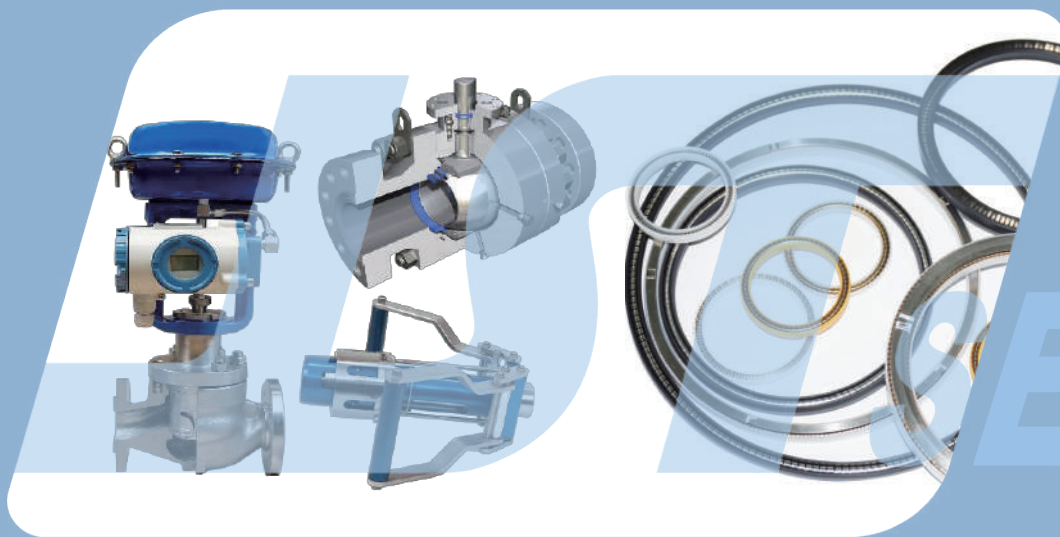




Professional Innovation Cooperation Win-win



Spring Energized Seals



Guangzhou JST Seals Technology Co., Ltd.



**JST** has a complete technical system, including material formulation laboratory, comprehensive performance laboratory For high & low temperature and high Pressure products, -196°C cryogenic temperature laboratory, equipped with high and low temperature tensile testing machine, material abrasion testing machine, material immersion testing machine, low temperature retraction testing machine, DSC vulcanization tester, carbon black dispersion analyzer, creep tester, finite element analysis (FEA) , and in combination with the company's PLM system, it can make deeper researches on elastomer materials, polymer composites and product performance.



We have elastomer seal production workshop, polymer seal production workshop, class 10,000 clean room, and tooling processing workshop.

JST's products and services cover oil & gas drilling, chemicals, semiconductor, new energy, construction machinery, LNG, aerospace, nuclear & wind power, medical equipment and other industries, and meet the complex and harsh working conditions and technical requirements of various industries with its strength.



## Main Products:

- ◆ API 6A gate valve seal
- ◆ API 6A wellhead equipment seal
- ◆ Downhole packer element
- ◆ Downhole seal stack
- ◆ Well service pump packing
- ◆ Hammer union seal
- ◆ API 6D ball valve and LNG seal
- ◆ Hydraulic seal
- ◆ FFKM seal / O ring
- ◆ Oil-free lubricated pump seal



## Ability:

- ◆ API Spec Q1
- ◆ ISO 9001:2015
- ◆ HSE management system
- ◆ API 6A PR2F test
- ◆ RGD test
- ◆ H2S immersion test (Norsok M710)
- ◆ Low temperature test (-196°C)
- ◆ FEA/Finite Element Analysis
- ◆ R & D center
- ◆ More than 52 patents & inventions



JST has passed ISO9001 certification, API Q1 certification and HSE certification.



**Spring energized seals** have been widely used in harsh working conditions such as extreme operating temperatures, high pressure, corrosive chemical media, low friction, and high operating speeds. Through years of R & D and application promotion, spring energized seals have been widely used in the above fields. Meanwhile, the quality of our products have also been approved by customers. We will keep on providing reliable sealing solutions for more and more customers.



Aerospace



Food and Medical



Intelligent Laser Equipment



Filling Machines & Equipment



Industrial Automation



Industrial Control Valve



Oil and Gas

The main materials for seal jackets are modified PTFE and other high-performance polymers.

PTFE is a sealing material with superior chemical resistance and good heat resistance compared to perfluorinated rubber. It can be applied to the vast majority of chemical fluid solvents, hydraulic oils, and lubricants. Its compression set is very small, so it can provide long-term sealing performance.

Spring energized seals use various special springs to overcome the elastic problems of PTFE or other high-performance polymers.



JST has developed sealing components that can replace the vast majority of applications in static or dynamic (reciprocating or rotating). The temperature range can be from -196 °C to 300 °C, the pressure can range from vacuum to ultra-high pressure of 70MPa, with a movement speed up to 20m/s. Springs can be selected from different materials based on different application environments, making them suitable for various high-temperature corrosive fluids.

## ● Common seal jacket material

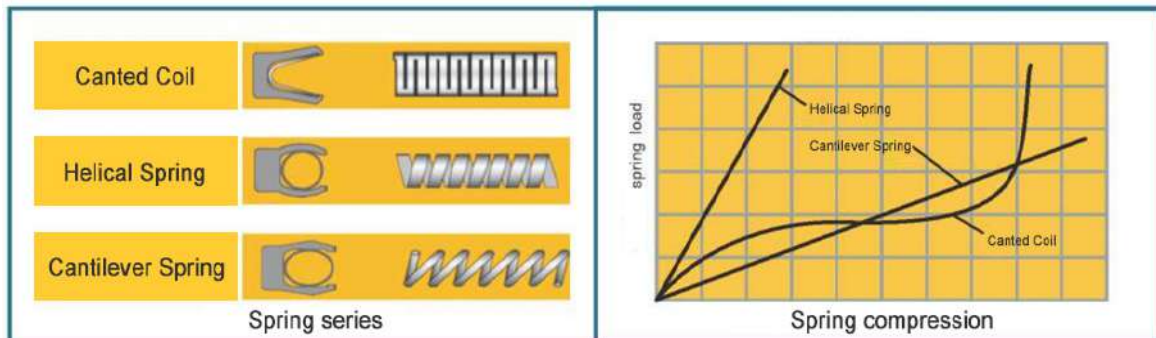
Material code	Material	Color	Temp Range °C	Wear resistance	Main Application
P	Virgin PTFE	White	-196~200	1	Static, vacuum, refrigerant.
C	PTFE +Graphite	Black	-70~250	8	Medium load oil pressure, air pressure, emulsified oil, sea water.
G	PTFE +Carbon fibre	Black	-70~250	8	Especially suitable for water.
D	PTFE +Glass fibre	Black	-70~250	8	Suitable for strong acid and strong oxidant environments.
T	PTFE +Bronze	Green or Brown	-50~220	3	Medium and high load hydraulic components, high side load.
E	UPE	Translucent	-196~80	10	Excellent wear resistance, especially suitable for low temperature applications.
K	PEEK	Light yellow	-196~260	11	Suitable for ultra-high pressure and related harsh environments.
F	PCTFE	Translucent	-196~150	7	Cold flow resistance, abrasion resistance and dimensional stability.

The metal spring is installed inside the jacket to provide compensation for the sealing lip, so that the seal has permanent elasticity that is not affected by changes in operating temperature, pressure or medium. In addition to corrosion resistance, spring energized seals also have two important characteristics: load value and compression deformation. The spring load value affects the sealing ability and wear rate of the seal. The amount of compression deformation determines the ability of the seal to compensate for wear and groove size changes.

- **Spring type and performance characteristics**

Series	Feature	Application
V	schistose, small but stable elasticity	1.piston and rod seal for to-and-fro machinery. 2.middle pressure. 3.little bias for groove dimension when still.
H	sheet thread form	1.middle and high pressure. 2.evenly bearing stress. 3.no big bias for groove dimension.
C	line thread form,unstable elasticity	1.low pressure. 2.sensitive to pressure.

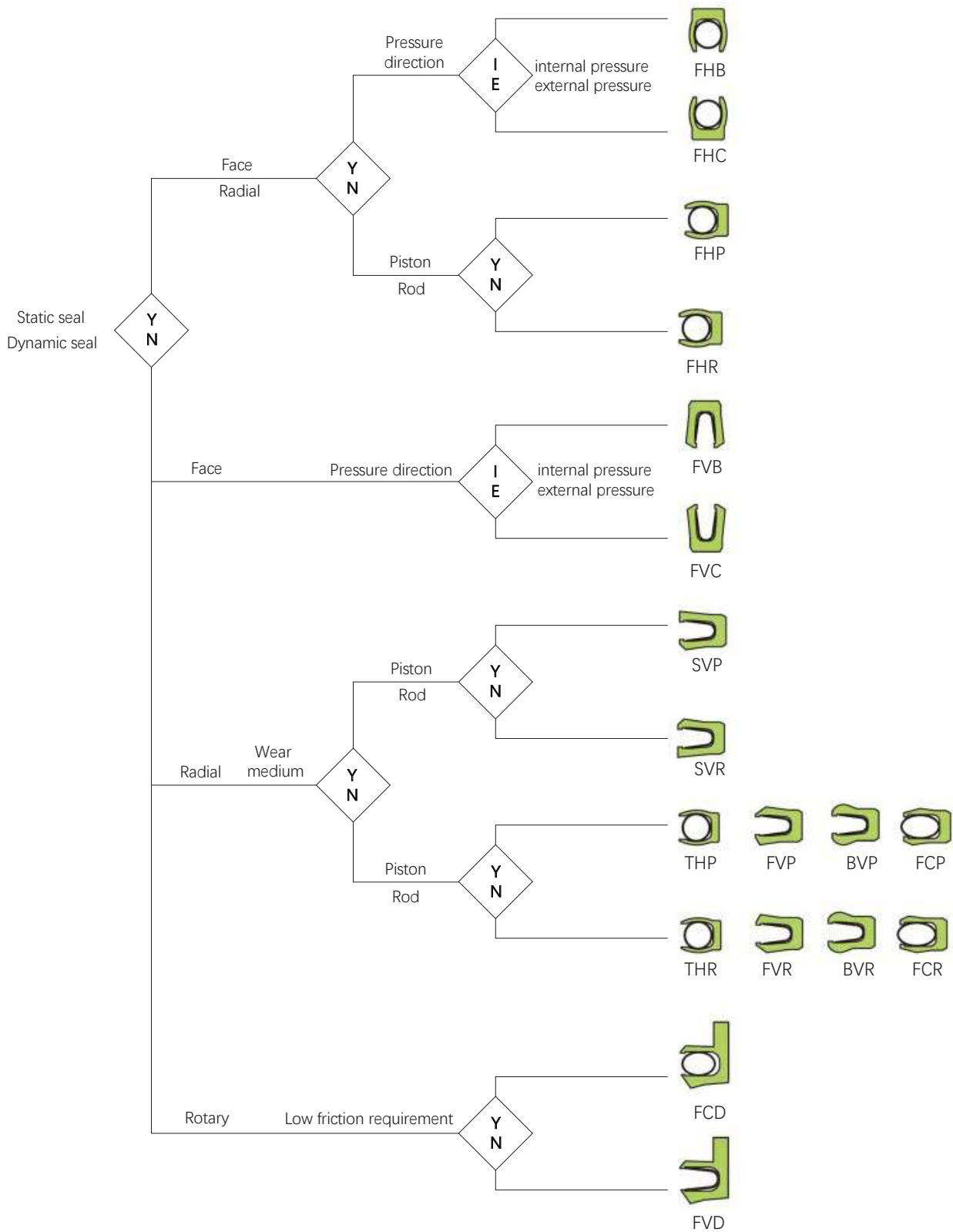
- **Spring load curve**



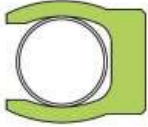




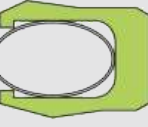
- **Spring material introduction**

Spring Material	Description
301/302 SS	The standard spring material of the spring energized seals can be used in oil, grease, air, water, water-based gas, food, medicine and other media conditions.
316 SS	Compared with 301 stainless steel, 316 stainless steel has significantly higher corrosion resistance and high temperature strength, and has a certain ability to resist oxidation erosion.
Hastelloy C-276	Widely used in corrosive media, such as acids, corrosives, seawater, etc.
R30003 (Elgiloy/Cocalloy)	NACE-approved, excellent corrosion resistance and fatigue resistance: suitable for crude oil and sour natural gas media.
Inconel 718/750	It has high strength, good initial properties, and good corrosion resistance under high and low temperature conditions. Can be used in petrochemical industry and corrosive media, and can replace some Elgiloy applications.

## ● Quick Selection Chart

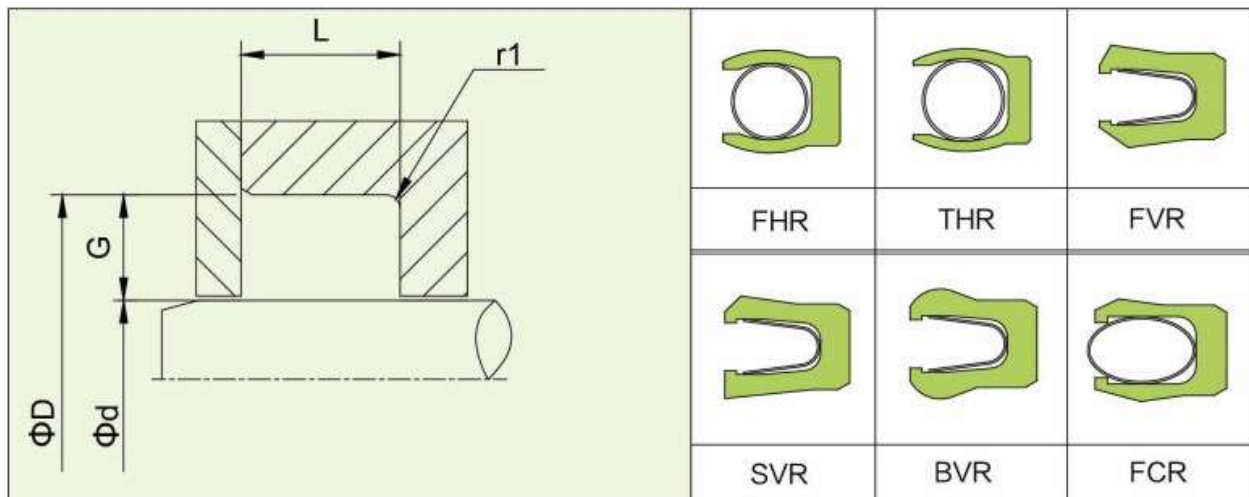


## ● Piston Rod Seal

Product Type		Product Description	Technical Data		
			Working temp	Pressure	Speed
FHR		<ol style="list-style-type: none"> <li>Arc-shaped sealing lip combined with helical spring design.</li> <li>With high spring load, it can maintain good sealing performance even at low temperature, low pressure or when the mating surface finish is not ideal; suitable for static and slow dynamic sealing.</li> <li>Application: ball valves, mechanical seals, cryogenic equipment, crude oil and natural gas equipment, cuum equipment, etc.</li> </ol>	-110°C ~260°C	Standard type 20MPa extended or barrier type 40MPa	-
THR		<ol style="list-style-type: none"> <li>The structure is the same as the FHR type. The arc-shaped sealing lip is lined with a helical spring; THR is a light load design on the FHR structure to achieve excellent sealing effect and long service life under low-speed operation.</li> <li>Application: regulating valves, liquid chromatographs, rotary joints, etc</li> </ol>	-110°C ~260°C	Standard type 20MPa extended or barrier type 40MPa	-
FVR		<ol style="list-style-type: none"> <li>Optimized asymmetric design of slope lip combined with V-shaped cantilever spring.</li> <li>FVR has medium spring load and wide deformation range, long life cycle and ability to compensate for wear in dynamic sealing applications.</li> <li>Application: cylinders, valves, pumps, machine tools, pharmaceutical equipment, filling equipment, etc.</li> </ol>	-60°C ~260°C	Standard type 20MPa extended or barrier type 40MPa	Reciprocate 15m/s Rotate 1m/s
SVR		<ol style="list-style-type: none"> <li>The structure is the same as the FVR type. The SVR is a dynamic sealing lip specially designed for high-viscosity media, so that it has good scraping ability.</li> <li>Application: cylinders, valves, pumps, machine tools, pharmaceutical equipment, filling equipment, glue machines, etc.</li> </ol>	-60°C ~260°C	Standard type 20MPa extended or barrier type 40MPa	Reciprocate 15m/s Rotate 1m/s
BVR		<ol style="list-style-type: none"> <li>The arc-shaped sealing lip is combined with a V-shaped spring. The BVR is specially designed for air sealing and low-temperature applications. It has a good sealing effect even when the hardware surface is not ideal.</li> <li>Application: cylinders, valves, pumps, machine tools, pharmaceutical equipment, cryogenic equipment, etc.</li> </ol>	-60°C ~260°C	Standard type 20MPa extended or barrier type 40MPa	Reciprocate 15m/s Rotate 1m/s
FCR		<ol style="list-style-type: none"> <li>Optimized asymmetric design of bevel lip combination C-type Canted-Coil spring:</li> <li>The C-type spring in FCR has three types: light load, medium load and heavy load, and has a fairly constant load within a wide deformation range. It can be assembled in a closed groove without damaging the seals.</li> <li>Application: butterfly valves, hydraulic and pneumatic equipment, valve electronic equipment, etc.</li> </ol>	-60°C ~260°C	Standard type 20MPa extended or barrier type 40MPa	Reciprocate 15m/s Rotate 1m/s



## ● Piston Rod Seal Groove Selection

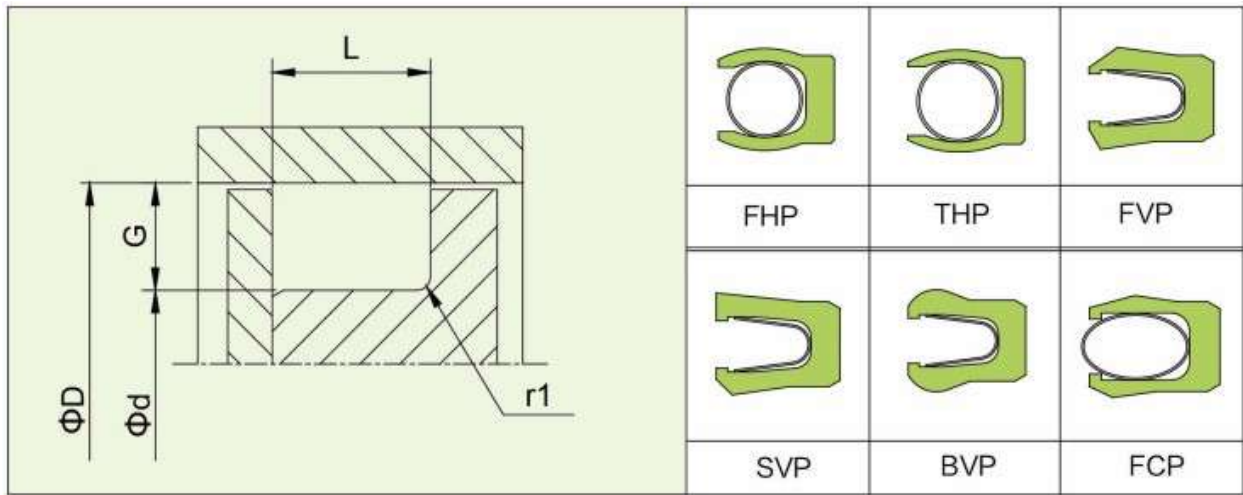


Cross-section Code	Groove ID		Groove Depth	Groove OD	Groove Width	Radius
	d h9			D	L	r1
	Standard scope	Extension scope	G	H9	+0.2	max
A	3.0-8.9	3.0-25.0	1.45	d+2.9	2.4	0.4
B	9.0-18.9	6.0-100.0	2.25	d+4.5	3.6	0.4
C	19.0-41.9	10.0-200.0	3.10	d+6.2	4.8	0.4
D	42-124.9	20.0-400.0	4.70	d+9.4	7.1	0.6
E	125.0-799.9	50.0-1200.0	6.10	d+12.2	9.5	0.6
F	800.0-1500.0	80.0-1500.0	9.50	d+19.0	15.0	0.8

## ● Rod seal





Product Type		Product Description	Technical Data		
			Working temp	Pressure	Speed
FHP		<ol style="list-style-type: none"> <li>Arc-shaped sealing lip combined with helical spring.</li> <li>With high spring load, it can maintain good sealing effect even under low humidity, low pressure or when the mating surface finish is not ideal; suitable for static and slow dynamic sealing.</li> <li>Application: ball valves, mechanical seals, cryogenic equipment, crude oil and natural gas equipment, vacuum equipment, etc.</li> </ol>	-110°C ~260°C	Standard type 20MPa extended or barrier type 40MPa	
THP		<ol style="list-style-type: none"> <li>The structure is the same as the FHP type, with a round strong sealing lip lined with a helical spring; THP is a light load design on the FHP structure to achieve excellent sealing effect and long service life under low-speed operation.</li> <li>Application: regulating valves, wave chromatographs, rotary joints, etc.</li> </ol>	-110°C ~260°C	Standard type 20MPa extended or barrier type 40MPa	
FVP		<ol style="list-style-type: none"> <li>Optimized asymmetric design of sloped mouth combined with V-shaped cantilever spring.</li> <li>FVP has medium spring load and wide deformation range, long life cycle and ability to compensate for wear in dynamic sealing applications.</li> <li>Application: cylinders, valves, pumps, machine tools, pharmaceutical equipment, filling equipment, etc.</li> </ol>	-60°C ~260°C	Standard type 20MPa extended or barrier type 40MPa	Reciprocate 15m/s Rotate 1m/s
SVP		<ol style="list-style-type: none"> <li>The structure is the same as the FVP type. The SVP is a dynamic sealing lip specially designed for high-viscosity media, giving it good scraping ability.</li> <li>Application: oil cylinders, valves, pumps, machine tools, pharmaceutical equipment, Hunan installation equipment, glue machines, etc.</li> </ol>	-60°C ~260°C	Standard type 20MPa extended or barrier type 40MPa	Reciprocate 15m/s Rotate 1m/s
BVP		<ol style="list-style-type: none"> <li>Arc-shaped sealing mouth combined with V-shaped spring, BVP is specially designed for air sealing and low-temperature applications. It has a good sealing effect even when the hardware surface is not ideal.</li> <li>Application: cylinders, valves, pumps, machine tools, pharmaceutical equipment, cryogenic equipment, etc.</li> </ol>	-60°C ~260°C	Standard type 20MPa extended or barrier type 40MPa	Reciprocate 15m/s Rotate 1m/s
FCP		<ol style="list-style-type: none"> <li>Optimized asymmetric design of bevel lip combination C-type Canted-Coil spring</li> <li>The C-type spring in FCP has three types: light load, medium load and heavy load, and has a fairly constant load within a wide deformation range.</li> <li>Application: butterfly valves, hydraulic and pneumatic equipment, and other equipment.</li> </ol>	-60°C ~260°C	Standard type 20MPa extended or barrier type 40MPa	Reciprocate 15m/s Rotate 1m/s

## ● Rod Seal Groove Selection



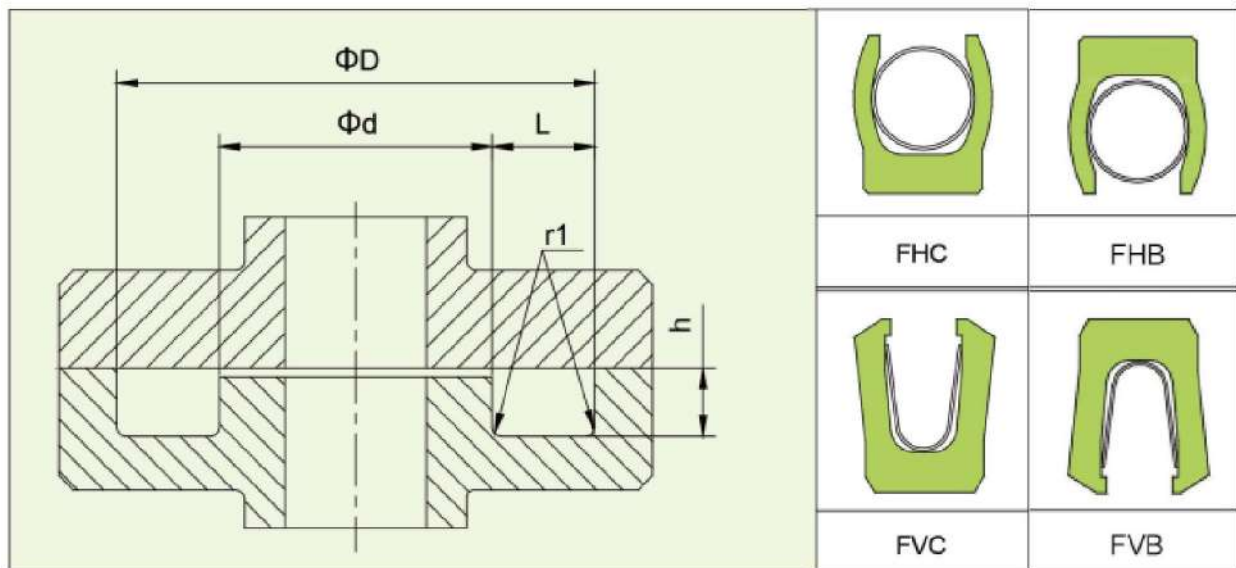
Cross-section Code	Groove OD		Groove Depth	Groove ID	Groove Width	Radius
	D h9			d	L	r1
	Standard scope	Extension scope	G	h9	+0.2	max
A	6.0-12.9	6.0-25.0	1.45	D-2.9	2.4	0.4
B	13.0-23.9	10.0-100.0	2.25	D-4.5	3.6	0.4
C	24.0-47.9	16.0-200.0	3.10	D-6.2	4.8	0.4
D	48-134.9	28.0-400.0	4.70	D-9.4	7.1	0.6
E	135.0-799.9	55.0-1200.0	6.10	D-12.2	9.5	0.6
F	800.0-1500.0	100.0-1500.0	9.50	D-19.0	15.0	0.8

## ● Face seal

Product Type		Product Description	Technical Data		
			Working temp	Pressure	Speed
FHB		<p>1. The end face seal design of helical spring combined with arc lip, with pressure coming from the inside direction.</p> <p>2. With high spring load, it is the best choice for low temperature, gas and low pressure static flange sealing applications.</p> <p>3. Application: valves, compressor cylinders, cryogenic equipment, rotary joints, etc.</p>	-110°C ~260	Standard type 20MPa extended or blocked country type 40MPa	-
FVB		<p>1. The end face sealing design of the V-shaped spring combination inclined lip, with pressure coming from the inside direction.</p> <p>2. It has medium load and low load V-shaped springs to meet dynamic applications.</p> <p>3. Application: valves, compressor cylinders, rotary joints, laser heads.</p>	-60°C ~260°C	Standard type 20MPa extended or blocked country type 40MPa	-
FHC		<p>1. The end face seal design of helical spring combined with arc lip, with pressure coming from the outside direction.</p> <p>2. With high spring load, it is the best choice for low temperature, gas and low pressure static flange sealing applications.</p> <p>3. Application: vacuum applications, compressor cylinders, rotary joints, and mechanical seals.</p>	-110°C ~260°C	Standard type 20MPa extended or blocked country type 40MPa	-
FVC		<p>1 The end face sealing design of the V-shaped spring combination inclined lip, with pressure coming from the outside direction.</p> <p>2. It has medium load and low load V-shaped springs to meet dynamic applications.</p> <p>3. Application: valves, compressor cylinders, rotary joints, laser heads.</p>	-60°C ~260°C	Standard type 20MPa extended or blocked country type 40MPa	-



## ● Face seal



## ● Face seal (inner compression) Groove Selection

Cross-section Code	Groove OD		Groove Depth		Groove Width	Radius
	D H10		h	Tolerance	L	r1
	Standard scope	Extension scope			min	max
A	10.0-13.9	10.0-40.0	1.45	+0.03	2.40	0.4
B	14.0-24.9	13.0-100.0	2.25	+0.05	3.60	0.4
C	25.0-45.9	18.0-200.0	3.10	+0.08	4.80	0.4
D	46-124.9	28.0-400.0	4.70	+0.10	7.10	0.6
E	125.0-999.9★	45.0-1000.0★	6.10	+0.12	9.50	0.6
F	1000.0-1500.0★★	110.0-1500.0★★	9.50	+0.15	15.00	0.8



## ● Face seal (outer compression) Groove Selection

Cross-section Code	Groove ID		Groove Depth		Groove Width	Radius
	d h10		h	Tolerance	L	r1
	Standard scope	Extension scope			min	max
A	3.0-8.9	3.0-25.0	1.45	+0.03	2.40	0.4
B	9.0-18.9	6.0-100.0	2.25	+0.05	3.60	0.4
C	19.0-41.9	10.0-200.0	3.10	+0.08	4.80	0.4
D	42-124.9	20.0-400.0	4.70	+0.10	7.10	0.6
E	125.0-799.9★	50.0-1200.0★	6.10	+0.12	9.50	0.6
F	800.0-1500.0★★	80.0-1500.0★★	9.50	+0.15	15.00	0.8

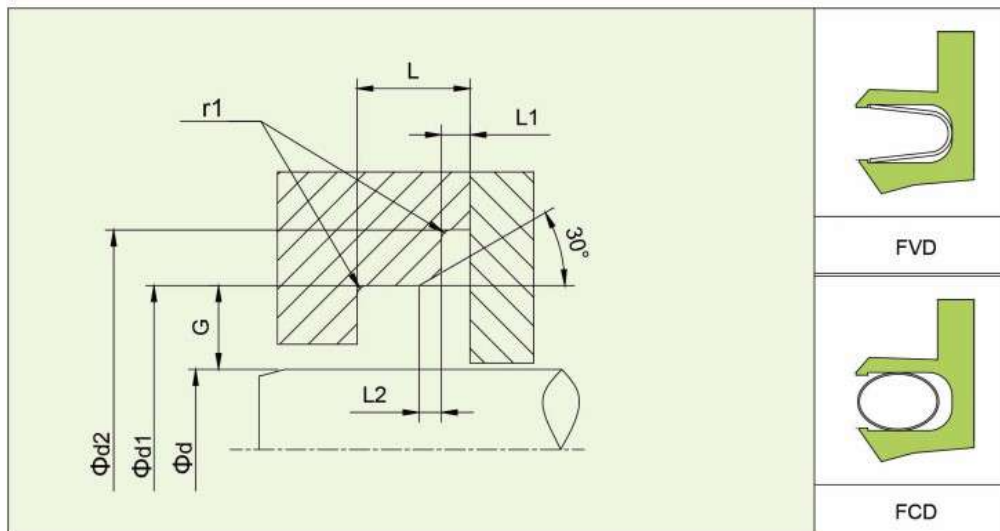
★ For diameter above 700mm, Lmin=10.8mm

★★ For diameter above 700mm, Lmin=17.8mm

## ● Rotary Seal

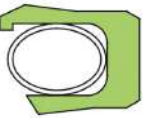
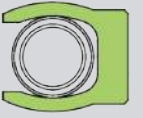
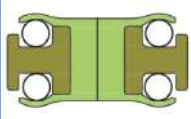



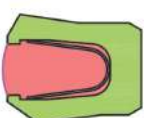
Product type		Product description	Technical data		
			Working temperature	Pressure	Speed
FVD		FVD is a rotary seal design based on FVR that adds flange braking edge. The flange edge prevents rotation of the seal in the groove, and the V-shaped spring ensures long life and the ability to compensate for wearing in dynamic sealing applications.	-60°C ~260°C	Standard type 15MPa Extension type 30MPa	Reciprocate 10m/s Rotary 2m/s
FCD		FCD is a rotary seal design based on FCR that adds a flange braking edge. The flange edge can prevent the seal from rotating in the groove, and the C-type spring has a relatively constant load, making the seal unaffected by hardware, eccentricity, and seal wear in dynamic sealing applications.	-60°C ~260°C	Standard type 15MPa Extension type 30MPa	Reciprocate 10m/s Rotary 2m/s

## ● Rotary Seal Groove Selection



Cross-section Code	Shaft Diameter		Groove Depth	Groove Diameter	Flange Edge Diameter	Groove Width	Flange Edge Width	Guiding Chamfer	Radius
	d h9		G	d1	d2	L	L1	L2	r1
	Standard Scope	Extension Scope		H9	H10	+0.2	-0.1	+0.2	max
B	8.0-19.9	5.0-100.0	2.50	d+5.0	d+9.0	3.6	0.85	0.8	0.4
C	20.0-39.9	10.0-200.0	3.50	d+7.0	d+12.5	4.8	1.35	1.1	0.4
D	40.0-399.9	20.0-500.0	5.25	d+10.5	d+17.5	7.1	1.80	1.4	0.6
E	400-700.0	35.0-800.0	7.00	d+14	d+22.0	9.5	2.80	1.6	0.6

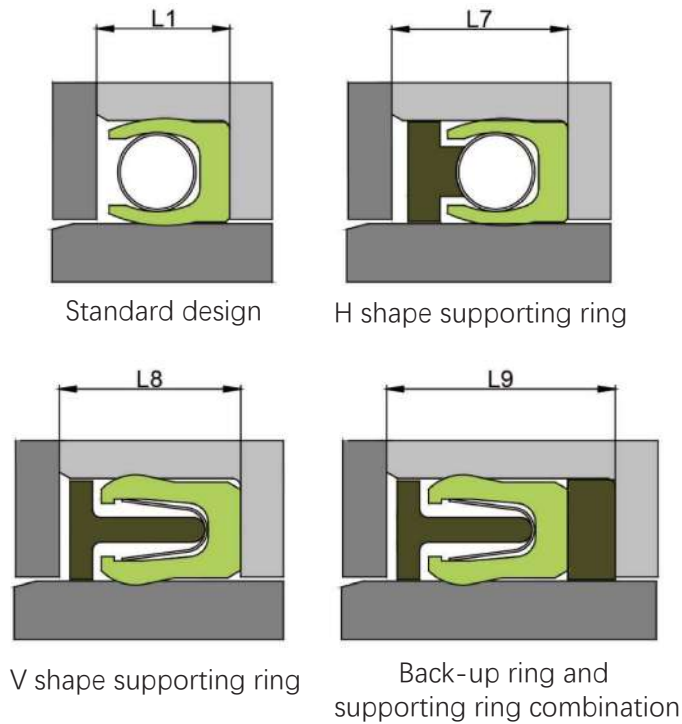
## ● Non-standard types

Product type		Product description	Technical data		
			Working temperature	Pressure	Speed
SCR		Scraper type design is suitable for abrasive media and is suitable for friction-sensitive and low-torque applications; accommodates wider hardware tolerances and eccentricities	-50°C ~250°C	Standard type 20MPa Extension type and back-up ring type 40MPa	Reciprocate 15m/s Rotary 1m/s
FDR		Ultra-low temperature one-way sealing design, special jacket material, and customized high-load alloy spring can achieve low-temperature and efficient sealing	-196°C ~200°C	Standard type 20MPa Extension type and back-up ring type 40MPa	-
FMR		Ultra-low temperature two-way sealing design can achieve pressure sealing in two directions. Special jacket material, customized high-load alloy spring, lined with stainless steel metal support, excellent sealing performance at low temperature.	-196°C ~200°C	Standard type 20MPa Extension type and back-up ring type 40MPa	-
FSR		Special reciprocating and rotating seal design, the O-ring in the outer groove of the seal ring can prevent the seal from moving with the shaft, and effective static sealing can be achieved at the outer ring.	-50°C ~250°C	-	Reciprocate 15m/s Rotary 1m/s
FBR		FBR is a double seal design based on FSR, developed to meet special needs; the one-piece design can reduce hardware processing costs, and is recommended for low-pressure reciprocating and rotating applications.	-50°C ~250°C	-	Reciprocate 15m/s Rotary 1m/s
FOR		Rubber elastomer O-rings replace metal springs, such as silicone rubber, nitrile rubber, fluorine rubber, etc. The price is cheaper than spring energized seals. Due to the limitations of rubber materials, it is recommended for low-demand working conditions.	-50°C ~250°C	Standard type 20MPa Extension type and back-up ring type 40MPa	Reciprocate 15m/s Rotary 1m/s
FNC		Spring energized lip seal that meets the high cleanliness requirements of food and medicine application. The spring cavity is filled with FDA-certified high-temperature silicone rubber, so that contaminants will not remain in the spring cavity, making cleaning and disinfection more convenient.	-50°C ~250°C	Standard type 20MPa Extension type and back-up ring type 40MPa	Reciprocate 15m/s Rotary 1m/s



## ● Supporting ring selection

The support ring and back-up ring are used to protect the lip seal from damage. When the pressure is forward, a back-up ring made of high modulus material is placed at the root of the lip seal to prevent the sealing ring from extruding; when there is back pressure, a support ring is added to the front of the lip seal to prevent the back pressure from deforming the sealing lip; The V-shaped spring lip seal and the support ring design can realize the self pressure relief function.

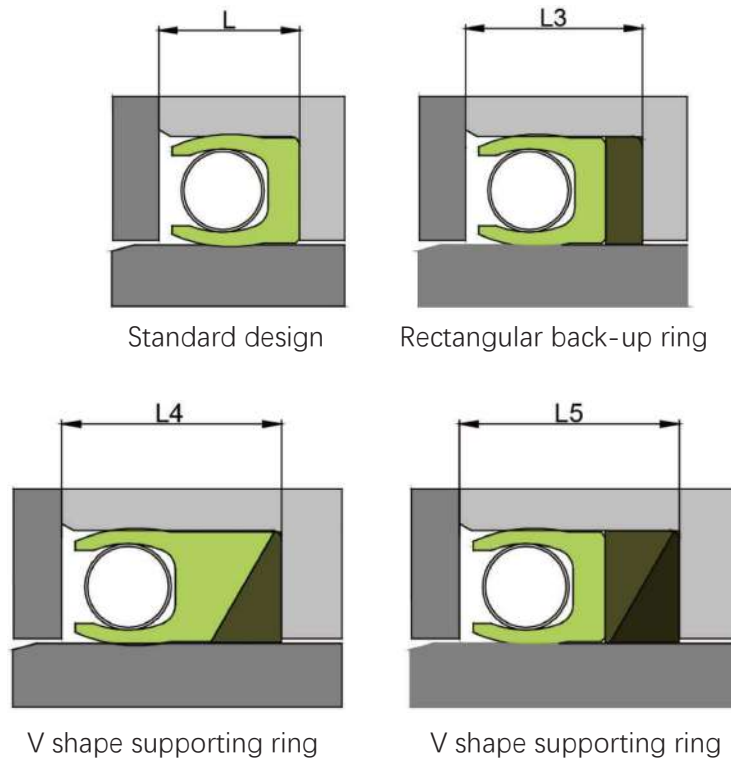


## ● Groove width recommendation

Cross-section Code	Standard design	H shape supporting ring	V shape supporting ring	Back-up ring and supporting ring combination
	L/mm	L7/mm	L8/mm	L9/mm
A	2.4	3.8	3.8	5.3
B	3.6	5	5	6.4
C	4.8	6.3	6.3	8.7
D	7.1	10.4	10.4	12.5
E	9.5	14.5	14.5	15.5
F	15	20	20	23.5

## ● Back-up Ring Selection

Under high pressure and high temperature conditions, if the extrusion gap is big, it may cause the sealing jacket to be extruded into the mating gap, which will cause premature failure of the seal. The extrusion gap should be controlled to a minimum, or by increasing the thickness of the seal root and using back-up rings to increase sealing pressure resistance.



## ● Groove width recommendation

Cross-section Code	Standard design	Rectangular back-up ring design	Triangular back-up ring design	Double triangular back-up ring design
	L1/mm	L3/mm	L4/mm	L5/mm
A	2.4	3.6	5.3	5.3
B	3.6	5	6.2	6.2
C	4.8	6.8	7.7	7.7
D	7.1	9.1	10.8	10.8
E	9.5	12	14.7	14.7
F	15	18.5	24.5	24.5

## ● Groove type

### Open groove

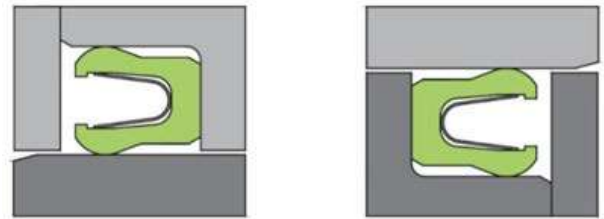
The open groove structure is the most recommended groove form. The open groove structure is a separate two-piece design. The lip seal does not need to be stretched or twisted for assembly.(Fig:4-1)

Typical features:

The lip seal does not need to be stretched or twisted for assembly.

Lip seal can be disassembled and assembled repeatedly without causing damage to it.

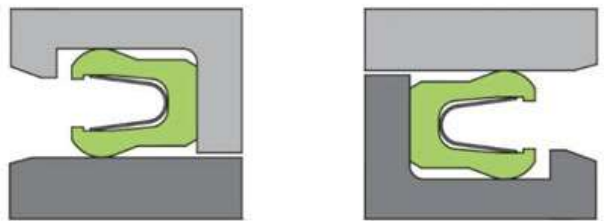
Two-piece structure groove type may increase manufacturing costs.



(Fig:4-1) Open groove

### Stepped groove

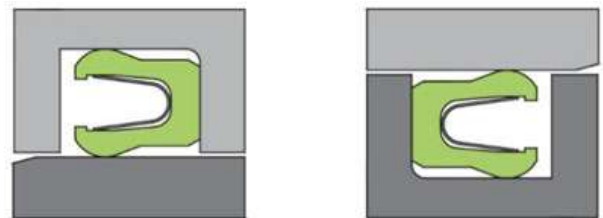
The stepped groove is a one-piece step design. The step is to keep the sealing ring in the groove. The height of the step is very small and no installation tools are required. The lip seal can be easily pushed into the groove. For piston sealing, Stepped groove is a good structure. Stepped grooves are not a good choice when there is back pressure.(Fig 4-2)



(Fig:4-2) Stepped groove

### Closed groove

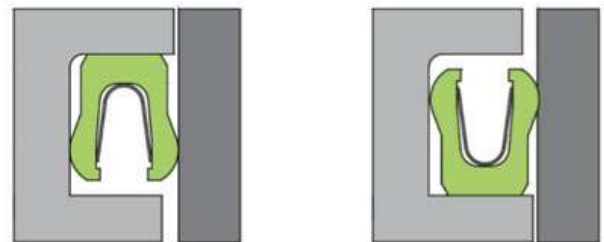
The closed groove is a one-piece integral design and is not recommended. It is only suitable for certain seal diameters, which requires stretching or compression to install the seal, and installation tools are needed, which may cause damage to the seal during removal.(Fig 4-3)



(Fig:4-3) Closed groove

### Groove for face seal

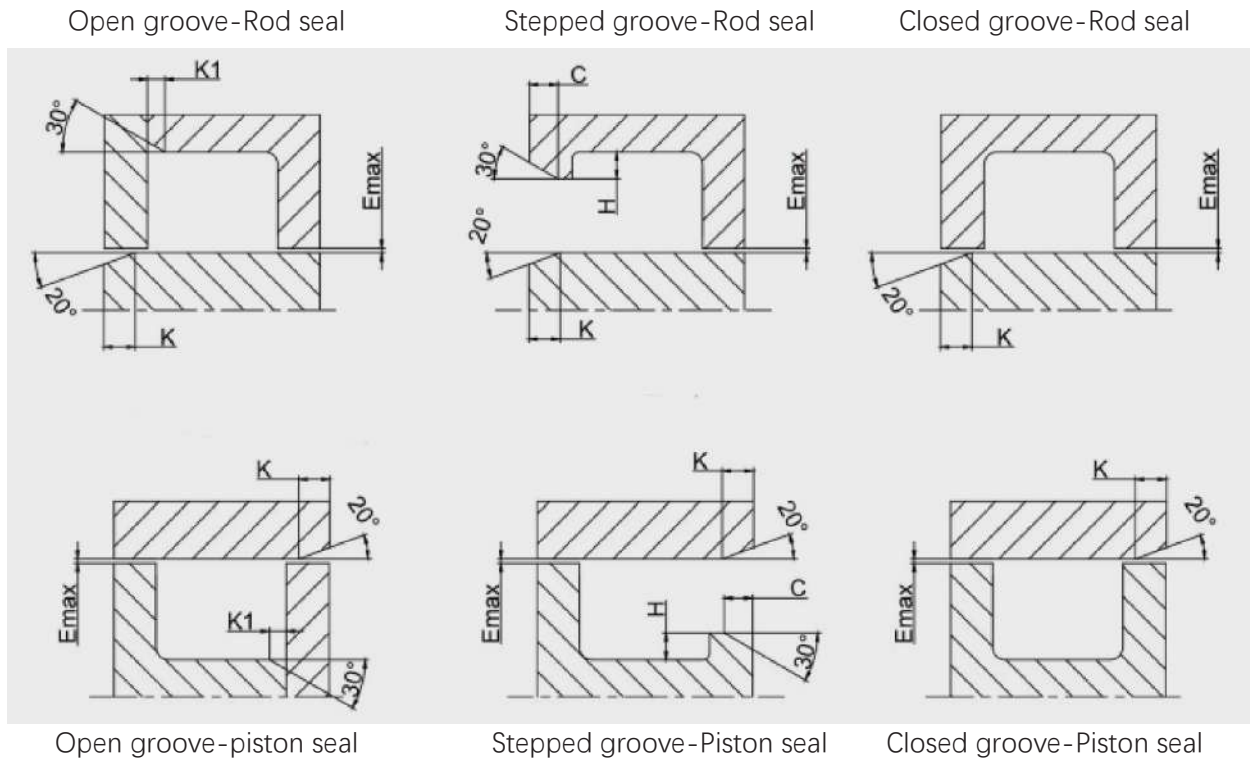
The face seal groove is the same as O-rings installation groove. Face seals are easy to be installed in this kind of groove. The groove wall of the pressure side is not a must.(Fig 4-4)



(Fig:4-4) Groove for face seal

## ● Installing Chamfers And Extruding Gaps

In order to avoid damage to the lip seal during installation and use, the design of hardware installation chamfers and extrusion gaps is particularly important. The extrusion gap should be kept to a minimum and should not exceed the recommended values in the table below. Parts without bearings or centering devices must have diameter clearance as the maximum clearance.



## ● Chamfers and extrusion gaps recommendation

Cross-section Code	K1	K	C	H	E max			
	min	min	min	min	3Mpa	10Mpa	20Mpa	40Mpa
A	0.5	1.2	0.7	0.4	0.15	0.1	0.08	0.05
B	0.6	1.5	1.1	0.6	0.2	0.15	0.1	0.07
C	1.0	2.5	1.25	0.7	0.3	0.2	0.15	0.08
D	1.5	4.5	1.4	0.8	0.4	0.25	0.2	0.1
E	2.0	5.5	1.6	0.9	0.5	0.3	0.25	0.12
F	3.0	10.5	2.6	1.5	0.75	0.5	0.4	0.2



## ● Surface roughness and hardness

### Surface roughness

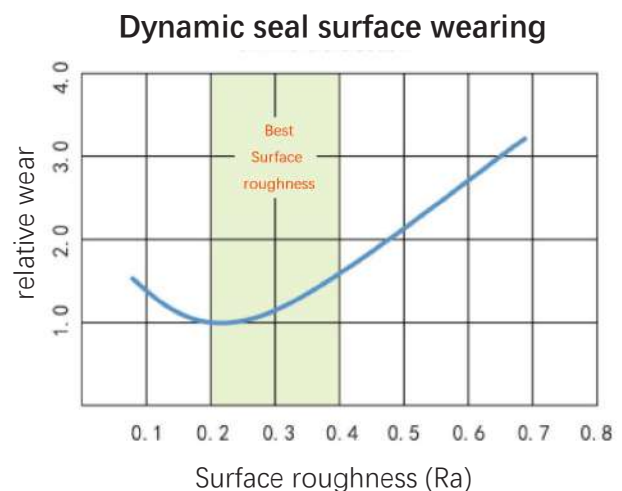
The surface roughness has a great impact on the performance of the lip seal. A rough surface will also cause leakage channels and accelerate the wear of the seal, directly affecting the sealing life. Therefore, good hardware surface finish is necessary to ensure the best sealing effect.

Under dry running and lubrication conditions, the mating surface for reciprocating and rotating motion is recommended to be between Ra0.2 and Ra0.4, with no bulges and a flat surface area of at least 50%. This structure facilitates the formation of a thin PTFE protective film or lubricating film on the running surface, thereby reducing seal wear.

Recommend Surface roughness (Ra)		
Media	Static	Dynamic
Low temperature and low molecular gases (hydrogen, helium, Freon)	0.1-0.3 $\mu$ m	0.1-0.2 $\mu$ m
Low viscosity media (water, alcohol, air, natural gas, aviation hydraulic oil)	0.3-0.8 $\mu$ m	0.2-0.3 $\mu$ m
High viscosity media (hydraulic oil, crude oil, gear oil, sealants, adhesives)	0.4-0.8 $\mu$ m	0.2-0.4 $\mu$ m

### Dynamic mating surface hardness

The higher the hardness of the sealing mating surface, the better the overall sealing performance. Good hardness can reduce the wear of the seal and increase the seal life. For slow to medium-speed reciprocating applications, it is recommended that the surface hardness be above HRC45; for high-speed reciprocating and rotating applications, it is recommended that the surface hardness be above HRC65.





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