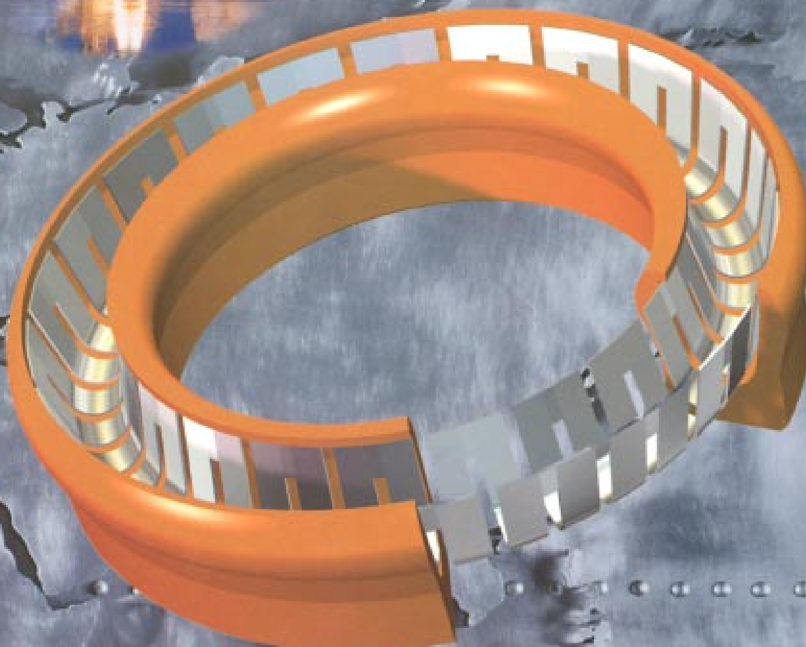
AccuSeal

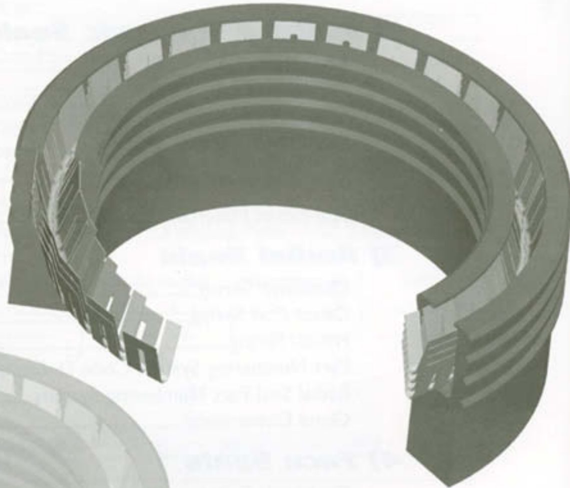


technical design manual

STATIC & DYNAMIC SEALING

Introduction

AccuSeal is a manufacturer of PTFE based, spring energized seals and sealing systems. Some advantages of our PTFE compounds over standard elastomers include: lower friction for dynamic applications, greater media compatibility and a greater temperature range.



The purpose of this guide is to help select sealing solutions for specific applications. It will cover standard seal geometries for spring-energized seals and rotary lip seals.

In general, seals with spring energizers can be designed for static, reciprocating and slow to medium rotary service. Lip seal designs are reserved for high-speed rotary applications with low pressures where friction is a concern. No matter the system specifications, AccuSeal can provide the solution.

Hardware Preparation

Surface finish is very important in any sealing system and becomes critical in dynamic applications. If a surface is too rough, then sealability and seal life will be reduced dramatically.

Hardness of the dynamic surface is also key to successful sealing. If the dynamic surface is too soft, the sealing lip may wear a groove into the hardware and will lose its ability to seal.

Charts 1.1 & 1.2 give suggestions for hardness and surface finish for different applications.

1.1

RECOMMENDED MINIMUM HARDNESS VALUES

Type of Motion	Surface Speed (sfpm)	Rockwell C Hardness				
		at 0 psi	150	500	1000	5000+
Reciprocating	up to 100	30	30	35	40	50
	100 and over	44	44	48	50	60
Rotary	up to 150	44	50	55	70	70+
	150 to 500	60	65	70	70+	*
	500 to 2500+	65	70	70+	*	*Consult Factory

1.2

RECOMMENDED SURFACE FINISH

Media Being Sealed	Dynamic Surface	Static Surface
Cryogenics, Helium Hydrogen	2-8 µin Ra*	8-12 µin Ra
Gases (air, nitrogen, oxygen natural gas, etc.)	6-12 µin Ra	12-20 µin Ra
Liquids (hydraulic fluid, water, crude oil, etc.)	8-16 µin Ra	16-32 µin Ra

*Ra = Roughness Arithmetic Average

Metallic Spring Energizer Materials

Available Springs

AccuSeals are available with three different types of spring: Cantilever, Helical and Offset Coil. (The advantages and disadvantages of each spring are outlined in sections 3 and 4.) Since these seals rely on system pressure to actuate, the purpose of the spring is to create a positive seal in the absence of pressure (i.e. startup conditions). Figure 1.3 lists the available AccuSeal spring materials by load and series. Figure 1.4 gives a general description of where each material type may be most effective. Consult the factory for spring loads and materials not listed.

1.3

SPRING LOADS AVAILABLE BY CROSS SECTION

Seal Type	Spring Cross-Section	Spring Load[1]	Spring Materials Available[2]	Cross-sectional sizes[3] available 000	100	200	300	400
AccuSeal AVS-A		M	S – Stainless Type 301	•	•	•	•	•
			H – Hastelloy®[4] C-276		•	•	•	•
			E – Elgiloy®[5]	•	•	•	•	•
		H	S – Stainless Type 301		•	•	•	
			H – Hastelloy C-276		•	•	•	
			E – Elgiloy		•	•	•	
AccuSeal ACS-A		L	S – Stainless Type 302	•	•	•	•	•
			H – Hastelloy C-276	•	•	•	•	•
		M	S – Stainless Type 302	•	•	•	•	•
			H – Hastelloy C-276	•	•	•	•	•
		H	S – Stainless Type 302	•	•	•	•	•
			H – Hastelloy C-276	•	•	•	•	•
AccuSeal AHS-A		H	S – 302 SS	•	•	•	•	•
			H – Hastelloy C-276	•	•	•	•	•

[1] L=Light • M=Medium • H=Heavy
[2] Consult factory for any materials not listed.
[3] For definition of 000 to 400, see pp. 14-17 in section 3.
[4] Hastelloy® is a registered trademark of Haynes International.
[5] Elgiloy® is a registered trademark of Elgiloy limited partnership.

1.4

SPRING MATERIAL CODES

Code	Spring Material[1]	Application
S	300 Series[2] Stainless	General-purpose for service to 550°F in most fluids. Not recommended for highly corrosive media.
H	Hastelloy® C-276	Better resistance to corrosive media, or in milder fluids when temperatures exceed 400°F.
E	Elgiloy®	NACE-approved[4] for corrosion resistance in salt water, severe media, or in milder corrosives over 500°F.
F	Silicone-Filled[3]	Food contact applications. Silicone gel keeps food particles out of the spring cavity, and complies with FDA regulations for repetitive-contact-food surfaces. Silicone gel also keeps abrasives and viscous media such as hot glue out of the spring cavity, and eliminates dead volume in the seal.

[1] Consult factory for any materials not listed.
[2] Cantilever spring is made from Type 301 SS. Offset Coil and Helical are Type 302 SS.
[3] Underlying spring is Cantilever stainless steel, unless otherwise specified by special part numbers.
[4] National Association of Corrosion Engineers.

Seal Design Parameters

Friction Considerations

The amount of friction induced by a seal depends on several different factors including: seal material, spring load, system pressure and temperature. To provide the best sealing solution for a given application, the most critical aspect of the system must be determined. If positive sealing is most important, then a higher amount of friction and wear must be acceptable. If seal life and low friction are critical, then absolute sealability may be reduced.

Seal wear in dynamic systems is unavoidable. Careful consideration of friction issues can help maximize seal performance. An intelligent material selection and proper hardware preparation can provide an ideal solution to almost any problem.

The total force to overcome friction in a system is dependent on several factors.

- Coefficient of friction of the seal material (see pp. 7-8 for coefficients of specific materials)
- Spring force
- System pressure force
- Dynamic surface finish
- Diameter of dynamic surface

To calculate the breakout force for a given system, follow the steps and use charts 1.5 & 1.6.

1) Determine the applicable spring type chart. (i.e. Offset Coil or Cantilever)

2) Find the appropriate system pressure on the x-axis.

3) Trace vertically to the intersection point of the appropriate spring series listed to the right of the chart.

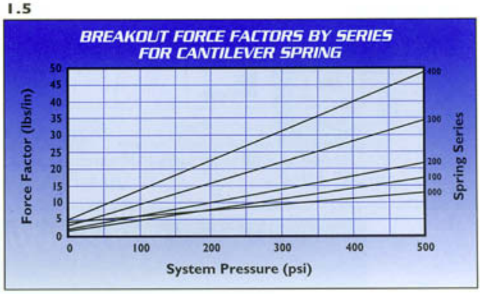
4) From that point, trace left horizontally back to the y-axis. This is the correct force factor.

5) To find the breakout force, multiply the force factor by the dynamic surface diameter. This will give the breakout force in (lbs.)[1]

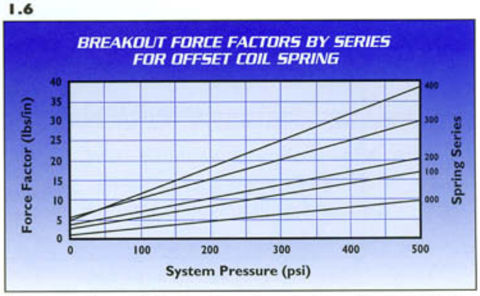
*Torque (T) in-lb = Force (F) lb x Dynamic Radius (R) in.

Consult the factory for conditions not shown.

1.5



1.6



[1] Charts based on $\mu=0.10$. Seal running on dry steel surface with an 8 μin Ra finish. Medium spring load.

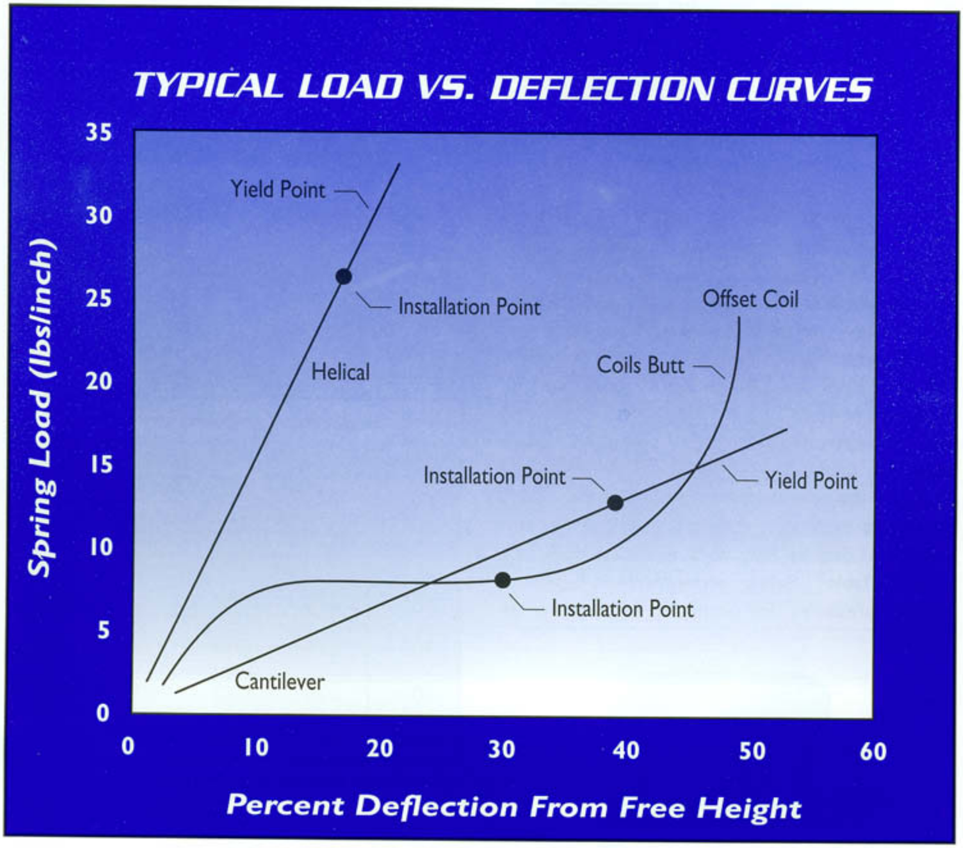
AccuSeal • section 1

Seal Design Parameters

Load vs. Deflection

When selecting a spring type for a given application, it is important to consider how the spring will load as it is deflected. Friction, positive sealing and wear are all variables that can be adjusted through proper spring selection. As figure 1.7 shows, the **Cantilever** spring maintains a linear relationship between spring deflection and spring force and has a gradual slope. This means that as spring deflection increases, so does the force due to the spring. Likewise, as the seal jacket wears, the spring will decompress and the spring force will fall off accordingly. The **Helical** spring also displays a linear relationship between spring force and deflection but the slope of the line is much steeper. This means that a slight change in the deflection of the spring will result in a dramatic change in the spring force. The relationship between spring force and deflection for the **Offset Coil** spring is not linear. The flat section of the curve for this type of spring allows for constant spring force over a wide range of deflection. This is a distinct advantage in friction sensitive applications.

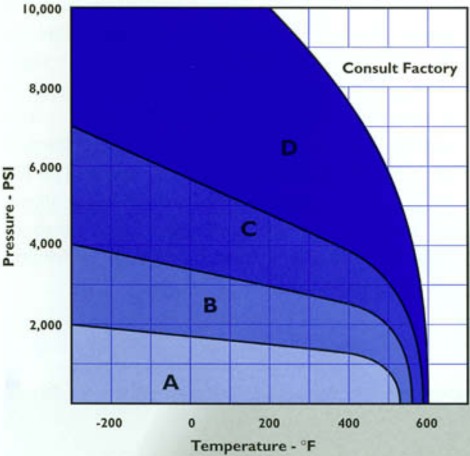
1.7



Seal Design Parameters

1.8

TEMPERATURE VS. PRESSURE & SEAL DESIGN

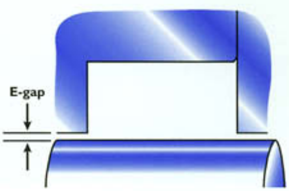


Temperature vs. Pressure

AccuSeals are designed to cover a wide range of temperature and pressure combinations. For many applications a standard seal will be sufficient to solve the problem. Figure 1.8 shows various combinations of temperature and pressure and a grade for how a standard AccuSeal will perform in that range. 'A' being the most standard application and 'D' being the most difficult. For those applications outside the ranges shown, consult our factory and our engineering personnel will be glad to assist you.

Extrusion Gaps

An effective way to increase a seal's performance is to closely control the extrusion gap or E-gap. (See illustration below). As temperature increases, the seal jacket will tend to soften and a smaller E-gap will need to be maintained so that the seal will not extrude. The same is true for high pressures. Identical seals will perform differently based on the consistency of the E-gap. If a seal is allowed to extrude, it will not be able to maintain positive sealing as long as a seal that does not extrude. Table 1.9 lists recommended E-gaps at various pressures for standard AccuSeal cross sections.



1.9

RECOMMENDED E-GAP AT PRESSURE

Series	Maximum Extrusion Gap at: 300psi	1500	3000	6000
000	.008	.004	.003	.002
100	.010	.006	.004	.003
200	.014	.008	.006	.003
300	.020	.010	.008	.004
400	.024	.012	.010	.005

Note: These are typical recommended values for 70°F service.

Seal Jacket Materials

AccuSeal jacket materials are compounded and processed for optimum seal performance in a wide variety of sealing environments. Our trained engineering staff can help select materials that optimize the performance of your equipment. The materials listed are our most commonly recommended compounds. Contact AccuSeal for information about additional compounds available.

2.1

Code	Description	Application	Temp. Range °F	High Press. Extrusion Resistance	Coef. Friction
101	Virgin PTFE	Recommended for static and light duty dynamic applications. Excellent material for cryogenics and low molecular weight gas service. Good for moderate to high vacuum service. FDA approved.	-425° to +450°	C	.05 .08
102	Carbon Graphite filled PTFE	Excellent resistance to wear and heat. General-purpose material. Recommended for dry and poorly lubricated applications. Excellent material for very high temperature environments and severe service requirements. Recommended for water and steam service.	-300° to +475°	A	.08 .12
103	Glass/Moly filled PTFE	Excellent wear and heat resistance. Recommended for high pressure applications particularly hydraulic service, steam and water. Can be abrasive when used in rotary service running against soft metals at high speeds.	-250° to +550°	B+	.08 .12
104	Carbon Black filled PTFE	Modified PTFE has similar properties to 101 but with increased wear and heat resistance. Recommended for light to medium duty dynamic applications. Excellent in gas service. 104 is designed for use in dynamic applications which require the excellent sealing results attainable with virgin PTFE.	-300° to +475°	B	.05 .10
105	Moly filled PTFE	Excellent in dry gas service with better wear resistance than 101.	-300° to +500°	B	.05 .10
107	UHMW-PE	Excellent wear resistance, but limited temperature and chemical resistance. Recommended for abrasive media. Extended life in severe environments. FDA approved.	-320° to +200°	A	.15 .25
109	Thermoplastic Elastomer	Elastomeric material with good wear and abrasion resistance for tight sealing, but limited temperature and chemical resistance. Excellent in hydraulic oils and water. Not recommended for steam.	-80° to +275°	B+	.30 .60
110	Ryton® PTFE Alloy	Excellent wear, temperature and pressure resistance. Recommended for high speed rotary and reciprocating applications. 110 is a unique alloy of PTFE which gives it the properties desired in dynamic applications involving high pressure and temperature.	-200° to +525°	A+	.12 .22

Ryton is a registered trademark of Phillips Petroleum Company
Tefzel is a registered trademark of DuPont
Ekonol is a registered trademark of Carborundum Plastics

A = Excellent
B = Good
C = Fair

SEAL MATERIALS

Seal Jacket Materials (cont.)

2.1

Code	Description	Application	Temp. Range °F	High Press. Extrusion Resistance	Coef. Friction
111	GUR UHMW-PE	Very closely related to 107 with the following advantages: Superior performance against virtually all acids, solvents, salts, etc. Zero moisture absorption.	-300° to +200°	A	.15 .25
120	Graphite filled PTFE	Excellent general purpose material with good heat and wear resistance. Non-abrasive. Compatible with all hydraulic fluids and most chemicals. Good in water and non-lubricating fluids.	-250° to +550°	A	.08 .12
122	Delrin	Very good back-up ring material but limited temperature range. Excellent for water service applications.	-70° to +250°	A	.30 .40
123	Nylon	Good extrusion resistance but limited in temperature range. Not recommended for water service.	-40° to +250°	A	.20 .40
124	Carbon-Graphite filled PTTE	Very good wear resistance in slow to moderate dynamic applications. Similar to 102, but with a higher percentage of filler material.	-300° to +525°	A	.08 .12
125	Bronze filled PTFE	Excellent wear and extrusion resistance. Good load bearing characteristics.	-200° to +575°	A	.09 .13
128	Ekonol® filled PTFE	Superior heat and wear resistance. Non-abrasive. Recommended for moderate to high speed dynamic service running against soft metals. Excellent wear resistance in dither type service.	-200° to +550°	B	.08 .12
137	ETFE Virgin Tefzel®	Fluoropolymer with superior resistance to nuclear radiation, but limited heat and wear resistance. Not recommended for general purpose sealing.	-100° to +300°	B	.30 .40
144	Virgin PEEK	A high modulus material with excellent high temperature resistance. Recommended for back-up rings.	-100° to +450°	A+	.35 .45

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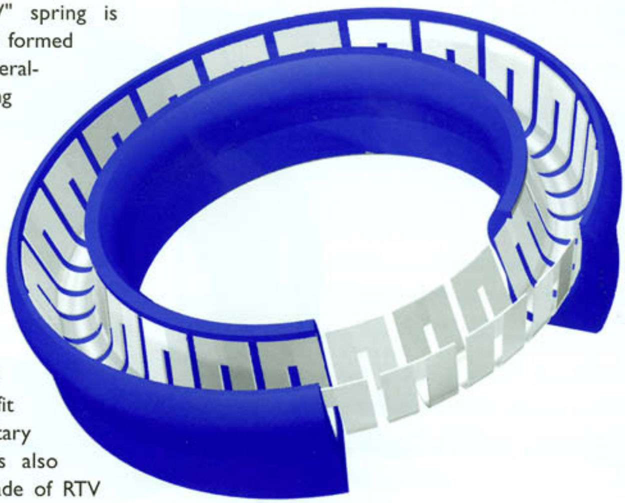
Cantilever Spring

The AccuSeal Cantilever or "V" spring is machined from flat strip stock and formed into its final shape. A good general-purpose spring, the cantilever spring can be used in most reciprocating applications and also in slow to moderate rotary service. The "V" shaped spring design provides a point contact for positive sealing along both the inside and outside diameters of the seal. A "V" spring together with a scraper lip is especially effective in applications with viscous fluid media. Available in all sizes to fit both standard industrial and military glands. The cantilever spring is also available with a FDA approved grade of RTV silicone for food and drug applications.



Standard Lip
Standard Heel

Scraper I.D. Lip
Standard Heel

Scraper O.D. Lip
Standard Heel

Scraper I.D. & O.D. Lip
Standard Heel

Standard Lip
Extended Heel

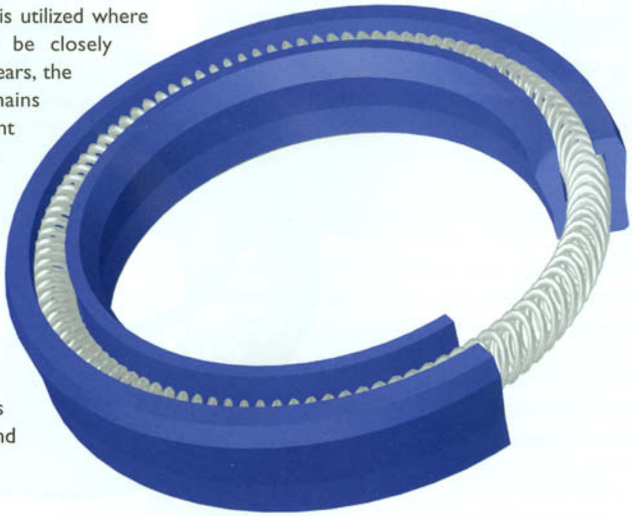
Scraper I.D. Lip
Extended Heel

Scraper O.D. Lip
Extended Heel

Scraper I.D. & O.D. Lip
Extended Heel

Offset - Coil Spring

The AccuSeal Offset Coil Spring is utilized where friction requirements need to be closely controlled. As the seal jacket wears, the force due to the spring remains constant allowing for a consistent friction force throughout the life of the seal. The offset Coil Spring is a good choice for greater shaft run-outs or wider hardware tolerances. This spring can handle side loading without taking a compression set, even during installation into stepped or closed glands. Available in all sizes to fit both standard industrial and military glands.



Standard Lip
Standard Heel

Scraper I.D. Lip
Standard Heel

Scraper O.D. Lip
Standard Heel

Scraper I.D. & O.D. Lip
Standard Heel

Standard Lip
Extended Heel

Scraper I.D. Lip
Extended Heel

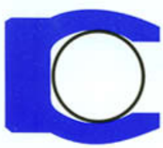
Scraper O.D. Lip
Extended Heel

Scraper I.D. & O.D. Lip
Extended Heel

Helical Spring

The AccuSeal Helical Wound Spring is designed for applications where a high unit load and tight sealing are the primary concerns. Most effective for static service, the Helical spring can also be used in slow dynamic systems. This spring is not recommended for dynamic applications where seal life and wear are critical aspects. A small amount of seal jacket wear dramatically reduces the force due to the spring and consequently the overall sealability. Available in all sizes to fit both standard industrial and military glands.

AHS-A



Standard Lip
Standard Heel

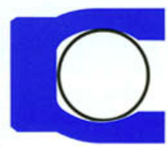
AHS-B

Scraper I.D. Lip
Standard Heel

AHS-C

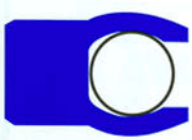
Scraper O.D. Lip
Standard Heel

AHS-D



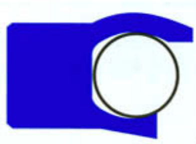
Scraper I.D. & O.D. Lip
Standard Heel

AHE-A



Standard Lip
Extended Heel

AHE-B



Scraper I.D. Lip
Extended Heel

AHE-C

Scraper O.D. Lip
Extended Heel

AHE-D

Scraper I.D. & O.D. Lip
Extended Heel

Cantilever Spring

The AccuSeal Cantilever Face Seal is a good general-purpose solution for static and slow dynamic systems. It is also a good choice when low friction is required or a low clamping force is available. Consult the factory for cross sections and diameters not listed.

Offset - Coil Spring

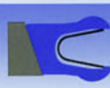
For dynamic systems that require low friction and a constant spring load, the AccuSeal Offset Coil Face Seal can be specified. As the seal jacket wears, the spring will compensate by decompressing and provide a constant force. Larger cross sections and diameters are available.

Helical Spring

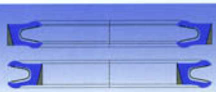
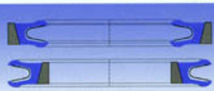
The AccuSeal Helical Face Seal is designed for static service. It is not recommended for dynamic applications. When a high unit load and tight sealing are the primary concerns, the Helical Face Seal is a good choice. For sizes not listed, consult the factory.

Backup Ring Configurations

ACCUSEAL RADIAL SEALS WITH BACKUP RINGS

SEAL / BACKUP CROSS-SECTION	PRESSURE RATING	APPLICATIONS
 45° Insert	10,000 psi	The 45° insert is designed to increase the pressure capabilities of a seal when gland width is limited. The configuration shown is for a rod seal.
 30° Insert	20,000	The 30° insert can also be used in systems where gland width is limited but it offers more support than the 45° insert. The configuration shown is for a rod seal.
 Rectangular ring seal standard-length	10,000	The rectangular backup ring is the most commonly used. System pressure compresses the ring closing off the E-gap and providing a very reliable high-pressure seal.
 Rectangular ring seal extended-heel	20,000	Combining the rectangular backup ring with an extended heel type seal will add even more high-pressure sealability. If gland width is adequate, this configuration will yield better results than the standard heel configuration.
 30° Tapered Block Ring	30,000	When pressures exceed 20,000 psi, a 30° block backup ring may need to be specified. The taper on the block matches the taper on the heel of the seal to "push" the heel away from the E-gap.

ACCUSEAL FACE SEALS WITH BACKUP RINGS

SEAL CROSS-SECTION	PRESSURE RATING	APPLICATIONS
 45° Insert	15,000 psi	Similar to the radial seal configuration, a 45° insert can be used in face sealing applications when gland width is limited.
 30° Insert	20,000	For better support than the 45° insert, a 30° insert can be used. This backup ring spans the entire cross section of the seal and allows for slightly higher pressures than the 45° insert.
 Rectangular Backup Ring	15,000	As with radial seals, the rectangular backup ring is the one most often specified for face seals. The system pressure compresses the backup ring to close off the E-gap and provide a reliable sealing solution.
 30° Tapered Block Ring	30,000	The 30° block backup ring should be specified when system pressures exceed 20,000 psi. A taper on the heel of the seal matches the taper on the backup ring allowing system pressure to "push" the heel of the seal away from the E-gap.

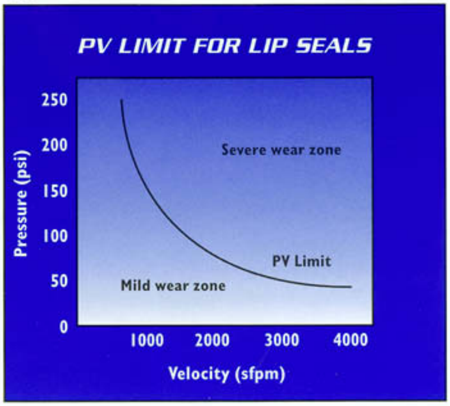
Rotary Sealing Considerations

Pressure-Velocity

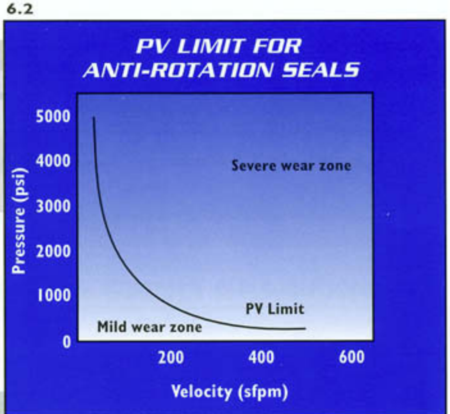
An important factor in the design of rotary seals is the "pressure-velocity" or PV limit. The PV limit is defined as the product of the system pressure and the surface velocity of the dynamic portion of the hardware. This factor is very useful in estimating seal life. If the PV limit is exceeded, a seal may wear at a rate greater than desired. The PV limit should always be considered when designing a dynamic seal. Charts 6.1 and 6.2 show the boundary between mild wear and severe wear for both lip seals and anti-rotation, spring-energized seals as a function of the PV limit.

Other factors may also contribute to seal wear in rotary systems. These factors include surface finish, temperature, lubrication and media abrasiveness. As a general rule, the better the surface finish the longer the seal will last when exposed to identical conditions. In high temperature applications, both the pressure rating and PV limit are reduced. Often in this type of system, application of a coolant will increase the life of the seal. In the case of abrasive fluid media, material selections become very important. Lower fill PTFE materials will wear at a greater rate than higher fill materials. Some non-PTFE materials such as UHMW-PE exhibit better wear characteristics. Keep in mind when using non-PTFE material that friction may increase and most materials are not as chemically compatible as PTFE.

6.1



6.2



Special Configurations

AccuSeal energizing devices can be customized to meet most special application requirements.

Silicone-Filled Spring Cavity

Silicone-filled seals for sanitary (i.e. food grade) applications conform to FDA requirements for inert contact with edible medias. Silicone gel fills the spring cavity, preventing entrapment of biological contaminants in the seal. This design also works well with semi-viscous, slurries or adhesives by keeping grit from packing into the spring cavity and interfering with the proper operation of the spring.

Coated Springs

In applications where the media cannot come in contact with any metallic substance, AccuSeal can also offer Teflon®[1] coated springs.

Nested Springs

When additional spring load is required, AccuSeal can offer nested springs, which increase the amount of spring force over a larger axial surface area. By nesting one or more springs inside of each other, the load bearing area can be increased to accommodate a larger sealing area and greater initial spring load.

Tandem Springs

By placing two springs "side-by-side" in tandem, an AccuSeal can be used to span a larger radial gap without sacrificing seal performance. This spring design provides twice the deflection range to accommodate wider gland tolerances and greater amounts of dynamic play.

O-ring Energizers

Elastomeric o-rings can be used to energize an AccuSeal design in special applications where metal energizers are not acceptable. However, these are not recommended due to temperature and media compatibility limitations.

SPECIAL ENERGIZERS

Silicone Filled

Nested Springs

Tandem Springs

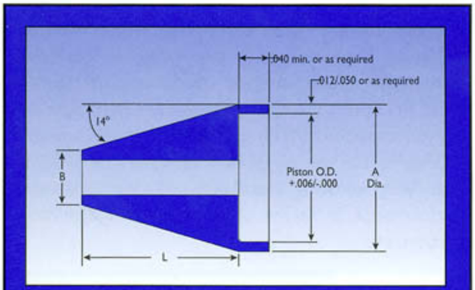
[1]Teflon® is a registered trademark of DuPont.

Installation

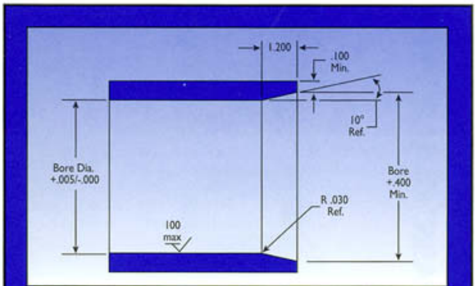
Installing a radial AccuSeal into a stepped or split gland requires no special tooling or procedures. The seal is typically guided into the gland by a lead-in chamfer. In the case of a stepped gland, the seal is pushed heel first over the chamfer on the step wall into position such that the heel of the seal is placed firmly against the back wall of the gland.

Installing an AccuSeal into a solid gland presents special considerations because of the inability to stretch polymeric materials. The procedure for installing an AccuSeal into a solid gland is carried out with the help of a loading mandrel and sizing tool. The loading mandrel is used to form a "ramp" which enables the seal to be gently stretched over the gland wall and into the gland without permanent damage. The sizing tool is then used to push the seal back into place since the polymeric jacket material does not readily recover once it's stretched and must be formed back into its correct size and shape. Typically in order to install an AccuSeal into a solid piston gland, the ratio of bore diameter to gland cross-section must be 20:1 or greater.

When installing an AccuSeal into a solid housing, other special installation tools may be necessary to effectively push the seal into place without damage. Typically in order to install an AccuSeal into a solid bore housing, the ratio of rod diameter to gland cross-section must be 32:1 or greater. Please consult factory for more specific guidelines.

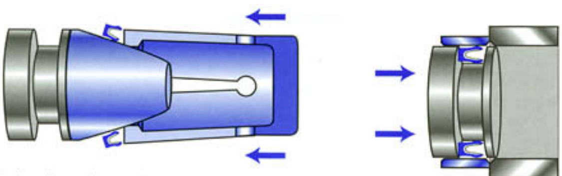


Loading Mandrel



Sizing Tool

Piston-seal installation into a solid gland



Push firmly and evenly until seal snaps into gland.

Install resizing tool over seal-heel first and work around to seat seal in gland. Keep the resizing tool over the seal and align with the bore. Push assembly evenly into the bore.

Gland Terminology

Hardware design is an essential element in the success of any fluid-sealing product. When designing hardware, it is important to consider gland type, mating-surface hardness and surface finish in order to properly design the right seal for a given application. The information in this section applies to the design of new hardware as well as modifying existing hardware to improve seal performance in terms of wear life, leakage rate, friction, etc.

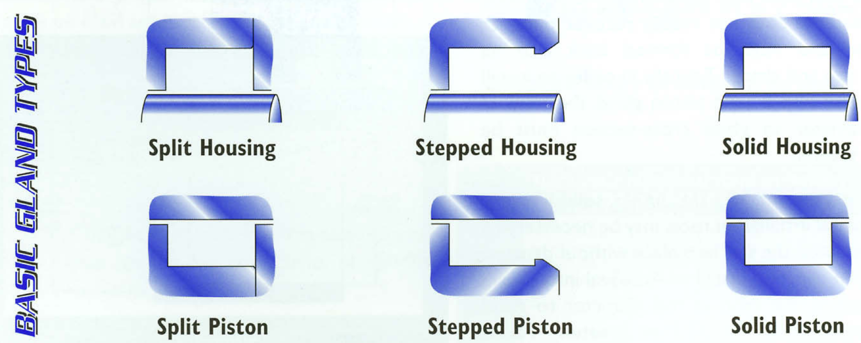
The main objective in selecting a gland type is to be able to install the seals without damaging or misaligning them. This section addresses the basic gland types and installation procedures.

Split Gland

The split gland entails hardware that is "split" into two or more separate pieces. This is the recommended gland type when designing hardware because it allows for easy installation without damaging the seal.

Stepped Glands

A stepped gland has a small step, which serves as a retaining wall and retains the seal. The step height is generally small so that the seal can be pushed past it easily. Once installed, the step holds the seal in place. In most cases, no special tooling or installation procedures are required. Consult the factory for specific step dimensions.



Basic Gland Types

There are three basic gland types to be considered. These are stepped, split and solid glands (see illustration). The gland required for a radial AccuSeal is similar to an o-ring gland with one major difference. An o-ring gland is typically solid (one-piece) with a full gland wall on each side. Since o-rings are typically elastomeric in nature, they can be easily stretched to fit into a solid gland. Conversely, the AccuSeal is made from polymeric compounds, which do not stretch like elastomers. Therefore, installation into such solid glands can be difficult, if not impossible. To install the AccuSeal easily requires either a split (preferable) or stepped gland. This enables installation without stretching or otherwise deforming the seal and risking damage or misalignment.

Solid Glands

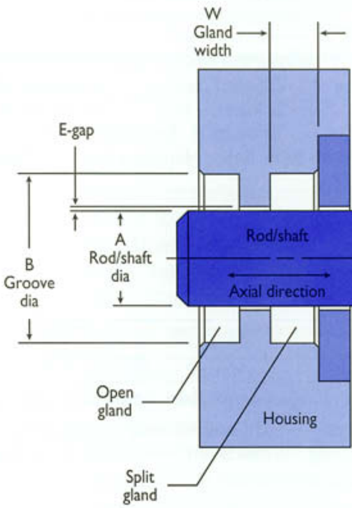
Because the AccuSeal does not stretch like an elastomeric o-ring, it is difficult to install in a solid radial gland. In some cases, it is possible to retrofit an AccuSeal into an existing solid gland as long as the ratio of seal diameter to cross-section is sufficiently large.

Face Seal Glands

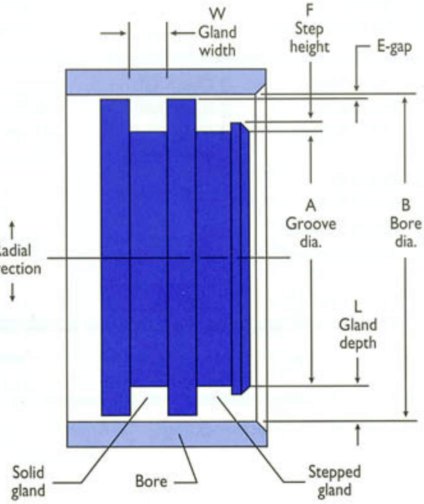
Face seal glands are typically the same as o-ring glands. There are typically no special considerations when installing face seals.

Gland Terminology

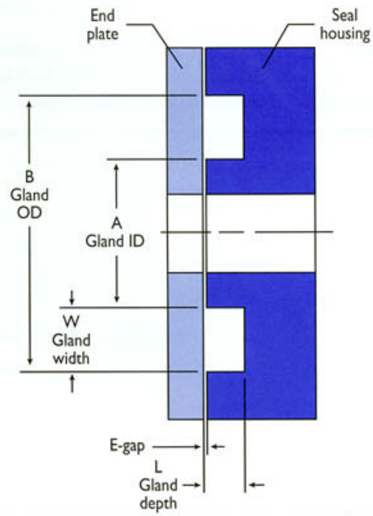
Rod and shaft-seal glands



Piston-seal glands



Face-seal glands



ENGINEERING DATA REQUEST

CLIENT INFORMATION

Company: ______________________ Date: ______________
Address: ______________________
City: ______________ State: ______________ Zip: ______________
Contact: ______________ Ph #: ______________ Fax #: ______________
Equipment: ______________ Model: ______________
Component: ______________ Cust. Part #: ______________
Existing Seal/Problem: ______________________
Number Seals/Unit: ______________ Number Seals/Year: ______________
Quote Qty: ______________ Req'd Delivery: ______________
Prototype Qty: ______________ Req'd Delivery: ______________

GLAND DESIGN

Gland Type: ❑ Open Gland ❑ Closed Gland ❑ Split Gland ❑ Stepped Gland
Seal Type: ❑ Rod/Shaft ❑ Piston ❑ Internal Face ❑ External Face
Dimensions: ❑ inch ❑ mm

	Min. / Max.	Material	Finish (μ in. Ra)	Hardness, Rc	Coating
Gland ID:	_____/_____	_______	_______	_______	_______
Gland OD:	_____/_____	_______	_______	_______	_______
Gland Width:	_____/_____				
Extrusion Gap:	_____/_____				
Side Load:	_____/_____				
Runout (TIR):	_____/_____				

What modifications to the hardware are permitted? ______________________

____

____

OPERATING CONDITIONS

❑ Static ❑ Reciprocating ❑ Rotary ❑ Oscillatory ❑ Unidirectional ❑ Bi-directional

			Minimum	Operating	Maximum	Media to be Sealed
Pressure:	psi	bar	_______	_______	_______	_______
Vacuum:	torr	in. Hg	_______	_______	_______	_______
Temperature:	°F	°C	_______	_______	_______	_______
Cycle Rate:	/min	Hz	_______	_______	_______	_______
Stroke Length:	inch	mm	_______	_______	_______	_______
RPM:			_______	_______	_______	
Rotation:	deg	rad	_______	_______	_______	
Velocity:	ft/min	m/sec	_______	_______	_______	

Breakout Friction/Torque: ______________ Running Friction/Torque: ______________
Expected Life: ______________ Allowable Leakage: ______________

DRAWING

AccuSeal