



U-CUP SELECTION GUIDE

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Introduction

The O-Ring Loaded U-Cup is a unique design that combines a precision molded "U" configuration packing with an elastomer loader. This seal was originally designed to improve the low pressure sealing capabilities of a standard lip type packing but the design principle has been effective in dealing with high and low temperature and pressure extremes, including vacuum. While originally designed as a unidirectional sealing device, with the proper design and accessories, the O-Ring Loaded U-Cup can also be used as a bi-directional seal.

The basic theory behind the O-Ring Loaded U-Cup is that when you add a "loader or energizer" to a lip seal, you turn it into a squeeze seal that provides high sealing force at low pressure. As the system pressure increases, the lip loading also increases, automatically compensating for the higher pressure while maintaining a positive seal. A rubber energizer typically has a better compression set, or memory than urethane and will enable the U-Cup to have a longer life expectancy.

This brochure will take you through a variety of U-Cup related sealing products and materials while giving you some basic guidelines of sealing principles and theories to help you design for your unique needs.

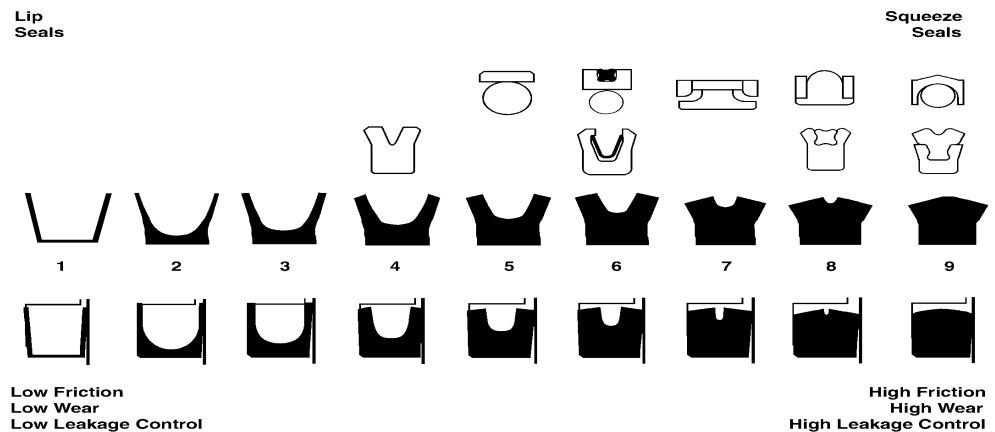
Seal Selection

There are a wide variety of U-Cup style seals for both rod and piston applications that come in an equally wide variety of materials. Below you will find the general guidelines you need to consider when choosing the style and material of the seal most appropriate for your application. For more demanding applications please contact your Hi-Tech Seals representative for design assistance.

- Fluid Media** - This will determine the type of seal materials and seal types suitable for your application.
- Service Temperature** - The minimum and maximum service temperatures of the seal and the fluid media will determine which materials and seal types are suitable.
- Pressure and Clearance Gap** - The maximum pressure and extrusion gap will determine the risk of seal extrusion failure in the application.
- Leakage and Drift Expectation** - Rod seal film control and piston seal drift varies between seal types. Refer to the Lip Squeeze Chart below for general guidelines.
- Ancillary Performance Criteria** -
 - Friction: Does the application require a seal with a precise level of friction?
 - Stability: At high linear velocities seal stability may be an issue. Stability varies between designs.
 - Contamination: Many seal types are somewhat resistant to fluid contamination and solid particles.
- Retrofit and Gland Size** - Many seal types are available to fit the same gland size but not in all cases.
- Assembly** - Seal installation will vary depending on seal type and size. Care needs to be taken to ensure you will be able to install the seal style you choose.
- Seal Life Expectancy** - Performance will depend on several factors including duty cycle, stroke, speed, pressure, surface finish and fluid type. Seal life will also vary depending on the style and material chosen.
- Price and Availability** - What suitable seal selection will be the most cost effective for your application?

Performance and Leakage Control Index

LIP SQUEEZE CHART



LIP CONFIGURATION CHART

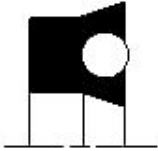
	Sample Seal	Lip Shape	Lip Installed	Pressure Pattern	Leakage Control	Hydroplaning Resistance	Contaminated Environments
1					high	high	poor
2					high	high	good
3					medium	medium	poor
4					low	low	good
5					low	low	excellent

Profiles

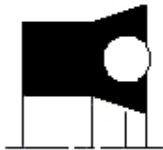
O-Ring Loaded U-Cups are available in four common profiles:

- Standard
- Deep
- Type B
- Square B

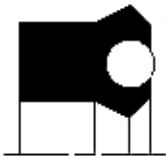
For each diameter there is also a variety of cross sections to choose from. Common cross sections are 1/8" - 1". The larger the cross section of the seal, the longer the life expectancy of the seal. The larger cross section seals are generally more reliable and more forgiving for design considerations such as tolerance, clearances, and surface finishes. Keep in mind that additional friction is created with a larger cross section seal and installation becomes more difficult.



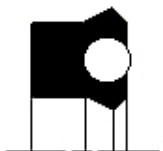
The Standard O-Ring Loaded U-Cup profile is square in cross section and it is suitable for both rod and piston applications. The Standard design can be widely used to replace existing hydraulic packing and O-Rings without changing gland design.



The Deep O-Ring Loaded U-Cup design is a modified version of the Standard's square shape. This design has approximately 1-1/2 times the axial depth of the Standard seal which greatly adds to the stability of the design in higher applications. Generally you would have to make gland modifications for this seal when replacing O-Rings but this design is ideal for replacing V or W packing or braided rope packing.



The Type B O-Ring Loaded U-Cup is similar in design to the Deep but it features a back beveled sealing lip designed for additional film breaking ability and increased squeeze on the sealing surface. By adding the back bevel on the lips, it aligns the seal interface near the centerline of the O-Ring energizer to provide increased sealing force which adds to the low pressure sealing capability while also increasing the high pressure sealing ability. The added length also provides stability to the seal.



The Square B design provides you with the additional sealing ability of the back bevel lip design, while still being able to replace o-rings without changing the groove.

Part Numbering

O-Ring Loaded U-Cups make use of a mnemonic part numbering system in that each series of numbers in the part number relate to a specific dimension in the sealing gland. There are four elements to this part number:

1. The first segment of the part number consists of three or four digits and represents the radial width of the seal in decimal equivalents (the decimal point is not used in this segment).
2. The second section of the part number is five digits (with decimal point) which specifies the inside diameter of the seal.
3. The third section of the part number consists of three - four digits (without decimal point) which identify the seals axial depth. For a Standard O-Ring Loaded U-Cup, where depth and width are the same, this series of numbers is deleted.
4. The fourth part of the numbering system identifies the specific seal design configuration required. The design configurations are identified as follows:

Seal Configurations	Suffix
Standard	None Required
Type B	B
Deep	None Required
Square B	SQB
Type Z	Z

The following are part number examples of the various O-Ring Loaded U-Cup design types which have the same inside and width values but differing depths. For the following, the seal is identified has a 4" ID and a 4-3/4" OD. In type SQB and Standard, the depth of the seal is 3/8". In type B, Deep, and Z, the depth is 5/8". The numbering system does not change for different materials.

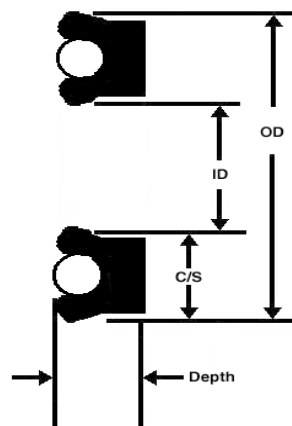
Design Type	Part Number			
	Width	ID	Depth	Type
Standard	375-	04.000-		
Deep	375-	04.000-	625	
Type B	375-	04.000-	625	B
Square B	375-	04.000-		B
Z-Seal	375-	04.000-	625	Z

For a complete list of machining dimensions, please visit our website at www.hitechseals.com and view the Polyseal O-Ring Loaded U-Cup machining dimensions under the Tech Info/Reference tab.

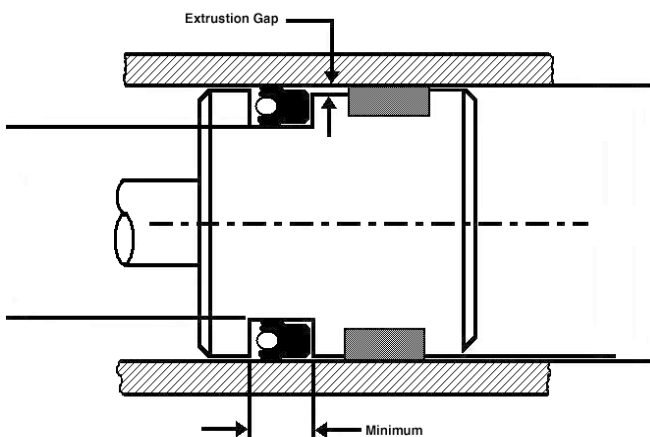
Specifying a Seal

1. Select seal configuration.
2. Check seal material compatibility for temperature and fluid.
3. Select seal cross section size.
4. Use pre-engineered charts to determine seal part number, gland groove dimensions, tolerances, and metal machine surface finishes.
5. To determine dimensions for non-standard rod or bore diameters not shown in the charts, please contact Hi-Tech Seals.
6. Determine maximum extrusion gap from dimension and machining tolerances. Both tolerances and adjustments can be adjusted to accommodate maximum allowable extrusion gap.
7. Determine minimum mating fits from dimension and machining tolerances to assure ease of assembly.

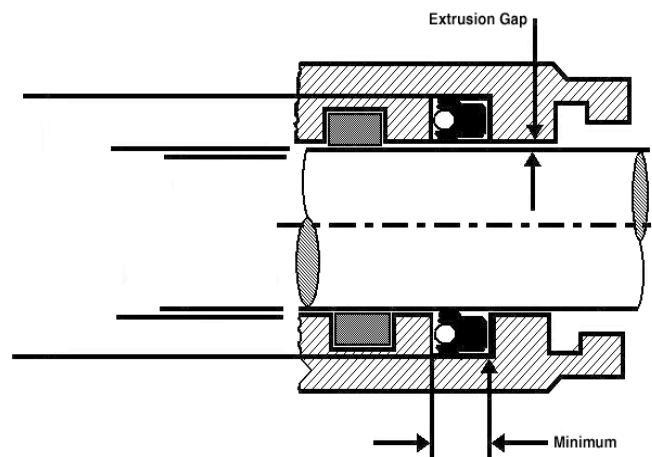
O-Ring Loaded U-Cup



Piston Application



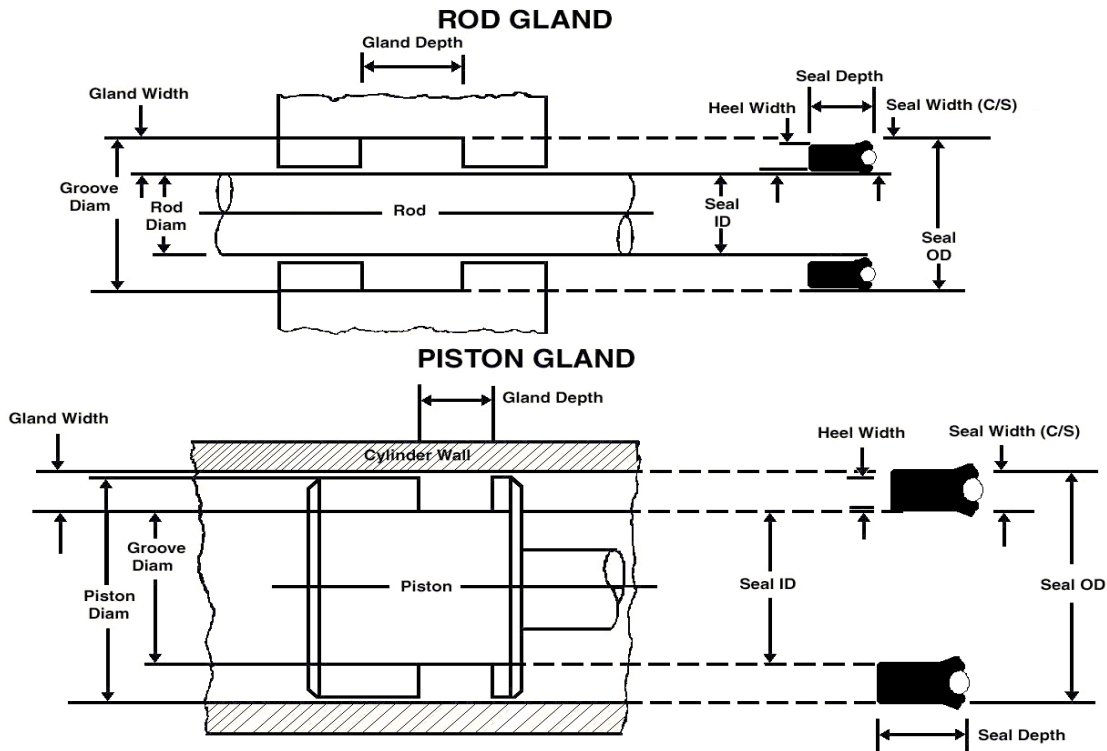
Rod Application



Gland Dimensions vs Seal Dimensions

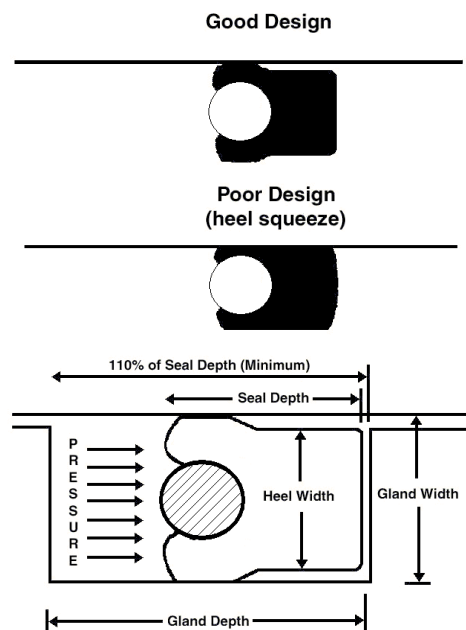
Seal dimensions have traditionally been designed to accommodate standard gland widths and normal manufacturing tolerances. Reduction in radial gland width from that recommendation could result in excessive friction, heat and wear leading to premature failure of the seal. Similarly, increased radial gland width could allow the lips to pull away from the sealing surfaces and result in leakage.

Three dimensions are necessary to completely define a seal gland: a diameter (either inside ("ID") or outside ("OD") diameter of the gland), the radial width of the gland and the axial depth. Typical seal and gland dimensions are shown below for both rod and piston applications.



O-Ring Loaded U-Cups are designed as lip seals and seal on the ID and OD contact points of the lips. The heel is designed to support and stabilize the sealing lips. Under no circumstances should heel squeeze be applied to the heel of the U-Cup. Squeeze in this area would result in an extremely high loading of the sealing lips and can result in increased friction, heat, seal wear, and likely premature seal failure.

Groove depth refers to the axial dimension of the seal gland and adequate space is required for the O-Ring Loaded U-Cup to perform properly. Free space allows for thermal expansion of the seal as well as swelling due to the effects of the system fluid. A convenient rule is to allow a minimum of 10% of the seal depth for free space. Therefore, a 3/8" deep seal would require a 0.413" gland depth. O-Ring Loaded U-Cups are designed to operate efficiently in any gland that exceeds this 10% minimum safety factor as long as the pressure is from one direction.



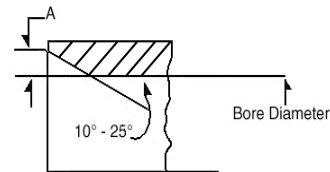
Design Criteria

The chart below provides you with a general guideline on surface finish. However, RMS surface finish alone does not ensure good seal performance and in some applications you will need to contact Hi-Tech Seals for additional recommendations. Surface finishes that are too high or too low can reduce seal life.

TYPICAL SURFACE FINISH		
Seal Type	O-Ring Loaded U-Cup	Z-Seal
Static	100 RMS	320 RMS
Dynamic	32 RMS	16 RMS

Chamfers are used as a guide to aid seal installation. The "A" dimension shown below will allow the O-Ring Loaded U-Cup to enter a cylinder bore and should be the minimum width designed.

Nominal Seal C/S	"A" Standard	"A" Deep	"A" Type B
1/8	.031	.036	.046
3/16	.046	.050	.062
1/4	.050	.062	.078
5/16	.062	.071	.078
3/8	.062	.078	.083
1/2	.094	.100	.109
9/16	.100	.125	.125
5/8	.100	.125	.125
3/4	.109	.125	.143
7/8	.120	.156	.156
1	.133	.163	.172



This last installation guide provides you with a general guideline of Cross Section versus Diameter with relationship to the difficulty of installation. If the cross section of the seal is too large in relation to the diameter it will be difficult to snap or stretch the seal into the groove.

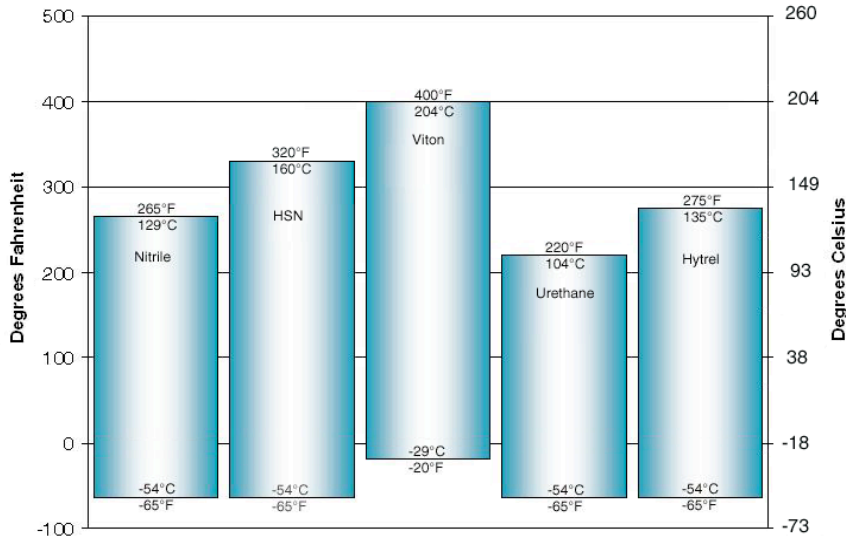
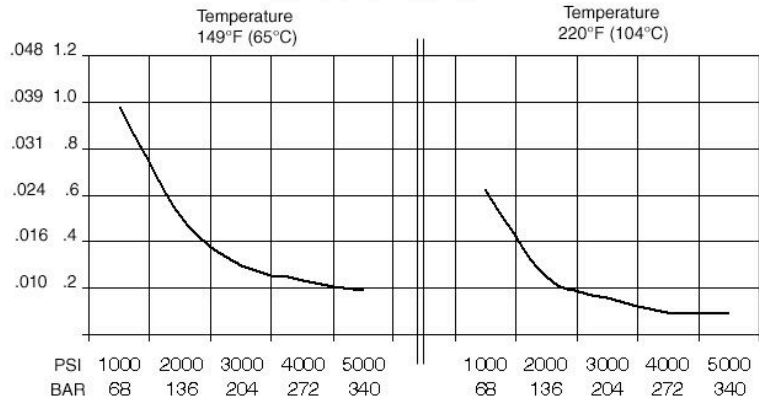
INSTALLATION GUIDE				
Cross Section vs Diameter				
Cross Section	Minimum Diameter ROD SEAL		Minimum Diameter PISTON SEAL	
	O-Ring Loaded Urethane U-Cup	Hytrel and Fluorotrel Z-Seal	O-Ring Loaded Urethane U-Cup	Hytrel and Fluorotrel Z-Seal
1/8"	.750 ID	1.000 ID	1.250 OD	1.750 OD
3/16"	1.000 ID	1.750 ID	1.750 OD	2.750 OD
1/4"	1.750 ID	2.750 ID	3.000 OD	4.500 OD
3/8"	3.000 ID	5.000 ID	6.000 OD	8.000 OD
1/2"	6.000 ID	8.000 ID	10.000 OD	12.000 OD
3/4"	8.000 ID	9.000 ID	15.000 OD	17.000 OD
1"	10.000 ID	10.000 ID	25.000 OD	25.000 OD

For a complete list of machining dimensions, please visit our website at www.hitechseals.com and view the Polyseal O-Ring Loaded U-Cup machining dimensions under the Tech Info/Reference tab.

Design Criteria continued

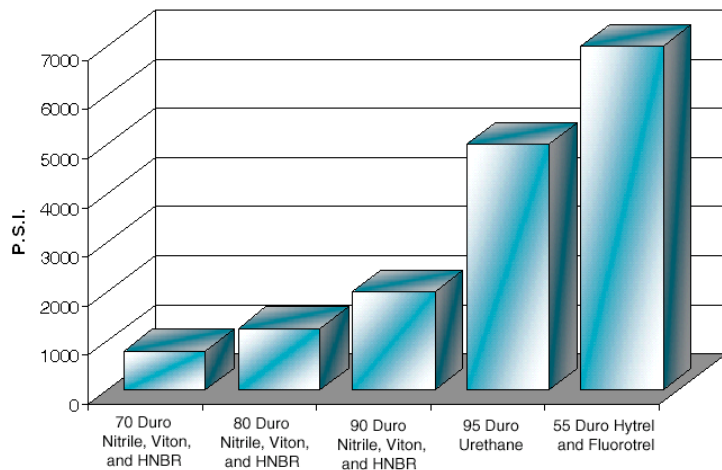
The prime consideration of pressure and how it affects the seal is centered on the extrusion resistance of the seal material and the extrusion gap which the seal must bridge without extruding. Urethane material has very high tensile moduli to resist extrusion at high pressure but as pressure increases the extrusion gap must be decreased to prevent extrusion as shown on the following chart.

O-Ring Loaded Urethane U-Cup



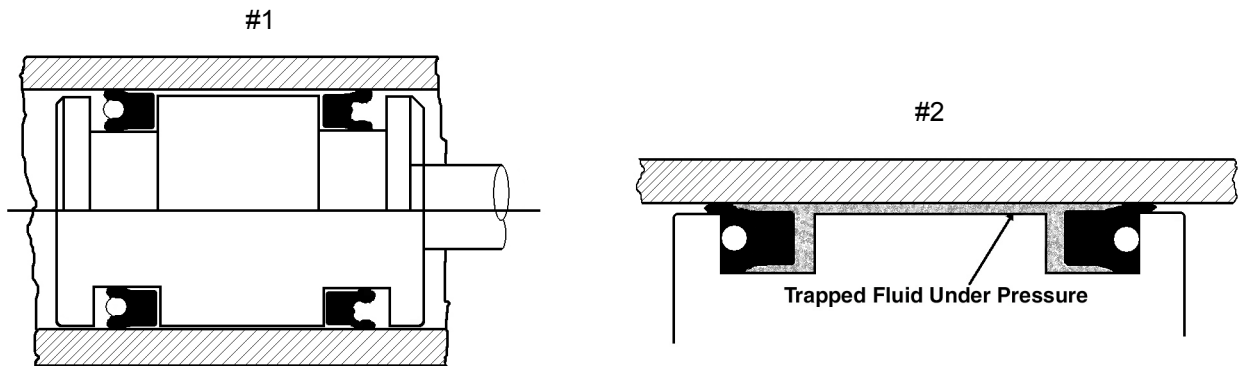
The temperature range of the seal is determined by the base polymer from which the seal is manufactured. This chart shows a general guideline for some of the common O-Ring Loaded U-Cup materials. For additional compound information please refer to the end of this design guide.

The ability of seal materials to withstand pressure varies depending on the compound. This chart provides you with general guidelines showing the maximum pressure you could expose an O-Ring Loaded U-Cup to without adding an anti-extrusion device or reducing your clearances with minimum risk of extrusion.

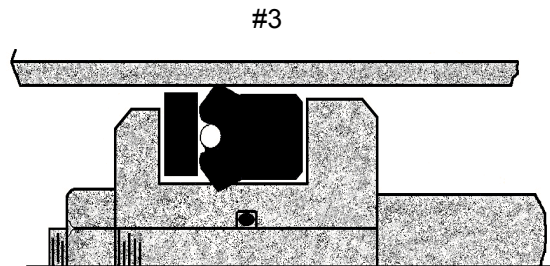


Double Acting Applications

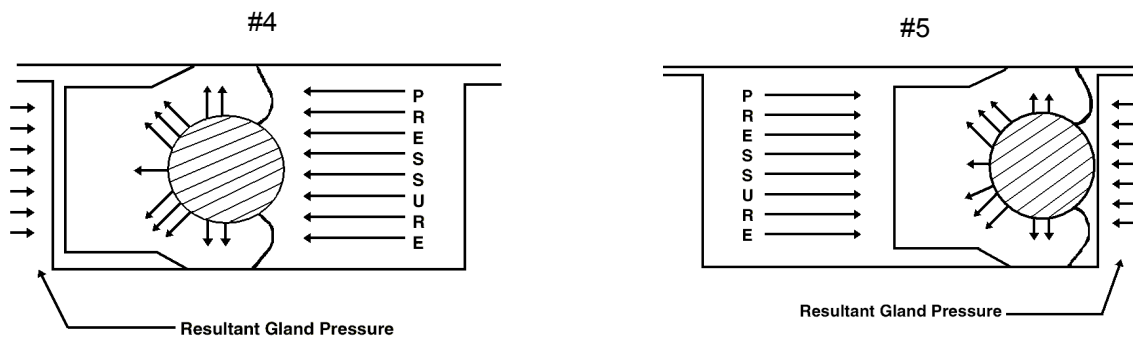
When designing for a double acting application using O-Ring Loaded U-Cups, there are a couple of options you can use. A typical double acting design will have two individual grooves cut for the O-Ring Loaded U-Cup and you then install the seals with the heel facing each other as in the diagram #1 below. A potential hazard to this design is the possibility of creating a pressure trap between the two seals as shown in diagram #2. The O-Ring Loaded U-Cup will hold pressure from both directions equally in some applications and as the pressure builds between the two seals you can damage the primary sealing lip by extruding it out of the seal cavity. This pressure trap can be easily avoided by removing the O-Ring energizer from one of the seals.



The second option is to use one seal and add a Lip Ring shown in diagram #3. By adding a lip ring you can use the O-Ring Loaded U-Cup as a double acting seal while only machining one seal groove. This design avoids the possibility of creating a pressure trap while increasing your bearing surface.



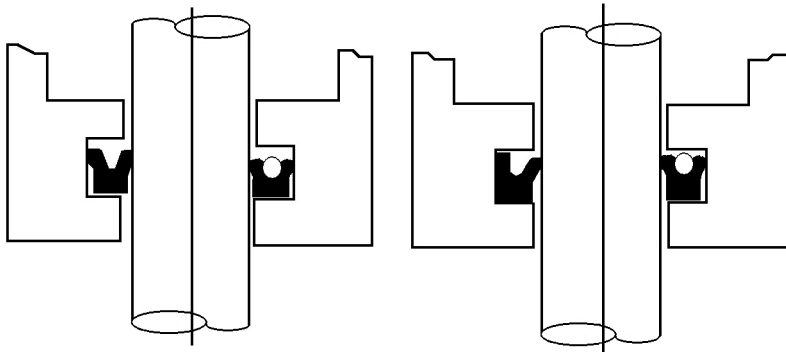
When the pressure comes from the opposite direction of the seal face the O-Ring Loaded U-Cup will slide towards the other end of the gland (#5). This traps the seal between the hydrostatic pressure on the heel of the seal and the gland face creating a mechanical squeezing action. Therefore the seal expands along exactly the same force vectors whether it is seeing pressure created from the fluid (#4) or from the mechanical pressure as shown in the diagrams below.



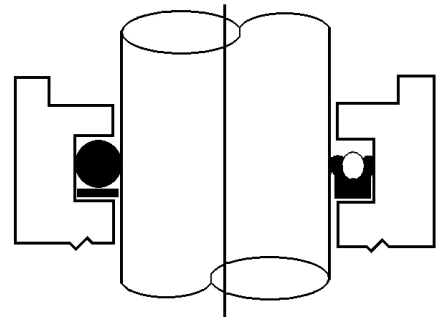
Replacing Existing Seals

O-Ring Loaded U-Cups can be used to retrofit most conventional seal designs generally without having to make dimensional changes to the seal groove. In most cases you can improve the performance of the seals by changing to an O-Ring Loaded U-Cup design. The diagrams below are examples of where you can replace existing seals with an O-Ring Loaded U-Cup.

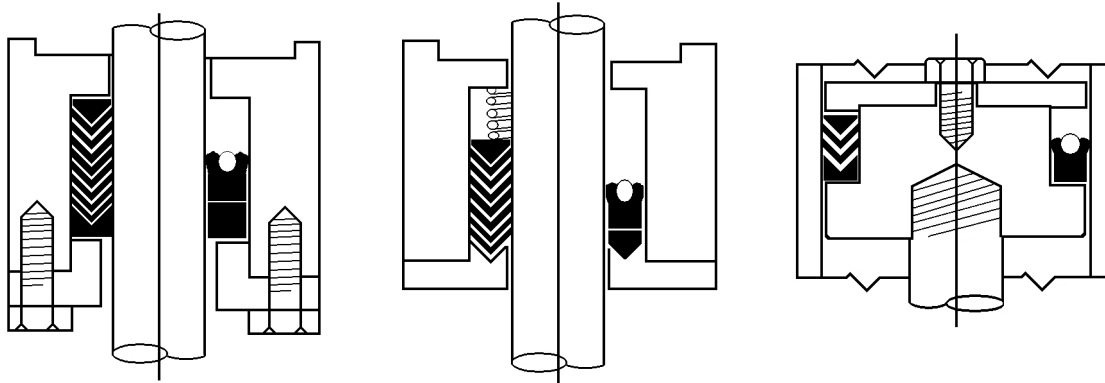
Replacing U-Rings



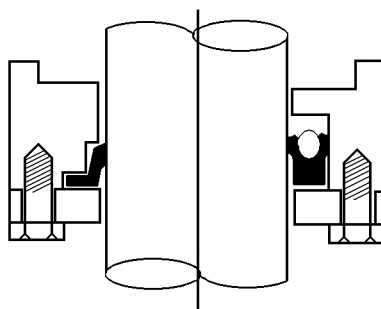
Replacing O-Rings



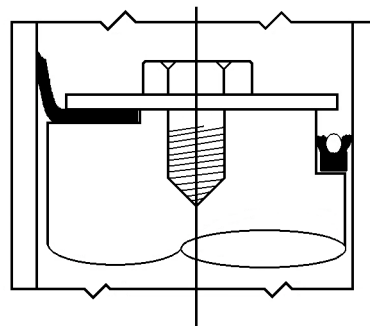
Replacing V-Rings



Replacing Flange Seals



Replacing Piston Seals



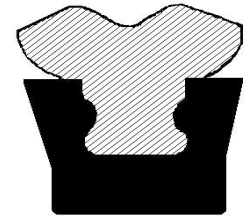
The Z-Seal

The Z-Seal is a squeeze type seal, combining the excellent sealability and low compression set of a soft rubber lip with the greater anti-extrusion of a hard thermoplastic base. Under low-pressure conditions, the seal provides its own compressive seal force. As pressure increases, hydrostatic pressure is mechanically transmitted through the elastomeric seal element into the anti-extrusion base. The applied force then deflects radially in a controlled manner, closing the extrusion gap behind the sealing lip. Under this condition, maximum sealing effectiveness is achieved.

Specifically designed for demanding dynamic applications, the Z-Seal can be used to upgrade existing designs as well as a positive seal for new product designs. By taking maximum advantage of the various elastomeric materials available today, the Z-Seal provides an extended range of endurance in extreme pressure, temperature, and chemical environments.

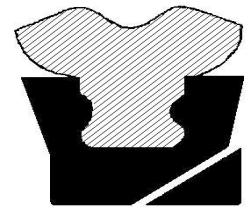
Deep Z

Specifically designed with a greater tolerance to side loading and additional compensation for axial run-out, the double lip design provides a greater resistance to compression set and extended life for the elastomeric seal element. Ideally suited for dynamic rod applications, the deep depth design provides increased stability in higher pressure applications.



Deep Z with Delta Back-Up

For applications exposed to severe shock loads or large clearance gaps, the modular "Delta" back-up ring provides the most economical way to close diametrical clearances with additional resistance to extrusion. Positively actuated to control friction, the split Delta design allows ease of installation and retains original seal height and groove depth.



Dimensions

The various Z-Seal configurations are designed to accommodate standard groove dimensions with normal manufacturing tolerances. Directly interchangeable with conventional seal designs, a wide range of Z-Seals are available in radial widths from as little as 1/8 of an inch to over 1 inch.

** Allowing for thermal expansion of the seal material and to facilitate seal installation, the groove depth should be a minimum of 10% greater than the specified seal height. As a rule of thumb, a groove depth in excess of 110% of seal height will not be detrimental to seal operation. However, as there are many factors which may affect seal life, seals should be tested under actual service conditions to ensure compatibility with the specific application.**

$$\begin{array}{r} \text{e.g. } 375 - 04.000 - 625 - \text{DZ} = \\ \begin{array}{r} .625" \text{ (seal height)} \\ + .0625" \text{ (10\% greater)} \\ \hline 0.6875 \text{ (minimum groove depth)} \end{array} \end{array}$$

Part Numbering System

Since Z-Seals have been designed to fit nominal gland dimensions, the dimensions applied to the part number of the seal reflect the gland dimensions and not the actual seal dimensions.

Design Type	Part Number			
	Width	ID	Depth	Type
Type Z	375 -	04.000 -	625 -	Z
Deep Z	375 -	04.000 -	625 -	DZ

Urethane U-Cup

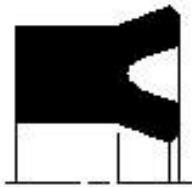
The Urethane U-Cup is a uni-directional seal that comes in four basic styles:

- Symmetrical
- Piston
- Rod
- UBR rod seal with a secondary sealing lip.

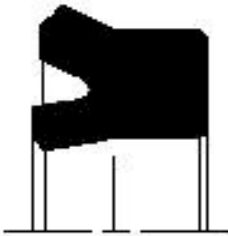
A Urethane U-Cup is specially designed to seal at high pressures, 5000 psi+, as well as at low pressures without having the additional squeeze created in an O-Ring Loaded U-Cup design. The benefits of a Urethane U-Cup seal include:

- Easy to install and remove
- Long life
- Low leakage

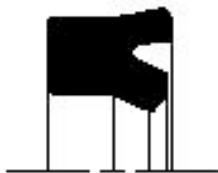
It has the same design requirements and part numbering as an O-Ring Loaded U-Cup.



The Symmetrical Urethane U-Cup has a u-shaped groove formed in such a manner that there is an inside and outside sealing lip. This design provides satisfactory service for most rod and piston sealing applications. For more demanding applications where temperatures and pressures are higher, you should consider one of the other designs.



The Piston style Urethane U-Cup is specially designed with a shorter, heavier outside sealing lip to achieve a higher initial sealing force on the tube. The Piston style Urethane U-Cup was developed to extend serviceability and improve reliability in piston sealing.



The Rod style Urethane U-Cup has the same basic design characteristics as the piston style seal, only reversed. The shorter, heavier inner lip was developed to attain maximum life and reliability in rod sealing applications.

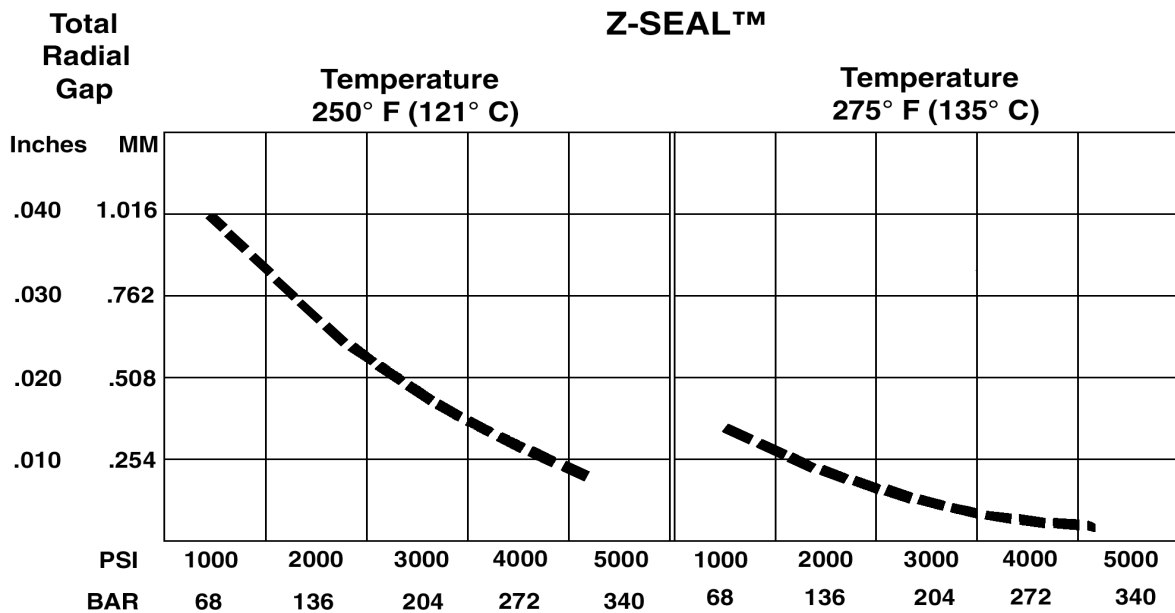
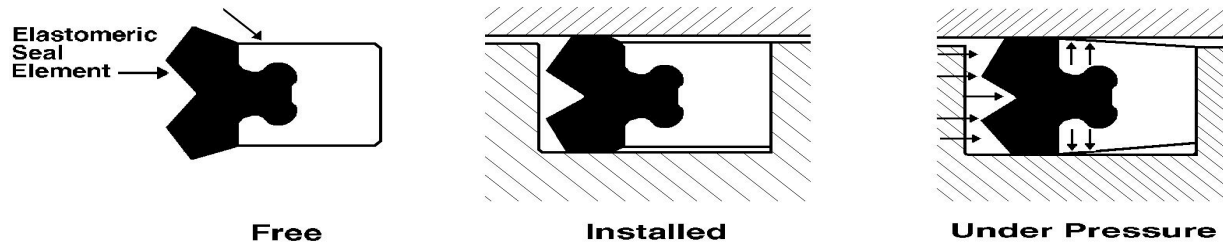


The UBR Rod seal is the newest generation Urethane U-Cup designed with a secondary "bump" on the inside heel of the seal. The addition of this bump provides the seal with added stability in the seal groove, which enhances the long term performance of the seal. This seal has proved to have better performance than conventional U-Cups in rod seal leakage tests as the initial leakage of the seal is reduced by the secondary sealing lip.

Sealing Principles of the Z-Seal/Deep Z-Seal

1. The lip configuration of the Z-Seal is designed to give both squeeze sealing force (as does an O-Ring) and automatic lip sealing force (as does a U-Cup). The Deep Z-Seal offers redundant sealing lips for additional lip contact.
2. Due to the very low compression set characteristics of an elastomeric lip material such as Nitrile or Viton®, there are no additional pre-loading devices required to ensure the seal.
3. The base of the seal is made of either Fluorotrel or Lubrithane, both are used for anti-extrusion. It has a lip-like configuration that spreads under pressure in order to close the extrusion gap behind the sealing lips, giving the seal a high pressure capability. Elastomeric seals gain extended life when properly backed up with a hard anti-extrusion device.
4. Both Viton® and Fluorotrel are specifically compounded to give a higher temperature and chemical resistance than that of other elastomeric sealing materials.

Thermoplastic Anti-Extrusion Element

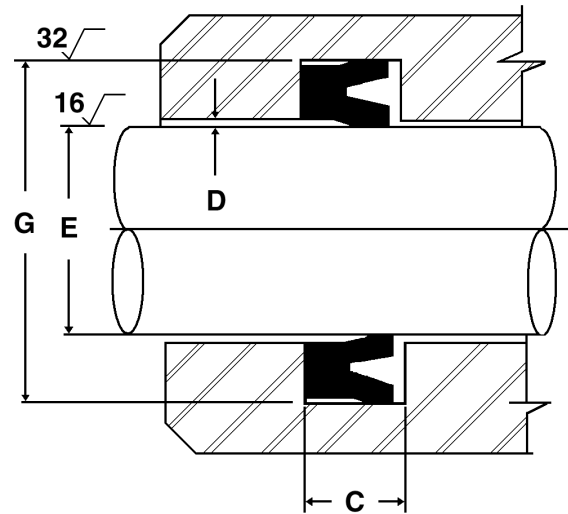


HU Seals

NOMINAL DIMENSIONS		
ID	OD	CUP HT
1/8	1/4	1/16
1/8	5/16	3/32
3/16	3/8	3/32
1/4	7/16	3/32
1/4	1/2	1/8
5/16	1/2	3/32
3/8	5/8	1/8
7/16	5/8	3/32
7/16	11/16	1/8
1/2	3/4	1/8
9/16	3/4	3/32
9/16	13/16	1/8
5/8	13/16	3/32
5/8	7/8	1/8
5/8	1	3/16
11/16	15/16	1/8
3/4	1	1/8
13/16	1 1/16	1/8
7/8	1 1/8	1/8
15/16	1 1/4	5/32
1	1 1/4	1/8
1	1 5/16	5/32
1	1 3/8	3/16
1	1 1/2	1/4
1 1/16	1 3/8	5/32
1 1/8	1 3/8	1/8
1 3/16	1 1/2	5/32
1 1/4	1 1/2	1/8
1 1/4	1 9/16	5/32
1 1/4	1 5/8	3/16
1 3/8	1 11/16	5/32
1 3/8	1 3/4	3/16
1 3/8	1 7/8	1/4
1 7/16	1 3/4	5/32
1 1/2	1 3/4	1/8
1 1/2	1 13/16	5/32
1 1/2	1 7/8	3/16
1 5/8	2	3/16
1 3/4	2 1/8	3/16
1 3/4	2 1/4	1/4
1 7/8	2 1/4	3/16
2	2 1/4	1/8
2	2 3/8	3/16
2	2 1/2	1/4
2 1/8	2 1/2	3/16
2 1/4	2 5/8	3/16
2 1/2	2 7/8	3/16
2 9/16	3	7/32
2 5/8	3	3/16
2 3/4	3 3/16	7/32
2 13/16	3 1/4	7/32
3	3 7/16	7/32
3 1/16	3 1/2	7/32
3 1/4	3 5/8	3/16
3 5/16	3 3/4	7/32
3 1/2	4	1/4
3 3/4	4 1/4	1/4
4	4 1/2	1/4
4 1/4	4 3/4	1/4
4 7/16	5	9/32
4 1/2	5	1/4
4 3/4	5 1/4	1/4
5	5 9/16	9/32
5 3/8	6	5/16
5 1/2	6 1/8	5/16
6 3/8	7	5/16
7 3/8	8	5/16
9 5/16	10	11/32
11 1/4	12	3/8
13	14	1/2

HU Seals (Blockvees) are specially designed homogenous Nitrile U-Cups. The heavy, compactly designed cross section of the HU Seal provides a reliable seal at high pressures without sacrificing its low friction properties.

HU Seals are designed for use in both hydraulic and pneumatic applications as rod or piston seals. The compact design is especially suited for applications where space is limited. The HU Seal is typically made from an 80 durometer Nitrile but also comes in Viton®, EPDM, and other homogenous materials.



Application Data for Style HU

Piston Groove Diameter (A) = Nominal Seal ID

Cylinder Bore (B) = Nominal Seal OD

Groove Length (C) = Cup Height + 10%

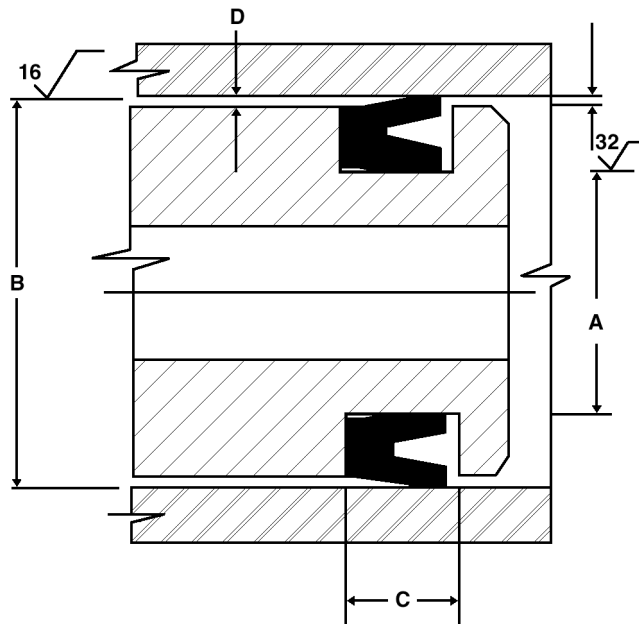
Rod Diameter (E) = Nominal Seal ID

Groove Diameter (G) = Nominal Seal OD

Max Diametrical Clearance (D) = 0.008" (500 PSI) or 0.0006" (3000 PSI)

Style 870 U-Cups

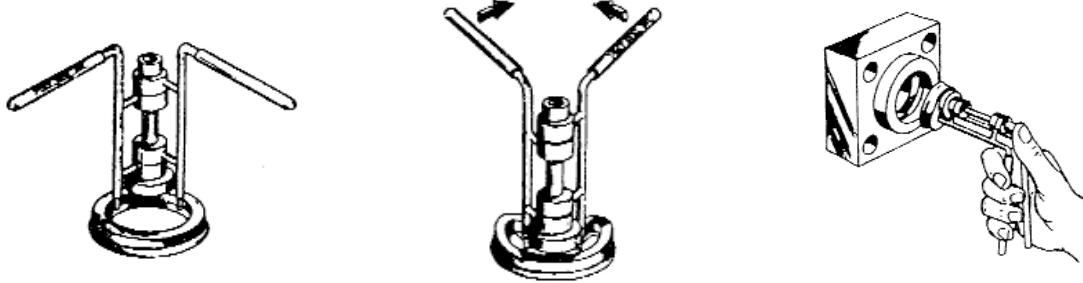
Style 870 U-Cups are normally used as a piston seal in a pneumatic cylinder. Typically made from a 70 durometer Nitrile, these are also available in Viton®, EPDM, and other homogenous rubber materials. This seal will provide excellent sealing in pressures up to 500 PSI or 1500 PSI with a back-up ring. The range of sizes available in style 870 U-Cups generally conform to those defined by the JIC and AN6226 standards.



Part numbers for HU and 870 U-Cups are given by ID and OD. For example, 1-1/2 x 2-1/8 x 5/16 is HU

NOMINAL DIMENSIONS			
REFERENCE #	ID	OD	CUP HT
870-1	1/8	1/2	3/16
870-2	3/16	9/16	3/16
870-3	1/4	5/8	3/16
870-4	5/16	11/16	3/16
870-5	3/8	3/4	3/16
870-6	7/16	13/16	3/16
870-7	1/2	7/8	3/16
870-8	1/4	3/4	1/4
870-9	5/16	13/16	1/4
870-10	3/8	7/8	1/4
870-11	7/16	15/16	1/4
870-12	1/2	1	1/4
870-13	9/16	1 1/16	1/4
870-14	5/8	1 1/8	1/4
870-15	11/16	1 3/16	1/4
870-16	3/4	1 1/4	1/4
870-17	13/16	1 5/16	1/4
870-18	7/8	1 3/8	1/4
870-19	15/16	1 7/16	1/4
870-20	1	1 1/2	1/4
870-21	1 1/16	1 9/16	1/4
870-22	1 1/8	1 5/8	1/4
870-23	1 3/16	1 11/16	1/4
870-24	1 1/4	1 3/4	1/4
870-25	1 1/4	1 7/8	5/16
870-26	1 3/8	2	5/16
870-27	1 1/2	2 1/8	5/16
870-28	1 5/8	2 1/4	5/16
870-29	1 3/4	2 3/8	5/16
870-30	1 7/8	2 1/2	5/16
870-31	2	2 5/8	5/16
870-32	2 1/8	2 3/4	5/16
870-33	2 1/4	2 7/8	5/16
870-34	2 3/8	3	5/16
870-35	2 1/2	3 1/8	5/16
870-36	2 1/2	3 1/4	3/8
870-37	2 5/8	3 3/8	3/8
870-38	2 3/4	3 1/2	3/8
870-39	2 7/8	3 5/8	3/8
870-40	3	3 3/4	3/8
870-41	1/8	3/8	1/8
870-42	3/16	7/16	1/8
870-43	1/4	1/2	1/8
870-44	5/16	9/16	1/8
870-45	3/8	5/8	1/8
870-46	7/16	11/16	1/8
870-47	1/2	3/4	1/8
870-48	5/8	1	3/16
870-49	3/4	1 1/8	3/16
870-50	7/8	1 1/4	3/16
870-51	1	1 3/8	3/16
870-52	1 1/8	1 1/2	3/16
870-53	1 1/4	1 5/8	3/16

Installation Tools

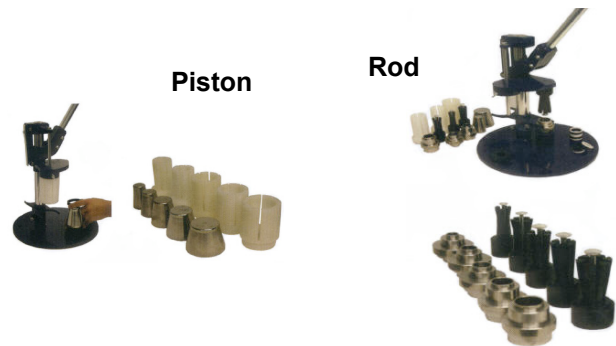


1. Place seal on flat surface with seal lip down.
2. Open tool so that center pin is outside the seal OD and the handle pins are inside the ID.
3. Rotate handles to deform seal.
4. Install seal in groove from external end of bore.
5. Release pressure and remove tool.
6. With finger pressure, snap remaining part of seal into groove.

Hi-Tech Seals is now offering a "Seals Assembly Press" that makes installing Rod and Piston Seals quick and easy. In three easy steps, anyone can install Rod Seals ranging from 5/8" to 1-1/4" in diameter and Piston Seals ranging from 1-1/4" to 3-1/4" in diameter (other diameters available upon request).

The benefits of the Seals Assembly Press:

- Rapid Rod and Piston Seal installation
- Reduces the risk of seal damage during installation
- Safer procedure for the assembler when compared to traditional methods



Speed and Safety



Funnels and PM Pressers for Rod Seals assembly are available in the following diameters: .625"/.750"/.875"/1.000"/1.125" and other diameters on request.

The manual press is prearranged for quick replacement of the pressers. By preventing any damage to the seal, it will make your job easier and more productive.

By replacing the Funnels and the PM Pressers with Cones and PF Pressers, you can use the same press to assemble Piston Seals for the following diameters:

Materials

Aflas™ (TFE/P)

-9°C to 232°C
16°F to 450°F

- Good high temperature capability
- Resistant to strong acids and bases, amines, solvents and hot water
- Aflas™ is found in numerous applications in the oilfield industry
- Poor low temperature performance and low resilience

Carboxylated Nitrile (CBX, XNBR)

-20°C to 135°C
-4°F to 275°F

- A Carboxylated Nitrile compound with increased strength, improved tensile and tear properties plus excellent abrasion resistance
- Lower solvent swell
- Excellent chemical resistance to petroleum oils and fluids
- Commonly used in dynamic applications
- Do not use with polar solvents, glycol brake fluids, aromatic hydrocarbons, chlorinated hydrocarbons and strong acids

Chloroprene (CR) (Neoprene DuPont™)

-40°C to 121°C
-40°F to 250°F

- Has exceptional ozone, weather and good chemical resistance
- Good mechanical properties are retained over a wide temperature range
- Exhibits good resistance to refrigerants (R12)

Ethylene Propylene (EPDM, EPR)

-54°C to 150°C
-65°F to 302°F

- Excellent resistance to ozone, hot water, steam and aging
- Wide temperature range
- Commonly used with brake fluids and refrigerants
- Poor resistance to petroleum fluids and mineral oils

Fluorocarbon (FKM, FPM)(Viton® DuPont™)

-26°C to 204°C
-15°F to 400°F

- Excellent resistance to higher temperatures, petroleum oils, gasoline
- Wide range of chemical resistance
- Very good ozone, weather and aging resistance
- Poor compatibility with H₂S over 2%, amines, acetone, hot water and steam
- Poor low temperature characteristics although some compounds are suitable to -40°C

Fluorosilicone (FVMQ)

-56°C to 204°C
-69°F to 400°F

- Wide temperature range
- Excellent resistance to hydrocarbon fuels, petroleum oils and silicone oils
- Relatively low tear strength, abrasion resistance and tensile strength
- Generally not suited for dynamic applications

Highly Saturated Nitrile (HNBR, HSN)

-40°C to 160°C
-40°F to 320°F

- A Nitrile based compound with improved chemical resistance
- Wider temperature range than standard Nitrile
- High strength material that resists extrusion, abrasion and wear
- Water and steam resistance to 149°C, H₂S resistance up to 10%
- Commonly used with petroleum oils and CO₂
- Do not use with chlorinated hydrocarbons, polar solvents or strong acids
- Low temperature compounds available down to -54°C

Hytrel® (TPC- ET)

-54°C to 149°C

-65°F to 300°F

- A thermoplastic elastomer able to handle high temperature's and hostile fluids
- Has excellent strength and toughness properties
- Demonstrates high resilience and flexibility which permits easier installation than PTFE materials
- Not suitable with water and phosphate fluids above 80°C

Nitrile (NBR)

-40°C to 120°C

-40°F to 250°F

- Presently the most widely used elastomer in the seal industry
- Provides an exceptional balance of good mechanical properties, wear properties and reasonable resilience
- Resistant to most mineral oils and greases
- Do not use with glycol based brake fluids and strong acids
- Low temperature compounds to -54°C

Perfluoroelastomer (FFKM)(Kalrez® DuPont™)

-15°C to 250°C

+5°F to 482°F

- Has the broadest chemical resistance of any elastomeric material
- Combines the sealing integrity of elastomers with chemical resistance approaching that of PTFE
- Not suitable with liquid sodium and potassium, fluorinated solvents and refrigerants
- Compounds available to 325°C/617°F

Polyurethane (AU, EU)

-53°C to 105°C

-65°F to 220°F

- A thermoplastic elastomer with higher tensile strength, toughness and wear resistance
- A good combination of hardness and elasticity
- Good low temperature flexibility
- Can be used in high pressure hydraulic systems where parts are subject to wear

PEEK

-70°C to 260°C

-94°F to 500°F

- High strength
- Able to retain it's mechanical properties at high temperatures
- Commonly used for anti-extrusion purposes
- Do not use with Hydrochloric, Nitric or Sulphuric acids

PTFE (Teflon® DuPont™)

-200°C to 250°C

-328°F to 482°F

- Has virtually universal chemical resistance
- Very low coefficient of friction
- Fillers such as bronze, moly, glass, and carbon are commonly added to alter mechanical properties

Silicone (VMQ)

-65°C to 232°C

85°F to 450°F

- Excellent resistance to oxidation and ozone degradation
- Wide temperature range
- Most commonly used in static applications due to its poor tensile strength and wear resistance
- Popular for food and medical applications

Material information given is intended to serve as a general guideline only. Actual testing in the application environment is always recommended.



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9211 - 41 Avenue NW, Edmonton, Alberta T6E 6R5
Ph: 780.438.6055 Toll Free Phone: 1.800.661.6055
Fax: 780.434.5866 Toll Free Fax: 1.800.465.5866
www.hitechseals.com E-Mail: info@hitechseals.com



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Bay 3, 5940 - 30 Street SE, Calgary, Alberta T2C 1X8
Ph: 403.720.2856 Toll Free Phone: 1.800.830.7822
Fax: 403.279.2662 Toll Free Fax: 1.800.321.0862
www.hitechseals.com E-Mail: info@hitechseals.com



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1180 Kerrisdale Blvd; Unit 8, Newmarket, Ontario L3Y 8Z9
Ph: 905.953.9666 Toll Free Phone: 1.877.296.9412
Fax: 905.953.8739 Toll Free Fax: 1.888.580.**SEAL** (7325)
www.hitechseals.com E-Mail: info@hitechseals.com



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ENREGISTRÉ

1450 Rue Nobel, Suite 20, Boucherville, Québec J4B 5H3
Tél: 450.655.**SEAL** (7325) Sans Frais Tél: 1.866.894.**SEAL** (7325)
Télec: 450.655.7359 Sans Frais Téléc: 1.866.904.**SEAL** (7325)
www.hitechseals.com Courriel: info@hitechseals.com

