Advantage Seal
The Seal of Quality

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# MECHANICAL SEAL CATALOG

Advantage Seal
The Seal of Quality



FIFTH EDITION



Advantage Seal
The Seal of Quality

## Our Mission

To empower pump companies and drive industry excellence. We are committed to delivering exceptional services, unwavering support, and top-notch products of the highest quality.

## Our Vision

We aspire to be at the forefront of technological advancements in the pump mechanical seal industry, setting new standards and redefining excellence.

## Core Values

At the heart of our values lies a steadfast commitment to:

· Customer Focus
· Reliability and Accountability
· Continuous Improvement
· Passion for Excellence

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# ADVANTAGE SEAL HISTORY

### 1995
With the rapid growth of mechanical seal manufacturers, Pac-Seal® was acquired by Durametallic Corp in 1995. Two years later, Durametallic merged with BorgWarner Industrial Products to form Flowserve® Corp, which today stands as one of the four leading mechanical seal manufacturers worldwide.

### 2002
Following the merger, the company's strategic priorities evolved to align with broader corporate objectives, placing greater emphasis on shareholder interests. Recognizing an opportunity to refocus on personalized service and technical excellence, a group of seasoned sealing experts and senior engineers founded *Advantage Seal* in 2002 in Bolingbrook, Illinois. Their mission was to reintroduce a customer-focused approach to the mechanical seals industry.

### 2003-2004
Advantage Seal began by specializing in high-quality, cost-effective OEM mechanical seals for pool and spa applications. Driven by a commitment to continuous improvement, the company consistently innovated to meet the evolving needs of its growing customer base. Before long, Advantage Seal successfully expanded into the OEM industrial and commercial pump mechanical seals market. By leveraging efficient manufacturing partnerships in China, the company maintained its ability to offer reliable, competitively priced products. This strategic approach facilitated steady growth, enabling Advantage Seal to extend its presence beyond the U.S. market into Europe and Asia.

### 2005
In 2005, Advantage Seal strategically expanded its operations by establishing a state-of-the-art facility in Ningbo, China, mirroring its U.S. manufacturing excellence. This expansion seamlessly blended American innovation with China's efficient manufacturing capabilities, enabling the company to consistently deliver high-quality, cost-effective sealing solutions. This strategic move not only enhanced production efficiency but also propelled Advantage Seal's growth, extending its reach from the U.S. to Europe and Asia.



### 2010
In 2010, Advantage Seal established its engineering support operations in the Philippines to strengthen its global service capabilities. This dedicated team plays a crucial role in supporting both the company's manufacturing facility in China and customers around the world. Equipped with cutting-edge design software and advanced tools, the Philippine engineers specialize in analyzing and resolving the most demanding seal application challenges. They also conduct hands-on failure analysis directly at end-user sites, ensuring a deep understanding of real-world conditions. The insights gained are continually integrated into the design process, driving continuous improvement and innovation. This operation reflects Advantage Seal's unwavering commitment to customer-focused solutions, technical excellence, and global collaboration.

### 2018
In 2018, Advantage Seal enhanced its Ningbo, China operation by integrating in-house rubber molding and precision machining departments. This strategic expansion allowed the company to streamline production, improve quality control, and significantly reduce manufacturing costs. By bringing these critical processes under one roof, Advantage Seal gained greater flexibility and responsiveness, enabling faster turnaround times and more competitive pricing.

The result is enhanced value for customers high-quality, reliable sealing solutions delivered with improved efficiency and service. This investment underscores Advantage Seal's ongoing commitment to innovation, cost leadership, and exceeding customer expectations.

### Now and the Future
Looking ahead, Advantage Seal remains steadfast in its commitment to being the trusted partner of high-quality OEM pump manufacturers worldwide. The company continues to invest in advanced technologies, innovative design solutions, and world-class manufacturing processes to deliver sealing products that set industry standards. With a relentless focus on quality, reliability, and customer satisfaction, Advantage Seal is dedicated to not only meeting but exceeding the evolving needs of its customers always ready to go the extra mile.

As part of its forward-thinking vision, Advantage Seal is also embracing sustainable practices and operational efficiencies to reduce environmental impact while supporting global growth. By fostering continuous innovation and strengthening partnerships across industries and regions, Advantage Seal is poised to lead the mechanical seals market into the future—offering value-driven, customer-centric solutions that stand the test of time.

# Mechanical Seal

A mechanical seal is a device used to prevent fluid leakage around the rotating shaft of a pump. These seals are commonly installed in pumps across a wide range of industries, including chemical processing, water treatment, paper production, food processing, and many other applications.

A mechanical seal typically consists of two main components: a rotating part and a stationary part. The rotating part is mounted on the pump shaft and turns with it during operation. The stationary part is fixed to the pump housing and includes a stationary seat along with a secondary seal, which prevents liquid from escaping. Together, these components create a tight seal that helps ensure efficient and reliable pump performance.





# Three Sealing Points

**Primary Sealing Point**

The primary sealing point is a dynamic seal formed where the rotating and stationary components are pressed tightly together, typically using spring force. Lubrication, usually provided by the process fluid (product media), is essential to reduce face friction and dissipate heat, thereby preventing premature wear.

This sealing action is achieved through two extremely flat, precision-lapped faces, typically within 3 helium light bands, creating a nearly leak-proof interface that allows minimal leakage, usually limited to vapor.

**Secondary Sealing Points A and B**

These are static sealing points responsible for sealing between the shaft and the bore. Materials commonly used for secondary seals include elastomers such as diaphragms, gaskets, and O-rings, as well as Teflon and other specialty materials. These components ensure that no fluid bypasses the main sealing interface through shaft or housing gaps.

# Factors To Consider When Selecting a Mechanical Seal

Mechanical seals fail prematurely either because the seal faces open or one of the seal components is damaged. A seal face could open when the product changes state, i.e., from liquid to gas, and interferes with the free movement of the seal by crystallizing, solidifying, or becoming viscous.

The solids in the product you are sealing could also clog the movable components. The most common cause of component damage is corrosion of the individual seal components, primarily because the material used is not compatible with the pumped medium. A seal may also be physically damaged due to high temperature or excessive pressure.



When selecting the correct seal, the design must be able to handle the speed, temperature, and pressure limits of the application, as well as any steam, cleaners, or solvents that might be used to clean or flush the lines.

It is important to note that the seal should ideally operate in a clean, cool, lubricating liquid.

When selecting the **seal's material of construction,** be sure to **consider the following characteristics of the material:**

1. Temperature constraints
2. Chemical resistance properties
3. Flexibility
4. Wear resistance
5. Thermal expansion and conductivity properties

Consider these material characteristics **when selecting the face and other component materials for the seal:**

1. Wear resistance
2. Low leakage and friction properties
3. Good thermal properties
4. Corrosion resistance



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# Consider the Following When Selecting a Mechanical Seal

## 1. Type of Fluid

Seal material must be able to withstand the fluid being processed. All seal materials must be chemically compatible with the fluid being handled; otherwise, there is an increased risk of seal failure.

## 2. Pressure

Pressure in the seal chamber and seal size determine the type of seal required balanced or unbalanced.

## 3. Characteristics of the Fluid

Knowing the viscosity of the fluid is important to ensure appropriate seal life. Abrasive fluids can cause excessive wear and shorten the seal's lifespan.

## 4. Temperature of the Fluid

Seal materials must be selected to appropriately handle the fluid's temperature. Different seal materials are rated for certain temperature ranges and should not be operated beyond their specified limits.

## 5. Emission & Reliability Specification

The seal type and arrangement selected must meet the desired reliability and emission standards for the pump application. There should be no leakage of fluids.

Double seals and double gas barrier seals are becoming the seals of choice.



# Advantage Design

Seal performance greatly influences pump performance.
Advantage Seal understands the importance of a properly designed seal in pump operations.

Our crimped rotating head design and hex-drive distribution system provide enhanced operation levels, superior reliability, increased durability, and greater ease-of-use as compared to other seal designs.



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## The Crimped Head Design

• By eliminating contact between the seal ring and the metal shell, Advantage seals are capable of operating at higher pressure levels and faster shaft speeds.

• With the seal ring crimped securely in place, foreign particles and solids cannot intrude and dislodge the seal ring.

• Manufactured without glue, our seals pose no questions of chemical compatibility or issues with seal rings falling out during installation, even if they are installed nose down.

## The Hex-Drive Distribution Advantage

• The hex-drive system evenly distributes torque around the seal head by incorporating a solid six-faced drive band that protects the diaphragm and eliminates the need for tangs and notches.

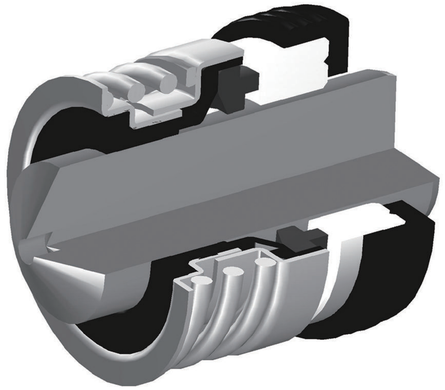
• Inferior tang and notch drive systems commonly fail due to broken tangs, loose engagements, and torn diaphragms. The Advantage Seal hex-drive system features a locking positive engagement that eliminates drive failure.

• You can rely on Advantage seals to endure, even during frequent start-and-stop operations, and high break-away torque situations.



# Type 16







## Single Coil Spring

Helps prevent clogging

## Variety of Mating Rings

O-Ring Mount
Cup Mount
DIN

## Unitized Design

No-hassle handling
Easy to install

## Hex Drive

Will not disengage during operation
Protects the elastomer bellows from damage

## Ideal for

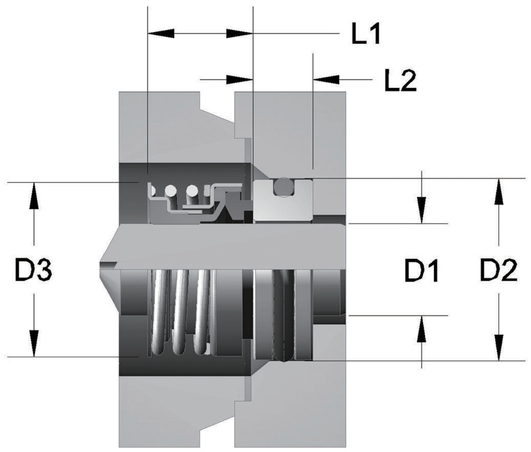
Pool Pumps
Spa Pumps
Smaller Industrial and
Commercial applications

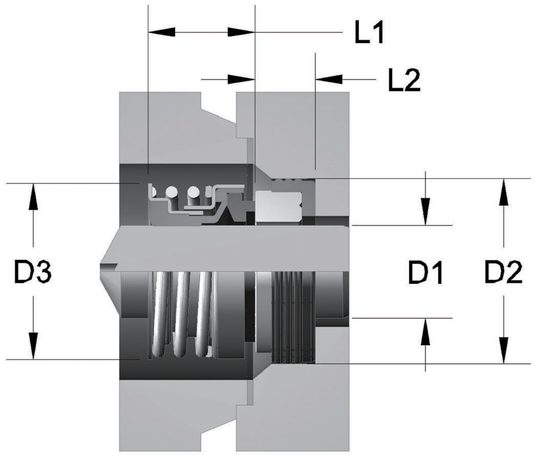
## Technical Parameters

Temperature: -40°F (-40°C) ~ 400°F (204°C)
Pressure: 150 PSI*
Speed: 12-15m/s








| US Standard | | | | |
|---|---|---|---|---|
| D1 | D2 | D3 | L1 | L2 |
| Inches | | | | |
| 0.375 | 0.875 | 0.915 | 0.656 | 0.281 |
| 0.437 | 1.000 | 0.915 | 0.656 | 0.312 |
| 0.500 | 1.000 | 0.915 | 0.656 | 0.312 |
| 0.625 | 1.250 | 1.190 | 0.718 | 0.406 |
| 0.750 | 1.375 | 1.304 | 0.718 | 0.406 |
| 0.875 | 1.500 | 1.463 | 0.812 | 0.406 |
| 1.000 | 1.625 | 1.588 | 0.812 | 0.437 |

| US Standard | | | | |
|---|---|---|---|---|
| D1 | D2 | D3 | L1 | L2 |
| Millimeter | | | | |
| 9.53 | 22.23 | 23.24 | 16.66 | 7.14 |
| 11.10 | 25.40 | 23.24 | 16.66 | 7.92 |
| 12.70 | 25.40 | 23.24 | 16.66 | 7.92 |
| 15.88 | 31.75 | 30.23 | 18.24 | 10.31 |
| 19.05 | 34.93 | 33.12 | 18.24 | 10.31 |
| 22.23 | 38.10 | 37.16 | 20.62 | 10.31 |
| 25.40 | 41.28 | 40.33 | 20.62 | 11.10 |

## Tolerance and Finishes

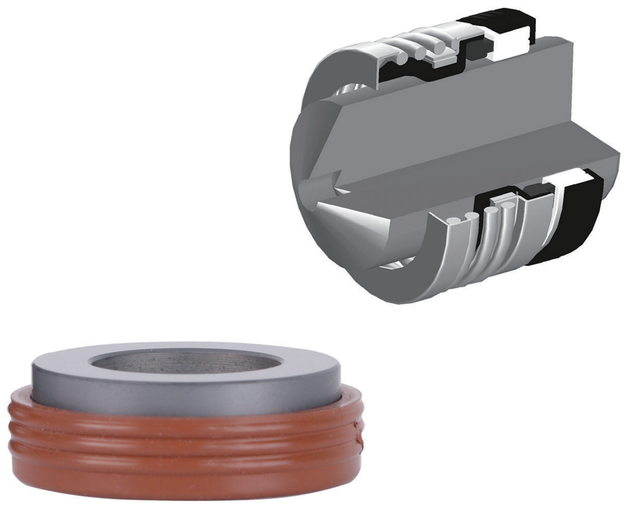
Equipment Shaft ± 0.002 (0.05mm)
Seat Bore ± 0.002 (0.05mm)
Shaft Sleeve surface finish 35 Ra to 105 Ra
Maximum End-Play 0.005 (0.13mm)

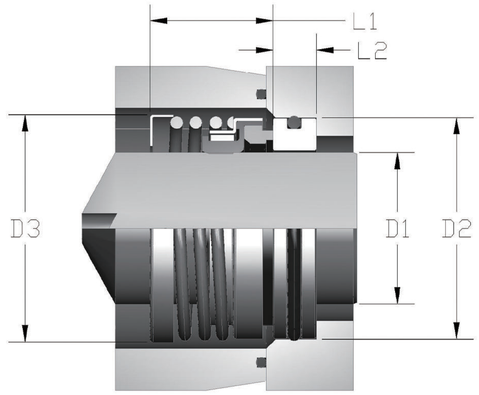
## Advantage Seal Type 16 replaces

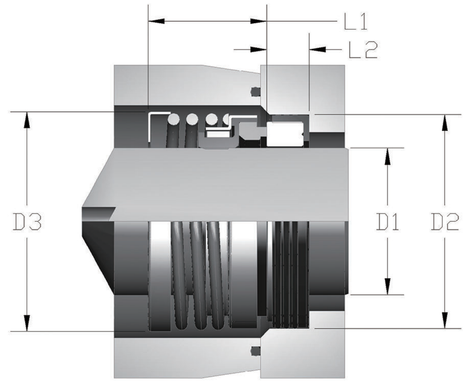
Pac-Seal Type 16
Sealol Type 60L
US Seal Type A

# Type 21








## Single Coil Spring

Helps prevent clogging

## Unitized Design

No-hassle handling
Easy to install

## Ideal for

Pool Pumps
Spa Pumps
Smaller Industrial and
Commercial applications

## Variety of Mating Rings

O-Ring Mount
Cup Mount
DIN

## Technical Parameters

Temperature: -40°F (-40°C) ~ 400°F (204°C)
Pressure: 150 PSI*
Speed: 12-15m/s

## Tolerance and Finishes

Equipment Shaft ± 0.002 (0.05mm)
Seat Bore ± 0.002 (0.05mm)
Shaft / Sleeve surface finish 35 Ra to 105 Ra
Maximum End-Play 0.005 (0.13mm)

## Advantage Seal Type 21 replaces

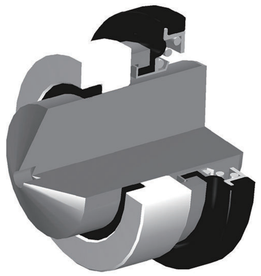
John Crane Type 21, Type 2100
Sealol Type 43 CU Short | Pac-Seal Type 21

| Metric DIN Standard | | | | |
|---|---|---|---|---|
| D1 | D2 | D3 | L1 | L2 |
| Millimeter | | | | |
| 18.00 | 32.99 | 33.12 | 26.59 | 10.49 |
| 20.00 | 34.98 | 33.12 | 26.59 | 10.49 |
| 22.00 | 37.01 | 33.12 | 26.59 | 10.49 |
| 24.00 | 38.99 | 40.34 | 28.98 | 10.49 |
| 25.00 | 40.01 | 40.34 | 28.98 | 10.49 |
| 28.00 | 42.98 | 46.69 | 31.75 | 10.49 |
| 30.00 | 45.01 | 46.69 | 31.75 | 10.49 |
| 32.00 | 48.01 | 46.69 | 31.75 | 10.49 |
| 33.00 | 48.01 | 46.69 | 31.75 | 10.49 |
| 35.00 | 50.01 | 49.86 | 31.75 | 10.49 |
| 38.00 | 56.01 | 54.71 | 33.32 | 11.51 |
| 40.00 | 57.99 | 61.85 | 33.32 | 11.51 |
| 43.00 | 61.01 | 61.85 | 33.32 | 11.51 |
| 45.00 | 62.99 | 61.85 | 33.32 | 11.51 |
| 48.00 | 65.99 | 65.02 | 33.32 | 11.51 |
| 50.00 | 70.00 | 71.37 | 35.71 | 13.49 |
| 53.00 | 73.00 | 74.55 | 35.71 | 13.49 |
| 55.00 | 74.98 | 74.55 | 35.71 | 13.49 |
| 58.00 | 78.00 | 74.55 | 38.48 | 13.49 |
| 60.00 | 80.01 | 77.06 | 38.48 | 13.49 |
| 63.00 | 83.01 | 87.30 | 38.48 | 13.49 |
| 65.00 | 84.99 | 90.40 | 38.48 | 13.49 |
| 68.00 | 89.99 | 90.40 | 38.48 | 15.49 |
| 70.00 | 92.00 | 90.40 | 45.49 | 15.49 |
| 75.00 | 96.82 | 93.57 | 45.49 | 15.49 |
| 80.00 | 105.13 | 99.92 | 45.49 | 15.49 |

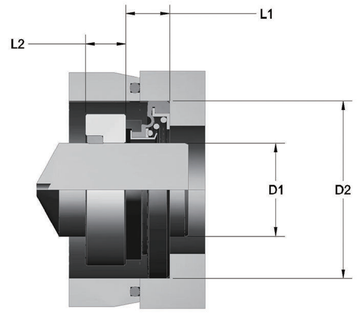
| US Standard | | | | |
|---|---|---|---|---|
| D1 | D2 | D3 | L1 | L2 |
| Inches | | | | |
| 0.500 | 1.000 | 0.915 | 0.812 | 0.312 |
| 0.625 | 1.250 | 1.177 | 0.875 | 0.406 |
| 0.750 | 1.375 | 1.304 | 0.875 | 0.406 |
| 0.875 | 1.500 | 1.463 | 0.937 | 0.406 |
| 1.000 | 1.625 | 1.588 | 1.000 | 0.437 |
| 1.125 | 1.750 | 1.838 | 1.062 | 0.437 |
| 1.250 | 1.875 | 1.838 | 1.062 | 0.437 |
| 1.375 | 2.000 | 1.963 | 1.125 | 0.437 |
| 1.500 | 2.125 | 2.154 | 1.125 | 0.437 |
| 1.625 | 2.375 | 2.435 | 1.375 | 0.500 |
| 1.750 | 2.500 | 2.435 | 1.375 | 0.500 |
| 1.875 | 2.625 | 2.560 | 1.500 | 0.500 |
| 2.000 | 2.750 | 2.810 | 1.500 | 0.500 |
| 2.125 | 3.000 | 3.034 | 1.687 | 0.562 |
| 2.250 | 3.125 | 3.034 | 1.687 | 0.562 |
| 2.375 | 3.250 | 3.105 | 1.812 | 0.562 |
| 2.500 | 3.375 | 3.340 | 1.812 | 0.562 |
| 2.625 | 3.375 | 3.559 | 1.937 | 0.625 |
| 2.750 | 3.500 | 3.559 | 1.937 | 0.625 |
| 2.875 | 3.750 | 3.684 | 2.062 | 0.625 |
| 3.000 | 3.875 | 3.934 | 2.062 | 0.625 |

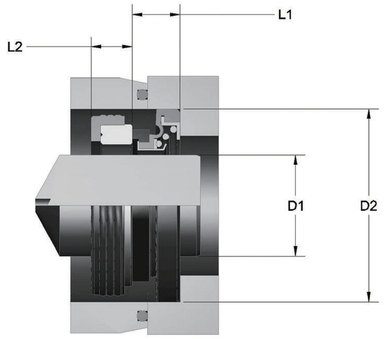
| US Standard | | | | |
|---|---|---|---|---|
| D1 | D2 | D3 | L1 | L2 |
| Millimeter | | | | |
| 12.70 | 25.40 | 23.24 | 20.62 | 7.92 |
| 15.88 | 31.75 | 29.90 | 22.23 | 10.31 |
| 19.05 | 34.93 | 33.12 | 22.23 | 10.31 |
| 22.23 | 38.10 | 37.16 | 23.80 | 10.31 |
| 25.40 | 41.28 | 40.34 | 25.40 | 11.10 |
| 28.58 | 44.45 | 46.69 | 26.97 | 11.10 |
| 31.75 | 47.63 | 46.69 | 26.97 | 11.10 |
| 34.93 | 50.80 | 49.86 | 28.58 | 11.10 |
| 38.10 | 53.98 | 54.71 | 28.58 | 11.10 |
| 41.28 | 60.33 | 61.85 | 34.93 | 12.70 |
| 44.45 | 63.50 | 61.85 | 34.93 | 12.70 |
| 47.63 | 66.68 | 65.02 | 38.10 | 12.70 |
| 50.80 | 69.85 | 71.37 | 38.10 | 12.70 |
| 53.98 | 76.20 | 77.06 | 42.85 | 14.27 |
| 57.15 | 79.38 | 77.06 | 42.85 | 14.27 |
| 60.33 | 82.55 | 78.87 | 46.02 | 14.27 |
| 63.50 | 85.73 | 84.84 | 46.02 | 14.27 |
| 66.68 | 82.73 | 90.40 | 49.20 | 15.88 |
| 69.85 | 88.90 | 90.40 | 49.20 | 15.88 |
| 73.03 | 95.25 | 93.57 | 52.37 | 15.88 |
| 76.20 | 98.43 | 99.92 | 52.37 | 15.88 |

# Type 41








| US Standard | | | |
|---|---|---|---|
| D1 | D2 | L1 | L2 |
| Inches | | | |
| 0.375 | 1.125 | 0.390 | 0.164 |
| 0.500 | 1.125 | 0.390 | 0.312 |
| 0.625 | 1.500 | 0.556 | 0.343 |
| 0.750 | 1.750 | 0.460 | 0.406 |
| 1.000 | 1.906 | 0.470 | 0.432 |

| US Standard | | | |
|---|---|---|---|
| D1 | D2 | L1 | L2 |
| Millimeter | | | |
| 9.53 | 28.58 | 9.91 | 4.17 |
| 12.70 | 28.58 | 9.91 | 7.92 |
| 15.88 | 38.10 | 14.12 | 8.71 |
| 19.05 | 44.45 | 11.68 | 10.31 |
| 25.40 | 48.41 | 11.94 | 10.97 |

## Anti-Clogging Design

Spring and other component that can build up debris are protected from the element, and remained dry.

## Rotating Mating Ring

Rotating mating ring provides operation at much higher speeds than rotary head seal design.

## The non-metallic exposure solution for special application

Up to 10,000 RPM
ID: 7.20 psig (0.5 bar)
OD: Up to 75 psig (5.0 bar)
From -40°F (-40°C) to 400°F (204°C)*
*Depending on seal size and material selection

## All Elastomer Exposure

Ideal for application that is sensitive to metal material.
Only seal face and the rubber material are directly expose to the fluid.

## Fully Convoluted Bellows

Allows maximum flexibility to compensate for axial shaft movement.

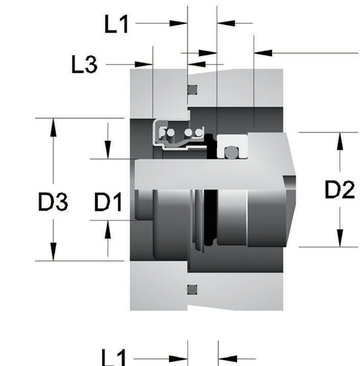
## Advantage Seal Type 41 replaces

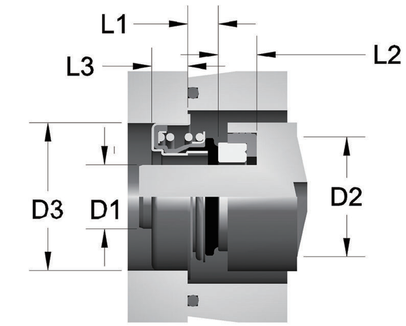
John Crane Type 11-A
US Seal Type Q
Flowserve Type 40

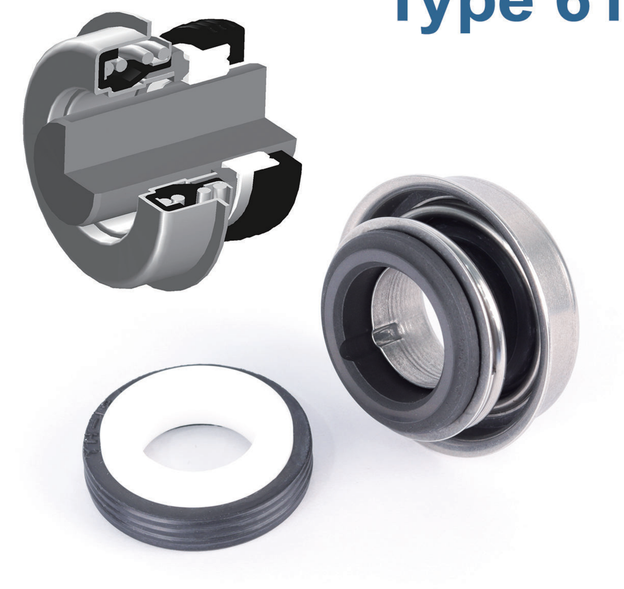




# Type 61



| US Standard | | | | | |
|---|---|---|---|---|---|
| D1 | D2 | D3 | L1 | L2 | L3 |
| Inches | | | | | |
| 0.312 | | 1.125 | 0.065 | | 0.315 |
| 0.375 | 0.875 | 1.125 | 0.065 | 0.160 | 0.315 |
| 0.375 | 0.875 | 1.125 | 0.065 | 0.240 | 0.315 |
| 0.375 | 0.875 | 1.125 | 0.065 | 0.281 | 0.315 |
| 0.375 | 1.000 | 1.125 | 0.065 | 0.205 | 0.315 |
| 0.500 | 1.000 | 1.125 | 0.187 | 0.312 | 0.375 |
| 0.500 | 1.000 | 1.125 | 0.187 | 0.250 | 0.375 |
| 0.500 | 1.000 | 1.125 | 0.187 | 0.218 | 0.375 |
| 0.500 | 1.000 | 1.125 | 0.187 | 0.290 | 0.375 |
| 0.625 | 1.250 | 1.437 | 0.265 | 0.406 | 0.350 |
| 0.625 | 1.375 | 1.437 | 0.265 | 0.375 | 0.350 |
| 0.625 | 1.375 | 1.437 | 0.265 | 0.181 | 0.350 |
| 0.625 | 1.187 | 1.437 | 0.265 | 0.343 | 0.350 |
| 0.625 | 1.375 | 1.437 | 0.265 | 0.266 | 0.350 |
| 0.625 | 1.078 | 1.437 | 0.265 | 0.210 | 0.350 |
| 0.625 | 1.187 | 1.437 | 0.265 | 0.281 | 0.350 |
| 0.625 | 1.250 | 1.437 | 0.265 | 0.375 | 0.350 |
| 0.625 | 1.093 | 1.437 | 0.265 | 0.218 | 0.350 |
| 0.625 | 1.312 | 1.437 | 0.265 | 0.250 | 0.350 |
| 0.625 | 1.250 | 1.437 | 0.265 | 0.281 | 0.350 |
| 0.750 | 1.375 | 1.575 | 0.265 | 0.406 | 0.350 |
| 0.750 | 1.375 | 1.575 | 0.265 | 0.375 | 0.350 |
| 1.000 | 1.625 | 1.812 | 0.312 | 0.437 | 0.400 |

| US Standard | | | | | |
|---|---|---|---|---|---|
| D1 | D2 | D3 | L1 | L2 | L3 |
| Millimeter | | | | | |
| 7.92 | | 28.58 | 1.65 | | 8.00 |
| 9.53 | 22.23 | 28.58 | 1.65 | 4.06 | 8.00 |
| 9.53 | 22.23 | 28.58 | 1.65 | 6.1 | 8.00 |
| 9.53 | 22.23 | 28.58 | 1.65 | 7.14 | 8.00 |
| 9.53 | 25.40 | 28.58 | 1.65 | 5.21 | 8.00 |
| 12.70 | 25.40 | 28.58 | 4.75 | 7.92 | 9.53 |
| 12.70 | 25.40 | 28.58 | 4.75 | 6.35 | 9.53 |
| 12.70 | 25.40 | 28.58 | 4.75 | 5.54 | 9.53 |
| 12.70 | 25.40 | 28.58 | 4.75 | 7.37 | 9.53 |
| 15.88 | 31.75 | 36.50 | 6.73 | 10.31 | 8.89 |
| 15.88 | 34.93 | 36.50 | 6.73 | 9.53 | 8.89 |
| 15.88 | 34.93 | 36.50 | 6.73 | 4.60 | 8.89 |
| 15.88 | 30.15 | 36.50 | 6.73 | 8.71 | 8.89 |
| 15.88 | 34.93 | 36.50 | 6.73 | 6.76 | 8.89 |
| 15.88 | 27.38 | 36.50 | 6.73 | 5.33 | 8.89 |
| 15.88 | 30.15 | 36.50 | 6.73 | 7.14 | 8.89 |
| 15.88 | 31.75 | 36.50 | 6.73 | 9.53 | 8.89 |
| 15.88 | 27.76 | 36.50 | 6.73 | 5.54 | 8.89 |
| 15.88 | 33.32 | 36.50 | 6.73 | 6.35 | 8.89 |
| 15.88 | 31.75 | 36.50 | 6.73 | 7.14 | 8.89 |
| 19.05 | 34.93 | 40.01 | 6.73 | 10.31 | 8.89 |
| 19.05 | 34.93 | 40.01 | 6.73 | 9.53 | 8.89 |
| 25.40 | 41.28 | 46.02 | 7.92 | 11.10 | 10.16 |

## Advantage Seal Type 61 replaces

John Crane Type 6A | US Seal Type B | Pac Seal Type 68

## Tolerance and Finishes

Equipment Shaft ± 0.002 (0.05mm) | Seat Bore ± 0.002 (0.05mm) | Shaft / Sleeve surface finish 35 Ra to 105 Ra | Maximum End-Play 0.005 (0.13mm)

# Type 201

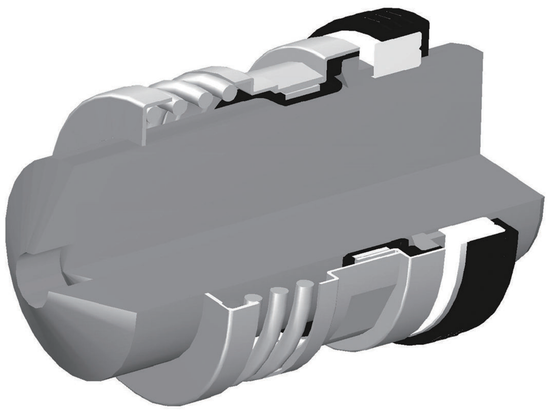


## Technical Parameters

Temperature：-40°F (-40℃) ～400°F (204℃)
Pressure：150 PSI*
Speed：12-15m/s

## Innovative Design

Fewer seal components than other designs
Commonality of components with Type 202 seal
Delivers Performance and Value



## Single Coil Spring

Helps prevent clogging

## Variety of Mating Rings

O-Ring Mount
Cup Mount
DIN

## Crimped Head

Cushions rotary seal face
without metal to seal face contact.
Greatly simplifies installation
No adhesive on seal face
Prevents penetration of solids
into the seal head

## Convoluted Bellows

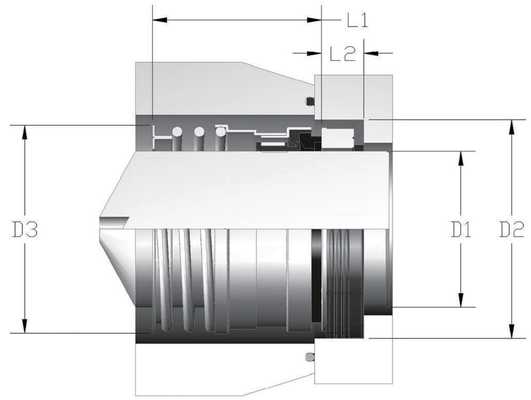
Greater self-aligning capability
Adjusts for End-Play, Runout,
and Equipment Tolerance issues

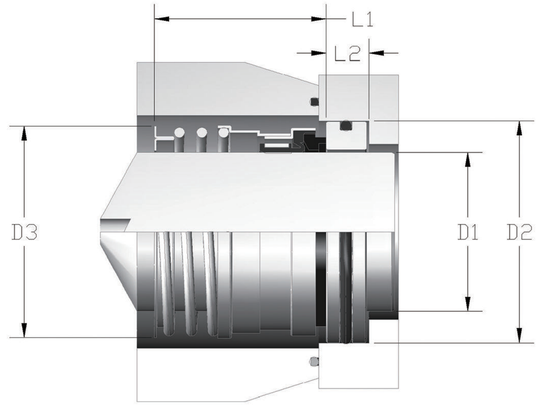
## The Solid Hex Drive Advantage

Standard in every Advantage Seal Type 201
Locking, Positive Engagement
Drive Band cannot be installed improperly
Eliminates damage to bellows
Eliminates drive failure








| US Standard | | | | |
|---|---|---|---|---|
| D1 | D2 | D3 | L1 | L2 |
| Inches | | | | |
| 0.750 | 1.375 | 1.242 | 1.312 | 0.406 |
| 0.875 | 1.500 | 1.367 | 1.375 | 0.406 |
| 1.000 | 1.625 | 1.500 | 1.562 | 0.437 |
| 1.125 | 1.750 | 1.625 | 1.625 | 0.437 |
| 1.250 | 1.875 | 1.742 | 1.625 | 0.437 |
| 1.375 | 2.000 | 1.875 | 1.687 | 0.437 |
| 1.500 | 2.125 | 2.150 | 1.687 | 0.437 |
| 1.625 | 2.375 | 2.250 | 2.000 | 0.500 |
| 1.750 | 2.500 | 2.375 | 2.000 | 0.500 |
| 1.875 | 2.625 | 2.500 | 2.125 | 0.500 |
| 2.000 | 2.750 | 2.625 | 2.125 | 0.500 |
| 2.125 | 3.000 | 2.884 | 2.375 | 0.562 |
| 2.250 | 3.125 | 2.884 | 2.375 | 0.562 |
| 2.375 | 3.250 | 3.062 | 2.500 | 0.562 |
| 2.500 | 3.375 | 3.232 | 2.500 | 0.562 |
| 2.625 | 3.375 | 3.375 | 2.750 | 0.625 |
| 2.750 | 3.500 | 3.500 | 2.750 | 0.625 |
| 2.875 | 3.750 | 3.625 | 2.875 | 0.625 |
| 3.000 | 3.875 | 3.750 | 2.875 | 0.625 |
| 3.125 | 4.125 | 4.000 | 3.125 | 0.781 |
| 3.250 | 4.125 | 4.125 | 3.125 | 0.781 |
| 3.375 | 4.250 | 4.250 | 3.125 | 0.781 |
| 3.500 | 4.375 | 4.375 | 3.125 | 0.781 |
| 3.625 | 4.750 | 4.500 | 3.250 | 0.781 |
| 3.750 | 4.750 | 4.625 | 3.250 | 0.812 |
| 3.875 | 4.875 | 4.750 | 3.375 | 0.812 |
| 4.000 | 5.000 | 4.875 | 3.375 | 0.875 |

| US Standard | | | | |
|---|---|---|---|---|
| D1 | D2 | D3 | L1 | L2 |
| Millimeter | | | | |
| 19.05 | 34.93 | 31.55 | 33.32 | 10.31 |
| 22.23 | 38.10 | 34.72 | 34.93 | 10.31 |
| 25.40 | 41.28 | 38.10 | 39.67 | 11.10 |
| 28.58 | 44.45 | 41.28 | 41.28 | 11.10 |
| 31.75 | 47.63 | 44.25 | 41.28 | 11.10 |
| 34.93 | 50.80 | 47.63 | 42.85 | 11.10 |
| 38.10 | 53.98 | 54.61 | 42.85 | 11.10 |
| 41.28 | 60.33 | 57.15 | 50.80 | 12.70 |
| 44.45 | 63.50 | 60.33 | 50.80 | 12.70 |
| 47.63 | 66.68 | 63.50 | 53.98 | 12.70 |
| 50.80 | 69.85 | 66.68 | 53.98 | 12.70 |
| 53.98 | 76.20 | 73.25 | 60.33 | 14.27 |
| 57.15 | 79.38 | 73.25 | 60.33 | 14.27 |
| 60.33 | 82.55 | 77.77 | 63.50 | 14.27 |
| 63.50 | 85.73 | 82.09 | 63.50 | 14.27 |
| 66.68 | 85.73 | 85.73 | 69.85 | 15.88 |
| 69.85 | 88.90 | 88.90 | 69.85 | 15.88 |
| 73.03 | 95.25 | 92.08 | 73.03 | 15.88 |
| 76.20 | 98.43 | 95.25 | 73.03 | 15.88 |
| 79.38 | 104.78 | 101.60 | 79.38 | 19.84 |
| 82.55 | 104.78 | 104.78 | 79.38 | 19.84 |
| 85.73 | 107.95 | 107.95 | 79.38 | 19.84 |
| 88.90 | 111.13 | 111.13 | 79.38 | 19.84 |
| 92.08 | 120.65 | 114.30 | 82.55 | 19.84 |
| 95.25 | 120.65 | 117.48 | 82.55 | 20.62 |
| 98.43 | 123.83 | 120.65 | 85.73 | 20.62 |
| 101.60 | 127.00 | 123.83 | 85.73 | 22.23 |

## Tolerance and Finishes

Equipment Shaft ± 0.002 (0.05mm)
| Seat Bore ± 0.002 (0.05mm)
| Shaft / Sleeve surface finish 35 Ra to 105 Ra
| Maximum End-Play 0.005 (0.13mm)

## Advantage Seal Type 201 replaces

John Crane1 Type, Type 21, Type 2100
| US Seal Type E | Sealol 43CE Long
| Pac Seal Type 51

# Type 202





## Technical Parameters

Temperature：-40°F (-40℃) ～400°F (204℃)
Pressure：150 PSI*
Speed：12-15m/s

## Innovative Design

Fewer seal components than other designs
Commonality of components with Type 202 seal
Delivers Performance and Value

## Crimped Head

Cushions rotary seal face
without metal to seal face contact.
Greatly simplifies installation
No adhesive on seal face
Prevents penetration of solids
into the seal head

## Single Coil Spring

Helps prevent clogging

## Variety of Mating Rings

O-Ring Mount, Cup Mount, DIN

## Convoluted Bellows

Greater self-aligning capability
Adjusts for End-Play, Runout,
and Equipment Tolerance issues

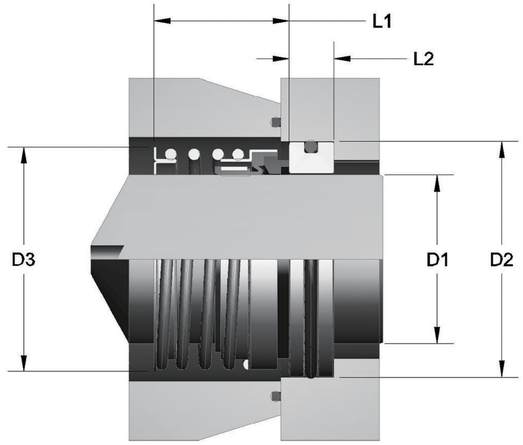
## The Solid Hex Drive Advantage

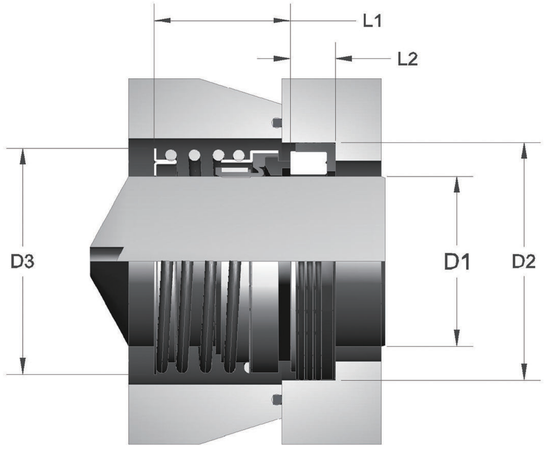
Standard in every Advantage Seal Type 202
Locking, Positive Engagement
Drive Band cannot be installed improperly
Eliminates damage to bellows
Eliminates drive failure

| Metric DIN Standard | | | | |
|---|---|---|---|---|
| D1 | D2 | D3 | L1 | L2 |
| Millimeter | | | | |
| 18.00 | 32.99 | 31.55 | 26.59 | 10.49 |
| 20.00 | 34.98 | 34.72 | 26.59 | 10.49 |
| 22.00 | 37.01 | 34.72 | 26.59 | 10.49 |
| 24.00 | 38.99 | 38.10 | 28.98 | 10.49 |
| 25.00 | 40.01 | 38.10 | 28.98 | 10.49 |
| 28.00 | 42.98 | 41.27 | 31.75 | 10.49 |
| 30.00 | 45.01 | 44.25 | 31.75 | 10.49 |
| 32.00 | 48.01 | 47.62 | 31.75 | 10.49 |
| 33.00 | 48.01 | 47.62 | 31.75 | 10.49 |
| 35.00 | 50.01 | 47.62 | 31.75 | 10.49 |
| 38.00 | 56.01 | 54.61 | 33.32 | 11.51 |
| 40.00 | 57.99 | 57.15 | 33.32 | 11.51 |
| 43.00 | 61.01 | 60.32 | 33.32 | 11.51 |
| 45.00 | 62.99 | 60.32 | 33.32 | 11.51 |
| 48.00 | 65.99 | 63.50 | 33.32 | 11.51 |
| 50.00 | 70.00 | 66.65 | 35.71 | 13.49 |
| 53.00 | 73.00 | 73.25 | 35.71 | 13.49 |
| 55.00 | 74.98 | 73.25 | 35.71 | 13.49 |
| 58.00 | 78.00 | 73.25 | 38.48 | 13.49 |
| 60.00 | 80.01 | 77.78 | 38.48 | 13.49 |
| 63.00 | 83.01 | 82.09 | 38.48 | 13.49 |
| 65.00 | 84.99 | 85.73 | 38.48 | 13.49 |
| 68.00 | 89.99 | 88.90 | 38.48 | 15.49 |
| 70.00 | 92.00 | 88.90 | 45.49 | 15.49 |
| 75.00 | 96.82 | 95.25 | 45.49 | 15.49 |
| 80.00 | 105.13 | 101.60 | 45.49 | 15.49 |








| US Standard | | | | |
|---|---|---|---|---|
| D1 | D2 | D3 | L1 | L2 |
| Inches | | | | |
| 0.750 | 1.375 | 1.242 | 0.875 | 0.406 |
| 0.875 | 1.500 | 1.367 | 0.937 | 0.406 |
| 1.000 | 1.625 | 1.500 | 1.000 | 0.437 |
| 1.125 | 1.750 | 1.625 | 1.062 | 0.437 |
| 1.250 | 1.875 | 1.742 | 1.062 | 0.437 |
| 1.375 | 2.000 | 1.875 | 1.125 | 0.437 |
| 1.500 | 2.125 | 2.150 | 1.125 | 0.437 |
| 1.625 | 2.375 | 2.250 | 1.375 | 0.500 |
| 1.750 | 2.500 | 2.375 | 1.375 | 0.500 |
| 1.875 | 2.625 | 2.500 | 1.500 | 0.500 |
| 2.000 | 2.750 | 2.625 | 1.500 | 0.500 |
| 2.125 | 3.000 | 2.884 | 1.687 | 0.562 |
| 2.250 | 3.125 | 2.884 | 1.687 | 0.562 |
| 2.375 | 3.250 | 3.062 | 1.812 | 0.562 |
| 2.500 | 3.375 | 3.232 | 1.812 | 0.562 |
| 2.625 | 3.375 | 3.375 | 1.937 | 0.625 |
| 2.750 | 3.500 | 3.500 | 1.937 | 0.625 |
| 2.875 | 3.750 | 3.625 | 2.062 | 0.625 |
| 3.000 | 3.875 | 3.750 | 2.062 | 0.625 |
| 3.125 | 4.125 | 4.000 | 2.187 | 0.781 |
| 3.250 | 4.125 | 4.125 | 2.187 | 0.781 |
| 3.375 | 4.250 | 4.250 | 2.187 | 0.781 |
| 3.500 | 4.375 | 4.375 | 2.187 | 0.781 |
| 3.625 | 4.750 | 4.500 | 2.312 | 0.781 |
| 3.750 | 4.750 | 4.625 | 2.312 | 0.812 |
| 3.875 | 4.875 | 4.750 | 2.312 | 0.812 |
| 4.000 | 5.000 | 4.875 | 2.312 | 0.875 |

| US Standard | | | | |
|---|---|---|---|---|
| D1 | D2 | D3 | L1 | L2 |
| Millimeter | | | | |
| 19.05 | 34.93 | 31.55 | 22.23 | 10.31 |
| 22.23 | 38.10 | 34.72 | 23.80 | 10.31 |
| 25.40 | 41.28 | 38.10 | 25.40 | 11.10 |
| 28.58 | 44.45 | 41.28 | 26.97 | 11.10 |
| 31.75 | 47.63 | 44.25 | 26.97 | 11.10 |
| 34.93 | 50.80 | 47.63 | 28.58 | 11.10 |
| 38.10 | 53.98 | 54.61 | 28.58 | 11.10 |
| 41.28 | 60.33 | 57.15 | 34.93 | 12.70 |
| 44.45 | 63.50 | 60.33 | 34.93 | 12.70 |
| 47.63 | 66.68 | 63.50 | 38.10 | 12.70 |
| 50.80 | 69.85 | 66.68 | 38.10 | 12.70 |
| 53.98 | 76.20 | 73.25 | 42.85 | 14.27 |
| 57.15 | 79.38 | 73.25 | 42.85 | 14.27 |
| 60.33 | 82.55 | 77.77 | 46.02 | 14.27 |
| 63.50 | 85.73 | 82.09 | 46.02 | 14.27 |
| 66.68 | 85.73 | 85.73 | 49.20 | 15.88 |
| 69.85 | 88.90 | 88.90 | 49.20 | 15.88 |
| 73.03 | 95.25 | 92.08 | 52.37 | 15.88 |
| 76.20 | 98.43 | 95.25 | 52.37 | 15.88 |
| 79.38 | 104.78 | 101.60 | 55.55 | 19.84 |
| 82.55 | 104.78 | 104.78 | 55.55 | 19.84 |
| 85.73 | 107.95 | 107.95 | 55.55 | 19.84 |
| 88.90 | 111.13 | 111.13 | 55.55 | 19.84 |
| 92.08 | 120.65 | 114.30 | 58.72 | 19.84 |
| 95.25 | 120.65 | 117.48 | 58.72 | 20.62 |
| 98.43 | 123.83 | 120.65 | 58.72 | 20.62 |
| 101.60 | 127.00 | 123.83 | 58.72 | 22.23 |

## Tolerance and Finishes

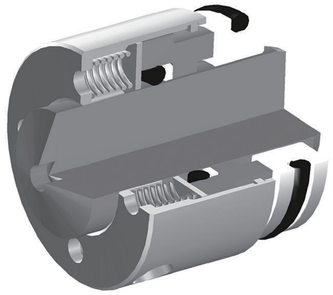
Equipment Shaft ± 0.002 (0.05mm)
| Seat Bore ± 0.002 (0.05mm)
| Shaft / Sleeve surface finish 35 Ra to 105 Ra |
Maximum End-Play 0.005 (0.13mm)

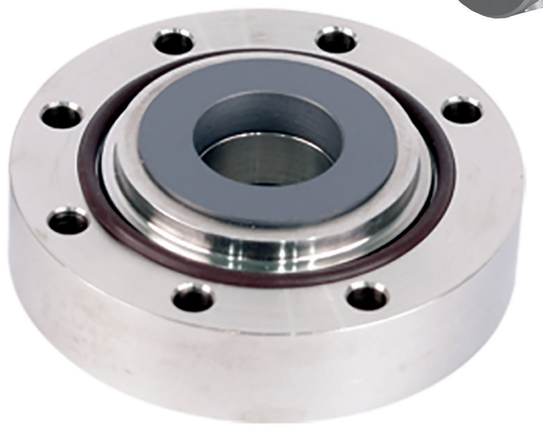
## Advantage Seal Type 202 replaces

John Crane Type 2, Type 21, Type 2100
Seal Type 43 CE short, 43BE
Burgman Type M2, M3, M377
US Seal Type D | Pac-Seal Type 52

# Type 81







## The compact, durable, multi spring, choice for services

Up to 5,000 sf/m*
Up to 500 psig (34 Bar)*
From -40°F (-40°C) to 400°F (204°C)*
*Depending on seal size and material selection

## O-Ring Secondary Seal

Available in Buna, Viton ™
Neoprene, and
Kalrez™

## Variety of Mating Rings

O-Ring Mount
Cup Mount
DIN

## Unitized Design

Rotating face held in by a snap ring
No-hassle handling
Easy to install

## Tolerance and Finishes

Equipment Shaft ± 0.002 (0.05mm) | Seat Bore ± 0.002 (0.05mm) | Shaft / Sleeve surface finish 35 Ra to 105 Ra | Maximum End-Play 0.005 (0.13mm)

## Advantage Seal Type 81 replaces

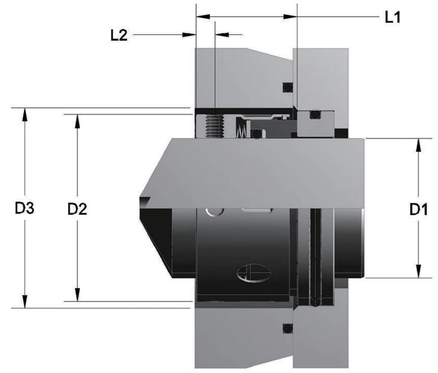
John Crane Type 8-1 | US Seal Type J | Pac Seal Type 8

## Ideal for

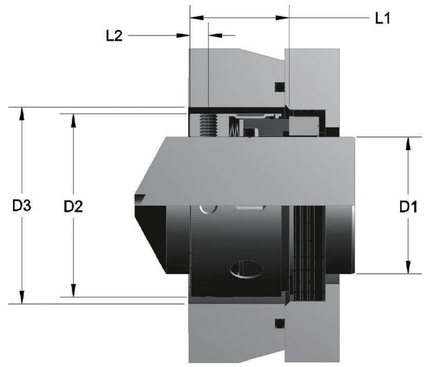
Industrial Fluids
Caustics
Light Hydrocarbons
Corrosives and high pressure liquids and gasses








O-ring

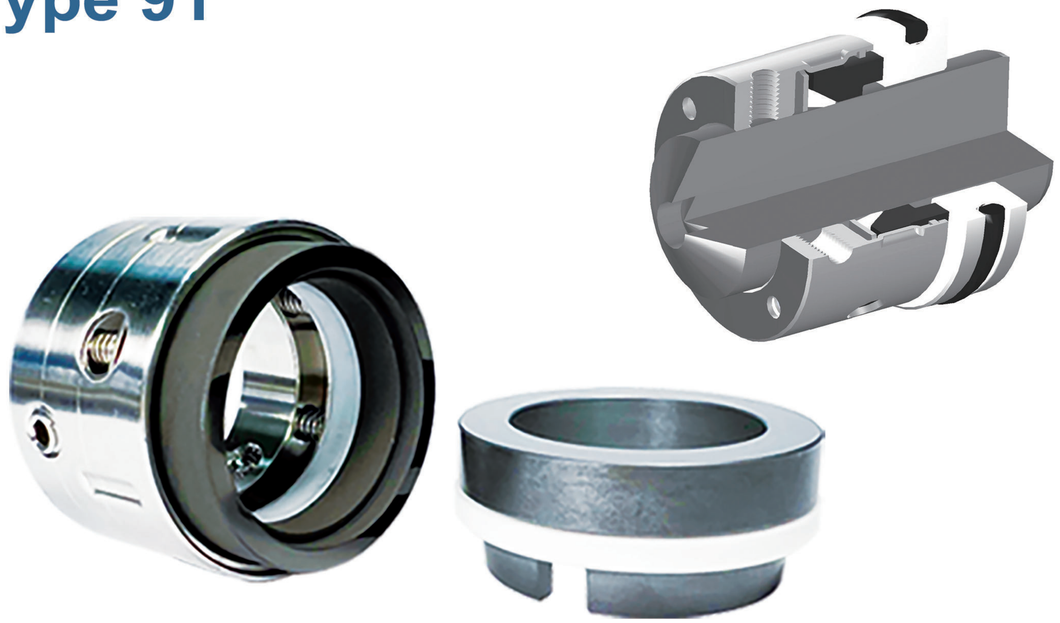



Cup mount

| STANDARD | | | | |
|---|---|---|---|---|
| D1 | D2 | D3 | L1 | L2 |
| Inches | | | | |
| 0.500 | 1.031 | 1.156 | 0.812 | 0.156 |
| 0.625 | 1.187 | 1.312 | 0.750 | 0.156 |
| 0.750 | 1.312 | 1.437 | 0.875 | 0.187 |
| 0.875 | 1.437 | 1.562 | 0.937 | 0.187 |
| 1.000 | 1.562 | 1.750 | 1.000 | 0.187 |
| 1.125 | 1.687 | 1.875 | 1.062 | 0.218 |
| 1.250 | 1.875 | 2.000 | 1.062 | 0.187 |
| 1.375 | 2.000 | 2.125 | 1.125 | 0.187 |
| 1.500 | 2.125 | 2.250 | 1.125 | 0.187 |
| 1.625 | 2.375 | 2.500 | 1.375 | 0.281 |
| 1.750 | 2.500 | 2.625 | 1.375 | 0.281 |
| 1.875 | 2.625 | 2.750 | 1.375 | 0.281 |
| 2.000 | 2.750 | 2.875 | 1.375 | 0.281 |
| 2.125 | 3.000 | 3.125 | 1.687 | 0.343 |
| 2.250 | 3.125 | 3.250 | 1.687 | 0.343 |
| 2.375 | 3.250 | 3.375 | 1.687 | 0.343 |
| 2.500 | 3.375 | 3.500 | 1.687 | 0.343 |
| 2.625 | 3.500 | 3.625 | 1.687 | 0.343 |
| 2.750 | 3.625 | 3.750 | 1.687 | 0.343 |
| 2.875 | 3.750 | 3.875 | 1.687 | 0.343 |
| 3.000 | 3.812 | 4.000 | 1.687 | 0.343 |
| 3.125 | 3.937 | 4.062 | 1.687 | 0.343 |
| 3.250 | 4.125 | 4.250 | 1.687 | 0.343 |
| 3.375 | 4.250 | 4.375 | 1.687 | 0.343 |
| 3.500 | 4.375 | 4.500 | 1.687 | 0.343 |
| 3.625 | 4.500 | 4.625 | 1.687 | 0.343 |
| 3.750 | 4.625 | 4.750 | 1.687 | 0.343 |
| 3.875 | 4.750 | 4.875 | 1.687 | 0.343 |
| 4.000 | 4.875 | 5.000 | 1.687 | 0.343 |

| ALTERNATIVE 81T VERSION | | | | |
|---|---|---|---|---|
| D1 | D2 | D3 | L1 | L2 |
| Inches | | | | |
| 0.500 | 0.937 | 1.062 | 0.937 | 0.187 |
| 0.625 | 1.062 | 1.187 | 0.937 | 0.156 |
| 0.750 | 1.187 | 1.312 | 0.937 | 0.187 |
| 0.875 | 1.312 | 1.437 | 0.937 | 0.187 |
| 1.000 | 1.437 | 1.562 | 1.000 | 0.187 |
| 1.125 | 1.562 | 1.687 | 1.000 | 0.218 |
| 1.250 | 1.687 | 1.812 | 1.000 | 0.187 |
| 1.375 | 1.937 | 2.062 | 1.375 | 0.187 |
| 1.500 | 1.937 | 2.062 | 1.125 | 0.187 |
| 1.625 | 2.250 | 2.375 | 1.156 | 0.187 |
| 1.750 | 2.312 | 2.437 | 1.375 | 0.281 |
| 1.875 | 2.500 | 2.625 | 1.375 | 0.281 |
| 2.000 | 2.625 | 2.750 | 1.375 | 0.281 |
| 2.125 | 2.812 | 2.937 | 1.687 | 0.343 |
| 2.250 | 2.843 | 2.968 | 1.375 | 0.234 |
| 2.375 | 3.000 | 3.125 | 1.687 | 0.343 |
| 2.500 | 3.125 | 3.250 | 1.375 | 0.234 |
| 2.625 | 3.250 | 3.375 | 1.687 | 0.343 |
| 2.750 | 3.375 | 3.500 | 1.687 | 0.343 |
| 2.875 | 3.500 | 3.625 | 1.687 | 0.343 |
| 3.000 | 3.625 | 3.750 | 1.687 | 0.343 |
| 3.125 | 3.750 | 3.875 | 1.687 | 0.343 |
| 3.250 | 3.875 | 4.000 | 1.687 | 0.343 |
| 3.375 | 4.000 | 4.125 | 1.687 | 0.343 |
| 3.500 | 4.125 | 4.250 | 1.687 | 0.343 |
| 3.625 | 4.250 | 4.375 | 1.687 | 0.343 |
| 3.750 | 4.375 | 4.500 | 1.687 | 0.343 |
| 3.875 | 4.500 | 4.625 | 1.687 | 0.343 |
| 4.000 | 4.625 | 4.750 | 1.687 | 0.343 |

# Type 91



## The compact, durable, multi spring, wedge seal choice for services:

Up to 5,000 sf/m*
Up to 350 psig (24 Bar)*
From -350°F (-212°C) to 750°F (400°C)*
*Depending on seal size and material selection

## Wedge Secondary Seal

Available in Teflon™ PTFE and flexible graphite materials
Creates positive seal for use in extreme temperature/chemical applications

## Variety of Mating Rings

O-Ring Mount
Cup Mount
DIN

## Unitized Design

Rotating face held in by a snap ring
No-hassle handling
Easy to install

## Tolerance and Finishes

Equipment Shaft ± 0.002 (0.05mm) | Seat Bore ± 0.002 (0.05mm) | Shaft / Sleeve surface finish 35 Ra to 105 Ra | Maximum End-Play 0.005 (0.13mm)

## Advantage Seal Type 91 replaces

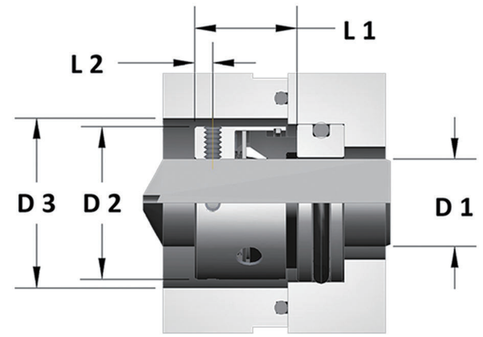
John Crane Type 9 | US Seal Type J | Pac Seal Type 9

## Ideal for

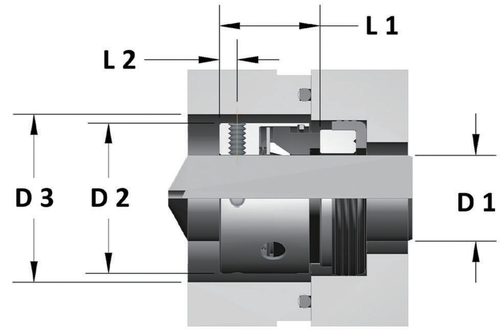
Industrial Fluids
Caustics
Light Hydrocarbons
Corrosives and high pressure liquids and gasses








O-ring



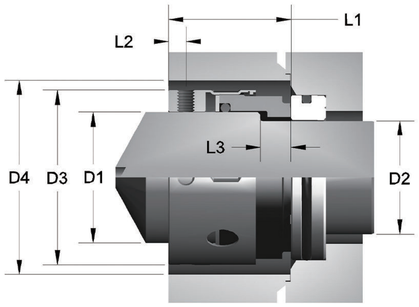

Cup mount

| STANDARD | | | | |
|---|---|---|---|---|
| D1 | D2 | D3 | L1 | L2 |
| Inches | | | | |
| 0.500 | 1.031 | 1.156 | 0.812 | 0.156 |
| 0.625 | 1.187 | 1.312 | 0.750 | 0.156 |
| 0.750 | 1.312 | 1.437 | 0.875 | 0.187 |
| 0.875 | 1.437 | 1.562 | 0.937 | 0.187 |
| 1.000 | 1.562 | 1.750 | 1.000 | 0.187 |
| 1.125 | 1.687 | 1.875 | 1.062 | 0.218 |
| 1.250 | 1.875 | 2.000 | 1.062 | 0.187 |
| 1.375 | 2.000 | 2.125 | 1.125 | 0.187 |
| 1.500 | 2.125 | 2.250 | 1.125 | 0.187 |
| 1.625 | 2.375 | 2.500 | 1.375 | 0.281 |
| 1.750 | 2.500 | 2.625 | 1.375 | 0.281 |
| 1.875 | 2.625 | 2.750 | 1.375 | 0.281 |
| 2.000 | 2.750 | 2.875 | 1.375 | 0.281 |
| 2.125 | 3.000 | 3.125 | 1.687 | 0.343 |
| 2.250 | 3.125 | 3.250 | 1.687 | 0.343 |
| 2.375 | 3.250 | 3.375 | 1.687 | 0.343 |
| 2.500 | 3.375 | 3.500 | 1.687 | 0.343 |
| 2.625 | 3.500 | 3.625 | 1.687 | 0.343 |
| 2.750 | 3.625 | 3.750 | 1.687 | 0.343 |
| 2.875 | 3.750 | 3.875 | 1.687 | 0.343 |
| 3.000 | 3.812 | 4.000 | 1.687 | 0.343 |
| 3.125 | 3.937 | 4.062 | 1.687 | 0.343 |
| 3.250 | 4.125 | 4.250 | 1.687 | 0.343 |
| 3.375 | 4.250 | 4.375 | 1.687 | 0.343 |
| 3.500 | 4.375 | 4.500 | 1.687 | 0.343 |
| 3.625 | 4.500 | 4.625 | 1.687 | 0.343 |
| 3.750 | 4.625 | 4.750 | 1.687 | 0.343 |
| 3.875 | 4.750 | 4.875 | 1.687 | 0.343 |
| 4.000 | 4.875 | 5.000 | 1.687 | 0.343 |

| ALTERNATIVE 91T VERSION | | | | |
|---|---|---|---|---|
| D1 | D2 | D3 | L1 | L2 |
| Inches | | | | |
| 0.500 | 0.937 | 1.062 | 0.937 | 0.187 |
| 0.625 | 1.062 | 1.187 | 0.937 | 0.156 |
| 0.750 | 1.187 | 1.312 | 0.937 | 0.187 |
| 0.875 | 1.312 | 1.437 | 0.937 | 0.187 |
| 1.000 | 1.437 | 1.562 | 1.000 | 0.187 |
| 1.125 | 1.562 | 1.687 | 1.000 | 0.218 |
| 1.250 | 1.687 | 1.812 | 1.000 | 0.187 |
| 1.375 | 1.937 | 2.062 | 1.375 | 0.187 |
| 1.500 | 1.937 | 2.062 | 1.125 | 0.187 |
| 1.625 | 2.250 | 2.375 | 1.156 | 0.187 |
| 1.750 | 2.312 | 2.437 | 1.375 | 0.281 |
| 1.875 | 2.500 | 2.625 | 1.375 | 0.281 |
| 2.000 | 2.625 | 2.750 | 1.375 | 0.281 |
| 2.125 | 2.812 | 2.937 | 1.687 | 0.343 |
| 2.250 | 2.843 | 2.968 | 1.375 | 0.234 |
| 2.375 | 3.000 | 3.125 | 1.687 | 0.343 |
| 2.500 | 3.125 | 3.250 | 1.375 | 0.234 |
| 2.625 | 3.250 | 3.375 | 1.687 | 0.343 |
| 2.750 | 3.375 | 3.500 | 1.687 | 0.343 |
| 2.875 | 3.500 | 3.625 | 1.687 | 0.343 |
| 3.000 | 3.625 | 3.750 | 1.687 | 0.343 |
| 3.125 | 3.750 | 3.875 | 1.687 | 0.343 |
| 3.250 | 3.875 | 4.000 | 1.687 | 0.343 |
| 3.375 | 4.000 | 4.125 | 1.687 | 0.343 |
| 3.500 | 4.125 | 4.250 | 1.687 | 0.343 |
| 3.625 | 4.250 | 4.375 | 1.687 | 0.343 |
| 3.750 | 4.375 | 4.500 | 1.687 | 0.343 |
| 3.875 | 4.500 | 4.625 | 1.687 | 0.343 |
| 4.000 | 4.625 | 4.750 | 1.687 | 0.343 |

# Type 81B






| US Standard | | | | | | |
|---|---|---|---|---|---|---|
| D1 | D2 | D3 | D4 | L1 | L2 | L3 |
| Inches | | | | | | |
| 0.500 | 0.375 | 1.031 | 1.156 | 1.125 | 0.156 | 0.312 |
| 0.625 | 0.500 | 1.187 | 1.312 | 1.062 | 0.156 | 0.281 |
| 0.750 | 0.625 | 1.312 | 1.437 | 1.250 | 0.187 | 0.312 |
| 0.875 | 0.750 | 1.437 | 1.562 | 1.250 | 0.187 | 0.281 |
| 1.000 | 0.875 | 1.562 | 1.750 | 1.312 | 0.187 | 0.343 |
| 1.125 | 1.000 | 1.687 | 1.875 | 1.375 | 0.218 | 0.343 |
| 1.250 | 1.125 | 1.875 | 2.000 | 1.375 | 0.187 | 0.343 |
| 1.375 | 1.125 | 2.000 | 2.125 | 1.437 | 0.187 | 0.343 |
| 1.500 | 1.250 | 2.125 | 2.250 | 1.437 | 0.187 | 0.343 |
| 1.625 | 1.375 | 2.375 | 2.500 | 1.750 | 0.281 | 0.437 |
| 1.750 | 1.500 | 2.500 | 2.625 | 1.750 | 0.281 | 0.437 |
| 1.875 | 1.625 | 2.625 | 2.750 | 1.750 | 0.281 | 0.437 |
| 2.000 | 1.750 | 2.750 | 2.875 | 1.750 | 0.281 | 0.437 |
| 2.125 | 1.875 | 3.000 | 3.125 | 2.062 | 0.343 | 0.500 |
| 2.250 | 2.000 | 3.125 | 3.250 | 2.062 | 0.343 | 0.500 |
| 2.375 | 2.125 | 3.250 | 3.375 | 2.062 | 0.343 | 0.500 |
| 2.500 | 2.250 | 3.375 | 3.500 | 2.062 | 0.343 | 0.500 |
| 2.625 | 2.375 | 3.500 | 3.625 | 2.062 | 0.343 | 0.500 |
| 2.750 | 2.500 | 3.625 | 3.750 | 2.062 | 0.343 | 0.500 |
| 2.875 | 2.625 | 3.750 | 3.875 | 2.062 | 0.343 | 0.500 |
| 3.000 | 2.750 | 3.812 | 4.000 | 2.062 | 0.343 | 0.500 |
| 3.125 | 2.875 | 3.937 | 4.062 | 2.062 | 0.343 | 0.562 |
| 3.250 | 3.000 | 4.125 | 4.250 | 2.062 | 0.343 | 0.562 |
| 3.375 | 3.125 | 4.250 | 4.375 | 2.062 | 0.343 | 0.562 |
| 3.500 | 3.250 | 4.375 | 4.500 | 2.062 | 0.343 | 0.562 |
| 3.625 | 3.375 | 4.500 | 4.625 | 2.062 | 0.343 | 0.562 |
| 3.750 | 3.500 | 4.625 | 4.750 | 2.062 | 0.343 | 0.562 |
| 3.875 | 3.625 | 4.750 | 4.875 | 2.062 | 0.343 | 0.562 |
| 4.000 | 3.750 | 4.875 | 5.000 | 2.062 | 0.343 | 0.562 |

| ALTERNATIVE 81BT VERSION | | | | | | |
|---|---|---|---|---|---|---|
| D1 | D2 | D3 | D4 | L1 | L2 | L3 |
| Inches | | | | | | |
| 0.500 | 0.375 | 0.937 | 1.062 | 1.125 | 0.156 | 0.312 |
| 0.625 | 0.500 | 1.062 | 1.187 | 1.062 | 0.156 | 0.281 |
| 0.750 | 0.625 | 1.187 | 1.312 | 1.250 | 0.187 | 0.312 |
| 0.875 | 0.750 | 1.312 | 1.437 | 1.250 | 0.187 | 0.281 |
| 1.000 | 0.875 | 1.437 | 1.625 | 1.312 | 0.187 | 0.343 |
| 1.125 | 1.000 | 1.562 | 1.750 | 1.375 | 0.218 | 0.343 |
| 1.250 | 1.125 | 1.687 | 1.875 | 1.375 | 0.187 | 0.343 |
| 1.375 | 1.125 | 1.937 | 2.125 | 1.687 | 0.187 | 0.343 |
| 1.500 | 1.250 | 1.937 | 2.125 | 1.437 | 0.187 | 0.343 |
| 1.625 | 1.375 | 2.250 | 2.437 | 1.593 | 0.187 | 0.437 |
| 1.750 | 1.500 | 2.312 | 2.500 | 1.750 | 0.281 | 0.437 |
| 1.875 | 1.625 | 2.500 | 2.687 | 1.750 | 0.281 | 0.437 |
| 2.000 | 1.750 | 2.625 | 2.812 | 1.750 | 0.281 | 0.437 |
| 2.125 | 1.875 | 2.812 | 3.000 | 2.062 | 0.343 | 0.500 |
| 2.250 | 2.000 | 2.843 | 3.031 | 1.750 | 0.234 | 0.500 |
| 2.375 | 2.125 | 3.000 | 3.187 | 2.062 | 0.343 | 0.500 |
| 2.500 | 2.250 | 3.125 | 3.312 | 1.750 | 0.234 | 0.500 |
| 2.625 | 2.375 | 3.250 | 3.437 | 2.062 | 0.343 | 0.500 |
| 2.750 | 2.500 | 3.375 | 3.562 | 2.062 | 0.343 | 0.500 |
| 2.875 | 2.625 | 3.500 | 3.687 | 2.062 | 0.343 | 0.500 |
| 3.000 | 2.750 | 3.625 | 3.812 | 2.062 | 0.343 | 0.500 |
| 3.125 | 2.875 | 3.750 | 3.937 | 2.062 | 0.343 | 0.562 |
| 3.250 | 3.000 | 3.875 | 4.062 | 2.062 | 0.343 | 0.562 |
| 3.375 | 3.125 | 4.000 | 4.187 | 2.062 | 0.343 | 0.562 |
| 3.500 | 3.250 | 4.125 | 4.312 | 2.062 | 0.343 | 0.562 |
| 3.625 | 3.375 | 4.250 | 4.437 | 2.062 | 0.343 | 0.562 |
| 3.750 | 3.500 | 4.375 | 4.562 | 2.062 | 0.343 | 0.562 |
| 3.875 | 3.625 | 4.500 | 4.687 | 2.062 | 0.343 | 0.562 |
| 4.000 | 3.750 | 4.625 | 4.812 | 2.062 | 0.343 | 0.562 |

## Tolerance and Finishes:

Equipment Shaft ± 0.002 (0.05mm) |
Seat Bore ± 0.002 (0.05mm)
| Shaft / Sleeve surface finish 35 Ra to 105 Ra |
Maximum End-Play 0.005 (0.13mm)

## Advantage Seal Type 81B replaces

John Crane Type 8B1
Pac-Seal Type 8B

## The compact, durable, multi spring, choice for services

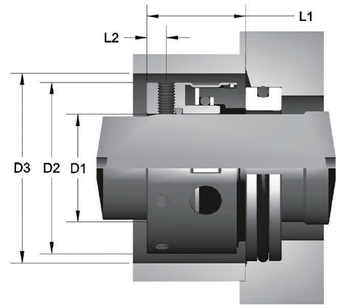
Up to 5,000 sf/m*
Up to 500 psig (34 Bar)*
From -40°F (-40°C) to 400°F (204°C)*
*Depending on seal size and material selection





# Type 81BSS






| US Standard | | | | |
|---|---|---|---|---|
| D1 | D2 | D3 | L1 | L2 |
| Inches | | | | |
| 0.500 | 1.312 | 1.437 | 1.125 | 0.156 |
| 0.625 | 1.437 | 1.562 | 1.062 | 0.156 |
| 0.750 | 1.562 | 1.750 | 1.250 | 0.187 |
| 0.875 | 1.750 | 1.875 | 1.250 | 0.187 |
| 1.000 | 1.875 | 2.000 | 1.312 | 0.187 |
| 1.125 | 2.000 | 2.125 | 1.375 | 0.218 |
| 1.250 | 2.125 | 2.250 | 1.375 | 0.187 |
| 1.375 | 2.250 | 2.375 | 1.437 | 0.187 |
| 1.500 | 2.375 | 2.500 | 1.437 | 0.187 |
| 1.625 | 2.500 | 2.625 | 1.750 | 0.281 |
| 1.750 | 2.625 | 2.750 | 1.750 | 0.281 |
| 1.875 | 2.750 | 2.875 | 1.750 | 0.281 |
| 2.000 | 3.000 | 3.125 | 1.750 | 0.281 |
| 2.125 | 3.125 | 3.250 | 2.062 | 0.343 |
| 2.250 | 3.250 | 3.375 | 2.062 | 0.343 |
| 2.375 | 3.375 | 3.500 | 2.062 | 0.343 |
| 2.500 | 3.500 | 3.625 | 2.062 | 0.343 |
| 2.625 | 3.625 | 3.750 | 2.062 | 0.343 |
| 2.750 | 3.750 | 3.875 | 2.062 | 0.343 |
| 2.875 | 3.812 | 3.937 | 2.062 | 0.343 |
| 3.000 | 3.937 | 4.062 | 2.062 | 0.343 |
| 3.125 | 4.125 | 4.250 | 2.062 | 0.343 |
| 3.250 | 4.250 | 4.375 | 2.062 | 0.343 |
| 3.375 | 4.375 | 4.500 | 2.062 | 0.343 |
| 3.500 | 4.500 | 4.625 | 2.062 | 0.343 |
| 3.625 | 4.625 | 4.750 | 2.062 | 0.343 |
| 3.750 | 4.750 | 4.875 | 2.062 | 0.343 |
| 3.875 | 4.875 | 5.000 | 2.062 | 0.343 |
| 4.000 | 5.000 | 5.125 | 2.062 | 0.343 |

| ALTERNATIVE 81BSST VERSION | | | | |
|---|---|---|---|---|
| D1 | D2 | D3 | L1 | L2 |
| Inches | | | | |
| 0.500 | 1.187 | 1.312 | 1.125 | 0.156 |
| 0.625 | 1.312 | 1.437 | 1.062 | 0.156 |
| 0.750 | 1.437 | 1.562 | 1.250 | 0.187 |
| 0.875 | 1.562 | 1.687 | 1.250 | 0.187 |
| 1.000 | 1.687 | 1 812 | 1.312 | 0.187 |
| 1.125 | 1.937 | 2.062 | 1.375 | 0.218 |
| 1.250 | 1.937 | 2.062 | 1.375 | 0.187 |
| 1.375 | 1.937 | 2.062 | 1.687 | 0.187 |
| 1.500 | 2.250 | 2.375 | 1.437 | 0.187 |
| 1.625 | 2.312 | 2.437 | 1.593 | 0.187 |
| 1.750 | 2.500 | 2.625 | 1.750 | 0.281 |
| 1.875 | 2.625 | 2.750 | 1.750 | 0.281 |
| 2.000 | 2.812 | 2.937 | 1.750 | 0.281 |
| 2.125 | 2.843 | 2.968 | 2.062 | 0.343 |
| 2.250 | 3.000 | 3.125 | 1.750 | 0.234 |
| 2.375 | 3.125 | 3.250 | 2.062 | 0.343 |
| 2.500 | 3.250 | 3.375 | 1.750 | 0.234 |
| 2.625 | 3.375 | 3.500 | 2.062 | 0.343 |
| 2.750 | 3.500 | 3.625 | 2.062 | 0.343 |
| 2.875 | 3.625 | 3.750 | 2.062 | 0.343 |
| 3.000 | 3.750 | 3.875 | 2.062 | 0.343 |
| 3.125 | 3.875 | 4.000 | 2.062 | 0.343 |
| 3.250 | 4.000 | 4.125 | 2.062 | 0.343 |
| 3.375 | 4.125 | 4.250 | 2.062 | 0.343 |
| 3.500 | 4.250 | 4.375 | 2.062 | 0.343 |
| 3.625 | 4.375 | 4.500 | 2.062 | 0.343 |
| 3.750 | 4.500 | 4.625 | 2.062 | 0.343 |
| 3.875 | 4.625 | 4.750 | 2.062 | 0.343 |
| 4.000 | 4.750 | 4.875 | 2.062 | 0.343 |

## Tolerance and Finishes

Equipment Shaft ± 0.002 (0.05mm) |
Seat Bore ± 0.002 (0.05mm)
| Shaft / Sleeve surface finish 35 Ra to 105 Ra |
Maximum End-Play 0.005 (0.13mm)

## Advantage Seal Type 81B replaces

John Crane Type 8-1 | US Seal Type J | Pac Seal Type 8

## The compact, durable, multi spring, choice for services

Up to 5,000 sf/m*
Up to 500 psig (34 Bar)*
From -40°F (-40°C) to 400°F (204°C)*
*Depending on seal size and material selection

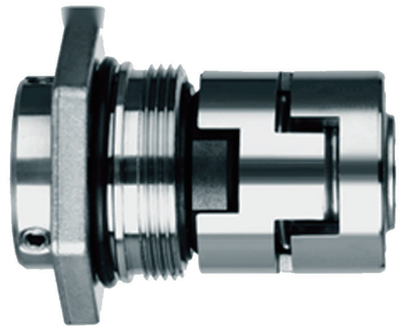
# SEALING THE WORLD ONE SEAL AT A TIME

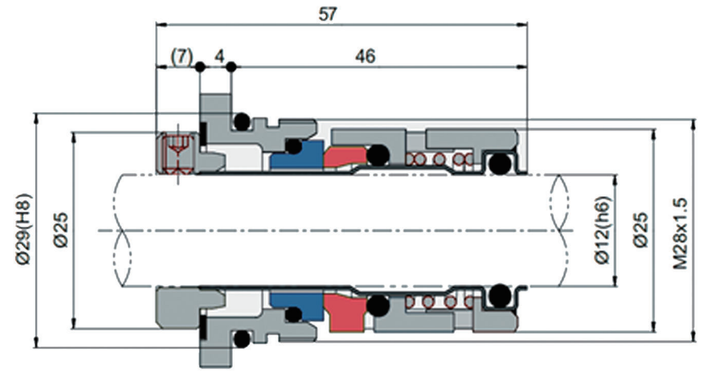






# Type 511-12






## Advantage Seal Type 511-12 Replaces

Type 511-12 Cartridge Seal To Replace
Grundfos® "H-"Code Seals
Installed In CR,CRI,CRIE Series Vertical Multi -Stage Pumps

## Application

It is suitable to Grundfos® Pumps:
Model:CR1.3.5.10.15.20.32.45.64.90
Model:CRN1.3.5.10.15.20.32.45.64.90

## Features

- Fully welded structure for easier disassembly
- Extended stroke and thick insert for better axial alignment tolerance
- Lower balance coefficient for higher pressure capacity

## Applicable medium

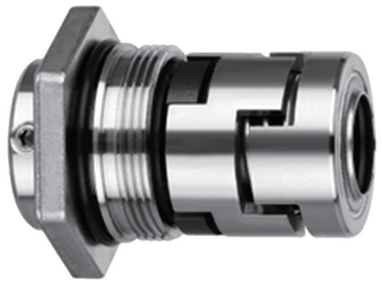
Water
Oil
Etc
Amorphous organic solvents such asacid alkali and salt

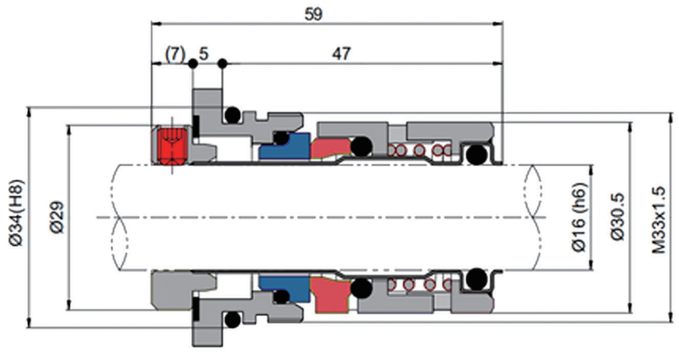
## Parameters

Pressure:p1 = 25 bar (362 PSI)
Temperature:t = -30 °C(-22°F) ... 220 °C (+428°F)
Sliding velocity:vg = 20 m/s (66 ft/s)
* Dependent on medium, size and material



# Type 511-16






## Advantage Seal Type 511-16 Replaces

Type 511-16 Cartridge Seal To Replace
Grundfos® "H-"Code Seals
Installed In CR,CRI,CRIE Series Vertical Multi -Stage Pumps

## Application

It is suitable to Grundfos® Pumps:
Model:CR1.3.5.10.15.20.32.45.64.90
Model:CRN1.3.5.10.15.20.32.45.64.90

## Features

- Fully welded structure for easier disassembly
- Extended stroke and thick insert for better axial alignment tolerance
- Lower balance coefficient for higher pressure capacity

## Applicable medium

Water
Oil
Etc
Amorphous organic solvents such as acid alkali and salt

## Parameters

Pressure:p1 = 25 bar (362 PSI)
Temperature:t = -30 °C(-22°F) ... 220 °C (+428°F)
Sliding velocity:vg = 20 m/s (66 ft/s)
* Dependent on medium, size and material

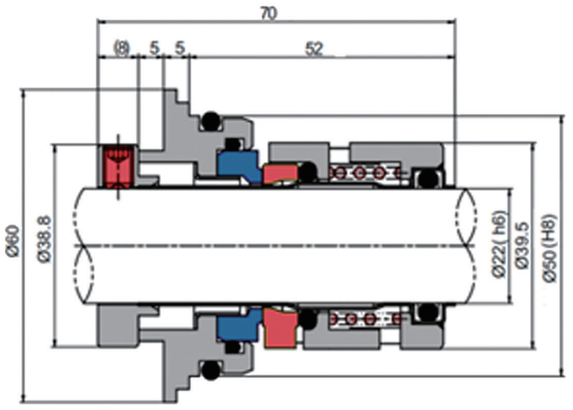






# Type 511-22






## Advantage Seal Type 511-22 Replaces

Type 511-22 Cartridge Seal To Replace
Grundfos® "H-"Code Seals
Installed In CR,CRI,CRIE Series Vertical Multi -Stage Pumps

## Application

It is suitable to Grundfos® Pumps:
Model:CR1.3.5.10.15.20.32.45.64.90
Model:CRN1.3.5.10.15.20.32.45.64.90

## Features

- Fully welded structure for easier disassembly
- Extended stroke and thick insert for better axial alignment tolerance
- Lower balance coefficient for higher pressure capacity

## Applicable medium

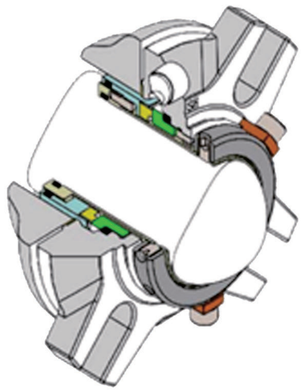
Water
Oil
Etc
Amorphous organic solvents such as acid alkali and salt

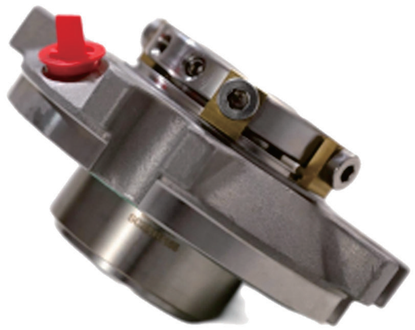
## Parameters

Pressure:p1 = 25 bar (362 PSI)
Temperature:t = -30 °C(-22°F) ... 220 °C (+428°F)
Sliding velocity:vg = 20 m/s (66 ft/s)
* Dependent on medium, size and material



# Type AA03





## Parameters

Pressure: p1= Vacuum(-28”Hg) to 20 Bar g (290 psig)- OD pressurized only

Temperature: t= -40ºC to +180ºC [-40ºF to +356ºF]

Sliding velocity: vg= Upto 20m/s (4000 ft/min)

* Dependent on medium, size and material

## Features

- Balanced, modular design with standardized parts to reduce maintenance costs
- Small spring design prevents contact with the medium, extending seal life
- Driving screw directly positioned on shaft or sleeve to minimize drive loss
- Four-bolt design compatible with ISO 2858 pump types
- Supports API 11, 21, and 32 flushing schemes

## Advantage Seal Type AA01 Replaces

AESSEAL® CSS

BURGMANN® Mtex Dual

JOHN CRANE® 5625PR

FLOWSERVE® X-200

CHESTERTON® 286

## Application

Process pumps

Other rotating equipment

Mixer and agitators

## Applicable Medium

All kinds of acidic

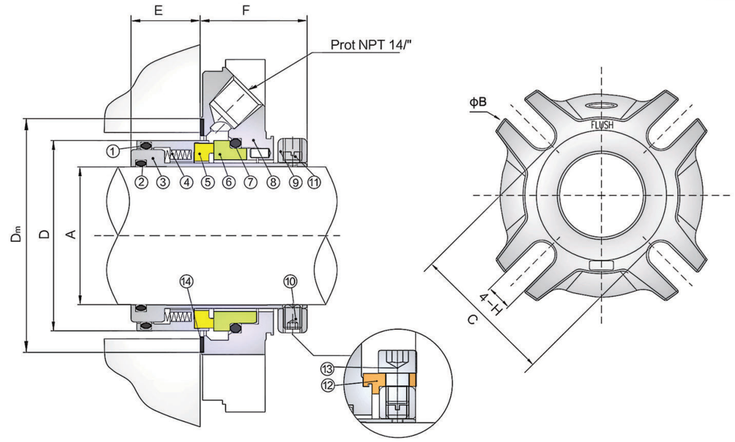
Alkaline

Low-grade slurry

Water-oil and other media








| NO. | Description | Material | NO. | Description | Material |
|---|---|---|---|---|---|
| 1 | O-Ring | EPDM/Viton/Aflas/Kalrez | 8 | Gland | Stainless Steel |
| 2 | O-Ring | EPDM/Viton/Aflas/Kalrez | 9 | Clamp Ring | Stainless Steel |
| 3 | Shaft Sleeve | Stainless Steel | 10 | Drive Screw | Stainless Steel |
| 4 | Spring | Alloy 276 | 11 | Anti-tamper Screw | Stainless Steel |
| 5 | Rotay Face | Carbon/SSIC/TC | 12 | Setting Clip | Brass |
| 6 | Stationary Face | SSIC/TC | 13 | Clip Screw | Stainless Steel |
| 7 | O-Ring | EPDM/Viton/Aflas/Kalrez | 14 | Gasket | Af1 |

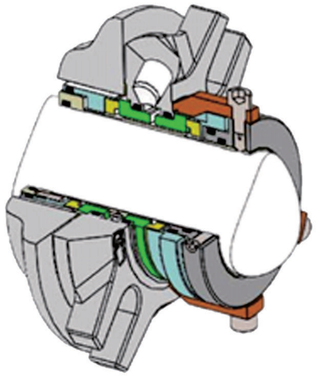
## AA03 -size information(mm)

| A | B | C | D | DM | E | F | H |
|---|---|---|---|---|---|---|---|
| 24 | 110.0 | 60.5 | 38.0 | 56.0 | 18.2 | 37.4 | 13.2 |
| 25 | 110.0 | 60.5 | 39.4 | 56.0 | 18.2 | 37.4 | 13.2 |
| 28 | 110.0 | 60.5 | 42.6 | 58.0 | 18.2 | 37.4 | 13.2 |
| 30 | 110.0 | 63.5 | 44.0 | 61.5 | 18.2 | 37.4 | 13.2 |
| 32 | 110.0 | 63.5 | 46.0 | 61.5 | 18.2 | 37.4 | 13.2 |
| 33 | 110.0 | 63.5 | 47.0 | 61.5 | 18.2 | 37.4 | 13.2 |
| 35 | 110.0 | 67.0 | 49.0 | 65.0 | 18.2 | 37.4 | 13.2 |
| 38 | 127.0 | 72.0 | 55.8 | 70.0 | 22.5 | 35.0 | 14.2 |
| 40 | 127.0 | 72.0 | 55.8 | 70.0 | 22.5 | 35.0 | 14.2 |
| 43 | 127.0 | 72.0 | 59.0 | 71.0 | 22.5 | 35.0 | 14.2 |
| 45 | 133.0 | 77.0 | 62.2 | 75.0 | 22.5 | 35.0 | 14.2 |
| 48 | 133.0 | 77.0 | 65.4 | 75.0 | 22.5 | 35.0 | 14.2 |
| 50 | 133.0 | 77.0 | 65.4 | 75.0 | 22.5 | 35.0 | 14.2 |
| 53 | 139.0 | 86.0 | 68.5 | 83.0 | 24.4 | 35.5 | 14.2 |
| 55 | 146.0 | 94.0 | 71.7 | 92.0 | 24.4 | 35.5 | 17.5 |
| 58 | 146.0 | 94.0 | 74.9 | 92.0 | 24.4 | 35.5 | 17.5 |
| 60 | 155.0 | 100.0 | 78.1 | 92.0 | 24.4 | 35.5 | 17.5 |
| 63 | 178.0 | 109.5 | 84.1 | 108.0 | 23.2 | 37.8 | 17.5 |
| 65 | 178.0 | 109.5 | 87.3 | 108.0 | 23.2 | 37.8 | 17.5 |
| 70 | 178.0 | 109.5 | 90.5 | 108.0 | 23.2 | 37.8 | 17.5 |
| 75 | 190.5 | 125.0 | 96.8 | 124.0 | 23.2 | 37.8 | 17.5 |
| 80 | 190.5 | 125.0 | 100.0 | 124.0 | 23.2 | 37.8 | 17.5 |
| 85 | 203.0 | 135.0 | 106.4 | 133.0 | 23.2 | 37.8 | 17.5 |
| 90 | 216.0 | 150.0 | 112.7 | 146.0 | 23.2 | 37.8 | 20.0 |
| 95 | 216.0 | 150.0 | 119.1 | 146.0 | 23.2 | 37.8 | 20.0 |
| 100 | 229.0 | 168.0 | 122.2 | 165.0 | 23.2 | 37.8 | 20.0 |

## AA03 -size information(Inches)

| A | B | C | D | DM | E | F | H |
|---|---|---|---|---|---|---|---|
| 1.000 | 4.125 | 2.375 | 1.550 | 2.205 | 0.716 | 1.472 | 0.520 |
| 1.125 | 4.250 | 2.375 | 1.675 | 2.283 | 0.716 | 1.472 | 0.520 |
| 1.250 | 4.375 | 2.500 | 1.810 | 2.421 | 0.716 | 1.472 | 0.559 |
| 1.375 | 4.375 | 2.625 | 1.928 | 2.559 | 0.716 | 1.472 | 0.559 |
| 1.500 | 5.000 | 2.832 | 2.198 | 2.756 | 0.885 | 1.378 | 0.559 |
| 1.625 | 5.000 | 2.832 | 2.323 | 2.795 | 0.885 | 1.378 | 0.559 |
| 1.750 | 5.250 | 3.022 | 2.448 | 2.953 | 0.885 | 1.378 | 0.559 |
| 1.875 | 5.250 | 3.022 | 2.576 | 2.953 | 0.885 | 1.378 | 0.689 |
| 2.000 | 5.500 | 3.386 | 2.698 | 3.268 | 0.960 | 1.397 | 0.689 |
| 2.125 | 5.750 | 3.687 | 2.823 | 3.622 | 0.960 | 1.397 | 0.689 |
| 2.250 | 5.750 | 3.687 | 2.948 | 3.622 | 0.960 | 1.397 | 0.689 |
| 2.375 | 6.000 | 3.937 | 3.073 | 3.622 | 0.960 | 1.397 | 0.689 |
| 2.500 | 7.000 | 4.312 | 3.312 | 4.252 | 0.913 | 1.488 | 0.689 |
| 2.625 | 7.000 | 4.312 | 3.437 | 4.252 | 0.913 | 1.488 | 0.689 |
| 2.750 | 7.000 | 4.312 | 3.562 | 4.252 | 0.913 | 1.488 | 0.689 |
| 2.875 | 7.500 | 4.937 | 3.687 | 4.764 | 0.913 | 1.488 | 0.689 |
| 3.000 | 7.500 | 4.937 | 3.812 | 4.882 | 0.913 | 1.488 | 0.689 |
| 3.125 | 7.500 | 4.937 | 3.937 | 4.882 | 0.913 | 1.488 | 0.689 |
| 3.250 | 8.000 | 5.312 | 4.062 | 5.118 | 0.913 | 1.488 | 0.689 |
| 3.375 | 8.000 | 5.312 | 4.187 | 5.236 | 0.913 | 1.488 | 0.689 |
| 3.500 | 8.000 | 5.312 | 4.312 | 5.236 | 0.913 | 1.488 | 0.689 |
| 3.625 | 8.500 | 5.900 | 4.437 | 5.748 | 0.913 | 1.488 | 0.787 |
| 3.750 | 8.500 | 5.900 | 4.562 | 5.748 | 0.913 | 1.488 | 0.787 |
| 3.875 | 8.500 | 5.900 | 4.687 | 5.748 | 0.913 | 1.488 | 0.787 |
| 4.000 | 9.000 | 6.600 | 4.812 | 6.496 | 0.913 | 1.488 | 0.787 |

# Type AA04





## Parameters

Pressure: p1= Vacuum(-28”Hg) to 20 Bar g (290 psig)- OD pressurized only

Temperature: t= -40ºC to +180ºC [-40ºF to +356ºF]

Sliding velocity: vg= Upto 20m/s (4000 ft/min)

* Dependent on medium, size and material

## Features

- Balanced design
- Modular structure with standardized parts reduces maintenance costs
- Small spring design prevents medium contact, extending seal life
- Driving screw directly mounted on shaft or sleeve to minimize drive loss
- Four-bolt design compatible with ISO 2858 standard pumps
- Supports API 52, 53, and 54 flushing plans

## Application

Process pumps

Other rotating equipment

Mixer and agitators

## Applicable Medium

All kinds of acidic

Alkaline

Low-grade slurry

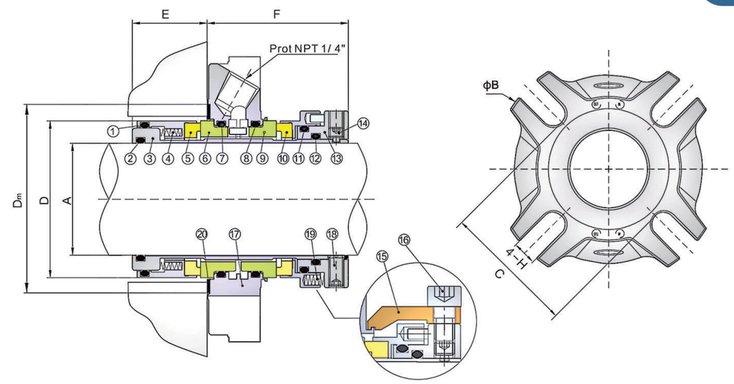
Water-oil and other media

## Advantage Seal Type AA01 Replaces

AESSEAL® CDP CDPN








| NO. | Description | Material | NO. | Description | Material |
|---|---|---|---|---|---|
| 1 | O-Ring | EPDM/Viton/Aflas/Kalrez | 11 | O-Ring | EPDM/Viton/Aflas/Kalrez |
| 2 | O-Ring | EPDM/Viton/Aflas/Kalrez | 12 | O-Ring | EPDM/Viton/Aflas/Kalrez |
| 3 | Shaft Sleeve | Stainless Steel | 13 | Clamp Ring | Stainless Steel |
| 4 | Spring | Alloy 276 | 14 | Anti-tamper Screw | Stainless Steel |
| 5 | Inner Rotary Face | Carbon/SSIC/TC | 15 | Setting Clip | Brass |
| 6 | Inner Stationary Face | SSIC/TC | 16 | Clip Screw | Stainless Steel |
| 7 | O-Ring | EPDM/Viton/Aflas/Kalrez | 17 | Gland | Stainless Steel |
| 8 | O-Ring | EPDM/Viton/Aflas/Kalrez | 18 | Drive Screw | Stainless Steel |
| 9 | Outer Stationary Face | SSIC/TC | 19 | Spring | Alloy 276 |
| 10 | Outer Rotary Face | Carbon/SSIC/TC | 20 | Gasket | AF1 |

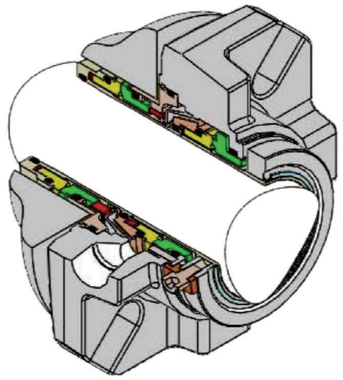
## AA04-size information(mm)

| A | B | C | D | DM | E | F | H |
|---|---|---|---|---|---|---|---|
| 24 | 110.0 | 60.5 | 38.0 | 56.0 | 31.1 | 51.0 | 13.2 |
| 25 | 110.0 | 60.5 | 39.4 | 56.0 | 31.1 | 51.0 | 13.2 |
| 28 | 110.0 | 60.5 | 42.6 | 58.0 | 31.1 | 51.0 | 13.2 |
| 30 | 110.0 | 63.5 | 44.0 | 61.5 | 31.1 | 51.0 | 13.2 |
| 32 | 110.0 | 63.5 | 46.0 | 61.5 | 31.1 | 51.0 | 13.2 |
| 33 | 110.0 | 63.5 | 47.0 | 61.5 | 31.1 | 51.0 | 13.2 |
| 35 | 110.0 | 67.0 | 49.0 | 65.0 | 31.1 | 51.0 | 13.2 |
| 38 | 127.0 | 72.0 | 55.8 | 70.0 | 29.1 | 56.3 | 14.2 |
| 40 | 127.0 | 72.0 | 55.8 | 70.0 | 29.1 | 56.3 | 14.2 |
| 43 | 127.0 | 72.0 | 59.0 | 71.0 | 29.1 | 56.3 | 14.2 |
| 45 | 133.0 | 77.0 | 62.2 | 75.0 | 29.1 | 56.3 | 14.2 |
| 48 | 133.0 | 77.0 | 65.4 | 75.0 | 29.1 | 56.3 | 14.2 |
| 50 | 133.0 | 77.0 | 65.4 | 75.0 | 29.1 | 56.3 | 14.2 |
| 53 | 139.0 | 86.0 | 68.5 | 83.0 | 68.5 | 68.5 | 14.2 |
| 55 | 146.0 | 94.0 | 71.7 | 92.0 | 31.1 | 56.3 | 17.5 |
| 58 | 146.0 | 94.0 | 74.9 | 92.0 | 31.1 | 56.3 | 17.5 |
| 60 | 155.0 | 100.0 | 78.1 | 92.0 | 31.1 | 56.3 | 17.5 |
| 63 | 178.0 | 109.5 | 84.1 | 108.0 | 28.1 | 63.8 | 17.5 |
| 65 | 178.0 | 109.5 | 87.3 | 108.0 | 28.1 | 63.8 | 17.5 |
| 70 | 178.0 | 109.5 | 90.5 | 108.0 | 28.1 | 63.8 | 17.5 |
| 75 | 190.5 | 125.0 | 96.8 | 124.0 | 28.1 | 63.8 | 17.5 |
| 80 | 190.5 | 125.0 | 100.0 | 124.0 | 28.1 | 63.8 | 17.5 |
| 85 | 203.0 | 135.0 | 106.4 | 133.0 | 28.1 | 63.8 | 17.5 |
| 90 | 216.0 | 150.0 | 112.7 | 146.0 | 28.1 | 63.8 | 20.0 |
| 95 | 216.0 | 150.0 | 119.1 | 146.0 | 28.1 | 63.8 | 20.0 |
| 100 | 229.0 | 168.0 | 122.2 | 165.0 | 28.1 | 63.8 | 20.0 |

## AA04-size information(Inches)

| A | B | C | D | DM | E | F | H |
|---|---|---|---|---|---|---|---|
| 1.000 | 4.125 | 2.375 | 1.550 | 2.205 | 1.226 | 2.008 | 0.520 |
| 1.125 | 4.250 | 2.375 | 1.675 | 2.283 | 1.226 | 2.008 | 0.520 |
| 1.250 | 4.375 | 2.500 | 1.810 | 2.421 | 1.226 | 2.008 | 0.559 |
| 1.375 | 4.375 | 2.625 | 1.928 | 2.559 | 1.226 | 2.008 | 0.559 |
| 1.500 | 5.000 | 2.832 | 2.198 | 2.756 | 1.147 | 2.217 | 0.559 |
| 1.625 | 5.000 | 2.832 | 2.323 | 2.795 | 1.147 | 2.217 | 0.559 |
| 1.750 | 5.250 | 3.022 | 2.448 | 2.953 | 1.147 | 2.217 | 0.559 |
| 1.875 | 5.250 | 3.022 | 2.576 | 2.953 | 1.147 | 2.217 | 0.689 |
| 2.000 | 5.500 | 3.386 | 2.698 | 3.268 | 1.231 | 2.217 | 0.689 |
| 2.125 | 5.750 | 3.687 | 2.823 | 3.622 | 1.231 | 2.217 | 0.689 |
| 2.250 | 5.750 | 3.687 | 2.948 | 3.622 | 1.231 | 2.217 | 0.689 |
| 2.375 | 6.000 | 3.937 | 3.073 | 3.622 | 1.231 | 2.217 | 0.689 |
| 2.500 | 7.000 | 4.312 | 3.312 | 4.252 | 1.231 | 2.217 | 0.689 |
| 2.625 | 7.000 | 4.312 | 3.437 | 4.252 | 1.107 | 2.512 | 0.689 |
| 2.750 | 7.000 | 4.312 | 3.562 | 4.252 | 1.107 | 2.510 | 0.689 |
| 2.875 | 7.500 | 4.937 | 3.687 | 4.764 | 1.107 | 2.512 | 0.689 |
| 3.000 | 7.500 | 4.937 | 3.812 | 4.882 | 1.107 | 2.512 | 0.689 |
| 3.125 | 7.500 | 4.937 | 3.937 | 4.882 | 1.107 | 2.512 | 0.689 |
| 3.250 | 8.000 | 5.312 | 4.062 | 5.118 | 1.107 | 2.512 | 0.689 |
| 3.375 | 8.000 | 5.312 | 4.187 | 5.236 | 1.107 | 2.512 | 0.689 |
| 3.500 | 8.000 | 5.312 | 4.312 | 5.236 | 1.107 | 2.512 | 0.689 |
| 3.625 | 8.500 | 5.900 | 4.437 | 5.748 | 1.107 | 2.512 | 0.787 |
| 3.750 | 8.500 | 5.900 | 4.562 | 5.748 | 1.107 | 2.512 | 0.787 |
| 3.875 | 8.500 | 5.900 | 4.687 | 5.748 | 1.107 | 2.512 | 0.787 |
| 4.000 | 9.000 | 6.600 | 4.812 | 6.496 | 1.107 | 2.512 | 0.787 |

# Type AA09





## Parameters

Temperature: t= -40°C to + 260°C [-40°F to + 500°F]

Sliding velocity: vg= Upto 25m/s (5000 ft/min)

Pressure:p1= Vacuum(-28"Hg)to 25 Bar g (363 psig)- OD pressurized only

* Dependent on medium, size and material

## Features

- Balanced design
- Modular structure with standardized parts reduces maintenance costs
- Small spring design prevents medium contact, extending seal life
- Driving screw directly mounted on shaft or sleeve to minimize drive loss
- Four-bolt design compatible with ISO 2858 standard pumps
- Supports API 52, 53, and 54 flushing plans

## Advantage Seal Type AA01 Replaces

AESSEAL® DMSF/DMSC

## Application

Process pumps

Other rotating equipment

Mixer and agitators

## Applicable Medium

All kinds of acidic

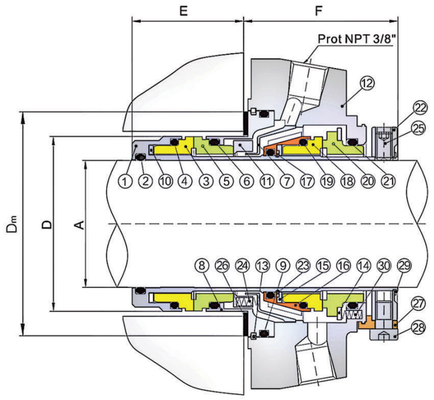
Alkaline

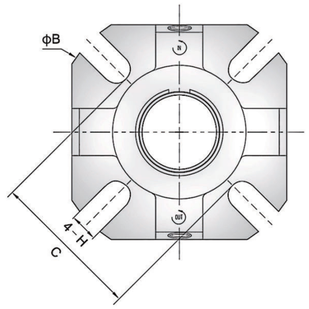
Low-grade slurry

Water-oil and other media








| NO. | Description | Material | NO. | Description | Material |
|---|---|---|---|---|---|
| 1 | Shaft Sleeve | Stainless Steel | 16 | Pump Ring | Stainless Steel |
| 2 | O-Ring | EPDM/Viton/Aflas/Kalrez | 17 | O-Ring | EPDM/Viton/Aflas/Kalrez |
| 3 | Inner Rotary Face | SSIC/TC | 18 | Outer Rotary Face | SSIC/TC |
| 4 | O-Ring | EPDM/Viton/Aflas/Kalrez | 19 | O-Ring | EPDM/Viton/Aflas/Kalrez |
| 5 | Inner Stationary Face | Carbon/SSIC/TC | 20 | Outer Stationary Face | Carbon/SSIC/TC |
| 6 | O-Ring | EPDM/Viton/Aflas/Kalrez | 21 | O-Ring | EPDM/Viton/Aflas/Kalrez |
| 7 | Deflector | Stainless Steel | 22 | Clamp Ring | Stainless Steel |
| 8 | Gland Insert | Stainless Steel | 23 | Wcirclip | Stainless Steel |
| 9 | O-Ring | EPDM/Viton/Aflas/Kalrez | 24 | Spring | Alloy 276 |
| 10 | Dive Ring | Stainless Steel | 25 | Drive Screw | Stainless Steel |
| 11 | SpringPlate | Stainless Steel | 26 | Gasket | AF1 |
| 12 | Gland | Stainless Steel | 27 | Setting Clip | Brass |
| 13 | Snap Ring | Stainless Steel | 28 | Clip Screw | Stainless Steel |
| 14 | Spring Plate | Stainless Steel | 29 | Criclip | Stainless Steel |
| 15 | Pin | Stainless Steel | 30 | Spring | Alloy 276 |

## AA09 -size information(mm)

| A | B | C | D | DM | E | F | H |
|---|---|---|---|---|---|---|---|
| 25 | 105.0 | 66.5 | 42.0 | 55.0 | 38.9 | 54.2 | 14.0 |
| 28 | 105.0 | 66.5 | 45.5 | 60.0 | 38.9 | 54.2 | 14.0 |
| 30 | 105.0 | 66.5 | 47.0 | 60.0 | 38.9 | 54.2 | 14.0 |
| 32 | 105.0 | 66.5 | 50.0 | 63.0 | 38.9 | 54.2 | 14.0 |
| 33 | 105.0 | 66.5 | 50.0 | 63.0 | 38.9 | 54.2 | 14.0 |
| 35 | 120.0 | 68.5 | 52.0 | 65.0 | 38.9 | 54.2 | 14.0 |
| 38 | 135.0 | 80.0 | 55.0 | 75.5 | 38.9 | 54.2 | 15.0 |
| 40 | 135.0 | 80.0 | 57.0 | 75.5 | 40.1 | 54.2 | 15.0 |
| 43 | 135.0 | 80.0 | 60.0 | 75.5 | 40.1 | 54.2 | 15.0 |
| 45 | 139.0 | 84.5 | 62.0 | 80.0 | 40.1 | 54.2 | 14.0 |
| 48 | 139.0 | 84.5 | 65.0 | 80.0 | 40.1 | 54.2 | 14.0 |
| 50 | 150.0 | 87.5 | 68.0 | 83.0 | 40.1 | 54.2 | 17.5 |
| 53 | 150.0 | 97.0 | 72.0 | 93.0 | 40.1 | 54.2 | 17.5 |
| 55 | 150.0 | 97.0 | 72.0 | 93.0 | 40.1 | 54.2 | 17.5 |
| 60 | 165.0 | 102.0 | 77.9 | 98.5 | 40.1 | 54.2 | 17.5 |
| 63 | 171.0 | 108.0 | 81.0 | 104.5 | 40.1 | 54.2 | 17.5 |
| 65 | 171.0 | 108.0 | 84.2 | 104.5 | 40.1 | 54.2 | 17.5 |
| 70 | 180.0 | 112.0 | 87.5 | 107.0 | 40.1 | 54.2 | 17.5 |

## AA09 -size information(Inches)

| A | B | C | D | DM | E | F | H |
|---|---|---|---|---|---|---|---|
| 1.000 | 4.134 | 2.618 | 1.654 | 2.165 | 2.106 | 0.393 | 0.551 |
| 1.125 | 4.134 | 2.618 | 1.791 | 2.362 | 2.106 | 0.393 | 0.551 |
| 1.250 | 4.134 | 20a3. | 1.968 | 2.480 | 2.106 | 0.393 | 0.551 |
| 1.375 | 4.725 | 5150a | 2.047 | 2.559 | 2.106 | 0.393 | 0.551 |
| 1.500 | 5.315 | .1.69 | 2.165 | 2.972 | 2.106 | 0.393 | 0.591 |
| 1.625 | 5.315 | a3.2. | 2.362 | 2.972 | 2.106 | 0.393 | 0.591 |
| 1.750 | 5.475 | 18a26 | 2.441 | 3.150 | 2.106 | 0.393 | 0.551 |
| 1.875 | 5.475 | 3.326 | 2.559 | 3.150 | 2.106 | 0.393 | 0.551 |
| 2.000 | 5.906 | 3.450 | 2.677 | 3.268 | 2.106 | 0.393 | 0.689 |
| 2.125 | 5.906 | 3.819 | 2.835 | 3.661 | 2.106 | 0.393 | 0.689 |
| 2.250 | 6.500 | 3.327 | 2.937 | 3.878 | 2.106 | 0.393 | 0.689 |
| 2.375 | 6.500 | 4.015 | 3.067 | 3.878 | 2.106 | 0.393 | 0.689 |
| 2.500 | 6.725 | 4.251 | 3.189 | 4.114 | 2.106 | 0.393 | 0.689 |
| 2.625 | 6.725 | 4.251 | 3.315 | 4.114 | 2.106 | 0.393 | 0.689 |
| 2.750 | 7.100 | 4.409 | 3.445 | 4.213 | 2.106 | 0.393 | 0.689 |

# Type AJ01





## Features

- Stationary face compensation technology
- Solid structure minimizes deformation under extreme temperatures
- High-speed capability up to 220°C with no face drop or displacement
- Handles pressure up to 25 bar
- Compatible with API Plans 11, 21, 32, and 62

## Parameters

Pressure:p1 = Vacuum (-28”Hg)to 25 Bar g(362 psig)-

OD pr essurized only

Temperature:t = -20ºC to +220ºC [-68ºF to +428ºF]

Sliding velocity:vg = Upto 25 m/s (4000 ft/min)

* Dependent on medium, size and material

## Applicable Medium

All kinds of acidic

Alkaline

Low-grade slurry

Water-oil and other media

## Advantage Seal Type A J01 Replaces

AESSEAL® CKS

BURGMANN® Cartex Single

JOHN CRANE® 5610 4610

FLOWSERVE® P-50

CHESTERTON® 150/ 155

## Application

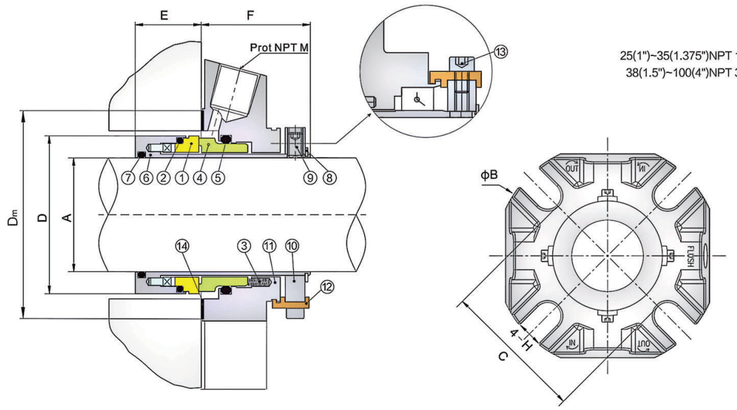
Process pumps

Other rotating equipment

Mixer and agitators








| NO. | Description | Material | NO. | Description | Material |
|---|---|---|---|---|---|
| 1 | Rotary Face | SSIC/TC | 8 | Circlip | Stainless Steel |
| 2 | O-Ring | EPDM/Viton/Aflas/Kalrez | 9 | Drive Screw | Stainless Steel |
| 3 | Spring | Alloy 276 | 10 | Clamp Ring | Stainless Steel |
| 4 | Stationary Face | Carbon/SSIC/TC | 11 | Gland | Stainless Steel |
| 5 | O-Ring | EPDM/Viton/Aflas/Kalrez | 12 | Setting Clip | Brass |
| 6 | Shaft Sleeve | Stainless Steel | 13 | Clip Screw | Stainless Steel |
| 7 | O-Ring | EPDM/Viton/Aflas/Kalrez | 14 | Gasket | AF1 |

## AJ01 -size information(mm)

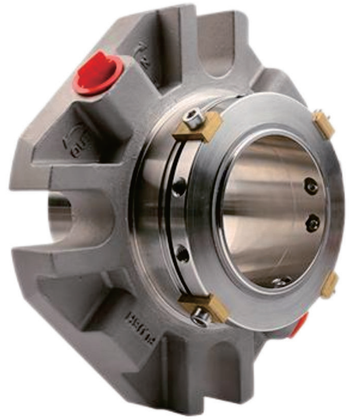
| A | B | C | D | DM | E | F | H |
|---|---|---|---|---|---|---|---|
| 25 | 105.0 | 62.0 | 43.0 | 60.0 | 24.6 | 42.4 | 13.2 |
| 28 | 105.0 | 62.0 | 46.0 | 60.0 | 24.6 | 42.4 | 13.2 |
| 30 | 105.0 | 67.0 | 48.6 | 65.0 | 24.6 | 42.4 | 13.2 |
| 32 | 110.0 | 70.0 | 50.0 | 65.0 | 24.6 | 42.4 | 13.2 |
| 33 | 110.0 | 70.0 | 50.0 | 65.0 | 24.6 | 42.4 | 13.2 |
| 35 | 113.0 | 72.0 | 53.0 | 68.0 | 24.6 | 42.4 | 13.2 |
| 38 | 135.0 | 80.0 | 56.0 | 78.0 | 24.6 | 42.4 | 13.2 |
| 40 | 135.0 | 80.0 | 58.0 | 78.0 | 24.6 | 42.4 | 14.2 |
| 42 | 135.0 | 80.0 | 61.0 | 78.0 | 24.6 | 42.4 | 14.2 |
| 43 | 135.0 | 80.0 | 61.0 | 78.0 | 24.6 | 42.4 | 14.2 |
| 45 | 138.0 | 82.5 | 62.5 | 79.0 | 24.6 | 42.4 | 14.2 |
| 48 | 138.0 | 82.5 | 65.5 | 82.0 | 24.6 | 42.4 | 14.2 |
| 50 | 150.0 | 87.0 | 68.0 | 85.0 | 24.6 | 42.4 | 14.2 |
| 53 | 150.0 | 97.0 | 72.0 | 95.0 | 24.6 | 42.4 | 18.0 |
| 55 | 150.0 | 97.0 | 73.0 | 88.0 | 24.6 | 42.4 | 18.0 |
| 60 | 157.0 | 102.0 | 78.0 | 100.0 | 24.6 | 42.4 | 18.0 |
| 65 | 165.0 | 109.0 | 84.8 | 107.0 | 24.6 | 42.4 | 18.0 |
| 70 | 178.0 | 118.5 | 93.1 | 116.0 | 24.6 | 42.4 | 18.0 |
| 75 | 190.0 | 129.0 | 100.0 | 125.0 | 26.6 | 57.4 | 18.0 |
| 80 | 195.0 | 135.0 | 106.4 | 131.0 | 26.6 | 57.4 | 18.0 |
| 85 | 198.0 | 139.0 | 109.5 | 135.0 | 26.6 | 57.4 | 22.0 |
| 90 | 205.0 | 145.0 | 115.9 | 142.0 | 26.6 | 57.4 | 22.0 |
| 95 | 208.0 | 148.0 | 119.1 | 145.0 | 26.6 | 57.4 | 22.0 |
| 100 | 218.0 | 154.0 | 125.4 | 146.0 | 26.6 | 57.4 | 22.0 |

## AJ01 -size information(Inches)

| A | B | C | D | DM | E | F | H |
|---|---|---|---|---|---|---|---|
| 1.000 | 4.134 | 2.440 | 1.693 | 2.362 | 0.969 | 1.669 | 0.520 |
| 1.125 | 4.134 | 2.440 | 1.811 | 2.362 | 0.969 | 1.669 | 0.520 |
| 1.250 | 4.330 | 2.760 | 2.000 | 2.250 | 0.969 | 1.669 | 0.520 |
| 1.375 | 4.449 | 2.840 | 2.087 | 2.677 | 0.969 | 1.669 | 0.520 |
| 1.500 | 4.842 | 3.149 | 2.205 | 2.874 | 0.969 | 1.669 | 0.520 |
| 1.625 | 4.842 | 3.149 | 2.402 | 3.071 | 0.969 | 1.669 | 0.599 |
| 1.750 | 5.433 | 3.248 | 2.461 | 3.110 | 0.969 | 1.669 | 0.599 |
| 1.875 | 5.433 | 3.248 | 2.579 | 3.228 | 0.969 | 1.669 | 0.599 |
| 2.000 | 5.905 | 3.818 | 2.667 | 3.346 | 0.969 | 1.669 | 0.599 |
| 2.125 | 5.905 | 3.818 | 2.874 | 3.465 | 0.969 | 1.669 | 0.709 |
| 2.250 | 6.181 | 4.020 | 3.071 | 3.937 | 0.969 | 1.669 | 0.709 |
| 2.375 | 6.417 | 4.290 | 3.212 | 4.213 | 0.969 | 1.669 | 0.709 |
| 2.500 | 6.417 | 4.290 | 3.339 | 4.213 | 0.969 | 1.669 | 0.709 |
| 2.625 | 7.008 | 4.660 | 3.661 | 4.567 | 0.969 | 1.669 | 0.709 |
| 2.750 | 7.283 | 4.960 | 3.858 | 3.779 | 0.969 | 1.669 | 0.709 |
| 2.875 | 7.480 | 5.079 | 3.937 | 4.921 | 1.047 | 2.260 | 0.709 |
| 3.000 | 7.677 | 5.197 | 4.189 | 5.157 | 1.047 | 2.260 | 0.709 |
| 3.125 | 7.677 | 5.315 | 4.212 | 4.113 | 1.047 | 2.260 | 0.709 |
| 3.250 | 7.795 | 5.472 | 4.311 | 5.315 | 1.047 | 2.260 | 0.709 |
| 3.375 | 7.795 | 5.591 | 4.500 | 5.157 | 1.047 | 2.260 | 0.866 |
| 3.500 | 8.071 | 5.709 | 4.563 | 5.591 | 1.047 | 2.260 | 0.866 |
| 3.625 | 8.189 | 5.827 | 4.689 | 5.709 | 1.047 | 2.260 | 0.866 |
| 3.750 | 8.583 | 6.063 | 4.937 | 5.945 | 1.047 | 2.260 | 0.866 |
| 4.000 | 8.583 | 6.063 | 4.937 | 5.945 | 1.047 | 2.260 | 0.866 |

# Type AJ09





## Features

- Stationary face compensation technology
- Solid seal structure minimizes deformation in extreme temperatures
- Integrated, bi-directional diversion with sleeve and pump ring
- High-speed performance up to 220°C with no seal face drop or displacement
- Withstands pressures up to 25 bar
- Wetted parts available in Duplex Steel, 904L, and Alloy 276
- Compatible with API Plans 52, 53A, 53B, and 54

## Parameters

Pressure:p1 = Vacuum (-28”Hg)to 25 Barg(362 psig) -OD pr essurized only
Temperature:t = -20ºC to +220ºC [-67ºF to +428ºF]
Sliding velocity:vg = Upto 25 m/s (4000 ft/min)
* Dependent on medium, size and material

## Advantage Seal Type AJ09 Replaces

AESSEAL® CKD
BURGMANN® Cartex Dual
JOHN CRANE® 5620PR 4620P
FLOWSERVE® P-200
CHESTERTON® 250/ 255

## Application

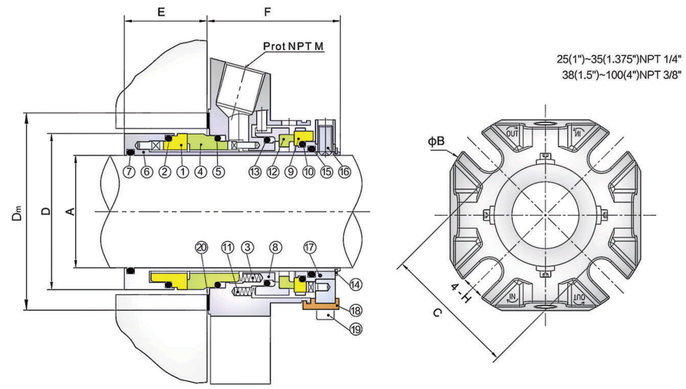
Process pumps
Other rotating equipment
Mixer and agitators

## Applicable Medium

All kinds of acidic
Alkaline
Low-grade slurry
Water-oil and other media








| NO. | Description | Material | NO. | Description | Material |
|---|---|---|---|---|---|
| 1 | Inner Rotary Face | SSIC/TC | 11 | Spring | Alloy 276 |
| 2 | O-Ring | EPDM/Viton/Aflas/Kalrez | 12 | Outer Stationary Face | Carbon-316SS Stainless Steel |
| 3 | Spring | Alloy 276 | 13 | O-Ring | EPDM/Viton/Aflas/Kalrez |
| 4 | Inner Stationary Face | Carbon/SSIC/TC | 14 | Circlip | Alloy 276 |
| 5 | O-Ring | EPDM/Viton/Aflas/Kalrez | 15 | O-Ring | EPDM/Viton/Aflas/Kalrez |
| 6 | Shaft Sleeve | Stainless Steel | 16 | Drive Screw | Stainless Steel |
| 7 | O-Ring | EPDM/Viton/Aflas/Kalrez | 17 | Clamp Ring | Stainless Steel |
| 8 | Gland | Stainless Steel | 18 | Setting Clip | Brass |
| 9 | Outer Rotary Face | TC-Stainless Steel | 19 | Clip Screw | Stainless Steel |
| 10 | O-Ring | EPDM/Viton/Aflas/Kalrez | 20 | Gasket | AF1 |

## AJ09 -size information(mm)

| A | B | C | D | DM | E | F | H |
|---|---|---|---|---|---|---|---|
| 25 | 105.0 | 62.0 | 43.0 | 60.0 | 33.1 | 53.4 | 13.2 |
| 28 | 105.0 | 62.0 | 46.0 | 60.0 | 33.1 | 53.4 | 13.2 |
| 30 | 105.0 | 67.0 | 48.6 | 65.0 | 33.1 | 53.4 | 13.2 |
| 32 | 110.0 | 70.0 | 50.0 | 65.0 | 33.1 | 53.4 | 13.2 |
| 33 | 110.0 | 70.0 | 50.0 | 65.0 | 33.1 | 53.4 | 13.2 |
| 35 | 113.0 | 72.0 | 53.0 | 68.0 | 33.1 | 53.4 | 13.2 |
| 38 | 135.0 | 80.0 | 56.0 | 78.0 | 33.1 | 53.4 | 13.2 |
| 40 | 135.0 | 80.0 | 58.0 | 78.0 | 33.1 | 53.4 | 14.2 |
| 42 | 135.0 | 80.0 | 61.0 | 78.0 | 33.1 | 53.4 | 14.2 |
| 43 | 135.0 | 80.0 | 61.0 | 78.0 | 33.1 | 53.4 | 14.2 |
| 45 | 138.0 | 82.5 | 62.5 | 79.0 | 33.1 | 53.4 | 14.2 |
| 48 | 138.0 | 82.5 | 65.5 | 82.0 | 33.1 | 53.4 | 14.2 |
| 50 | 150.0 | 87.0 | 68.0 | 85.0 | 33.1 | 53.4 | 14.2 |
| 53 | 150.0 | 97.0 | 72.0 | 95.0 | 33.1 | 53.4 | 18.0 |
| 55 | 150.0 | 97.0 | 73.0 | 88.0 | 33.1 | 53.4 | 18.0 |
| 60 | 157.0 | 102.0 | 78.0 | 100.0 | 33.1 | 53.4 | 18.0 |
| 65 | 165.0 | 109.0 | 84.8 | 107.0 | 33.1 | 53.4 | 18.0 |
| 70 | 178.0 | 118.5 | 93.1 | 116.0 | 33.1 | 53.4 | 18.0 |
| 75 | 190.0 | 129.0 | 100.0 | 125.0 | 44.1 | 63.9 | 18.0 |
| 80 | 195.0 | 135.0 | 106.4 | 131.0 | 44.1 | 63.9 | 18.0 |
| 85 | 198.0 | 139.0 | 109.5 | 135.0 | 44.1 | 63.9 | 22.0 |
| 90 | 205.0 | 145.0 | 115.9 | 142.0 | 44.1 | 63.9 | 22.0 |
| 95 | 208.0 | 148.0 | 119.1 | 145.0 | 44.1 | 63.9 | 22.0 |
| 100 | 218.0 | 154.0 | 125.4 | 146.0 | 44.1 | 63.9 | 22.0 |

## AJ09 -size information(Inches)

| A | B | C | D | DM | E | F | H |
|---|---|---|---|---|---|---|---|
| 1.000 | 4.134 | 2.440 | 1.693 | 2.362 | 1.303 | 2.102 | 0.520 |
| 1.125 | 4.134 | 2.440 | 1.811 | 2.362 | 1.303 | 2.102 | 0.520 |
| 1.250 | 4.330 | 2.760 | 2.000 | 2.250 | 1.303 | 2.102 | 0.520 |
| 1.375 | 4.449 | 2.840 | 2.087 | 2.677 | 1.303 | 2.102 | 0.520 |
| 1.500 | 4.842 | 3.149 | 2.205 | 2.874 | 1.303 | 2.102 | 0.520 |
| 1.625 | 4.842 | 3.149 | 2.402 | 3.071 | 1.303 | 2.102 | 0.599 |
| 1.750 | 5.433 | 3.248 | 2.461 | 3.110 | 1.303 | 2.102 | 0.599 |
| 1.875 | 5.433 | 3.248 | 2.579 | 3.228 | 1.303 | 2.102 | 0.599 |
| 2.000 | 5.905 | 3.818 | 2.667 | 3.346 | 1.303 | 2.102 | 0.599 |
| 2.125 | 5.905 | 3.818 | 2.874 | 3.465 | 1.303 | 2.102 | 0.709 |
| 2.250 | 6.181 | 4.020 | 3.071 | 3.937 | 1.303 | 2.102 | 0.709 |
| 2.375 | 6.417 | 4.290 | 3.212 | 4.213 | 1.303 | 2.102 | 0.709 |
| 2.500 | 6.417 | 4.290 | 3.339 | 4.213 | 1.303 | 2.102 | 0.709 |
| 2.625 | 7.008 | 4.660 | 3.661 | 4.567 | 1.303 | 2.102 | 0.709 |
| 2.750 | 7.283 | 4.960 | 3.858 | 3.779 | 1.303 | 2.102 | 0.709 |
| 2.875 | 7.480 | 5.079 | 3.937 | 4.921 | 1.736 | 2.516 | 0.709 |
| 3.000 | 7.677 | 5.197 | 4.189 | 5.157 | 1.736 | 2.516 | 0.709 |
| 3.125 | 7.677 | 5.315 | 4.212 | 4.113 | 1.736 | 2.516 | 0.709 |
| 3.250 | 7.795 | 5.472 | 4.311 | 5.315 | 1.736 | 2.516 | 0.709 |
| 3.375 | 7.795 | 5.591 | 4.500 | 5.157 | 1.736 | 2.516 | 0.866 |
| 3.500 | 8.071 | 5.709 | 4.563 | 5.591 | 1.736 | 2.516 | 0.866 |
| 3.625 | 8.189 | 5.827 | 4.689 | 5.709 | 1.736 | 2.516 | 0.866 |
| 3.750 | 8.583 | 6.063 | 4.937 | 5.945 | 1.736 | 2.516 | 0.866 |
| 4.000 | 8.583 | 6.063 | 4.937 | 5.945 | 1.736 | 2.516 | 0.866 |

# Type ASI





## Features

Cartridge Double Seal Design

Easy to install

No pump modifications necessary

No special fitting tools required

Standard model compatible with Grindex® and Flygt® pumps

## Application

Mining industry, Submersible pumps and wide range of applications throughout the industry

## Parameters

Pressure：p1 = 12 bar (174 PSI)

Temperature：t = -30 °C(-22°F) ... 180 °C (+356°F)

Sliding velocity：vg = 10 m/s (33 ft/s)

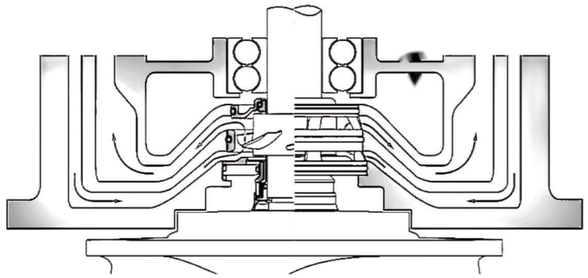
* Dependent on medium, size and material

## Applicable Medium

Wastewater







## Features

Rotary Ring□Sic/TC）

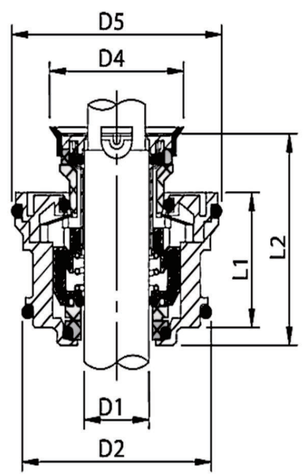
Stationary Ring（Sic/TC）

Secondary Seal（NBR/EPDM/Viton）

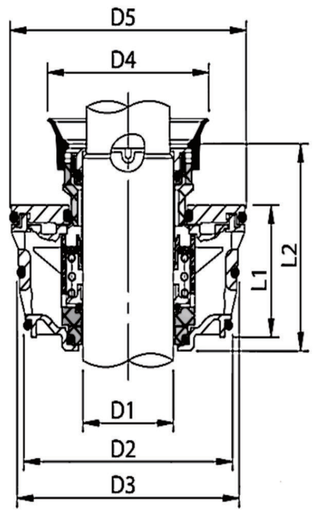
Spring and Metal Part（Stainless Steel）

Other Parts（Plastic/Cast Aluminum/ AISI 304）

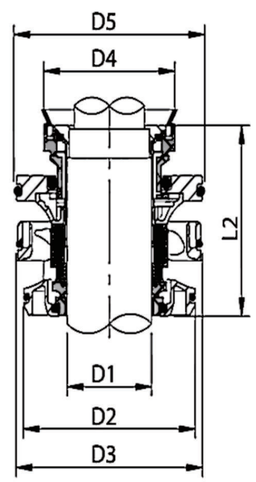
| Xylem® Flygt® Pumps | Shaft Size | ASI Seal Code | Standard Materials |
|---|---|---|---|
| 2610、2620、2630、2640、4610&4620 | 20mm | ASI-20 | TC/TC/TC/TC/VIT |
| 2660、4630&4640 | 25mm | ASI-25 | TC/TC/TC/TC/VIT |
| 2670、3153、5100.210、5100.211、5100.220&5100.221 | 35mm | ASI-35 | TC/TC/TC/TC/VIT |
| 3171、4650、4660、5100.250、5100.251、5100.260&5100.261 | 45mm | ASI-45 | TC/TC/TC/TC/VIT |
| 3202,4670,4680,5100.300,5100,310,5150.300&5150.310 | 60mm | ASI-60 | TC/TC/TC/TC/VIT |
| 3301、5150.350&5150.360 | 90mm | ASI-90 | TC/TC/TC/TC/VIT |




20-25mm




35mm




45-60-90 mm

| D1 | D2 | D3 | D4 | D5 | L1 | L2 |
|---|---|---|---|---|---|---|
| 20 | 55 | / | 39.5 | 60.5 | 34.5 | 54 |
| 25 | 60 | / | 44 | 66 | 36 | 56.5 |
| 35 | 80 | 85 | 59 | 90.5 | 44.5 | 66.5 |
| 45 | 90 | 97 | 71 | 99 | / | 85 |
| 60 | 115 | 116.5 | 82.5 | 126.5 | / | 86.5 |
| 90 | 145 | 149 | 108 | 156.5 | / | 92.5 |

## Elastomer Bellow



Type 16C



Type 71



Type 816



Type 821



Type 841

## Pusher Seal



Type 31



Type 37





## Pusher Seal



Type 37B



Type 81B



Type 81BSS



Type 846B



Type 582



Type 860



Type 850

# Type Of Stationary Seats



Type 1



Type 2



Type 3



Type 4



Type 5



Type 8



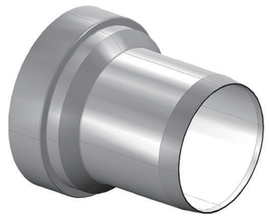
Type 20



Type 25



# Advantage Seal Accessories



Sleeves - Type 24



Bushing - Type 13




Working Length Finder

Tungsten Seal Face Ring



Tungsten Sleeves





# Care and Handling of Mechanical Seals

Dirt on the seal face, even oil from fingerprints, can cause a mechanical seal to fail. Tiny particulates can create wear and destroy seal faces, leading to leakage. Ensure proper handling during installation by following these tips:

1. Wash hands.

2. Don't unpack the seal until ready to install.

3. Avoid touching or handling lapped seal faces.

4. Use clean tissue paper on the workbench to prevent contamination.

5. Don't set the seal down on its face.

6. Clean faces with soft tissue and water-based lubricant or water before putting them together on the equipment.



# Be Sure to Follow Proper Installation Guidelines:

1. Read the installation instructions carefully before attempting to install the seal.

2. Use laser alignment tools to ensure the pump is not misaligned. Misalignment puts undue stress on mechanical seal components, causing them to malfunction, wear prematurely, and potentially fail.

3. Ensure that the lubrication is compatible with seal components and the product being pumped. Incorrect lubrication can damage O-rings or rubber bellows on the seal, causing them to tear or roll.

4. Make sure the shaft is clean prior to installation.



Advantage Seal

*The Seal of Quality*

# Seal Material Compatibility Guide





This guide is provided as a general aid for selecting appropriate materials for use with a wide range of aggressive chemicals commonly encountered in mechanical seal applications. Because chemicals and their properties can vary greatly, this chart should be used at your discretion.

The accuracy of these ratings cannot be guaranteed. Your chemical supplier is the most reliable source for definitive material compatibility data. Careful consideration must be given to all characteristics of the chemical and process system, including chemical concentration, installation conditions, pressure, and temperature before a final material is selected.

Although the information set forth herein is presented in good faith and believed to be correct as of the date of issuance, Advantage Seal Inc. (ASISEAL) makes no guarantee or representation regarding the completeness or accuracy of the data resulting from use or reliance upon any information, recommendations, or suggestions contained herein.

**ASISEAL MAKES NO EXPRESS OR IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE INFORMATION CONTAINED HEREIN OR ANY PRODUCT OR SUBSTANCE REFERRED TO HEREIN,** whether used alone or in combination with any other material.

Nothing contained herein is to be construed as a recommendation to use any product in conflict with any patent. The information is subject to change without notice.



| Legends:<br>A – Good (No known Effect)<br>B – Fair (Use with caution)<br>X – Bad (Not Compatible)<br>Blank - Insufficient Data | Formula | Notes | 316 SS | Alloy 20 SS | 304 SS | Hastelloy "C" | Inconel 600/718 | Carbon | Ceramic | Tungsten Carbide | SiC Reaction -Bond | SiC Sintered | Buna Nitrile | Viton (FKM) | EPDR | Teflon | Kalrez 4079 | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetaldehyde <200˚F (93˚C) | $C_2H_4O$ | 12 | A | A | A | A | | A | A | A | A | A | X | X | X | A | X | Kalrez 1050LF,SD-1475 Fugitive Emissions |
| Acetate Solvents | | 1,5 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | |
| Acetic Anhydride <200˚F (93˚C) | $C_4H_6O_3$ | 1 | A | B | B | A | B | A | A | X | A | A | X | X | X | A | A | |
| Acetic Acid <5% <200˚F (93˚C) | $CH_3COOH$ | 1 | A | A | X | A | B | A | A | X | A | A | X | A | A | A | A | |
| Acetic Acid <40% <200˚F (93˚C) | $CH_3COOH$ | 1 | A | A | X | A | X | A | A | X | A | A | X | X | X | A | A | |
| Acetic Acid >40% <200˚F (93˚C) | $CH_3COOH$ | 1 | B | B | X | A | X | A | A | X | A | A | X | X | X | A | A | |
| Acetic Acid-Glacial (100%) <250˚F (121˚C) | $CH_3COOH$ | 3 | B | B | X | A | B | A | A | X | A | A | X | X | X | A | A | |
| Acetic Acid Vapors | $CH_3COOH$ | 6 | B | B | X | A | B | A | A | X | A | A | X | X | A | A | A | |
| Acetone <200˚F (93˚C) | $C_3H_6O$ | 1,5 | A | A | A | A | | A | A | A | A | A | X | X | A | A | A | Flammable |
| Acetylene <250˚F (121˚C) | $C_2H_2$ | 1,7 | A | A | A | A | | A | A | A | A | A | A | A | A | A | A | Flammable |
| Acrylic Acid <150˚F (66˚C) | $C_3H_4O_2$ | 12 | A | A | B | A | | A | A | A | A | A | X | X | X | A | A | See SD-1475, Fugitive Emissions |
| Acrylonitrile <200˚F (93˚C) | $C_3H_3N$ | 12 | B | B | A | A | A | A | A | A | A | A | X | X | X | A | A | See SD-1475, Fugitive Emissions |
| Adipic Acid <150˚F (66˚C) | $C_6H_{10}O_4$ | 1 | B | B | A | A | B | A | A | X | A | A | A | X | A | A | A | Melting Point - 305˚F (152˚C) |
| Allyl Alcohol <200˚F (93˚C) | $C_3H_60$ | 1,5 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | |
| Allyl Chloride <200˚F (93˚C) | $C_3H_5Cl$ | 4,12 | B | B | X | B | B | A | A | A | A | A | X | X | X | A | A | See SD-1475, Fugitive Emissions |
| Alum Solution <10% 70˚F (21˚C) | $AlK(SO_4)_2$ | 4,8 | B | A | A | B | B | A | A | X | A | A | A | A | A | A | A | See SD-1112, Pulp and Paper |
| Alum Solution >10% | $AlK(SO_4)_2$ | 3 | B | B | B | B | B | A | A | X | A | A | A | A | A | A | A | See SD-1112, Pulp and Paper |
| Aluminum Chloride <200˚F (93˚C) | $AlCl_3$ | 4 | X | X | X | A | X | A | A | X | A | A | A | A | A | A | A | |
| Aluminum Sulfate <50% <200˚F (93C) | $Al_2(SO_4)_3$ | 4 | X | A | X | A | X | A | A | X | A | A | A | A | A | A | A | |
| Amine (Services) <200˚F (93˚C) | | 1 | A | A | A | A | B | A | A | X | A | A | X | X | X | A | X | Flammable, Kalrez 1050LF |
| Amino Benzene Sulfuric Acid <200˚F (93C) | $C_6H_7NO_3S$ | 1 | B | B | B | B | B | A | A | X | A | A | X | X | X | A | A | |
| Amino Benzoic Acid <200˚F (93˚C) | $C_7H_7NO_2$ | 4 | B | B | B | B | B | A | A | X | A | A | X | X | X | A | A | |
| Ammonia Anhydrous <300˚F (149˚C) | $NH_3$ | 1,5,7 | A | A | A | A | A | A | A | A | A | A | X | X | A | A | X | Explosive in air; Kalrez 1050LF |
| Ammonia, Aqua <200˚F (93˚C) | $NH_3 + H_20$ | 1 | B | B | B | B | B | A | A | A | A | A | X | X | A | A | A | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ammonium Bifluoride <150˚F (66˚C) | $NH_4HF_2$ | 4 | X | B | X | B | B | A | X | X | A | A | A | A | A | A | A | |
| Ammonium Carbamate <150˚F (66˚C) | $CH_6N_2O_2$ | 1 | B | B | | B | | A | A | A | A | A | | | | A | A | |
| Ammonium Carbonate <200˚F (93C) | $(NH_4)_2CO_3$ | 4 | B | B | B | B | B | A | A | X | A | A | X | A | A | A | A | |
| Ammonium Hydroxide <200˚F (93˚C) | $NH_4OH$ | 1 | B | B | B | B | B | A | A | A | A | A | X | X | A | A | X | Kalrez 1050LF |
| Ammonium Nitrate <200˚F (93˚C) | $NH_4NO_3$ | 6 | A | A | A | B | | A | A | X | A | A | A | X | A | A | A | Explosive |
| Ammonium Phosphates <40%<200˚F | $NH_4H_2PO_4$ | 4 | B | B | B | B | B | A | A | X | A | A | A | X | A | A | A | |
| Ammonium Stearate | $C_{18}H_{39}NO_2$ | 6 | A | A | A | A | | A | A | A | A | A | | | | A | | |
| Ammonium Sulfate <200˚F (93˚C) | $(NH_4)_2SO_4$ | 4 | B | B | X | B | B | A | A | X | A | A | A | X | A | A | A | |
| Amyl Alcohol <200˚F (93˚C) | $C_5H_{12}O$ | 1 | A | A | A | A | A | A | A | A | A | A | X | X | A | A | A | Extremely Toxic |
| Aniline <400˚F (204˚C) | $C_6H_7N$ | 1 | A | A | A | B | B | A | A | X | A | A | X | X | X | A | A | Extremely Toxic |
| Aniline Dyes <400˚F (204˚C) | | 1 | A | A | A | B | B | A | A | X | A | A | X | X | X | A | A | |
| Aqua Regia <150˚F (66˚C) | $HNO_3 + HCl$ | 6 | X | X | X | X | X | X | A | X | A | A | X | X | X | A | A | |
| Aroclor 1248 <350˚F (177˚C) | | 1,10 | A | A | B | A | A | A | A | A | A | A | X | A | X | A | A | See SD-182, Heat Transfer Fluids |
| Aroclor 1248 >350˚F (177˚C) | | 1,10 | A | A | B | A | A | A | A | A | A | A | X | A | X | A | A | See SD-182, Heat Transfer Fluids |
| Arsenic Acid <200˚F (93˚C) | $H_3AsO_4$ | 1 | B | B | B | B | | A | A | X | A | A | A | A | A | A | A | Extremely Toxic |
| Arsenic Trioxide <200˚F (93˚C) | $As_2O_3$ | 6 | B | B | B | B | B | A | A | X | A | A | A | A | A | A | A | Extremely Toxic |
| Ascorbic Acid 70˚F (21˚C) | $C_6H_8O_6$ | 1 | A | A | A | A | B | A | A | A | A | A | X | X | X | A | A | |
| Ash Slurry | | 3 | A | A | A | A | | A | A | A | A | A | | A | | A | | |
| Asphalt-Emulsified | | 9 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | |
| Barium Chloride <60% <200˚F | $BaCl_2$ | 4 | B | B | B | A | A | A | A | X | A | A | A | A | A | A | A | Extremely Toxic |
| Barium Hydroxide <40% <200˚F | $Ba(OH)_2$ | 4 | A | A | B | B | B | A | A | A | A | A | A | A | A | A | A | Extremely Toxic |
| Barium Nitrate <50% <200˚F (93˚C) | $Ba(NO_3)_2$ | 4 | B | B | B | B | B | A | A | X | A | A | A | A | A | A | A | Extremely Toxic |
| Barium Sulfate <10% <200˚F (93˚C) | $BaSO_4$ | 4 | B | B | B | B | B | A | A | X | A | A | A | A | A | A | A | |
| Beer | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Benzene (Benzol) <200˚F (93˚C) | $C_6H_6$ | 12 | B | A | B | A | A | A | A | A | A | A | X | A | X | A | A | See SD-1475, Fugitive Emissions |
| Benzene Sulfonic Acid 70˚F (21˚C) | $C_6H_5SO_3$ | 1 | B | A | B | B | | A | A | X | A | A | X | A | X | A | A | |
| Benzoic Acid <200˚F (93˚C) | $C_7H_6O_2$ | 9 | B | B | B | A | B | A | A | X | A | A | X | A | X | A | A | |
| Black Liquor, Sulfate <50% | | 8 | B | B | B | A | B | A | A | A | A | A | X | X | A | A | A | See SD-1072, Black Liquor |
| Black Liquor, Sulfate >50% | | 6 | B | B | B | A | B | A | A | A | A | A | X | X | A | A | A | See SD-1072, Black Liquor |
| Boiler Feed Water | $H_2O$ | 1,7 | B | A | B | A | A | A | A | A | A | A | A | A | A | A | A | See SD-129, Hot Water |

**NOTES:** 1Bypass Flush, 2External Mount Seal, 3External Flush, 4Product May Salt Out, 5Use Carbon as one face, 6Double Seal, 7Balanced Seal, 8Quench, 9Steam Jacket, 10Steam Purge, 11<50ppm Chloride, 12Volatile Hazardous Air Pollutants

| Legends:<br>A – Good (No known Effect)<br>B – Fair (Use with caution)<br>X – Bad (Not Compatible)<br>Blank - Insufficient Data | Formula | Notes | 316 SS | Alloy 20 SS | 304 SS | Hastelloy "C" | Inconel 600/718 | Carbon | Ceramic | Tungsten Carbide | SiC Reaction-Bond | SiC Sintered | Buna Nitrile | Viton (FKM) | EPDR | Teflon | Kalrez 4079 | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bonderite Solution | | 1 | A | | | | | A | A | A | A | A | A | A | | A | A | |
| Borated Water <5% <300˚F (149˚C) | | 1,4 | A | A | B | A | B | A | A | A | A | A | X | X | A | X | A | EPT, See SD-1265, Nuclear Power Plant |
| Borated Water <12% <300˚F (149˚C) | | 1,4 | B | B | B | A | B | A | A | A | A | A | X | X | A | X | A | EPT, See SD-1265, Nuclear Power Plant |
| Borated Water >12% <300˚F (149˚C) | | 1,4 | B | B | B | A | B | A | A | A | A | A | X | X | A | X | A | EPT, See SD-1265, Nuclear Power Plant |
| Boric Acid <50% <300˚F (149˚C) | $H_3BO_3$ | 4 | B | B | B | A | B | A | A | X | A | A | A | A | A | A | A | |
| Brine <200˚F (93˚C) | NaCl | 4 | X | B | X | A | A | A | A | A | A | A | A | A | A | A | A | |
| Bromine (dry) 100% <150˚F (66˚C) | $Br_2$ | 6 | X | X | X | A | A | A | A | A | A | A | X | A | X | A | A | |
| Bromine (wet) <200˚F (93˚C) | HBr | 6 | X | X | X | X | X | X | A | X | A | A | X | A | X | A | A | |
| Bunker "C" Fuel Oil | | 1,8 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | See SD-826, Refinery |
| Butadiene <200˚F (93˚C) | $C_4H_6$ | 6,12 | A | A | A | A | B | A | A | A | A | A | X | A | X | A | X | See SD-826 and SD-1475; TLV:2 ppm |
| Butane (gas) <300˚F (149˚C) | $C_4H_{10}$ | 6,12 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable, See SD-826 and SD-1475 |
| Butane (liquid) <300˚F (149˚C) | $C_4H_{10}$ | 1,5,7, 12 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable, See SD-826 and SD-1475 |
| Butyl Acetate <300˚F (149˚C) | $C_6H_{12}O_2$ | 1 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | |
| Butyl Alcohol <200˚F (93˚C) | $C_4H_{10}O$ | 1 | A | A | A | A | B | A | A | X | A | A | A | A | X | A | A | |
| Butylaldehyde <200˚F (93˚C) | $C_4H_8O$ | 1 | A | A | A | A | | A | A | A | A | A | X | X | X | A | X | Flammable, Kalrez 2035 |
| Butyric Acid <200˚F (93˚C) | $C_4H_8O_2$ | 1 | B | B | B | A | X | A | A | X | A | A | X | X | X | A | A | |
| Calcium Bisulfite <250˚F (121˚C) | $Ca(HSO_3)_2$ | 4 | A | A | X | A | B | A | A | X | A | A | X | X | A | A | A | See SD-1112, Pulp and Paper |
| Calcium Carbonate <200˚F (93˚C) | $CaCO_3$ | 3 | A | B | A | B | B | A | A | A | A | A | A | A | A | A | A | |
| Calcium Chloride <200˚F (93˚C) | $CaCl_2$ | 4 | X | B | X | A | A | A | A | A | A | A | A | A | A | A | A | |
| Calcium Hydroxide <50% <200˚F (93˚C) | $CA(OH)_2$ | 4 | B | B | X | A | B | A | A | A | X | A | A | A | A | A | A | |
| Calcium Hypochlorite 70 F (21˚C) | $Ca(OCl)_2$ | 6 | X | A | X | B | X | X | A | X | A | A | X | A | A | A | A | See SD-1112, Pulp and Paper |
| Calcium Nitrate <40% <200˚F (93˚C) | $Ca(NO_3)_2$ | 4 | B | B | B | B | B | A | A | X | A | A | A | A | A | A | A | |
| Calcium Phosphate <10% <200˚F (93˚C) | $Ca(HPO_4)_2$ | 4 | B | B | B | B | B | A | A | X | A | A | A | A | A | A | A | |
| Calcium Stearate <10% <200˚F (93˚C) | $C_{36}H_{70}CaO_4$ | 6 | B | B | B | B | B | A | A | X | A | A | | | | A | A | See SD-1112, Pulp and Paper |
| Calcium Sulfate <10% <200˚F (93˚C) | $CaSO_4$ | 4 | A | A | A | A | | A | A | X | A | A | A | A | A | A | A | |
| Cane Sugar <20% | $C_{12}H_{22}O_{11}$ | 3 | A | A | X | A | A | A | A | A | A | A | A | A | A | A | A | |
| Caprolactam | $C_6H_{11}NO$ | 9,12 | A | A | A | A | | A | A | A | A | A | X | X | X | A | A | See SD-1475, Fugitive Emissions |
| Carbon Dioxide (gas) | $CO_2$ | 6 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Carbon Dioxide (liquid) | $CO_2$ | 1,5,7 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Carbonic Acid <10% <200˚F (93˚C) | $CO_2 + H_2O$ | 1 | A | A | A | A | | A | A | X | A | A | X | A | A | A | A | |
| Carbon Monoxide | CO | 6 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | Extremely Toxic |
| Carbon Tetrachloride 100% <200˚F (93˚C) | $CCl_4$ | 12 | B | A | X | A | B | A | A | A | A | A | X | A | X | A | X | Kalrez Compound 1050LF, See SD-1475 |
| Castor Oil | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | |
| Chlorine, Anhydrous <125˚F (52˚C) | $Cl_2$ | 6,12 | B | A | B | A | B | X | A | X | A | A | X | X | X | A | A | Extremely Toxic, See SD-1475 |
| Chlorine (wet) <125˚F (52˚C) | HCl + HOCl | 1 | X | X | X | B | X | A | A | X | A | A | X | X | X | A | A | See SD-1112, Pulp and Paper |
| Chlorine Dioxide <125˚F (52˚C) | $ClO_2$ | 6 | X | B | X | B | X | A | A | X | A | A | X | A | X | A | X | See SD-1112, Pulp and Paper |
| Chloroacetic Acid <90% <150˚F (66˚C) | $ClC_2H_3O_2$ | 12 | X | B | X | B | X | A | A | X | A | A | X | X | X | A | A | See SD-1475, Fugitive Emissions |
| Chloroacetic Acid >90% <150˚F (66˚C) | $ClC_2H_3O_2$ | 12 | X | B | X | A | B | A | A | X | A | A | X | X | X | A | A | See SD-1475, Fugitive Emissions |
| Chlorobenzene <90% <150˚F (66˚C) | $C_6H_5Cl$ | 12 | X | B | X | B | B | A | A | X | A | A | X | A | X | A | A | See SD-1475, Fugitive Emissions |
| Chlorobenzene >90% <150˚F (66˚C) | $C_6H_5Cl$ | 12 | X | B | X | A | B | A | A | X | A | A | X | A | X | A | A | See SD-1475, Fugitive Emissions |
| Chloroform <200˚F (93˚C) | $CHCl_3$ | 6,12 | B | B | B | B | A | A | A | A | A | A | X | A | X | A | A | Extremely Toxic, See SD-1475 |
| Chloroform 100% 70˚F (21˚C) | $CHCl_3$ | 6,12 | A | A | B | A | A | A | A | A | A | A | X | A | X | A | A | Extremely Toxic, See SD-1475 |
| Chloropicrin 100% <200˚F (93˚C) | $CClNO_2$ | 1 | B | B | B | A | A | A | A | X | A | A | | | | A | A | |
| Chlorosulfonic Acid >20% <200˚F (93˚C) | $SO_2(OH)Cl$ | 1 | X | B | X | A | X | X | A | X | A | A | X | X | X | A | A | |
| Chromic Acid <20% <150˚F (66˚C) | $H_2CrO_4$ | 1 | X | X | X | A | X | X | A | X | A | A | X | X | X | A | A | |
| Citric Acid <50% <212˚F (100˚C) | $C_6H_8O_7$ | 1 | A | B | B | A | B | A | A | X | A | A | A | A | A | A | A | |
| Citric Acid >50% <212˚F (100˚C) | $C_6H_8O_7$ | 1 | X | B | X | A | B | A | A | X | A | A | A | A | A | A | A | |
| Clay Slurry | | 6 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | See SD-1112, Pulp and Paper |
| Coal Tar | | 9 | A | A | X | A | A | A | A | A | A | A | A | A | X | A | A | See SD-826, Refinery |
| Condensate <250˚F (121˚C) | $H_2O$ | 1 | A | A | B | A | A | A | A | A | A | A | A | A | A | A | A | See SD-129, Hot Water |
| Cooling Tower Water | $H_2O$ | 1, 11 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Copper Acetate <20% <200˚F (93˚C) | $C_4H_6CuO_4$ | 4 | A | A | B | B | B | A | A | X | A | A | X | X | A | A | A | |

**NOTES:** 1Bypass Flush, 2External Mount Seal, 3External Flush, 4Product May Salt Out, 5Use Carbon as one face, 6Double Seal, 7Balanced Seal, 8Quench, 9Steam Jacket, 10Steam Purge, 11<50ppm Chloride, 12Volatile Hazardous Air Pollutants

| Legends:<br>A – Good (No known Effect)<br>B – Fair (Use with caution)<br>X – Bad (Not Compatible)<br>Blank - Insufficient Data | Formula | Notes | 316 SS | Alloy 20 SS | 304 SS | Hastelloy "C" | Inconel 600/718 | Carbon | Ceramic | Tungsten Carbide | SiC Reaction-Bond | SiC Sintered | Buna Nitrile | Viton (FKM) | EPDR | Teflon | Kalrez 4079 | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Copper Acetate >20% <200˚F (93˚C) | $C_4H_6CuO_4$ | 6 | B | B | B | B | B | A | A | X | A | A | X | X | A | A | A | |
| Copper Ammonia Acetate <150˚F (66˚C) | | 6 | A | A | A | B | B | A | A | A | A | A | X | X | A | A | A | |
| Copper Chloride <100˚F (38˚C) | $CuCl_2$ | 6 | X | X | X | B | | A | A | X | A | A | A | A | A | A | A | |
| Copper Cyanide <10% <200˚F (93˚C) | CuCN | 4 | A | A | A | B | B | A | A | X | A | A | A | A | A | A | A | Extremely Toxic |
| Copper Cyanide >10% <200˚F (93˚C) | CuCN | 6 | B | B | B | B | B | A | A | X | A | A | A | A | A | A | A | Extremely Toxic |
| Copper Nitrate <10% <200˚F (93˚C) | $Cu(NO_3)_2$ | 4 | A | A | A | X | X | A | A | X | A | A | X | X | A | A | A | |
| Copper Nitrate >10% <200˚F (93˚C) | $Cu(NO_3)_2$ | 6 | B | B | B | X | X | A | A | X | A | A | X | X | A | A | A | |
| Copper Sulfate <60% <200˚F (93˚C) | $CuSO_4$ | 4 | B | B | B | A | B | A | A | X | A | A | A | A | A | A | A | |
| Corn Oil | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | |
| Corn Syrup (glucose) | $C_6H_{12}O_6$ | 3 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Corn Syrup (glucose) | $C_6H_{12}O_6$ | 1,8 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Cotton Seed Oil | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable |
| Creosote <200˚F (93˚C) | | 3 | B | B | B | A | B | A | A | X | A | A | A | A | X | A | A | Flammable |
| Cresylic Acid | $C_7H_8O$ | 12 | B | B | B | B | B | A | A | X | A | A | X | A | X | A | A | See SD-1475, Fugitive Emissions |
| Crude Oil | | 1,8,11 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable |
| Cumene <200˚F (93˚C) | $C_9H_{12}$ | 12 | B | B | B | B | B | A | A | X | A | A | X | A | X | A | A | See SD-1475, Fugitive Emissions |
| Cutting Oil (abrasive) | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Dura Dirt Diverter |
| Cutting Oil (clean) | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | |
| Cyclohexane <200˚F (93˚C) | $C_6H_{12}$ | 1,5,7 | B | B | B | B | B | A | A | A | A | A | A | A | X | A | A | |
| Cyclohexanol <200˚F (93˚C) | $C_6H_{12}O$ | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | |
| Cyclohexanone <200˚F (93˚C) | $C_6H_{12}O$ | 1 | B | B | B | B | B | A | A | A | A | A | X | X | X | A | A | |
| De-Butanizer Reflux | | 1,5,7 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | X | Flammable, See SD-826, Refinery |
| De-Ethanizer Reflux | | 1,5,7 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | X | Flammable, See SD-826, Refinery |
| De-Propanizer Reflux | | 1,5,7 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | X | Flammable, See SD-826, Refinery |
| Dextrose >200˚F (93˚C) | $C_6H_{12}O_6$ | 3 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dextrose <200˚F (93˚C) | $C_6H_{12}O_6$ | 1,8 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Diacetone Alcohol <200˚F (93˚C) | $C_6H_{12}O_2$ | 1 | A | A | A | A | A | A | A | A | A | A | X | X | A | A | A | Flammable |
| Diatomaceous Earth/Water <10% | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Diatomaceous Earth/Water >10% | | 3 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Dibutylamine <100˚F (38˚C) | $C_8H_{19}N$ | 1 | A | A | A | A | | A | A | A | A | A | X | X | X | A | X | Kalrez 1050LF |
| Dibutyl Ether <200˚F (93˚C) | $C_8H_{18}O$ | 1 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | Flammable, Explosive |
| Dibutyl Phthalate <212˚F (100˚C) | $C_{16}H_{22}O_4$ | 12 | A | A | A | A | | A | A | A | A | A | X | X | X | A | A | See SD-1475, Fugitive Emissions |
| Dichlorobenzene 100% <200˚F (93˚C) | $C_6H_4Cl_2$ | 12 | B | B | B | A | B | A | A | X | A | A | X | A | X | A | A | See SD-1475, Fugitive Emissions |
| Dichloroethane 70˚F (21˚C) | $C_2H_4Cl_2$ | 1 | A | A | A | B | B | A | A | A | A | A | X | A | X | A | A | |
| Dichloroethylene | $C_2H_2Cl_2$ | 1 | B | B | B | B | B | A | A | X | A | A | X | A | X | A | A | |
| Dichlorohydrin <200˚F (93˚C) | $C_3H_6Cl_2O$ | 1 | B | B | B | B | | A | A | X | A | A | | | | A | A | |
| Diesel Fuel | | 1,5,12 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | See SD-826, Refinery |
| Diethanolamine (DEA) <200˚F (93˚C) | $C_4H_{11}NO_2$ | 12 | A | A | A | A | A | A | A | X | A | A | X | X | X | A | X | Kalrez 1050LF, See SD-1475 |
| Diethylamine <200˚F (93˚C) | $C_4H_{11}N$ | 1 | A | A | A | A | B | A | A | X | A | A | X | X | X | A | X | Flammable, Kalrez 1050LF |
| Diethyl Carbonate <125˚F (52˚C) | $C_5H_{10}O_3$ | 1 | A | A | A | A | | A | A | A | A | A | X | A | X | A | A | Flammable |
| Diethyl Ether <200˚F (93˚C) | $C_4H_{10}O$ | 1 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | Flammable, Explosive |
| Diethylene Glycol <300˚F (149˚C) | $C_4H_{10}O_3$ | 1 | A | A | A | B | A | A | A | A | A | A | A | A | A | A | A | |
| Diethylene Triamine <200˚F (93˚C) | | 1 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | X | Kalrez 1050LF |
| Di-Isobutyl Ketone <200˚F (93˚C) | | 1 | A | A | A | A | | A | A | A | A | A | X | X | A | A | A | |
| Di-Isopropyl Ketone | | 1 | A | A | A | A | | A | A | A | A | A | X | X | A | A | A | |
| Dimethylamine <200˚F (93˚C) | $C_2H_7N$ | 1 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | X | Kalrez 1050LF |
| Dimethyl Formamide (DMF) <400˚F(204˚C) | $C_3H_7NO$ | 12 | A | A | A | A | | A | A | A | A | A | X | X | A | A | A | See SD-1475, Fugitive Emissions |
| Dimethyl Hydrazine (UDMM) <100˚F (38˚C) | $C_2H_8N_2$ | 1 | A | | A | A | A | A | A | A | A | A | X | X | A | A | X | Should not come in contact w/ water or steam; Kalrez 1050LF |
| Dimethyl Terephthalate (DMT) | | 9,12 | A | A | A | A | | A | A | A | A | A | X | X | X | A | A | See SD-1475, Fugitive Emissions |
| Dinitrochorobenzene (DMCB) <200˚F (93˚C) | $C_6H_3ClN_2O_4$ | 3 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | |
| Dioctylamine <200˚F (93˚C) | | 1 | A | | | A | B | A | A | A | A | A | X | X | X | A | X | Kalrez 1050LF |
| Dioctyl Phthalate <200˚F (93˚C) | $C_{24}H_{38}O_4$ | 1 | A | A | A | A | | A | A | A | A | A | X | X | X | A | A | |

**NOTES:** 1Bypass Flush, 2External Mount Seal, 3External Flush, 4Product May Salt Out, 5Use Carbon as one face, 6Double Seal, 7Balanced Seal, 8Quench, 9Steam Jacket, 10Steam Purge, 11<50ppm Chloride, 12Volatile Hazardous Air Pollutants

| Legends:<br>A – Good (No known Effect)<br>B – Fair (Use with caution)<br>X – Bad (Not Compatible)<br>Blank - Insufficient Data | Formula | Notes | 316 SS | Alloy 20 SS | 304 SS | Hastelloy "C" | Inconel 600/718 | Carbon | Ceramic | Tungsten Carbide | SiC Reaction-Bond | SiC Sintered | Buna Nitrile | Viton (FKM) | EPDR | Teflon | Kalrez 4079 | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diphenyl <500˚F (260˚C) | $C_{12}H_{10}$ | 9 | A | A | A | | | A | A | A | A | A | X | A | X | A | A | |
| Distilled Water | $H_2O$ | 1 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Dow Corning Silicone Fluids | | 1 | A | A | A | A | A | A | A | A | A | A | X | A | A | A | A | |
| Dowtherm A <400˚F (204˚C) | | 1,10 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | See SD-182, Heat Transfer Fluid |
| Dowtherm G <400˚F (204˚C) | | 1,10 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | See SD-182, Heat Transfer Fluid |
| Dowtherm H <400˚F (204˚C) | | 1,10 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | See SD-182, Heat Transfer Fluid |
| Dowtherm LF <400˚F (204˚C) | | 1,10 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | See SD-182, Heat Transfer Fluid |
| DuraClear - Synthetic Blend Barrier Fluid | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | DS-4609-7-F |
| DuraClear - Pure Synthetic Barrier Fluid | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | DS-4614-5-F & DS-4614-32-F |
| Dye Liquors | | 1 | A | A | A | A | B | A | A | A | A | A | X | A | X | A | A | See SD-1112, Pulp and Paper |
| Epichlorohydrin <200˚F (93˚C) | $C_3H_5C_{IO}$ | 6,12 | B | A | X | A | A | A | A | A | A | A | X | X | X | A | X | See SD-1475; Kalrez 2035 |
| Epsom Salt <40% | $MgSO_4$ | 4 | A | A | A | B | A | A | A | A | A | A | A | A | A | A | A | |
| Ethane | $C_2H_6$ | 1,5,7, 12 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable, See SD-826 and SD-1475 |
| Ethanol (Ethyl Alcohol) <200˚F (93˚C) | $C_2H_5OH$ | 1,5 | A | A | A | A | A | A | A | A | A | A | X | X | A | A | A | Flammable |
| Ethanol (Fuel Grade w/ 5% Gasoline) | $C_2H_5OH$ | 1,5 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | Flammable |
| Ethanolamine (MEA) <200˚F (93˚C) | $C_2H_7NO$ | 1 | A | A | A | A | B | A | A | A | A | A | X | X | X | A | X | Kalrez 1050LF |
| Ether, Ethyl | $C_4H_{10}O$ | 1,5 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | Flammable, Explosive |
| Ethyl Acetate <300˚F (149˚C) | $C_4H_8O_2$ | 5,12 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | Flammable, Explosive, See SD-1475 |
| Ethyl Alcohol (Ethanol) <200˚F (93˚C) | $C_2H_5OH$ | 1,5 | A | A | A | A | A | A | A | A | A | A | X | X | A | A | A | Flammable |
| Ethyl Benzene <200˚F (93˚C) | | 12 | B | A | B | A | B | A | A | A | A | A | X | A | X | A | A | See SD-1475, Fugitive Emissions |
| Ethyl Bromide <100˚F (38˚C) | $C_2H_5Br$ | 1 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | Flammable, Explosive |
| Ethyl Cellulose | | 3 | B | B | B | B | | A | A | X | A | A | X | X | X | A | A | |
| Ethyl Chloride 100% | $C_2H_5Cl$ | 12 | A | A | A | B | A | A | A | A | A | A | A | A | X | A | A | Flammable, Explosive, See SD-1475 |
| Ethylene | $C_2H_4$ | 1,5,7, 12 | A | A | A | A | A | A | A | A | A | A | A | X | X | A | A | Flammable, See SD-826 and SD-1475 |
| Ethylene Dichloride | $C_2H_4Cl_2$ | 12 | B | B | X | X | B | A | A | X | A | A | X | X | X | A | A | See SD-1475, Fugitive Emissions |
| Ethylene Glycol <300˚F (149˚C) | $C_2H_6O_2$ | 12 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | See SD-1475, Fugitive Emissions |
| Ethylene Oxide <200˚F (93˚C) | $C_2H_4O$ | 1,5,7, 12 | B | B | B | A | A | A | A | A | A | A | X | X | X | A | X | Flammable, Kalrez 2035, See SD-1475 |
| Ethylene Trichloride 70˚F (21˚C) | $C_2H_4Cl_3$ | 1 | A | A | A | | A | A | A | A | A | A | X | A | X | A | A | |
| Ethyl Sulfate | $C_2H_6SO_4$ | 1 | B | B | B | B | | A | A | X | A | A | X | X | X | A | A | |
| Fatty Acid | | | | | | | | | | | | | | | | | | Refer to Specific Acid |
| Ferric Chloride <125˚F (52˚C) | $FeCl_3$ | 6 | X | X | X | B | X | X | A | X | A | A | A | A | A | A | A | Titanium Wetted Metal Parts |
| Ferric Hydroxide <175˚F (79˚C) | $FeHO_2$ | 3 | B | B | B | B | | A | A | | A | A | X | A | A | A | A | |
| Ferric Nitrate <125˚F (52˚C) | $Fe(NO_3)_3$ | 4 | B | A | B | B | X | A | A | X | A | A | A | A | A | A | A | |
| Ferric Sulfate <125˚F (52˚C) | $Fe_2(SO_4)_3$ | 4 | | A | B | A | | A | A | A | A | A | A | A | A | A | A | |
| Ferrous Chloride <50% <175˚F (79˚C) | $FeCl_2$ | 4 | X | X | X | B | X | A | A | X | A | A | X | A | A | A | A | |
| Ferrous Sulfate <175˚F (79˚C) | $FeSO_4$ | 4 | X | B | X | B | B | A | A | X | A | A | X | A | A | A | A | |
| Fluosilicic Acid 70˚F (21˚C) | $H_2SiF_6$ | 6 | X | X | X | X | A | X | A | X | X | A | A | A | A | A | A | Monel |
| Formaldehyde <40% <200˚F (93˚C) | $CH_2O + H_20$ | 8,12 | A | A | A | B | B | A | A | X | A | A | X | X | X | A | A | See SD-1475, Fugitive Emissions |
| Formaldehyde >40% <200˚F (93˚C) | $CH_2O + H_20$ | 8,12 | A | A | B | B | B | A | A | X | A | A | X | X | X | A | A | See SD-1475, Fugitive Emissions |
| Formamide <200˚F (93˚C) | $CH_3NO$ | 1 | B | B | B | B | B | A | A | X | A | A | X | X | X | A | A | |
| Formic Acid <160˚F (71˚C) | HCOOH | 1 | X | A | X | A | X | A | A | X | A | A | X | X | X | A | A | |
| Freon 11 & Refrig. Oil | $CCl_3F$ | 1 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | X | |
| Freon 12 & Refrig. Oil | $CCl_2F_2$ | 1,7 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | X | |
| Freon 13 & Refrig. Oil | $CClF_3$ | 1,7 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | X | |
| Freon 14 & Refrig. Oil | $CF_4$ | 1,7 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | X | |
| Freon 21 & Refrig. Oil | $CHCl_2F$ | 1 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | |
| Freon 22 & Refrig. Oil | $CHClF_2$ | 1,7 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | |
| Freon 31 & Refrig. Oil | $CH_2ClF$ | 1 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | X | |
| Freon 32 & Refrig. Oil | $CH_2F_2$ | 1 | A | A | A | A | A | A | A | A | A | A | A | X | X | A | X | |
| Freon 112 & Refrig. Oil | $C_2Cl_4F_2$ | 1 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | X | |
| Freon 113 & Refrig. Oil | $C_2Cl_3F_3$ | 1 | A | A | A | A | A | A | A | A | A | A | A | X | X | A | X | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Freon 114 & Refrig. Oil | $C_2Cl_2F_4$ | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | X | |
| Freon 115 & Refrig. Oil | $C_2Cl_2F_5$ | 1,7 | A | A | A | A | A | A | A | A | A | A | A | X | X | A | X | |
| Fruit Juices | | 1 | A | A | A | | B | A | A | A | A | A | A | A | A | A | A | Use Food Grade Materials |
| Fuel Oil | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | |
| Furfural <20% <200˚F (93˚C) | $C_5H_4O_3$ | 1 | A | A | A | B | B | A | A | X | A | A | X | X | X | A | A | |
| Furfural >20% <200˚F (93˚C) | $C_5H_4O_3$ | 1 | B | B | B | B | B | A | A | X | A | A | X | X | X | A | A | |
| Furfuryl Alcohol <200˚F (93˚C) | $C_5H_6O_2$ | 1 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | |
| Gas Oil | | 1,5,12 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable |
| Gasoline w/ <20%MTBE | | 1,5,12 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable, See SD-826, Refinery |
| Gelatin <200˚F (93˚C) | | 3 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Glacial Acetic Acid <150˚F (66˚C) | $CH_3COOH$ | 3 | B | B | X | A | B | A | A | X | A | A | X | X | X | A | A | |
| Glaubers Salt (Sodium Sulfate) | $NaSO_4$ | 4 | A | A | X | B | B | A | A | X | A | A | X | A | X | A | A | |
| Glaubers Salt | $NaSO_4$ | 6 | B | B | X | B | B | A | A | X | A | A | X | A | X | A | A | |
| Glucose | $C_6H_{12}O_6$ | 3 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Glucose | $C_6H_{12}O_6$ | 1,8 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | Warm Water Quench |
| Glues | | 3 | A | A | A | A | | A | A | A | A | A | A | A | A | A | A | |
| Glue Sizing | | 3 | A | A | A | A | | A | A | A | A | A | A | X | X | A | A | |
| Glycerin (Glycerol) <200˚F (93˚C) | $C_3H_8O_3$ | 1 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Glycol (Diethylene) <300˚F (149˚C) | $C_4H_{10}O_3$ | 1 | A | A | A | B | A | A | A | A | A | A | A | A | A | A | A | |
| Glycol (Ethylene) <300˚F (149˚C) | $C_2H_6O_2$ | 12 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | See SD-1475, Fugitive Emissions |
| Glycol (Isobutylene) | $C_4H_8$ | 1 | B | B | B | B | B | A | A | X | A | A | X | A | A | A | A | |
| Glycol (Polyethylene) | | 1 | A | A | A | A | A | A | A | A | A | A | X | A | A | A | A | |
| Glycol (Polypropylene) | | 1 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | |
| Glycol (Propylene) | $C_3H_8O_2$ | 1 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Green Sulfate Liquor-Clarified | | 1 | B | B | X | A | B | A | A | A | A | A | X | A | A | A | A | See SD-1112, Pulp and Paper |
| Green Sulfate Liquor-w/Dregs | | 3 | B | B | X | A | B | A | A | A | A | A | X | A | A | A | A | See SD-1112, Pulp and Paper |
| Heat Transfer Fluids | | | | | | | | | | | | | | | | | | See SD-182, Heat Transfer Fluids |
| Heptane (gas) <200˚F (93˚C) | $C_7H_{16}$ | 6 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable |
| Heptane (liquid) <200˚F (93˚C) | $C_7H_{16}$ | 1,5,7 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable |
| Hexane (gas) <200˚F (93˚C) | $C_6H_{14}$ | 6,12 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable, See SD-1475, Fugitive Emissions |
| Hexane (liquid) <200˚F (93˚C) | $C_6H_{14}$ | 1,5,7,12 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable, See SD-1475, Fugitive Emissions |
| Hexanol <200˚F (93˚C) | $C_6H_{14}O$ | 1,5 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | |
| Hydrazine <150˚F (66˚C) | $N_2H_4$ | 5,7,12 | A | A | X | X | X | A | A | X | A | A | X | X | A | A | A | See SD-1475, Fugitive Emissions |
| Hydrobromic Acid <200˚F (93˚C) | HBr | 6 | X | X | X | | X | X | A | X | A | A | X | A | A | A | A | |
| Hydrochloric Acid <2% <125˚F (52˚C) | HCl | 1,12 | X | X | X | A | X | A | A | X | A | A | X | A | A | A | A | See SD-1475, Fugitive Emissions |
| Hydrochloric Acid <10% 70˚F (21˚C) | HCl | 1,12 | X | X | X | A | X | A | A | X | A | A | X | A | A | A | A | See SD-1475, Fugitive Emissions |
| Hydrochloric Acid <37% <125˚F (52C) | HCl | 1,12 | X | X | X | X | X | A | A | X | A | A | X | A | X | A | A | See SD-1475, Fugitive Emissions |
| Hydrocyanic Acid <200˚F (93˚C) | HCN | 6,12 | X | B | X | B | B | A | A | X | A | A | X | A | A | A | A | Extremely Toxic, See SD-1475 |
| Hydrofluoric Acid <125˚F (52˚C) | HF | 3,7,12 | X | B | X | B | X | X | A | X | X | A | X | A | X | A | A | See SD-1475, #6 Carbon |
| Hydrofluoric Acid <125˚F (52˚C) | HF | 6,12 | X | B | X | B | X | X | A | X | X | A | X | A | X | A | A | See SD-1475, #6 Carbon |
| Hydrogen (gas) | $H_2$ | 6 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Hydrogen Cyanide <200˚F (93˚C) | HCN | 6,12 | X | B | X | B | B | A | A | X | A | A | X | A | A | A | A | Extremely Toxic, See SD-1475 |
| Hydrogen Peroxide <200˚F (93˚C) | $H_2O_2$ | 1 | B | B | B | B | B | X | A | X | A | A | X | A | X | A | A | #6 Carbon |
| Hydrogen Sulfide (wet) <125˚F (52˚C) | $H_2S + H_2O$ | 6 | X | X | X | A | B | A | A | X | A | A | X | X | A | A | A | |
| Hydrogen Sulfide 100% 70˚F (21˚C) | $H_2S$ | 6 | B | A | X | A | B | A | A | X | A | A | X | X | A | A | A | Extremely Toxic, Flammable |
| Hydrogen Sulfide 100% <125˚F (52˚C) | $H_2S$ | 6 | B | A | X | B | B | A | A | X | A | A | X | X | A | A | A | Extremely Toxic, Flammable |
| Hypochlorous Acid 70˚F (21˚C) | HOCl | 1 | X | X | X | A | | X | A | X | A | A | X | X | A | A | A | |
| Iodine (wet) <100˚F (38˚C) | $I_2 + H_20$ | 6 | B | B | B | B | X | X | A | X | A | A | X | A | X | A | A | |
| Iodoform <125˚F (52˚C) | $CHI_3$ | 4 | A | A | X | B | B | A | A | X | A | A | X | X | A | A | A | |
| Isobutane <200˚F (93˚C) | $C_4H_{10}$ | 1,5,7 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable, See SD-826, Refinery |
| Isobutyl Acetate <200˚F (93˚C) | $C_6H_{12}O_2$ | 1 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | Flammable |
| Isobutyl Alcohol | $C_4H_{10}O$ | 1 | B | B | B | B | B | A | A | X | A | A | A | A | X | A | A | Flammable |
| Isobutylene Glycol | $C_4H_8$ | 1 | B | B | B | B | B | A | A | X | A | A | X | A | A | A | A | |

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| Legends:<br>A – Good (No known Effect)<br>B – Fair (Use with caution)<br>X – Bad (Not Compatible)<br>Blank - Insufficient Data | Formula | Notes | 316 SS | Alloy 20 SS | 304 SS | Hastelloy "C" | Inconel 600/718 | Carbon | Ceramic | Tungsten Carbide | SiC Reaction-Bond | SiC Sintered | Buna Nitrile | Viton (FKM) | EPDR | Teflon | Kalrez 4079 | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isobutyl Methyl Ketone <200˚F (93˚C) | $C_6H_{12}O$ | 1 | B | B | B | B | B | A | A | X | A | A | X | X | X | A | A | |
| Isobutylaldehyde | $C_4H_8O$ | 1 | A | A | A | A | | A | A | A | A | A | X | X | X | A | A | |
| Isopentane | $C_5H_{12}$ | 1,5,7 | B | B | B | B | B | A | A | A | A | A | A | A | X | A | A | Flammable, See SD-826, Refinery |
| Isopropanol <200˚F (93˚C) | $C_3H_80$ | 1 | A | A | A | A | A | A | A | A | A | A | X | A | A | A | A | Flammable |
| Isopropyl Acetate <200˚F (93˚C) | $C_5H_{10}O_2$ | 1 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | |
| Isopropyl Alcohol | $C_3H_8O$ | 1,5 | A | A | A | A | A | A | A | A | A | A | X | A | A | A | A | Flammable |
| Isopropylamine | $C_3H_9N$ | 1 | A | A | A | | | A | A | A | A | A | X | X | X | A | X | Kalrez 1050LF |
| Jet Fuel JP-3 | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable |
| Jet Fuel JP-4 | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable |
| Jet Fuel JP-5 | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable |
| Jet Fuel JP-6 | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable |
| Jet Fuel JP-8 | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable |
| Jet Fuel JP-9 | | 1 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | Flammable |
| Jet Fuel JP-911 | | 1 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | Flammable |
| Jet Fuel JP-10 | | 1 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | Flammable |
| Kaolin Slurry (Clay Slurry) | $H_2Al_2Si_2O_8$ | 6 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | See SD-1112, Pulp and Paper |
| Kerosene | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable |
| Lacquers (MEK Solvent) | | 3 | A | A | A | A | B | A | A | A | A | A | X | X | X | A | A | Flammable |
| Lard | | 9 | A | A | A | A | B | A | A | A | A | A | A | A | X | A | A | Flammable |
| Lactic Acid <150˚F (66˚C) | $C_3H_6O_3$ | 1 | B | A | B | B | X | A | A | X | A | A | X | A | X | A | A | |
| Lactic Acid 30-60% <125˚F (52˚C) | $C_3H_6O_3$ | 1 | B | A | B | A | X | A | A | X | A | A | X | A | X | A | A | |
| Latex, Emulsion | | 6 | A | A | B | A | | A | A | A | A | A | A | A | A | A | A | See SD-1073, Latex |
| Lead Acetate <200˚F (93˚C) | $Pb(CH_3COOH)2$ | 6 | B | B | B | B | B | A | A | X | A | A | X | X | A | A | A | Extremely Toxic |
| Lead Chloride <200˚F (93˚C) | $PbCl_2$ | 6 | X | B | X | B | B | A | A | X | A | A | X | A | X | A | A | Extremely Toxic |
| Lead Nitrate <200˚F (93˚C) | $Pb(NO_3)_2$ | 6 | B | B | B | B | B | A | A | X | A | A | A | X | A | A | A | |
| Levulinic Acid <200˚F (93˚C) | | 1 | B | B | B | A | A | A | A | X | A | A | | | | A | A | |
| Lime Slurry <50% <200˚F (93˚C) | $Ca(OH)_2$ | 3 | B | B | B | A | A | A | A | A | A | A | A | A | A | A | A | |
| Linseed Oil <400˚F (204˚C) | | 1 | A | A | A | A | B | A | A | A | A | A | A | A | X | A | A | Flammable |
| Liquidified Natural Gas (LNG) | | 1,5,7 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable, See SD-826, Refinery |
| Liquidified Petroleum Gas (LPG) | | 1,5,7 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable, See SD-826, Refinery |
| Lithium Chloride <212˚F (100˚C) | LiCl | 4 | B | A | X | A | A | A | A | A | A | A | X | X | A | A | A | Extremely Toxic |
| Lithium Hydroxide <212˚F (100˚C) | LiOH | 1 | B | B | B | B | B | X | A | A | A | A | X | X | A | A | A | |
| Lubricating Oil | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable |
| Lye (caustic) | | | | | | | | | | | | | | | | | | See Sodium Hydroxide |
| Magnesium Chloride <200˚F (93˚C) | $MgCl_2$ | 4 | X | X | X | A | B | A | A | A | A | A | A | A | A | A | A | |
| Magnesium Hydroxide | $Mg(OH)_2$ | 3 | B | B | B | A | A | A | A | A | A | A | X | A | A | A | A | |
| Magnesium Nitrate <150˚F (66˚C) | $Mg(NO_3)_2$ | 4 | B | B | B | B | B | A | A | X | A | A | A | A | A | A | A | |
| Magnesium Sulfate <40% <150˚F (66˚C) | $MgSO_4$ | 4 | A | A | A | B | A | A | A | A | A | A | A | A | A | A | A | |
| Maleic Acid <150˚F (66˚C) | $C_4H_4O_4$ | 1 | B | B | B | B | B | A | A | X | A | A | X | A | X | A | A | |
| Maleic Anhydride <350˚F (177˚C) | $C_4H_3O_3$ | 9,12 | A | | A | A | A | A | A | A | A | A | X | X | X | A | A | See SD-1225 and SD-1475 |
| Maleic Acid <50% <212˚F (100˚C) | $C_4H_6O_5$ | 1 | A | B | A | B | B | A | A | X | A | A | A | A | X | A | A | |
| Manganese Chloride <50% <200˚F (93˚C) | $MnCl_2$ | 4 | B | A | X | A | B | A | A | X | A | A | X | X | X | A | A | |
| Manganese Sulfate <200˚F (93˚C) | $MnSO_4$ | 4 | A | A | X | A | A | A | A | X | A | A | A | A | A | A | A | |
| Mercaptans 100% 70˚F (21˚C) | | 1 | A | A | A | | A | A | A | X | A | A | X | X | A | A | A | |
| Mercuric Chloride <30% <150˚F (66˚C) | $HgCl_2$ | 6 | X | X | | B | X | A | A | X | A | A | A | A | A | A | A | Extremely Toxic |
| Mercury <150˚F (66˚C) | Hg | 6 | A | A | A | A | B | A | A | A | A | A | A | A | A | A | A | Extremely Toxic, See SD-1158, Mercury |
| Methane (gas) | $CH_4$ | 6,12 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable, See SD-826 and SD-1475 |
| Methane (liquid) | $CH_4$ | 1,5,7, 12 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | X | Flammable, See SD-826 and SD-1475 |
| Methanol <200˚F (93˚C) | $CH_4O$ | 1,12 | A | A | B | A | A | A | A | A | A | A | A | X | A | A | A | Extremely Toxic, Flammable, See SD-1475 |
| Methyl Acetate <200˚F (93˚C) | $C_3H_6O_2$ | 1 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | |
| Methyl Acrylate <200˚F (93˚C) | $C_4H_6O_2$ | 1 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | |
| Methyl Bromide (gas) | $CH_3Br$ | 6,12 | A | | B | B | B | A | A | X | A | A | X | A | X | A | A | Extremely Toxic, See SD-1475 |

**NOTES:** 1Bypass Flush, 2External Mount Seal, 3External Flush, 4Product May Salt Out, 5Use Carbon as one face, 6Double Seal, 7Balanced Seal, 8Quench, 9Steam Jacket, 10Steam Purge, 11<50ppm Chloride, 12Volatile Hazardous Air Pollutants

| Legends:<br>A – Good (No known Effect)<br>B – Fair (Use with caution)<br>X – Bad (Not Compatible)<br>Blank - Insufficient Data | Formula | Notes | 316 SS | Alloy 20 SS | 304 SS | Hastelloy "C" | Inconel 600/718 | Carbon | Ceramic | Tungsten Carbide | SiC Reaction-Bond | SiC Sintered | Buna Nitrile | Viton (FKM) | EPDR | Teflon | Kalrez 4079 | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Methyl Chloride <125˚F (52˚C) | $CH_3Cl$ | 1,5,12 | A | B | X | A | B | A | A | X | A | A | X | A | X | A | A | Extremely Toxic, Flammable, See SD-1475 |
| Methyl Ethyl Ketone (MEK) <150˚F (66˚C) | $C_4H_8O$ | 1,5,12 | B | B | B | B | B | A | A | X | A | A | X | X | A | A | A | Flammable See SD-1475, Fugitive Emissions |
| Methyl Ethyl Ketone 100% <150˚F (66˚C) | $C_4H_8O$ | 1,5,12 | A | A | A | A | B | A | A | X | A | A | X | X | A | A | A | Flammable See SD-1475, Fugitive Emissions |
| Methyl Isobutyl Ketone (MIBK)<150˚F(66˚C) | $C_6H_{12}O$ | 1,5,12 | B | B | B | B | B | A | A | X | A | A | X | X | X | A | A | See SD-1475, Fugitive Emissions |
| Methyl Methacrylate <125˚F (52˚C) | $C_4H_6O$ | 1,12 | A | A | A | | | A | A | | A | A | X | X | X | A | A | See SD-1475, Fugitive Emissions |
| Methyl-Tert-Butyl-Ether(MTBE)<200˚F (93˚C) | | 1,5,7 | B | B | B | B | B | A | A | A | A | A | X | X | X | A | A | |
| Methylene Chloride <125˚F (52˚C) | $CH_2Cl_2$ | 1,5,12 | B | A | B | B | A | A | A | X | A | A | X | X | X | A | A | See SD-1475, Fugitive Emissions |
| Methylene Dichloride <125˚F (52˚C) | $CH_2Cl_2$ | 1,5,12 | B | A | B | B | A | A | A | X | A | A | X | X | X | A | A | See SD-1475, Fugitive Emissions |
| Mineral Oil | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable |
| Mineral Spirits | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable |
| Molasses | | 1,8 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Use Food Grade Materials |
| Monoethanolamine (MEA) <200˚F (93˚C) | $C_2H_7NO$ | 1 | A | A | A | A | B | A | A | A | A | A | X | X | X | A | X | Kalrez 1050LF |
| Muriatic Acid <125˚F (52˚C) | HCl | 1,12 | X | X | X | X | X | A | A | X | A | A | X | A | X | A | A | See SD-1475, Fugitive Emissions |
| Naphtha | | 1,5,12 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | Flammable, SD1475, Fugitive Emissions |
| Naphthalene <400˚F (204˚C) | $C_{10}H_8$ | 1,5,12 | A | A | A | A | B | A | A | X | A | A | X | A | X | A | A | Flammable, SD1475, Fugitive Emissions |
| Naphthalene Chloride <200˚F (93˚C) | $C_{10}H_7Cl$ | 1 | A | A | A | B | B | A | A | A | A | A | A | A | X | A | A | |
| Naphthenic Acid <300˚F (149˚C) | | 1 | A | A | X | B | B | A | A | X | A | A | X | A | X | A | A | |
| Nickel Chloride <80% <212˚F (100˚C) | $NiCl_2$ | 4 | B | B | X | A | | A | A | X | A | A | A | A | A | A | A | |
| Nickel Plating Solution | | 6 | B | B | X | B | B | A | A | X | A | A | A | A | A | A | A | See SD-201, Plating Solutions |
| Nickel Sulfate <40% <125˚F (52˚C) | $NiSO_4$ | 4 | B | B | A | B | B | A | A | X | A | A | A | A | A | A | A | |
| Nitric Acid <60% <170˚F (77˚C) | $HNO_3$ | 1 | A | B | X | X | X | X | A | X | A | A | X | X | X | A | A | See SD-1108, Nitric Acid |
| Nitric Acid <80% <125˚F (52˚C) | $HNO_3$ | 1 | A | A | B | X | X | X | A | X | A | A | X | X | X | A | A | See SD-1108, Nitric Acid |
| Nitric Acid 70˚F (21˚C) | $HNO_3$ | 1 | A | A | B | X | X | X | A | X | A | A | X | X | X | A | A | See SD-1108, Nitric Acid |
| Nitric Acid <70% 70˚F (21˚C) | $HNO_3$ | 1 | A | A | B | A | X | X | A | X | A | A | X | X | X | A | A | See SD-1108, Nitric Acid |
| Nitric Acid <20% 70˚F (21˚C) | $HNO_3$ | 1 | A | A | B | A | X | A | A | X | A | A | X | X | X | A | A | See SD-1108, Nitric Acid |
| Nitrobenzene | $C_6H_5NO_2$ | 6,12 | A | A | A | B | A | A | A | A | A | A | X | X | A | A | A | Extremely Toxic, Flammable, SD-1475 |
| Nitroethane | $C_2H_5NO_2$ | 1 | A | A | A | B | A | A | A | A | A | A | X | X | X | A | A | |
| Nitrogen (Gas) | $N_2$ | 6 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Nitrogen (Liquid) | $N_2$ | 6 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Nitromethane | $CH_3NO_2$ | 1 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | Flammable |
| Nitropropane | $C_3H_7NO_2$ | 12 | A | A | A | B | A | A | A | A | A | A | X | X | X | A | A | See SD-1475, Fugitive Emissions |
| Nitrous Acid <200˚F (93˚C) | $HNO_2$ | 1 | B | B | X | X | X | A | A | X | A | A | X | X | X | A | A | |
| Oleic Acid <150˚F (66˚C) | $C_{18}H_{34}O_2$ | 1 | B | A | X | A | A | A | A | X | A | A | X | X | X | A | A | |
| Oleum <125˚F (52˚C) | $H_2SO_4$ & $SO_3$ | 1 | B | B | B | A | B | X | A | X | A | A | X | X | X | A | A | See SD-175, Sulfur Acid |
| Olive Oil | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable, Use Food Grade Materials |
| Oxalic Acid <125˚F (52˚C) | $C_2H_2O_4$ | 1 | X | A | X | B | B | A | A | X | A | A | X | A | A | A | A | |
| Oxygen (Dry Gas) | $O_2$ | 6 | A | A | | A | A | A | A | A | A | A | X | X | X | A | A | See SD-1112, Pulp and Paper |
| Ozone (Wet) | $O_3 + H_2O$ | 3 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | See SD-1112, Pulp and Paper |
| Palm Oil | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable |
| Palmitic Acid <400˚F (204˚C) | $C_{16}H_{32}O_2$ | 9 | A | A | A | A | B | A | A | A | A | A | A | A | X | A | A | See SD-1112, Pulp and Paper |
| Paper Stock | | 3 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | See SD-1112, Pulp and Paper |
| Paracymene 70˚F (21˚C) | | 1 | A | A | | A | B | A | A | A | A | A | X | A | X | A | A | |
| Paraffin, Molten | | 9 | A | A | A | A | 0 | A | A | A | A | A | A | A | X | A | A | Flammable |
| Paraformaldehyde <30% <350˚F (177˚C) | $(CH_2O)_6$ | 4 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | |
| Paraldehyde <200˚F (93˚C) | $C_6H_{12}O_3$ | 1 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | |
| Peanut Oil | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable, Use Food Grade Materials |
| Pectin Liquor | | 1 | A | A | | A | A | A | A | A | A | A | A | A | X | A | A | |
| Penicillin | | 1 | A | A | | A | A | A | A | A | A | A | X | A | X | A | A | |
| Pentane (Gas) <200˚F (93˚C) | $C_5H_{12}$ | 6 | B | B | B | A | B | A | A | A | A | A | A | A | X | A | A | Flammable |
| Pentane (Liquid) <200˚F (93˚C) | $C_5H_{12}$ | 1,5,7 | B | B | B | A | B | A | A | A | A | A | A | A | X | A | A | Flammable, See SD-826, Refinery |
| Perchloroethylene 100% <200˚F (93˚C) | $C_2Cl_4$ | 1 | B | B | B | A | A | A | A | A | A | A | X | A | X | A | A | |

**NOTES:** 1Bypass Flush, 2External Mount Seal, 3External Flush, 4Product May Salt Out, 5Use Carbon as one face, 6Double Seal, 7Balanced Seal, 8Quench, 9Steam Jacket, 10Steam Purge, 11<50ppm Chloride, 12Volatile Hazardous Air Pollutants

| Legends:<br>A – Good (No known Effect)<br>B – Fair (Use with caution)<br>X – Bad (Not Compatible)<br>Blank - Insufficient Data | Formula | Notes | 316 SS | Alloy 20 SS | 304 SS | Hastelloy "C" | Inconel 600/718 | Carbon | Ceramic | Tungsten Carbide | SiC Reaction-Bond | SiC Sintered | Buna Nitrile | Viton (FKM) | EPDR | Teflon | Kalrez 4079 | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Peroxide of Hydrogen <200˚F (93˚C) | $H_2O_2$ | 1 | B | B | B | B | B | X | A | X | A | A | X | A | X | A | A | |
| Persulfuric Acid <250˚F (121˚C) | $H_2SO_5$ | 1 | B | B | B | | | A | A | X | A | A | | | | A | A | Explosive |
| Petroleum Ether | | 1 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | Explosive, Flammable |
| Petroleum Oil | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable |
| Phenol | $C_6H_5OH$ | 6,12 | B | B | B | A | A | A | A | X | A | A | X | A | X | A | A | Extremely Toxic, See SD-1475 |
| Phenyl Acetic Acid <200˚F (93˚C) | $C_8H_8O_2$ | 1 | B | A | B | A | | A | A | A | A | A | X | X | A | A | A | |
| Phosgene <300˚F (149˚C) | $CCl_2O$ | 6,12 | X | | X | A | | A | A | A | A | A | X | X | X | A | A | Extremely Toxic, See SD-1475 |
| Phosphoric Acid <85% <150˚F (66˚C) | $H_3PO_4$ | 1 | A | A | A | A | B | A | A | X | A | A | X | A | A | A | A | See SD-1221, Phosphoric Acid |
| Phosphoric Acid <200˚F (93˚C) | $H_3PO_4$ | 1 | X | B | X | A | B | A | A | X | A | A | X | A | A | A | A | See SD-1221, Phosphoric Acid |
| Phosphorous Oxychloride <200˚F (93˚C) | $POCl_3$ | 1 | X | X | X | B | B | A | A | X | A | A | X | X | X | A | A | |
| Phosphorous Trichloride <150˚F (66˚C) | $PCl_3$ | 1 | A | | A | A | X | A | A | X | A | A | X | A | A | A | A | |
| Phthalic Acid <400˚F (204˚C) | $C_8H_6O_4$ | 4 | A | A | B | B | B | A | A | X | A | A | X | X | X | A | A | |
| Phthalic Anhydride <400˚F (204˚C) | $C_8H_4O_3$ | 9,12 | A | A | A | A | | A | A | A | A | A | X | X | X | A | A | See SD-1225 and SD-1475 |
| Phthalic Anhydride (Crude) <400˚F (204˚C) | | 9,12 | A | | X | A | | A | A | A | A | A | X | X | X | A | A | See SD-1225 and SD-1475 |
| Plating Solution – Chrome | | 6 | X | B | X | B | | X | A | X | A | A | X | A | A | A | A | See SD-201, Plating Solutions |
| Plating Solution - Nickel/Copper | | 6 | B | B | X | B | | A | A | X | A | A | A | A | A | A | A | See SD-201, Plating Solutions |
| Picric Acid <200˚F (93˚C) | $C_6H_3N_3O_7$ | 6 | B | B | B | B | | A | A | X | A | A | X | A | X | A | A | |
| Polybutadiene (Rubber) | $(C_4H_6)_x$ | 3 | A | A | A | A | | A | A | A | A | A | | | | A | A | |
| Polyethylene | $(C_4H_6)_x$ | 3 | A | A | A | A | | A | A | A | A | A | | | | A | A | |
| Polyethylene Glycol | | 1 | A | A | A | A | A | A | A | A | A | A | X | A | A | A | A | |
| Polypropylene Glycol | | 1 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | |
| Polystyrene | $(C_8H_8)_x$ | 3 | B | B | B | | | A | A | A | A | A | X | X | X | A | X | |
| Potash <200˚F (93˚C) | $K_2CO_3$ | 4 | B | A | B | A | B | A | A | X | A | A | A | A | X | A | A | |
| Potassium Bicarbonate <30% <212˚F(100˚C) | $KHCO_3$ | 4 | A | B | A | B | B | A | A | X | A | A | A | A | X | A | A | |
| Potassium Bicarbonate >30% <212˚F(100˚C) | $KHCO_3$ | 6 | B | B | B | B | B | A | A | X | A | A | A | A | X | A | A | |
| Potassium Carbonate <200˚F (93˚C) | $K_2CO_3$ | 4 | B | A | B | A | B | A | A | X | A | A | A | A | X | A | A | |
| Potassium Chloride <30% <200˚F (93˚C) | KCl | 4 | B | A | X | B | B | A | A | X | A | A | A | A | A | A | A | |
| Potassium Cyanide <200˚F (93˚C) | KCN | 6 | B | B | B | B | B | A | A | X | A | A | A | A | A | A | A | Extremely Toxic |
| Potassium Hydroxide <300˚F (149˚C) | KOH | 1,8 | X | B | X | B | B | A | A | A | X | A | X | X | A | A | A | |
| Potassium Hydroxide <40% 70˚F (21˚C) | KOH | 1,8 | B | B | B | A | B | A | A | A | X | A | X | X | A | A | A | |
| Potassium Nitrate <200˚F (93˚C) | $KNO_3$ | 4 | B | B | B | B | B | A | A | X | A | A | A | A | A | A | A | |
| Potassium Permanganate <200˚F (93˚C) | $KmnO_4$ | 3 | B | B | B | B | B | A | A | X | A | A | X | X | A | A | A | |
| Potassium Phosphate <200˚F (93˚C) | $K_3PO_4$ | 4 | B | B | B | B | B | A | A | X | A | A | A | A | A | A | A | |
| Potassium Silicate <200˚F (93˚C) | $K_2Si_2O_5$ | 3 | B | B | B | B | B | A | A | X | A | A | A | A | A | A | A | |
| Potassium Sulfate <200˚F (93˚C) | $K_2SO_4$ | 4 | A | A | A | B | B | A | A | X | A | A | A | A | A | A | A | |
| Propane (Gas) | $C_3H_8$ | 6 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable, See SD-826 & SD-1475 |
| Propane (Liquid) | $C_3H_8$ | 1,5,7,12 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable, See SD-826 & SD-1475 |
| Propionaldehyde <150˚F (66˚C) | $C_3H_6O$ | 12 | A | A | A | A | A | A | A | A | A | A | X | X | A | A | A | See SD-1475, Fugitive Emissions |
| Propionic Acid <150˚F (66˚C) | $C_3H_6O_2$ | 1 | B | B | X | A | X | A | A | X | A | A | X | X | A | A | A | |
| Propyl Acetate <150˚F (66˚C) | $C_5H_{10}O_2$ | 1 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | |
| Propyl Alcohol (Propanol) <200˚F (93˚C) | $C_3H_8O$ | 1 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Propylene (Gas) | $C_3H_6$ | 6 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | Flammable, See SD-826 |
| Propylene (Liquid) | $C_3H_6$ | 1,5,7 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | Flammable, See SD-826 |
| Propylene Glycol | $C_3H_8O_2$ | 1 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Propylene Oxide <200˚F (93˚C) | $C_3H_6O$ | 5,7,12 | A | A | A | | | A | A | A | A | A | X | X | X | A | X | Flammable, Kalrez 2035, See SD-1475 |
| PVC (Polyvinyl Chloride) | $C_2H_3Cl$ | 5,12 | A | A | X | A | | A | A | A | A | A | X | X | X | A | A | See SD-1200 and SD-1475, Toxic |
| Pyridine <212˚F (100˚C) | $C_5H_5N$ | 1 | A | A | A | A | B | A | A | A | A | A | X | X | X | A | A | |
| Rosin - Paper Mill <400˚F (204˚C) | | 9 | A | A | A | A | | A | A | A | A | A | X | X | X | A | A | See SD-1112, Pulp and Paper |
| Rosin Size <350˚F (177˚C) | | 3 | A | A | B | A | | A | A | A | A | A | X | X | A | A | A | See SD-1112, Pulp and Paper |
| Royal Purple Barrier Fluid #22 | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | |
| Salicylic Acid <200 F (93C) | $C_7H_6O_3$ | 3 | B | A | B | B | B | A | A | A | A | A | X | A | A | A | A | Dust Explosive |

**NOTES:** 1Bypass Flush, 2External Mount Seal, 3External Flush, 4Product May Salt Out, 5Use Carbon as one face, 6Double Seal, 7Balanced Seal, 8Quench, 9Steam Jacket, 10Steam Purge, 11<50ppm Chloride, 12Volatile Hazardous Air Pollutants

| Legends:<br>A – Good (No known Effect)<br>B – Fair (Use with caution)<br>X – Bad (Not Compatible)<br>Blank - Insufficient Data | Formula | Notes | 316 SS | Alloy 20 SS | 304 SS | Hastelloy "C" | Inconel 600/718 | Carbon | Ceramic | Tungsten Carbide | SiC Reaction-Bond | SiC Sintered | Buna Nitrile | Viton (FKM) | EPDR | Teflon | Kalrez 4079 | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sea Water <200˚F (93˚C) | | 1 | B | B | B | A | B | A | A | A | A | A | A | A | A | A | A | |
| Sewage | | 3 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | See SD-1078, Effluent |
| Sewage Sludge | | 2 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | See SD-1078, Effluent |
| Silicone Oils | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Silver Chloride 70˚F (21˚C) | AgCl | 4 | X | B | X | B | | A | A | X | A | A | A | A | A | A | A | |
| Silver Nitrate <60% 70˚F (21˚C) | $AgNO_3$ | 3 | A | A | B | A | X | A | A | X | A | A | X | A | A | A | A | Extremely Toxic |
| Soap Liquors | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Soda Ash <200˚F (93˚C) | $Na_2CO_3$ | 4 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Soda - Caustic | NaOH | | | | | | | | | | | | | | | | | See SD-1041 Sodium Hydroxide |
| Sodium Acetate <200˚F (93˚C) | $NaC_2H_3O_2$ | 4 | B | A | B | A | A | A | A | A | A | A | X | X | A | A | A | |
| Sodium Bicarbonate <20% <212˚F (100˚C) | $NaHCO_3$ | 4 | A | A | A | B | A | A | A | A | A | A | A | A | A | A | A | |
| Sodium Bisulfite <200˚F (93˚C) | $NaHSO_3$ | 4 | X | B | X | B | X | A | A | X | A | A | A | A | A | A | A | |
| Sodium Borate(Borax) <200˚F (93˚C) | $Na_2B_4O_7$ | 3 | A | A | | A | A | A | A | A | A | A | A | A | A | A | A | |
| Sodium Bromide <200˚F (93˚C) | | 3 | B | B | B | B | B | A | A | X | A | A | X | A | A | A | A | |
| Sodium Carbonate <200˚F (93˚C) | $Na_2CO_3$ | 4 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | See SD-1487, Sodium Carbonate |
| Sodium Chlorate <140˚F (60˚C) | $NaClO_3$ | 4 | B | A | B | A | A | A | A | A | A | A | X | A | A | A | A | See SD-1112, Pulp and Paper |
| Sodium Chloride <200˚F (93˚C) | NaCl | 4 | X | B | X | A | A | A | A | A | A | A | A | A | A | A | A | |
| Sodium Chromate <140˚F (60˚C) | $Na_2CRO_4$ | 4 | A | A | A | A | A | X | A | A | A | A | A | A | X | A | A | |
| Sodium Cyanide <200˚F (93˚C) | NaCN | 4 | X | A | X | | A | A | A | X | A | A | A | X | A | A | A | Extremely Toxic |
| Sodium Ferricyanide <200˚F (93˚C) | $Na_3Fe(CN)_6$ | 3 | B | B | B | B | A | A | A | | A | A | X | A | A | A | A | Extremely Toxic |
| Sodium Hydrosulfide <200˚F (93˚C) | NaHS | 4 | A | A | A | A | A | A | A | A | A | A | X | A | A | A | A | |
| Sodium Hydroxide 51- 70% <250˚F (121˚C) | NaOH | 1,8 | X | A | X | B | B | A | A | A | X | A | X | X | A | A | A | See SD-1041, Sodium Hydroxide |
| Sodium Hydroxide 21-50% <250˚F (121˚C) | NaOH | 1,8 | X | A | X | A | B | A | A | A | X | A | X | X | A | A | A | See SD-1041, Sodium Hydroxide |
| Sodium Hydroxide 1- 20% <250˚F (121˚C) | NaOH | 1,8 | A | A | X | A | B | A | A | A | X | A | X | X | A | A | A | See SD-1041, Sodium Hydroxide |
| Sodium Hydroxide <40% 70˚F (21˚C) | NaOH | 1,8 | A | A | X | A | B | A | A | A | X | A | X | X | A | A | A | See SD-1041, Sodium Hydroxide |
| Sodium Hypochlorite <125˚F (52˚C) | NaClO | 3 | X | X | X | A | X | X | A | X | A | A | X | A | A | A | A | See SD-1112, Pulp and Paper |
| Sodium Metasilicates <200˚F (93˚C) | $Na_2SiO_3$ | 3 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Sodium Nitrate <212˚F (100˚C) | $NaNO_3$ | 4 | A | A | A | A | A | A | A | A | A | A | X | X | A | A | A | |
| Sodium Nitrite <200˚F (93˚C) | $NaNO_2$ | 4 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | |
| Sodium Perchlorate <200˚F (93˚C) | $NaClO_4$ | 4 | B | A | B | B | A | A | A | A | A | A | X | A | A | A | A | |
| Sodium Phosphate-Mono <200˚F (93˚C) | $NaH_2PO_4$ | 4 | A | A | A | A | A | A | A | X | A | A | A | A | A | A | A | |
| Sodium Phosphate-Di <200˚F (93˚C) | $Na_2HPO_4$ | 4 | A | A | A | A | A | A | A | X | A | A | A | A | A | A | A | |
| Sodium Phosphate-Tri <200˚F (93˚C) | $Na_3PO_4$ | 4 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Sodium Silicate <200˚F (93˚C) | $Na_2SiO_3$ | 3 | A | A | A | B | A | A | A | A | A | A | A | A | A | A | A | |
| Sodium Sulfate <200˚F (93˚C) | $Na_2SO_4$ | 4 | B | A | B | B | B | A | A | X | A | A | A | A | A | A | A | |
| Sodium Sulfide <200˚F (93˚C) | $Na_2S$ | 4 | X | A | X | B | B | A | A | X | A | A | A | A | A | A | A | |
| Sodium Sulfite <200˚F (93˚C) | $NaSO_3$ | 4 | A | A | B | B | B | A | A | X | A | A | A | A | A | A | A | |
| Sodium Thiosulfate <200˚F (93˚C) | $Na_2S_2O_3$ | 4 | A | A | B | B | B | A | A | X | A | A | X | A | A | A | A | |
| Soybean Oil | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable, Use Food Grade Materials |
| Stannic Chloride | SnCl | 6 | X | X | X | X | X | A | A | X | A | A | A | A | A | A | A | |
| Starch | $(C_6H_{10}O_5)_x$ | 3 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Stearic Acid <150˚F (65˚C) | $C_{18}H_{36}O_2$ | 9 | A | A | A | B | B | A | A | A | A | A | X | X | X | A | A | |
| Stoddard Solution | | 1,5 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | |
| Styrene <200˚F (93˚C) | $C_8H_8$ | 3,12 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | X | Extremely Toxic, See SD-1475 |
| Succinic Acid <200˚F (93˚C) | $C_4H_6O_4$ | 3 | B | B | B | B | B | A | A | X | A | A | X | X | X | A | A | |
| Sugar Solution (Sucrose) >200˚F (93˚C) | $C_{12}H_{22}O_{11}$ | 3 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | Use Food Grade Materials |
| Sugar Solution (Sucrose) <200˚F (93˚C) | $C_{12}H_{22}O_{11}$ | 1,8 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | Use Food Grade Materials |
| Sulfur Dioxide - Wet <200˚F (93˚C) | $SO_2 + H_20$ | 1 | B | B | X | B | X | A | A | X | A | A | X | X | A | A | A | |
| Sulfur - Molten <400˚F (204˚C) | S | 9 | B | X | X | A | A | A | A | A | A | A | X | A | X | A | A | |
| Sulfuric Acid 0-90% <125˚F (52˚C) | $H_2SO_4$ | 1 | X | A | X | A | X | A | A | X | A | A | X | A | X | A | A | See SD-175, Sulfuric Acid |
| Sulfuric Acid 90-100% <125˚F (52˚C) | $H_2SO_4$ | 1 | X | A | X | A | X | X | A | X | A | A | X | A | X | A | A | See SD-175, Sulfuric Acid |

**NOTES:** 1Bypass Flush, 2External Mount Seal, 3External Flush, 4Product May Salt Out, 5Use Carbon as one face, 6Double Seal, 7Balanced Seal, 8Quench, 9Steam Jacket, 10Steam Purge, 11<50ppm Chloride, 12Volatile Hazardous Air Pollutants

| Legends:<br>A – Good (No known Effect)<br>B – Fair (Use with caution)<br>X – Bad (Not Compatible)<br>Blank - Insufficient Data | Formula | Notes | 316 SS | Alloy 20 SS | 304 SS | Hastelloy "C" | Inconel 600/718 | Carbon | Ceramic | Tungsten Carbide | SiC Reaction-Bond | SiC Sintered | Buna Nitrile | Viton (FKM) | EPDR | Teflon | Kalrez 4079 | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sulfuric Acid 60-70% 300˚F (149˚C) | $H_2SO_4$ | 2 | X | B | X | X | X | X | A | X | A | A | X | X | X | A | | See SD-175, Sulfuric Acid |
| Sulfuric Acid - Oleum <125˚F (52˚C) | $H_2SO_4$ + $SO_3$ | 1 | B | B | B | A | B | X | A | X | A | A | X | X | X | A | A | See SD-175, Sulfuric Acid |
| Sulfurous Acid <150˚F (65˚C) | $SO_2 + H_20$ | 1 | B | B | X | B | X | A | A | X | A | A | X | A | X | A | A | |
| Syrup (Sucrose Solution) >200˚F (93˚C) | $C_{12}H_{22}O_{11}$ | 3 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | Use Food Grade Materials |
| Syrup (Sucrose Solution) >200˚F (93˚C) | $C_{12}H_{22}O_{11}$ | 1,8 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | Use Food Grade Materials |
| Tall Oil <350˚F (177˚C) | | 3 | B | B | B | A | B | A | A | A | A | A | X | X | X | A | A | Flammable |
| Tannic Acid <200˚F (93˚C) | $C_{76}H_{52}O_{46}$ | 1 | A | A | A | B | A | A | A | A | A | A | A | A | A | A | A | |
| Tar Bituminous | | 3 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | Flammable |
| Tartaric Acid <150˚F (65˚C) | $C_4H_6O_2$ | 1 | A | B | B | A | A | A | A | X | A | A | A | A | X | A | A | |
| Tetrachloroethane 100% | $C_2H_2Cl_4$ | 1 | X | B | X | A | B | A | A | A | A | A | X | A | X | A | A | See SD-1475, Fugitive Emissions |
| Tetrachlorethylene 100% <250˚F (121˚C) | $C_2H_4Cl_4$ | 1 | B | B | B | A | A | A | A | A | A | A | X | A | X | A | B | See SD-1475, Fugitive Emissions |
| Tetraethyl Lead | $C_8H_{20}Pb$ | 6 | B | B | B | B | B | A | A | X | A | A | X | A | X | A | A | Extremely Toxic |
| Tetrahydrofuran (THF) <100˚F (38˚C) | | 1 | B | | A | A | | A | A | X | A | A | X | X | X | A | A | |
| Therminols | | 1,8 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | See SD-182, Heat Transfer Fluids |
| Titanium Dioxide Slurry <10% | $TiO_2$ | 1,8 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | See SD-1112, Pulp and Paper |
| Titanium Dioxide Slurry >10% | $TiO_2$ | 6 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Titanium Tetrachloride <100˚F (38˚C) | $TiCl_4$ | 3,12 | B | B | X | B | A | A | A | X | A | A | X | A | X | A | A | See SD-1475, Fugitive Emissions |
| Toluene | $C_7H_8$ | 12 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | A | See SD-1475, Fugitive Emissions |
| Transformer Oil | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable |
| Transmission Fluid | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Flammable |
| Trichloroacetic Acid <200˚F (93˚C) | $C_2HCl_3O_2$ | 1 | X | B | X | B | | A | A | X | A | A | X | X | X | A | A | |
| Trichlorobenzene 100% <300˚F (149˚C) | $C_6H_3Cl_3$ | 12 | A | A | A | A | B | A | A | A | A | A | X | A | X | A | A | See SD-1475, Fugitive Emissions |
| Trichloroethane 100% <200˚F (93˚C) | $C_2H_3Cl_3$ | 12 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | See SD-1475, Fugitive Emissions |
| Trichloroethylene 100% <200˚F (93˚C) | $C_2HCl$ | 6,12 | A | A | A | A | | A | A | X | A | A | X | A | X | A | A | Extremely Toxic, See SD-1475 |
| Triethanolamine (TEA) <200˚F (93˚C) | $C_6H_{15}NO_3$ | 1 | A | A | A | A | B | A | A | A | A | A | X | X | X | A | X | Kalrez 1050LF |
| Trimethyl Amine (TMA) <200˚F (93˚C) | | 1 | A | A | A | A | A | A | A | A | A | A | X | X | X | A | X | Kalrez 1050LF |
| Tung Oil | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | |
| Turpentine | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | |
| Ucon Oils | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | See SD-182, Heat Transfer Fluid |
| Urea <350˚F (177˚C) | $CH_4N_2O$ | 1 | B | B | B | B | B | A | A | A | A | A | X | X | X | A | A | |
| Vegetable Oil <300˚F (149˚C) | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | Use Food Grade Materials |
| Vinegar | $CH_3COOH$ | 1 | A | A | X | A | X | A | A | X | A | A | X | X | X | A | A | |
| Vinyl Acetate <300˚F (149˚C) | $C_4H_6O_2$ | 12 | A | A | A | A | | A | A | A | A | A | X | X | X | A | A | See SD-1475, Fugitive Emissions |
| Vinyl Chloride <125˚F (52˚C) | $C_2H_3Cl$ | 5,12 | A | A | X | A | | A | A | A | A | A | X | X | X | A | A | See SD-1200 and SD-1475, Toxic |
| Water - Boiler Feed | | 1,7 | B | A | B | A | A | A | A | A | A | A | X | A | A | A | A | See SD-129, Hot Water |
| Water - Borated <300˚F (149˚C) | | 4 | B | B | X | A | B | A | A | A | A | A | A | A | A | A | A | See SD-1265, Nuclear Power Plant |
| Water - Brackish <200˚F (93˚C) | | 1 | B | B | X | A | A | A | A | A | A | A | A | A | A | A | A | |
| Water – Clean | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Water - Cooling Tower | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Water - Condensate <250˚F (121˚C) | | 1 | A | A | X | A | A | A | A | A | A | A | A | A | A | A | A | See SD-129, Hot Water |
| Water - Deionized | | 1 | A | B | X | A | A | A | A | A | A | A | A | A | A | A | A | |
| Water - Demineralized | | 1 | A | B | X | A | A | A | A | A | A | A | A | A | A | A | A | |
| Water - Distilled | | 1 | A | B | X | A | A | A | A | A | A | A | A | A | A | A | A | |
| Water - Heavy | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | See SD-1265, Nuclear Power Plant |
| Water - River or Lake, Fresh | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Water - Sea <200˚F (93˚C) | | 4 | B | B | X | A | A | A | A | A | A | A | A | A | A | A | A | |
| Water - Sour | $H_2O + H_2S$ | 6 | A | A | B | B | B | A | A | X | A | A | X | X | A | A | A | |
| Water - w/Oil | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | X | A | A | |
| Whiskey | $C_2H_6O$ | 1 | A | A | A | A | A | A | A | A | A | A | X | X | A | A | A | Use Food Grade Materials |
| White Liquor - Unclarified <300˚F (149˚C) | $NaOH+Na_2S$ | 6 | B | B | B | A | B | A | A | A | A | A | X | X | A | A | A | See SD-1112, Pulp and Paper |
| White Liquor - Clarified <300˚F (149˚C) | $NaOH+Na_2S$ | 1,8 | B | B | B | A | B | A | A | A | A | A | X | X | A | A | A | See SD-1112, Pulp and Paper |

**NOTES:** 1Bypass Flush, 2External Mount Seal, 3External Flush, 4Product May Salt Out, 5Use Carbon as one face, 6Double Seal, 7Balanced Seal, 8Quench, 9Steam Jacket, 10Steam Purge, 11<50ppm Chloride, 12Volatile Hazardous Air Pollutants

| Legends:<br>A – Good (No known Effect)<br>B – Fair (Use with caution)<br>X – Bad (Not Compatible)<br>Blank - Insufficient Data | Formula | Notes | 316 SS | Alloy 20 SS | 304 SS | Hastelloy "C" | Inconel 600/718 | Carbon | Ceramic | Tungsten Carbide | SiC Reaction-Bond | SiC Sintered | Buna Nitrile | Viton (FKM) | EPDR | Teflon | Kalrez 4079 | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| White Water - Calcium | | 3 | A | A | X | A | X | A | A | A | A | A | X | X | A | A | A | See SD-1112, Pulp and Paper |
| White Water - Chlorine Dioxide | | 3 | X | B | X | B | X | A | A | X | A | A | X | A | X | A | A | See SD-1112, Pulp and Paper |
| White Water - Caustic | | 3 | A | A | B | A | B | A | A | A | A | A | X | X | A | A | A | See SD-1112, Pulp and Paper |
| White Water - Paper Machine | | 3 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | See SD-1112, Pulp and Paper |
| Wine | | 1 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | Use Food Grade Materials |
| Wort | | 6 | A | A | A | A | A | A | A | A | A | A | A | A | | A | A | |
| Xylene (Xylol) <350˚F (177˚C) | $C_8H_{10}$ | 5,12 | A | A | A | A | A | A | A | A | A | A | X | A | X | A | A | Flammable, See SD-1475, Fugitive Emissions |
| Yeast - Torula <150˚F (66˚C) | | 6 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | Use Food Grade Materials |
| Yeast - Wort <150˚F (66˚C) | | 6 | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Zinc Chloride | $ZnCl_2$ | 4 | X | B | X | A | B | A | A | X | A | A | A | A | A | A | A | |
| Zinc Cyanide | $Zn(CN)_2$ | 4 | B | B | X | A | B | A | A | | A | A | A | A | A | A | A | Extremely Toxic |
| Zinc Nitrate | $Zn(NO_3)_2$ | 4 | B | B | B | | B | A | A | | A | A | | A | | A | A | |
| Zinc Phosphate Sol'n <20% <150˚F (66˚C) | $Zn_3(PO_4)_2$ | 4 | A | | X | | | A | A | | A | A | | | | A | A | |
| Zinc Sulfate <200˚F (93˚C) | $ZnSO_4$ | 4 | B | B | B | B | B | A | A | X | A | A | A | A | A | A | A | |

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