Furfural																										2
Furfuryl Alcohol	100	<50	<122	98-00-0	520	CB/SSC-CB/SSC-5-Chemlast550	53, 54	280	CB/SSC-CB/SSC-5-Chemlast550	53, 54	A	A	A	A	A	A	A	A	A	A	1.13	0.00	170.00	-14.63	4.82	Xn
Gas Oil, Heavy	100	>350	>662		186HT	TC/SSC-5-Graphite	62				A	A	A	A	A	A	A	A	A	A						*
Gas Oil, Light	100	>250	>482		186HT	TC/SSC-5-Graphite	62				A	A	A	A	A	A	A	A	A	A						*
Gasoline	100	<50	<122	8006-61-9	180	CB/SSC-5-Buna-N	11	891	CB/SSC-5-Buna-N	11	A	A	A	A	A	A	A	A	A	A						Ca, T, Xn
Gelatin	100	<100	<212	9000-70-8	180	TC/SSC-5-FKM	62	891	TC/SSC-5-FKM	62	A	A	A	A	A	A	A	A	A	A						2, 3
Glauber's Salt; See Sodium Sulfate																										
Glucose	<20	<100	<212	50-99-7	180	TC/SSC-5-FKM	62	280	TC/SSC-CB/SSC-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	1.54	0.00	0.00	146.00		1, 2, 3
Glues	100	<100	<212		280	TC/SSC-CB/SSC-5-FKM	53, 54				A	A	A	A	A	A	A	A	A	A						*
Glycerin	100	>30	>86	56-81-5	520	TC/SSC-5-FKM	11, 13	442	RSC/RSC-5-FKM	11, 13	A	A	A	A	A	A	A	A	A	A	1.25	0.00	287.85	18.18	923.50	
Glycerin	100	<30	<86	56-81-5	280	TC/SSC-SSC/TC-5-FKM	53, 54				A	A	A	A	A	A	A	A	A	A						
Glycerol; See Glycerin																										
Glycol Ether; See Diethylene Glycol																										

KEY - Page 144 NOTES - 1 - CRYSTALLIZING FLUID 2 - SLURRY OR ABRASIVE FLUID 3 - FLUID MAY SET UP OR HARDEN 4 - FLUID MAY FLASH 5 - NONLUBRICATING FLUID 6 - VHAP

Mechanical Seal Recommendations by Fluid										Materials of Construction Performance Capabilities										Fluid Properties																	
Fluid Information		Recommended Mechanical Seal			Secondary			Metals			Faces			Elastomers			Fluid Properties																				
FLUID	PERCENT CONCENTRATION	TEMPERATURE		CAS	SEAL	MATERIAL	P/PLANS	SEAL	MATERIAL	P/PLANS	SS	A20	HB	HC	MONEL	Ti	CB	CR	TC	RSC	SSC	DC	FKM	EP	BUNA-N	NEOPRENE	TI/FKM	FF50	FF500	PHASE	SPECIFIC GRAVITY (25°C)	VAPOR (ATM) PRESSURE (25°C)	BOILING POINT (°C)	MELTING POINT (°C)	VISCOSITY (cP) (25°C) (1 ATM)	HAZARD INFORMATION	NOTES
		°C	°F																																		
Glycolic Acid; See Hydroxyacetic Acid	100	<100	<212		280	CB/SSC-CB/A20-EPDM	53, 54	280	CB/SSC-CB-5-FKM	53, 54	B	B	B	B	B	B	A	B	A	B	A	A	A	A	A	A	A	L						*	1, 2		
Green Liquor	<SP			506-99-4	520	CB/SSC-CB/SSC-5-FKM	53, 54	280	CB/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C									
Guanidine Nitrate	100	>205	>401		186HT	TC/SSC-5-Graphite	62				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						*			
Heat Transfer Oils	100	<175	<347		180	TC/SSC-5-Chemilast550	62				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						*			
Heat Transfer Oils	100	<100	<212	7440-59-7	4400H	SSC/CB-5-Buna-N	32	280	CB/SSC-CB-5-Buna-N	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Helium	100	<120	<248	142-82-5	186	CB/SSC-5-TI/FKM	62	180	CB/SSC-5-Buna-N	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Heptane, n-	<SP	<50	<122	100-97-0	520	CB/SSC-CB/SSC-5-Kalrez 1050LF	53, 54	280	CB/SSC-CB-5-Kalrez 1050LF	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hexamethylenetetramine	100	<120	<248	110-54-3	520	CB/SSC-CB/SSC-5-Buna-N	53, 54	280	CB/SSC-CB-5-Buna-N	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hexane, n-	100	<100	<212	111-27-3	180	CB/SSC-5-FKM	11, 13	891	CB/RSC-5-FKM	11, 13	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hexone; See Methyl Isobutyl Ketone	100	<20	<68		180	TC/RSC-5-FKM	11	891	TC/RSC-5-FKM	11	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hydroalcohol	100	<100	<212	302-01-2	520	CB/SSC-CB/SSC-5-EPDM	53, 54	280	CB/SSC-CB-5-EPDM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hydraulic Oil (petroleum based)	100	<65	<149	10035-10-6	280	SSC/SSC-CB-5-FKM	53, 54	280	SSC/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hydrobromic Acid	<30	<65	<149	10035-10-6	280	SSC/SSC-CB-5-FKM	53, 54	280	SSC/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hydrobromic Acid	100	<200	<392		186HT	TC/SSC-5-Graphite	62				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hydrochloric Acid	>30	>38	>100	7647-01-0	280	CB/SSC-CB-5-FKM	53, 54	280	CB/SSC-CB-5-FKM	53, 54	B	B	B	B	B	B	A	A	A	A	A	A	A	A	A	A	A	L									
Hydrochloric Acid	<30	<38	<100	7647-01-0	280	CB/SSC-CB-5-FKM	53, 54	280	CB/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hydrofluoric Acid	<80	<65	<149	7664-39-3	280	SSC/SSC-CB/SSC-5-FKM	53, 54	280	SSC/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hydrofluoric Acid (aerated)	>40	<100	<212	7664-39-3	280	SSC/SSC-CB/SSC-5-FKM	53, 54	280	SSC/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hydrofluorosulfic Acid	>30	<100	<212	16961-83-4	520	CB/SSC-CB/SSC-5-FKM	53, 54	280	CB/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hydrofluorosulfic Acid	<30	<60	<140	1333-74-0	4400H	SSC/CB-5-EPDM	32	280	CB/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hydrogen (gas)	100	<20	<68	7647-01-0	4400H	SSC/CB-5-EPDM	32	280	SSC/CB-5-EPDM	32	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hydrogen Chloride (gas)	100	<50	<122	74-90-8	520	CB/SSC-CB/SSC-5-FKM	53, 54	280	CB/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hydrogen Cyanide	100	<20	<68	74-90-8	520	CB/SSC-CB/SSC-5-FKM	53, 54	280	CB/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hydrogen Cyanide	100	<65	<149	7664-39-3	280	CB/SSC-CB/SSC-5-FKM	53, 54	280	CB/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hydrogen Peroxide	<80	<37	<98	7722-84-1	280	SSC/SSC-CB-5-FKM	53, 54	280	SSC/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hydrogen Peroxide	<30	<37	<98	7722-84-1	180	SSC/SSC-5-FKM	11, 13	891	SSC/SSC-5-FKM	11, 13	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hydrogen Sulfide	100	<65	<149	7783-06-4	4400H	SSC/CB-5-EPDM	32				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L										
Hydro-Lube (water/glycol base)	100	<100	<212	123-31-9	520	CB/SSC-CB/SSC-5-FKM	53, 54	280	CB/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L										
Hydroquinone, p-	<70	<100	<212	123-31-9	520	CB/SSC-CB/SSC-5-FKM	53, 54	280	CB/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hydroxyacetic Acid	100	<20	<68	79-14-1	180	CB/SSC-5-EPDM	32	442	RSC/CB-5-EPDM	32	B	B	B	B	B	B	A	A	A	A	A	A	A	A	A	A	L										
Hydroxyacetic Acid	100	<20	<68	7790-92-3	520	CB/SSC-CB/SSC-5-FKM	53, 54	280	CB/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Hypochlorous Acid	<100	<20	<68	120-77-9	280	TC/SSC-CB/SSC-5-FKM	53, 54	280	TC/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Ink	100	<20	<68		180	TC/SSC-5-FKM	11, 13	891	TC/RSC-5-FKM	11, 13	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Insecticide	100	<20	<68	16752-77-5	520	TC/SSC-CB/SSC-5-FKM	53, 54	280	TC/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Iodine	>10	>20	>68	7553-56-2	280	SSC/SSC-CB/SSC-5-FKM	53, 54	280	SSC/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Iodine	100	<20	<68	7553-56-2	280	SSC/SSC-CB/SSC-5-FKM	53, 54	280	SSC/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Iodine Pentaffluoride	100	<20	<68	7783-66-6	280	SSC/SSC-CB/SSC-5-FKM	53, 54	280	SSC/SSC-CB-5-FKM	53, 54	B	B	B	B	B	B	A	A	A	A	A	A	A	A	A	A	L										
Iodobrom	<100	<150	<302	75-47-8	520	CB/SSC-CB/SSC-5-FKM	53, 54	280	CB/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Iron Acetate	<SP	<50	<122	10450-55-2	520	CB/SSC-CB/SSC-5-FKM	53, 54	280	CB/SSC-CB-5-FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L									
Iron Chloride; See Ferric Chloride																											L										
Iron Dichloride; See Ferric Chloride																											L										
Iron Hydroxide																											L										

KEY - Page 144 NOTES - 1 - CRYSTALLIZING FLUID 2 - SLURRY OR ABRASIVE FLUID



Mechanical Seal Recommendations by Fluid										Materials of Construction Performance Capabilities										Fluid Properties															
Fluid Information		Recommended Mechanical Seal			Secondary		Metals			Faces			Elastomers			Fluid Properties			HAZARD INFORMATION	NOTES															
FLUID	PERCENT CONCENTRATION	TEMPERATURE °C	TEMPERATURE °F	CAS	SEAL	MATERIAL	PILING PLANS	SEAL	MATERIAL	PILING PLANS	A20	HB	HC	HT	MONEL	TI	CB	CR			TC	SSC	DG	FKM	BUNA-N	NEOPRENE	TI/FKM	FF50	FF50	PHASE	SPECIFIC GRAVITY (25°C)	VAPOR PRESSURE (ATM) (25°C)	BOILING POINT (°C)	MELTING POINT (°C)	VISCOSITY (cP) (25°C) (1ATM)
Lube Oils (petroleum based)	100	<80	<176		180	TC/SSC - S - FKM	11, 13	891	TC/RSC - S - FKM	11, 13	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						*	
Lye; See Potassium Hydroxide	<50	<100	<212	7786-30-3	180	TC/SSC - HC - FKM	62	280	TC/SSC/SSC/CB - HC - FKM	62	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C						1	
Magnesium Chloride	>50	<70	<158	1335-26-8	520	SSC/SSC/SSC/SSC - S - EPDM	53, 54	280	SSC/SSC/SSC/SSC - S - EPDM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C						1	
Magnesium Dioxide	>20	<100	<212	1309-42-8	520	CB/SSC/CB/SSC - S - FKM	53, 54	280	CB/SSC/CB/SSC - S - FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C						1	
Magnesium Hydroxide	>20	<100	<212	10377-40-3	520	CB/SSC/CB/SSC - HC - FKM	53, 54	280	CB/SSC/CB/SSC - HC - FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C						1	
Magnesium Nitrate	>45	<100	<212	7487-88-9	280	CB/SSC/SSC/CB - S - FKM	53, 54	280	CB/SSC/SSC/CB - S - FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C						1	
Magnesium Sulfate	<45	<100	<212	7487-88-9	180	CB/SSC - S - FKM	62	280	CB/SSC/SSC/CB - S - FKM	62	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C						1	
Magnesium Sulfite	<20	<68	7757-89-2	520	CB/SSC/CB/SSC - S - FKM	53, 54	280	CB/SSC/CB/SSC - S - FKM	53, 54	280	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C						1	
Maleic Acid	>15	<65	<149	110-16-7	180	CB/SSC - HC - FKM	62	280	CB/SSC/SSC/CB - HC - FKM	62	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C						Xn, Xi	
Maleic Anhydride	<SP	<175	<347	108-31-6	280	CB/SSC/SSC/CB - S - Chemlast50	53, 54	280	CB/SSC/SSC/CB - S - FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C						Xn, Xi	
Malic Acid	<50	<100	<212	6915-15-7	180	SSC/SSC - S - FKM	62	280	CB/SSC/SSC/CB - S - FKM	62	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C						C	
Manganese Sulfate	<SP	<100	<212	7785-87-7	180	CB/SSC - S - FKM	62	280	CB/SSC/SSC/CB - S - FKM	62	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C						Xn, N	
Mannitol	<SP	<100	<212	69-65-8	180	CB/TC/TC - S - FKM	62	280	CB/TC/TC/CB - S - FKM	62	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C						2	
Mercaptans; See Thiols																																			
Mercuric Chloride	<SP	<60	<140	7487-94-7	520	CB/SSC/CB/SSC - TI - FKM	53, 54	280	CB/SSC/SSC/CB - TI - FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C						T+, C, N	
Mercury	100	<60	<140	7439-97-6	280	CB/SSC/SSC/CB - S - FKM	53, 54	280	CB/SSC/SSC/CB - S - FKM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						T, N	
Mesityl Oxide	100	<100	<212	141-79-7	186	TC/SSC - S - TI/FKM	62	280	TC/SSC - S - FKM	62	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						Xn	
Methanal; See Formaldehyde																																			
Methane	100	<80	<176	74-82-8	225	SSC/CB/SSC/CB - S - FKM	11/52	280	SSC/CB/SSC/CB - S - FKM	11/52	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	G						F+	
Methanol; See Methyl Alcohol																																			
Methyl Acetate	100	<65	<149	79-20-9	186	TC/SSC - S - TI/FKM	62	280	TC/SSC - S - FKM	62	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						F, Xi	
Methyl Acrylate	100	<65	<149	96-33-3	280	CB/SSC/SSC/CB - S - EPDM	53, 54	280	CB/SSC/SSC/CB - S - EPDM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						F, Xn	
Methyl Alcohol	100	<100	<212	67-56-1	180	CB/SSC - S - EPDM	11, 13	891	CB/RSC - S - EPDM	11, 13	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						F, T	
Methyl Bromide; See Bromomethane																																			
Methyl Butanol; See Amyl Alcohol																																			
Methyl Butyl Ketone	100	<60	<140	591-78-6	520	CB/SSC/CB/SSC - S - EPDM	53, 54	280	CB/SSC/CB/SSC - S - EPDM	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						T	
Methyl Cellulosate (TIN)	100	<50	<122	109-88-4	520	CB/SSC/CB/SSC - S - Chemlast50	53, 54	280	CB/SSC/CB/SSC - S - Chemlast50	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						T, Xn	
Methyl Chloride	100	<37	<98	74-87-3	225	SSC/CB/SSC/CB - S - Chemlast50	53, 54	4400H	SSC/CB - S - Chemlast50	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	G						Ca, F+, Xn	
Methyl Cyanide; See Acetonitrile																																			
Methyl Dioxitol; See Diethylene Glycol Monomethyl Ether																																			
Methyl Ether	100	<20	<68	115-10-6	4400H	SSC/CB - S - FKM	32	225	SSC/CB/SSC/CB - S - FKM	32	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	G						F+	
Methyl Ethyl Ketone	100	<100	<212	78-99-3	186	CB/SSC - S - TI/FKM	62	255	SSC/CB/SSC/CB - S - Chemlast50	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						F, Xi	
Methyl Formate	100	<50	<122	107-31-8	186	CB/SSC - S - TI/FKM	62	180	CB/SSC - S - Chemlast50	62	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						F+, Xn, Xi	
Methyl Isobutyl Carbonyl	100	<20	<68	108-11-2	180	CB/SSC - S - FKM	11, 13	442	RSC/CB - S - FKM	11, 13	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						Xi	
Methyl Isobutyl Ketone	100	<65	<149	108-10-1	186	CB/SSC - S - TI/FKM	62	180	CB/SSC - S - Chemlast50	62	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						F, Xn, Xi	
Methyl Isopropyl Ketone	100	<90	<194	563-80-4	520	CB/SSC/CB/SSC - S - Chemlast50	53, 54	280	CB/SSC/CB/SSC - S - Chemlast50	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						F	
Methyl Methacrylate	100	<100	<212	80-62-6	280	TC/SSC/SSC/CB - S - Chemlast50	53, 54	186	SSC/SSC - S - TI/FKM	62	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						F, Xi	
Methyl Oleate	100	<20	<68	112-62-9	510	CB/SSC - S - FKM	11, 13	442	RSC/CB - S - FKM	11, 13	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						5, 8, 4	
Methyl Phenyl Ketone, m-; See Acetophenone																																			
Methyl Salicylate	100	<20	<68	119-36-8	280	SSC/SSC/SSC/CB - S - Chemlast50	53, 54	280	SSC/SSC/SSC/CB - S - Chemlast50	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						2, 4, 1	
Methyl Tert Butyl Ether	100	<100	<212	1634-04-4	186	CB/SSC - S - TI/FKM	62	180	CB/SSC - S - Chemlast50	62	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						6	
Methylamine, n-	100	<20	<68	100-61-8	520	TC/SSC/TC/SSC - S - Chemlast50	53, 54	280	TC/SSC/TC/SSC - S - Chemlast50	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						T, N	
Methylcyclopentane	100	<20	<68	96-37-7	4400H	SSC/CB - S - Chemlast50	32	280	SSC/CB - S - Chemlast50	32	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						-142, 4, 2	
Methylene Chloride	100	<100	<212	75-09-2	225	SSC/CB/SSC/CB - S - Fluorosilicone	53, 54	225	SSC/CB/SSC/CB - S - Fluorosilicone	53, 54	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						Ca, Xn	

KEY - Page 144 NOTES - 1 - CRYSTALLIZING FLUID 2 - SLURRY OR ABRASIVE FLUID 3 - FLUID MAY SET UP OR HARDEN 4 - FLUID MAY FLASH 5 - NONLUBRICATING FLUID 6 - VHAP













Mechanical Seal Recommendations by Fluid																																		
Fluid Information			Recommended Mechanical Seal				Materials of Construction Performance Capabilities				Fluid Properties																							
FLUID	PERCENT CONCENTRATION	TEMPERATURE		CAS	SEAL	MATERIAL	PLANS	SEAL	MATERIAL	PLANS	Metals				Faces				Elastomers				SPECIFIC GRAVITY (25°C)	VAPOR (ATM)	BOILING POINT (°C)	MELTING POINT (°C)	VISCOSITY (cP) (25°C) (1ATM)	HAZARD INFORMATION	NOTES					
		°C	°F								A20	HB	HC	MONEL	TI	CB	CR	TC	RSC	DC	FKM	EP								BUNA-N	NEOPRENE	TI/FKM	FF50	FF250
Sour Gas; See Hydrogen Sulfide																																		
Sour Water	100	<50	<122	7783-06-4	180	SSC/SSC-HC-EPDM	11, 13	891	CB/SSC-HC-EPDM	11, 13	891	CB/SSC-HC-EPDM	11, 13	891	CB/SSC-HC-EPDM	A	A	A	A	A	A	A	A	A	A	G	1991	-60.35	85-47	0.12	F+, T+, N			
Stannic Chloride	<50	<65	<149	7646-78-8	180	SSC/CB-HC/S-FKM	11, 13	440	CB/RSC-S-FKM	11, 13	440	CB/RSC-S-FKM	11, 13	440	CB/RSC-S-FKM	A	A	A	A	A	A	A	A	A	A	L						C		
Stannous Chloride	<10	<100	<212	7772-99-8	520	CB/SSC/CB/SSC-S-Chemlast550	53, 54	280	SSC/SSC/CB/SSC-S-Chemlast550	53, 54	280	SSC/SSC/CB/SSC-S-Chemlast550	53, 54	280	SSC/SSC/CB/SSC-S-Chemlast550	B	A	B	A	A	A	A	A	A	A	C								
Starch	>5	<100	<212	9005-29-8	180	CB/SSC-S-FKM	32	442	CB/TC-S-FKM	32	442	CB/TC-S-FKM	32	442	CB/TC-S-FKM	A	A	A	A	A	A	A	A	A	A	C							1, 2, 3	
Steam	100	>115	>599	7732-18-5	180	CB/SSC-S-EPDM	21	280	CB/SSC/CB/SSC-S-EPDM	21	280	CB/SSC/CB/SSC-S-EPDM	21	280	CB/SSC/CB/SSC-S-EPDM	A	A	A	A	A	A	A	A	A	A	L	0.99	100.00					5	
Steam	100	>120	>248	7732-18-5	180	CB/SSC-S-EPDM	11	280	CB/SSC/CB/SSC-S-EPDM	11	280	CB/SSC/CB/SSC-S-EPDM	11	280	CB/SSC/CB/SSC-S-EPDM	A	A	A	A	A	A	A	A	A	L								5	
Stearic Acid	100	<65	<149	57-11-4	180	CB/SSC-S-Chemlast550	62	186	CB/SSC-S-TI/FKM	62	186	CB/SSC-S-TI/FKM	62	186	CB/SSC-S-TI/FKM	A	A	A	A	A	A	A	A	A	L	1.02	375.20	69.60				2, 3		
Styrene Monomer	100	<50	<122	110-42-5	280	TC/SSC/SSC/TC-S-Chemlast550	53, 54									A	A	B	A	A	A	A	A	A	L	0.90	145.16	-30.61	0.70	Xn, Xi	5, 6			
Succinic Acid	<SP	<20	<68	110-15-6	180	CB/SSC-TI-FKM	2/62	280	CB/SSC/CB/SSC-TI-FKM	2/62	280	CB/SSC/CB/SSC-TI-FKM	2/62	280	CB/SSC/CB/SSC-TI-FKM	B	B	B	A	A	A	A	A	A	L	1.57	317.85	187.50						
Succinic Anhydride	<SP	<20	<68	108-30-5	520	CB/SSC/CB/SSC-S-FKM	53, 54	280	CB/SSC/CB/SSC-S-FKM	53, 54	280	CB/SSC/CB/SSC-S-FKM	53, 54	280	CB/SSC/CB/SSC-S-FKM	A	A	A	A	A	A	A	A	A	C							Xi		
Sucrose	<SP	<100	<212	57-50-1	180	TC/TC-S-FKM	62	280	CB/SSC/CB/SSC-S-FKM	62	280	CB/SSC/CB/SSC-S-FKM	62	280	CB/SSC/CB/SSC-S-FKM	A	A	A	A	A	A	A	A	A	C							1, 2		
Sucrose	100	<120	<248	57-50-1	180	TC/TC-S-FKM	62	280	TC/TC/CB/SSC-S-FKM	62	280	TC/TC/CB/SSC-S-FKM	62	280	TC/TC/CB/SSC-S-FKM	A	A	A	A	A	A	A	A	A	C							1, 2, 3		
Sugar Solutions; See Sucrose																																		
Sulfamic Acid	<SP	<100	<212	5329-14-6	180	SSC/SSC-S-FKM	62	280	SSC/SSC/CB/SSC-S-FKM	62	280	SSC/SSC/CB/SSC-S-FKM	62	280	SSC/SSC/CB/SSC-S-FKM	A	A	A	A	A	A	A	A	A	C	2.13	0.00	204.85				Xi	1	
Sulfate Liquors; See White Liquor																																		
Sulfite Liquors; See Red Liquor																																		
Sulfur Chloride	100	<60	<140	10025-67-9	520	CB/SSC/CB/SSC-HC-FKM	53, 54	280	CB/SSC/CB/SSC-HC-FKM	53, 54	280	CB/SSC/CB/SSC-HC-FKM	53, 54	280	CB/SSC/CB/SSC-HC-FKM	B	A	A	A	A	A	A	A	A	L								T, Xn, C, N	
Sulfur Dichloride	100	<20	<68	10945-99-0	280	CB/SSC/CB/SSC-HC-FKM	53, 54									A	A	A	A	A	A	A	A	L	1.61	0.28	59.60	-122.00				C, Xi, N		
Sulfur Dioxide	97	<50	<122	7446-09-5	225	SSC/CB/SSC/CB-TI-Chemlast550	53, 54									A	A	A	A	A	A	A	A	L										
Sulfur Trioxide (wet)	100	<60	<140	7446-11-9	280	CB/SSC/CB/SSC-S-EPDM	53, 54									B	B	B	A	A	A	A	A	L								4, 5		
Sulfur, Molten	<100	<200	<392	7704-34-9	280	TC/SSC/SSC/CB-S-FKM	53, 54									A	A	A	A	A	A	A	A	L	1.82	0.00	336.85	10.31	23.55			C	2, 3	
Sulfuric Acid	>95	<37	<98	7664-93-9	180	SSC/SSC-S-LD-FKM	11, 13	891	RSC/SSC-S-LD-FKM	11, 13	891	RSC/SSC-S-LD-FKM	11, 13	891	RSC/SSC-S-LD-FKM	A	A	A	A	A	A	A	A	L									C	
Sulfuric Acid	<95	<37	<98	7664-93-9	180	SSC/SSC-A20-LD-FKM	11, 13	891	SSC/SSC-A20-LD-FKM	11, 13	891	SSC/SSC-A20-LD-FKM	11, 13	891	SSC/SSC-A20-LD-FKM	A	A	A	A	A	A	A	A	L									C	
Sulfuric Acid	<75	<37	<98	7664-93-9	180	CB/SSC-A20-LD-FKM	11, 13	440	CB/SSC-S-LD-FKM	11, 13	440	CB/SSC-S-LD-FKM	11, 13	440	CB/SSC-S-LD-FKM	A	A	A	A	A	A	A	A	L									C	
Sulfuric Acid	<5	<37	<98	7664-93-9	180	CB/SSC-S-FKM	11, 13	442	CB/SSC-S-FKM	11, 13	442	CB/SSC-S-FKM	11, 13	442	CB/SSC-S-FKM	A	A	A	A	A	A	A	A	L									Xi	
Sulfuric Acid	36	<37	<98	7664-93-9	180	CB/SSC-A20-LD-FKM	11, 13	442	CB/SSC-S-FKM	11, 13	442	CB/SSC-S-FKM	11, 13	442	CB/SSC-S-FKM	A	A	A	A	A	A	A	A	L									C	
Sulfuric Acid, Fuming	103	<20	<68	8014-95-7	180	SSC/SSC-S-Chemlast550	11, 13	186	SSC/SSC-S-Chemlast550	11, 13	186	SSC/SSC-S-Chemlast550	11, 13	186	SSC/SSC-S-Chemlast550	A	A	A	A	A	A	A	A	L										
Sulfurous Acid	100	<60	<140	7782-99-2	520	SSC/SSC/CB/SSC-A20-Chemlast550	53, 54	280	SSC/SSC/CB/SSC-A20-Chemlast550	53, 54	280	SSC/SSC/CB/SSC-A20-Chemlast550	53, 54	280	SSC/SSC/CB/SSC-A20-Chemlast550	B	B	B	A	A	A	A	A	L										
Sulfurous Acid	<100	<60	<140	7782-99-2	520	SSC/SSC/CB/SSC-TI-Chemlast550	53, 54	280	SSC/SSC/CB/SSC-TI-Chemlast550	53, 54	280	SSC/SSC/CB/SSC-TI-Chemlast550	53, 54	280	SSC/SSC/CB/SSC-TI-Chemlast550	A	A	A	A	A	A	A	A	L									*	
Syltherm 800 (TM Dow Corning)	100	<20	<68		520	TC/SSC-TC/TC-S-FKM	53, 54	280	TC/SSC-TC/TC-S-FKM	53, 54	280	TC/SSC-TC/TC-S-FKM	53, 54	280	TC/SSC-TC/TC-S-FKM	A	A	A	A	A	A	A	A	L										
Tall Oil	100	<100	<212	8002-26-4	180	TC/SSC-S-FKM	62	280	TC/SSC/CB/SSC-S-FKM	62	280	TC/SSC/CB/SSC-S-FKM	62	280	TC/SSC/CB/SSC-S-FKM	A	B	A	A	A	A	A	A	L									*	
Tall Oil Resin (acids)	100	>100	>212		186	TC/SSC-S-TI/FKM	62									A	A	A	A	A	A	A	L									*		
Tannic Acid	<SP	<20	<68	1401-55-4	510	CB/SSC-S-FKM	11, 13	891	CB/SSC-S-FKM	11, 13	891	CB/SSC-S-FKM	11, 13	891	CB/SSC-S-FKM	A	A	B	A	A	A	A	A	L										
Tartaric Acid	>20	<100	<212	87-69-4	180	CB/SSC-S-FKM	62	280	CB/SSC/CB/SSC-S-FKM	62	280	CB/SSC/CB/SSC-S-FKM	62	280	CB/SSC/CB/SSC-S-FKM	A	B	A	A	A	A	A	A	L									1	
Terephthalic Acid	<SP	<37	<98	100-21-0	180	TC/SSC-S-Chemlast550	13	186	SSC/SSC-S-TI/FKM	13	186	SSC/SSC-S-TI/FKM	13	186	SSC/SSC-S-TI/FKM	A	A	A	A	A	A	A	A	L	1.51	558.85	427.00						2	
Tert-Butyl Alcohol	100	>25	>77	75-65-0	180	CB/SSC-S-FKM	11, 13	442	RSC/CB/SSC-S-FKM	11, 13	442	RSC/CB/SSC-S-FKM	11, 13	442	RSC/CB/SSC-S-FKM	A	A	A	A	A	A	A	A	L										
Tert-Butyl Mercaptan	100	<20	<68	75-66-1	520	CB/SSC/CB/SSC-S-FKM	53, 54	280	CB/SSC/CB/SSC-S-FKM	53, 54	280	CB/SSC/CB/SSC-S-FKM	53, 54	280	CB/SSC/CB/SSC-S-FKM	A	A	A	A	A	A	A	A	L	0.79	0.24	64.22	1.11	0.58			F, Xn		
Tetrahydrofuran	100	<20	<68	79-27-6	520	CB/SSC/CB/SSC-S-FKM	53, 54	280	CB/SSC/CB/SSC-S-FKM	53, 54	280	CB/SSC/CB/SSC-S-FKM	53, 54	280	CB/SSC/CB/SSC-S-FKM	A	A	A	A	A	A	A	A	L	2.95	0.00	243.50	0.00	7.46			T+, Xi		
Tetrahydrofuran	100	<20	<68	5999-70-4	510	CB/SSC-S-FKM	11, 13	891	CB/TC-S-FKM	11, 13	891	CB/TC-S-FKM	11, 13	891	CB/TC-S-FKM	A	A	A	A	A	A	A	A	L										
Tetrahydrofuran	100	<100	<212	79-34-5	520	CB/SSC/CB/SSC-HC-FKM	53, 54	280	CB/SSC/CB/SSC-HC-FKM	53, 54	280	CB/SSC/CB/SSC-HC-FKM	53, 54	280	CB/SSC/CB/SSC-HC-FKM	A	A	A	A	A	A	A	A	L	1.59	0.01	145.10	-43.80	1.62			T+, N	6	
Tetrahydrofuran	100	<100	<212	79-34-5	520	CB/SSC/CB/SSC-HC-FKM	53, 54	280	CB/SSC																									

Mechanical Seal Recommendations by Fluid										Materials of Construction Capabilities										Fluid Properties																
Fluid Information			Recommended Mechanical Seal			Secondary				Materials of Construction Capabilities										Fluid Properties																
FLUID	PERCENT CONCENTRATION	TEMPERATURE		CAS	SEAL	MATERIAL	P/ING PLANS	SEAL	MATERIAL	P/ING PLANS	Materials of Construction Capabilities										SPECIFIC GRAVITY (25°C)	VAPOR PRESSURE (25°C)	BOILING POINT (°C)	MELTING POINT (°C)	VISCOSITY (cP) (25°C) (1ATM)	HAZARD INFORMATION	NOTES									
		°C	°F								Metals	Faces	Elastomers																							
											Metals	Faces	Elastomers																							
Therminol (TM 44, 55, 66)	100	<175	<347		180	TC/SSC-5-FKM	2/62				A	A	A	A	A	A	A	A	A	A	A	A	A	A	L		*									
Therminol (TM 44, 55, 66)	100	>175	>347		186HT	TC/SSC-5-FKM	62				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	*									
Thiols	100	<70	<158	74-93-1	186	CB/SSC-5-TJ/FKM	62				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	F+, Xn, N									
Tin Chloride; See Stannic Chloride																																				
Tin Tetrachloride; See Stannic Chloride																																				
Titanium Dioxide	>10	>37	>98	13463-67-7	280	SSC/SSC/SSC/CB-5-FKM	53, 54				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	2, 3, 5									
Titanium Dioxide	<10	<37	<98	13463-67-7	280	SSC/SSC/SSC/CB-5-FKM	53, 54	255	TC/TC-TC/CB-5-FKM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C									
Titanium Tetrachloride	100	<70	<158	7550-45-0	280	SSC/SSC/SSC/CB-5-FKM	53, 54				B	B	A	A	A	A	A	A	A	A	A	A	A	A	B	B	L	C								
Toluene	100	<100	<212	108-88-3	180	CB/SSC-5-Chemlast550	11, 13	186	CB/SSC-5-TJ/FKM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	0.86	0.04	110.63	-94.97	0.55	F, Xn	5, 6	
Toluol; See Toluene																																				
Tomato Juice	100	<60	<140		180	SSC/SSC-5-FKM	62	891	CB/RSC-5-FKM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	*								
Toxophene	100	<100	<212	8001-35-2	520	SSC/SSC/CB/SSC-HC-Chemlast550	53, 54	280	SSC/SSC/SSC/CB-HC-Chemlast550		B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C						Ca, T, Xn, Ni, N	6	
Transformer Oil	100	<150	<302		180	TC/SSC-5-FKM	11	891	TC/RSC-5-FKM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	*							
Transmission Fluid Type A	100	<175	<347		180	TC/SSC-5-FKM	2/62				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	*								
Triacetin	100	<20	<68	102-76-1	510	CB/SSC-5-EPDM	11, 13	891	CB/TC-5-EPDM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	1.15	0.00	259.00	4.10	3.44			
Triad; See Trichloroethylene																																				
Triallyl Phosphate	100	<20	<68		520	SSC/SSC/CB/SSC-5-FKM	53, 54	280	SSC/SSC/SSC/CB-5-FKM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	*								
Triazole, 1, 2, 4	<50	<100	<212	208-88-0	510	CB/SSC-5-FKM	11, 13	891	CB/TC-5-FKM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	Xn								
Tributoxy Ethyl Phosphate	100	<20	<68	78-51-3	520	TC/SSC/CB/SSC-5-EPDM	53, 54	280	TC/SSC-SSC/CB-5-EPDM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L								
Tributyl Phosphate	100	<20	<68	126-73-8	520	CB/SSC/CB/SSC-5-Oleomlast550	53, 54	280	CB/SSC-SSC/CB-5-Chemlast550		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	Xn								
Trichloroethane; See Chloroform																																				
Trichloroacetic Acid (TCA)	<50	<100	<212	76-03-9	280	SSC/SSC/SSC/CB-HC-Chemlast550	53, 54				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C						4		
Trichlorobenzene, 1, 2, 4	100	<65	<149	120-82-1	280	CB/SSC/CB/SSC-5-FKM	53, 54				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	1.45	0.00	213.00	17.00	19.05	6		
Trichloroethylene, 1, 1, 1	100	<60	<140	71-55-6	520	CB/SSC/CB/SSC-5-FKM	53, 54	280	CB/SSC/CB-5-FKM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	1.33	0.16	74.08	-30.05	0.79	Xn, N	6
Trichloroethylene	100	<37	<98	79-01-6	520	CB/SSC/CB/SSC-5-FKM	53, 54	280	CB/SSC/CB-5-FKM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	1.46	0.10	86.95	-84.75	0.55	Ca, Xn	6
Trichloroethylene	100	<20	<68	79-01-6	520	CB/SSC/CB/SSC-5-FKM	53, 54	280	CB/SSC/CB-5-FKM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						Ca, Xn	6
Trichlorofluoromethane	100	<20	<68	75-69-4	4400HC	SSC/CB-5-Chemlast550	32	280	CB/SSC/CB-5-Chemlast550		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	1.48	1.05	23.82	-111.11	0.43		
Tricresyl Phosphate	100	<65	<149	1330-78-5	520	CB/SSC/CB/SSC-HC-FKM	53, 54	280	CB/SSC/CB-5-FKM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L							
Triethanolamine	100	<50	<122	102-71-6	186	CB/SSC-5-TJ/FKM	62	180	CB/SSC-5-Chemlast550		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	1.12	0.00	335.39	21.20	609.01	F, C, Xn	6
Triethylamine	100	<50	<122	121-44-8	520	CB/SSC/CB/SSC-5-Chemlast550	53, 54	280	CB/SSC/CB-5-Chemlast550		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	0.72	0.09	88.77	-114.70	0.35		
Trifluoromethane; See Iodoform																																				
Trisodium Phosphate; See Sodium Phosphate																																				
Tung Oil	100	<200	<392	8001-20-5	180	TC/SSC-5-FKM	2/62	280	TC/SSC/CB-5-FKM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L							3
Turbine Oil #15	100	<120	<248		180	TC/SSC-5-FKM	11	891	TC/RSC-5-FKM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L							*
Turbo Oil #35	100	<120	<248		180	TC/SSC-5-FKM	11	891	TC/RSC-5-FKM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L							*
Turpentine	100	<65	<149	8006-64-2	180	TC/SSC-5-FKM	11, 13	891	TC/RSC-5-FKM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						Xn, Xi, N	
Ucon (TM Hydrolytes)	100	<100	<212		180	TC/SSC-5-EPDM	11, 13	891	TC/RSC-5-EPDM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						*	
Ucon (TM Oil)	100	<100	<212		180	TC/SSC-5-EPDM	11, 13	891	TC/RSC-5-EPDM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						*	
Urea	>50	<60	<140	57-13-6	280	SSC/SSC/CB/SSC/CB-TI-FKM	53, 54	891	CB/RSC-5-FKM		B	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	191.85	132.70				1, 5	
Urea	<50	<60	<140	57-13-6	180	SSC/SSC-5-FKM	62	891	CB/RSC-5-FKM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						1, 5	
Urea-Formaldehyde Resin	<SP	<60	<140	9011-05-6	280	TC/SSC/CB-5-Chemlast550	53, 54				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L							3	
Varnish	100	<100	<212		280	TC/SSC/CB-5-FKM	53, 54				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L							3	
Vegetable Juices	100	<60	<140		180	CB/TC-5-FKM	11, 13	442	CB/CB-5-FKM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						*	
Vegetable Oil	100	<65	<149		180	TC/SSC-5-FKM	62	280	TC/SSC/CB-5-FKM		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						*	
Versilube (TM F44, 50, 55)	100	>175	>347		186HT	SSC/SSC-5-FKM	62				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L						*		
Vinegar; See Acetic Acid-10																																				
Vinyl Acetate	100	<60	<140	108-05-4	280	TC/SSC/CB-5-FKM	53, 54				A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	L	0.93	0.15	72.50	-92.80	0.41	F	3, 6	







10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60

0  
6  
31  
32  
33



SECTION V

# TECHNICAL REFERENCE

**SEAL CHAMBER PRESSURE ESTIMATION**

Seal chamber pressure must be known before the proper seal and flush plan can be selected. Seal chamber pressure can vary from pump design, flow rate, and fluid being pumped. Suction and discharge pressures are required to perform these calculations. Often, pump specification sheets can be old and outdated, i.e., design, operating points may have changed due to a change in process demands. It is, for this reason, that suction and discharge pressures should be physically measured with pressure gages.

**Single Stage, Single Suction, Overhung Process Pumps**

Overhung centrifugal pumps are the most common process pumps in the industry. The seal chamber is located behind the pump impeller. Seal chamber pressure can vary based on pump design. The following equations are based on closed throat design seal chambers. Pump designs include wear rings and balance holes in the impeller to reduce thrust load on the bearings. The seal chamber pressure is a function of wear ring clearance as well as size and location of the balance holes.

Quick estimate  $P_{sb} = P_s + .25(P_d - P_s)$

Enclosed or semi-enclosed impellers with wear ring design and balance holes  $P_{sb} = P_s + .05(P_d - P_s)$

Open impeller design with centrifugal pump-out vanes or repeller (no balance holes)  $P_{sb} = P_s + *D(P_d - P_s)$

\*D = .3 if the impeller is at minimum diameter and .1 if the impeller is at maximum diameter.

**Single Stage, Double Suction Pumps**

The single stage, double suction impeller is placed between bearings while the seal chambers are located adjacent to the suction eyes of the impeller. The stuffing box pressure is equal to the suction pressure.  $P_{sb} = P_s$

**Multi-Stage Pumps**

Multi-stage pumps inherently have higher discharge pressures, but low-to-medium stuffing box pressures due to impeller arrangement, casing design, balance drums and the use of balance lines. These multi-stage pumps can be mounted horizontally or vertically.

**Two Stage Horizontal Pumps**

Impeller arrangement can have two configurations:

**1.) Back to Back**

In this arrangement, the seal chambers are located adjacent to the suction eye of the impeller. One chamber will see suction pressure and the other will see first stage discharge pressure.  $P_{sb1} = P_s$   
 $P_{sb2} = P_s + .5(P_d - P_s)$

**2.) Eye to Eye**

In this arrangement the seal chambers are located adjacent to the backside of the impeller. One chamber will see the discharge of the first stage and the other will see pump discharge pressure (second stage discharge).  $P_{sb1} = P_s + .5(P_d - P_s)$   
 $P_{sb2} = P_d$

**Multi-Stage Horizontal Pumps**

Multi-stage boiler feed pumps are used to develop high pressures, but the seal chamber is not necessarily at a high pressure. These pumps have a low pressure chamber (suction pressure) and a higher-pressure chamber (pressure between suction and discharge).  $P_{sb1} = P_s$

Typically, a balance line is used to reduce pressure in the higher pressure seal chamber. Provided pump tolerances are in check, the higher-pressure seal chamber is as follows:  $P_{sb2} = P_s + 5 \text{ bar } (75 \text{ psig})$

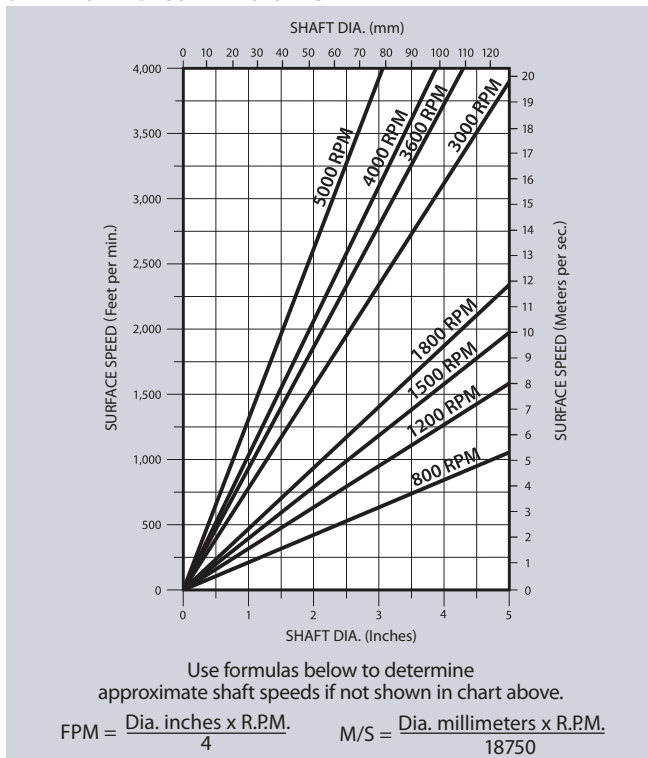
Note: If pump tolerances are not in check and, in the absence of a balance line, the higher-pressure chamber will be a pressure between suction and discharge pressure.  $P_{sb2} = P_s + .5(P_d - P_s)$

**Multi-Stage Vertical Pumps (Can or Turbine)**

In these pumps the seal chamber is located at the discharge elbow. Therefore the seal chamber pressure would see discharge pressure.  $P_{sb} = P_d$

Note: The installation of a bleed-off line can reduce seal chamber pressure, provided pump tolerances are in check.  $P_{sb2} = P_s + 5 \text{ bar } (75 \text{ psig})$

**SHAFT SPEED CONVERSION CHART**



**METRIC FORMULAS:**

$$\text{Head (m)} = \frac{\text{Pressure (bar)} \times 9.8}{SG} = \frac{\text{mm Hg.} \times 0.0014}{SG}$$

$$\text{Pressure (bar)} = \frac{\text{Head (m)} \times SG}{9.8}$$

$$\text{Mm of Mercury} = \frac{\text{Head (m)} \times SG}{0.0014}$$

$$\text{Power (kW)} = \frac{Q \text{ (l/min)} \times \text{Head (m)} \times SG}{\text{efficiency} \times 6128}$$

**IMPERIAL FORMULAS:**

$$\text{Head (ft.)} = \frac{\text{psi} \times 2.31}{\text{sp. gr.}} = \frac{\text{In. Hg.}}{\text{sp. gr.} \times .88}$$

$$\text{BHP (centrifugal)} = \frac{\text{GPM} \times \text{head (ft.)} \times \text{sp. gr.}}{3960 \times \text{pump eff.}}$$

$$\text{PSI} = \frac{\text{head (ft.)} \times \text{sp. gr.}}{2.31} = .49 \times \text{In. Hg.}$$

$$\text{BHP (Positive Disp.)} = \frac{\text{GPM} \times \text{psi}}{1715 \times \text{pump eff.}}$$



**UNITS OF MEASURE**

**Mariner's Measure**

6 Feet = 1 Fathom  
 120 Fathoms = 1 Cable Length (U.S.N.)  
 8.439 Cable Lengths = 1 Nautical Mile  
 6076.12 Ft. = 1 Nautical Mile  
 1 Nautical Mile = 1.15 Statute Mile (International)

**Inch System Conversion**

Inches	x	0.0254	=	Meters
Feet	x	0.305	=	Meters
Yards	x	0.914	=	Meters
Miles	x	1609.	=	Meters
Miles	x	1.609	=	Kilometers
Millimeters	x	0.03937	=	Inches
Centimeters	x	0.3937	=	Inches
Meters	x	39.37	=	Inches
Meters	x	3.281	=	Feet
Meters	x	1.094	=	Yards
Kilometers	x	0.621	=	Miles
Sq. Centimeters	x	0.155	=	Square Inches
Sq. Meters	x	10.764	=	Square Feet
Sq. Meters	x	1.186	=	Square Yards
Cubic Centimeters	x	0.061	=	Cubic Inches
Cubic Inches	x	16.2	=	Cubic Centimeters
Liters	x	0.2642	=	Gallons
Gallons	x	3.78	=	Liters
Cubic Meters	x	1.308	=	Cubic Yards
Cubic Yards	x	0.765	=	Cubic Meters

**Metric System Prefixes**

Mega = 1,000,000	Deci = 0.1	Tera (T) = 10 <sup>12</sup>
Kilo = 1,000	Centi = 0.01	Giga (G) = 10 <sup>9</sup>
Hecto = 100	Milli = 0.001	Nano (N) = 10 <sup>-9</sup>
Deka = 10	Micro = 0.000001	Pico (P) = 10 <sup>-12</sup>

**Length**

1 centimeter	=	0.3937 inch	=	0.0328 foot
1 meter	=	39.37 inches	=	1.0936 yards
1 kilometer	=	0.62137 mile	=	3280 feet
1 inch	=	2.54 centimeters		
1 foot	=	0.3048 meter		
1 mil	=	0.001 inch		

**Square Measure**

1 sq. cm.	=	0.1550 sq. in.		
1 sq. meter	=	1.196 sq. yd.	=	10.764 sq. ft.
1 sq. kilometer	=	0.386 sq. mile		
1 sq. inch	=	6.452 sq. cm.		
1 sq. foot	=	929.03 sq. cm.	=	0.092903 sq. meter
1 sq. yard	=	0.8361 sq. meter		
1 sq. mile	=	2.59 sq. kilometers		
1 circular mil	=	0.7854 sq. mil		
1 sq. inch	=	1,000,000 sq. mils		

**Cubic Measure**

1 cu. centimeter = 0.061 cu. inch    1 cu. in. = 16.39 cu. cm.  
 1 cu. meter = 1.308 cu. yards = 35.316 cu. feet  
 1 gallon (U.S.) = 231 cubic inches  
 1 cu. ft. = 7.48 gallons    1 liter = 1,000 cu. centimeters

**Time**

1 day = 86,400 seconds    1 year = 8,760 hours (approx.)

**Velocity**

1 ft./sec. = 0.3048 meter/sec.	1 meter/sec. = 3.281 ft./sec.
1 ft./min. = 0.00508 meter/sec.	1 meter/sec. = 196.9 ft./min.
1 mile/hr. = 0.4470 meter/sec.	1 meter/sec. = 2.237 mi./hr.
1 kilometer/hr. = 0.2778 meter/sec.	1 meter/sec. = 3.60 km/hr.

**Acceleration**

1 ft./sec./sec.	=	0.3048 meter/sec./sec.
1 mile/hr./sec.	=	0.4470 meter/sec./sec.
1 kilometer/hr./sec.	=	0.2778 meter/sec./sec.
Standard gravitation	=	9.806 meters/sec./sec.
Standard gravitation	=	980.6 cm/sec./sec.
Standard gravitation	=	32.2 ft./sec./sec.

**Mass**

1 slug = 32.2 pounds mass = 14.606 kilograms  
 1 pound mass = 453.6 grams

**Force**

1 pound force	=	1 slug	x	1 foot sec./sec.
1 dyne	=	1 gram	x	1 centimeter/sec./sec.
1 newton	=	1 kilogram	x	meter/sec./sec.
1 pound force	=	4.452 newtons		
1 newton	=	100,000 dynes	=	0.224 pound force
1 gram force	=	980.6 dynes		

**Pressure**

1 atmosphere = 14.69 pounds/sq. inch = 29.92 in. of Hg.  
 = 76 cm of Hg. = 33.9 ft. of water  
 1 in Hg. = 0.491 pounds/sq. inch  
 Water pressure pounds/sq. inch = head in ft. x 0.434

**Torque**

Torque is the product of force and perpendicular distance.  
 1 lb.-ft. = 1.356 newton-meter = 1.356 joule/radian  
 1 lb.-ft. = 1.356 x 10<sup>7</sup> dynes-centimeter  
 1 lb.-ft. = 1.383 x 10<sup>4</sup> grams-centimeter  
 1 lb.-ft. = 192 ounce-inches

**Work and Energy - Mechanical**

1 erg = 1 dyne x 1 centimeter  
 1 joule = 1 newton x 1 meter = 10<sup>5</sup> dynes x 10<sup>2</sup> cm = 10<sup>7</sup> ergs  
 1 ft.-lb. = 1 pound force x 1 foot = 1.356 joules

**Work and Energy - Heat Equivalent**

1 Btu raises 1 pound of water 1°F  
 1 gram calorie raises 1 gram of water 1°C  
 1 Btu = 252 gram calories = 778.3 ft.-lb. = 1054.8 joules  
 1 gram calorie = 0.003964 Btu = 4.184 joules  
 1 horsepower hour = 2545 Btu

**Work and Energy - Electrical Equivalent**

1 joule = 1 watt x 1 second = 1 amp (dc) x 1 volt (dc) x 1 sec.  
 W (joules) = 1/2 L (henries) x I (amperes)<sup>2</sup>  
 W (joules) = 1/2 C (farads) x E (volts)<sup>2</sup>  
 1 kilowatt hour = 3,600,000 joules

**Power**

1 watt = 1 joule/sec.  
 1 horsepower = 550 ft. lb./sec. = 746 watts  
 1 watt = 3.413 Btu/hr = 0.239 gram calorie/sec.  
 P watts = R (ohms) x I (amperes)<sup>2</sup>  
 P watts =  $\frac{E \text{ (volts)}^2}{R \text{ (ohms)}}$

**Angles**

1 circle = 2π radians = 360 degrees    1 radian = 57.3 degrees  
 1 degree = 0.01745 radians

**Geometric Figures**

Circle, area of = D<sup>2</sup> x 0.7854 = π<sup>2</sup>    r = radius  
 Circle, circumference of = πD or 2πr  
 Sphere, area of = πD<sup>2</sup> = 4πr<sup>2</sup>    D = diameter  
 Sphere, volume of = D<sup>3</sup> x 0.5236 = 4/3 πr<sup>3</sup>  
 Triangle, area of = 1/2 altitude x base  
 Cone, volume of = area of base x 1/3 altitude  
 Trapezoid, area of = 1/2 (sum of parallel sides) x altitude  
 Pyramid, volume of = area of base x 1/3 altitude

**Miscellaneous Constants**

π = 3.14159    e = 2.71828  
 Log<sub>e</sub> X = 2.30259 log<sub>10</sub> X  
 Electronic charge = 4.5 x 10<sup>-10</sup> e.s.u. = 1.60 x 10<sup>-20</sup> e.m.u.  
 Mass units = 1.07 x 10<sup>-3</sup> x Mev = 6.71 x 10<sup>2</sup> ergs  
 Speed of light = 3 x 10<sup>8</sup> meters/second  
 Speed of sound = (in air at sea level) = 1100 ft/second

**TEMPERATURE CONVERSION TABLES**

NOTE-The numbers in **BOLD FACE** refer to the temperature either in degrees Centigrade or Fahrenheit which is desired to convert into the other scale.

°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	
-17.8	<b>0</b>	32.0	5.6	<b>42</b>	107.6	28.9	<b>84</b>	183.2	171	<b>340</b>	644	404	<b>760</b>	1400
-17.2	<b>1</b>	33.8	6.1	<b>43</b>	109.4	29.4	<b>85</b>	185.0	177	<b>350</b>	662	410	<b>770</b>	1418
-16.7	<b>2</b>	35.6	6.7	<b>44</b>	111.2	30.0	<b>86</b>	186.8	182	<b>360</b>	680	416	<b>780</b>	1436
-16.1	<b>3</b>	37.4	7.2	<b>45</b>	113.0	30.6	<b>87</b>	188.6	188	<b>370</b>	698	421	<b>790</b>	1454
-15.6	<b>4</b>	39.2	7.8	<b>46</b>	114.8	31.1	<b>88</b>	190.4	193	<b>380</b>	716	427	<b>800</b>	1472
-15.0	<b>5</b>	41.0	8.3	<b>47</b>	116.6	31.7	<b>89</b>	192.2	199	<b>390</b>	734	432	<b>810</b>	1490
-14.4	<b>6</b>	42.8	8.9	<b>48</b>	118.4	32.2	<b>90</b>	194.0	204	<b>400</b>	752	438	<b>820</b>	1508
-13.9	<b>7</b>	44.6	9.4	<b>49</b>	120.2	32.8	<b>91</b>	195.8	210	<b>410</b>	770	443	<b>830</b>	1526
-13.3	<b>8</b>	46.4	10.0	<b>50</b>	122.0	33.3	<b>92</b>	197.6	216	<b>420</b>	788	449	<b>840</b>	1544
-12.8	<b>9</b>	48.2	10.6	<b>51</b>	123.8	33.9	<b>93</b>	199.4	221	<b>430</b>	806	454	<b>850</b>	1562
-12.2	<b>10</b>	50.0	11.1	<b>52</b>	125.6	34.4	<b>94</b>	201.2	227	<b>440</b>	824	460	<b>860</b>	1580
-11.7	<b>11</b>	51.8	11.7	<b>53</b>	127.4	35.0	<b>95</b>	203.0	232	<b>450</b>	842	466	<b>870</b>	1598
-11.1	<b>12</b>	53.6	12.2	<b>54</b>	129.2	35.6	<b>96</b>	204.8	238	<b>460</b>	860	471	<b>880</b>	1616
-10.6	<b>13</b>	55.4	12.8	<b>55</b>	131.0	36.1	<b>97</b>	206.6	243	<b>470</b>	878	477	<b>890</b>	1634
-10.0	<b>14</b>	57.2	13.3	<b>56</b>	132.8	36.7	<b>98</b>	208.4	249	<b>480</b>	896	482	<b>900</b>	1652
-9.4	<b>15</b>	59.0	13.9	<b>57</b>	134.6	37.2	<b>99</b>	210.2	254	<b>480</b>	914	488	<b>910</b>	1670
-8.9	<b>16</b>	60.8	14.4	<b>58</b>	136.4	37.8	<b>100</b>	212.0	260	<b>500</b>	932	493	<b>920</b>	1686
-8.3	<b>17</b>	62.6	15.0	<b>59</b>	138.2				266	<b>510</b>	950	499	<b>930</b>	1706
-7.8	<b>18</b>	64.4	15.6	<b>60</b>	140.0	43.3	<b>110</b>	230	271	<b>520</b>	968	504	<b>940</b>	1724
-7.2	<b>19</b>	66.2	16.1	<b>61</b>	141.8	48.9	<b>120</b>	248	277	<b>530</b>	986	510	<b>950</b>	1742
-6.7	<b>20</b>	68.0	16.7	<b>62</b>	143.6	54.4	<b>130</b>	266	282	<b>540</b>	1004	516	<b>960</b>	1760
-6.1	<b>21</b>	69.8	17.2	<b>63</b>	145.4	60.0	<b>140</b>	284	288	<b>550</b>	1022	521	<b>970</b>	1778
-5.6	<b>22</b>	71.6	17.8	<b>64</b>	147.2	65.6	<b>150</b>	302	293	<b>560</b>	1040	527	<b>980</b>	1796
-5.0	<b>23</b>	73.4	18.3	<b>65</b>	149.0	71.1	<b>160</b>	320	299	<b>570</b>	1058	532	<b>990</b>	1814
-4.4	<b>24</b>	75.2	18.9	<b>66</b>	150.8	76.7	<b>170</b>	338	304	<b>580</b>	1076	538	<b>1000</b>	1832
-3.9	<b>25</b>	77.0	19.4	<b>67</b>	152.6	82.2	<b>180</b>	356	310	<b>590</b>	1094	543	<b>1010</b>	1850
-3.3	<b>26</b>	78.8	20.0	<b>68</b>	154.4	87.8	<b>190</b>	374	316	<b>600</b>	1112	549	<b>1020</b>	1868
-2.8	<b>27</b>	80.6	20.6	<b>69</b>	156.2	93.3	<b>200</b>	392	321	<b>610</b>	1130	554	<b>1030</b>	1886
-2.2	<b>28</b>	82.4	21.1	<b>70</b>	158.0	98.9	<b>210</b>	410	327	<b>620</b>	1148	560	<b>1040</b>	1904
-1.7	<b>29</b>	84.2	21.7	<b>71</b>	159.8	104	<b>212</b>	413	332	<b>630</b>	1166	566	<b>1050</b>	1922
-1.1	<b>30</b>	86.0	22.2	<b>72</b>	161.6	100	<b>220</b>	428	338	<b>640</b>	1184	571	<b>1060</b>	1940
-6	<b>31</b>	87.8	22.8	<b>73</b>	163.4	110	<b>230</b>	446	343	<b>650</b>	1202	577	<b>1070</b>	1958
0	<b>32</b>	89.6	23.3	<b>74</b>	165.2	116	<b>240</b>	464	349	<b>660</b>	1220	582	<b>1080</b>	1976
6	<b>33</b>	91.4	23.9	<b>75</b>	167.0	121	<b>250</b>	482	354	<b>670</b>	1238	588	<b>1090</b>	1994
1.1	<b>34</b>	93.2	24.4	<b>76</b>	168.8	127	<b>260</b>	500	360	<b>680</b>	1256	593	<b>1100</b>	2012
1.7	<b>35</b>	95.0	25.0	<b>77</b>	170.6	132	<b>270</b>	518	366	<b>690</b>	1274	599	<b>1110</b>	2030
2.2	<b>36</b>	96.8	25.6	<b>78</b>	172.4	138	<b>280</b>	536	371	<b>700</b>	1292	604	<b>1120</b>	2048
2.8	<b>37</b>	98.6	26.1	<b>79</b>	174.2	143	<b>290</b>	554	377	<b>710</b>	1310	610	<b>1130</b>	2066
3.3	<b>38</b>	100.4	26.7	<b>80</b>	176.0	149	<b>300</b>	572	382	<b>720</b>	1328	616	<b>1140</b>	2084
3.9	<b>39</b>	102.2	27.2	<b>81</b>	177.8	154	<b>310</b>	590	388	<b>730</b>	1346	621	<b>1150</b>	2102
4.4	<b>40</b>	104.0	27.8	<b>82</b>	179.6	160	<b>320</b>	608	393	<b>740</b>	1364	627	<b>1160</b>	2120
5.0	<b>41</b>	105.8	28.3	<b>83</b>	181.4	166	<b>330</b>	626	399	<b>750</b>	1382	632	<b>1170</b>	2138

**OTHER HANDY FORMULAS**

**Power Transmission by Shaft**

HP = [Torque (in lb-ft) x rpm] ÷ 5250

**Power to Drive Pumps**

HP =  $\frac{\text{Gal. per min.} \times \text{total head (inc. friction)}}{3,960 \times \text{eff. of pump}}$

Where: Approx. friction head (ft.) =  
 $\frac{\text{pipe length (ft.)} \times [\text{velocity of flow (fps)]}^2 \times 0.02}{5.367 \times \text{diameter (in.)}}$

Eff. = Approximately 0.50 to 0.85

**Formula for Problems Involving Rotating Masses**

Time required to change speed of rotating mass from N<sub>1</sub> to N<sub>2</sub> rpm.

$t = \frac{(Wr^2)(N_2 - N_1)}{(308)(\text{torque lb-ft})} \text{ Sec.}$

Where (Wr<sup>2</sup>) = Flywheel effect.

Kinetic energy of rotating mass.

K.E. =  $\frac{(WK^2)(\text{rpm}^2)}{5870} \text{ ft-lbs} = \frac{(WK^2)(\text{rpm}^2)}{3.23 \times 10^6} \text{ hp. sec.}$

Where W = Weight (lbs.)

K = Radius of gyration (ft.)

**Induction motor acceleration loss.**

Loss  $\cong \left(1 + \frac{R_1}{R_2}\right) \frac{WK^2(N_2 - N_1)^2}{3.23 \times 10^6} \text{ hp. sec.}$

Where R<sub>1</sub> and R<sub>2</sub> = stator and rotor resistances.

Stored energy constant.

$H = \frac{0.231 (Wr^2) (\text{rpm})^2 \cdot 10^{-6}}{\text{kva}} \text{ Kw. sec. per kva.}$

**Transfer of WK<sub>2</sub> through a gear.**

$WK_1^2 = WK_2^2 \left(\frac{N_2}{N_1}\right)^2$

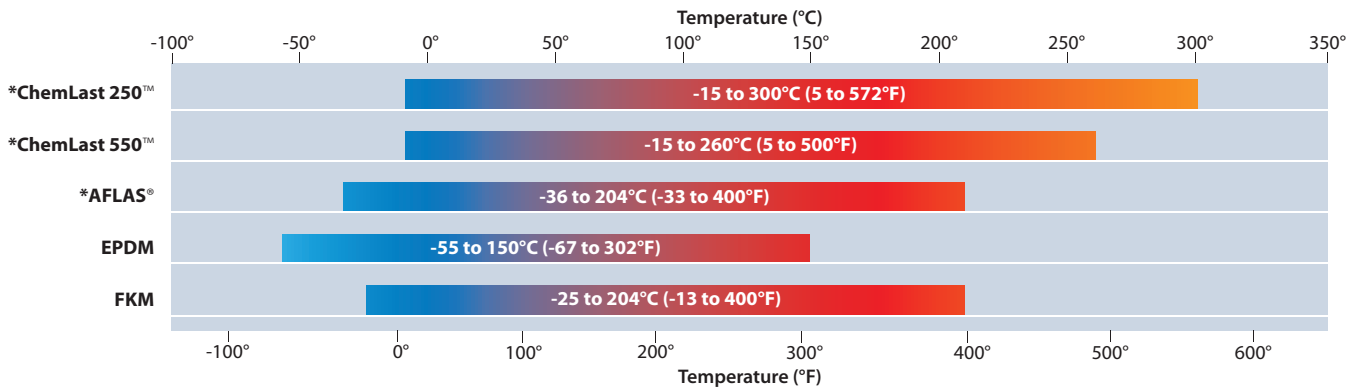
**COMMON FRACTIONS REDUCED TO DECIMALS**

8ths	16ths	32nds	64ths	Decimal		
			1	.015625		
			2	.03125		
			3	.046875		
	1	2	4	.0625		
			5	.078125		
		3	6	.09375		
			7	.109375		
1	2	4	8	.125		
			9	.140625		
		5	10	.15625		
			11	.171875		
		3	6	.12	.1875	
			13	.203125		
			7	14	.21875	
			15	.234375		
2	4	8	16	.25		
			17	.265625		
			9	18	.28125	
			19	.296875		
		5	10	20	.3125	
			21	.328125		
			11	22	.34375	
			23	.359375		
		3	6	12	24	.375
			25	.390625		
			13	26	.40625	
			27	.421875		
		7	14	28	.4375	
			29	.453125		
			15	30	.46875	
			31	.484375		
4	8	16	32	.5		

8ths	16ths	32nds	64ths	Decimal			
			33	.515625			
			17	34	.53125		
			35	.546875			
		9	18	36	.5625		
			37	.578125			
			19	38	.59375		
			39	.609375			
		5	10	20	40	.625	
			41	.640625			
			21	42	.65625		
			43	.671875			
			11	22	44	.6875	
			45	.703125			
			23	46	.71875		
			47	.734375			
		6	12	24	48	.75	
			49	.765625			
			25	50	.78125		
			51	.796875			
			13	26	52	.8125	
			53	.828125			
			27	54	.84375		
			55	.859385			
			7	14	28	56	.875
			57	.890625			
			29	58	.90625		
			59	.921875			
			15	30	60	.9375	
			61	.953125			
			31	62	.96875		
			63	.984375			
			8	16	32	64	1.00000

## MATERIAL REFERENCE

### Operating Limits of Elastomers



### Key to Seal Materials

Component	Chesterton	EN12756	Description
<b>Faces</b>	CB	B	Carbon Graphite, Resin Impregnated
	SSC	Q <sub>1</sub>	Silicon Carbide, Sintered Pressureless
	RSC	Q <sub>2</sub>	Silicon Carbide, Reaction Bonded
	TC	U <sub>2</sub>	Tungsten Carbide, Ni-Binder
	CR	V	Aluminum Oxide, 99.5%
<b>Metals</b>	316	G	CrNiMo steel (1.4401)
	Alloy-20	M <sub>3</sub>	20 Cb3 (2.4660)
	Ti	T <sub>2</sub>	Titanium (3.7035)
	HC	M <sub>5</sub>	Hastelloy® C-276 (2.4819)
	HB	M <sub>1</sub>	Hastelloy® B2 (2.4617)
	Monel®	M <sub>4</sub>	Monel® Alloy K500 (2.4375)
<b>Elastomers</b>	FKM	V	Fluorocarbon
	EPDM	E	Ethylene Propylene Rubber
	FEPM	X	Tetra-ethylene Propylene Rubber
	FFKM	K	Perfluoroelastomer
	C550	K <sub>1</sub>	Chemlast 550
	C250	K <sub>2</sub>	Chemlast 250

\* Consult Chesterton Engineering on lower temperature limits

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FORM NO. EN21847

PRINTED IN USA 04/11