



CHEMFLEX™

SPRING ENERGIZED SEALS & CASE SEALS



PRODUCT PERFORMANCE. AFFORDABILITY. AVAILABILITY.



Black Hawk Seals, LLC is an innovative supplier of high-quality, competitively priced seals available through select, authorized dealers and distributors. Engineered for the most demanding seal applications using the latest manufacturing technology, superior materials, and industry knowledge. Black Hawk Seals manufactures more than 20 profiles of our Chemflex™ Spring Energized Seals. With a focus on quality, high-performance, and affordability, Chemflex™ SE Seals we redeveloped by our in-house engineers with decades of experience in this specific application.



- 1. Corporate Headquarters, R&D and Manufacturing
- 2. China
- 3. Taiwan
- 4. India
- 5. Thailand
- 6. Malaysia

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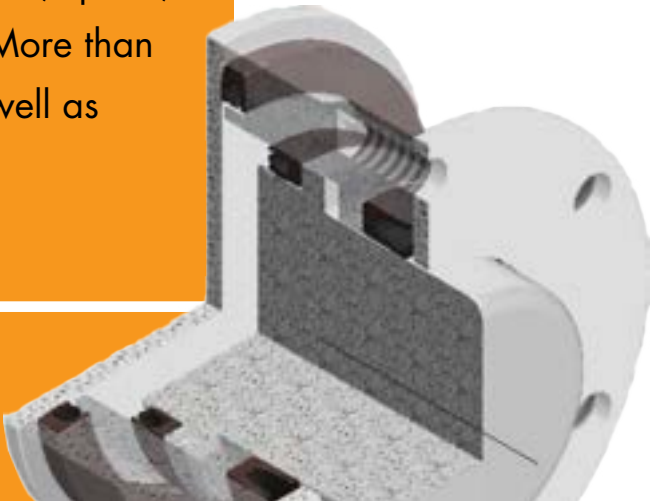
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Chemflex SE Design Principle

Chemflex SE Seals are a type of spring-energized u-cup that uses a metal spring to apply pressure on the seal lips against the mating surface. It can accommodate different jacket profiles, spring types, and materials. These seals can be used in rod and piston configurations.

Chemflex SE Seals are single-acting, spring-energized seals used in high-performance, demanding dynamic and static applications. Three styles of springs are offered to energize **Chemflex SE Seals**, including Canted Coil, Cantilever, and Helical Springs.

The **Chemflex SE Seal** is designed and precision machined from engineered materials, using our premium Tylon™ PTFE family of materials. Tylon material blends are optimized to perform in a wide range of applications, including extreme conditions such as pressure, temperature, speed, media, surface finish and materials. More than a hundred PTFE blends available as well as UHMW, PEEK and PPS.



Features

- Excellent leakage control
- Excellent wear resistance
- Excellent fluid compatibility
- Demanding duty cycles
- Excellent resistance to extrusion in high pressure applications
- Aggressive and abrasive media
- Extreme temperature capabilities -420°F to 550°
- Low friction
- Very low breakaway friction
- High speed capabilities
- Short stroke - high frequency
- Silicone filled spring cavity (option)
- Low compression set
- Dry running
- Infinite shelf life
- Custom sizes
- No tooling charge
- Large diameters
- Back-up ring (option)

Seal Material

PTFE properties can be enhanced by blending various organic or non-organic materials.

Material Code	Material (Filler)	Typical Applications	Features
T01	100% PTFE	Excellent in cryogenic application	Food grade, non-abrasive, good in static applications
T05	PTFE + TURQUOISE DYE	Lower creep and good wear resistance	Same as PTFE with increased wear and creep properties
T09	PTFE + GRAPHITE	Dry running application & acts as lubricant	Graphite as lubricant is recommended in dry running applications
T10	PTFE + CARBON MICRO	Reduces creep and heat dissipate	Carbon micro dissipate heat quickly used high temp applications
T13	PTFE + PPS	Excellent low wearing material	PPS can be used on softer dynamic surfaces
T19	PTFE + MINERAL	FDA and sanitary applications	Mineral is anti bacterial growth and recommended in FDA application
T20	PTFE + GLASS FIBER + MOLY	Good in extreme high pressure and temp applications	Good rotary material and creep resistant
T25	PTFE + CARBON + GRAPHITE	Good in dry running high wear application	Carbon & Graphite low wear and anti extrusion applications
T29	PTFE + CARBON FIBER	Good in hydrofluoric acid and water applications	Carbon Fiber lower creep and increase compressive module
T35	PTFE + POLYIMIDE	Good in high wear applications	Polyimide enhances wear properties. Non-abrasive against softer surfaces
T40	PTFE + BRONZE + MOLY	Go-to material in hydraulic applications	Bronze and Moly is used in all hydraulic applications

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Spring Types

Cantilever Spring (V)

- 
- Ideally used in reciprocating rod and piston
 - Wide tolerance and misalignment in static application
 - Abrasive media with scraper lip design

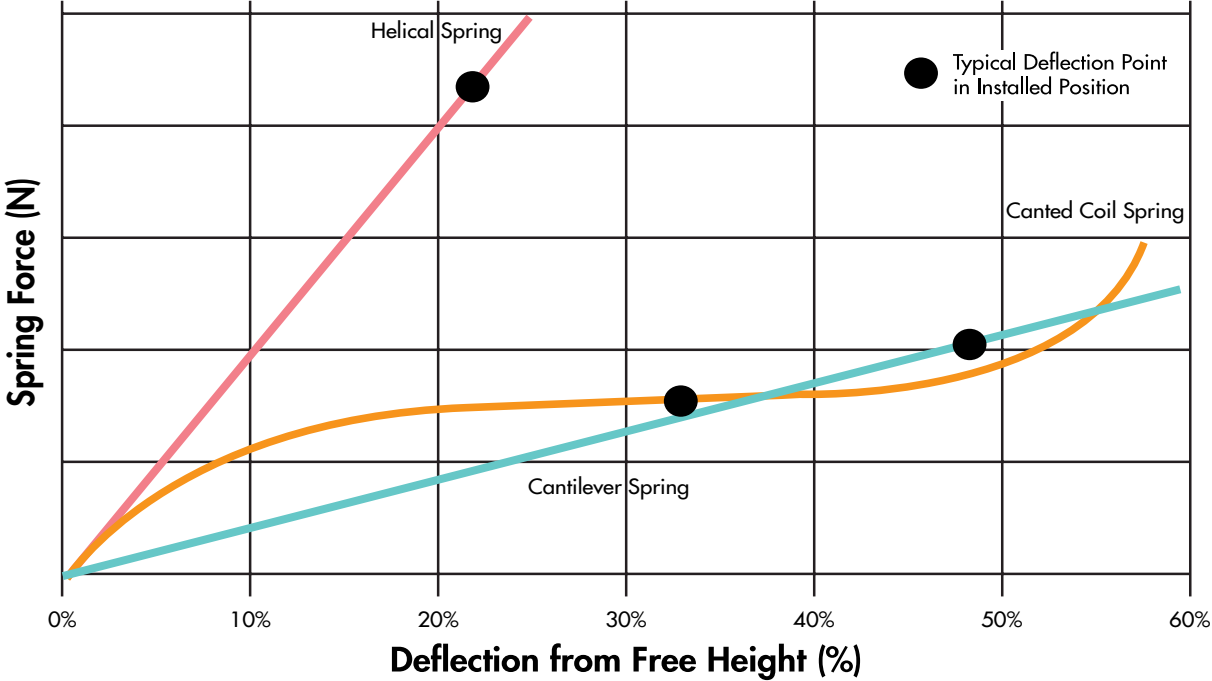
Canted Coil Spring (C)

- 
- Ideally used for rotary or reciprocating applications
 - Wide tolerance and misalignment in static application
 - Friction sensitive applications

Helical Spring (H)

- 
- Ideally used in static applications
 - Slow dynamic application under 100 sfpm
 - Ideal for cryogenic applications

LOAD VS. DEFLECTION CHART



Choosing the Right Seal

Chemflex seals offer major benefits in the design of components such as cylinders, pumps, rotary unions, and all static or dynamic applications.

Benefits include:

- Excellent temperature capability
- Low friction
- Great leak control
- High wear resistance
- High resistance to extrusion into gaps
- Withstanding aggressive and abrasive process media

PERFORMANCE

- Low compression set
- Capable of withstanding pressures above 200 MPa
- Excellent thermal resistance
- Properties are unaffected by contact with chemicals
- Low coefficient of friction
- Great dynamic and static sealing
- Capable of sealing at speeds of up to 15 m/s (2,940 fpm)



ADVANTAGES

- Low coefficient of friction that improves over time
- Stick-slip free operating
- High abrasion resistance
- Dimensionally stable
- Resistant to most fluids, chemicals, and gases
- Excellent resistance to aging
- Interchangeable with O-ring and Back-up ring combinations to AS4716 & ISO 6194
- Flexible design for hardware compatibility

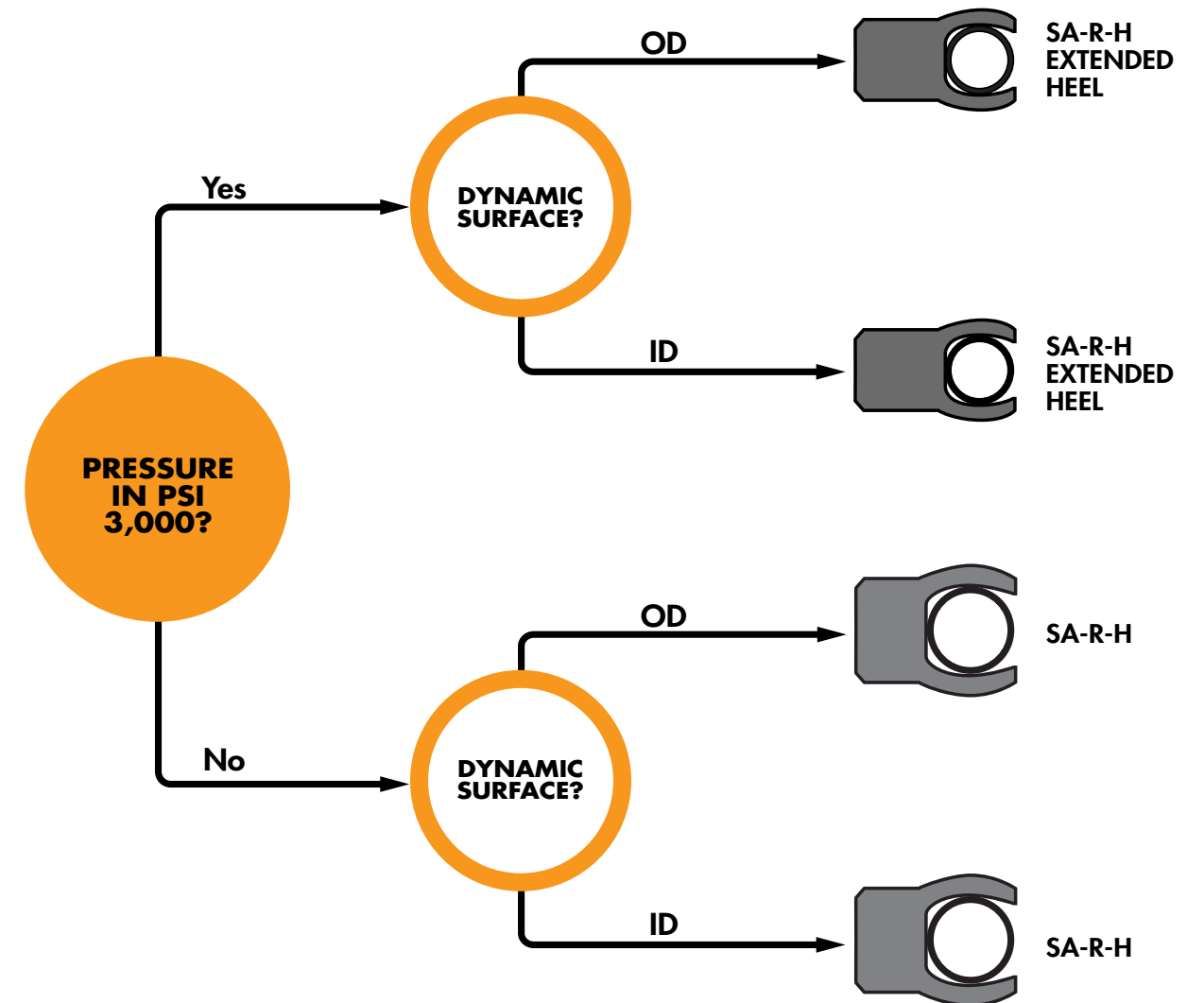
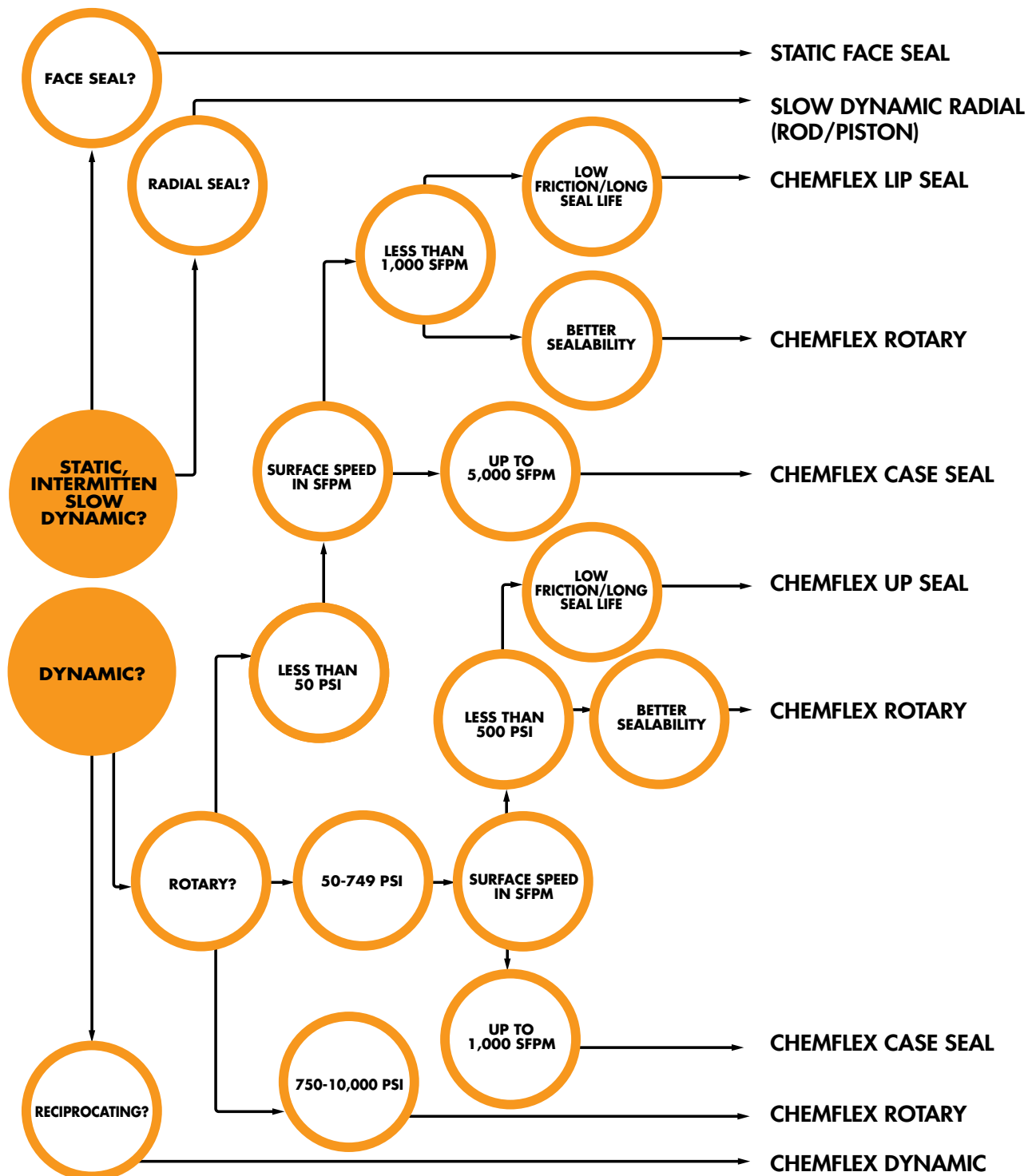
* Many spring materials are available.

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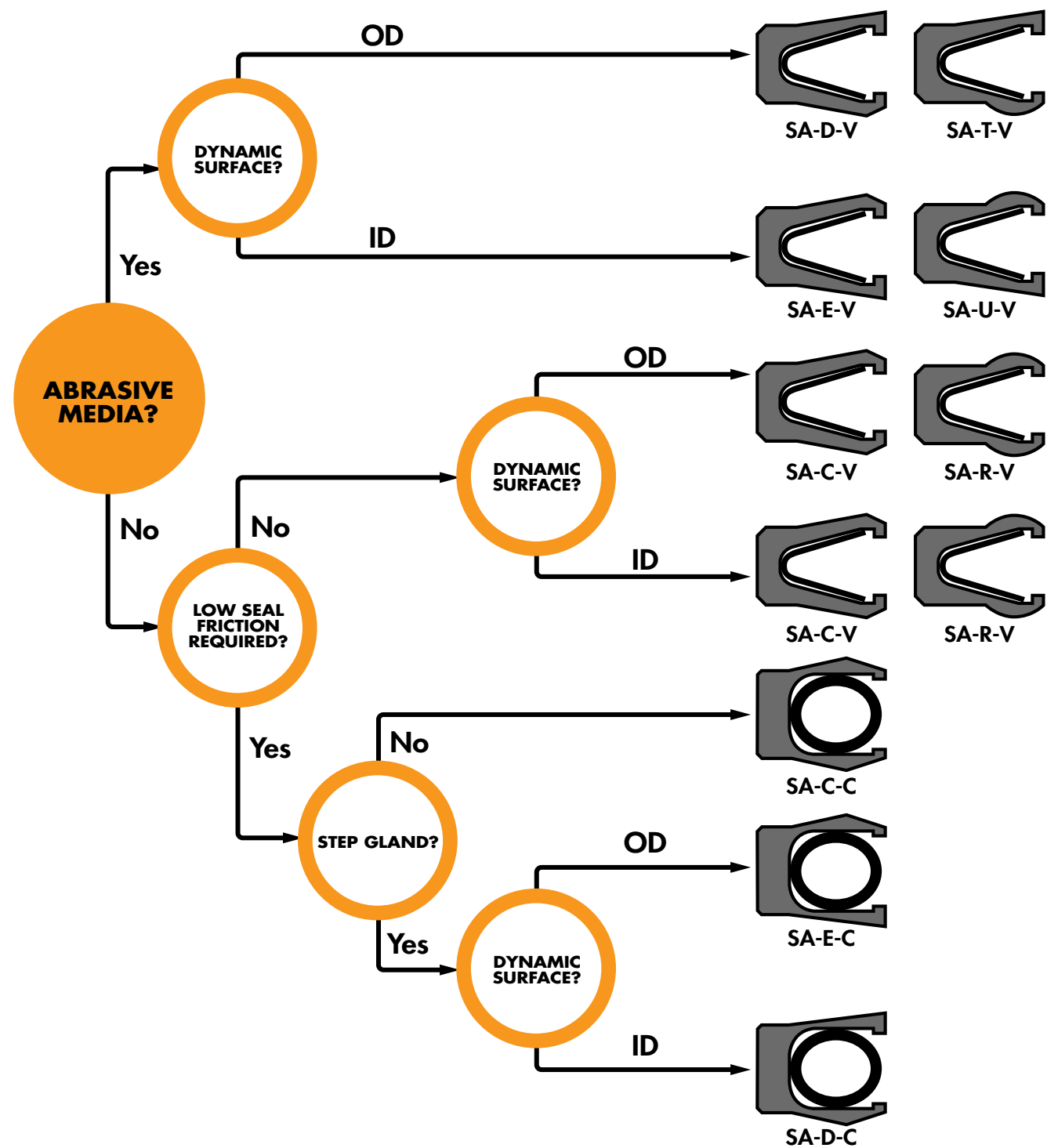
Decision Tree

This is a general guideline - several other parameters must be considered to optimize seal design. We highly recommend customers test application condition before releasing for production.



* Contact Black Hawk Seals engineering for static or slow dynamic rod and piston applications with pressure over 10,000 PSI. For pressure over 3,000 PSI, the extended heel option is recommended.

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10 Gland Designs And Installations

	PISTON	ROD/SHAFT
Split Glands		
Solid Glands		
Step Glands		
Face Seal Gland		

Preferred/Recommended Design

- No seal stretch
- No damage to hardware when seal is replaced
- No need for installation tool

Non-recommended Design

- For new design and Chemflex seal substitutions, see chart X for min. seal dimensions required and installation technique
- Step gland has small ledge
- To retain seal, see chart xx for recommended step/ledge heights
- Face seal gland full gland wall
- Not needed on pressure side of seal

* Contact Black Hawk Seals engineering for static or slow dynamic rod and piston applications with pressure over 10,000 PSI. For pressure over 3,000 PSI, the extended heel option is recommended.

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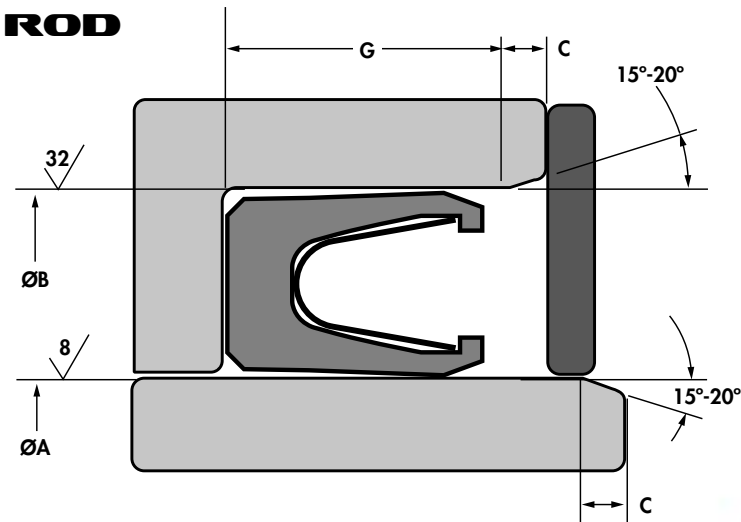
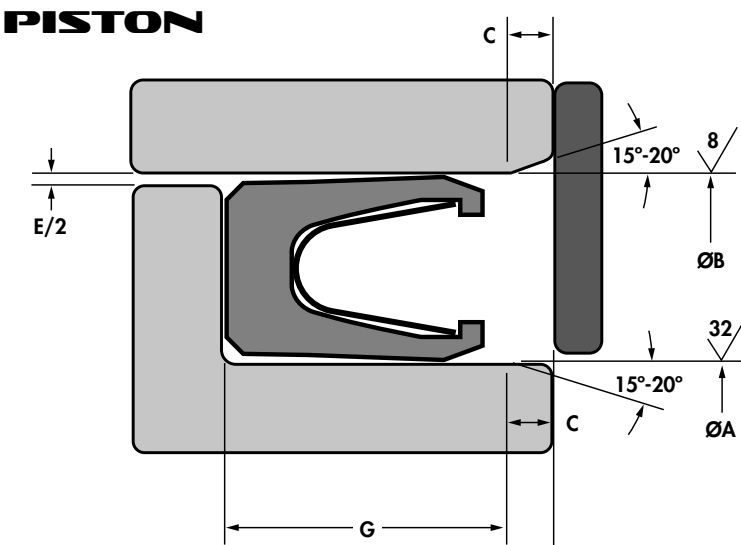
Heel First Installations

Due to the rigidity of Chemflex seals in comparison to elastomer O-rings and U-cups, damage and stretching can occur when they are compressed beyond material limitations. To avoid these issues, we commend utilizing a two-piece split gland design. This allows for easy installation or removal of the seal without needing additional tools while also reducing the risk of damage.

Lead-in chamfers that are blended and very smooth are necessary to prevent damage to the seal during installation.

When installing the Chemflex seal with the heel or non-pressure side first, the lead-in chamfers may be smaller than when the seal goes in lips first. These seals are designed with a slight clearance at the heel. If lead-in chamfer angles cannot be made, a full polished radius may also be used. Both designs must be very smooth and free from sharp edges that can damage the seal.

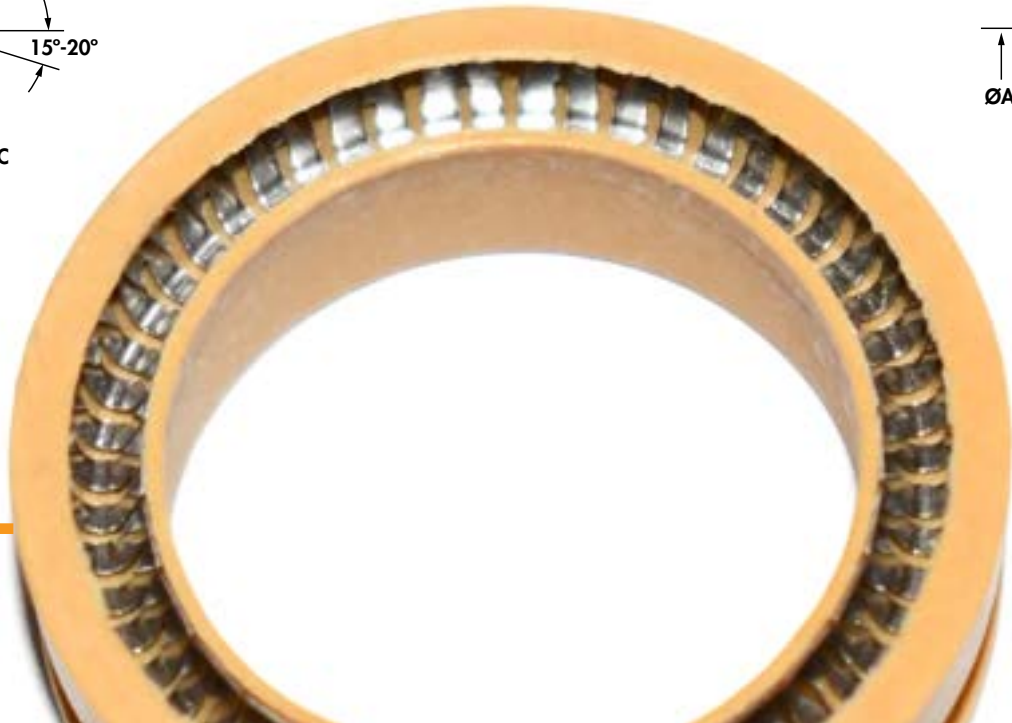
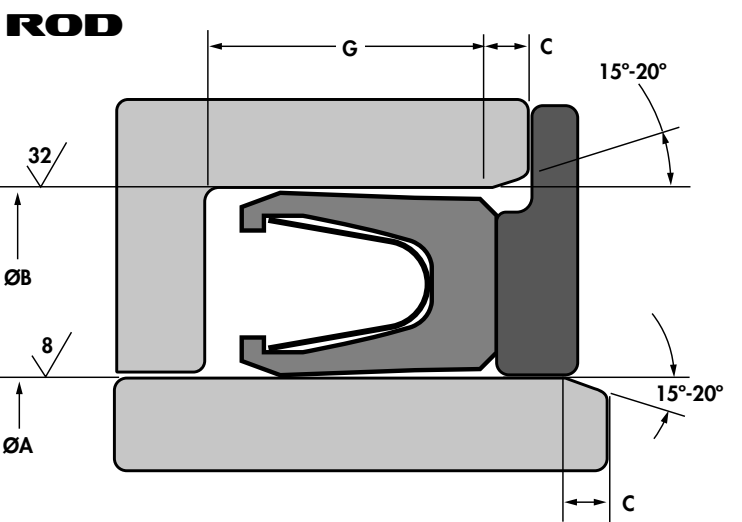
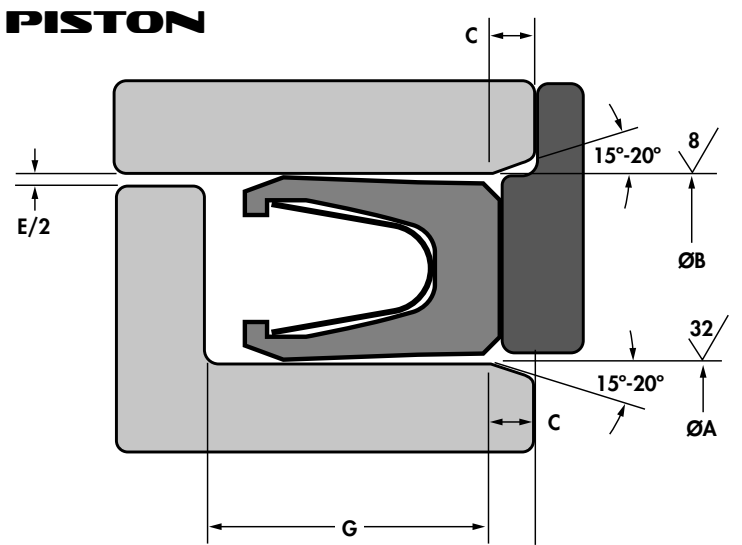
Cross-Section Size		C Min
Nominal	Cross Section	
1/16	062	0.020
3/32	093	0.030
1/8	125	0.030
3/16	187	0.040
1/4	250	0.050



Lip First Installations

When installing the Chemflex Seal with the lips or pressure-side first, the lead in chamfers need to be longer than when the seal goes in heel first. The Chemflex seal is designed with pre-load interference on the lips that requires additional clearance to prevent damage during installation.

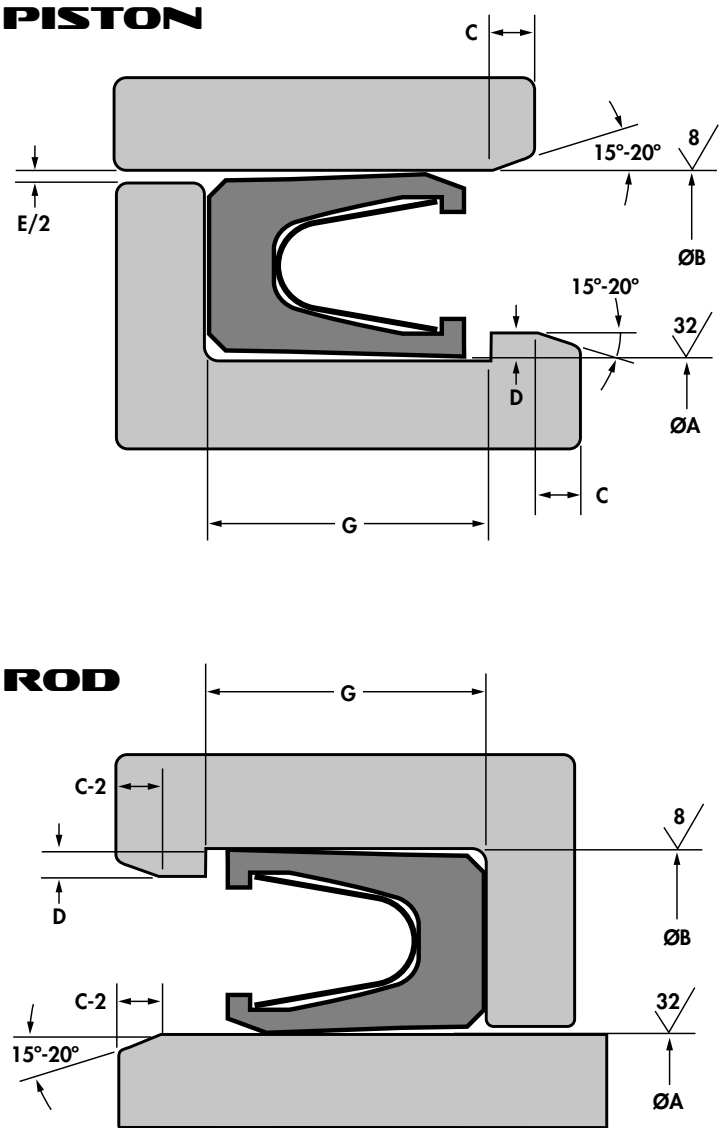
A stepped retention plate is required to provide a flat backed surface for the seal as well as prevent extrusion into the lead-in angles. All chamfers must be very smooth and free from sharp edges that can damage the seal. If the necessary angles and retention plate cannot be accomplished, installation tool will be required.



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Step Cut Gland Installations

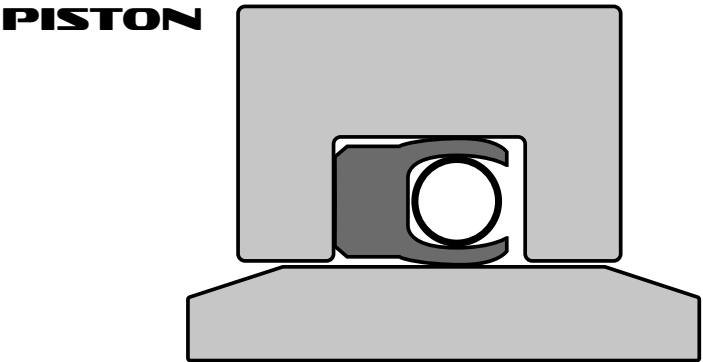
The step cut gland can only be used when the seal sees pressure from the open or spring side of the seal. This requires the seal to be installed heel or non-pressure side first, snapping the seal lips behind the retention step. After installing the seal into the groove, the assembly can be pushed into a piston bore, or over a rod.



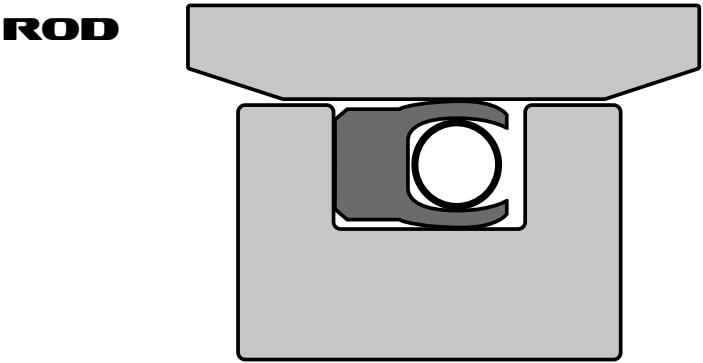
Cross-Section Size		C-1 Min	C-2 Min For:		D
Nominal	Cross Section		Heel Side	Lip Side	
1/16	062	0.035	0.020	0.050	0.007/0.010
3/32	093	0.050	0.030	0.070	0.010/0.015
1/8	125	0.065	0.030	0.090	0.015/0.020
3/16	187	0.080	0.040	0.110	0.020/0.025
1/4	250	0.095	0.050	0.140	0.025/0.030

Closed Glands

The least desirable gland design for the Chemflex seal is the closed gland design. The seal cross-section, diameter and material are all factors that determine whether the Chemflex seal can be stretched into a solid piston groove or compressed into a rod seal housing. Chemflex seals are more easily stretched into piston grooves than compressed into rod seal housings.



Piston Seal - Suitable for Close Groove				
Cross Section Size		Min Rod Diameter		
Nominal	Cross Section	V Series	C Series	H Series
1/16	062	1,500	1,000	1,000
3/32	093	2,000	1.250	1,250
1/8	125	2,750	2,000	2,000
3/16	187	4,750	3,000	3,000
1/4	250	6,000	4,500	4,500

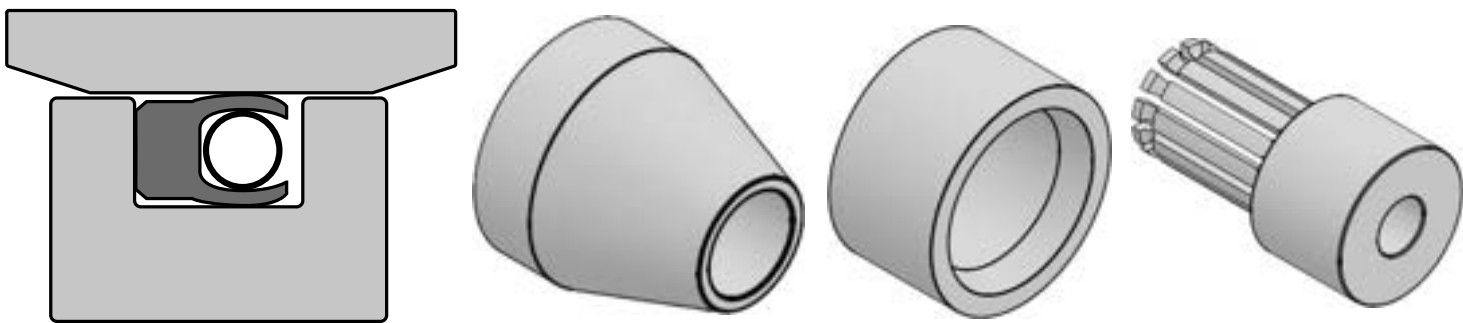


Rod Seal - Suitable for Close Groove				
Cross Section Size		Min Rod Diameter		
Nominal	Cross Section	V Series	C Series	H Series
1/16	062	1,500	1,000	1,000
3/32	093	2,000	1.250	1,250
1/8	125	2,750	2,000	2,000
3/16	187	4,750	3,000	3,000
1/4	250	6,000	4,500	4,500

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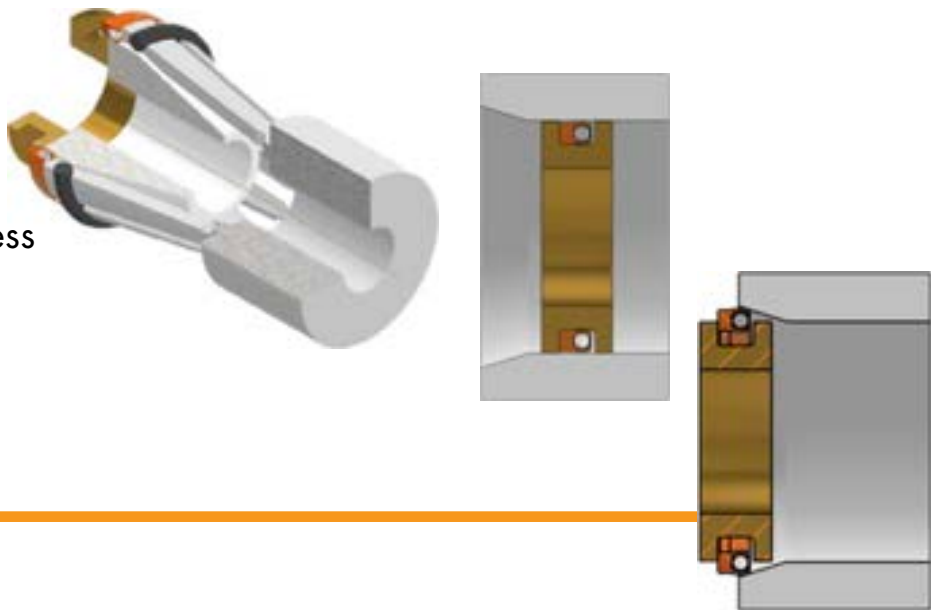
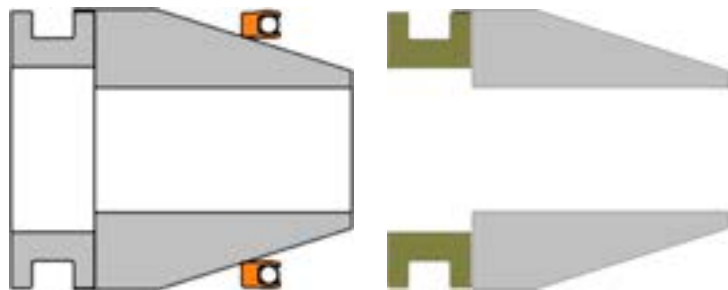
Installation – Piston Closed/Solid Gland

Loading cone, pusher and resizing tools are used to install the Chemflex seal. Contact application engineering for design specifications.



INSTALLATION STEPS:

- 1 Place loading cone flash with piston gland.
- 2 Preheat seal to 300°F to soften the Chemflex seal. This can be done by soaking the seal in hot oil, using hotplate or submerging in boiling water.
- 3 Push seal with pusher tool to piston groove.
- 4 Use resizing tool to compress seal to original diameter.



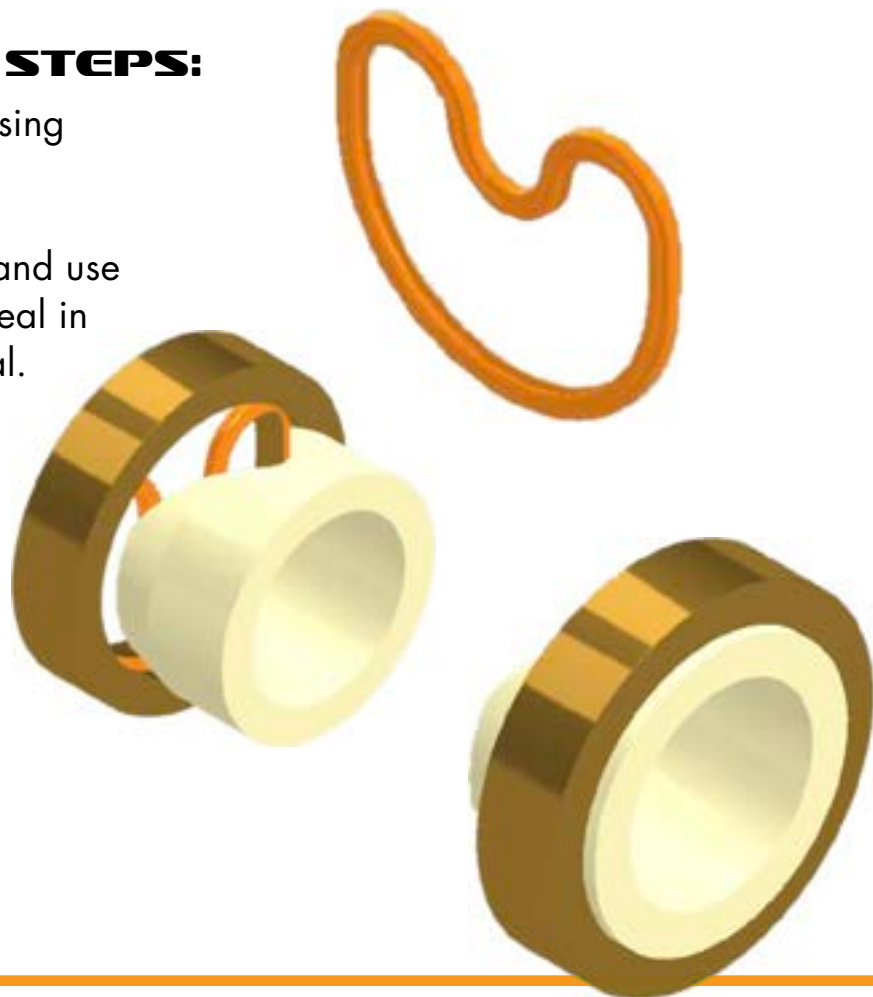
Installation – Rod Closed/Solid Gland

Loading cone, pusher and resizing tools are used to install the Chemflex seal. Contact application engineering for design specifications.



INSTALLATION STEPS:

- 1 Make pretzel shape using installation tool.
- 2 Install seal in groove and use resizing tool to flare seal in groove and resize seal.

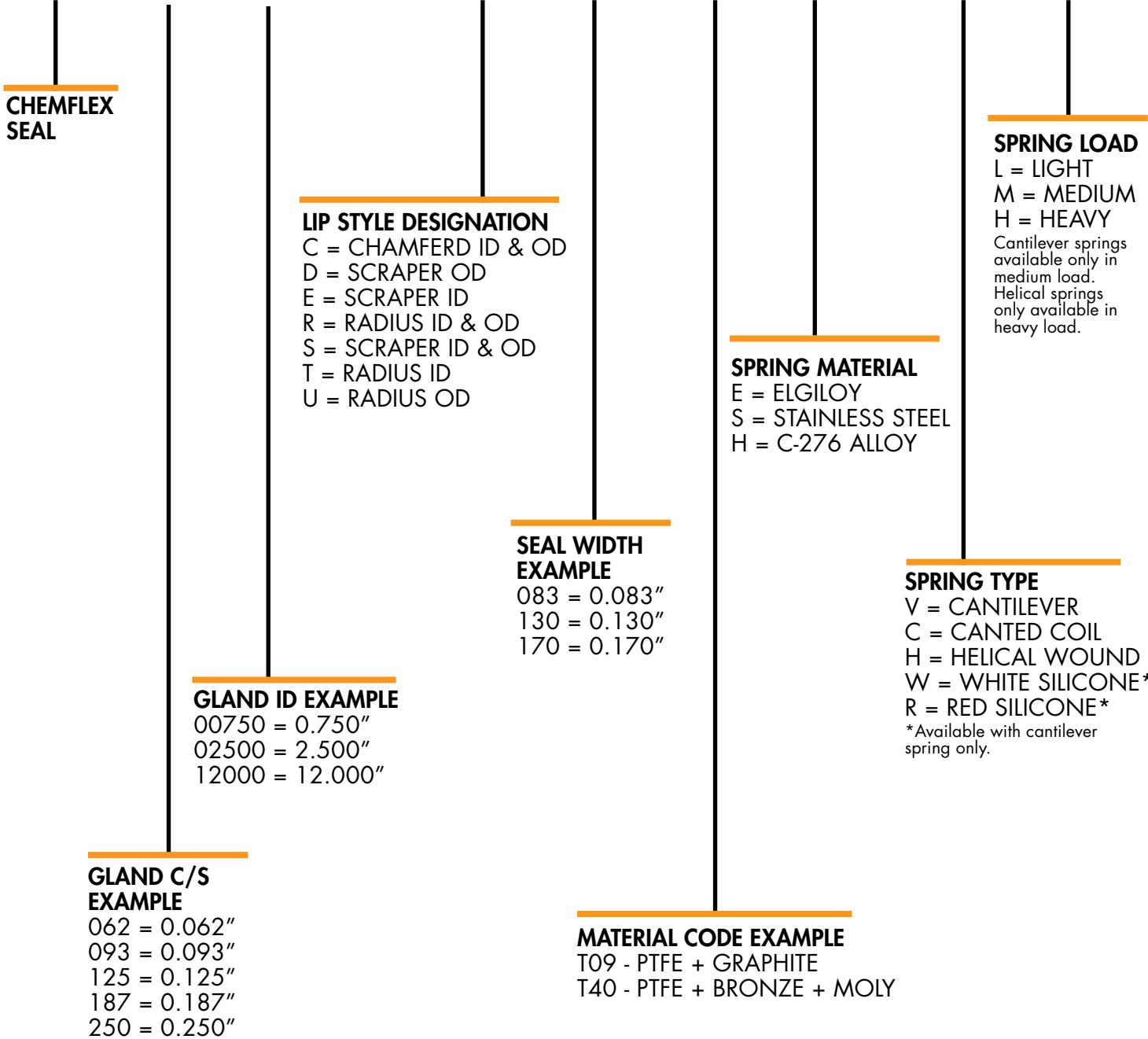


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Part Number Structure

SA-125-00750- S -170-T09-S - V - M



Dash #	A Rod or Groove Diameter	B Bore or Groove Diameter	Part No.
	+0.000/-0.001	+0.001/-0.000	
-006	0.125	0.250	SA-06200125XXX-TXXXX
-007	0.156	0.281	SA-06200156XXX-TXXXX
-008	0.187	0.312	SA-06200187XXX-TXXXX
-009	0.218	0.343	SA-06200218XXX-TXXXX
-010	0.250	0.375	SA-06200250XXX-TXXXX
-011	0.312	0.437	SA-06200312XXX-TXXXX
-012	0.375	0.500	SA-06200375XXX-TXXXX
-013	0.437	0.562	SA-06200437XXX-TXXXX
-014	0.500	0.625	SA-06200500XXX-TXXXX
-015	0.562	0.687	SA-06200562XXX-TXXXX
-016	0.625	0.750	SA-06200625XXX-TXXXX
-017	0.687	0.812	SA-06200687XXX-TXXXX
-018	0.750	0.875	SA-06200750XXX-TXXXX
-019	0.812	0.937	SA-06200812XXX-TXXXX
-020	0.875	1.000	SA-06200875XXX-TXXXX
-021	0.937	1.062	SA-06200937XXX-TXXXX
-022	1.000	1.125	SA-06201000XXX-TXXXX
-023	1.062	1.187	SA-06201062XXX-TXXXX
-024	1.125	1.250	SA-06201125XXX-TXXXX
-025	1.187	1.312	SA-06201187XXX-TXXXX
-026	1.250	1.375	SA-06201250XXX-TXXXX
-027	1.312	1.437	SA-06201312XXX-TXXXX
-028	1.375	1.500	SA-06201375XXX-TXXXX
-029	1.500	1.625	SA-06201500XXX-TXXXX
-030	1.625	1.750	SA-06201625XXX-TXXXX
-031	1.750	1.875	SA-06201750XXX-TXXXX
-032	1.875	2.000	SA-06201875XXX-TXXXX
-033	2.000	2.125	SA-06202000XXX-TXXXX
-034	2.125	2.250	SA-06202125XXX-TXXXX

Dash #	A Rod or Groove Diameter	B Bore or Groove Diameter	Part No.
	+0.000/-0.001	+0.001/-0.000	
-035	2.250	2.375	SA-06202250XXX-TXXXX
-036	2.375	2.500	SA-06202375XXX-TXXXX
-037	2.500	2.625	SA-06202500XXX-TXXXX
-038	2.625	2.750	SA-06202625XXX-TXXXX
-039	2.750	2.875	SA-06202750XXX-TXXXX
-040	2.875	3.000	SA-06202875XXX-TXXXX
-041	3.000	3.125	SA-06203000XXX-TXXXX
-042	3.250	3.375	SA-06203250XXX-TXXXX
-043	3.500	3.625	SA-06203500XXX-TXXXX
-044	3.750	3.875	SA-06203750XXX-TXXXX
-045	4.000	4.125	SA-06204000XXX-TXXXX

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Dash #	A Rod or Groove Diameter	B Bore or Groove Diameter	Part No.
	+0.000/-0.001	+0.001/-0.000	
-106	0.187	0.375	SA-09300187XXXX-XXXXXX
-107	0.219	0.406	SA-09300219XXXX-XXXXXX
-108	0.250	0.437	SA-09300250XXXX-XXXXXX
-109	0.312	0.500	SA-09300312XXXX-XXXXXX
-110	0.375	0.562	SA-09300375XXXX-XXXXXX
-111	0.437	0.625	SA-09300437XXXX-XXXXXX
-112	0.500	0.687	SA-09300500XXXX-XXXXXX
-113	0.562	0.750	SA-09300562XXXX-XXXXXX
-114	0.625	0.812	SA-09300625XXXX-XXXXXX
-115	0.687	0.875	SA-09300687XXXX-XXXXXX
-116	0.750	0.937	SA-09300750XXXX-XXXXXX
-117	0.812	1.000	SA-09300812XXXX-XXXXXX
-118	0.875	1.062	SA-09300875XXXX-XXXXXX
-119	0.937	1.125	SA-09300937XXXX-XXXXXX
-120	1.000	1.187	SA-09301000XXXX-XXXXXX
-121	1.062	1.250	SA-09301062XXXX-XXXXXX
-122	1.125	1.312	SA-09301125XXXX-XXXXXX
-123	1.187	1.375	SA-09301187XXXX-XXXXXX
-124	1.250	1.437	SA-09301250XXXX-XXXXXX
-125	1.312	1.500	SA-09301312XXXX-XXXXXX
-126	1.375	1.562	SA-09301375XXXX-XXXXXX
-127	1.437	1.625	SA-09301437XXXX-XXXXXX
-128	1.500	1.687	SA-09301500XXXX-XXXXXX
-129	1.562	1.750	SA-09301562XXXX-XXXXXX
-130	1.625	1.812	SA-09301625XXXX-XXXXXX

Dash #	A Rod or Groove Diameter	B Bore or Groove Diameter	Part No.
	+0.000/-0.002	+0.002/-0.000	
-131	1.687	1.875	SA-09301687XXXX-XXXXXX
-132	1.750	1.937	SA-09301750XXXX-XXXXXX
-133	1.812	2.000	SA-09301812XXXX-XXXXXX
-134	1.875	2.062	SA-09301875XXXX-XXXXXX
-135	1.937	2.125	SA-09301937XXXX-XXXXXX
-136	2.000	2.187	SA-09302000XXXX-XXXXXX
-137	2.062	2.250	SA-09302062XXXX-XXXXXX
-138	2.125	2.312	SA-09302125XXXX-XXXXXX
-139	2.187	2.375	SA-09302187XXXX-XXXXXX
-140	2.250	2.437	SA-09302250XXXX-XXXXXX
-141	2.312	2.500	SA-09302312XXXX-XXXXXX
-142	2.375	2.562	SA-09302375XXXX-XXXXXX
-143	2.437	2.625	SA-09302437XXXX-XXXXXX
-144	2.500	2.687	SA-09302500XXXX-XXXXXX
-145	2.562	2.750	SA-09302562XXXX-XXXXXX
-146	2.625	2.812	SA-09302625XXXX-XXXXXX
-147	2.687	2.875	SA-09302687XXXX-XXXXXX
-148	2.750	2.937	SA-09302750XXXX-XXXXXX
-149	2.812	3.000	SA-09302812XXXX-XXXXXX
-150	2.875	3.062	SA-09302875XXXX-XXXXXX
-151	3.000	3.187	SA-09303000XXXX-XXXXXX
-152	3.250	3.437	SA-09303250XXXX-XXXXXX
-153	3.500	3.687	SA-09303500XXXX-XXXXXX
-154	3.750	3.937	SA-09303750XXXX-XXXXXX
-155	4.000	4.187	SA-09304000XXXX-XXXXXX
-156	4.250	4.437	SA-09304250XXXX-XXXXXX
-157	4.500	4.687	SA-09304500XXXX-XXXXXX
-158	4.750	4.937	SA-09304750XXXX-XXXXXX
-159	5.000	5.187	SA-09305000XXXX-XXXXXX
-160	5.250	5.437	SA-09305250XXXX-XXXXXX
-161	5.500	5.687	SA-09305500XXXX-XXXXXX
-162	5.750	5.937	SA-09305750XXXX-XXXXXX
-163	6.000	6.187	SA-09306000XXXX-XXXXXX

Dash #	A Rod or Groove Diameter	B Bore or Groove Diameter	Part No.
	+0.000/-0.001	+0.001/-0.000	
-202	0.250	0.500	SA-12500250XXXX-TXXXXX
-203	0.312	0.562	SA-12500312XXXX-TXXXXX
-204	0.375	0.625	SA-12500375XXXX-TXXXXX
-205	0.437	0.687	SA-12500437XXXX-TXXXXX
-206	0.500	0.750	SA-12500500XXXX-TXXXXX
-207	0.562	0.812	SA-12500562XXXX-TXXXXX
-208	0.625	0.875	SA-12500625XXXX-TXXXXX
-209	0.687	0.937	SA-12500687XXXX-TXXXXX
-210	0.750	1.000	SA-12500750XXXX-TXXXXX
-211	0.812	1.062	SA-12500812XXXX-TXXXXX
-212	0.875	1.125	SA-12500875XXXX-TXXXXX
-213	0.937	1.187	SA-12500937XXXX-TXXXXX
-214	1.000	1.250	SA-12501000XXXX-TXXXXX
-215	1.062	1.312	SA-12501062XXXX-TXXXXX
-216	1.125	1.375	SA-12501125XXXX-TXXXXX
-217	1.187	1.437	SA-12501187XXXX-TXXXXX
-218	1.250	1.500	SA-12501250XXXX-TXXXXX
-219	1.312	1.562	SA-12501312XXXX-TXXXXX
-220	1.375	1.625	SA-12501375XXXX-TXXXXX
-221	1.437	1.687	SA-12501437XXXX-TXXXXX
-222	1.500	1.750	SA-12501500XXXX-TXXXXX
-223	1.625	1.875	SA-12501625XXXX-TXXXXX
-224	1.750	2.000	SA-12501750XXXX-TXXXXX
-225	1.875	2.125	SA-12501875XXXX-TXXXXX
-226	2.000	2.250	SA-12502000XXXX-TXXXXX
-227	2.125	2.375	SA-12502125XXXX-TXXXXX
-228	2.250	2.500	SA-12502250XXXX-TXXXXX
-229	2.375	2.625	SA-12502375XXXX-TXXXXX
-230	2.500	2.750	SA-12502500XXXX-TXXXXX
-231	2.625	2.875	SA-12502625XXXX-TXXXXX
-232	2.750	3.000	SA-12502750XXXX-TXXXXX
-233	2.875	3.125	SA-12502875XXXX-TXXXXX
-234	3.000	3.250	SA-12503000XXXX-TXXXXX
-235	3.125	3.375	SA-12503125XXXX-TXXXXX
-236	3.250	3.500	SA-12503250XXXX-TXXXXX
-237	3.375	3.625	SA-12503375XXXX-TXXXXX

Dash #	A Rod or Groove Diameter	B Bore or Groove Diameter	Part No.
	+0.000/-0.001	+0.001/-0.000	
-238	3.500	3.750	SA-12503500XXXX-TXXXXX
-239	3.625	3.875	SA-12503625XXXX-TXXXXX
-240	3.750	4.000	SA-12503750XXXX-TXXXXX
-241	3.875	4.125	SA-12503875XXXX-TXXXXX
-242	4.000	4.250	SA-12504000XXXX-TXXXXX
-243	4.125	4.375	SA-12504125XXXX-TXXXXX
-244	4.250	4.500	SA-12504250XXXX-TXXXXX
-245	4.375	4.625	SA-12504375XXXX-TXXXXX
-246	4.500	4.750	SA-12504500XXXX-TXXXXX
-247	4.625	4.875	SA-12504625XXXX-TXXXXX
-248	4.750	5.000	SA-12504750XXXX-TXXXXX
-249	4.875	5.125	SA-12504875XXXX-TXXXXX
-250	5.000	5.250	SA-12505000XXXX-TXXXXX
-251	5.125	5.375	SA-12505125XXXX-TXXXXX
-252	5.250	5.500	SA-12505250XXXX-TXXXXX
-253	5.375	5.625	SA-12505375XXXX-TXXXXX
-254	5.500	5.750	SA-12505500XXXX-TXXXXX
-255	5.625	5.875	SA-12505625XXXX-TXXXXX
-256	5.750	6.000	SA-12505750XXXX-TXXXXX
-257	5.875	6.125	SA-12505875XXXX-TXXXXX
-258	6.000	6.250	SA-12506000XXXX-TXXXXX
-259	6.250	6.500	SA-12506250XXXX-TXXXXX
-260	6.500	6.750	SA-12506500XXXX-TXXXXX
-261	6.750	7.000	SA-12506750XXXX-TXXXXX
-262	7.000	7.250	SA-12507000XXXX-TXXXXX
-263	7.250	7.500	SA-12507250XXXX-TXXXXX
-264	7.500	7.750	SA-12507500XXXX-TXXXXX
-265	7.750	8.000	SA-12507750XXXX-TXXXXX

CHEMFLEX

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Dash #	A Rod or Groove Diameter	B Bore or Groove Diameter	Part No.
	+0.000/-0.002	+0.002/-0.000	
-266	8.000	8.250	SA-12508000XXXX-TXXXXX
-267	8.250	8.500	SA-12508250XXXX-TXXXXX
-268	8.500	8.750	SA-12508500XXXX-TXXXXX
-269	8.750	9.000	SA-12508750XXXX-TXXXXX
-270	9.000	9.250	SA-12509000XXXX-TXXXXX
-271	9.250	9.500	SA-12509250XXXX-TXXXXX
-272	9.500	9.750	SA-12509500XXXX-TXXXXX
-273	9.750	10.000	SA-12509750XXXX-TXXXXX
-274	10.000	10.250	SA-12510000XXXX-TXXXXX
-275	10.500	10.750	SA-12510500XXXX-TXXXXX
-276	11.000	11.250	SA-12511000XXXX-TXXXXX
-277	11.500	11.750	SA-12511500XXXX-TXXXXX
-278	12.000	12.250	SA-12512000XXXX-TXXXXX
-279	12.500	12.750	SA-12512500XXXX-TXXXXX
-280	13.000	13.250	SA-12513000XXXX-TXXXXX
-281	13.500	13.750	SA-12513500XXXX-TXXXXX

Dash #	A Rod or Groove Diameter	B Bore or Groove Diameter	Part No.
	+0.000/-0.002	+0.002/-0.000	
-310	0.500	0.875	SA-18700500XXXX-TXXXXX
-311	0.562	0.937	SA-18700562XXXX-TXXXXX
-312	0.625	1.000	SA-18700625XXXX-TXXXXX
-313	0.687	1.062	SA-18700687XXXX-TXXXXX
-314	0.750	1.125	SA-18700750XXXX-TXXXXX
-315	0.812	1.187	SA-18700812XXXX-TXXXXX
-316	0.875	1.250	SA-18700875XXXX-TXXXXX
-317	0.937	1.312	SA-18700937XXXX-TXXXXX
-318	1.000	1.375	SA-18701000XXXX-TXXXXX
-319	1.062	1.437	SA-18701062XXXX-TXXXXX
-320	1.125	1.500	SA-18701125XXXX-TXXXXX
-321	1.187	1.562	SA-18701187XXXX-TXXXXX
-322	1.250	1.625	SA-18701250XXXX-TXXXXX
-323	1.312	1.687	SA-18701312XXXX-TXXXXX
-324	1.375	1.750	SA-18701375XXXX-TXXXXX
-325	1.500	1.875	SA-18701500XXXX-TXXXXX
-326	1.625	2.000	SA-18701625XXXX-TXXXXX
-327	1.750	2.125	SA-18701750XXXX-TXXXXX
-328	1.875	2.250	SA-18701875XXXX-TXXXXX
-329	2.000	2.375	SA-18702000XXXX-TXXXXX
-330	2.125	2.500	SA-18702125XXXX-TXXXXX
-331	2.250	2.625	SA-18702250XXXX-TXXXXX
-332	2.375	2.750	SA-18702375XXXX-TXXXXX
-333	2.500	2.875	SA-18702500XXXX-TXXXXX
-334	2.625	3.000	SA-18702625XXXX-TXXXXX
-335	2.750	3.125	SA-18702750XXXX-TXXXXX
-336	2.875	3.250	SA-18702875XXXX-TXXXXX
-337	3.000	3.375	SA-18703000XXXX-TXXXXX
-338	3.125	3.500	SA-18703125XXXX-TXXXXX
-339	3.250	3.625	SA-18703250XXXX-TXXXXX
-340	3.375	3.750	SA-18703375XXXX-TXXXXX
-341	3.500	3.875	SA-18703500XXXX-TXXXXX
-342	3.625	4.000	SA-18703625XXXX-TXXXXX
-343	3.750	4.125	SA-18703750XXXX-TXXXXX
-344	3.875	4.250	SA-18703875XXXX-TXXXXX
-345	4.000	4.375	SA-18704000XXXX-TXXXXX

Dash #	A Rod or Groove Diameter	B Bore or Groove Diameter	Part No.
	+0.000/-0.002	+0.002/-0.000	
-346	4.125	4.500	SA-18704125XXXX-TXXXXX
-347	4.250	4.625	SA-18704250XXXX-TXXXXX
-348	4.375	4.750	SA-18704375XXXX-TXXXXX
-349	4.500	4.875	SA-18704500XXXX-TXXXXX
-350	4.625	5.000	SA-18704625XXXX-TXXXXX
-351	4.750	5.125	SA-18704750XXXX-TXXXXX
-352	4.875	5.250	SA-18704875XXXX-TXXXXX
-353	5.000	5.375	SA-18705000XXXX-TXXXXX
-354	5.125	5.500	SA-18705125XXXX-TXXXXX
-355	5.250	5.625	SA-18705250XXXX-TXXXXX
-356	5.375	5.750	SA-18705375XXXX-TXXXXX
-357	5.500	5.875	SA-18705500XXXX-TXXXXX
-358	5.625	6.000	SA-18705625XXXX-TXXXXX
-359	5.750	6.125	SA-18705750XXXX-TXXXXX
-360	5.875	6.250	SA-18705875XXXX-TXXXXX
-361	6.000	6.375	SA-18706000XXXX-TXXXXX
-362	6.250	6.625	SA-18706250XXXX-TXXXXX
-363	6.500	6.875	SA-18706500XXXX-TXXXXX
-364	6.750	7.125	SA-18706750XXXX-TXXXXX
-365	7.000	7.375	SA-18707000XXXX-TXXXXX
-366	7.250	7.625	SA-18707250XXXX-TXXXXX
-367	7.500	7.875	SA-18707500XXXX-TXXXXX
-368	7.750	8.125	SA-18707750XXXX-TXXXXX
-369	8.000	8.375	SA-18708000XXXX-TXXXXX
-370	8.250	8.625	SA-18708250XXXX-TXXXXX
-371	8.500	8.875	SA-18708500XXXX-TXXXXX
-372	8.750	9.125	SA-18708750XXXX-TXXXXX
-373	9.000	9.375	SA-18709000XXXX-TXXXXX
-374	9.250	9.625	SA-18709250XXXX-TXXXXX
-375	9.500	9.875	SA-18709500XXXX-TXXXXX

Dash #	A Rod or Groove Diameter	B Bore or Groove Diameter	Part No.
	+0.000/-0.002	+0.002/-0.000	
-376	9.750	10.125	SA-18709750XXXX-TXXXXX
-377	10.000	10.375	SA-18710000XXXX-TXXXXX
-378	10.500	10.875	SA-18710500XXXX-TXXXXX
-379	11.000	11.375	SA-18711000XXXX-TXXXXX
-380	11.500	11.875	SA-18711500XXXX-TXXXXX
-381	12.000	12.375	SA-18712000XXXX-TXXXXX
-382	13.000	13.375	SA-18713000XXXX-TXXXXX
-383	14.000	14.375	SA-18714000XXXX-TXXXXX
-384	15.000	15.375	SA-18715000XXXX-TXXXXX
-385	16.000	16.375	SA-18716000XXXX-TXXXXX
-386	17.000	17.375	SA-18717000XXXX-TXXXXX
-387	18.000	18.375	SA-18718000XXXX-TXXXXX
-388	19.000	19.375	SA-18719000XXXX-TXXXXX
-389	20.000	20.375	SA-18720000XXXX-TXXXXX
-390	21.000	21.375	SA-18721000XXXX-TXXXXX
-391	22.000	22.375	SA-18722000XXXX-TXXXXX
-392	23.000	23.375	SA-18723000XXXX-TXXXXX
-393	24.000	24.375	SA-18724000XXXX-TXXXXX
-394	25.000	25.375	SA-18725000XXXX-TXXXXX

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SPRING ENERGIZED

Dash #	A Rod or Groove Diameter	B Bore or Groove Diameter	Part No.
	+0.000/-0.003	+0.003/-0.000	
-401	1.500	2.000	SA-25001500XXXX-TXXXXX
-402	1.625	2.125	SA-25001625XXXX-TXXXXX
-403	1.750	2.250	SA-25001750XXXX-TXXXXX
-404	1.875	2.375	SA-25001875XXXX-TXXXXX
-405	2.000	2.500	SA-25002000XXXX-TXXXXX
-406	2.125	2.625	SA-25002125XXXX-TXXXXX
-407	2.250	2.750	SA-25002250XXXX-TXXXXX
-408	2.375	2.875	SA-25002375XXXX-TXXXXX
-409	2.500	3.000	SA-25002500XXXX-TXXXXX
-410	2.625	3.125	SA-25002625XXXX-TXXXXX
-411	2.750	3.250	SA-25002750XXXX-TXXXXX
-412	2.875	3.375	SA-25002875XXXX-TXXXXX
-413	3.000	3.500	SA-25003000XXXX-TXXXXX
-414	3.125	3.625	SA-25003125XXXX-TXXXXX
-415	3.250	3.750	SA-25003250XXXX-TXXXXX
-416	3.375	3.875	SA-25003375XXXX-TXXXXX
-417	3.500	4.000	SA-25003500XXXX-TXXXXX
-418	3.625	4.125	SA-25003625XXXX-TXXXXX
-419	3.750	4.250	SA-25003750XXXX-TXXXXX
-420	3.875	4.375	SA-25003875XXXX-TXXXXX
-421	4.000	4.500	SA-25004000XXXX-TXXXXX
-422	4.125	4.625	SA-25004125XXXX-TXXXXX
-423	4.250	4.750	SA-25004250XXXX-TXXXXX
-424	4.375	4.875	SA-25004375XXXX-TXXXXX
-425	4.500	5.000	SA-25004500XXXX-TXXXXX
-426	4.625	5.125	SA-25004625XXXX-TXXXXX
-427	4.750	5.250	SA-25004750XXXX-TXXXXX
-428	4.875	5.375	SA-25004875XXXX-TXXXXX
-429	5.000	5.500	SA-25005000XXXX-TXXXXX
-430	5.125	5.625	SA-25005125XXXX-TXXXXX
-431	5.250	5.750	SA-25005250XXXX-TXXXXX
-432	5.375	5.875	SA-25005375XXXX-TXXXXX
-433	5.500	6.000	SA-25005500XXXX-TXXXXX
-434	5.625	6.125	SA-25005625XXXX-TXXXXX
-435	5.750	6.250	SA-25005750XXXX-TXXXXX
-436	5.875	6.375	SA-25005875XXXX-TXXXXX
-437	6.000	6.500	SA-25006000XXXX-TXXXXX
-438	6.250	6.750	SA-25006250XXXX-TXXXXX

Dash #	A Rod or Groove Diameter	B Bore or Groove Diameter	Part No.
	+0.000/-0.003	+0.003/-0.000	
-439	6.500	7.000	SA-25006500XXXX-TXXXXX
-440	6.750	7.250	SA-25006750XXXX-TXXXXX
-441	7.000	7.500	SA-25007000XXXX-TXXXXX
-442	7.250	7.750	SA-25007250XXXX-TXXXXX
-443	7.500	8.000	SA-25007500XXXX-TXXXXX
-444	7.750	8.250	SA-25007750XXXX-TXXXXX
-445	8.000	8.500	SA-25008000XXXX-TXXXXX
-446	8.500	9.000	SA-25008500XXXX-TXXXXX
-447	9.000	9.500	SA-25009000XXXX-TXXXXX
-448	9.500	10.000	SA-25009500XXXX-TXXXXX
-449	10.000	10.500	SA-25010000XXXX-TXXXXX
-450	10.500	11.000	SA-25010500XXXX-TXXXXX
-451	11.000	11.500	SA-25011000XXXX-TXXXXX
-452	11.500	12.000	SA-25011500XXXX-TXXXXX
-453	12.000	12.500	SA-25012000XXXX-TXXXXX
-454	12.500	13.000	SA-25012500XXXX-TXXXXX
-455	13.000	13.500	SA-25013000XXXX-TXXXXX
-456	13.500	14.000	SA-25013500XXXX-TXXXXX
-457	14.000	14.500	SA-25014000XXXX-TXXXXX
-458	14.500	15.000	SA-25014500XXXX-TXXXXX
-459	15.000	15.500	SA-25015000XXXX-TXXXXX
-460	15.500	16.000	SA-25015500XXXX-TXXXXX
-461	16.000	16.500	SA-25016000XXXX-TXXXXX
-462	16.500	17.000	SA-25016500XXXX-TXXXXX
-463	17.000	17.500	SA-25017000XXXX-TXXXXX
-464	17.500	18.000	SA-25017500XXXX-TXXXXX
-465	18.000	18.500	SA-25018000XXXX-TXXXXX
-466	18.500	19.000	SA-25018500XXXX-TXXXXX
-467	19.000	19.500	SA-25019000XXXX-TXXXXX
-468	19.500	20.000	SA-25019500XXXX-TXXXXX
-469	20.000	20.500	SA-25020000XXXX-TXXXXX
-470	21.000	21.500	SA-25021000XXXX-TXXXXX
-471	22.000	22.500	SA-25022000XXXX-TXXXXX
-472	23.000	23.500	SA-25023000XXXX-TXXXXX
-473	24.000	24.500	SA-25024000XXXX-TXXXXX
-474	25.000	25.500	SA-25025000XXXX-TXXXXX
-475	26.000	26.500	SA-25026000XXXX-TXXXXX

CHEMFLEX CASE

Rotary PTFE Lip Seals

The **Chemflex Case Seal** is a rotary lip seal design featuring a metal case and Tylon PTFE seal. Case Seals are recommended where operating conditions exceed the capabilities of typical elastomer radial oil seals. **Chemflex Case Seal** critical operating conditions include shaft speed, pressure, and temperature. The design of the Chemflex Case Seal provides excellent leakage protection and external contamination exclusion in highly demanding applications.

The assembly features a metal case press-fit into the bore which provides static OD sealing and anti-rotation. Dynamic sealing functions are performed by the Tylon PTFE seal lip and exclusion lips that yield low break-out torque and low running friction. Static gaskets fixed between seal components prevent leakage through the seal assembly.

Tylon seal lip of the **Chemflex Case Seal** allows for stick-slip free operation, effectively reducing heat generation and allowing surface speeds of up to 10,000 sfpm (50 m/s). The Black Hawk line of **Chemflex Case Seals** provides high-performance sealing in challenging applications offered at a competitive price.

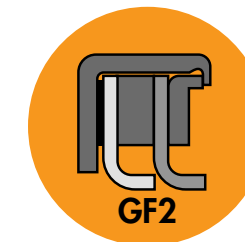
SEALS

Features

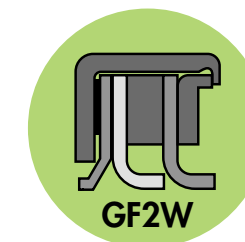
- Low friction and breakaway torque
- Surface speed up to 10,000 feet per minute
- Wide temperature range -65° F to 450° F [-53° C to 232° C]
- Pressure up to 500 psi [35 Bar]
- Chemical resistance
- Large diameter capability
- Custom profile design capability to meet aggressive application requirements.
- Cost competitive
- No tooling charge



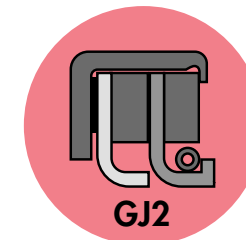
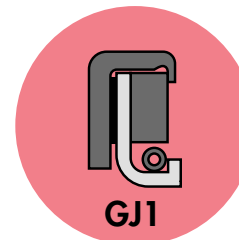
LIP SEAL



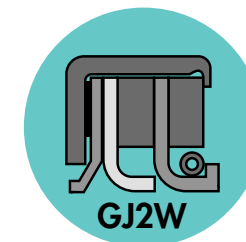
LIP SEAL + WIPER



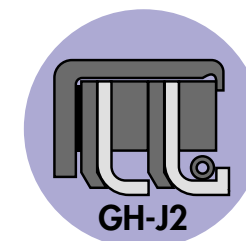
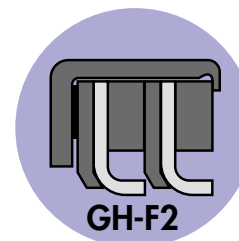
LIP SEAL + GARTER SPRING



LIP SEAL + WIPER + GARTER SPRING

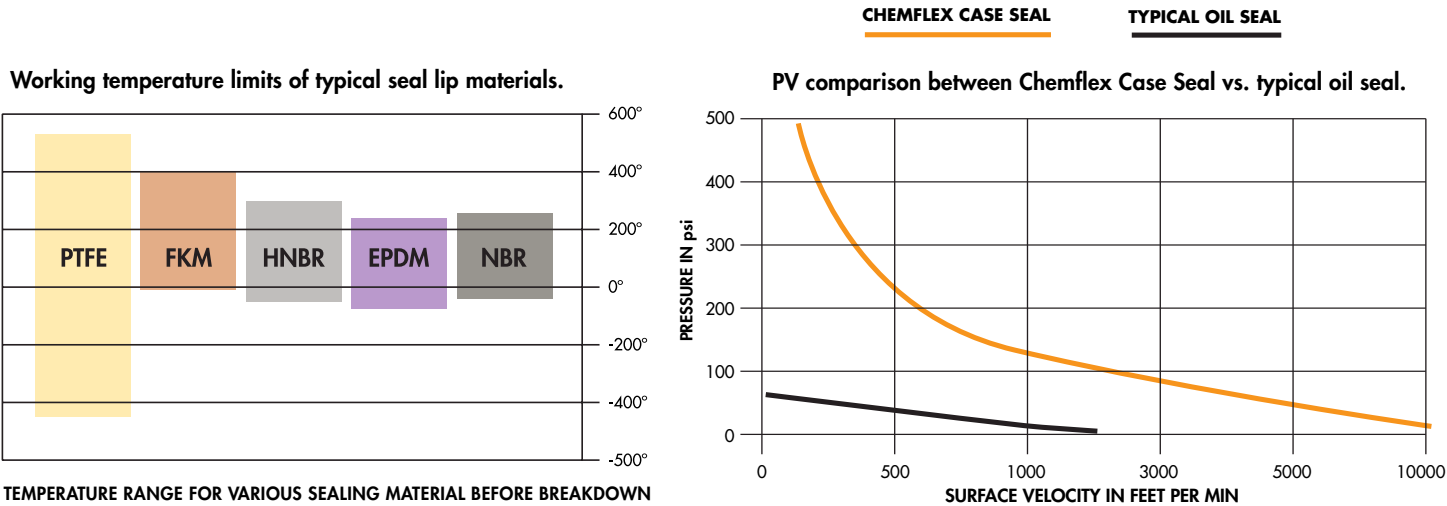


HIGH PRESSURE LIP SEAL



CHEMFLEX CASE SEALS

Rotary PTFE Lip Seals



Tylon	Compound/Advantage	Color	Case Materials	Gasket	Spring Material
T09	Graphite, Low Friction	Black	Stainless Steel	NBR	Stainless Steel
T10	Carbon Fiber, Excellent Wear & Extrusion Resistance	Black	Aluminum	FKM	
T20	Glass/MoS ₂ , High Wear Resistance	Black	Cold Roll Steel	EPDM	
T35	Polyimide, FDA Compliant, Great on Soft Mating Surfaces	Tan	Zinc Plated Cold Roll Steel	Durlon®	
T91	Mineral, FDA Compliant, Low Abrasion	White			

*Additional PTFE Compounds Available

Hydrodynamic sealing lip design options are available, contact Black Hawk Seals engineering for details.

TYPICAL APPLICATIONS

- Motor
 - Gearboxes
 - Pumps
- Compressors
 - Valve
 - Extruders
- Spindles
 - Mixers
 - Cryogenics

Chemflex Case Seals vs Other Seals



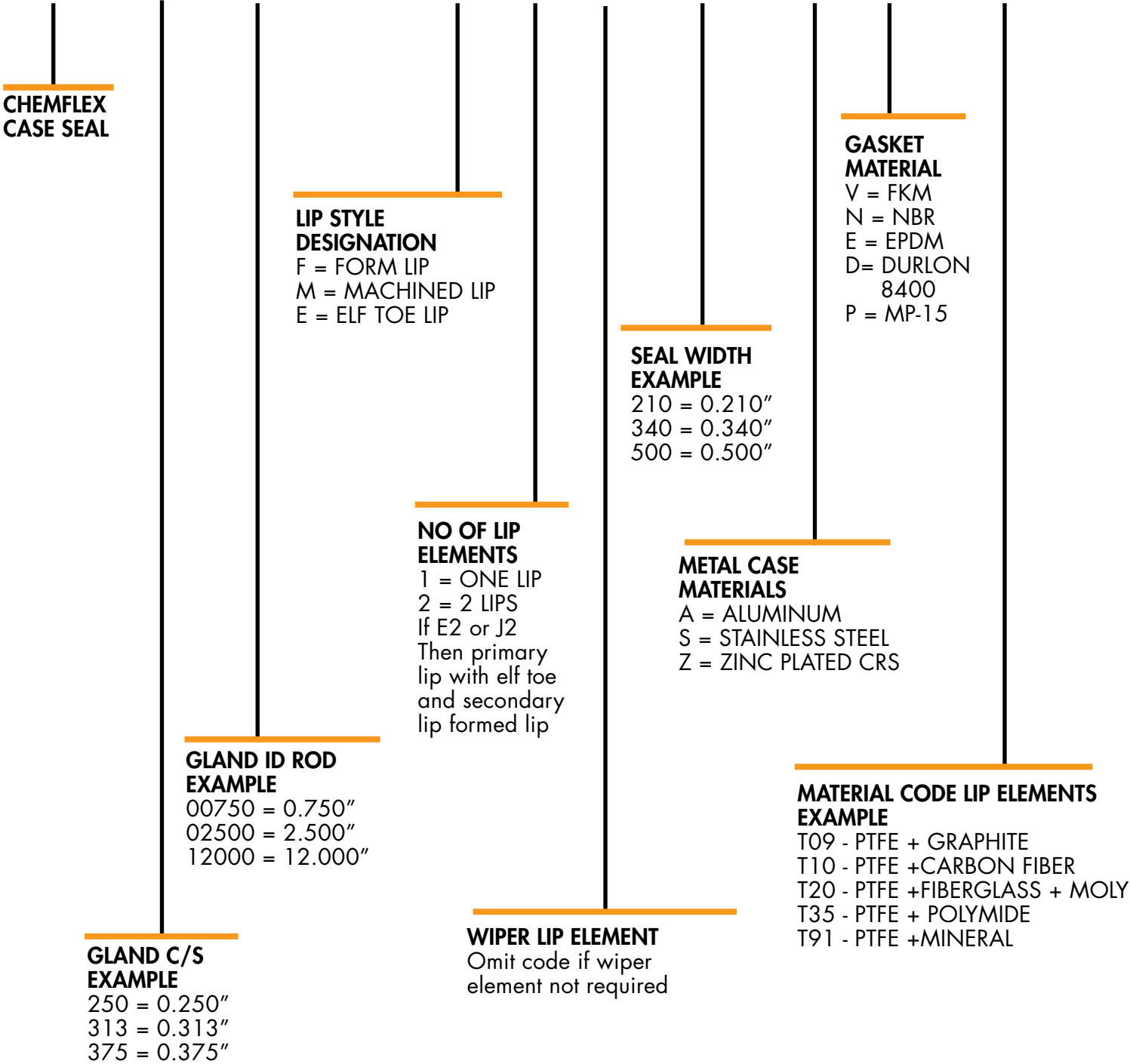
SEAL TYPE COMPARISON TABLE

Seal Type	Application	Cost
Rubber	Abrasive environments, low temperatures, weather exposure, and water contact	\$
Rubber Bonded to Metal	Same environments as basic rubber applications, with added support from metal backing	\$\$
Elastomer (w/spring)	Applications requiring chemical and flame resistance along with pressure sealing via spring	\$\$
Chemflex Case (w/o spring)	Harsh environments with chemicals, abrasion, and exposure to multiple elements (low temp, oil, water, chemical, heat, flame, weather)	\$\$\$
Chemflex Case (w/ spring)	Demanding applications needing both chemical/fluid resistance and strong shaft sealing via spring support	\$\$\$\$
Mechanical	Situations without lubrication and needing a more robust mechanical sealing solution	\$\$\$\$\$
Custom Mechanical Design	Non-lubricated environments requiring specialized performance	\$\$\$\$\$\$

CHEMFLEX CASE SEALS

Part Number Structure

GC-250-00750- F -1-W-170- S -V - T09



CHEMFLEX

CASE SEALS

Dash #	B Max Gland ID	A Gland OD	Part no.
-112	0.405	0.687	FC-09300687130-TXXXXX
-113	0.468	0.750	FC-09300750130-TXXXXX
-114	0.530	0.812	FC-09300812130-TXXXXX
-115	0.593	0.875	FC-09300875130-TXXXXX
-116	0.655	0.937	FC-09300937130-TXXXXX
-117	0.718	1.000	FC-09301000130-TXXXXX
-118	0.780	1.062	FC-09301062130-TXXXXX
-119	0.843	1.125	FC-09301125130-TXXXXX
-120	0.905	1.187	FC-09301187130-TXXXXX
-121	0.968	1.250	FC-09301250130-TXXXXX
-122	1.030	1.312	FC-09301312130-TXXXXX
-123	1.093	1.375	FC-09301375130-TXXXXX
-124	1.155	1.437	FC-09301437130-TXXXXX
-125	1.218	1.500	FC-09301500130-TXXXXX
-126	1.280	1.562	FC-09301562130-TXXXXX
-127	1.343	1.625	FC-09301625130-TXXXXX
-128	1.405	1.687	FC-09301687130-TXXXXX
-129	1.468	1.750	FC-09301750130-TXXXXX
-130	1.530	1.812	FC-09301812130-TXXXXX
-131	1.593	1.875	FC-09301875130-TXXXXX
-132	1.655	1.937	FC-09301937130-TXXXXX
-133	1.718	2.000	FC-09302000130-TXXXXX
-134	1.780	2.062	FC-09302062130-TXXXXX

Dash #	B Max Gland ID	A Gland OD	Part no.
-135	1.843	2.125	FC-09302125130-TXXXXX
-136	1.905	2.187	FC-09302187130-TXXXXX
-137	1.968	2.250	FC-09302250130-TXXXXX
-138	2.030	2.312	FC-09302312130-TXXXXX
-139	2.093	2.375	FC-09302375130-TXXXXX
-140	2.155	2.437	FC-09302437130-TXXXXX
-141	2.218	2.500	FC-09302500130-TXXXXX
-142	2.280	2.562	FC-09302562130-TXXXXX
-143	2.343	2.625	FC-09302625130-TXXXXX
-144	2.405	2.687	FC-09302687130-TXXXXX
-145	2.468	2.750	FC-09302750130-TXXXXX
-146	2.530	2.812	FC-09302812130-TXXXXX
-147	2.593	2.875	FC-09302875130-TXXXXX
-148	2.655	2.937	FC-09302937130-TXXXXX
-149	2.718	3.000	FC-09303000130-TXXXXX
-150	2.780	3.062	FC-09303062130-TXXXXX
-151	2.905	3.187	FC-09303187130-TXXXXX
-152	3.155	3.437	FC-09303437130-TXXXXX
-153	3.405	3.687	FC-09303687130-TXXXXX
-154	3.655	3.937	FC-09303937130-TXXXXX
-155	3.905	4.187	FC-09304187130-TXXXXX
-156	4.155	4.437	FC-09304437130-TXXXXX
-157	4.405	4.687	FC-09304687130-TXXXXX
-158	4.655	4.937	FC-09304937130-TXXXXX
-159	4.905	5.187	FC-09305187130-TXXXXX
-160	5.155	5.437	FC-09305437130-TXXXXX
-161	5.405	5.687	FC-09305687130-TXXXXX
-162	5.655	5.937	FC-09305937130-TXXXXX
-163	5.905	6.187	FC-09306187130-TXXXXX
-164	6.155	6.437	FC-09306437130-TXXXXX
-165	6.405	6.687	FC-09306687130-TXXXXX
-166	6.655	6.937	FC-09306937130-TXXXXX
-167	6.905	7.187	FC-09307187130-TXXXXX

Dash #	B Max Gland ID	A Gland OD	Part no.
-210	0.625	1.000	FC-12501000170-TXXXXX
-211	0.687	1.062	FC-12501062170-TXXXXX
-212	0.750	1.125	FC-12501125170-TXXXXX
-213	0.812	1.187	FC-12501187170-TXXXXX
-214	0.875	1.250	FC-12501250170-TXXXXX
-215	0.937	1.312	FC-12501312170-TXXXXX
-216	1.000	1.375	FC-12501375170-TXXXXX
-217	1.062	1.437	FC-12501437170-TXXXXX
-218	1.125	1.500	FC-12501500170-TXXXXX
-219	1.187	1.562	FC-12501562170-TXXXXX
-220	1.250	1.625	FC-12501625170-TXXXXX
-221	1.312	1.687	FC-12501687170-TXXXXX
-222	1.375	1.750	FC-12501750170-TXXXXX
-223	1.500	1.875	FC-12501875170-TXXXXX
-224	1.625	2.000	FC-12502000170-TXXXXX
-225	1.750	2.125	FC-12502125170-TXXXXX
-226	1.875	2.250	FC-12502250170-TXXXXX
-227	2.000	2.375	FC-12502375170-TXXXXX
-228	2.125	2.500	FC-12502500170-TXXXXX
-229	2.250	2.625	FC-12502625170-TXXXXX
-230	2.375	2.750	FC-12502750170-TXXXXX
-231	2.500	2.875	FC-12502875170-TXXXXX
-232	2.625	3.000	FC-12503000170-TXXXXX
-233	2.750	3.125	FC-12503125170-TXXXXX
-234	2.875	3.250	FC-12503250170-TXXXXX
-235	3.000	3.375	FC-12503375170-TXXXXX
-236	3.125	3.500	FC-12503500170-TXXXXX
-237	3.250	3.625	FC-12503625170-TXXXXX
-238	3.375	3.750	FC-12503750170-TXXXXX
-239	3.500	3.875	FC-12503875170-TXXXXX
-240	3.625	4.000	FC-12504000170-TXXXXX
-241	3.750	4.125	FC-12504125170-TXXXXX
-242	3.875	4.250	FC-12504250170-TXXXXX
-243	4.000	4.375	FC-12504375170-TXXXXX
-244	4.125	4.500	FC-12504500170-TXXXXX
-245	4.250	4.625	FC-12504625170-TXXXXX
-246	4.375	4.750	FC-12504750170-TXXXXX
-247	4.500	4.875	FC-12504875170-TXXXXX

Dash #	B Max Gland ID	A Gland OD	Part no.
-248	4.625	5.000	FC-12505000170-TXXXXX
-249	4.750	5.125	FC-12505125170-TXXXXX
-250	4.875	5.250	FC-12505250170-TXXXXX
-251	5.000	5.375	FC-12505375170-TXXXXX
-252	5.125	5.500	FC-12505500170-TXXXXX
-253	5.250	5.625	FC-12505625170-TXXXXX
-254	5.375	5.750	FC-12505750170-TXXXXX
-255	5.500	5.875	FC-12505875170-TXXXXX
-256	5.625	6.000	FC-12506000170-TXXXXX
-257	5.750	6.125	FC-12506125170-TXXXXX
-258	5.875	6.250	FC-12506250170-TXXXXX
-259	6.125	6.500	FC-12506500170-TXXXXX
-260	6.375	6.750	FC-12506750170-TXXXXX
-261	6.625	7.000	FC-12507000170-TXXXXX
-262	6.875	7.250	FC-12507250170-TXXXXX
-263	7.125	7.500	FC-12507500170-TXXXXX
-264	7.375	7.750	FC-12507750170-TXXXXX
-265	7.625	8.000	FC-12508000170-TXXXXX
-266	7.875	8.250	FC-12508250170-TXXXXX
-267	8.125	8.500	FC-12508500170-TXXXXX
-268	8.375	8.750	FC-12508750170-TXXXXX
-269	8.625	9.000	FC-12509000170-TXXXXX
-270	8.875	9.250	FC-12509250170-TXXXXX
-271	9.125	9.500	FC-12509500170-TXXXXX
-272	9.375	9.750	FC-12509750170-TXXXXX
-273	9.625	10.000	FC-12510000170-TXXXXX
-274	9.875	10.250	FC-12510250170-TXXXXX
-275	10.375	10.750	FC-12510750170-TXXXXX
-276	10.875	11.250	FC-12511250170-TXXXXX
-277	11.375	11.750	FC-12511750170-TXXXXX
-278	11.875	12.250	FC-12512250170-TXXXXX
-279	12.375	12.750	FC-12512750170-TXXXXX
-280	12.875	13.250	FC-12513250170-TXXXXX
-281	13.375	13.750	FC-12513750170-TXXXXX

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CASE SEALS

Dash #	B Max Gland ID	A Gland OD	Part no.
-325	1.312	1.875	FC-18701875260-TXXXXX
-326	1.437	2.000	FC-18702000260-TXXXXX
-327	1.562	2.125	FC-18702125260-TXXXXX
-328	1.687	2.250	FC-18702250260-TXXXXX
-329	1.812	2.375	FC-18702375260-TXXXXX
-330	1.937	2.500	FC-18702500260-TXXXXX
-331	2.062	2.625	FC-18702625260-TXXXXX
-332	2.187	2.750	FC-18702750260-TXXXXX
-333	2.312	2.875	FC-18702875260-TXXXXX
-334	2.437	3.000	FC-18703000260-TXXXXX
-335	2.562	3.125	FC-18703125260-TXXXXX
-336	2.687	3.250	FC-18703250260-TXXXXX
-337	2.812	3.375	FC-18703375260-TXXXXX
-338	2.937	3.500	FC-18703500260-TXXXXX
-339	3.062	3.625	FC-18703625260-TXXXXX
-340	3.187	3.750	FC-18703750260-TXXXXX
-341	3.312	3.875	FC-18703875260-TXXXXX
-342	3.437	4.000	FC-18704000260-TXXXXX
-343	3.562	4.125	FC-18704125260-TXXXXX
-344	3.687	4.250	FC-18704250260-TXXXXX
-345	3.812	4.375	FC-18704375260-TXXXXX
-346	3.937	4.500	FC-18704500260-TXXXXX
-347	4.062	4.625	FC-18704625260-TXXXXX
-348	4.187	4.750	FC-18704750260-TXXXXX
-349	4.312	4.875	FC-18704875260-TXXXXX
-350	4.437	5.000	FC-18705000260-TXXXXX
-351	4.562	5.125	FC-18705125260-TXXXXX
-352	4.687	5.250	FC-18705250260-TXXXXX
-353	4.812	5.375	FC-18705375260-TXXXXX
-354	4.937	5.500	FC-18705500260-TXXXXX
-355	5.062	5.625	FC-18705625260-TXXXXX

Dash #	B Max Gland ID	A Gland OD	Part no.
-356	5.187	5.750	FC-18705750260-TXXXXX
-357	5.312	5.875	FC-18705875260-TXXXXX
-358	5.437	6.000	FC-18706000260-TXXXXX
-359	5.562	6.125	FC-18706125260-TXXXXX
-360	5.687	6.250	FC-18706250260-TXXXXX
-361	5.812	6.375	FC-18706375260-TXXXXX
-362	6.062	6.625	FC-18706625260-TXXXXX
-363	6.312	6.875	FC-18706875260-TXXXXX
-364	6.562	7.125	FC-18707125260-TXXXXX
-365	6.812	7.375	FC-18707375260-TXXXXX
-366	7.062	7.625	FC-18707625260-TXXXXX
-367	7.312	7.875	FC-18707875260-TXXXXX
-368	7.562	8.125	FC-18708125260-TXXXXX
-369	7.812	8.375	FC-18708375260-TXXXXX
-370	8.062	8.625	FC-18708625260-TXXXXX
-371	8.312	8.875	FC-18708875260-TXXXXX
-372	8.562	9.125	FC-18709125260-TXXXXX
-373	8.812	9.375	FC-18709375260-TXXXXX
-374	9.062	9.625	FC-18709625260-TXXXXX
-375	9.312	9.875	FC-18709875260-TXXXXX
-376	9.562	10.125	FC-18710125260-TXXXXX
-377	9.812	10.375	FC-18710375260-TXXXXX
-378	10.312	10.875	FC-18710875260-TXXXXX
-379	10.812	11.375	FC-18711375260-TXXXXX
-380	11.312	11.875	FC-18711875260-TXXXXX
-381	11.812	12.375	FC-18712375260-TXXXXX
-382	12.812	13.375	FC-18713375260-TXXXXX
-383	13.812	14.375	FC-18714375260-TXXXXX
-384	14.812	15.375	FC-18715375260-TXXXXX
-385	15.812	16.375	FC-18716375260-TXXXXX
-386	16.812	17.375	FC-18717375260-TXXXXX
-387	17.812	18.375	FC-18718375260-TXXXXX
-388	18.812	19.375	FC-18719375260-TXXXXX
-389	19.812	20.375	FC-18720375260-TXXXXX
-390	20.812	21.375	FC-18721375260-TXXXXX

Dash #	B Max Gland ID	A Gland OD	Part no.
-425	4.250	5.000	FC-25005000360-TXXXXX
-426	4.375	5.125	FC-25005125360-TXXXXX
-427	4.500	5.250	FC-25005250360-TXXXXX
-428	4.625	5.375	FC-25005375360-TXXXXX
-429	4.750	5.500	FC-25005500360-TXXXXX
-430	4.875	5.625	FC-25005625360-TXXXXX
-431	5.000	5.750	FC-25005750360-TXXXXX
-432	5.125	5.875	FC-25005875360-TXXXXX
-433	5.250	6.000	FC-25006000360-TXXXXX
-434	5.375	6.125	FC-25006125360-TXXXXX
-435	5.500	6.250	FC-25006250360-TXXXXX
-436	5.625	6.375	FC-25006375360-TXXXXX
-437	5.750	6.500	FC-25006500360-TXXXXX
-438	6.000	6.750	FC-25006750360-TXXXXX
-439	6.250	7.000	FC-25007000360-TXXXXX
-440	6.500	7.250	FC-25007250360-TXXXXX
-441	6.750	7.500	FC-25007500360-TXXXXX
-442	7.000	7.750	FC-25007750360-TXXXXX
-443	7.250	8.000	FC-25008000360-TXXXXX
-444	7.500	8.250	FC-25008250360-TXXXXX
-445	7.750	8.500	FC-25008500360-TXXXXX
-446	8.250	9.000	FC-25009000360-TXXXXX
-447	8.750	9.500	FC-25009500360-TXXXXX
-448	9.250	10.000	FC-25010000360-TXXXXX
-449	9.750	10.500	FC-25010500360-TXXXXX
-450	10.250	11.000	FC-25011000360-TXXXXX
-451	10.750	11.500	FC-25011500360-TXXXXX
-452	11.250	12.000	FC-25012000360-TXXXXX

Dash #	B Max Gland ID	A Gland OD	Part no.
-453	11.750	12.500	FC-25012500360-TXXXXX
-454	12.250	13.000	FC-25013000360-TXXXXX
-455	12.750	13.500	FC-25013500360-TXXXXX
-456	13.250	14.000	FC-25014000360-TXXXXX
-457	13.750	14.500	FC-25014500360-TXXXXX
-458	14.250	15.000	FC-25015000360-TXXXXX
-459	14.750	15.500	FC-25015500360-TXXXXX
-460	15.250	16.000	FC-25016000360-TXXXXX
-461	15.750	16.500	FC-25016500360-TXXXXX
-462	16.250	17.000	FC-25017000360-TXXXXX
-463	16.750	17.500	FC-25017500360-TXXXXX
-464	17.250	18.000	FC-25018000360-TXXXXX
-465	17.750	18.500	FC-25018500360-TXXXXX
-466	18.250	19.000	FC-25019000360-TXXXXX
-467	18.750	19.500	FC-25019500360-TXXXXX
-468	19.250	20.000	FC-25020000360-TXXXXX

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Dash #	B Max Gland ID	A Gland OD	Part no.
-008	0.187	0.375	FX-06200375083-TXXXXX
-009	0.218	0.406	FX-06200406083-TXXXXX
-010	0.249	0.437	FX-06200437083-TXXXXX
-011	0.312	0.500	FX-06200500083-TXXXXX
-012	0.374	0.562	FX-06200562083-TXXXXX
-013	0.437	0.625	FX-06200625083-TXXXXX
-014	0.499	0.687	FX-06200687083-TXXXXX
-015	0.562	0.750	FX-06200750083-TXXXXX
-016	0.624	0.812	FX-06200812083-TXXXXX
-017	0.687	0.875	FX-06200875083-TXXXXX
-018	0.749	0.937	FX-06200937083-TXXXXX
-019	0.812	1.000	FX-06201000083-TXXXXX
-020	0.874	1.062	FX-06201062083-TXXXXX
-021	0.937	1.125	FX-06201125083-TXXXXX
-022	0.999	1.187	FX-06201187083-TXXXXX
-023	1.062	1.250	FX-06201250083-TXXXXX
-024	1.124	1.312	FX-06201312083-TXXXXX
-025	1.187	1.375	FX-06201375083-TXXXXX
-026	1.249	1.437	FX-06201437083-TXXXXX
-027	1.312	1.500	FX-06201500083-TXXXXX
-028	1.374	1.562	FX-06201562083-TXXXXX
-029	1.499	1.687	FX-06201687083-TXXXXX
-030	1.624	1.812	FX-06201812083-TXXXXX
-031	1.749	1.937	FX-06201937083-TXXXXX
-032	1.874	2.062	FX-06202062083-TXXXXX
-033	1.999	2.187	FX-06202187083-TXXXXX
-034	2.124	2.312	FX-06202312083-TXXXXX
-035	2.249	2.437	FX-06202437083-TXXXXX
-036	2.374	2.562	FX-06202562083-TXXXXX
-037	2.499	2.687	FX-06202687083-TXXXXX
-038	2.624	2.812	FX-06202812083-TXXXXX
-039	2.749	2.937	FX-06202937083-TXXXXX
-040	2.874	3.062	FX-06203062083-TXXXXX
-041	2.999	3.187	FX-06203187083-TXXXXX
-042	3.249	3.437	FX-06203437083-TXXXXX
-043	3.499	3.687	FX-06203687083-TXXXXX
-044	3.749	3.937	FX-06203937083-TXXXXX
-045	3.999	4.187	FX-06204187083-TXXXXX

Dash #	B Min Gland OD	A Gland ID	Part no.
-110	0.375	0.657	FX-09300375130-TXXXXX
-111	0.437	0.719	FX-09300437130-TXXXXX
-112	0.500	0.782	FX-09300500130-TXXXXX
-113	0.562	0.844	FX-09300562130-TXXXXX
-114	0.625	0.907	FX-09300625130-TXXXXX
-115	0.687	0.969	FX-09300687130-TXXXXX
-116	0.749	1.031	FX-09300749130-TXXXXX
-117	0.812	1.094	FX-09300812130-TXXXXX
-118	0.874	1.156	FX-09300874130-TXXXXX
-119	0.937	1.219	FX-09300937130-TXXXXX
-120	1.000	1.282	FX-09301000130-TXXXXX
-121	1.062	1.344	FX-09301062130-TXXXXX
-122	1.125	1.407	FX-09301125130-TXXXXX
-123	1.187	1.469	FX-09301187130-TXXXXX
-124	1.250	1.532	FX-09301250130-TXXXXX
-125	1.312	1.594	FX-09301312130-TXXXXX
-126	1.375	1.657	FX-09301375130-TXXXXX
-127	1.437	1.719	FX-09301437130-TXXXXX
-128	1.500	1.782	FX-09301500130-TXXXXX
-129	1.562	1.844	FX-09301562130-TXXXXX
-130	1.625	1.907	FX-09301625130-TXXXXX
-131	1.687	1.969	FX-09301687130-TXXXXX
-132	1.750	2.032	FX-09301750130-TXXXXX
-133	1.812	2.094	FX-09301812130-TXXXXX
-134	1.875	2.157	FX-09301875130-TXXXXX
-135	1.937	2.219	FX-09301937130-TXXXXX
-136	2.000	2.282	FX-09302000130-TXXXXX

Dash #	B Min Gland OD	A Gland ID	Part no.
-137	2.062	2.344	FX-09302062130-TXXXXX
-138	2.125	2.407	FX-09302125130-TXXXXX
-139	2.187	2.469	FX-09302187130-TXXXXX
-140	2.250	2.532	FX-09302250130-TXXXXX
-141	2.312	2.594	FX-09302312130-TXXXXX
-142	2.374	2.656	FX-09302374130-TXXXXX
-143	2.437	2.719	FX-09302437130-TXXXXX
-144	2.500	2.782	FX-09302500130-TXXXXX
-145	2.562	2.844	FX-09302562130-TXXXXX
-146	2.625	2.907	FX-09302625130-TXXXXX
-147	2.687	2.969	FX-09302687130-TXXXXX
-148	2.750	3.032	FX-09302750130-TXXXXX
-149	2.812	3.094	FX-09302812130-TXXXXX
-150	2.875	3.157	FX-09302875130-TXXXXX
-151	3.000	3.282	FX-09303000130-TXXXXX
-152	3.250	3.532	FX-09303250130-TXXXXX
-153	3.500	3.782	FX-09303500130-TXXXXX
-154	3.750	4.032	FX-09303750130-TXXXXX
-155	4.000	4.282	FX-09304000130-TXXXXX
-156	4.250	4.532	FX-09304250130-TXXXXX
-157	4.500	4.782	FX-09304500130-TXXXXX
-158	4.750	5.032	FX-09304750130-TXXXXX
-159	5.000	5.282	FX-09305000130-TXXXXX
-160	5.250	5.532	FX-09305250130-TXXXXX
-161	5.500	5.782	FX-09305500130-TXXXXX
-162	5.750	6.032	FX-09305750130-TXXXXX
-163	6.000	6.282	FX-09306000130-TXXXXX
-164	6.250	6.532	FX-09306250130-TXXXXX
-165	6.500	6.782	FX-09306500130-TXXXXX

Dash #	B Min Gland OD	A Gland ID	Part no.
-208	0.625	1.000	FX-12500625170-TXXXXX
-209	0.687	1.062	FX-12500687170-TXXXXX
-210	0.750	1.125	FX-12500750170-TXXXXX
-211	0.812	1.187	FX-12500812170-TXXXXX
-212	0.875	1.250	FX-12500875170-TXXXXX
-213	0.937	1.312	FX-12500937170-TXXXXX
-214	1.000	1.375	FX-12501000170-TXXXXX
-215	1.062	1.437	FX-12501062170-TXXXXX
-216	1.125	1.500	FX-12501125170-TXXXXX
-217	1.187	1.562	FX-12501187170-TXXXXX
-218	1.250	1.625	FX-12501250170-TXXXXX
-219	1.312	1.687	FX-12501312170-TXXXXX
-220	1.375	1.750	FX-12501375170-TXXXXX
-221	1.437	1.812	FX-12501437170-TXXXXX
-222	1.500	1.875	FX-12501500170-TXXXXX
-223	1.625	2.000	FX-12501625170-TXXXXX
-224	1.750	2.125	FX-12501750170-TXXXXX
-225	1.875	2.250	FX-12501875170-TXXXXX
-226	2.000	2.375	FX-12502000170-TXXXXX
-227	2.125	2.500	FX-12502125170-TXXXXX
-228	2.250	2.625	FX-12502250170-TXXXXX
-229	2.375	2.750	FX-12502375170-TXXXXX
-230	2.500	2.875	FX-12502500170-TXXXXX
-231	2.625	3.000	FX-12502625170-TXXXXX
-232	2.750	3.125	FX-12502750170-TXXXXX
-233	2.875	3.250	FX-12502875170-TXXXXX
-234	3.000	3.375	FX-12503000170-TXXXXX
-235	3.125	3.500	FX-12503125170-TXXXXX
-236	3.250	3.625	FX-12503250170-TXXXXX
-237	3.375	3.750	FX-12503375170-TXXXXX
-238	3.500	3.875	FX-12503500170-TXXXXX
-239	3.625	4.000	FX-12503625170-TXXXXX
-240	3.750	4.125	FX-12503750170-TXXXXX
-241	3.875	4.250	FX-12503875170-TXXXXX
-242	4.000	4.375	FX-12504000170-TXXXXX
-243	4.125	4.500	FX-12504125170-TXXXXX
-244	4.250	4.625	FX-12504250170-TXXXXX
-245	4.375	4.750	FX-12504375170-TXXXXX

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Dash #	B Min Gland OD	A Gland ID	Part no.
-246	4.500	4.875	FX-12504500170-TXXXXX
-247	4.625	5.000	FX-12504625170-TXXXXX
-248	4.750	5.125	FX-12504750170-TXXXXX
-249	4.875	5.250	FX-12504875170-TXXXXX
-250	5.000	5.375	FX-12505000170-TXXXXX
-251	5.125	5.500	FX-12505125170-TXXXXX
-252	5.250	5.625	FX-12505250170-TXXXXX
-253	5.375	5.750	FX-12505375170-TXXXXX
-254	5.500	5.875	FX-12505500170-TXXXXX
-255	5.625	6.000	FX-12505625170-TXXXXX
-256	5.750	6.125	FX-12505750170-TXXXXX
-257	5.875	6.250	FX-12505875170-TXXXXX
-258	6.000	6.375	FX-12506000170-TXXXXX
-259	6.250	6.625	FX-12506250170-TXXXXX
-260	6.500	6.875	FX-12506500170-TXXXXX
-261	6.750	7.125	FX-12506750170-TXXXXX
-262	7.000	7.375	FX-12507000170-TXXXXX
-263	7.250	7.625	FX-12507250170-TXXXXX
-264	7.500	7.875	FX-12507500170-TXXXXX
-265	7.750	8.125	FX-12507750170-TXXXXX
-266	8.000	8.375	FX-12508000170-TXXXXX
-267	8.250	8.625	FX-12508250170-TXXXXX
-268	8.500	8.875	FX-12508500170-TXXXXX
-269	8.750	9.125	FX-12508750170-TXXXXX
-270	9.000	9.375	FX-12509000170-TXXXXX
-271	9.250	9.625	FX-12509250170-TXXXXX
-272	9.500	9.875	FX-12509500170-TXXXXX
-273	9.750	10.125	FX-12509750170-TXXXXX
-274	10.000	10.375	FX-12510000170-TXXXXX
-275	10.500	10.875	FX-12510500170-TXXXXX
-276	11.000	11.375	FX-12511000170-TXXXXX
-277	11.500	11.875	FX-12511500170-TXXXXX
-278	12.000	12.375	FX-12512000170-TXXXXX
-279	13.000	13.375	FX-12513000170-TXXXXX
-280	14.000	14.375	FX-12514000170-TXXXXX
-281	15.000	15.375	FX-12515000170-TXXXXX

Dash #	B Min Gland OD	A Gland ID	Part no.
-325	1.500	2.062	FX-18701500260-TXXXXX
-326	1.625	2.187	FX-18701625260-TXXXXX
-327	1.750	2.312	FX-18701750260-TXXXXX
-328	1.875	2.437	FX-18701875260-TXXXXX
-329	2.000	2.562	FX-18702000260-TXXXXX
-330	2.125	2.687	FX-18702125260-TXXXXX
-331	2.250	2.812	FX-18702250260-TXXXXX
-332	2.375	2.937	FX-18702375260-TXXXXX
-333	2.500	3.062	FX-18702500260-TXXXXX
-334	2.625	3.187	FX-18702625260-TXXXXX
-335	2.750	3.312	FX-18702750260-TXXXXX
-336	2.875	3.437	FX-18702875260-TXXXXX
-337	3.000	3.562	FX-18703000260-TXXXXX
-338	3.125	3.687	FX-18703125260-TXXXXX
-339	3.250	3.812	FX-18703250260-TXXXXX
-340	3.375	3.937	FX-18703375260-TXXXXX
-341	3.500	4.062	FX-18703500260-TXXXXX
-342	3.625	4.187	FX-18703625260-TXXXXX
-343	3.750	4.312	FX-18703750260-TXXXXX
-344	3.875	4.437	FX-18703875260-TXXXXX
-345	4.000	4.562	FX-18704000260-TXXXXX
-346	4.125	4.687	FX-18704125260-TXXXXX
-347	4.250	4.812	FX-18704250260-TXXXXX
-348	4.375	4.937	FX-18704375260-TXXXXX
-349	4.500	5.062	FX-18704500260-TXXXXX
-350	4.625	5.187	FX-18704625260-TXXXXX
-351	4.750	5.312	FX-18704750260-TXXXXX
-352	4.875	5.437	FX-18704875260-TXXXXX
-353	5.000	5.562	FX-18705000260-TXXXXX
-354	5.125	5.687	FX-18705125260-TXXXXX
-355	5.250	5.812	FX-18705250260-TXXXXX
-356	5.375	5.937	FX-18705375260-TXXXXX
-357	5.500	6.062	FX-18705500260-TXXXXX

Dash #	B Min Gland OD	A Gland ID	Part no.
-358	5.625	6.187	FX-18705625260-TXXXXX
-359	5.750	6.312	FX-18705750260-TXXXXX
-360	5.875	6.437	FX-18705875260-TXXXXX
-361	6.000	6.562	FX-18706000260-TXXXXX
-362	6.250	6.812	FX-18706250260-TXXXXX
-363	6.500	7.062	FX-18706500260-TXXXXX
-364	6.750	7.312	FX-18706750260-TXXXXX
-365	7.000	7.562	FX-18707000260-TXXXXX
-366	7.250	7.812	FX-18707250260-TXXXXX
-367	7.500	8.062	FX-18707500260-TXXXXX
-368	7.750	8.312	FX-18707750260-TXXXXX
-369	8.000	8.562	FX-18708000260-TXXXXX
-370	8.250	8.812	FX-18708250260-TXXXXX
-371	8.500	9.062	FX-18708500260-TXXXXX
-372	8.750	9.312	FX-18708750260-TXXXXX
-373	9.000	9.562	FX-18709000260-TXXXXX
-374	9.250	9.812	FX-18709250260-TXXXXX
-375	9.500	10.062	FX-18709500260-TXXXXX
-376	9.750	10.312	FX-18709750260-TXXXXX
-377	10.000	10.562	FX-18710000260-TXXXXX
-378	10.500	11.062	FX-18710500260-TXXXXX
-379	11.000	11.562	FX-18711000260-TXXXXX
-380	11.500	12.062	FX-18711500260-TXXXXX
-381	12.000	12.562	FX-18712000260-TXXXXX
-382	13.000	13.562	FX-18713000260-TXXXXX
-383	14.000	14.562	FX-18714000260-TXXXXX
-384	15.000	15.562	FX-18715000260-TXXXXX
-385	16.000	16.562	FX-18716000260-TXXXXX
-386	17.000	17.562	FX-18717000260-TXXXXX
-387	18.000	18.562	FX-18718000260-TXXXXX
-388	19.000	19.562	FX-18719000260-TXXXXX
-389	20.000	20.562	FX-18720000260-TXXXXX
-390	21.000	21.562	FX-18721000260-TXXXXX

Dash #	B Min Gland OD	A Gland ID	Part no.
-425	4.500	5.250	FX-25004500360-TXXXXX
-426	4.625	5.375	FX-25004625360-TXXXXX
-427	4.750	5.500	FX-25004750360-TXXXXX
-428	4.875	5.625	FX-25004875360-TXXXXX
-429	5.000	5.750	FX-25005000360-TXXXXX
-430	5.125	5.875	FX-25005125360-TXXXXX
-431	5.250	6.000	FX-25005250360-TXXXXX
-432	5.375	6.125	FX-25005375360-TXXXXX
-433	5.500	6.250	FX-25005500360-TXXXXX
-434	5.625	6.375	FX-25005625360-TXXXXX
-435	5.750	6.500	FX-25005750360-TXXXXX
-436	5.875	6.625	FX-25005875360-TXXXXX
-437	6.000	6.750	FX-25006000360-TXXXXX
-438	6.250	7.000	FX-25006250360-TXXXXX
-439	6.500	7.250	FX-25006500360-TXXXXX
-440	6.750	7.500	FX-25006750360-TXXXXX
-441	7.000	7.750	FX-25007000360-TXXXXX
-442	7.250	8.000	FX-25007250360-TXXXXX
-443	7.500	8.250	FX-25007500360-TXXXXX
-444	7.750	8.500	FX-25007750360-TXXXXX
-445	8.000	8.750	FX-25008000360-TXXXXX
-446	8.500	9.250	FX-25008500360-TXXXXX
-447	9.000	9.750	FX-25009000360-TXXXXX
-448	9.500	10.250	FX-25009500360-TXXXXX
-449	10.000	10.750	FX-25010000360-TXXXXX
-450	10.500	11.250	FX-25010500360-TXXXXX
-451	11.000	11.750	FX-25011000360-TXXXXX
-452	11.500	12.250	FX-25011500360-TXXXXX
-453	12.000	12.750	FX-25012000360-TXXXXX
-454	12.500	13.250	FX-25012500360-TXXXXX
-455	13.000	13.750	FX-25013000360-TXXXXX
-456	13.500	14.250	FX-25013500360-TXXXXX
-457	14.000	14.750	FX-25014000360-TXXXXX
-458	14.500	15.250	FX-25014500360-TXXXXX
-459	15.000	15.750	FX-25015000360-TXXXXX
-460	15.500	16.250	FX-25015500360-TXXXXX
-461	16.000	16.750	FX-25016000360-TXXXXX
-462	16.500	17.250	FX-25016500360-TXXXXX
-463	17.000	17.750	FX-25017000360-TXXXXX
-464	17.500	18.250	FX-25017500360-TXXXXX
-465	18.000	18.750	FX-25018000360-TXXXXX
-466	18.500	19.250	FX-25018500360-TXXXXX
-467	19.000	19.750	FX-25019000360-TXXXXX
-468	19.500	20.250	FX-25019500360-TXXXXX

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