

Dongsuh Ind. has achieved the world best quality and service through the complete process renovation such as the standardization of the production process and management of standard dimension, etc. based on the creative mind and passion as an innovative company for challenge and creative value of the unlimited possibility to realize the customer needs. We are also doing our utmost for the customer impression not for the customer satisfaction while securing the reliability based on the company's ultra precise production technology and know-how along with the cutting-edge facilities.

Our production services range from the nuclear power plants to chemical power plants, chemical plant and shipbuilding industry, etc. We fully concentrate on the production of high quality products along with the continuous R & D. Further, we have the thorough quality assurance system through the complete quality test by our in-house quality control and latest test facilities and to this end we are determined to do our utmost to take full responsibility and roles as a partner of our customers.

Challenging to the world based on the company's best technology and best quality for different products is the commitment of Dongsuh Ind. to realize the company's business philosophy to be a true enterprise. Active business and aggressive management are come from the confidence in the world best technology and products followed by the challenge mind for the future.

We are committed to ensuring our utmost to be the best value innovative enterprise for all of our customers and our all company members as the 21st century enterprise having the most competitive power under this unlimited competition age. We wish all of you more prosperity and progress.

Thank you
President **Seo Jeoung Kwon**



The attractive Company Creating absolute value



The DONGSUH is moving forward with a renewed spirit of service for customers.

Technical management leading the best product
Customer satisfaction leading customer impression
Our dreams come true as the World's No.1



Innovation for tomorrow

Environment

Humanism

Technology

Research & Development

sealing device

www.dongsuhco.com



index

Mechanical Packing

- 10 PRODUCT DESCRIPTION
- 21 TECHNICAL DATA

Die-Formed Packings & Gaskets

- 28 PRODUCT DESCRIPTION

Spiral Wound Gaskets

- 36 PRODUCT DESCRIPTION
- 42 SPIRAL WOUND GASKET DIMENSIONS

Mechanical Seal

- 48 PRODUCT DESCRIPTION
- 68 TECHNICAL DATA

Specialized Product

- 80 O-RING
- 90 SPRING ENERGIZED SEAL
- 102 V-PACKING
- 108 METAL O-RING
- 112 METAL GASKET
- 122 BLOWER SEAL KIT
- 126 SINGLE LIP SPRING LOADED SEAL
- 132 ACTUATOR SEAL KIT



DONGSUH INDUSTRY

The DONGSUH is moving forward with a renewed spirit of service for customers.

It is designed to have both high tensile strength and flexibility simultaneously for braiding continuous filament carbon fiber having high thermal conductivity and low coefficient of friction in a unique method of DONGSUH.

Mechanical Packing

We will make it for customer impressed not customer satisfaction.



Mechanical Packing

- 10 ALS 910C
Carbon Yarn Packing
- 11 ALS 900G
Reinforced Graphite Tape Packing
- 12 ALS 970
Carbon Graphite Packing
- 13 ALS 955W
Inconel Wire Graphite Tape Packing
- 14 ALS 420
PTFE Valve Packing
- 15 ALS 600
General Pump Packing
- 16 ALS 610
Synthetic Packing
- 17 ALS 620
PTFE Pump Packing
- 18 ALS 623S
Hybrid materials Packing
- 19 ALS 630N
Meta Aramid Packing
- 20 ALS 640K
Para Aramid Packing
- 21 **TECHNICAL DATA**

ALS 910C

Carbon Yarn Packing

It is designed to have both high tensile strength and flexibility simultaneously for braiding continuous filament carbon fiber having high thermal conductivity and low coefficient of friction in a unique method of DONGSUH. Such braiding feature allows for convenient use in any size of the device guaranteeing the most optimal flexibility unlike other conventional carbon packings which are to stress only high strength. DONGSUH ALS910C prevents the air gas or liquid from being leaked out or penetrated into the packing inside since the high purity inorganic agent for preventing penetration is spread inside or outside packing with the heat-resistant lubricant. The special braid technology available only by DONGSUH prevents such penetration preventing agent or heat-resistant lubricant from being leaked out. The surface will minimize the stem damage caused by friction and high purity graphite and molybdenum-based anti corrosion agent have been used to prevent the stem from being corroded so that the packing performance for something like friction and anti corrosion was much improved. For valve type, if you use it with DONGSUH ALS350 as End Ring, you can get the better sealing effect.

높은 열전도율과 낮은 마찰계수를 가진 연속 필라멘트 탄소섬유를 DONGSUH 만의 독특한 방식방법으로 편조시 고강도와 함께 유연성을 동시에 가질수 있도록 하였습니다. 이러한 방사 특징은 고강도만을 강조하는 기존의 탄소패킹과 달리 최적의 유연성을 보장하여 어떠한 장치 및 사이즈에도 손쉽게 사용가능하도록 하였습니다. 또한 DONGSUH ALS910C는 기체, 액체와 같은 사용유체가 패킹 내부를 통해 침투하는 것을 방지하기 위해 패킹 외부뿐만 아니라 내부에 고순도 무기질 침투방지제를 내열성 윤활제와 함께 내장하여 유체가 누출되거나 스며드는 것을 방지해줍니다. 그리고 DONGSUH만의 독특한 방사구성은 이러한 침투방지제 및 내열윤활제가 외부로 빠져나가는 것을 방지해줍니다. 그리고 표면은 마찰로 인한 스템 손상을 최소로 하고 스템부식을 방지하기위해 몰리브덴 기반의 부식방지제와 고순도 흑연 파우더를 사용하여 마찰특성 및 부식저항과 같은 패킹 성능을 월등히 향상 시켰습니다. 밸브용으로 DONGSUH ALS350과 함께 End Ring으로서 사용하면 더 나은 씰링효과를 기대할 수 있습니다.



TYPE : ALS910C DATE PACKAGED ±5%

SIZE	inch	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
	mm	3.2	4.8	6.4	7.9	9.5	11.1	12.7	14.2	15.9	19.1	22.2	25.4
M/LB (최소길이)	33.80	15.02	8.45	5.54	4.15	3.04	2.32	1.85	1.48	1.03	0.76	0.58	
포장단위 (Box)	BOX(LB)	2	2	2	5	2	5	10	5	10	5	10	10
	M/BOX	67.60	30.04	16.90	11.08	42.25	27.70	8.30	20.75	41.50	15.20	30.04	11.60
								23.20	9.25	18.50	14.80	10.30	7.60
													5.80

적용분야 / Application

- 대부분의 유체를 취급하는 모든 펌프 및 밸브
- All types of pumps and valves handling the most liquids

기술자료 / Technical data

- 온도한계 : 1050°F 450°C Steam
- 내화학성 : pH 0-14(강산화제 제외)
- 압력한계 : 3600PSI / 250Bar Valve / 500PSI / 34Bar Pump
- 속도 : 3000FPM (15m/s)
- Temp limit : 1050°F 450°C Steam
- Chemical-resistant : pH 0-14
- Pressure limit : 3600PSI / 250Bar Valve / 500PSI / 34Bar Pump
- Speed : 3000FPM (15m/s)

ALS 900G

Reinforced Graphite Tape Packing

This braid packing adds the molybdenum-based anti-corrosion agent to the high purity flexible graphite tape at below 50ppm Chloride which is equivalent to the nuclear power level with high degree of thermal conductivity and low coefficient of the friction, and it is the multi-purpose packing designed for use of both valves and pumps as it is more endurable with the continuous filament carbon fiber inside the braid as well as the graphite inside in order to be endurable at high RPM and pressure. Therefore it is not necessary to use End Ring for prevention of extrusion. Moreover, the most optimal flexibility is guaranteed with the special braiding technology of DONGSUH ALS900G, so that the adjustment or harmonization with the shaft or stem is outstanding as the entire distribution is uniformed even if it is mounted in any shaft or stem size. No wearing or scratching of the shaft or stem can be found due to the self-lubricating function of the high purity graphite while decreasing the packing life span significantly. DONGSUH ALS900G is suitable for overall conditions in the factory such as valve and pumps, etc. Using with ALS350 Graphite Molding Packing as End Ring will get better sealing effect.

높은 열전도율과 낮은 마찰계수를 가지고 원자력 등급에 해당하는 염화물(Chloride) 50ppm 이하 고순도 플렉시블 그라파이트 테이프에 몰리브덴 기반 부식방지제를 첨가하여 편조된 패킹으로 높은 회전속도와 압력에 견디기 위해 그라파이트 방사내부와 편조구조 내부에 연속 필라멘트 탄소섬유를 보강하여 내구성을 강화시켜 밸브 및 펌프 모두에 사용되기 위해 설계된 다목적 패킹입니다. 따라서 압출방지용 End Ring을 사용할 필요가 없습니다. 또한 일반 그라파이트 패킹과 달리 DONGSUH ALS900G의 독특한 편조방식으로 최적의 유연성을 보장하여 어떠한 샤프트나 스템사이즈에 장착하더라도 전체적 분포가 균일해지는 특성이 있어 샤프트나 스템과의 조화 및 조정력이 탁월합니다. 고순도의 그라파이트 자체 윤활기능으로 샤프트나 스템의 마모 및 굵힘이 사라지고 패킹 수명은 현저히 증가합니다. DONGSUH ALS900G은 밸브 및 펌프등 공장전반에서 사용되기에 적합한 구조입니다. ALS350 Graphite Molding Packing과 함께 End Ring으로서 사용하면 보다높은 씰링효과를 기대할 수 있습니다.



TYPE : 900G DATE PACKAGED ±5%																	
SIZE	inch	1/8	3/16	1/4	5/16	3/8		7/16		1/2		9/16	5/8	3/4	7/8	1	
	mm	3.2	4.8	6.4	7.9	9.5		11.1		12.7		14.2	15.9	19.1	22.2	25.4	
M/LB (최소길이)		31.38	13.95	7.84	5.15	3.84		2.80		2.14		1.71	1.36	0.95	0.70	0.53	
포장단위 (Box)	BOX(LB)	2	2	2	5	2	5	2	5	10	5	10	5	10	10	10	
	M/BOX	67.76	27.90	15.68	39.20	10.30	25.75	7.66	19.15	38.30	14.00	28.00	10.70	21.40	8.55	17.10	13.60
																5.30	

적용분야 / Application

- 밸브
- 펌프(발전설비 보일러급수 및 복수펌프 등)
- SOOT BLOWER
- 그외 여러공장에서 효과적 씰링이 요구되는 모든곳
- Valve
- Pump (Power plant, boiler water supply and condensate pump, etc.)
- SOOT BLOWER
- All other places requiring efficient sealing in the factory

기술자료 / Technical data

- 온도한계 : 840°F 450°C Air / 1200°F 650°C Steam
- 내화학성 : pH 0-14(강산화제 제외)
- 압력한계 : 4300PSI / 300Bar / 440PSI / 30Bar Pump
- 속도 : 4000FPM / 20m/s
- Temp limit : 840°F 450°C Air / 1200°F 650°C Steam
- Chemical-resistant : pH 0-14 (except oxidant)
- Pressure limit : 4300PSI / 300Bar / 440PSI / 30Bar Pump
- Speed : 4000FPM / 20m/s

ALS 970

Carbon Graphite Packing

DONGSUH ALS970 is a new type of packing developed and manufactured adding special heat-resistant lubricant after braiding with the continuous filament carbon yarn reinforced in each edge part with high purity flexible graphite below 50ppm Chloride which is equivalent to the nuclear power level. The application ranges are so wide with the outstanding performances because it has higher heat-resistance with the functions to avoid being pushed by pressure. With the high purity inorganic agent for penetration prevention inside, it prevents the liquid from being leaked out or penetrated and further such packing functions as friction and anti-corrosion were much improved due to the high purity graphite powder and molybdenum-based anti corrosion agent adopted. ALS 970 is the outstanding product to resolve many problems in valve and pump for high pressure and high temperature.

DONGSUH ALS970은 원자력 등급에 해당하는 염화물(Chloride) 50ppm 이하 고순도 Flexible Graphite에 각 모서리 부분을 강인한 연속 필라멘트 Carbon Yarn을 함께 편조한 후 특수 내열운활제를 첨가하여 제작되어진 새롭게 개발된 패킹으로 높은 내열성과 함께 압력에 의한 밀림을 방지하고 그 활용범위가 광범위한 탁월한 성능을 가진 패킹입니다.

또한 내부에 고순도 무기질 침투방지제를 내장하여 유체가 누출되거나 스며드는것을 방지해주며 몰리브덴 기반 부식방지제와 고순도 흑연 파우더를 사용하여 마찰특성 및 부식저항과 같은 패킹성능을 향상시켰습니다. ALS 970은 고온, 고압용 밸브 및 펌프에 대한 여러문제점을 해결해 줄수 있는 우수한 제품입니다.



TYPE : ALS970C DATE PACKAGED ±5%																	
SIZE	inch	1/8	3/16	1/4	5/16	3/8		7/16		1/2		9/16		5/8	3/4	7/8	1
	mm	3.2	4.8	6.4	7.9	9.5		11.1		12.7		14.2		15.9	19.1	22.2	25.4
M/LB (최소길이)	33.80	15.02	8.45	5.54	4.15	3.04		2.32		1.85		1.48	1.03	0.76	0.58		
포장단위 (Box)	BOX(ILB)	2	2	2	5	2	5	2	10	5	10	5	10	10	10	10	
	M/BOX	67.60	30.04	16.90	11.08	42.25	27.70	8.30	20.75	41.50	15.20	30.04	11.60	23.20	9.25	18.50	14.80
																	5.80

적용분야 / Application

- 화력발전소 고온 고압밸브
- 원자력발전소 고온 고압밸브
- 발전설비 보일러, 급수및 복수펌프등
- 각종 밸브류(급수, 복수, 터빈, 순환수)
- 펌프, Mixer 그외
- High temp. and high pressure valve for thermal power plant
- High temp. and high pressure valve for nuclear power plant
- Power plant, boiler, water supply and condensate pump, etc.
- Different types of valves (water supply, condensate pump, turbine, water circulation pump, etc.)
- Pumps and mixers and others

기술자료 / Technical data

- 온도한계 : 1050°F 450°C Steam
- 내화학성 : pH 0-14(강산화제 제외)
- 압력한계 : 3600PSI / 250Bar Valve / 500PSI / 34Bar Pump
- 속 도 : 3000FPM (15m/s)
- Temp limit : 1050°F 450°C Steam
- Chemical-resistant : pH 0-14 (except oxidant)
- Pressure limit : 3600PSI / 250Bar Valve / 500PSI / 34Bar Pump
- Speed : 3000FPM (15m/s)

ALS 955W

Inconel Wire Graphite Tape Packing

DONGSUH ALS955W is the best grade of packing material developed for only high temp. and high pressure valve. Inconel wire is specially reinforced with the braid of the high-purity graphite tape below 50ppm of Chloride which is equivalent to the nuclear power level with the high quality anti-corrosion agent added, so this latest packing material is second-to-none when it comes to the maximum temp. and maximum pressure for the power plant in the country as a braided packing. DONGSUH ALS955W produced by the in-house special braid technology is convenient for installation and extrusion-resistance since it is dense and flexible. Some special heat-resistant lubricant is added along with the penetration prevention agent so as not to penetrate the liquid into the packing inside reducing the friction of the stem as much as possible for long time use as it is dispersed to outside from the packing inside at high temperature. In addition, it is coated with special lubricant together with the best quality anti-corrosion agent for the packing outside to reduce the stem wearing and corrosive resistance significantly. DONGSUH ALS955W is the best quality packing material which has been proved in high temp and high pressure valve.

DONGSUH ALS955W는 고온 고압 밸브 전용으로 개발된 최고등급의 패킹입니다. 최고등급의 부식방지제가 첨가된 원자력 등급에 해당하는 염화물50ppm 이하 고순도 그라파이트 테이프가 조밀하게 쌓인가닥을 Inconel® Wire가 특수형태로 보강하여 편조된 패킹으로 국내 발전설비 최고온도, 최고압력에서 성능이 입증된 명실상부한 첨단패킹입니다. 자체 개발된 편조기술로 만들어진 DONGSUH ALS955W는 치밀하면서도 유연성이 우수하여 내압출성 및 설치가 용이합니다. 패킹내부에는 유체가 패킹내부로 스며들지 못하도록 하는 침투방지제와 함께 특수 내열윤활제가 첨가되어 있어 고온시 패킹 내부에서 외부로 분산되어 장시간 사용시 스템의 마찰감소를 극대화 하였으며 패킹외부에도 최고등급의 부식방지제와 함께 특수윤활제를 코팅처리하여 부식저항 및 스텰마모를 현저히 줄였습니다. DONGSUH ALS955W는 고온, 고압 밸브에서 성능이 입증된 최고품질의 패킹입니다.



TYPE : ALS955W DATE PACKAGED ±5%

SIZE	inch	1/8	3/16	1/4	5/16		3/8		7/16		1/2		9/16		5/8	3/4	7/8	1	
	mm	3.2	4.8	6.4	7.9		9.5		11.1		12.7		14.2		15.9	19.1	22.2	25.4	
M/LB (최소길이)	25.85	11.48	6.46	3.24		2.93		2.28		1.74		1.39		1.11	0.77	0.60	0.46		
포장단위 (Box)	BOX(LB)	2	2	2	5	2	5	2	5	10	5	10	5	10	5	10	10	10	
	M/BOX	51.70	22.96	12.92	32.30	8.48	21.20	5.86	14.65	29.30	11.40	22.80	8.70	17.40	6.95	13.90	11.10	7.70	6.00

적용분야 / Application

- 각종 고온 고압밸브
- 화력발전소 고온 고압밸브
- 원자력발전소 고온 고압밸브
- Different valves for high temp and high pressure
- High temp and high pressure valves for thermal power plant
- High temp and high pressure valves for nuclear power plant

기술자료 / Technical data

- 온도한계 : 840°F 450°C Air / 1200°F 650°C Steam
- 내화학성 : pH 0-14(강산화제 제외)
- 압력한계 : 8000PSI / 550Bar
- Temp limit : 840°F 450°C Air / 1200°F 650°C Steam
- Chemical-resistant : pH 0-14 (except oxidant)
- Pressure limit : 8000 PSI / 550Bar

※Inconel®은 International Nickel Company의 등록상표입니다.

ALS 420

PTFE Valve Packing

DONGSUH ALS420 is PTFE packing for valve only. Special coating was applied on PTFE fiber with PTFE lubricant and this unique braid technology developed by Dongsuh has outstanding features durable to high pressure and it can work in almost every field. No hardened for long time use and the packing function is outstanding. With the excellent chemical-resistant property, it is suitable for conveying line of such liquids as strong chemical substances, etc.

DONGSUH ALS420은 밸브전용 순수 PTFE 패킹입니다. PTFE 섬유에 PTFE 윤활제를 특수하게 코팅한 패킹으로 DONGSUH만의 독자적인 편조기술로 고압에 견디는 특성이 탁월하고 산소를 비롯한 거의 모든매체에 적용 가능합니다.

또한 장시간 사용해도 경화되지 않고 패킹성능이 떨어지지 않습니다.

뛰어난 내화학성은 강한 화학물질과 같은 유체의 이송라인에 적합합니다.



TYPE : ALS420 DATE PACKAGED ±5%

SIZE	inch	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
	mm	3.2	4.8	6.4	7.9	9.5	11.1	12.7	14.2	15.9	19.1	22.2	25.4
M/LB (최소길이)		21.97	9.76	6.10	4.00	2.77	2.02	1.74	1.39	1.11	0.77	0.57	0.43
포장단위 [Box]	BOX(LB)	2	2	2	5	2	5	10	5	10	5	10	10
	M/BOX	43.94	19.52	12.2	30.50	8.00	20.00	5.54	13.85	27.70	10.10	20.20	8.70

적용분야 / Application

- 내산성이 요구되는 밸브
- 증기 및 강한 화학성이 요구되는 밸브
- 260°C 이하의 저압 Control Valve
- Valves requiring acid resistance
- Valves requiring vapour or steam and strong chemical property.
- Control valve for below 260°C

기술자료 / Technical data

- 온도한계 : 500°F 260°C
- 내화학성 : pH 0-14
- 압력한계 : 3000PSI / 210Bar
- Temp limit : 500°F 260°C
- Chemical-resistant : pH 0-14
- Pressure limit : 3000 PSI / 210Bar

ALS 600

General Pump Packing

DONGSUH ALS600 is the excellent air-tight packing product with the chemical resistant property for general use pump packing specially manufactured by Dongsuh for the unique impregnated method. It added heat-resistant lubricant and PTFE to acrylic fiber.

DONGSUH ALS600은 Acrylic 섬유에 PTFE 및 특수 내열 윤활제를
DONGSUH만의 독자적인 함침방법으로 제작된 일반 펌프파킹으로 내화학성과 밀봉성이 우수한 제품입니다.



TYPE : ALS600 DATE PACKAGED ±5%																	
SIZE	inch	1/8	3/16	1/4	5/16	3/8		7/16		1/2		9/16		5/8	3/4	7/8	1
	mm	3.2	4.8	6.4	7.9	9.5		11.1		12.7		14.2		15.9	19.1	22.2	25.4
M/LB (최소길이)		25.85	11.48	6.86	4.50	3.32		2.43		1.86		1.48		1.18	0.83	0.65	0.49
포장단위 [Box]	BOX(LB)	2	2	2	5	2	5	2	5	10	5	10	5	10	10	10	10
	M/BOX	51.70	22.96	13.72	34.40	9.00	22.50	6.64	16.60	33.20	12.15	24.30	9.30	18.60	7.40	14.80	11.80

적용분야 / Application

- 일반 펌프파킹
- General pump packing

기술자료 / Technical data

- 온도한계 : 500°F (260°C)
- 내화학성 : pH 0-14
- 압력한계 : 1600FPM (8m/s)
- Temp limit : 500°F (260°C)
- Chemical-resistant : pH 0-14
- Pressure limit : 1600FPM (8m/s)

ALS 610

Synthetic Packing

DONGSUH ALS 610 is for multi-purpose packing impregnated with much more PTFE lubricants than other pump packings along with DONGSUH's special synthetic fiber, so it does not have lubrication problem for the initial operation.

The packing was specially developed by Dongsuh to reduce the shaft wearing as the inside lubricant will keep playing lubrication role during the operation time.

It also maintains higher strength than other ordinary packings using the unique braid know-how of DONGSUH ALS 610 to keep the packing density constantly when operating the product as Dongsuh's special braid structure will restrict the change of the penetration prevent agent.

DONGSUH ALS 610은 합성사 개념이 도입된 DONGSUH만의 독자적 특수 합성섬유에 PTFE 윤활제가 기존 펌프패킹보다
다량 함침 되어 제작된 다목적용 패킹으로 초기 작동시 윤활에 의한 문제가 발생하지 않으며. 운전 기간내 내부윤활제가 지속적으로
윤활 역할을 함으로서 사프트 마모를 감소시키도록 특수 개발된 패킹입니다.
또한 DONGSUH ALS 610의 독자적 편조방법을 통해 일반 패킹보다 높은 강도를 유지할 수 있으며. DONGSUH만의
특수 방사구조가 침투방지제의 변화를 제한함으로서 제품 운전시 패킹밀도를 일정하게 유지시켜 주는 역할까지 수행합니다.



TYPE : ALS610 DATE PACKAGED ±5%

SIZE	inch	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
	mm	3.2	4.8	6.4	7.9	9.5	11.1	12.7	14.2	15.9	19.1	22.2	25.4
M/LB (최소길이)	29.29	13.02	8.45	5.54	3.83	3.04	2.32	1.85	1.48	1.03	0.76	0.58	
포장단위 (Box)	BOX(LB)	2	2	2	5	2	5	10	5	10	5	10	10
	M/BOX	58.58	26.04	16.90	42.25	11.08	27.70	7.66	19.15	38.30	15.20	30.40	11.60

적용분야 / Application

- 교반기
- 회전 및 왕복 펌프의 축
- Agitator
- Rotation and reciprocating pump shaft

기술자료 / Technical data

- 온도한계 : 500°F (260°C)
- 내화학성 : pH 4-10
- 압력한계 : 2000FPM (10m/s)
- Temp limit : 500°F (260°C)
- Chemical-resistant : pH 4-10
- Pressure limit : 2000FPM (10m/s)

ALS 620

PTFE Pump Packing

DONGSUH ALS 620 is the PTFE packing for pump only with the outstanding heat-resistance, chemical resistance and lubrication properties. It was specially processed with pure PTFE fiber and PTFE lubricant so that the packing capability will remain unchanged as it maintains the density even for long time use. DONGSUH ALS 620 packing is suitable for such industries requiring chemical-resistance since it was developed for the purpose of prevention of contamination.

DONGSUH ALS 620은 내열성, 내약품성, 윤활성 등이 우수한 펌프전용 PTFE 패킹으로 순수 PTFE 섬유와 PTFE 윤활제가 특수처리 되어 장기간 사용시에도 밀도 유지가 가능하기에 패킹성능이 지속적으로 떨어지는 현상을 초래하지 않습니다. DONGSUH ALS 620 패킹은 오염방지 목적의 내화학성이 요구되는 산업분야에 사용하기가 적합합니다.



TYPE : ALS620 DATE PACKAGED ±5%																		
SIZE	inch	1/8	3/16	1/4	5/16	3/8		7/16		1/2		9/16		5/8	3/4	7/8	1	
	mm	3.2	4.8	6.4	7.9	9.5		11.1		12.7		14.2		15.9	19.1	22.2	25.4	
M/LB (최소길이)	24.41	10.27	5.78		3.79		2.62		2.03		1.55		1.23		0.98	0.69	1.50	0.39
포장단위 (Box)	BOX(LB)	2	2	2	5	2	5	2	5	10	5	10	5	10	10	10	10	10
	M/BOX	48.82	20.54	11.56	28.90	7.58	18.95	5.24	13.10	26.20	10.15	20.30	7.75	15.50	6.15	12.30	9.80	6.90
																		39.90

적용분야 / Application

- 내화학성이 요구되는 펌프
- 회전 및 왕복펌프의 축
- 교반기
- Pumps requiring chemical-resistance
- Rotation and reciprocating pump shaft
- Agitator

기술자료 / Technical data

- 온도한계 : 500°F (260°C)
- 내화학성 : pH 0-14
- 압력한계 : 1600FPM (8m/s)
- Temp limit : 500°F (260°C)
- Chemical-resistant : pH 0-14
- Pressure limit : 1600FPM (8m/s)

ALS 623S

Hybrid materials Packing

ALS 623S was developed for pump packing with which the graphite particle is impregnated for outstanding lubrication with PTFE fiber. ALS 623S packing is suitable for the pump requiring heat-resistance and chemical resistance. The product is superior to the thermal conductivity and adhesiveness of the pump rotation shaft. ALS 623S packing has strong points in long life, low wearing and excellent leakage control, etc. Its another advantage is that it does not affect the damage on the pump shaft due to the outstanding lubricating capability.

ALS 623S는 PTFE 섬유에 탁월한 윤활작용을 위해 GRAPHITE 입자가 특수 분산 함침되어 있는 펌프용 패킹으로 개발된 제품입니다. ALS 623S 패킹은 내열성, 내약품성이 요구되는 펌프에 적합하고 열전도율과 펌프 회전의 축에 대한 밀착성이 대단히 우수한 제품입니다. ALS 623S 패킹은 긴 수명, 낮은 마모성, 뛰어난 누출제어 등의 강점을 지녔으며 탁월한 윤활작용으로 인해 펌프 축에 손상을 주지 않는 이점을 가지는 우수한 제품입니다.



TYPE: ALS623S DATE PACKAGED ±5%

SIZE	inch	1/8	3/16	1/4	5/16	3/8		7/16		1/2		9/16		5/8	3/4	7/8	1	
	mm	3.2	4.8	6.4	7.9	9.5		11.1		12.7		14.2		15.9	19.1	22.2	25.4	
M/LB (최소길이)		17.57	9.76	5.78	3.79	2.89		2.02		1.55		1.23		0.98	0.69	0.51	0.39	
포장단위 (Box)	BOX(LB)	2	2	2	5	2	5	2	5	10	5	10	5	10	10	10	10	
	M/BOX	35.14	19.52	11.56	28.90	7.58	18.95	5.78	1445	28.90	10.10	20.20	7.75	15.50	6.15	12.30	9.80	6.90

적용분야 / Application

- 고속 펌프용 • High speed pump
- 원심 펌프용 • Centrifugal pump
- 교반기, Mixer • Agitator and Mixer

기술자료 / Technical data

- 온도한계 : 500°F (290°C)
- 내화학성 : pH 1-13
- 압력한계 : 3600FPM (18m/s)
- Temp limit : 500°F (290°C)
- Chemical-resistant : pH 1-13
- Pressure limit : 3600FPM (18m/s)

ALS 630N

Meta Aramid Packing

DONGSUH ALS 630N is the packing impregnating PTFE with aramid fiber to reduce the shaft and sleeve wearing as lowest as possible caused by the heat damage while preventing the leakage in the most efficient way. Therefore, we can expect the effect of reducing the power significantly and there is no sticking because of no heat damage at high rotation speed of the shaft.

Especially, DONGSUH ALS 630N guarantees superior packing capability when it is used under bad mechanical conditions with poor working environment unlike other ordinary packings thanks to the powerful strength of the heat-resistance and good tensile strength in aramid fiber. You can get the effect of heat-resistance, chemical-resistance and electric-insulation, etc. through the use of DONGSUH ALS 630N.

DONGSUH ALS 630N은 아라미드 섬유에 PTFE를 함침하여 설계된 패킹으로 뛰어난 누설방지와 열손상에 의한 샤프트 및 슬리브 마모를 최소로 줄여줍니다. 따라서 높은 샤프트 회전속도에도 열손상이 일어나지 않으므로 눌러붙은 현상이 없어 현저한 동력감소 효과를 기대할 수 있습니다. 열에 대한 저항력이 강한 강점과 아라미드 섬유의 강한 인장강도로 인해 일반적인 패킹과 달리 DONGSUH ALS 630N은 작업환경이 좋지 않고 기계적 환경이 악조건인 곳에 사용시 월등한 패킹성능을 보장합니다. DONGSUH ALS 630N을 통해 내열성, 내화학성, 전기절연성 등의 효과를 기대할 수 있습니다.



TYPE: ALS630N DATE PACKAGED ±5%

SIZE	inch	1/8	3/16	1/4	5/16	3/8		7/16		1/2		9/16	5/8	3/4	7/8	1
	mm	3.2	4.8	6.4	7.9	9.5		11.1		12.7		14.2	15.9	19.1	22.2	25.4
M/LB (최소길이)		25.85	11.48	6.86	4.50	3.32		2.43		1.86		1.48	1.18	0.83	0.65	0.49
포장단위 (Box)	BOX(LB)	2	2	2	5	2	5	2	5	10	5	10	5	10	10	10
	M/BOX	51.70	22.96	13.72	34.40	9.00	22.50	6.64	16.60	33.20	12.15	24.30	9.30	18.60	7.40	14.80

적용분야 / Application

- Slurry-용 펌프 • Slurry pump
- 해수펌프 • Sea water pump
- 교반기, Mixer • Agitator and Mixer

기술자료 / Technical data

- 온도한계 : 500°F (290°C)
- 내화학성 : pH 2-12
- 압력한계 : 2000FPM (10m/s)
- Temp limit : 500°F (290°C)
- Chemical-resistant : pH 2-12
- Pressure limit : 2000FPM (10m/s)

ALS 640K

Para Aramid Packing

DONGSUH ALS640K is the wear-resistant packing produced by Dongsuh's unique braided know-how and impregnated technology with PTFE and special heat-resistant lubricant on para-aramid fiber. ALS640K has effect to prevent the sleeve and shaft from contamination or stain and it is designed to have endurable pressure, temperature, chemical-resistance and wear-resistance for all parts. ALS640K is most advantageous for slurry in the liquid rather than other ordinary packings due to the high tensile strength, so it is suitable to liquid pump with serious wearing slurries.

DONGSUH ALS640K은 파라계아라미드 섬유에 PTFE 및 특수내열 윤활제를 DONGSUH만의 고유의 방사 방식과 함침방법으로 제작된 내마모성 패킹입니다. ALS640K은 슬리브와 샤프트의 오염 및 얼룩짐을 방지하는 효과가 있고 압력, 온도, 내화학성, 내마모성 모든부분에 대하여 강하게 설계되었습니다.

ALS640K는 높은 인장강도로 인해 일반 패킹보다 유체내 슬러리에 많은 강점을 가지고 있기에 마모성 슬러리가 심한 유체 이송펌프에 적합한 제품입니다.



TYPE : ALS640K DATE PACKAGED ±5%																		
SIZE	inch	1/8	3/16	1/4	5/16	3/8		7/16		1/2		9/16		5/8	3/4	7/8	1	
	mm	3.2	4.8	6.4	7.9	9.5		11.1		12.7		14.2		15.9	19.1	22.2	25.4	
M/LB (최소길이)	17.57	9.76	5.78		3.79	2.89		2.02		1.55		1.23		0.98	0.69	0.51	0.39	
포장단위 [Box]	BOX(LB)	2	2	2	5	2	5	2	5	10	5	10	5	10	10	10	10	
	M/BOX	35.14	19.52	11.56	28.90	7.58	18.95	5.78	1445	28.90	10.10	20.20	7.75	15.50	6.15	12.30	9.80	6.90
																	3.90	

적용분야 / Application

- 원심력펌프 왕복펌프 회전펌프
- Mixer
- 교반기,
- Centrifugal pump, reciprocating pump and rotation pump
- Mixer
- Agitator

기술자료 / Technical data

- 온도한계 : 500°F (260°C)
- 내화학성 : pH 1-13
- 압력한계 : 300PSI (20bar)
- 축의선속도 : 2000FPM (10m/s)
- Temp limit : 500°F (260°C)
- Chemical-resistant : pH 1-13
- Pressure limit : 300PSI (20bar)
- Lineal speed of the shaft : 2000FPM (10m/s)

펌프 및 밸브 팩킹의 설치

INSTALLATIONS OF PUMP AND VALVE PACKINGS

파킹설치후 사고의 원인은 잘못된 팩킹설치에 있습니다. 효과적인 팩킹을 설치하기 위해 다음의 단계에 따라 하시면 됩니다.

Many packing failures are due to incorrect installation of the packing.

The following steps have been devised to ensure effective installation of packings.

1. 스타팅 박스내 기존사용 팩킹 제거 / Remove all the old packing from the stuffing box

스타팅 박스내를 깨끗하게 청소하고 샤프트나 슬리브의 마모를 검사하고 만약 마모가 심하면 교체 및 정비합니다.

Clean box and shaft thoroughly and examine shaft or sleeve for wear and scoring. Replace shaft or sleeve if wear is excessive.

2. 올바른 팩킹너비 사용 / Use the correct cross-section of packing or die-formed rings

특수한 경우를 제외하고는 모든 표준 샤프트사이즈는 $1/16"$ 씩 증가합니다. 만약 계산된 사이즈가 $1/16"$ 아래이면 더 큰 사이즈를 사용하여야 합니다. 예를 들어 스타팅 박스 내경이 $3-7/16"$ 이고 샤프트 외경이 $2-1/2"$ 이면 팩킹 너비는 $7/16"$ 을 사용하는보다 $1/2"$ 을 사용하는 것이 좋습니다.

Except for special precision molded packings, all standard shaft packings are made up in increments of $1/16"$ from the smallest size available and up. For most application if the calculated size figures under a 16th of an inch it is generally best to use the next size greater.

Thus, if the shaft measures $2-1/2"$ and the inside of the stuffing box $3-7/16"$ the size of packing to use would be $1/2"$ rather than $7/16"$.

3. 팩킹 절단 / Cutting of packing

팩킹링을 자르는 가장 좋은 방법은 샤프트와 같은 직경의 심봉위에서 팩킹을 자르는 것입니다. 각각의 링을 같은 방법으로 자르거나 먼저 잘려진 링을 이용하여 계속 자르면 됩니다. 링의 OD둘레가 ID둘레보다 더 크다는 것을 기억하셔야 합니다.

The best way to cut packing rings is to cut them on a mandrel the same diameter as the shaft in the stuffing box area.

Each successive ring can be cut in the same manner, or the first ring can be used as a master from which the balance of the rings are cut. Remember that the O.D. circumference of the ring is greater than the I.D. circumference.

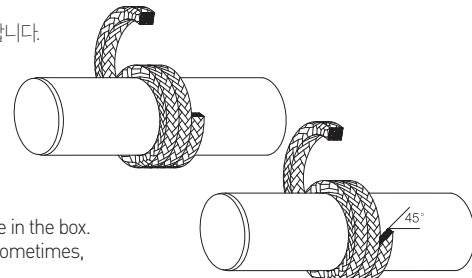
4. 설치 / Installation

한번에 한개의 링을 설치해야 하며 절단 팩킹링들은 최소 90도를 이루며 설치되어야 합니다.

또한 각각의 링은 탬핑툴로 견고하게 설치해야 합니다.

만약 글랜드 follower에만 의존하여 설치하면 맨먼저 설치한 링에 비해 마지막 링이 빨리 마모되는 경우가 있습니다.

Install one ring at a time. Joint of successive rings should be staggered and be kept at least 90 degree apart. Each individual ring should be firmly seated with a tamping tool. Never depend on the follower entirely to seat a set of rings properly - this practice will jam the last rings installed but leave the front rings loose in the box. The result is excessive and rapid wear of rear rings, erratic packing performance, sometimes, twisting and tearing of the front rings because they are loose in the stuffing box.

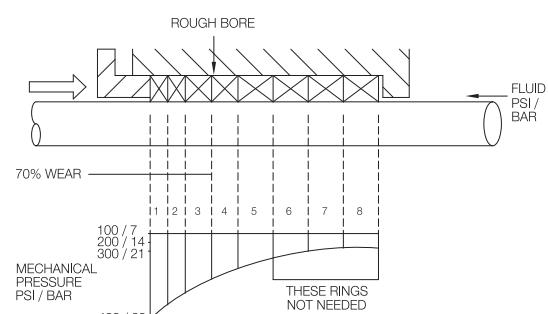


5. 팩킹 조정 / Adjustment of packing

펌프의 경우 팩킹이 설치완료된 펌프를 기동할 때 반드시 누설이 될 수 있도록 해야 합니다. 이러한 누설은 팩킹 수명을 연장하는데 아주 중요한 요소입니다. 누설이 초당 두방울 미만으로 줄어들때까지 글랜드를 조이면 됩니다. 누설이 일정한 속도로 안정화되기 까지 하루정도가 걸리는데 누설을 멈추게 하기위해 글랜드를 조이게 되면 팩킹이 타버리므로 결코 누설을 멈추게 하면 안됩니다. 밸브의 경우 스템을 돌려 부하가 느껴지는 점까지 글랜드를 적절히 조입니다. 단 스템이 움직이지 않을때까지 조이면 안됩니다. 하루정도 밸브를 라인선상에 놓고 글랜드를 다시 조여줍니다. 누설이 확인되면 안전조건에 따라 누설이 안될때까지 글랜드를 조이면 됩니다.

Pump - After last ring is installed, take up bolts finger tight. Allow packing to leak freely when starting up a newly packed pump.

Excessive leakage during the first hour of operation will result in a better packing job over a longer period of time. Start the pump and take up bolts until leakage is decreased to no more than 2 drops per second. It will take about one working day to break in a set of packing to a point where leakage is stabilized at a uniform acceptable rate. Stopping leakage entirely at this point will cause the packing to burn up. Valve-Bring the follower down on the packing to the point where heavy resistance to wrenching is felt. Do not wrench down to the point where the stem won't turn. After the valve has been on the line a day or so, even if no leakage exists, the follower should be tightened slightly. If leakage is observed, adjust the gland in accordance with safe maintenance procedures and manufacturers' recommendations



스터핑 박스 설계 STUFFING BOX DESIGN

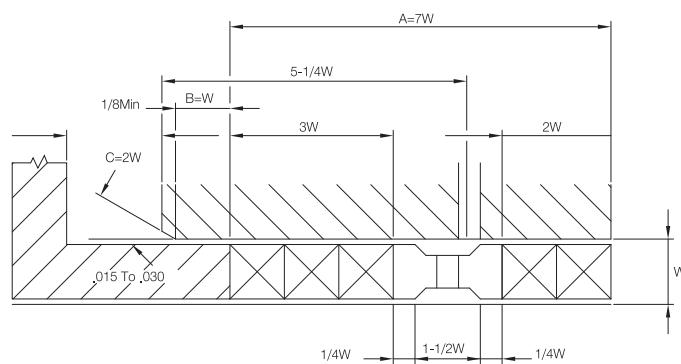
I. 회전축 / Rotation Shafts

도면에서 표시된 A는 랜턴 글랜드를 포함한 총 패킹입니다.

랜턴 글랜드 사용시 표준적인 패킹깊이는 7W이며 랜턴글랜드를 제외하였을때는 5W입니다.

Dimension A shown on this drawing is the total depth of packing including lantern gland.

A standard depth of 7W or 7 times the packing space has been established when a lantern gland is used. A depth dimension of 5W is used where lantern gland is omitted.

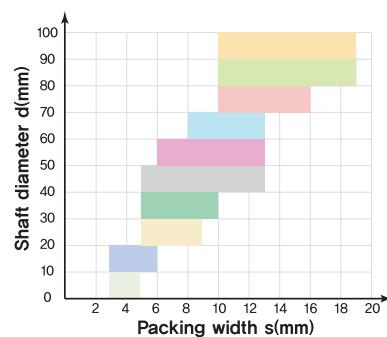


SHAFT RANGE [Inch]	W	SHAFT RANGE [mm]	W
5/8" to and including 1-1/8"	5/16"	16mm to and including 29mm	8mm
1-1/8" to and including 1-7/8"	3/8"	29mm to and including 48mm	10mm
1-7/8" to and including 3"	1/2"	48mm to and including 75mm	13mm
3" to and including 4-3/4"	5/8"	75mm to and including 120mm	16mm
4-3/4" to and including 12"	3/4"	120mm to and including 300mm	19mm

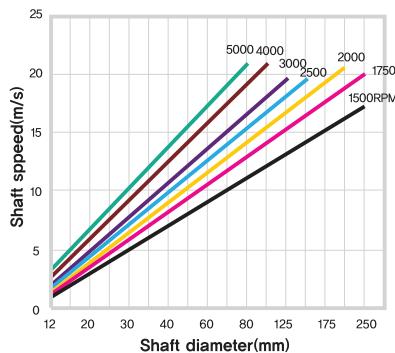
※ FSA(Fluid Sealing Association) 및 ESA(European Sealing Association) 기준 참조 / Date From FSA(Fluid sealig Association) and ESA(European sealig Association)

2. 밸브 및 펌프의 패킹너비의 범위 / Selecting Proper Valve or Pump Packing Width

Shaft Diameter 범위	Packing width 범위
0~10	3~5
10~20	3~6
20~30	5~9
30~40	5~10
40~50	5~13
50~60	6~13
60~70	8~13
70~80	10~16
80~90	10~19
90~100	10~19



3. 축속도 / Shaft Speed



다음의 그래프는 축경에 대한 축속도를 나타내고 있습니다.

축속도 변환방법은 다음과 같습니다.

Shaft Speed Conversion Method

Conversion Factor

1 m/s = 196.8 FPM

1FPM = 0.005 m/s

Shaft Diameter		SHAFT RANGE [mm]												
		100	300	500	1000	1500	1750	2000	2500	3000	3600	4000	4500	5000
0.500"	12	0.1 13	0.2 39	0.3 65	0.6 131	0.9 196	1.1 229	1.3 262	1.6 327	2.3 471	2.3 471	2.5 523	2.8 589	3.1 654
0.750"	16	0.1 20	0.3 59	0.4 98	0.8 196	1.3 294	1.5 343	1.7 393	2.1 491	3.0 707	3.0 707	3.3 785	3.8 883	4.2 981
0.875"	20	0.1 23	0.3 69	0.5 114	1.0 229	1.6 343	1.8 401	2.1 458	2.6 572	3.8 824	3.8 824	4.2 916	4.7 1030	5.2 1145
1.000"	25	0.1 26	0.4 79	0.7 131	1.3 262	2.0 393	2.3 458	2.6 523	3.3 654	4.7 942	4.7 942	5.2 1047	5.9 1178	6.5 1308
1.250"	30	0.2 33	0.5 98	0.8 164	1.6 327	2.4 491	2.7 572	3.1 654	3.9 818	5.7 1178	5.7 1178	6.3 1308	7.1 1472	7.9 1635
1.500"	32	0.2 39	0.5 118	0.8 196	1.7 393	2.5 589	2.9 687	3.3 785	4.2 981	6.0 1413	6.0 1413	6.7 1570	7.5 1766	8.4 1963
1.750"	40	0.2 46	0.6 137	1.0 229	2.1 458	3.1 687	3.7 801	4.2 916	5.2 1145	7.5 1649	7.5 1649	8.4 1832	9.4 2061	10.5 2290
2.000"	50	0.3 52	0.8 157	1.3 262	2.6 523	3.9 785	4.6 916	5.2 1047	6.5 1308	9.4 1884	9.4 1884	10.5 2093	11.8 2355	13.1 2617
2.500"	60	0.3 65	0.9 196	1.6 327	3.1 654	4.7 981	5.5 1145	6.3 1308	7.9 1635	11.3 2355	11.3 2355	12.6 2617	14.1 2944	15.7 3271
3.000"	65	0.3 79	1.0 236	1.7 393	3.4 785	5.1 1178	6.0 1374	6.8 1570	8.5 1963	12.2 2826	12.2 2826	13.6 3140	15.3 3533	17.0 3925
3.500"	80	0.4 92	1.3 275	2.1 458	4.2 916	6.3 1374	7.3 1603	8.4 1832	10.5 2290	15.1 3297	15.1 3297	16.7 3663	18.8 4121	20.9 4579
4.000"	100	0.5 105	1.6 314	2.6 523	5.2 1047	7.9 1570	9.2 1832	10.5 2093	13.1 2617	18.8 3768	18.8 3768	20.9 4187		
5.000"	125	0.7 131	2.0 393	3.3 654	6.5 1308	9.8 1963	11.4 2290	13.1 2617	16.4 3271					
6.000"	150	0.8 157	2.4 471	3.9 785	7.9 1570	11.8 2355	13.7 2748	15.7 3140	19.6 3925					
7.000"	175	0.9 183	2.7 550	4.6 916	9.2 1832	13.7 2748	16.0 3205	18.3 3663						
8.000"	200	1.0 209	3.1 628	5.2 1047	10.5 2093	15.7 3140	18.3 3663	20.9 4187						
9.000"	220	1.2 236	3.5 707	5.8 1178	11.5 2355	17.3 3533	20.1 4121							
10.000"	250	1.3 262	3.9 785	6.5 1308	13.1 2617	19.6 3925								

Conversion Factor 1m/s=196.8FPM / 1FPM=0.005m/s ※ At shaft velocities exceeding 4000FPM/20m/s, consult manufacturer.

패킹선정

SELECTING PROPER PACKING

패킹을 선정하고자 할때 정비인력은 다음의 5가지 조건을 반드시 알아야만 합니다.

To determine which packings should be used, there are certain basic questions that must be answered, and these include..

- | | |
|------------------------------|------------------------------------|
| 1. 화학적 특성[pH] | / Chemical Condition (pH of fluid) |
| 2. 온도 | / Temperature |
| 3. 압력 | / Pressure |
| 4. 축속도 | / Shaft Speed |
| 5. 스터핑 박스 치수 [축외경. 스터핑박스 내경] | / Dimensions of Stuffing Box |

운전환경에 따른 올바른 패킹재질 선택

SELECTING PROPER PACKING

TABLE II Packing Recommendations

	Service Conditions							Motion		Acid
	Temperature		Pressure [Stuffing Box]		Shaft Speed		pH Range	Rotary	Reciprocating	Valve stem
	°F	°C	PSI	BAR	FPM	m/s				
Vegetable Fiber										
Lubricated	210	98	150	10	1000	5	5-9	○	○	○
PTFE Coated	250	120	300	20	1200	6	5-9	○	○	○
Asbestos										
Lubricated	250	120	300	20	1800	9	2-13	○	○	○
PTFE Coated	500	260	500	34	2500	13	2-13	○	○	○
Valve Packing w/Wire	1200	650	1200	80			2-13			○
Acrylic										
Lubricated	250	120	300	20	1500	7.5	4-10	○	○	○
PTFE Coated	500	260	500	34	2250	11	2-12	○	○	○
Aramid										
Lubricated	250	120	300	20	1500	7.5	4-11	○	○	
PTFE Coated	500	260	500	34	2250	11	2-12	○	○	○
Carbon/Graphite										
Carbon-Pumps[3]	500	260	500	34	4000	20	[2]	○	○	○
Graphite-Pumps[3]	500	260	500	34	4000	20	[2]	○	○	○
Valve Application[3]	1250*	675	4000	272			[2]			○
Graphite Tape-Die Form	1250*	675	4000	272	4000	20	[2]	○	○	○
Braided Flex/Graphite	1250*	675	3000	204	4000	20	[2]	○	○	○
※ Steam Applications										
Copolyimide										
Lubricated	250	120	300	20	500	7.5	4-11	○	○	
PTFE Coated	500	260	500	34	2250	11	1-12	○	○	○

	Service Conditions							Motion		Acid
	Temperature		Pressure [Stuffing Box]		Shaft Speed		pH Range	Rotary	Reciprocating	Valve stem
	°F	°C	PSI	BAR	FPM	m/s				
Glass										
Dry	1200	648					2-12			○
PTFE Coated	500	260	300	20	1800	9	2-12	○		○
Melamine										
Lubricated	200	120	300	20	1500	7.5	4-11	○	○	
PTFE Coated	400	200	500	34	2000	10	3-14	○	○	○
Metals(4)										
Lead	550	288	1000	70	1000	5	4-10	○	○	○
Aluminum	1000	538	1000	70	1000	5	4-10	○	○	○
Copper	1900	1038	1000	70	1000	5	4-10	○	○	○
Novoloid										
PTFE Coated	320	200	500	34	2000	10	1-13	○	○	○
Polyphenylene										
PTFE Coated	400	200	500	34	2000	10	1-14	○	○	○
PTFE										
Lubricated	500	260	300	20	1800	9	0-14	○	○	○
Dry	500	260	300	20	1000	5	0-14	○	○	○

※ CAUTION: Many packing manufacturers offer blends of the above defined materials.

As a result of blending, the limitations listed for speed, temperature, pH range, etc, will change.
Please consult packing manufacturer for specific application information.

The above listed recommendations are for reference only. Consult manufacturer for style suitability to the intended service.

NOTES

- NOTES**

 1. consult manufacturer for proper oxygen certifiable style.
 2. 0-14 except strong oxidizers.
 3. Temperature, pressure, shaft speed performance are heavily dependent upon employed coating system. Consult manufacturer for proper style selection.
 4. Primarily used as bushings, pushers or for bearing support.



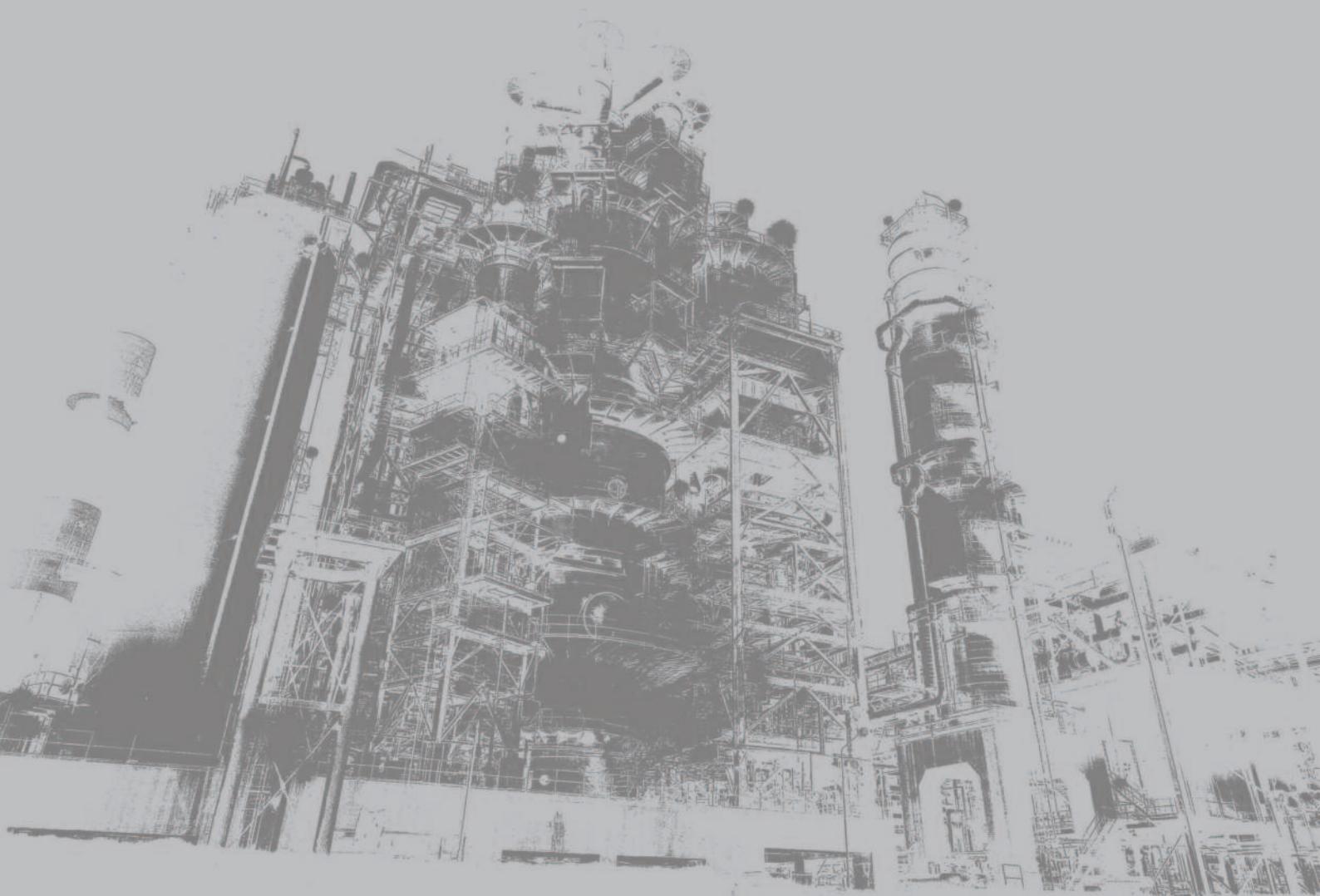
DONGSUH INDUSTRY

The DONGSUH is moving forward with a renewed spirit of service for customers.

It is designed to have both high tensile strength and flexibility simultaneously for braiding continuous filament carbon fiber having high thermal conductivity and low coefficient of friction in a unique method of DONGSUH.

Die-Formed Packings & Gaskets

We will make it for customer impressed not customer satisfaction.



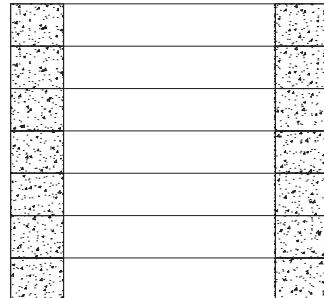
Die-Formed Packings & Gaskets

- 28 ALS 300
Die-Formed Packing
- 29 ALS 355 / 357
Die-Formed Dynamic Packing
- 30 ALS 350 / 359
Die-Formed Bonnet Gasket
- 31 ALS 350Y / 359Y
Graphite Yarn Reinforced Bonnet Gasket
- 32 ALS 350M / 359M
Metal Cap Reinforced Bonnet Gasket
- 33 ALS 350MS / 359MS
Metal Mesh Reinforced Bonnet Gasket

ALS 300

Die-Formed Packing

- Graphite Tape Packing을 설치를 쉽게 일정한 치수로 압축성형한 패킹입니다.
- 흑연자체의 자기윤활성과 낮은 마찰계수는 왕복 및 회전축에 손상을 주지 않고 폭넓은 범위에서 사용이 가능합니다.
- 펌프 및 밸브를 해체하지 않고 글랜드만 해체해야 하는 경우 절단하여 납품이 가능합니다.
- 사용용도에 따라 ALS910C, ALS900G, ALS955W와 함께 사용하면 보다 나은 씰링효과를 볼수 있습니다.
- Graphite Tape Packing is the packing that compressed and molded in a certain dimension for easy installation.
- The graphite's self-lubrication capability and low coefficient of friction allow to use in a wide range without giving damage on the reciprocating and rotary shaft.
- If you want to disassemble only gland without disassembling pump and valve, you can just cut it and deliver.
- You can get better sealing effects if you use with ALS910C, ALS900G and ALS955W depending on the use purpose.



Pressure	Chemical Resistance	Temperature
4600psi (317bar)	pH 0-14	From -400°F (-240°C) to 800°F (430°C) in air From -400°F (-240°C) to 5400°F (3000°C) in non oxidizing From -400°F (-240°C) to 800°F (650°C) in steam

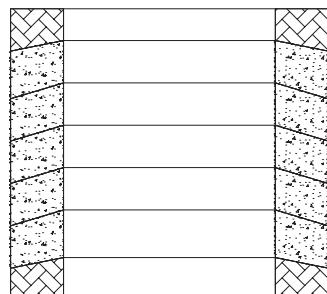
- Service : For use pumps and valves, high temperature and pressure stem valves, valve bonnet
- Ordering information in inches and millimeters
Inform D1, D2, T or H
Inform the stem/shaft O.D. and stuffing box I.D. and the total depth of packing

ALS 355 / 357 Die-Formed Dynamic Packing

- 상. 하부에 위치한 고밀도 Die-Formed Ring은 회전왕복운동에 의한 저밀도 graphite의 크랙 및 크러쉬 현상을 방지합니다. 또한 적은 토크(Torque)로 우수한 씰링성을 부여합니다.
- End ring으로서 사용용도에 따라 ALS910C, ALS900G를 사용하시면 보다 높은 씰링성을 보장합니다.
- The high density Die-Formed Ring in the upper and lower part will prevent the low density graphite from crack and crushing by rotary and reciprocating.
- It guarantees better sealing effects if you use ALS970, ALS910C and ALS900G depending on the use purpose as end ring.

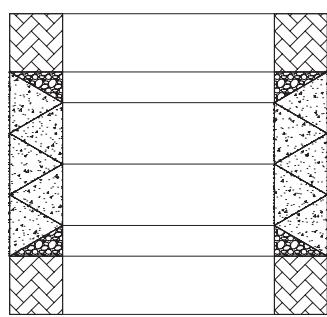
ALS 355

- 일정각도로 Die-Formed Ring이 제작되었기 때문에 글랜드에 의한 조립체결시 저채부하중으로 우수한 sealing성을 확보할 수 있습니다.
- Since the Die-Formed Ring was produced at a certain angle it can get outstanding sealing effect thanks to the low tightening torque load when assembling and coupling by gland.



ALS 357

- Graphite tape를 서로 다른 각도로 설계된 금형에 압축 성형한 패킹입니다.
- Graphite tape is the packing compressed with the molding designed at different angles.



Pressure	Chemical Resistance	Temperature
4600psi [317bar]	pH 0-14	From -400°F (-240°C) to 800°F (430°C) in air From -400°F (-240°C) to 5400°F (3000°C) in non oxidizing From -400°F (-240°C) to 800°F (650°C) in steam

- Ordering information in inches and millimeters
Inform D1, D2, T1, T2, H / Inform the stem, shaft O.D. and stuffing box I.D. and the total depth of packing

ALS 350 / 359

Die-Formed Bonnet Gasket

- 99.8% 이상의 고순도 graphite tape를 감아서 상부와 하부에 내열합금 박판을 삽입하여 압축 성형한 bonnet 전용 가스켓입니다.
- 흑연자체의 자기윤활성과 낮은 마찰계수는 왕복 및 회전축에 손상을 주지 않고 폭넓은 범위에서 사용이 가능합니다.
- This is the bonnet exclusive gasket compressed and molded by inserting the heat-resistant alloy sheet into upper and lower part after winding the graphite tape for over 99.8% high purity.
- The graphite's self-lubrication capability and low coefficient of friction allow to use in a wide range without giving damage on the reciprocating and rotary shaft.

■ Service : For use in high pressure, high temperature steam valve bonnet

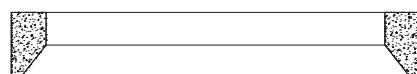
ALS 350

- 99.8% 이상의 고순도 graphite tape를 설계된 금형에 감아서 압축 성형한 bonnet 전용 가스켓입니다.
- This is the bonnet exclusive gasket compressed and molded by winding the graphite tape for over 99.8% high purity with the mold designed.



ALS 359

- Graphite tape를 서로 다른 각도로 설계된 금형에 압축 성형한 패킹입니다.
- Graphite tape is the packing compressed with the molding designed at different angles.



Pressure	Chemical Resistance	Temperature
4200psi (290bar)	pH 0-14	From -400°F (-240°C) to 800°F (430°C) in air From -400°F (-240°C) to 5400°F (3000°C) in non oxidizing From -400°F (-240°C) to 800°F (650°C) in steam

■ Ordering information in inches and millimeters

Inform Bonnet Angle, Bonnet O.D. and stuffing box I.D. and the total depth of packing

Inform D1, D2, G1 or G2, H

ALS 350Y / 359Y

Graphite Yarn Reinforced Bonnet Gasket

- 99.8%이상의 고순도 Graphite Tape을 감아서 상부와 하부에 윤활성이 우수한 Graphite Yarn을 편조한 보강재와 같이 압축 성형하여 내구성이 우수한 가스켓입니다.
- 발전설비 초고압 밸브의 Bonnet에 설치되어 우수한 밀봉성과 온도변화에 대응하도록 설계된 Pressure Sealing으로 상하부에 Graphite Yarn(with Inconel wire overnite)을 편조한 보강재를 결합함으로 Extrusion 및 Crush 현상을 효과적으로 억제 할 수 있습니다.
- Highly purity Graphite Tape of 99.8% or more is wound and the graphite yarn which has excellent lubricity at the upper part and lower part is compression-molded together with braided reinforcement to provide excellent durability.
- Power generation facility It is installed in Bonnet of high pressure valve and it is designed to cope with excellent sealing and temperature change. It can effectively suppress extrusion and crushing by combining graphite yarn (with Inconel wire overnite) braided on upper and lower part.

ALS 350Y

- 접촉면적을 증대시켜 내부 유체의 접촉면 압력을 감소시키고 원주방향으로 팽창한 가스켓은 강한 면접촉으로 큰 기밀성을 가지며 보강 된 YARN은 효율적으로 EXTRUSION 현상을 억제할 수 있습니다.
- Increasing the contact area reduces the contact surface pressure of the inner fluid, and the circumferentially expanded gasket has a large airtightness due to strong surface contact, and the reinforced YARN can effectively suppress the extrusion phenomenon.



ALS 359Y

- 밸브 보닛과 같은 경사면을 가지도록 성형한 보닛 가스켓으로 볼트 체결을 통해 하단부는 강한 압축력이 가해져 큰 기밀성을 가지며 보강된 Yarn은 충격압력에 대한 CRUSH 현상을 방지합니다.
- It is a bonnet gasket which is shaped like a valve bonnet. It is tightened by bolts and the bottom part is tightly tightened by strong compressive force. The reinforced yarn prevents CRUSH phenomenon against impact pressure.



Pressure	Chemical Resistance	Temperature
5000psi (350bar)	pH 0-14	From -400°F (-240°C) to 800°F (430°C) in air From -400°F (-240°C) to 5400°F (3000°C) in non oxidizing From -400°F (-240°C) to 800°F (650°C) in steam

■ Ordering information in inches and millimeters

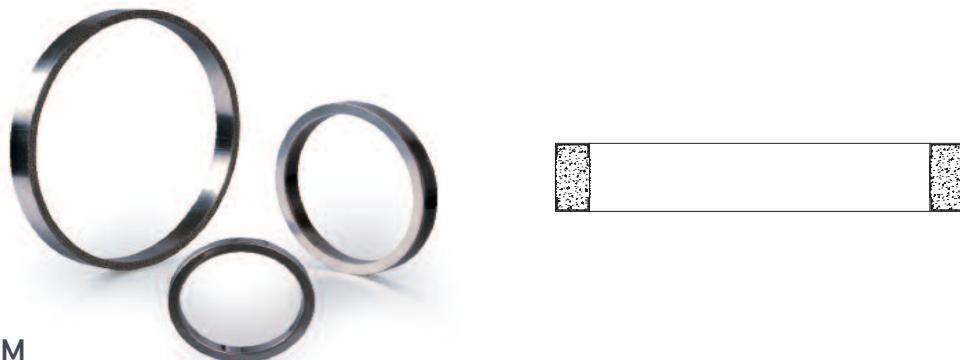
Inform D1, D2, T1, T2, H / Inform the stem, shaft O.D. and stuffing box I.D. and the total depth of packing

ALS 350M / 359M Metal Cap Reinforced Bonnet Gasket

- 99.8% 이상의 고순도 graphite tape를 감아서 상부와 하부에 내열합금 박판을 삽입하여 압축성형한 bonnet 전용 가스켓입니다.
- 흑연자체의 자기윤활성과 낮은 마찰계수는 왕복 및 회전축에 손상을 주지 않고 폭넓은 범위에서 사용이 가능합니다.
- 상·하부 캡은 패킹의 상부와 하부를 고정시켜 graphite의 crush 현상, 산화현상 및 침투누설을 방지합니다.
- This is the bonnet exclusive gasket compressed and molded by inserting the heat-resistant alloy sheet into upper and lower part after winding the graphite tape for over 99.8% high purity.
- The graphite's self-lubrication capability and low coefficient of friction allow to use in a wide range without giving damage on the reciprocating and rotary shaft.
- The upper and lower cap is fixed with the upper and lower packing to prevent the graphite from crushing, oxidation and leaking.
- Service : For use in high pressure, high temperature steam valve bonnet

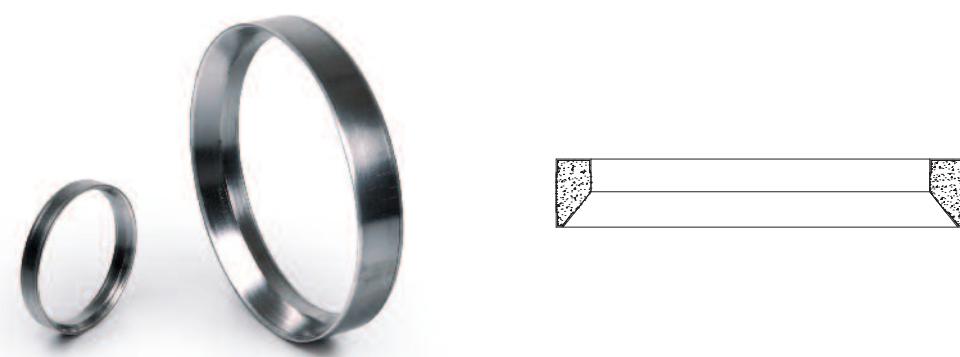
ALS 350M

- 99.8% 이상의 고순도 graphite tape를 설계된 금형에 감아서 압축 성형한 bonnet 전용 가스켓입니다.
- This is the bonnet exclusive gasket compressed and molded by winding the graphite tape for over 99.8% high purity with the mold designed.



ALS 359M

- 99.8% 이상의 고순도 graphite tape를 Bonnet 각도에 따라 설계된 금형에 감아서 압축 성형한 bonnet 전용 가스켓입니다.
- This is the bonnet exclusive gasket compressed and molded by winding the graphite tape for over 99.8% high purity with the mold designed according to the bonnet angle.



Pressure	Chemical Resistance	Temperature
5000psi (345bar)	pH 0-14	From -400°F (-240°C) to 800°F (430°C) in air From -400°F (-240°C) to 5400°F (3000°C) in non oxidizing From -400°F (-240°C) to 800°F (650°C) in steam

- Ordering information in inches and millimeters
- Inform Bonnet Angle, Bonnet O.D. and stuffing box I.D. and the total depth of packing
- Inform D1, D2, G1 or G2, H

ALS 350MS / 359MS

Metal Mesh Reinforced Bonnet Gasket

- 흑연자체의 자기윤활성과 낮은 마찰계수는 왕복 및 회전축에 손상을 주지 않고 푸넓은 범위에서 사용이 가능합니다.
 - 상·하부 메쉬는 패킹의 상부와 하부를 고정시켜 graphite의 crush 현상, 산화현상 및 침투누설을 방지합니다.
 - The graphite's self-lubrication capability and low coefficient of friction allow to use in a wide range without giving damage on the reciprocating and rotary shaft.
 - The upper and lower mesh is fixed with the upper and lower packing to prevent the graphite from crushing, oxidation and leaking.
- Service : For use in high pressure, high temperature steam / valve bonnet

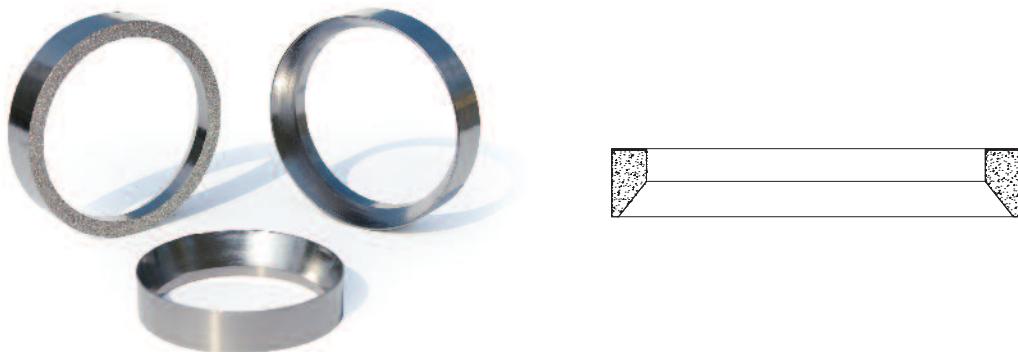
ALS 350MS

- 99.8% 이상의 고순도 graphite tape를 설계된 금형에 감아서 압축 성형한 bonnet 전용 가스켓입니다.
- This is the bonnet exclusive gasket compressed and molded by winding the graphite tape for over 99.8% high purity with the mold designed.



ALS 359MS

- 99.8% 이상의 고순도 graphite tape를 Bonnet 각도에 따라 설계된 금형에 감아서 압축 성형한 bonnet 전용 가스켓입니다.
- This is the bonnet exclusive gasket compressed and molded by winding the graphite tape for over 99.8% high purity with the mold designed according to the bonnet angle.



Pressure	Chemical Resistance	Temperature
4200psi (290bar)	pH 0-14	From -400°F (-240°C) to 800°F (430°C) in air From -400°F (-240°C) to 5400°F (3000°C) in non oxidizing From -400°F (-240°C) to 800°F (650°C) in steam

- Ordering information in inches and millimeters
Inform Bonnet Angle, Bonnet O.D. and stuffing box I.D. and the total depth of packing
Inform D1, D2, G1 or G2, H



DONGSUH INDUSTRY

The DONGSUH is moving forward with a renewed spirit of service for customers.

It is designed to have both high tensile strength and flexibility simultaneously for braiding continuous filament carbon fiber having high thermal conductivity and low coefficient of friction in a unique method of DONGSUH.

Spiral Wound Gaskets

We will make it for customer impressed not customer satisfaction.



Spiral Wound Gaskets

- 36 **ALS 7Series
Spiral Wound Gaskets**
- 37 **Special Type Gasket**
- 42 **SPIRAL WOUND GASKET DIMENSIONS for
ASME B16.5 FLANGES**
- 44 **SPIRAL WOUND GASKET DIMENSIONS for
ASME B16.47 SERIES "A" FLANGES**
- 45 **SPIRAL WOUND GASKET DIMENSIONS for
ASME B16.47 SERIES "B" FLANGES**

ALS 7 Series Spiral Wound Gaskets

The spiral wound gasket is the most ideal type having flexibility and recovery which are essential for high temperature and high pressure among semi-metal gaskets. It is wound in spiral combined with V-type metal thin hoop and non-ferrous material filler. The winding start part and end part are wound by the hoop over several times and then both edge is processed by spot welding to make the gasket. The gasket has outstanding capability as it features unique structure with elastic metal and flexible filler.

스파이럴형가스켓(Spiral Wound Gasket)은 세미메탈 가스켓 중 고온고압에 필수요건인 유연성과 복원성을 겸비한 가장 이상적인 타입으로서. V자형 금속재의 얇은판(Hoop)과 비금속 재료인 필러(Filler)를 겹쳐 나선형으로 감으며. 감는 시작부분과 끝부분을 Hoop만으로 수회 감아 양끝을 Spot 용접하여 제작한 가스켓입니다. 탄력있는 금속과 유연한 Filler로 이루어진 독특한 구조로 형성되어 우수한 가스켓 기능을 가지고 있습니다.

특징 / Feature

- 고온 및 고압에 우수한 기능을 발휘합니다.
- 온도, 압력, 진동 및 운전조건의 변화에 자동적으로 유연성과 복원성을 발휘합니다.
- 원형 또는 타원형 등 어떠한 치수라도 효율적으로 제작가능합니다.
- 불균형한 플랜지의 압력 구분에 맞추어 제조하므로 뛰어난 씰성을 발휘합니다.
- 특수한 운전조건에 따라 HOOP 및 Filler의 소재를 선택하여 제작가능합니다.
- Outstanding capability for high temperature and high pressure
- Automatic flexibility and recovery from the change of temperature, pressure, vibration and working conditions
- Efficient production for any type of dimensions such as round or oval type, etc.
- Outstanding sealing capability as it is produced according to the pressure of unbalanced flange.
- Hoop and Filler materials can be selected according to special operating conditions.



표기방법 / Designation method

ALS #7									
Dongsuh 고유번호									
FILLER 재질						FILLER 재질			
GRAPHITE	4					외륜링이 없을때	표기하지 않고 비워둠		
TEFLON	5					CARBON STEEL	S		
NON-ASBESTOS	6					SUS 304	3		
외륜링 형상						SUS316 / SUS316L	8		
외륜링이 있을때	3					기타	제질별 표기법 참조바람		
외륜링이 없을때	0								
HOOP 재질						외륜링 형상			
SUS 304	4					외륜링이 있을때	표기하지 않음		
SUS 316 / SUS 316L	8					외륜링이 없을때	R		
SUS 347	7								
기타	6								
Material (재질)		Code (기호)		Material (재질)		Code (기호)			
Low Carbon		S		SUS 347		7			
SUS 304		3		Inconel		9			
SUS 316 / SUS 316L		8		Titanium		11			

ALS M Serise Spiral Type Gaskets

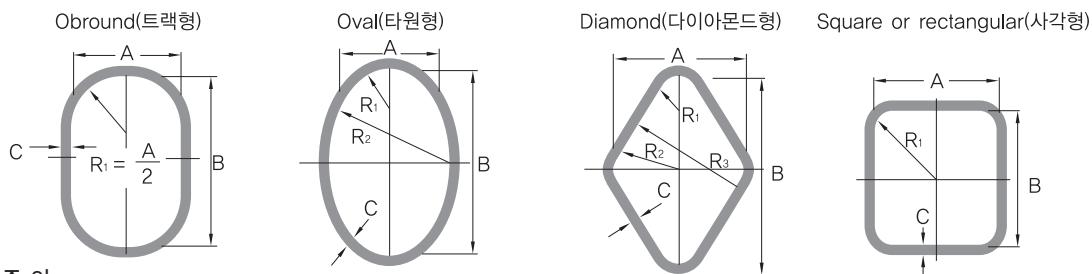
특수형상 S.W GASKET은 보일러 맨홀 및 핸드홀, 밸브 본네트 덮개용으로 150LBS~2500LBS 압력하에 요구된 형상 및 치수로 제작・설계됩니다. 7404-M은 SUS304와 Graphite Paper로 7406-M은 SUS316과 GRAPHITE PAPER로 제작가능합니다. 기타 재질의 금속이 사용된 것은 7408-M입니다.

Special S.W. gasket is manufactured and designed in a shape and dimension required at 150LBS~2500LBS pressure for boiler manhole, handhole and valve bonnet cover. 7404-M can be produced with SUS304 and Graphite Paper while 7406-M can be produced with SUS316 and Graphite Paper. 7408-M uses other metal materials.

SERVICE TEMPERATURE 사용온도	7404-M : up to 600°C 7406-M : up to 650°C
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특수형상 S.W 가스켓 주문시 필요사항 / Requirements for ordering special S.W. gasket

- | | |
|--------------------------------|--|
| 1. 압력범위 | / Pressure range |
| 2. 사용온도 | / Working temp |
| 3. 가스켓 두께 (예 : 3.2mm, 4.5mm 등) | / Gasket thickness (Ex: 3.2mm, 4.5mm, etc.) |
| 4. Hoop 재질 | / Hoop material |
| 5. 형상 및 치수 밀그림 참조 | / For shape and dimension, refer to the below diagram. |



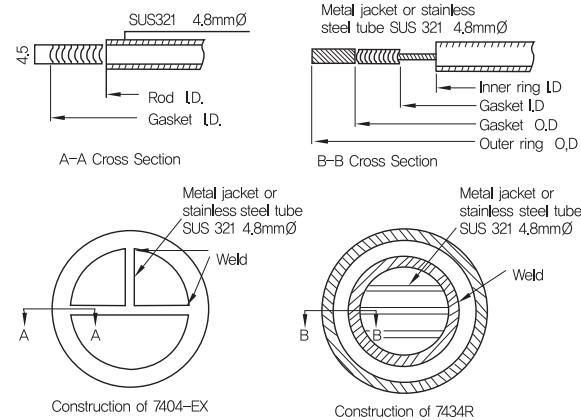
주의

- 일부타원형은 R3가 명시되어야 합니다.
 - 타원형 및 트랙형은 "A"가 40mm 이상, 다이아몬드・사각형은 60mm 이상 되어야 합니다.
 - A/B는 2/3 이상 되어야 합니다.
- Some oval type should specify R3.
 - Oval and track type should be over 40mm for "A" while diamond/rectangular type should be over 60mm.
 - A/B should be over 2/3.

ALS EX Serise Gasket for heat exchanger

EX시리즈 가스켓은 열교환기용으로 설계・제작됩니다. 가스켓과 가스켓 안쪽 Hoop의 주위홈에 고정된 3.2mm 구경의 SUS304 Rod에 용접된 Pass Lib으로 이루어져 있습니다. 가지는 4.8mm 구경 및 0.5mm 두께의 SUS321 Tube가 사용됩니다. 요구에 따라 Graphite 메탈자켓 가지가 사용될 수 있습니다. 용도에 따라 내 뿐붙이 혹은 내・외붙이 형상도 가능합니다.

EX series gasket is designed and manufactured for heat exchanger use. It is made of the pass lib welding on SUS304 Rod in 3.2mm diameter fixed on the surrounding groove of hoop inside gasket. The branch uses SUS321 Tube in 4.8mm diameter and 0.5mm thickness. Graphite metal jacket branch can be used depending on the requirement. Inner or outer ring type is available depending on the application.



1. 후프의 재료 코드 / Material Code of Hoop

Materials	Code	Recommended	Temp
SUS 304	304	Standard product (기본형)	500°C
SUS 304L	304L	Fluid where low carbon contained stainless steel is required (저탄소 스텐레스가 요구되는 유체)	430°C
SUS 316	316	Petroleum and petrochemical industries (석유화학산업)	600°C
SUS 316L	316L	Fluid where low carbon contained stainless steel is required (저탄소 스텐레스가 요구되는 유체)	800°C
SUS 310S	310	For high temperature (고온용)	800°C
SUS 321	321	Petroleum and Petrochemical industries (석유화학산업)	800°C
SUS 347	347	For high temperature (고온용)	800°C
SUS 430	430	Where Ni content is not allowed (Ni가 함유되어서는 안되는 곳)	700°C
AISI316ELC	316ELC	Thermal power station at supercritical pressure (고압의 열발전소)	800°C
AISI309S+Cb	309S+Cb	Thermal power station at high temperature (고압의 열발전소)	800°C
Titanium	TI	Anti-corrosion at high temperature (고온 • 내식용)	800°C
Monel	MO	Anti-corrosion at high temperature (고온 • 내식용)	800°C
Nickel	NI	Anti-corrosion at high temperature (고온 • 내식용)	760°C
Aluminium	AL	For aluminium flange (알루미늄 프랜지)	200°C
Inconel 600	IN	Anti-corrosion at high temperature (고온 • 내식용)	800°C

특정재질은 3.2mm 혹은 6.4mm 두께가 불가능 할 수가 있습니다.

Some materials might not be available for 3.2 and 6.4mm thick.

2. 필러 재료의 가용성 / Availability of Filler Materials

Materials	Recommended	Temp
Graphite	완벽한 공기 밀봉성이 요구되는 진공 및 고온조건, 열순환하에서도 Bolt 조임이 필요치 않은곳 The place not needed for bolt tightening under vacuum, high temperature and heat circulation requiring perfect air tight.	450°C
PTFE	강산 / Strong acid	260°C

3. 단면 형상 / Section Profile

Basic Type		Outer Ring Attached Type	
Inner Ring Attached Type		Outer Ring & Inner Ring Attached Type	

4. 사용압력 및 온도 / Working Pressure and Temperature

Fluid(유체)	ALD No.		7438R		7538R	
	Temp.(°C) (온도)	Pressure (kgf/cm²) (압력)	Temp.(°C) (온도)	Pressure (kgf/cm²) (압력)		
Water	100	350	100	200		
steam, Hot Water	580	350	300	100		
Hot Oil	580	200	300	100		
Organic Solvents	580	200	300	100		
Heat Transfer Liquids	580	200	300	100		
Hydrocarbon	580	200	300	100		
Gases	580	200	300	100		
Cryogenic Gases	-240	200	-100	100		
Acidic Fluid		100	300	100		
Vacuum	580		300			

주의 : ALS No. 7436R는 300°C 이상의 합성열전달 유체 (KSK 오일 등)에 추천됩니다.

※Graphite은 산화제에는 사용할 수 없습니다.

Note: ALS No. 7436R is recommended for composite heat transfer fluid [KSK oil, etc.] at above 300°C.

※Graphite can not be used for oxidizer.

5. 제품의 치수 / Dimensions of Products (Thickness L 4.5mm)

Outer ring O.D(외륜외경) Inner ring O.D(내륜외경) Gasket ID(가스켓내경)	Width of Gasket (가스켓폭)	Width of Inner ring (내륜폭)	Width of Gasket (가스켓폭)	Outer ring O.D(외륜외경) Inner ring O.D(내륜외경) Gasket ID(가스켓내경)	Width of Gasket (가스켓폭)	Width of Inner ring (내륜폭)	Width of Outer ring (외륜폭)
	Dimensions	Min. Width	Min. Width		Dimensions	Min. Width	Min. Width
15~30	5.0~10	3.0	-	301~400	9.0~40	9.0	9.0
31~46	5.0~15	3.0	5.5	401~500	10.0~40	10.0	10.0
47~55	5.5~20	3.5	5.5	501~600	11.0~35	11.0	11.0
56~70	5.5~25	4.0	5.5	601~800	12.0~35	12.0	12.0
71~90	6.0~30	4.5	5.5	801~1000	13.0~30	13.0	13.0
91~110	6.0~35	5.0	5.5	1001~1200	14.0~30	14.0	14.0
111~150	6.5~35	5.5	5.5	1201~1500	15.0~23	15.0	15.0
151~170	7.0~40	6.0	6.0	1501~1800	15.0~23	20.0	20.0
171~200	7.0~40	7.0	7.0	1801~2000	15.0~25	-	20.0
201~300	8.0~40	8.0	8.0				

6. 최대 가스켓 외경 / Maximum Gasket O.D

unit : mm

Gasket Thickness	ALS No.	NA S.W. Gasket		GRAPHITE S.W. Gasket		TEFLON S.W. Gasket	
		Dimensions	Min. Width	Dimensions	Min. Width	Dimensions	Min. Width
3.2		500		400		400	
4.5 [Standard]		2000		1500		1500	
6.4		-		2500		2500	

주의 : 최대 내·외륜구경은 2000mm이다. SUS 304는 대형 SIZE RING 제작이 가능합니다.

Note: Maximum inside/outside diameter is 2000mm. SUS 304 can produce large size ring.

7. 내·외경링의 표준 두께 / Standard Thickness of Inner & Outer Rings

unit : mm

Gasket Thickness	Material	GRAPHITE S.W. Gasket	
		Low Carbon Steel	SUS304
3.2		2.0	2.0
4.5 [Standard]		3.2	3.0
6.4		4.5	4.0

주의 : Carbon steel 및 SUS 304 이외의 재질은 문의해 주시기 바랍니다.

Note: For other materials except carbon steel and SUS 304, please contact us.

8. 가스켓 형태의 선택 / Selection of The Gasket Type

1. 사용목적에 적합한 가스켓 형태를 선택했는지 확인 합니다.
 2. 돌출면과 평면 플랜지에 사용되는 모든 PTFE 충전 SPIRAL WOUND GASKET은 내 • 외륜타입을 사용해야 합니다.
 3. 형태의 SPIRAL WOUND GASKET을 사용할 때는 압축 조절판이 플랜지 배열과 결합되어 있는지 확인합니다.
- Ensure that you selected the right gasket type for right use purpose.
 - All P.T.F.E and charging spiral wound gasket for tongue and flat flange shall use inner or outer ring type.
 - If you use spiral wound gasket, check if the pressure adjusting plate is combined with the flange.

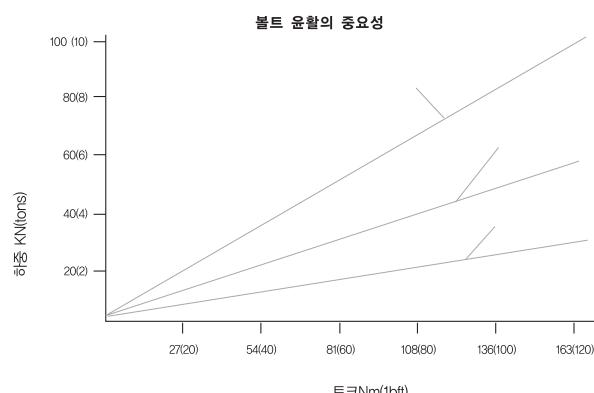
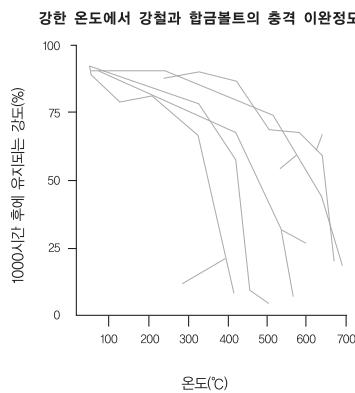
9. 가스켓 압축 / Gasket Compression

1. 완벽한 SEALING을 위해 SPIRAL WOUND GASKET은 아래 두께로 압축되어야 합니다.
 2. 내 • 외륜타입을 부착한 SPIRAL WOUND GASKET은 내륜에 완전히 압축. 밀착되어야 합니다.
 3. 내륜에 압축한게 조절판의 역할을 하므로 가스켓에 손상을 입히거나 SEALING에 영향을 미치지 않습니다.
- The spiral wound gasket should be compressed in the thickness as below for perfect sealing.
 - Spiral wound gasket with inner or outer ring type shall be compressed and close to the inner ring completely.
 - Since the compression on the inside ring plays adjusting plate role, it does not give damage on the gasket or does not affect on the sealing.

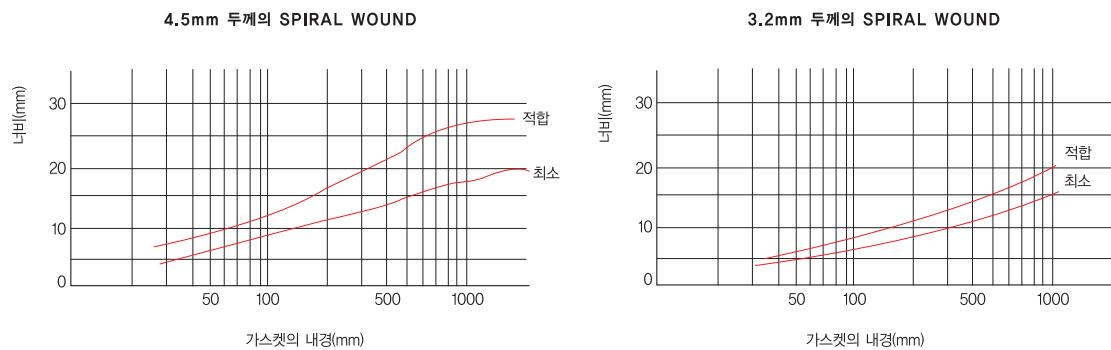
가스켓의 두께 / Gasket thickness	가스켓의 씰링된 두께 / Sealed thickness of gasket
3.2	2.4 ± 0.1
4.5	3.3 ± 0.1
6.4	4.8 ± 0.2

10. 조립단계 / Assembling

1. 플랜지 면을 깨끗하고 양호한 상태로 유지하며. 조립이 완료된 상태에서 면 사이의 간격이 3.2~6.3μ im 정도인가를 확인합니다.
 2. 저강도 볼트의 한계를 고려하여. 운전조건에 적합한 볼트재질이 사용되는가를 확인한다. 볼트에는 필히 기름칠을 해주어야 하고 토크형태의 볼트 조이기. MoS2나 이와 유사한 니켈 화합물을 볼트 윤활유로 사용하는 것이 바람직합니다. A/B는 2/3 이상 되어야 합니다.
 3. SPIRAL WOUND GASKET을 설치할 때는 볼트를 적절한 강도로 조여야 합니다. 볼트 지름이 1½ 이상인 경우. 가능하다면 유압 장력 장치의 사용을 권합니다.
- Ensure that the flange surface must be clean in good condition. Check if the interval space is 3.2~6.4 μ im when assembling is done.
 - Ensure that the bolt material should meet the operating condition considering the limit of low strength bolt.
The bolt must be lubricated without fail. It is desirable to use bolt lubricant for bolt tightening in torque type, MoS2 or similar nickel compound.
 - To install spiral wound gasket, the bolt must be tightened in a proper strength.
If the bolt diameter is above 1-1/4, we recommend to use the hydraulic tension device.



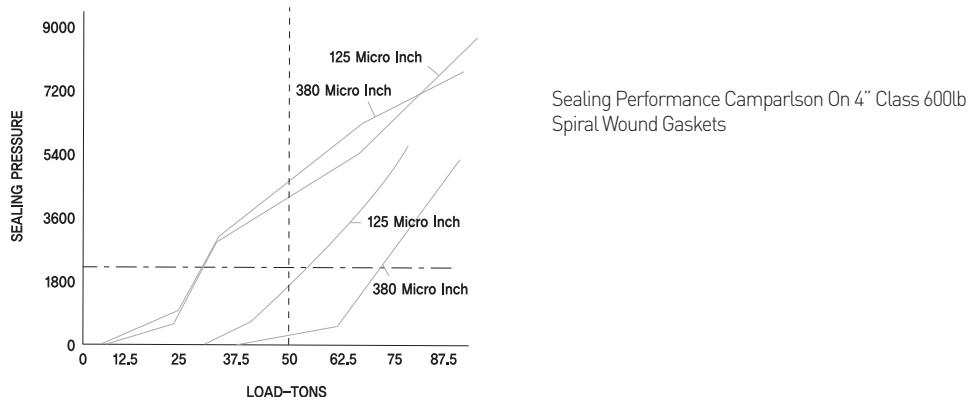
11. 제품 씰링내경의 너비와 요소 / Width and Elements of The Product's Sealing Inside Diameter



12. 제품 Filler 재질의 씰링 성능 / Sealing Performance of The Product's Filler Material

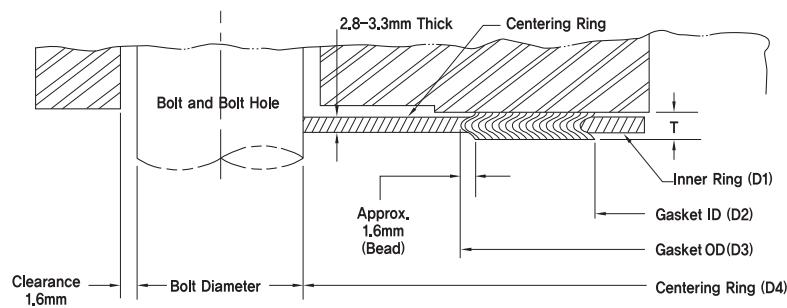
1. Chlorite Mineral과 graphite carbon이 주성분인 재질로서 asbestos보다 적은 량의 볼트 조임으로 최고의 기밀성을 유지합니다.
2. 압력 변동, 온도 변화 등 어떠한 악조건하에서도 최고의 기밀성을 유지합니다.
3. ALS 7438는 CLASS 900 플랜지에 발생하는 뜨거운 kerosene gas oil과 hydrogen gas로 인한 밀봉에 관한 문제점들을 해결하는 곳에 적합합니다.
4. ALS 7438R은 -170°C에서 액화가스를 처리하는 플랜지에 적합합니다.
5. -255°C에서. 액화 냉매가스를 사용하고 pipework와 내경 62inch에 달하는 용기가 부착된 Paraxylene plant에 적합합니다.
6. 부식성 유체나 산소, 냉매가스 등 기밀유지를 위한 곳에 사용됩니다.

- Maximum air tight with less tightening of bolt than asbestos due to chlorite mineral and graphite carbon adopted as main materials.
- Maximum air tight even under bad conditions such as change of pressure and temperature.
- ALS 7438 is good for resolving air tight problems caused by hot kerosene gas oil and hydrogen gas created from CLASS 900 flange.
- ALS 7438R is good for the flange to process LPG at -170°C
- Good for Paraxylene plant with containers having the inside diameter in 62 inches and pipework using liquid refrigerant gas at -255°C It is used for corrosive fluid, oxygen and refrigerant gas, etc. requiring air tight.



SPIRAL WOUND GASKET DIMENSIONS for ASME B16.5 FLANGES

ASME B16.20(1993)에 의한 SPIRAL WOUND GASKET 치수



Flange Size (NPS)	Class 150				Class 300				Class 400			
	D1	D2	D3	D4	D1	D2	D3	D4	D1	D2	D3	D4
1/2	14.2	19.1	31.8	47.8	14.2	19.1	31.8	54.1	14.2	19.1	31.8	54.1
3/4	20.6	25.4	39.6	57.2	20.6	25.4	39.6	66.8	20.6	25.4	39.6	66.8
1	26.9	31.8	47.8	66.8	26.9	31.8	47.8	73.2	26.9	31.8	47.8	73.2
1 1/4	38.1	47.8	60.5	76.2	38.1	47.8	60.5	82.6	38.1	47.8	60.5	82.6
1 1/2	44.5	54.1	69.9	85.9	44.5	54.1	69.9	95.3	44.5	54.1	69.9	95.3
2	55.6	69.9	85.9	104.9	55.6	69.9	85.9	111.3	55.6	69.9	85.9	111.3
2 1/2	66.5	82.6	98.6	124.0	66.5	82.6	98.6	130.3	66.5	82.6	98.6	130.3
3	81.0	101.6	120.7	136.7	81.0	101.6	120.7	149.4	81.0	101.6	120.7	149.4
4	106.4	127.0	149.4	174.8	106.4	127.0	149.4	181.1	106.4	120.7	149.4	177.8
5	131.8	155.7	177.8	196.9	131.8	155.7	177.8	215.9	131.8	147.6	177.8	212.9
6	157.2	182.6	209.6	222.3	157.2	182.6	209.6	251.0	157.2	174.8	209.6	247.7
8	215.9	233.4	263.7	279.4	215.9	233.4	263.7	308.1	209.6	225.6	263.7	304.8
10	268.2	287.3	317.5	339.9	268.2	287.3	317.5	362.0	260.4	274.6	317.5	358.9
12	317.5	339.9	374.7	409.7	317.5	339.9	374.7	422.4	317.5	327.2	374.7	419.1
14	349.3	371.6	406.4	450.9	349.3	371.6	406.4	485.9	349.3	362.0	406.4	482.6
16	400.1	422.4	463.6	514.4	400.1	422.4	463.6	539.8	400.1	412.8	463.6	536.7
18	449.3	474.7	527.1	549.4	449.3	474.7	527.1	596.9	449.3	469.9	527.1	593.9
20	500.1	525.5	577.9	606.6	500.1	525.5	577.9	654.1	500.1	520.7	577.9	647.7
24	603.3	628.7	685.8	717.6	603.3	628.7	685.8	774.7	603.3	628.7	685.8	768.4
26	654.1	673.1	698.5	725.4	654.1	673.1	711.2	771.7	654.1	666.8	698.5	746.3
28	704.9	723.9	749.3	776.2	704.9	723.9	762.0	825.5	701.8	714.5	749.3	800.1
30	755.7	774.7	800.1	827.0	755.7	774.7	812.8	886.0	752.6	765.3	806.5	857.3
32	806.5	825.5	850.9	881.1	806.5	825.5	863.6	939.8	800.1	812.8	860.6	911.4
34	857.3	876.3	908.1	935.0	857.3	876.3	914.4	993.9	850.9	866.9	911.4	962.2
36	908.1	927.1	958.9	987.6	908.1	927.1	965.2	1047.8	898.7	917.7	965.2	1022.4
38	958.9	974.6	1009.7	1044.7	971.6	1009.7	1047.8	1098.6	952.5	971.6	1022.4	1073.2
40	1009.7	1022.4	1063.8	1095.5	1022.4	1060.5	1098.6	1149.4	1000.3	1025.7	1076.5	1127.3
42	1060.5	1079.5	1114.6	1146.3	1054.1	1079.5	1117.6	1200.2	1051.1	1076.5	1127.3	1178.1
44	1111.3	1124.0	1165.4	1197.1	1124.0	1162.1	1200.2	1251.0	1104.9	1130.3	1181.1	1231.9
46	1162.1	1181.1	1224.0	1255.8	1178.1	1216.2	1254.3	1317.8	1168.4	1193.8	1244.6	1289.1
48	1212.9	1231.9	1270.0	1306.6	1200.2	1231.9	1270.0	1368.6	1206.5	1244.6	1295.4	1346.2
50	1263.7	1282.7	1325.6	1357.4	1267.0	1317.8	1355.9	1419.4	1257.3	1295.4	1346.2	1403.4
52	1314.5	1333.5	1376.4	1408.2	1317.8	1368.6	1406.7	1470.2	1308.1	1346.2	1397.0	1454.2
54	1365.3	1384.3	1422.4	1463.8	1346.2	1384.3	1422.4	1530.4	1352.6	1403.4	1454.2	1517.7
56	1412.7	1435.1	1470.2	1514.6	1428.8	1479.6	1524.0	1593.9	1403.4	1454.2	1505.0	1568.5
58	1463.5	1485.9	1522.5	1579.6	1484.4	1535.2	1573.3	1655.8	1454.2	1505.0	1555.8	1619.3
60	1514.3	1536.7	1573.3	1630.4	1505.0	1536.7	1574.8	1706.6	1517.1	1568.5	1619.3	1682.8

Tolerance of API Dimensions (API 치수허용오차)

unit : mm

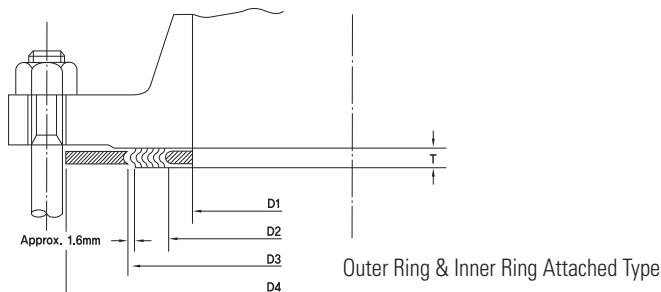
Flange Size B	D1	D2	D3	D4	T
1/2~1	-				
1 1/4~3	±0.76	±0.41	±0.76		
4~8					
10~24	±1.52		±1.52 - 0.76	±0.76	
26~34		±0.76			±0.76
36~60	±3.02		±1.52	±1.27	+0.250 - 0

Note : 1. 1/2" ~ 24" : ANSI B 16.5 FLANGES.
 2. 26" ~ 60" : API 605 & MSS SP-44 FLANGES.

Class 600				Class 900				Class 1500				Class 2500			
D1	D2	D3	D4	D1	D2	D3	D4	D1	D2	D3	D4	D1	D2	D3	D4
14.2	19.1	31.8	54.1	14.2	19.1	31.8	63.5	14.2	19.1	31.8	63.5	14.2	19.1	31.8	69.9
20.6	25.4	39.6	66.8	20.6	25.4	39.6	69.9	20.6	25.4	39.6	69.9	20.6	25.4	39.6	76.2
26.9	31.8	47.8	73.2	26.9	31.8	47.8	79.5	26.9	31.8	47.8	79.5	26.9	31.8	47.8	85.9
38.1	47.8	60.5	82.6	33.3	39.6	60.5	88.9	33.3	39.6	60.5	88.9	33.3	39.6	60.5	104.9
44.5	54.1	69.9	95.3	41.4	47.8	69.9	98.6	41.4	47.8	69.9	98.6	41.4	47.8	69.9	117.6
55.6	69.9	85.9	111.3	52.3	58.7	85.9	143.0	52.3	58.7	85.9	143.0	52.3	58.7	85.9	146.1
66.5	82.6	98.6	130.3	63.5	69.9	98.6	165.1	63.5	69.9	98.6	165.1	63.5	69.9	98.6	168.4
81.0	101.6	120.7	149.4	81.0	95.3	120.7	168.4	81.0	92.2	120.7	174.8	81.0	92.2	120.7	196.9
106.4	120.7	149.4	193.8	106.4	120.7	149.4	206.5	106.4	117.6	149.4	209.6	106.4	117.6	149.4	235.0
131.8	147.6	177.8	241.3	131.8	147.6	177.8	247.7	131.8	143.0	177.8	254.0	131.8	143.0	177.8	279.4
157.2	174.8	209.6	266.7	157.2	174.8	209.6	289.1	157.2	171.5	209.6	282.7	157.2	171.5	209.6	317.5
209.6	225.6	263.7	320.8	209.6	222.3	257.3	358.9	206.2	215.9	257.3	352.6	200.2	215.9	257.3	387.4
260.4	274.6	317.5	400.1	260.4	276.4	311.2	435.1	257.8	266.7	311.2	435.1	247.7	270.0	311.2	476.3
317.5	327.2	374.7	457.2	314.5	323.9	368.3	498.6	314.5	323.9	368.3	520.7	292.1	317.5	368.3	549.4
349.3	362.0	406.4	492.3	342.9	355.6	400.1	520.7	339.8	362.0	400.1	577.9				
400.1	412.8	463.6	565.2	393.7	412.8	457.2	574.8	387.4	406.4	457.2	641.4				
449.3	469.9	527.1	612.9	444.5	463.6	520.7	638.3	438.2	463.6	520.7	704.9				
500.1	520.7	577.9	682.8	495.3	520.7	571.5	698.5	489.0	514.4	571.5	755.7				
603.3	628.7	685.8	790.7	603.3	628.7	679.5	838.2	577.9	616.0	679.5	901.7				
644.7	663.7	714.5	765.3	673.1	692.2	749.3	838.2								
692.2	704.9	755.7	819.2	723.9	743.0	800.1	901.7								
752.6	778.0	828.8	879.6	787.4	806.5	857.3	958.9								
793.8	831.9	882.7	933.5	838.2	863.6	914.4	1016.0								
850.9	889.0	939.8	997.0	895.4	920.8	971.6	1073.2								
901.7	939.8	990.6	1047.8	927.1	946.2	997.0	1124.0								
952.5	990.6	1041.4	1104.9	1009.7	1035.1	1085.9	1200.2								
1009.7	1047.8	1098.6	1155.7	1060.5	1098.6	1149.5	1251.0								
1066.8	1104.9	1155.7	1219.2	1111.3	1149.4	1200.2	1301.8								
1111.3	1162.1	1212.9	1270.0	1155.7	1206.5	1257.3	1368.6								
1162.1	1212.9	1263.7	1327.2	1219.2	1270.0	1320.8	1435.1								
1219.2	1270.0	1320.8	1390.7	1270.0	1320.8	1371.6	1485.9								
1270.0	1320.8	1371.6	1447.8												
1320.8	1371.6	1422.4	1498.6												
1378.0	1428.2	1479.6	1555.8												
1428.8	1479.6	1530.4	1612.9												
1473.2	1536.7	1587.5	1663.7												
1530.4	1593.9	1644.7	1733.6												

SPIRAL WOUND GASKET DIMENSIONS for ASME B16.47 SERIES "A" FLANGES

ASME B16.20(1993) LARGE DIAMETER GASKET 치수



unit : mm

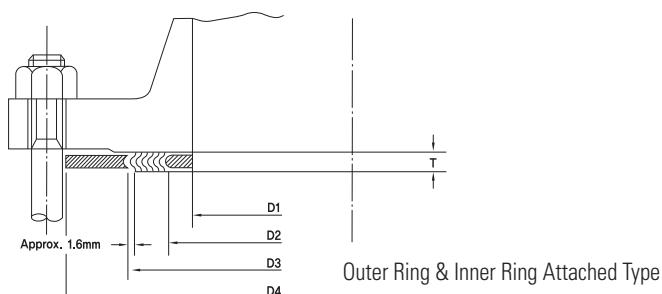
Flange Size (NPS)	Class 150				Class 300				Class 400			
	D1	D2	D3	D4	D1	D2	D3	D4	D1	D2	D3	D4
26	654.1	673.1	704.9	774.7	654.1	685.8	736.6	835.2	660.4	685.8	736.6	831.9
28	704.9	723.9	755.7	831.9	704.9	736.6	787.4	898.7	711.2	736.6	787.4	892.3
30	755.7	774.7	806.5	882.7	755.7	793.8	844.6	952.5	755.7	793.8	844.6	946.2
32	806.5	825.5	860.6	939.8	806.5	850.9	901.7	1006.6	812.8	850.9	901.7	1003.3
34	857.3	876.3	911.4	990.6	857.3	901.7	952.5	1057.4	863.6	901.7	952.5	1054.1
36	908.1	927.1	968.5	1047.8	908.1	955.8	1006.6	1117.6	917.7	955.8	1006.6	1117.6
38	958.9	977.9	1019.3	1111.3	952.5	977.9	1016.0	1054.1	952.5	971.6	1022.4	1073.2
40	1009.7	1028.7	1070.1	1162.1	1003.3	1022.4	1070.1	1114.6	1000.3	1025.7	1076.5	1127.3
42	1060.5	1079.5	1124.0	1219.2	1054.1	1073.2	1120.9	1165.4	1051.1	1076.5	1127.3	1178.1
44	1111.3	1130.3	1178.1	1276.4	1104.9	1130.3	1181.1	1219.2	1104.9	1130.3	1181.1	1231.9
46	1162.1	1181.1	1228.9	1327.2	1152.7	1178.1	1228.9	1273.3	1168.4	1193.8	1244.6	1289.1
48	1212.9	1231.9	1279.7	1384.3	1209.8	1235.2	1286.0	1324.1	1206.5	1244.6	1295.4	1346.2
50	1263.7	1282.7	1333.5	1435.1	1244.6	1295.4	1346.2	1378.0	1257.3	1295.4	1346.2	1403.4
52	1314.5	1333.5	1384.3	1492.3	1320.8	1346.2	1397.0	1428.8	1308.1	1346.2	1397.0	1454.2
54	1358.9	1384.3	1435.1	1549.4	1352.6	1403.4	1454.2	1492.3	1352.6	1403.4	1454.2	1517.7
56	1409.7	1435.1	1485.9	1606.6	1403.4	1454.2	1505.0	1543.1	1403.4	1454.2	1505.0	1568.5
58	1460.5	1485.9	1536.7	1663.7	1447.8	1511.3	1562.1	1593.9	1454.2	1505.0	1555.8	1619.3
60	1511.3	1536.7	1587.5	1714.5	1524.0	1562.1	1612.9	1644.7	1517.7	1568.5	1619.3	1682.8

unit : mm

Flange Size (NPS)	Class 600				Class 900			
	D1	D2	D3	D4	D1	D2	D3	D4
26	647.7	685.8	736.6	866.9	660.4	685.8	736.6	882.7
28	698.5	736.6	787.4	914.4	711.2	736.6	787.4	946.2
30	755.7	793.8	844.6	971.6	768.4	793.8	844.6	1009.7
32	812.8	850.9	901.7	1022.4	812.8	850.9	901.7	1073.2
34	863.6	901.7	952.5	1073.2	863.6	901.7	952.5	1136.7
36	917.7	955.8	1006.6	1130.3	920.8	958.9	1009.7	1200.2
38	952.5	990.6	1041.4	1104.9	1009.7	1035.1	1085.9	1200.2
40	1009.7	1047.8	1098.6	1155.7	1060.5	1098.6	1149.4	1251.0
42	1066.8	1104.9	1155.7	1219.2	1111.3	1149.4	1200.2	1301.8
44	1111.3	1162.1	1212.9	1270.0	1155.7	1206.5	1257.3	1368.6
46	1162.1	1212.9	1263.7	1327.2	1219.2	1270.0	1320.8	1435.1
48	1219.2	1270.0	1320.8	1390.7	1270.0	1320.8	1371.6	1485.9
50	1270.0	1320.8	1371.6	1447.8	-	-	-	-
52	1320.8	1371.6	1422.4	1498.6	-	-	-	-
54	1378.0	1428.8	1479.6	1555.8	-	-	-	-
56	1428.8	1479.6	1530.4	1612.9	-	-	-	-
58	1473.2	1536.7	1587.5	1663.7	-	-	-	-
60	1530.4	1593.9	1644.7	1733.6	-	-	-	-

SPIRAL WOUND GASKET DIMENSIONS for ASME B16.47 SERIES "B" FLANGES

ASME B16.20(1993) LARGE DIAMETER GASKET 치수



unit : mm

Flange Size (NPS)	Class 150				Class 300				Class 400			
	D1	D2	D3	D4	D1	D2	D3	D4	D1	D2	D3	D4
26	654.1	673.1	698.5	725.4	654.1	673.1	711.2	771.7	654.1	666.8	698.5	746.3
28	704.9	723.9	749.3	776.2	704.9	723.9	762.0	825.5	701.8	714.5	749.3	800.1
30	755.7	774.7	800.1	827.0	755.7	774.7	812.8	886.0	752.6	765.3	806.5	857.3
32	806.5	825.5	850.9	881.1	806.5	825.5	863.6	939.8	800.1	812.8	860.6	911.4
34	857.3	876.3	908.1	935.0	857.3	876.3	914.4	993.9	850.9	866.9	911.4	962.2
36	908.1	927.1	958.9	987.6	908.1	927.1	965.2	1047.8	898.7	917.7	965.2	1022.4
38	958.9	974.6	1009.7	1044.7	971.6	1009.7	1047.8	1098.6	952.5	971.6	1022.4	1073.2
40	1009.7	1022.4	1063.8	1095.5	1022.4	1060.5	1098.6	1149.4	1000.3	1025.7	1076.5	1127.3
42	1060.5	1079.5	1114.6	1146.3	1085.9	1111.3	1149.4	1200.2	1051.1	1076.5	1127.3	1178.1
44	1111.3	1124.0	1165.4	1197.1	1124.0	1162.1	1200.2	1251.0	1104.9	1130.3	1181.1	1231.9
46	1162.1	1181.1	1224.0	1255.8	1178.1	1216.2	1254.3	1317.8	1168.4	1193.8	1244.6	1289.1
48	1212.9	1231.9	1270.0	1306.6	1231.9	1263.7	1311.4	1368.6	1206.5	1244.6	1295.4	1346.2
50	1263.7	1282.7	1325.6	1357.4	1267.0	1317.8	1355.9	1419.4	1257.3	1295.4	1346.2	1403.4
52	1314.5	1333.5	1376.4	1408.2	1317.8	1368.6	1406.7	1470.2	1308.1	1346.2	1397.0	1454.2
54	1365.3	1384.3	1422.4	1463.8	1365.3	1403.4	1454.2	1530.4	1352.6	1403.4	1454.2	1517.7
56	1422.4	1444.8	1470.2	1514.6	1428.8	1479.6	1524.0	1593.9	1403.4	1454.2	1505.0	1568.5
58	1478.0	1500.4	1528.8	1579.6	1484.4	1535.2	1573.3	1655.8	1454.2	1505.0	1555.8	1619.3
60	1535.2	1557.3	1586.0	1630.4	1557.3	1589.0	1630.4	1706.6	1517.7	1568.5	1619.3	1682.8

unit : mm

Flange Size (NPS)	Class 600				Class 900			
	D1	D2	D3	D4	D1	D2	D3	D4
26	644.7	663.7	714.5	765.3	666.8	692.2	749.3	838.2
28	692.2	704.9	755.7	819.2	717.6	743.0	800.1	901.7
30	752.6	778.0	828.8	879.6	781.1	806.5	857.3	958.9
32	793.8	831.9	882.7	933.5	838.2	863.6	914.4	1016.0
34	850.9	889.0	939.8	997.0	895.4	920.8	971.6	1073.2
36	901.7	939.8	990.6	1047.8	920.8	946.2	997.0	1124.0
38	952.5	990.6	1041.4	1104.9	1009.7	1035.1	1085.9	1200.2
40	1009.7	1047.8	1098.6	1155.7	1060.5	1098.6	1149.4	1251.0
42	1066.8	1104.9	1155.7	1219.2	1111.3	1149.4	1200.2	1301.8
44	1111.3	1162.1	1212.9	1270.0	1155.7	1206.5	1257.3	1368.6
46	1162.1	1212.9	1263.7	1327.2	1219.2	1270.0	1320.8	1435.1
48	1219.2	1270.0	1320.8	1390.7	1270.0	1320.8	1371.6	1485.9
50	1270.0	1320.8	1371.6	1447.8	-	-	-	-
52	1320.8	1371.6	1422.4	1498.6	-	-	-	-
54	1378.0	1428.8	1479.6	1555.8	-	-	-	-
56	1428.8	1479.6	1530.4	1612.9	-	-	-	-
58	1473.2	1536.7	1587.5	1663.7	-	-	-	-
60	1530.4	1593.9	1644.7	1733.6	-	-	-	-



DONGSUH INDUSTRY

The DONGSUH is moving forward with a renewed spirit of service for customers.

It is designed to have both high tensile strength and flexibility simultaneously for braiding continuous filament carbon fiber having high thermal conductivity and low coefficient of friction in a unique method of DONGSUH.

Mechanical Seals

We will make it for customer impressed not customer satisfaction.

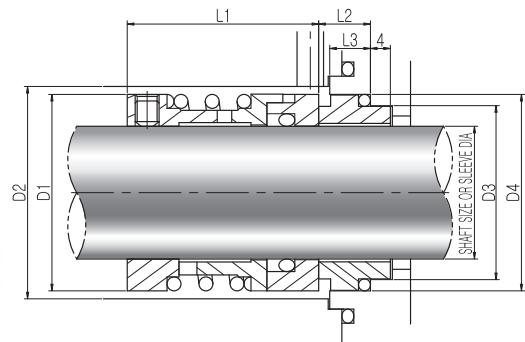


Mechanical Seals

- 48 ALS 122NB
MONO Spring Type Unbalance Seal
- 49 ALS 131NB
Corrosion Free Anti-Acid Outside Seal
- 51 ALS 151NB
Multi Spring Type Unbalance Seal
- 52 ALS 152AB
Multi Spring Type Balance Seal
- 53 ALS 172NB
Multi Spring Type Medium Pressure Un-Balance Seal
- 54 ALS 172AB
Multi Spring Type High Pressure Balance Seal
- 55 ALS 181NB
Multi Spring Type High Temperature & High Pressure Balance Seal
- 57 ALS 191NB
Metal Bellows Shaft Seal
- 58 ALS 201NB
General Purpose Shaft Seal
- 59 ALS 202NB
High Pressure Purpose Shaft Seal
- 60 ALS 203NB
High Pressure Purpose Shaft Seal
- 61 ALS 205NB
MONO Spring Type Slurry Seal
- 62 ALS 251
Elastomer Bellows Seal (High Pr)
- 63 ALS 252
Elastomer Bellows Seal
- 64 ALS 305NB
Cartridge Mounted High Speed-High Pressure Stationary Seal
- 65 ALS 311HB
Cartridge Mounted High Speed-High Pressure Stationary Seal
- 66 ALS 312AB
Cartridge Mounted Single Seal
- 67 ALS 322AB
Cartridge Mounted Double Balance Seal
- 68 **TECHNICAL DATA**
- 75 **CHEMICAL LISTINGS**

ALS 122NB

MONO Spring Type Unbalance Seal



Technical data / STANDARD MATERIALS

Metal Parts : 316 Stainless Steel.
 Springs : Alloy 20.
 O-Ring : Fluorocarbon installed. Ethylene propylene(EP) or Kalrez¹ available upon request.
 Rotating Face : Carbon, Solid Tungsten Carbide or Silicon Carbide available upon request.
 Stationary Face : Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide.

¹ Other Materials on Special Order.

Applications

- All types of rotary equipment, pumps, marine, mixers, agitators and compressors in a variety of service applications.
- Suitable for most general and light chemical duties ranging from water to weak acid solutions, wherever elastomer secondary seals can be used.
- SEA WTR Supply Pump for Nuclear & Thermal Power Plant.

Operating Conditions

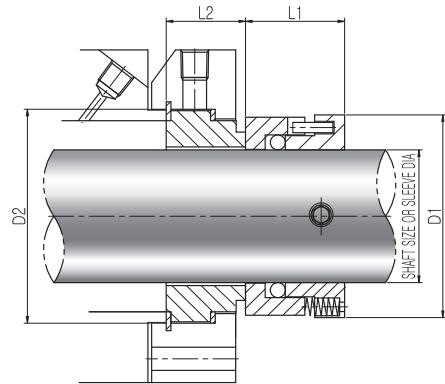
- Temperature : -40°C to + 200°C / -40°F to + 390°F Depending on materials used
- Pressure : Up to 10kg/Cm²
- Speed : Up to 10m/sec

Size in Millimeters

Shaft Dia	D1	D2	D3	D4	L1	L2	L3
020	34	36	30	36	43	11	8
022	36	38	32	38	44	11	8
025	39	41	35	41	46	12	9
028	42	44	38	44	46	12	9
030	44	46	40	46	48	13	10
032	46	48	42	48	48	13	10
035	49	51	45	51	50	13	10
038	54	58	48	54	50	13	10
040	56	60	50	56	52	14	11
042	58	62	52	58	52	14	11
045	61	65	55	61	52	14	11
048	64	68	58	64	59	15	12
050	66	70	60	66	59	15	12
052	68	72	62	68	63	15	12
055	71	75	65	71	63	15	12
058	76	83	70	76	66	15	12
060	78	85	72	78	68	16	13
062	80	87	74	80	68	16	13
065	83	90	77	83	71	16	13
068	86	93	80	86	72	16	13
070	90	95	81	90	73	18	15
075	95	104	86	95	74	18	15
080	100	109	91	100	76	18	15
085	105	114	96	105	77	18	15
090	110	119	101	110	78	18	15
095	115	124	106	115	80	18	15
100	120	129	116	125	81	21	17

ALS 131NB

Corrosion Free Anti-Acid Outside Seal



Technical data / STANDARD MATERIALS

Metal Parts : 316 Stainless Steel.
Springs : Alloy 20 or Hastelloy C.
O-Ring : Fluorocarbon installed. Ethylene Propylene(EP) or Kalrez available upon request.
Rotating Face : Carbon, Solid Tungsten Carbide or Silicon Carbide available upon request.
Stationary Face : Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide.

Other Materials on Special Order.

Applications

- All types of rotary equipment, pumps, marine, mixers, agitators and compressors in a variety of service applications.
- Corrosive Fluids Pumps.
- Acid Pump for Nuclear & Thermal Power Plant.

Operating Conditions

- Temperature : -40°C to + 200°C / -40°F to + 390°F Depending on materials used
- Pressure : Up to 10kg/Cm²
- Speed : Up to 15m/sec

Size in inches

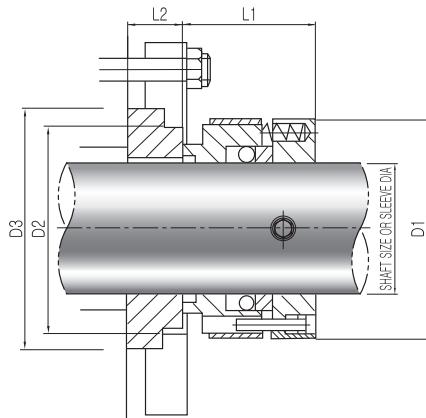
Shaft Dia	D1	D2	L1	L2
1.000	1.000	1.875	1.125	1.000
1.125	1.875	2.000	1.125	1.000
1.250	2.000	2.125	1.125	1.000
1.375	2.125	2.250	1.125	1.000
1.500	2.250	2.375	1.125	1.000
1.625	2.500	2.625	1.250	1.000
1.750	2.625	2.750	1.250	1.000
1.875	2.750	2.875	1.250	1.000
2.000	2.875	3.000	1.250	1.000
2.125	3.000	3.125	1.250	1.000
2.375	3.250	3.375	1.250	1.000
2.500	3.375	3.500	1.250	1.000

Size in Millimeters

Shaft Dia	D1	D2	D3	L1	L2
25	49	41.5	54.5	38	17.5
30	54	46.5	63.0	38	17.5
35	59	51.0	62.5	38	17.5
38	63	58.0	69.5	38	17.5
40	65	60.5	73.5	38	17.5
45	70	64.0	80.0	38	17.5
50	75	70.0	89.5	38	17.5
55	80	73.5	96.0	38	17.5
60	85	78.0	99.5	38	17.5
65	90	85.0	105.0	38	17.5
70	95	90.0	110.0	38	17.5
75	100	95.0	115.0	38	17.5
80	105	-	-	40	17.5
85	110	-	-	40	17.5

ALS 131NB

Corrosion Free Anti-Acid Outside Seal



Technical data / STANDARD MATERIALS

Metal Parts : 316 Stainless Steel.
 Springs : Alloy 20 or Hastelloy C.
 O-Ring : Fluorocarbon installed. Ethylene Propylene(EP) or Kalrez available upon request.
 Rotating Face : Carbon, Solid Tungsten Carbide or Silicon Carbide available upon request.
 Stationary Face : Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide.

Other Materials on Special Order:

Application

- All types of rotary equipment, pumps, marine, mixers, agitators and compressors in a variety of service applications.
- Corrosive Fluids Pumps.
- Acid Pump for Nuclear & Thermal Power Plant.

Operating Conditions

- Temperature : -40°C to +200°C / -40°F to +390°F Depending on materials used
- Pressure : Up to 10kg/Cm²
- Speed : Up to 15m/sec

Size in inches

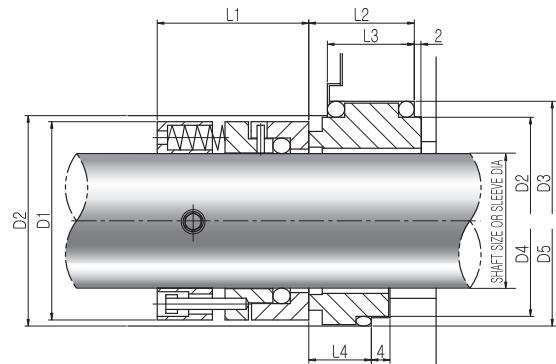
Shaft Dia	D1	D2	L1	L2
1.000	1.000	1.875	1.125	1.000
1.125	1.875	2.000	1.125	1.000
1.250	2.000	2.125	1.125	1.000
1.375	2.125	2.250	1.125	1.000
1.500	2.250	2.375	1.125	1.000
1.625	2.500	2.625	1.250	1.000
1.750	2.625	2.750	1.250	1.000
1.875	2.750	2.875	1.250	1.000
2.000	2.875	3.000	1.250	1.000
2.125	3.000	3.125	1.250	1.000
2.375	3.250	3.375	1.250	1.000
2.500	3.375	3.500	1.250	1.000

Size in Millimeters

Shaft Dia	D1	D2	D3	L1	L2
25	49	41.5	54.5	38	17.5
30	54	46.5	63.0	38	17.5
35	59	51.0	62.5	38	17.5
38	63	58.0	69.5	38	17.5
40	65	60.5	73.5	38	17.5
45	70	64.0	80.0	38	17.5
50	75	70.0	89.5	38	17.5
55	80	73.5	96.0	38	17.5
60	85	78.0	99.5	38	17.5
65	90	85.0	105.0	38	17.5
70	95	90.0	110.0	38	17.5
75	100	95.0	115.0	38	17.5
80	105	-	-	40	17.5
85	110	-	-	40	17.5

ALS 151NB

Multi Spring Type Unbalance Seal



Technical data / STANDARD MATERIALS

Metal Parts : 316 Stainless Steel or Hastelloy C.
 Springs : Alloy 20 or Hastelloy C..
 O-Ring : Fluorocarbon installed. Ethylene Propylene(EP) or Kalrez available upon request.
 Rotating Face : Carbon, Solid Tungsten Carbide or Silicon Carbide available upon request.
 Stationary Face : Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide.
 Other Materials on Special Order.

Applications

- All types of rotary equipment, pumps, marine, mixers, agitators and compressors in a variety of service applications.
- General Purpose Pumps. • SWBP, CCWP, Caustic Pump, Acid Pump, CVP for Nuclear & Thermal Power Plant.

Operating Conditions

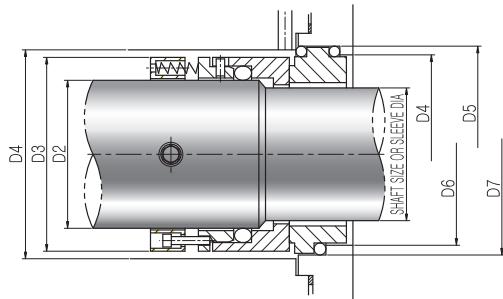
- Temperature : -40°C to + 200°C / -40°F to + 390°F Depending on materials used
- Pressure : Up to 20kg/Cm²
- Speed : Up to 20m/sec

Size in Millimeters

Shaft Dia	D1	D2	D3	D4	D5	L1	L2	L3	L4
020	34	36	42	29	35	34	23	18	9.5
022	36	38	44	31	37	34	23	18	9.5
025	39	41	47	34	40	34	23	18	9.5
028	42	44	50	37	43	34	23	18	9.5
030	44	46	52	39	45	34	23	18	9.5
032	46	48	54	42	48	34	23	18	9.5
035	49	51	57	44	50	34	23	18	9.5
038	54	58	64	49	56	37	25	20	10
040	56	60	66	51	58	37	25	20	10
042	58	62	68	-	-	37	25	20	-
045	61	65	71	56	63	37	25	20	13.5
048	64	68	74	59	66	37	25	20	13.5
050	66	70	76	62	70	38	25	20	14
052	68	72	78	-	-	39	25	20	-
055	71	75	81	67	75	39	25	20	14
058	76	83	89	70	78	40	28	22	14
060	78	85	91	72	80	40	28	22	14
062	80	87	93	-	-	40	28	22	-
065	83	90	96	77	85	40	28	22	-
068	86	93	99	81	90	40	30	24	14
070	90	95	101	83	92	41	30	24	14
075	95	104	110	88	97	41	30	24	17.5
080	100	109	115	95	105	41	31	25	17.5
085	105	114	120	100	110	42	31	25	17.5
090	110	119	125	105	115	44	31	25	17.5
095	115	124	130	110	120	44	31	25	17.5
100	120	129	135	115	125	44	31	25	17.5
105	127	134	140	-	-	44	31	25	-
110	132	139	145	-	-	44	31	25	-
120	144	150	160	-	-	51	41	30	-
130	154	160	170	-	-	51	41	30	-
140	164	175	185	-	-	51	41	30	-
150	180	190	200	-	-	61	41	30	-

ALS 152AB

Multi Spring Type Balance Seal



Technical data / STANDARD MATERIALS

Metal Parts : 316 Stainless Steel or Hastelloy C.
 Springs : Alloy 20 or Hastelloy C.
 O-Ring : Fluorocarbon installed. Ethylene Propylene(EP) or Kalrez available upon request.
 Rotating Face : Carbon, Solid Tungsten Carbide or Silicon Carbide available upon request.
 Stationary Face : Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide.
 · Other Materials on Special Order.

Application

- All types of rotary equipment, pumps, marine, mixers, agitators and compressors in a variety of service applications.
- General Purpose High Pressure Pumps. • Acid Pump, Sodium Hypo Feed Pump, CBP, COP, CCWP LDP for Nuclear & Thermal Power Plant.

Operating Conditions

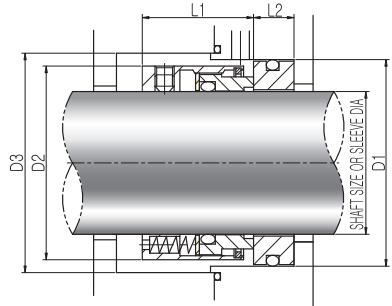
- Temperature : -40°C to + 200°C / -40°F to + 390°F Depending on materials used
- Pressure : Up to 30kg/Cm²
- Speed : Up to 20m/sec

Size in Millimeters

Shaft Dia	D1	D2	D3	D4	D5	D6	D7	L1	L2	L3	L4	L5
020	20	24	38	40	46	29	35	39	23	32	18	9.5
022	22	26	40	42	48	31	37	39	23	32	18	9.5
025	24	28	42	44	50	33	39	39	23	32	18	9.5
028	25	30	44	46	52	34	40	39	23	32	18	9.5
030	28	33	47	49	55	37	43	39	23	32	18	9.5
032	30	35	49	51	57	39	45	39	23	32	18	9.5
035	33	38	54	58	64	42	48	41	25	34	20	9.5
038	35	40	56	60	66	44	50	41	25	34	20	9.5
040	38	43	59	63	69	49	56	42	25	34	20	10
042	40	45	61	65	71	51	58	42	25	34	20	10
045	43	48	64	68	74	54	61	42	25	34	20	13.5
048	45	50	66	70	76	56	63	43	25	35	20	13.5
050	48	53	69	73	79	59	66	43	25	35	20	13.5
052	50	55	71	75	81	62	70	43	25	35	20	114
055	53	58	76	83	89	65	73	45	28	36	22	14
058	55	60	78	85	91	67	75	45	28	36	22	14
060	58	63	81	88	94	70	78	45	28	36	22	14
062	60	35	83	90	96	72	80	45	28	36	22	14
065	63	68	86	93	99	75	83	45	30	36	24	14
068	65	70	90	95	101	77	85	45	30	36	24	14
070	70	75	95	104	110	83	92	45	30	36	24	17.5
075	75	80	100	109	115	88	97	45	31	36	25	17.5
080	80	85	105	114	120	95	105	45	31	36	25	17.5
085	85	90	110	119	125	100	110	48	31	38	25	17.5
090	90	95	115	124	130	105	115	48	31	38	25	17.5
095	95	100	120	129	135	110	120	48	31	38	25	17.5
100	100	105	127	134	140	115	125	48	31	38	25	17.5
105	105	110	132	139	145	-	-	48	31	38	25	-
110	110	120	144	150	160	-	-	61	41	46	30	-
120	120	130	154	160	170	-	-	61	41	46	30	-
130	130	140	164	175	185	-	-	61	41	46	30	-
140	140	150	180	190	200	-	-	71	41	55	30	-
150	150	160	190	200	210	-	-	71	41	55	30	-

ALS 172NB

Multi Spring Type Medium Pressure Un-Balance Seal



Technical data / STANDARD MATERIALS

Metal Parts : 316 Stainless Steel.
 Springs : Alloy 20
 O-Ring : Fluorocarbon installed. Ethylene Propylene(EP) or Kalrez available upon request.
 Rotating Face : Carbon, Solid Tungsten Carbide or Silicon Carbide available upon request.
 Stationary Face : Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide.

Other Materials on Special Order.

Applications

- All types of rotary equipment, pumps, marine, mixers, agitators and compressors in a variety of service applications.
- Medium Pressure, Medium Speed Pumps.
- Stator Cooling Water Pump for Nuclear & Thermal Power Plant.

Operating Conditions

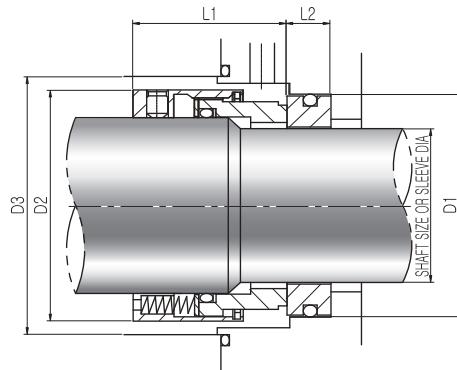
- Temperature : -40°C to + 200°C / -40°F to + 500°F Depending on materials used
- Pressure : Up to 15kg/Cm²
- Speed : Up to 30m/sec

Size in inches

Shaft Dia	D1	D2	D3	L1	L2
1/2	1	1 1/32	1 5/32	13/16	5/16
5/8	1 1/4	1 3/16	1 5/16	3/4	13/32
3/4	1 3/8	1 5/16	1 7/16	7/8	13/32
7/8	1 1/2	1 7/16	1 9/16	15/16	13/32
1	1 5/8	1 9/16	1 3/4	1	7/16
1 1/8	1 3/4	1 11/16	1 7/8	1 11/16	7/16
1 1/4	1 7/8	1 7/8	2	1 1/16	7/16
1 3/8	2	2	2 1/8	1 1/8	7/16
1 1/2	2 1/8	2 1/8	2 1/4	1 1/8	7/16
1 5/8	2 3/8	2 3/8	2 1/2	1 3/8	1/2
1 3/4	2 1/2	2 1/2	2 5/8	1 3/8	1/2
1 7/8	2 5/8	2 5/8	2 3/4	1 3/8	1/2
2	2 3/4	2 3/4	2 7/8	1 3/8	1/2
2 1/8	3	3	3 1/8	1 11/16	9/16
2 1/4	3 1/8	3 1/8	3 1/4	1 11/16	9/16
2 3/8	3 1/4	3 1/4	3 3/8	1 11/16	9/16
2 1/2	3 3/8	3 3/8	3 1/2	1 11/16	9/16
2 5/8	3 3/8	3 1/2	3 5/8	1 11/16	5/8
2 3/4	3 1/2	3 5/8	3 3/4	1 11/16	5/8
2 7/8	3 3/4	3 3/4	3 7/8	1 11/16	5/8
3	3 7/8	3 13/16	4	1 11/16	5/8
3 1/8	4	3 15/16	4 1/16	1 11/16	25/32
3 1/4	4 1/8	4 1/8	4 1/4	1 11/16	25/32
3 3/8	4 1/4	4 1/4	4 3/8	1 11/16	25/32
3 1/2	4 3/8	4 3/8	4 1/2	1 11/16	25/32
3 5/8	4 1/2	4 1/2	4 5/8	1 11/16	25/32
3 3/4	4 5/8	4 5/8	4 3/4	1 11/16	25/32
3 7/8	4 3/4	4 3/4	4 7/8	1 11/16	25/32
4	4 7/8	4 7/8	5	1 11/16	25/32

ALS 172AB

Multi Spring Type High Pressure Balance Seal



Technical data / STANDARD MATERIALS

Metal Parts : 316 Stainless Steel.
 Springs : Alloy 20
 O-Ring : Fluorocarbon installed. Ethylene Propylene(EP) or Kalrez available upon request.
 Rotating Face : Carbon, Solid Tungsten Carbide or Silicon Carbide available upon request.
 Stationary Face : Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide.

• Other Materials on Special Order.

Application

- All types of rotary equipment, pumps, marine, mixers, agitators and compressors in a variety of service applications.
- High Pressure, High Speed Pumps.
- Stator Cooling Water Pump for Nuclear & Thermal Power Plant.

Operating Conditions

- Temperature : -40°C to +200°C / -40°F to +500°F Depending on materials used
- Pressure : Up to 50kg/Cm²
- Speed : Up to 30m/sec

Size in inches

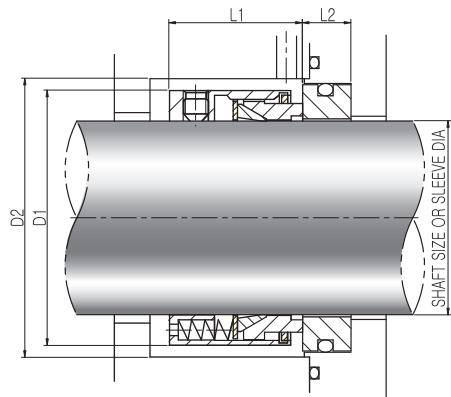
Shaft Dia	D1	D2	D3	L1	L2
1	1.508	1 9/16	1 13/16	1 5/16	13/32
1 1/8	1.633	1 11/16	1 15/16	1 3/8	7/16
1 1/4	1.758	1 7/8	2 1/8	1 3/8	7/16
1 3/8	1.758	2	2 1/4	1 7/16	7/16
1 1/2	1.883	2 1/8	2 3/8	1 7/16	7/16
1 5/8	2.008	2 3/8	2 5/8	1 3/4	7/16
1 3/4	2.133	2 1/2	2 3/4	1 3/4	7/16
1 7/8	2.383	2 5/8	2 7/8	1 3/4	1/2
2	2.508	2 3/4	3	1 3/4	1/2
2 1/8	2.633	3	3 1/8	2 1/16	1/2
2 1/4	2.758	3 1/8	3 1/4	2 1/16	1/2
2 3/8	3.008	3 1/4	3 3/8	2 1/16	9/16
2 1/2	3.133	3 3/8	3 1/2	2 1/16	9/16
2 5/8	3.258	3 1/2	3 5/8	2 1/16	9/16
2 3/4	3.383	3 5/8	3 3/4	2 1/16	9/16
2 7/8	3.383	3 3/4	3 13/16	2 1/16	5/8
3	3.508	3 13/16	3 15/16	2 1/16	5/8
3 1/8	3.758	3 15/16	3 1/8	2 1/16	5/8
3 1/4	3.883	4 1/8	4 1/4	2 1/16	5/8
3 3/8	4.008	4 1/4	4 3/8	2 1/16	25/32
3 1/2	4.133	4 3/8	4 3/8	2 1/16	25/32
3 5/8	4.258	4 1/2	4 1/2	2 1/16	25/32
3 3/4	4.383	4 5/8	4 5/8	2 1/16	25/32
3 7/8	4.508	4 3/4	4 3/4	2 1/16	25/32
4	4.633	4 7/8	4 7/8	2 1/16	25/32

Size in Millimeters

Shaft Dia	D1	D2	D3	L1	L2
25	39.5	39.5	46	33	10
28	42.5	42.5	49	35	11
30	44.5	44.5	51	35	11
32	47.5	47.5	54	35	11
35	50.8	50.8	57	36.5	11
38	54	54	60	36.5	11
40	56	56	62	44.5	11
45	63.5	63.5	70	44.5	11
48	67	67	73	44.5	12.7
50	70	70	76	44.5	12.7
55	76	76	82	52	12.7
60	82	82	89	52	14
65	85	85	92	52	14
70	92	92	98	52	14
75	95	95	102	52	16
80	100	100	107	52	16
85	107	107	114	52	20
90	112	112	118	52	20
95	117	117	124	52	20
100	124	124	130	52	20

ALS 181NB

Multi Spring Type High Temperature & High Pressure Balance Seal



Technical data / STANDARD MATERIALS

Metal Parts	: 316 Stainless Steel.
Springs	: Inconel X 750.
Wedge Sealing Member	: Available in PTFE and flexible graphite materials. Creates positive seal for use in extreme temperature / chemical applications.
Rotating Face	: Carbon, Solid Tungsten Carbide or Silicon Carbide available upon request. Stellite
Stationary Face	: Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide. Stellite
Other Materials on Special Order.	
Precision Lapped	: Lapping process results in high precision finished with optimal flatness.
Stationary Face	: Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide. Stellite
Mechanical Drive	: Reduces slippage in shaft or sleeve to eliminate galling and premature wear. Seals are birotational.

Application

- All types of rotary equipment, pumps, marine, mixers, agitators and compressors in a variety of service applications.
- High Pressure, High Speed Pumps.
- High Temperature Valves for Nuclear & Thermal Power Plant.

Operating Conditions

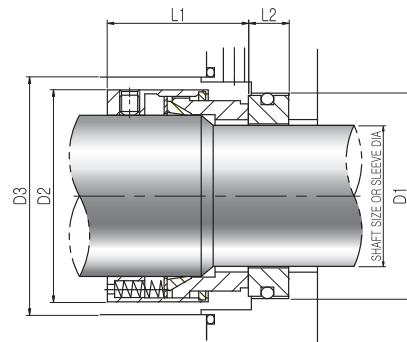
- Temperature : -50°C to + 500°C / -60°F to + 930°F Depending on materials used
- Pressure : Up to 30kg/Cm²
- Speed : Up to 30m/sec

Size in inches

Shaft Dia	D1	D2	L1	L2
.500	1.031	1.156	.812	.812
.625	1.187	1.312	.750	.812
.750	1.312	1.437	.875	.812
.875	1.437	1.562	.937	.812
1.000	1.562	1.750	1.000	.812
1.125	1.687	1.875	1.062	.812
1.250	1.875	2.000	1.062	.812
1.375	2.000	2.125	1.125	.875
1.500	2.125	2.250	1.125	.875
1.625	2.375	2.500	1.375	.875
1.750	2.500	2.625	1.375	.875
1.875	2.625	2.750	1.375	.875
2.000	2.750	2.875	1.375	1.000
2.125	3.000	3.125	1.687	1.000
2.250	3.125	3.250	1.687	1.000
2.375	3.250	3.375	1.687	1.000
2.500	3.375	3.500	1.687	1.000
2.625	3.500	3.625	1.687	1.000
2.750	3.625	3.750	1.687	1.000
2.875	3.750	3.875	1.687	1.000
3.000	3.812	4.000	1.687	1.000
3.125	3.937	4.062	1.687	1.000
3.250	4.125	4.250	1.687	1.000
3.375	4.250	4.375	1.687	1.000
3.500	4.375	4.500	1.687	1.000
3.625	4.500	4.625	1.687	1.000
3.750	4.625	4.750	1.687	1.000
3.875	4.750	4.875	1.687	1.000
4.000	4.875	5.000	1.687	1.000

ALS 181AB

Multi Spring Type High Temperature & High Pressure Balance Seal



Technical data / STANDARD MATERIALS

Metal Parts	: 316 Stainless Steel.
Springs	: Inconel X 750.
Wedge Sealing Member	: Available in PTFE and flexible graphite materials. Creates positive seal for use in extreme temperature / chemical applications.
Rotating Face	: Carbon, Solid Tungsten Carbide or Silicon Carbide available upon request. Stellite
Stationary Face	: Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide. Stellite
Other Materials on Special Order:	
Precision Lapped	: Lapping process results in high precision finished with optimal flatness.
Stationary Face	: Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide. Stellite
Mechanical Drive	: Reduces slippage in shaft or sleeve to eliminate galling and premature wear. Seals are birotational.

Application

- All types of rotary equipment, pumps, marine, mixers, agitators and compressors in a variety of service applications.
- High Pressure, High Speed Pumps.
- High Temperature Valves for Nuclear & Thermal Power Plant.

Operating Conditions

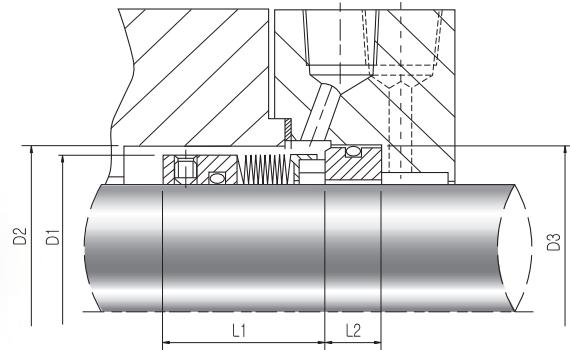
- Temperature : -50°C to +500°C / -60°F to +930°F Depending on materials used
- Pressure : Up to 30kg/Cm²
- Speed : Up to 30m/sec

Size in inches

Shaft Dia	D1	D2	D3	L1	L2
.500	1.031	1.031	1.218	1.125	.593
.625	1.187	1.187	1.375	1.062	.593
.750	1.312	1.312	1.500	1.187	.593
.875	1.437	1.437	1.625	1.250	.593
1.000	1.562	1.562	1.750	1.312	.593
1.125	1.687	1.687	1.875	1.375	.593
1.250	1.875	1.875	2.062	1.375	.593
1.375	2.000	2.000	2.187	1.437	.593
1.500	2.125	2.125	2.312	1.437	.593
1.625	2.375	2.375	2.562	1.750	.625
1.750	2.500	2.500	2.687	1.750	.625
1.875	2.625	2.625	2.812	1.750	.625
2.000	2.750	2.750	2.937	1.750	.625
2.125	3.000	3.000	3.187	2.062	.625
2.250	3.125	3.125	3.312	2.062	.750
2.375	3.250	3.250	3.437	2.062	.750
2.500	3.375	3.375	3.562	2.062	.750
2.625	3.500	3.500	3.687	2.062	.750
2.750	3.625	3.625	3.812	2.062	.750
2.875	3.750	3.750	3.937	2.062	.750
3.000	3.812	3.812	4.000	2.062	.750
3.125	3.937	3.937	4.125	2.062	.750
3.250	4.125	4.125	4.312	2.062	.750
3.375	4.250	4.250	4.437	2.062	.750
3.500	4.375	4.375	4.562	2.062	.750
3.625	4.500	4.500	4.687	2.062	.750
3.750	4.625	4.625	4.812	2.062	.750
3.875	4.750	4.750	4.937	2.062	.750
4.000	4.875	4.875	5.062	2.062	.750

ALS 191NB

Metal Bellows Shaft Seal



Technical data / STANDARD MATERIALS

Metal Parts : 316 Stainless Steel.
 Springs : Alloy 20 or Hastelloy C.
 O-Ring : Fluorocarbon installed. Ethylene Propylene(EP) or Kalrez available upon request.
 Rotating Face : Silicon Carbide, Carbon
 Stationary Face : Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide.

Other Materials on Special Order.

Applications

- All types of rotary equipment, pumps, marine, mixers, agitators and compressors in a variety of service applications.
- Slurry Pumps.
- COP for Nuclear & Thermal Power Plant.

Operating Conditions

- Temperature : -40°C to + 260°C / -40°F to + 500°F Depending on materials used
- Pressure : Up to 20kg/Cm²
- Speed : Up to 25m/sec

Size in inches

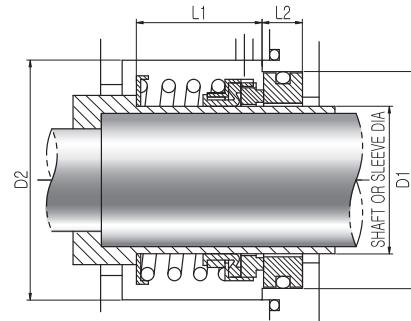
Shaft Dia	D1	D2	D3	L1	L2
1.000	1.500	1.625	1.625	1.250	0.437
1.125	1.625	1.750	1.750	1.250	0.437
1.250	1.750	1.875	1.875	1.250	0.437
1.375	1.937	2.000	2.000	1.250	0.437
1.500	2.125	2.250	2.150	1.250	0.437
1.625	2.250	2.375	2.375	1.500	0.500
1.750	2.375	2.500	2.500	1.500	0.500
1.875	2.500	2.625	2.625	1.500	0.500
2.000	2.625	2.750	2.750	1.500	0.500
2.125	2.750	2.875	3.000	1.500	0.562
2.250	2.875	3.000	3.125	1.500	0.562
2.375	3.000	3.125	3.250	1.500	0.562
2.500	3.125	3.250	3.375	1.500	0.562
2.625	3.250	3.375	3.375	1.500	0.625
2.750	3.437	3.625	3.500	1.625	0.625
2.875	3.562	3.750	3.750	1.625	0.625
3.000	3.687	3.875	3.875	1.625	0.625
3.125	3.812	4.000	4.000	1.625	0.781
3.250	3.937	4.125	4.125	1.625	0.781
3.375	4.062	4.250	4.250	1.625	0.781
3.500	4.187	4.375	4.375	1.625	0.781
3.625	4.321	4.500	4.500	1.625	0.781
3.750	4.437	4.625	4.625	1.625	0.781
3.875	4.562	4.750	4.750	1.625	0.781
4.000	4.687	4.875	4.875	1.625	0.781

Size in Millimeters

Shaft Dia	D1	D2	D3	L1	L2
25	38	42	42	32	11
28	42	45	45	32	11
30	40	47	47	32	11
32	45	48	48	32	11
35	49	51	51	32	11
40	54	57	57	38	13
45	60	64	64	38	13
48	64	67	67	38	13
50	67	70	70	38	13
55	70	73	73	38	14
60	76	79	79	38	14
65	80	85	85	38	14
70	87	92	92	42	16
75	93	98	98	42	16
80	97	100	100	42	20
85	103	108	108	42	20
90	106	111	110	42	20
95	113	117	117	42	20
100	119	124	124	42	20

ALS 201NB

General Purpose Shaft Seal



Technical data / STANDARD MATERIALS

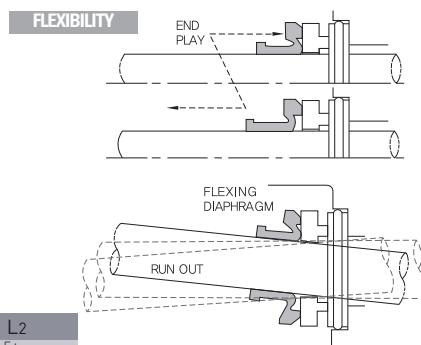
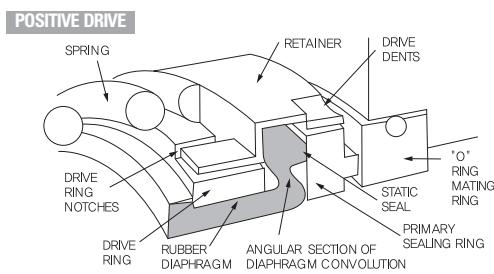
Metal Parts : 316 Stainless Steel. Springs : Alloy 20.
 Elastomer Bellows : Fluorocarbon installed. Ethylene propylene(EP) or Kalrez available upon request.
 Rotating Face : Carbon, Solid Tungsten Carbide or Silicon carbide available upon request.
 Stationary Face : Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide.

Applications

- All types of rotary equipment, pumps, marine, mixers, agitators and compressors in a variety of service applications.
- MSOP, RSOP, ESOP, SOVP, MOP, HFP, Lub Oil Pump for Nuclear & Thermal Power Plant.

Operating Conditions

- Temperature : -40°C to + 120°C / -40°F to + 390°F Depending on materials used
- Pressure : Up to 10kg/Cm²
- Speed : Up to 10m/se *Self Aligningg

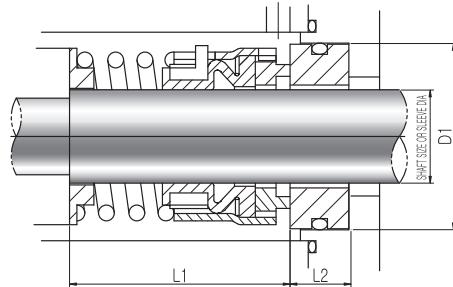


Size in inches

Shaft Dia	D1	D2	L1	L2
3/8	5/16	13/16	7/8	5/16
1/2	5/16	13/16	1	1 1/16
5/8	13/32	7/8	1 1/4	1 5/16
3/4	13/32	7/8	1 3/8	1 7/16
7/8	13/32	15/16	1 1/2	1 9/16
1	7/16	1	1 5/8	1 13/16
1 1/8	7/16	1 1/16	1 3/4	2 1/16
1 1/4	7/16	1 1/16	1 7/8	2 13/16
1 3/8	7/16	1 1/8	2	2 5/16
1 1/2	7/16	1 1/8	2 1/8	2 7/16
1 5/8	1/2	1 3/8	2 3/8	2 3/4
1 3/4	1/2	1 1/8	2 1/2	2 7/8
1 3/4	1/2	1 1/2	2 5/8	3
2	1/2	1 1/2	2 3/4	3 3/16
2 1/8	9/16	1 11/16	3	3 5/16
2 1/4	9/16	1 11/16	3 1/8	3 7/16
2 3/8	9/16	1 13/16	3 1/4	3 9/16
2 1/2	9/16	1 13/16	3 3/8	3 11/16
2 5/8	5/8	1 15/16	3 3/8	4
2 3/4	5/8	1 15/16	3 1/2	4 1/8
2 7/8	5/8	2 1/16	3 3/4	4 3/8
3	5/8	2 1/16	3 7/8	4 1/2
3 1/8	25/32	2 1/16	4	4 3/4
3 1/4	25/32	2 3/16	4 1/8	4 5/8
3 3/8	25/32	2 3/16	4 1/4	5 1/4
3 1/2	25/32	2 3/16	4 3/8	5 3/8
3 5/8	25/32	2 3/16	4 1/2	5 1/2
3 3/4	25/32	2 3/16	4 5/8	5 5/8
3 7/8	25/32	2 5/16	4 3/4	5 3/4
4	25/32	2 7/16	4 7/8	5 7/8

ALS 202NB

High Pressure Purpose Shaft Seal



Technical data / STANDARD MATERIALS

Metal Parts : 316 Stainless Steel. Springs : Alloy 20.
 Elastomer Bellows : Fluorocarbon installed. Ethylene propylene(EP) or Kalrez available upon request.
 Rotating Face : Carbon, Solid Tungsten Carbide or Silicon carbide available upon request.
 Stationary Face : Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide.

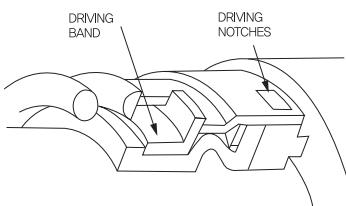
Applications

- Other Materials on Special Order.
- All types of rotary equipment, pumps, marine, mixers, agitators and compressors in a variety of service applications.
- BFP Conditioner L.O Recirculation & Forwarding Pump for Nuclear & Thermal Power Plant

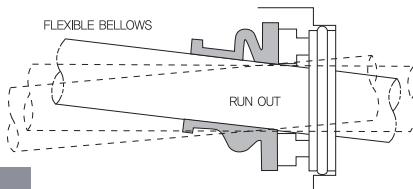
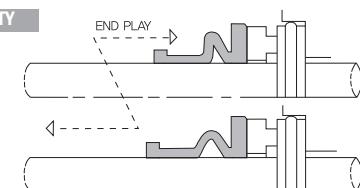
Operating Conditions

- Temperature : -40°C to + 120°C / -40°F to + 220°F Depending on materials used
- Pressure : Up to 25kg/Cm²
- Speed : Up to 20m/sec

POSITIVE DRIVE



FLEXIBILITY

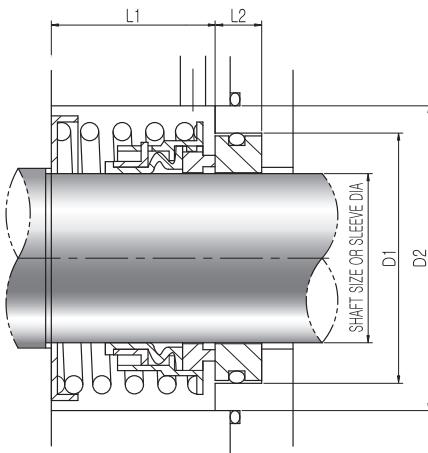


Size in inches

Shaft Dia	D1	D2	L1	L2
3/8	.875	1 1/16	1 3/16	5/16
1/2	1.000	1 3/16	1 3/16	5/16
5/8	1.250	1 11/32	1 5/16	13/32
11/16	1.312	1 13/32	1 5/16	13/32
3/4	1.375	1 15/32	1 5/16	13/32
13/16	1.437	1 9/16	1 3/8	13/32
7/8	1.500	1 21/32	1 3/8	13/32
15/16	1.562	1 11/16	1 9/16	7/16
1	1.625	1 3/4	1 9/16	7/16
1 1/16	1.687	1 13/16	1 5/8	7/16
1 1/8	1.750	1 7/8	1 5/8	7/16
1 3/16	1.812	1 15/16	1 5/8	7/16
1 1/4	1.875	2	1 5/8	7/16
1 3/8	2.000	2 1/8	1 11/16	7/16
1 7/16	2.062	2 3/16	1 11/16	7/16
1 1/2	2.215	2 1/4	1 11/16	7/16
1 5/8	2.375	2 1/2	2	1/2
1 3/4	2.500	2 5/8	2	1/2
1 7/8	2.625	2 3/4	2 1/8	1/2
1 15/16	2.687	2 13/16	2 1/8	1/2
2	2.750	2 15/16	2 1/8	1/2
2 1/8	3.000	3 1/8	2 3/8	9/16

ALS 203NB

High Pressure Purpose Shaft Seal



Technical data / STANDARD MATERIALS

- Metal Parts : 316 Stainless Steel.
 Springs : Alloy 20.
 Elastomer Bellows : Fluorocarbon installed. Ethylene propylene(EP) or Kalrez available upon request.
 Rotating Face : Carbon, Solid Tungsten Carbide or Silicon Carbide available upon request.
 Stationary Face : Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide.
 · Other Materials on Special Order.

Application

- All types of rotary equipment, pumps, marine, mixers, agitators and compressors in a variety of service applications.

Operating Conditions

- Temperature : -40°C to + 120°C / -40°F to + 220°F Depending on materials used
- Pressure : Up to 25kg/Cm²
- Speed : Up to 20m/sec

Size in inches

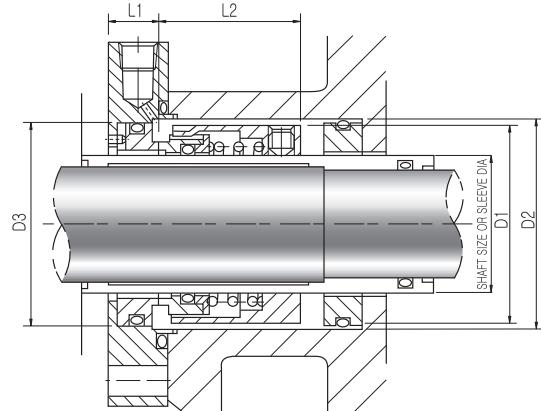
Shaft Dia	D1	D2	L1	L2
3/8	.875	1 1/16	1 3/16	5/16
1/2	1.000	1 3/16	1 3/16	5/16
5/8	1.250	1 11/32	1 5/16	13/32
11/16	1.312	1 13/32	1 5/16	13/32
3/4	1.375	1 15/32	1 5/16	13/32
13/16	1.437	1 9/16	1 3/8	13/32
7/8	1.500	1 21/32	1 3/8	13/32
15/16	1.562	1 11/16	1 9/16	7/16
1	1.625	1 3/4	1 9/16	7/16
1 1/16	1.687	1 13/16	1 5/8	7/16
1 1/8	1.750	1 7/8	1 5/8	7/16
1 3/16	1.812	1 15/16	1 5/8	7/16
1 1/4	1.875	2	1 5/8	7/16
1 3/8	2.000	2 1/8	1 11/16	7/16
1 7/16	2.062	2 3/16	1 11/16	7/16
1 1/2	2.215	2 1/4	1 11/16	7/16
1 5/8	2.375	2 1/2	2	1/2
1 3/4	2.500	2 5/8	2	1/2
1 7/8	2.625	2 3/4	2 1/8	1/2
1 15/16	2.687	2 13/16	2 1/8	1/2
2	2.750	2 15/16	2 1/8	1/2
2 1/8	3.000	3 1/8	2 3/8	9/16

Size in Millimeters

Shaft Dia	D1	D2	L1	L2
022	34	38	38	11
024	36	40	43	11
025	37	41	43	11
028	40	44	45	11
030	42	46	45	11
032	44	48	45	11
033	45	49	45	11
035	47	51	45	11
038	54	58	45	11
040	56	60	51	12.5
043	60.5	63	51	12.5
045	63.5	65	51	12.5
048	63.5	68	54	12.5
050	66.5	70	54	12.5
053	70	73	61	14
055	71.5	75	61	14
058	79.5	83	61	14
060	82.5	85	64	14
063	85.5	88	64	14
065	85.5	90	70	16
068	89	93	70	16
070	89	95	70	16

ALS 205NB

MONO Spring Type Slurry Seal



Technical data / STANDARD MATERIALS

Metal Parts : 316 Stainless Steel.
 Springs : Alloy 20.
 O-Ring : Fluorocarbon installed. Ethylene Propylene(EP) or Kalrez available upon request.
 Rotating Face : Carbon, Solid Tungsten Carbide or Silicon Carbide available upon request.
 Stationary Face : Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide.
 Other Materials on Special Order.

Applications

- All types of rotary equipment, pumps, marine, mixers, agitators and compressors in a variety of service applications.
- Paint, ink, Pump, Paper, Slurry Pumps.
- Over Flow Pump for Thermal Power Plant.

Operating Conditions

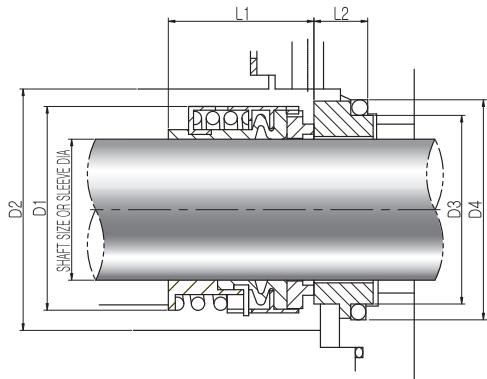
- Temperature : -40°C to + 200°C / -40°F to + 390°F Depending on materials used
- Pressure : Up to 15kg/Cm²
- Speed : Up to 20m/sec

Size in inches

Shaft Dia	D1	D2	D3	L1	L2
1.000	1.750	1.900	1.820	1.625	0.433
1.250	2.005	2.125	2.071	1.625	0.433
1.500	2.256	2.400	2.321	1.625	0.433
1.750	2.518	2.650	2.570	1.750	0.512
2.000	2.750	2.820	2.900	1.750	0.512
2.250	3.000	3.150	3.070	1.750	0.512
2.500	3.250	3.400	3.320	1.750	0.512
2.750	3.616	3.850	3.710	1.875	0.625
3.000	3.866	4.060	3.966	1.875	0.625
3.500	4.370	4.600	4.506	1.875	0.625
4.000	4.866	5.055	4.962	1.875	0.625

ALS 251

Elastomer Bellows Seal



Technical data / STANDARD MATERIALS

Metal Parts : 316 Stainless Steel.
 Springs : Alloy 20.
 O-Ring : Fluorocarbon installed. Ethylene Propylene(EP) or Kalrez available upon request.
 Rotating Face : Carbon, Solid Tungsten Carbide or Silicon Carbide available upon request.
 Stationary Face : Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide.
 Other Materials on Special Order.

Application

- All types of rotary equipment, pumps, marine, mixers, agitators and compressors in a variety of service applications.
- Suitable for most general and light chemical duties ranging from water to weak acid solutions, wherever elastomer secondary seals can be used.
- Light Oil BNR Pump for thermal Power Plant.

Operating Conditions

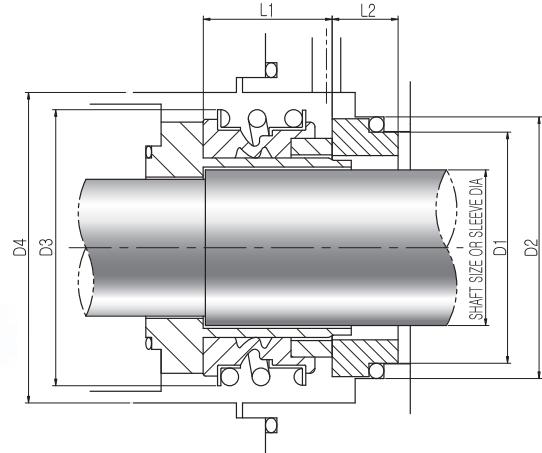
- Temperature : -40°C to +200°C / -40°F to +390°F Depending on materials used • Pressure : Up to 40kg/Cm² • Speed : Up to 25m/sec

Size in Millimeters

Shaft Dia	D1	D2	D3	D4	L1	L2
014	24	26	21	25	23.0	12.0
016	26	28	23	27	23.0	12.0
018	32	34	27	33	24.0	13.5
020	34	36	29	35	24.0	13.5
022	36	38	31	37	24.0	13.5
024	38	40	33	39	26.7	13.3
025	39	41	34	40	27.0	13.0
028	42	44	37	43	30.0	12.5
030	44	46	39	45	30.5	12.0
032	46	48	42	48	30.5	12.0
033	47	49	42	48	30.5	12.0
035	49	51	44	50	30.5	12.0
038	54	58	49	56	32.0	13.0
040	56	60	51	58	32.0	13.0
043	59	63	54	61	32.0	13.0
045	61	65	56	63	32.0	13.0
048	64	68	59	66	32.0	13.0
050	66	70	62	70	34.0	13.5
053	69	73	65	73	34.0	13.5
055	71	75	67	75	34.0	13.5
058	78	83	70	78	39.0	13.5
060	80	85	72	80	39.0	13.5
063	83	88	75	83	39.0	13.5
065	85	90	77	85	39.0	13.5
068	88	93	81	90	39.0	13.5
070	89	95	83	92	45.5	14.5
075	96	104	88	97	45.5	14.5
080	104	109	95	105	45.0	15.0
085	108	114	100	110	45.0	15.0
090	114	119	105	115	50.0	15.0
095	118	124	110	120	50.0	15.0
100	124	129	115	125	50.0	15.0

ALS 252

Elastomer Bellows Seal



Technical data / STANDARD MATERIALS

Metal Parts : 316 Stainless Steel.
 Springs : Alloy 20.
 O-Ring : Fluorocarbon installed. Ethylene Propylene[EP] or Kalrez available upon request.
 Rotating Face : Carbon, Solid Tungsten Carbide or Silicon Carbide available upon request.
 Stationary Face : Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide.
 Other Materials on Special Order.

Applications

- All types of rotary equipment, pumps, marine, mixers, agitators and compressors in a variety of service applications.
- Suitable for most general and light chemical duties ranging from water to weak acid solutions, wherever elastomer secondary seals can be used.
- CTCS Ball Injection & Recirculation Pump for Thermal Power Plant.

Operating Conditions

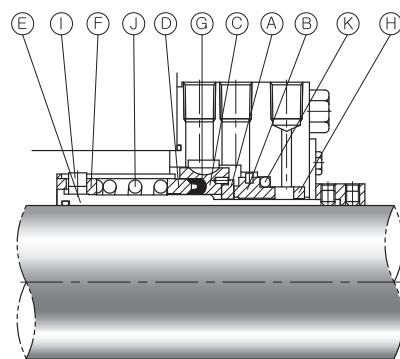
- Temperature : -40°C to + 200°C / -40°F to + 390°F Depending on materials used
- Pressure : Up to 16kg/Cm²
- Speed : Up to 25m/sec

Size in Millimeters

Shaft Dia	D1	D2	D3	D4	L1	L2
010	15.7	19.2	22.5	24	14.5	7.5
012	17.7	21.6	25.0	26	15.0	6.5
014	19.7	24.6	28.5	30	17.0	6.5
015	20.8	24.6	28.5	30	17.0	7.5
016	21.0	28.0	28.5	30	17.0	8.5
018	23.7	30.0	32.0	33	19.5	9.0
019	26.7	-	37.0	38	21.5	-
020	26.7	35.0	37.0	38	21.5	8.5
022	27.7	35.0	37.0	38	21.5	8.5
024	31.2	38.0	42.5	44	22.5	8.5
025	31.2	38.0	42.5	44	23.0	8.5
028	35.0	42.0	49.0	50	26.5	10.0
030	37.0	45.0	49.0	50	26.5	11.5
032	40.2	48.0	53.5	55	27.5	11.5
033	40.2	50.0	53.5	55	27.5	12.0
035	43.2	52.0	57.0	59	28.5	12.0
038	46.2	55.0	59.0	61	30.0	11.3
040	48.8	58.0	62.0	64	30.0	11.8
042	51.8	-	65.5	67	30.0	13.2
043	51.8	62.0	65.5	67	30.0	13.2
045	53.8	64.0	68.0	70	30.0	12.8
048	56.8	68.4	70.5	74	30.0	12.8
050	58.8	69.3	74.0	77	30.5	12.8
053	62.2	72.3	78.5	81	33.0	13.5
055	64.2	75.4	81.0	83	35.0	14.5
058	67.2	78.4	85.5	88	37.0	14.5
060	70.0	80.4	88.5	91	38.0	14.5
065	75.0	85.4	93.5	96	40.0	14.2
068	78.0	91.5	96.5	100	40.0	14.9
070	80.0	92.0	99.5	103	40.0	14.2
075	85.5	99.0	107.0	110	40.0	15.2
080	90.5	104.0	112.0	116	40.0	16.2
085	96.0	109.0	120.0	124	41.0	16.0
090	102.0	114.0	127.0	131	45.0	16.0
095	107.0	120.3	132.0	136	46.0	17.0
100	112.0	123.0	137.0	140	47.0	17.0

ALS 305NB

Cartridge Mounted High Speed-High Pressure Stationary Seal



Technical data / STANDARD MATERIALS

Metal Parts : 316 Stainless Steel.
 Springs : Alloy 20.
 O-Ring : Fluorocarbon installed. Ethylene Propylene(EP) or Kalrez available upon request.
 Rotating Face : Silicon Carbide or solid Tungsten Carbide.
 Stationary Face : Carbon.
 Other Materials on Special Order.

Applications

- All Shaft Speed High Pressure Pumps.
- Boiler Feed Water Pump for Nuclear & Thermal.

Operating Conditions

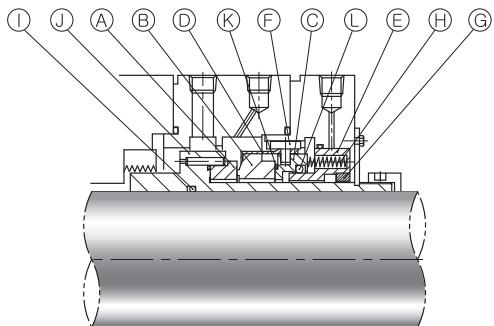
- Temperature : -40°C to + 260°C / -40°F to + 500°F Depending on materials used
- Pressure : Up to 80kg/Cm²
- Speed : Up to 70m/sec

Size in inches

No.	Part Name	Product Number
A	Rotating Face	305NB0011
B	Stationary Face	305NB0012
C	Rotating Face Holder	305NB0013
D	Spring Holder	305NB0014
E	Sleeve	305NB0015
F	Spring Seat	305NB0016
G	U-Cup Seal	305NB0042
H	Bushing	305NB0072
I	Drive Key	305NB0054
J	Spring	305NB0055
K	O-Ring	305NB0074

ALS 311HB

Cartridge Mounted High Speed-High Pressure Stationary Seal



Technical data / STANDARD MATERIALS

Metal Parts : 316 Stainless Steel.
 Springs : Alloy 20.
 O-Ring : Fluorocarbon installed. Ethylene Propylene(EP) or Kalrez available upon request.
 Rotating Face : Silicon Carbide or solid Tungsten Carbide.
 Stationary Face : Carbon.
 Other Materials on Special Order.

Applications

- High Shaft Speeds, High Pressure Pumps.
- Boiler Feed Water Pump for Nuclear & Thermal Power Plant.

Operating Conditions

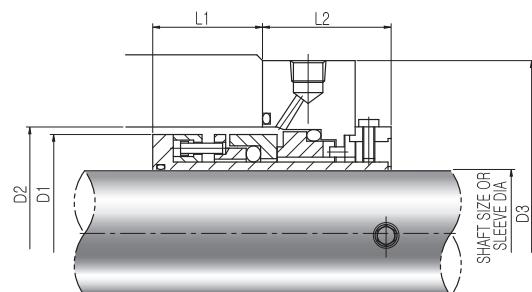
- Temperature : -40°C to + 260°C / -40°F to + 500°F Depending on materials used
- Pressure : Up to 80kg/Cm²
- Speed : Up to 70m/sec

Size in inches

No.	Part Name	Product Number
A	ROTATING FACE	311HB0011
B	STATIONARY FACE	311HB0012
C	BACK-UP RING	311HB0122
D	LOCK RING	311HB0223
E	SPRING HOLDER	311HB0324
F	LOCK PIN	311HB0325
G	BUSHING	311HB0505
H	SPRING	311HB0507
I	O-RING	311HB0166
J	SLEEVE	311HB0709
K	O-RING	311HB0166
L	O-RING	311HB0440

ALS 312AB

Cartridge Mounted Single Seal



Technical data / STANDARD MATERIALS

Metal Parts : 316 Stainless Steel.
 Springs : Alloy 20.
 O-Ring : Fluorocarbon installed. Ethylene Propylene(EP) or Kalrez available upon request.
 Rotating Face : Carbon, Solid Tungsten Carbide or Silicon Carbide available upon request.
 Stationary Face : Alumina Ceramic, Solid Tungsten Carbide or Silicon Carbide.
 Other Materials on Special Order.

Application

- All types of rotary equipment, pumps, marine, mixers, agitators and compressors in a variety of service applications.
- ACWP, CCWP for Nuclear & Thermal Power Plant.

Operating Conditions

- Temperature : -40°C to + 260°C / -40°F to + 500°F Depending on materials used
- Pressure : Up to 20kg/Cm²
- Speed : Up to 20m/sec

Size in inches

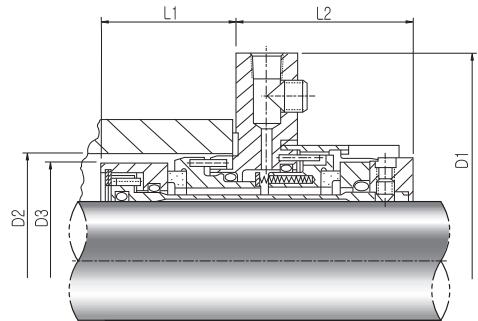
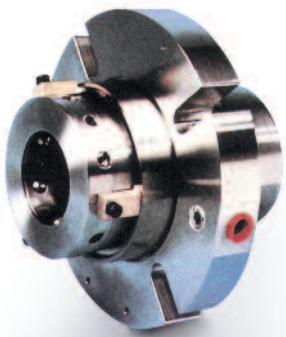
Shaft Dia	D1	D2	D3	L1	L2	K	B.C.D.	
							Min	Max
020	44	47	105	42.5	41.5	14	69	86
025	47	50	105	42.5	41.5	14	74	86
030	52	55	105	42.5	41.5	14	79	86
035	57	60	115	42.5	41.5	14	84	96
040	62	65	130	42.5	41.5	14	89	111
045	67	70	140	42.5	41.5	14	94	121
050	74	77	140	42.5	41.5	14	99	121
055	79	82	155	42.5	41.5	17	110	131
060	84	87	155	42.5	41.5	17	115	131
065	89	92	165	42.5	41.5	17	120	141
070	96	99	200	48	51.5	17	131	176
075	101	104	205	48	51.5	17	136	181
080	106	109	210	48	51.5	17	141	186
085	111	114	215	48	51.5	17	146	190
090	116	119	220	48	51.5	21	158	190
095	121	124	225	48	61.5	21	163	195
100	126	129	230	53.5	61.5	21	168	200
110	144	148	240	53.5	61.5	25	185	204
120	154	158	250	53.5	61.5	25	195	214
130	164	168	260	53.5	61.5	25	205	224
140	174	178	270	53.5	61.5	25	215	234
150	184	188	280	53.5	61.5	25	225	244

Size in Millimeters

Shaft Dia	D1	D2	D3	L1	L2	K	B.C.D.	
							Min	Max
1.000	1.80	1.92	4.131	1.67	1.63	0.57	2.93	3.15
1.250	2.05	2.17	4.131	1.67	1.63	0.57	3.18	3.40
1.500	2.31	2.42	4.501	1.67	1.63	0.57	3.43	3.65
1.750	2.63	2.75	5.512	1.67	1.63	0.57	3.68	3.90
2.000	2.88	3.00	5.512	1.67	1.63	0.57	4.01	4.15
2.500	3.38	3.500	6.500	1.67	1.63	0.69	4.60	4.86
3.000	3.50	3.62	8.071	1.67	1.63	0.69	5.51	5.87
3.500	4.00	4.12	8.501	2.11	2.42	0.81	6.01	6.58
4.000	4.50	4.65	9.051	2.11	2.42	0.81	6.50	7.08

ALS 322AB

Cartridge Mounted Double Balance Seal



Technical data / STANDARD MATERIALS

Metal Parts : 316 Stainless Steel.
 Springs : Hastelloy C.
 O-Ring : Fluorocarbon installed. Ethylene Propylene(EP) or Kalrez available upon request.
 Rotating Face : Solid Tungsten Carbide.
 Stationary Face : Carbon or Solid Tungsten Carbide.
 Other Materials on Special Order.

Applications

- Mixers, Double-ended Pumps, Vertical Turbine Pumps and Other Rotating Equipments.

Operating Conditions

- Temperature : -55°C to + 260°C / -65°F to + 500°F Depending on materials used
- Pressure : Up to 28kg/Cm²
- Speed : Up to 15m/sec

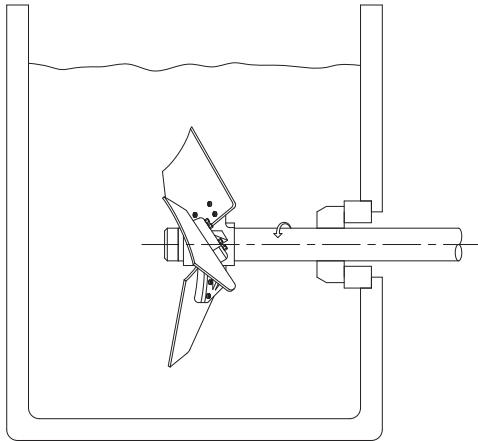
Size in inches

Shaft Dia	D1 Max	Stuffing Box Bore		D3	L1	L2
		D2Min	D2Max			
2.000	6.96	3.50	4.02	3.24	2.94	2.32
2.500	7.46	4.00	4.52	3.74	2.94	2.32
2.750	7.71	4.25	4.77	3.99	2.94	2.32
3.000	7.96	4.50	5.02	4.24	2.94	2.32
3.500	8.46	5.00	5.52	4.74	2.94	2.32
4.000	8.96	5.50	6.02	5.24	2.94	2.32
4.500	9.46	6.00	6.52	5.74	2.94	2.32
5.000	9.96	6.50	7.02	6.24	3.27	2.32
5.500	10.46	7.00	7.52	6.74	3.27	2.32
6.000	10.96	7.50	8.02	7.24	3.27	2.32
6.500	11.46	8.00	8.52	7.74	3.27	2.32

Size in inches

Shaft Dia	D1 Max	Stuffing Box Bore		D3	L1	L2
		D2Min	D2Max			
50	176.8	88	102	82.3	75.0	59.0
60	186.0	99	111	91.4	75.0	59.0
70	196.0	108	121	101.3	75.0	59.0
80	203.3	118	131	111.5	75.0	59.0
85	214.0	124	136	116.6	75.0	59.0
90	215.3	128	141	121.4	75.0	59.0
100	225.3	138	151	131.6	75.0	59.0
110	240.3	148	161	141.5	75.0	59.0

1. The Mechanical Seal



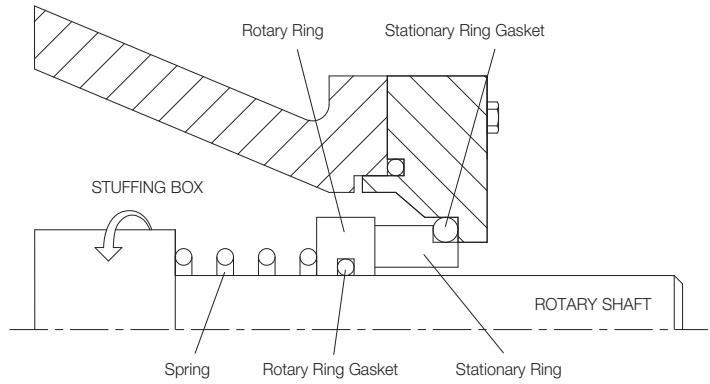
Mechanical seals have the purpose of preventing leakage of a fluid (liquid or gaseous) through the clearance between a shaft and the fluid container.

The main components of a mechanical seal are the seal rings on which a mechanical force is acting, generated by springs or bellows, and an hydraulic force, generated by the process fluid pressure.

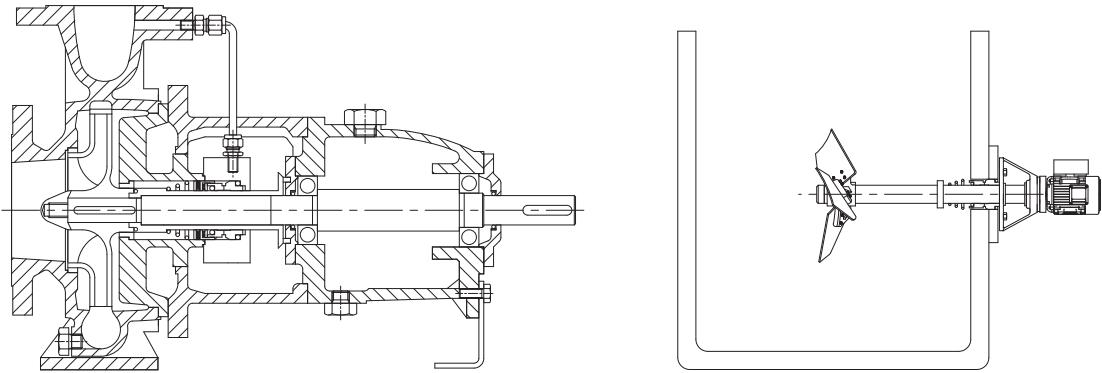
The seal ring which rotates with the shaft is called the "rotary ring"; the seal ring fixed on the casing of the machinery is called the "stationary ring".

Secondary seals are required to perform static sealing between rotary rings and shafts and also between stationary rings and the casing of the machinery.

Elastomeric O-Rings are usually used as secondary seals but alternative systems can be used, as described in the following sections.



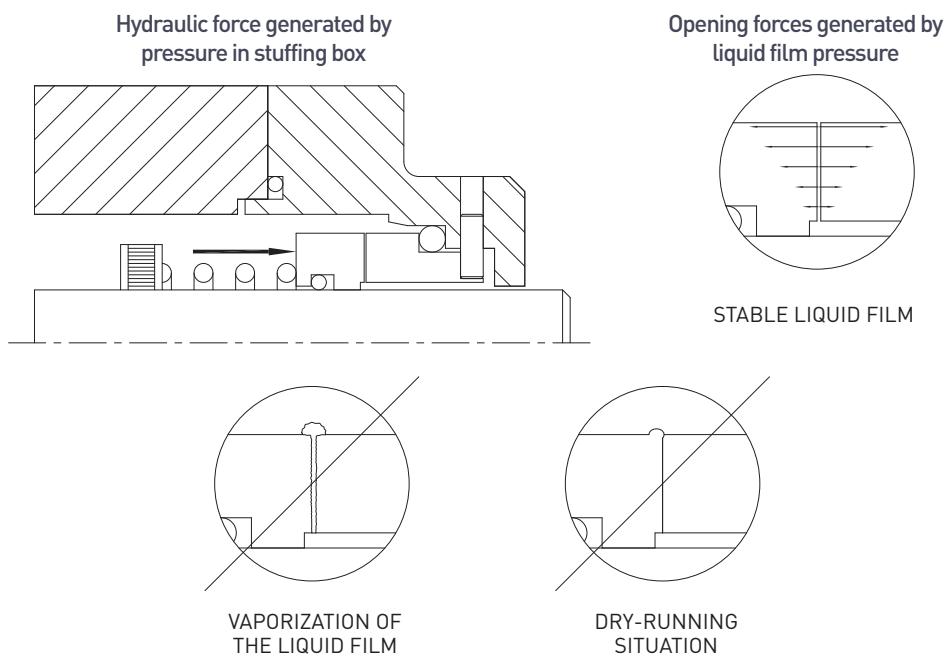
Typically mechanical seals are installed on pumps and mixers.



On both of the above set-ups, the installation of a suitable device is required to seal the fluid contained in the casing.

2. The Liquid Film

In order to minimize the amount of friction between the seal rings an efficient lubrication is required. Seal faces can be lubricated by the process fluid or, with double mechanical seals, by a proper auxiliary fluid (see chapter relevant to configurations). An stable and complete layer of lubrication greatly affects the performance and the life of a mechanical seal.



In order to insure good lubrication and sufficient cooling of the seal rings, the correct selection of a mechanical seal shall take into consideration the following

parameters:

Process fluid temperature Vaporisation pressure at operating temperature Process fluid characteristics Shaft speed (see also chapter relevant to selection)

Concepts and principles above discussed are valid for all mechanical seal operating with a liquid fluid. Dry-running seals and gas-seals operate on different principles and shall be considered further on.

3. Leakage

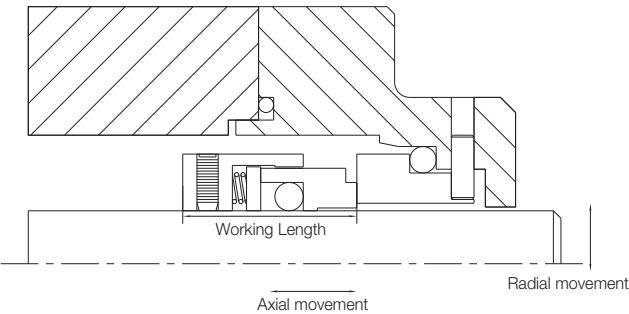
All mechanical seals produce leakage.

The reason lies in the previously discussed theory of lubrication; it is obvious that a stable lubrication layer means a certain amount of leakage.

Leakage can be calculated and depends on several factors as rotational speed, fluid pressure and characteristics, and balancing ratio. But the equipment on which the mechanical seal is installed can have some influence on it too. Often leakage is so reduced that it cannot be detected (vaporisation).

4. Degree of Freedom

The elastic components of a mechanical seal (spring or bellow, gaskets) are of paramount importance for good performance. The gasket mounted on the seal ring pushed by the spring or bellow (usually the rotary ring) has to follow the movement of the ring induced by unavoidable phenomena like vibrations, misalignment and shaft run-out and for this reason it's called "dynamic".



It follows that such parameters as working length, gasket compatibility with the process fluid, dimension and finishing of the shaft have to be carefully considered for good application of a mechanical seal.

5. Balancing Ratio

If we consider a piston on which a constant pressure is applied we know that the force produced shall be proportional to the area of the piston itself.

In mechanical seals, in addition to the closing force generated by the springs or bellow, an hydrostatic force generated by the fluid pressure acts on the seal ring.

As previously discussed the fluid pressure also penetrates between the seal faces, producing a lubrication film and generating an opening force.

The ratio between the forces which are closing the seal ring and the ones which are opening the seal ring is called the "balancing ratio".

When the balancing ratio is greater than one, we have an unbalanced seal. In the other cases we have a balanced seal.

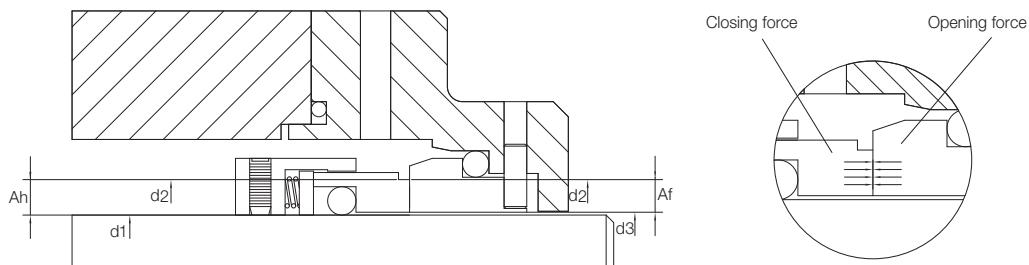
The dimensions needed for a balanced seal are obtainable thanks to a small notch placed on the sleeve or on the body of the seal itself.

6. Unbalanced Seal

Generally unbalanced seals have good performance when subjected to vibrations, misalignments or cavitation; they are cheaper and their application does not require shaft or sleeve notching.

The main limitation in the application of unbalanced mechanical seals is the operating pressure.

High pressures produce an excessive closing force which affects the stability of the liquid film between the seal faces, inducing overheating and premature wearing.



$$K = Ah / Af \rightarrow Ah > Af \rightarrow K > 1 \quad (\text{Practical Value } 1.1 < K < 1.4)$$

$$Ah = \frac{1}{4} \pi (d_2^2 - d_1^2) \quad Ah = \text{Annular area on which the pressure is acting}$$

$$Af = \frac{1}{4} \pi (d_2^2 - d_3^2) \quad Af = \text{Sliding faces area}$$

P_{seal} = Seal Face Pressure

P_{fluid} = Seal Face Fluid Pressure

P_{spring} = Seal Face Spring Pressure

$$P_{seal} = \frac{\pi(d_2^2 - d_1^2)4}{\pi(d_2^2 - d_3^2)4} \cdot P_{fluid} + P_{spring}$$

$$= \frac{d_2^2 - d_1^2}{d_2^2 - d_3^2} \cdot P_{fluid} + P_{spring}$$

$$k = \frac{d_2^2 - d_1^2}{d_2^2 - d_3^2} \cdot P_{fluid} + P_{spring}$$

$$\therefore P_{seal} = k \cdot P_{fluid} + P_{spring}$$

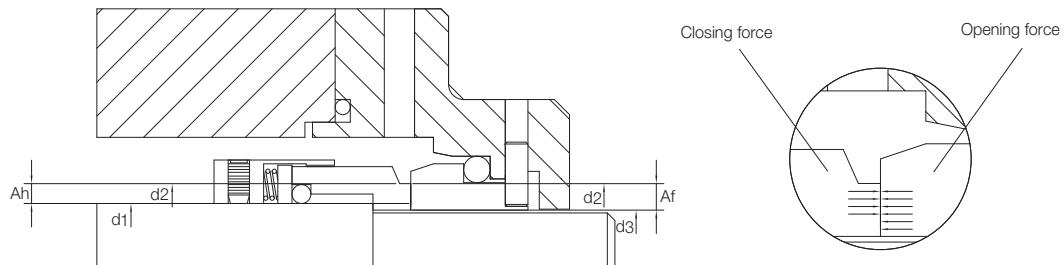
7. Balanced Seal

High pressure and high speed obviously generate proportionally high values of friction heating.

Balanced seals address this problem with a reduced closing force, as previously discussed.

Also in cases where a high value of vapour pressure has to be considered, a balanced mechanical seal is the right choice.

API standard defines as "flashing" all hydrocarbons that have a vapour pressure higher than 1 bar and for these fluids a double or tandem balanced seal has to be provided.



$$K = Ah / Af \rightarrow Ah > Af \rightarrow K > 1 \quad (\text{Practical Value } 0.6 < K < 0.9)$$

$$Ah = \frac{1}{4} \pi (d_2^2 - d_1^2) \quad Ah = \text{Annular area on which the pressure is acting}$$

$$Af = \frac{1}{4} \pi (d_2^2 - d_3^2) \quad Af = \text{Sliding faces area}$$

P_{seal} = Seal Face Pressure

P_{fluid} = Seal Face Fluid Pressure

P_{spring} = Seal Face Spring Pressure

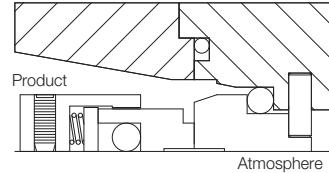
$$\begin{aligned} P_{seal} &= \frac{\pi(d_2^2 - d_1^2)4}{\pi(d_2^2 - d_3^2)4} \cdot P_{fluid} + P_{spring} \\ &= \frac{d_2^2 - d_1^2}{d_2^2 - d_3^2} \cdot P_{fluid} + P_{spring} \\ k &= \frac{d_2^2 - d_1^2}{d_2^2 - d_3^2} \cdot P_{fluid} + P_{spring} \\ \therefore P_{seal} &= k \cdot P_{fluid} + P_{spring} \end{aligned}$$

8. Single Internal Seal

This is the most popular and efficient configuration for the most applications.

It is called internal because of its being completely submerged in the product.

The balancing ratio is designed for pressure acting outside the seal, therefore usually, if installed as an external seal, the fluid pressure will cause translation of the stationary ring and excessive separation of the sealfaces.



9. Single Execution Seal

In this execution the sealed product is inside the seal and the outside part of the rotary ring is exposed to the atmosphere.

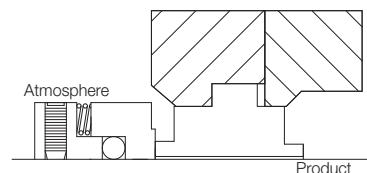
It is employed with aggressive fluids which can chemically attack materials commonly used for internal seals or when the use expensive.

In this type of seal often there are no metallic parts in contact with the product or, if there are any, special materials such as Hastelloy or Titanium are used.

The rotary ring and the stationary ring [in contact with process fluid] can be made of graphite, ceramic or silicon carbide.

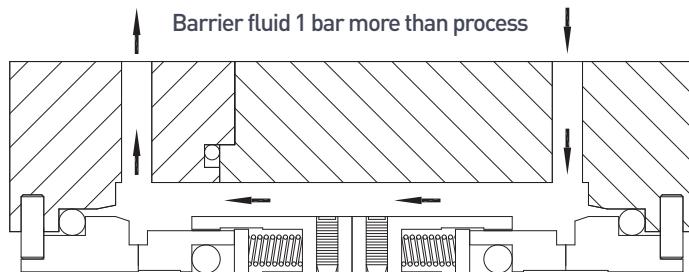
Gaskets can be in fluoroelastomer, PTFE or perfluoroelastomer.

The application of external seals is often employed in top entry mixers because of an easy installation and the possibility to carry out an efficient cooling of the stationary ring, required for dry running applications.



10. Back-to-Back Double Seal

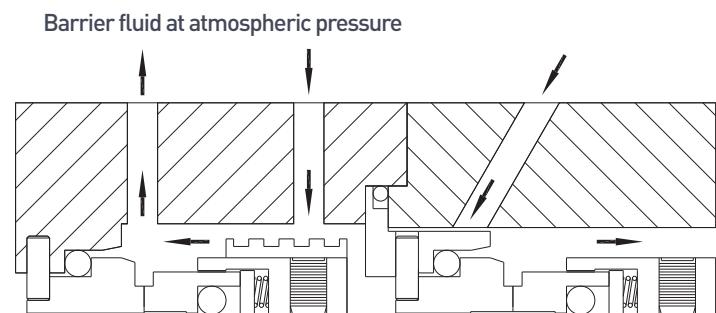
This configuration is recommended with critical products (i.e. gaseous, abrasive, toxic or lethal) and generally when no emissions in the atmosphere are permitted. The back-to-back lay-out, so called because the two seals are placed literally back to back, gives the possibility to create a barrier made of a pressurised auxiliary fluid not harmful to the environment. The lubrication of the seal faces is carried out by the auxiliary fluid which should be compatible with the process fluid.



In a back-to-back configuration an internal pressurisation having a value greater than the process fluid (at least 1 bar or 10% more) is required in order to avoid opening of the seal (as explained in chapter relevant to internal single seals) and to provide an efficient barrier against leakage of process fluid into the atmosphere.

11. Tandem Double Seal

In this configuration the two seals are assembled with the same orientation. The auxiliary fluid often is at a lower pressure than the process fluid but also pressurised systems can be implemented with suitable seal rings (see dual seals).



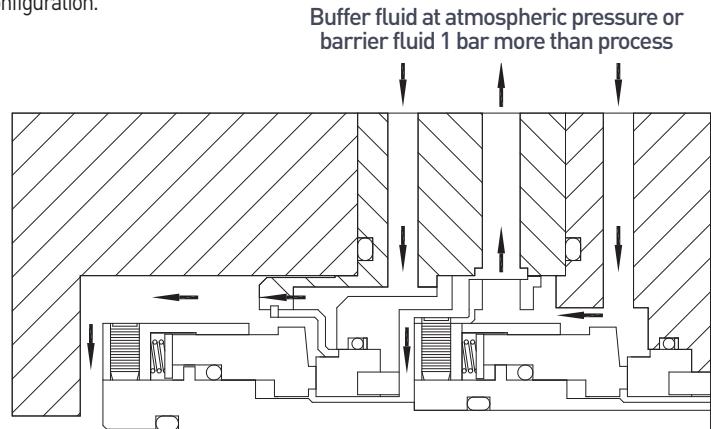
In an unpressurised configuration there is the advantage of avoiding relatively costly pressurisation systems obtaining a performance equivalent to the one of the back-to-back lay-out, which consists of:

- No leakage of the process fluid into the atmosphere
- Good lubrication and cooling of the seal rings

This configuration however is not suitable with toxic, abrasive or highly viscous process fluids, prone to create sticking of seal rings; in these cases the back-to-back configuration should be used. Tandem double seals are usually employed in petrochemical and refinery plants, where service with high vapour pressure and low specific weight on centrifugal pumps is required.

12. Dual Seal

This is a new configuration foreseen by API 682 standard (American Petroleum Institute), where the two seals are assembled in a tandem lay out. A special design of the seal rings gives the possibility to operate both in an unpressurised system and in a pressurised system (as with the back-to-back configuration), obtaining the advantages of the two previous configurations. Only a cartridge assembly is allowed by API 682 in this configuration.



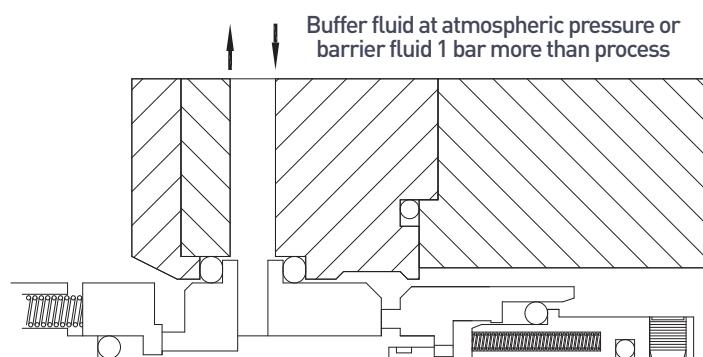
13. Face-to-Face Seal

This last double seal configuration is composed by a unique central stationary ring and two opposite rotary rings. It can work in the same way as a dual seal (pressurised and unpressurised system).

Less used than some of the previous configurations, it has some interesting features like:

Reduced overall length

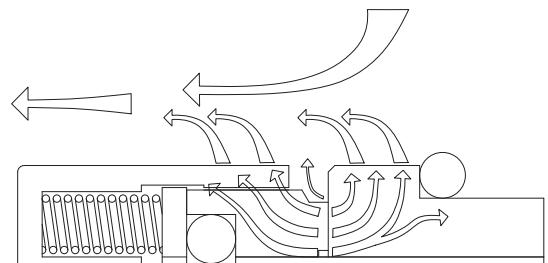
Spring not in contact with the process fluid



14. Cooling System and API Planes

The great importance of efficient lubrication of the seal rings for good importance has been previously underlined. It follows that a suitable cooling system should be implemented to limit the operating temperature of the seal. Many different lay-outs can be used, depending on the configuration and the required service.

A good seal selection must include criteria for a safe and durable installation. API standard has supplied an exhaustive collection of flushing and pressurisation lay-outs, each intended for a specific service. The various connection lay-outs are identified by a specific number which gives the possibility to simply define all possible configurations



15. Selection of Mechanical Seals

The API 682 standard is a powerful tool to carry out mechanical seal selection for intended use in refinery plants. In chemical plants the variety of applications and process fluids makes the selection of the seal a challenging job. Many parameters should be considered as characteristics of the fluids, configuration of the machinery on which the seal have to be installed, specific requirements in terms of compatibility with some restrictive standards (i.e. FDA rules for food industry).

In the next sections the most diffuse products and relevant recommended configurations are grouped into families and defined with the intent of explaining the logic of the API plans.

More details about specific products can be found in our catalogue, in the selection section.

16. Buffer Systems

To guarantee the correct working of double mechanical seals, the buffer interspace (between the product side and the atmosphere side of the mechanical seal) must be completely filled with clean buffer medium. Before starting up double mechanical seals it is vital, therefore, to ensure a sufficient rate of circulation of the buffer fluid. The buffer fluid pressure should lie 10% or at least 1.5 to 2 bar above the maximum pressure to be sealed. The flow rate must be controlled to ensure that the temperature of the buffer medium at the outlet lies below approximately 60°C and that it does not exceed boiling point under any circumstances. The maximum acceptable inlet/outlet temperature differential is 15 K. The buffer fluid outlet lies at the highest point of the stuffing box for automatic venting of any vapour.

In view of the basic conditions of operation, a buffer system must perform the following functions:

- Build-up pressure in the buffer inter space
- Compensation of leakage
- Circulation of the buffer medium
- Cooling of the buffer medium
- Cooling of the seal

The thermosyphon vessel, for example, performs the following functions in modes of operation with mechanical seals in tandem arrangement and in those requiring a pressureless liquid quench (see also circulation and cooling systems according to API 610):

- Cooling
- Selective absorption of product leakage
- Prevention of dry running

17. Circulation

For single seals it is generally advisable to install a circulation pipe from the discharge nozzle of the pump to the seal chamber. A pipe size G 1/4 is normally sufficient. There should be a close fitting neck bush between the pump casing and the seal chamber.

18. Flushing

Flushing systems are installed in accordance with DIN ISO 5199, Appendix E, Plan 08a or API 610, Appendix D, Plan 32. A clean and mostly cold external medium is injected into the stuffing box in the area of the sliding faces via an orifice (throttle) into the medium to be sealed. Flushing is used either to lower the temperature or to prevent deposits forming in the area of the mechanical seal. Again it is recommended that a close fitting neck bush is employed.

19. Quench

Quench is the term commonly used in sealing engineering for an arrangement that applies a pressureless external medium (fluid, vapour, gas) to a mechanical seal's faces on the atmosphere side. A quench is used on the one hand when a single mechanical seal does not function at all or only within certain limits without auxiliary measures or when a double mechanical seal with pressurized buffer medium is unnecessary. When an integral stationary seat stop is fitted, the quench pressure should not exceed 1 bar. A quench performs at least one of the duties described below

20. Fluid Quench

- Absorption or removal of leakage by the quench medium
- Monitoring of the mechanical seal's leakage rate by periodic measurement of the level of the quench medium in the circulation vessel or thermosyphon vessel
- Lubrication and cooling of the standby mechanical seal
- Exclusion of air: For media which react with atmospheric oxygen the quenching medium stops the leakage making contact with the atmosphere
- Protection against dry running: For applications subject to brief, periods of vacuum and operation of pumps without pumping liquid (submersible pumps) the quenching medium prevents dry running of the mechanical seal
- Stabilization of the lubrication film: For operation under vacuum and/or sealing pressures close to the vapour pressure, the quenching medium stabilizes the lubrication film
- Cooling or heating of the outboard side of the mechanical seal.

21. Steam Quench

- Heating: For media with a high melting point the vapour quench prevents the leakage from solidifying in that area of the mechanical seal critical for its proper functioning
- Exclusion of air
- Removal of leakage

22. Gas Quench

- Icing protection: with operating temperatures < 0°C (cryogenic mechanical seals), the injection of nitrogen or dry air into the seal housing prevents the mechanical seal parts on the atmosphere side from icing up
- Exclusion of air
- Removal of leakage

23. Sealing the quench medium

- Trottle bush - the preferred choice for gaseous and vaporous quench media, rarely for liquids

CHEMICAL LISTINGS

Fluid	Fluid	Fluid	Fluid
Acetaldehyde	-Z	ANG-25 [Glyceral Ester]	WZ
Acetamide	-Z	Ang-25 [Di-Ester Base]	W-
Acetic Acid, Glacial	-Z	[TG749]	
Hot, high press 5%	-Q- WZ	Anhydrous Ammonia	-Z
		Anhydrous Hydrogen Fluoride	
Acetylene Gas	-Z	Anhydrous Hydrazine	-Z
Acetylene Gas with Water of Liquid H.C.	-T-	Aniline	-Z
Acetic Anhydride	-Z	Aniline Dyes	-Z
Acetone	-Z	Aniline Liquid	-Q-
		Aniline Hydrochloride	-Z
Acetophenone	-Z	Aniline Oil	W-
Acetyl Acetone	-Z	Animal Oil [Lard Oil]	W-
Acetyl Chloride	W-	ANO-366	W-
Acetylene	WZ	Ansul Ether 161 or 181	-Q-
Acetylene Tetrabromide	WZ	Aqua Regia	W-
Acrylonitrile	-Q-	Argon (Gas)	W-
Aerozene 50 [50% Hydrazine, 50% UDMH]	-Z	Archlor, 1248	W-
Alcohol [Ethyl]	-Z	1254	W-
Alcohol [Iso-Butyl]	WZ	1260	W-
Alcohol [Iso-Propyl]	WZ	Aromatic Fuel-50%	W-
Alcohol [Methyl]	-Z	Arsenic Acid	WZ
Alcohol [Octyl]	-Z	Askarel	W-
Alkazene	W-	Asphalt	W-
Alkyd Resins	W-	ASTM Oil No.1	W-
Alkyl Benzene	W-	No.2	W-
Alkylate [Light]	W-	No.3	W-
Alkyl Acetone	-Q-	No.4	W-
Alkyl Amine	-Q-	ASTM Reference fuel a	W-
Alkyl Chloride	-Q-	b	W-
		c	W-
Alum Solution	WZ	Atlantic Ultra Gear-EP Lube	W-
Aluminum Acetate	-Z	Automatic Transmission	W-
Aluminum Bromide	WZ	Fluid	W-
Aluminum Chloride	WZ	Automotive Brake Fluid	-Z
[Forms HCl with H2O]	WZ	Bardol B	W-
Aluminum Fluoride	Z	Barium Chloride	WZ
Aluminum Hydroxide	-Z	Barium Chloride 25%	W-
Aluminum Nitrate	Z	Barium Hydroxide	WZ
Aluminum oxide	-T-	Barium Nitrate	W-
Aluminum Salts	WZ	Barium Salts	WZ
		Barium Sulfied	WZ
Aluminum Sulphate	WZ	Beer	WZ
Alums-NH3-CR-K	WZ	Beer Wort	-V-
Amine : Fat Condensate	-Q-	Beer Juice & Pulp	-V-
Amines-Mized	-Z	Beet Sugar Liquors	WZ
Ammonia : Aqueous	-V-	Belt Drive	-Z
Ammonia : Compressor	-V-	Benzaldehyde	-Z
Ammonia : Gas	-Z	Benzane	W-
Ammonia : Gas, Cold Liquid (Anhydrous)	-Z	Benzene (Benzol)	W-
Ammonium Bicarbonate	-V-	Benzenesulfonic Acid 10%	W-
Ammonium Bifluoride	-Q-	Benzene	W-
Ammonium Carbamate	-Z	Benzoinic Acid	W-
		Benzoinic Acid (solution)	W-
Ammonium Carbamate	-Z	Benzochloride	WZ
Ammonium Chloride	-Z	Benzophenone	W-
Ammonium Hydroxide 3 Molar Conentrated	-Z	Benzyl Benzoate	W-
		Benzyl Chloride	W-
Ammonium Nitrate 75%	-Z	Blzck Sulphate Liquors (Ambient Temperatures)	W-
Ammonium Nitrate	Z	Baeach Liquor	WZ
Ammonium Persulfate Solution	Z	Bonderite Solutions	W-
		Borax	WZ
Ammonium Persulfate 10%	Z	Borax Solutions	WZ
Ammonium Phosphate	Z	Boric Acid	WZ
Mono-Basic	Z	Boron Fluide (HEF)	W-
Dibasic	Z	Brake Fluid (Non-Petroleum)	Z
Tribasic	Z	Brayo 719-R(VV-H-910)	Z
		885 (MIL-L-6085A)	W-
Ammonium Salts	-Z	Brine-Calcium Chloride-30%	WZ
Ammonium Sulphate	-Z	Brine-Calcium Chloride-30%	-Z
Ammonium Sulphide	-Z	Brine-Copper Chloride to 75°F	WZ
Amyl Acetate	-Z	Brine-Sodium Chloride	WZ
Amyl Alcohol	Z	Bromine	W-
		Bromine Water	W-
Amyl Chloronaphthalene	W-	Bromobenzene	W-
Amyl Chloride	W-	Brine-Copper Chloride to 75°F	W-
Amyl Naphthalene	W-	Chloroaceton	W-
Amyl Nitrate	-Z	Chlorobenzene	W-
Anderol, L-774 [Di-Ester]	W-	Chlorododecane	W-
L-826 [Di-Ester]	W-	Chloroform	W-
L-829 [Di-Ester]	W-	Chlorobromo Methane	W-
		Chlorobutadiene	W-
		Chlorodane	W-
		Chlorododecane	W-
		Chloroform	W-
		Chloromethyl Ether	-Q-
O-Chloronaphthalene			
1-Chloro 1-Nitro Ethane			W-
Chlorosulphonic Acid			-Q-
Chlorotoluene			W-
Chlorox			W-
O-Chlorophenol			W-
Chrome Alum			WZ
Chrome Plating Sloutions			WZ
Chrome Acid, 50%			W-
Chromic Acid to 50%			W-
Chromic Oxide, 88 Wt. %			
Aqueous Solution Crtic Acid			WZ
Crtric Acid			WZ
Crtric Acid Solution to 500%			WZ
Coal Tar [Bunket C] #6 Fuel			W-
Cobalt Chloride			WZ
Coco Butter			-T-
Cocoanut-Fatty Acid			W-
Cocoanut Oil			WZ
Cod Liver Oil			WZ
Coke over Gas			W-
Choolanol			W-
Copper Acetate			-Z
Copper Chloride			WZ
Copper Chloride (10%@ Ambient Temp.)			WZ
Copper Cranide			WZ
Copper Nitrate			-T-
Copper Salts			WZ
Copper Sulphate			WZ
Creoste & Light Oil			W-
Creoste, Coal Tar			W-
Creoste, Wood			W-
Creosols			W-
Creosolic Acid			W-
Cretonaldehyde			-Q-
Crude Oil			W-
Creosols			W-
Corn Oil			W-
CORN SYRUP			W-
Cottonseed Oil			W-
Croeste & Light Oil			W-
Croeste, Coal Tar			W-
Creoste, Wood			W-
Cuprous Ammonia Acetate (CAA)			-Q-
Cutting Oil			W-
Cyclohexane			W-
cyclohexanol			W-
P-Cymene			-Z
Decalin			W-
Decane			W-
De-Butanizer Reflux			W-
De-Ethanizer Charge			W-
Delco Brake Fluid			-Z
Denatured Alcohol			WZ
Detergent, Water Solution			WZ
Developing Fluids (photo)			W-
Diacetone			-Z
Diacetone Alcohol			-Z
Diazinone			W-
Dibenzy Ether			-Z
Dibenzy Sebacate			W-
Dibromoethyl Benzene			-Q-
Dibutylamine			-Q-
Dibutyl Ether			-Q-
Dibutyl Phthalate			-Z
Dibutyl Sebacate			-Z
Dichlorobenzene			W-
O-Dichlorobenzene			W-
P-Dichlorobenzene			W-
Dichloro-Butane			W-
dichloro-Isopropyl Ether			-Q-
Dicyclohexylamine			-Q-
Diethylene Glycol			-Z
Dithanolamine [DEA]			-Q-
Diesel Oil			W-

W-viton

Z-Ethylene Propylene

Q-kalrez

V-Neoprene

T-Buna N

CHEMICAL LISTINGS

Mechanical Seals

Fluid	Fluid	Fluid	Fluid
Di-Ester Lubricant MIL-L-7808	12 and Sun/so 4G (50/50 Mixture)	W-	Hydrochloric Acid 3 Molar Concentrated
Di-Ester Synthetic Lubricants	W-	WZ	WZ W-
Diethylamine	13	WZ	Hydrochloric Acid
Diethyl Ether	13B1	WZ	Hydro-Drive, MIH 50 (Petroleum Base)
Diethylene Glycol	14	WZ	MIH 10 (Petroleum Base)
Diethyl Sebacate	21	-Q-	
Difluorodibromomethane	-Z	22	-Z
Diisobutylene	22 and ASTM Oil #2 (50/50 Mixture)	W-	Hydrofluoric Acid, 65% or less, Cold
Diisobutyl Sebacate	W-	31	WZ W-
Diisobutyl Ketone	-Z	32	65% or more, Cold 65% or less Hot
Diisopropyl Ketone	-Z	-Z	65% or more, Hot
Diisobutyl Formamide	-Z	112	Anhydrous
		113	
Dimethyl phthalate	-Z	114	Magnesium Chloride
Dinitro Toluene	-Q-	114B2	Magnesium Hydroxide
Diocetyl-Amine	-Q-	115	Magnesium Sulphate
Diocetyl Phthalate	-Z	K-152A	Magnesium Sulphite
Diocetyl Sebacate	W-	K-142B	Magnesium Salts
Dioxane	-Z	C318	Maleic Acid
Dipentene	W-	BF	Maleic Anhydride
Diphenyl	W-	MF	Maleic Acid
Diphenyl, Chlorinated	W-		Melamine Resins
Diphenyl Oxides	W-	Freon (concluded)	Mercaptans
Dowtherm, A E 209	W-	PCA	Mercric Chloride
Dow Guard	W-	TF	Mercric Chloride 10%@160.
Dry Cleaning Fluids	W-	Fruit Juices (Concentrated)-V-	Mercury
Dye Liquors	W-	Fruit Juices (Dilute)	Mercury Vapors
Elco 28-EP Lubricant	W-	Hydroquinone	Mesity Oxde (Ketone)
Epichlorohydrin	-Z	Fumaric Acid	
Ethane	-Z	Fuming Sulphuric Acid (20/50% Oleum)	Insecticides
Ethanol	-Z	W-	Iodine
Ethanol Amine	-Z	Furfural	Iodine Pentafluoride
Ethers	-Q-	Furfuraldehyde	Iosbutane
Ethyl Acetate-Organic Ester	-Z	Furfuryl Alcohol	Iosbutyl Alcohol
Ethyl Acetoacetate	-Z	Gallic Acid	Iso butyl N-Butyrate
Ethyl Acylate	-Z	Gasoline-Refined	Isododecane
Ethyl Alcohol	-Z	Gasoline-Sour	Iso Octane
Ethyl Benzene	WZ	Gasoline-Tanker Service	Iso Pentane
Ethyl Benzoate	W-	Gelatin	IsoPhorone (Ketone)
Ethyl Bromide	W-	Glacial Acetic Acid	Isopropanol
Ethyl Cellulosolve	W-	Glauber's Salt	Isopropyl Acetate
Ethyl Cellulose	-Z	Glucose	Isopropyl Alcohol
Ethyl Chloride	WZ	Glue	Isopropyl Chloride
Ethyl Chlorocarbonate	W-	Glue Sizing	Isopropyl Ether
Ethylene	W-	Glycerine-Glycerol	Jet Fuel (JP-3, 4, 5)
Ethylene Bomide	W-	Glycols	JP 3 (ML-J-5624)
Ethylene Chloride (Dry)	W-	Grain Mash	4 (ML-J-5624)
Ethylene Chlorhydrin	W-	Grease 212°F	5 (ML-J-5624)
Ethylene Diamine	-Z	Green Sulphate Liquor	6 (ML-J-25656)
Ethylene Dibromide	WW	Gulf GS-7050 Grease	Kerosene
Ethylene Dichloride	W-	Halowax Oil	[simar to RP-1 and JP-1]
Ethyl Ether	-Q-	HEF-2 (High Energy Fuel)	W-
Ethyl Formate	W-	Helium	ketchup
Ethyleneglycol	WZ	Heptane	Keystone #87HX-Grease
Ethylene Oxide	-Q-	N-Heptane	Lactams-Amino Acids
Ethylene Trichloride	W-	N-Hexaldehyde	Lactic Acid 60% or less
Ethyl hexanol	WZ	Hexane	@150°F
Ethyl mercaptan	-Q-	N-Hexane	60% of more @150°F
Ethyl Oxalate	W-	N-Hexane-1	Lacquers
Ethyl Penychlorobenzene	WZ	Hexyl Alcohol	Lacquer Solvents
Ethyl Silicate	WZ	Hilo MS u1	Lard, Animal Fat
Fatty Acids	W-	High Viscosity Lubricant U4	Latex
FC-43 Heptacosofluorotri-Butylamine	WZ	WZ	Lavender Oil
Ferric Chloride	WZ	H2	Lead Acetate
Ferric Chloride to 40%	WZ		Lead Nitrate
Ferric Nitrate	-WZ	Houghto-Safe 271 (Water and Glycol Base)	Lead Sulphamate
Film Dope	-Q-	620 Water / Glycol	Lehigh X1170
Fluorolube	-Z	1010, Phosphate Ester	Lehigh X1169
Formaldehyde	-Z	1055, Phosphate Ester	Light Grease
Formaldehyde-Formalin	-Q-	1120, Phosphate Ester	Lignoin
Formic Acid	-Q-	5040, (Water / Oil emulsion)	[Petroleum Ether or Benzene]
Freon,11 12	W-		W-
12 and ASTM Oil #2 (50/50 Mixture)	W-	Hydrolube (Water / Ethylene Glycol)	Lime Bleach
			Lime Sulphur
		(petrolene Base)	Lime Water
		-W	Lindol, hydraulic Fluid
			[Phosphate Ester Type]
			-Z
		Hydrazine	
		Hydrobromic Acid-	
		Hydrobromic Acid 40%	Lindol (TCP)
		Hydrocarbons (Saturated)	Linoleic Acid
		W-	Linseed Oil

DONGSUH Industry 76 page

CHEMICAL LISTINGS

Fluid	Fluid	Fluid	Fluid
Niter Cake WZ	Phosphoric Acid, Crude W-	Skelly, Solvent B, C, E W-	Terpineol W-
Nitric Acid, 3 Molar W-	Phosphorous Trichloride -Z	Skydrol 500 -Z	Tertiary Butyl Alcohol W-
Concentrated W-	Photographic Developers -Q-	Skydrol 7000 -Z	P-Tertiary Butyl Catechol W-
Cold Red Fuming (RFNA) W-	Phthalate Esters -Q-	Soap Solutions WZ	Tertiary Butyl Mercaptan W-
Inhibited Red Fuming (IRFNA) W-	Phthalic Anhydride -Q-	Soda Ash WZ	Tetrabromoethane W-
Nitric Acid to 60% W-	Pickling Solution W-	Sodium Acetate -Z	Tetrabutyl Titanate W-
Nitric Acid to 100% -Q-	Picric Acid, H2O Solution WZ	Sodium Bicarbonate [Baking Soda] WZ	Tetrachloroethane W-
Nitrobenzene W-	Molten W-	Sodium Borate WZ	Tetrachloroethylene W-
Nitrobenzene W-	Pinene W-	Sodium Carbonate WZ	tetrethyl Lead W-
Nitroethane -Q-	Pine Oil W-	(Soda Ash) WZ	Tetrethyl Lead "Blend" W-
Nitrogen WZ	Pneumatic Service WZ	Sodium Bisulphite WZ	Tetrahydrofuran Z
Nitrogen Tetroxide N204 -Q-	Polyvinyl Acetates -Z	Sodium Bisulphite WZ	Tetralin W-
Nitromethane -Z	Polyglycols -T-	Sodium Chloride WZ	Titanium Tetrachloride W-
Nitropropane -Z	Potassium Acetate -Z	Sodium Cyanide Z	Toluene-Toluol W-
Octadecane W-	Potassium Bicarbonate -T-	Sodium Hydrosulfite -Q-	Thluene Disocyanide -Z
N-Octane W-	Potassium Carbonate -T-	Sodium Hydroxide -Z	Tomato Juice -T-
Octachloro Toluene -Q-	Potassium Chlorate WZ	Sodium Hydroxide to 50% WZ	Toxaphene -Q-
Octyl Alcohol W-	Potassium Chloride WZ	Sodium Hydroxide over 50% WZ	Transformer Oil W-
Oil, Asphalt Base W-	Potassium Cupro cyanide WZ	Sodium Hypochlorite 20% W-	Transmission Fluid Type A W-
Oil, Castor W-	Potassium Cyanide -Z	Sodium Metaphosphate WZ	Triacetin -Z
Oil, Coconut W-	Potassium Dichromate WZ	Sodium Nitrate -Z	Triaryl Phosphate WZ
Oil, Cottonseed W-	Potassium hydroxide. 50% or less -Z	Sodium Perborate WZ	Tributoxyethyl Phosphate WZ
Oil, Diesel W-	Potassium Hydroxide. 50% or more -Z	Sodium Peroxide WZ	Tributyl Mercaptan W-
Oil, Fuel W-	Potassium Hydroxide. All Concentration -Z	Sodium Phosphate [Mono] WZ	Tributyl Phosphate W-
Oil, Hydraulic [Petroleum Base] W-	Potassium Hydroxide. All Concentration -Z	Sodium Phosphate [Dibasic] WZ	Trichloroacetic Acid -Z
Oil, Mineral Base W-	Potassium Nitrate WZ	Sodium Phosphate [Tribasic] WZ	Trichloroethane, Wet W-
Oil, Linseed W-	Potassium Permanganate -T-	Sodium Plumbite -T-	Trichloroethane, Dry W-
Oil, Lubricating W-	Potassium Phosphate. Di or Tri -T-	Sodium Salts WZ	Trichloroethylene, Wet W-
Oil, Mineral W-	Potassium Salts WZ	Sodium Silicate WZ	Trichloroethylene, Dry W-
Oil, Petroleum Crude W-	Potassium Salts WZ	Sodium Sulfate WZ	Triethanolamine -Z
Oil, Ucon W-	Potassium Sulphite or Nitrate WZ	Sodium Sulphide & Sulphite WZ	Triethylamine -Q-
Oleic Acid W-	Potassium Sulphite WZ	Sodium Tetraborate (Borax) -Z	Trisodium Phosphate -Q-
Oleum W-	Prestone Antifreeze WZ	Sodium Thiosulfate WZ	Tung Oil [China Wood Oil] W-
Oleum [Fuming Sufuric Acid] W-	PRl-High Temp. Hydr. Oil W-	Sour Natural Gas -V-	Turbine Oil W-
Olive Oil W-	Producer Gas W-	Sour Crude Oil -V-	Turbine Oil #15 (MIL-L-7808A) W-
Oronite 8200 W-	Propane W-	Sovasol NO.1 2, & 3 W-	Turbo Oil #35 W-
Oronite 8515 W-	Propion Aldehyde Q-	No. 74 & 74 W-	Turpentine W-
Orthochloro Ethyl Benzene W-	Propionic Acid Concentrated -Q-	Soybean Oil W-	Type I Fuel (MIL-S-3136) W-
Ortho-Dichlorobenzene W-	Propionic Acid Dilute -Q-	Spry W-	(Astm Ref. Fuel A) W-
Oxalic Acid [Weak] WZ	Propyl Acetate -Z	SR-6 Fuel W-	Type II Fuel MIL-S-3136 W-
Oxygen to 2001F WZ	N-Propyl Acetone -Z	SR-10 Fuel W-	Type III Fuel MIL-S-3136 W-
Ozone WZ	Propyl Alcohol WZ	Standard Oil Mobilube GX-90 W-	(ASTM Ref. Fuel B) W-
Paint Thinner, Duco W-	Propyl Nitrate -Z	EP Lube W-	Ucon Hydrolubes W-
Palmitic Acid W-	Propylene W-	Stannic Chloride WZ	Unsymmetrical Dimethyl Hydrazine (UDMH) -Z
Paracylene W-	Glycol -T-	Stannous Chloride 15% WZ	Urea Carbamate -Z
Para-Dichlorobenzene W-	Propylene Oxide -Z	Starch Slurry -Q-	Varnish W-
paraffin [Molten] 250°F or less -Q-	Propylene Polymer -Q-	Stauffer 7700 W-	Vegetable Juices -Q-
paraffin [Molten] 250°F or More W-	Pyranol. Transformer Oil W-	Stem, Below 350°F WZ	Vegetable Oil -Q-
Parker O Lube W-	Pydraul 150 WZ	Stearic Acid -Z	Versilube F-50 WZ
Panut Oil W-	135. A200. 312 W-	Stearic & Oleic Acid -Q-	Vineger WZ
Pectin Liquor W-	AC W-	Steep Liquor (Water) -Q-	Vinyl Acetate -Q-
Pentane [Liquid] W-	F-9 W-	Stoddard Solvent W-	Vinyl Chloride, Dry -Q-
Paraffin [Molten] 250°F or More W-	625 W-	Styrene (Monomer) W-	Vinyl Chloride, Wet or Impure -Q-
Pentane, 2 Methyl 2-4 Dimethyl W-	Pyrodine Oil -Z	Sugar Solution W-	Vinylidine Chloride -Q-
3 Methyl W-	Pyrogard 42, 43, 53, 55 [Phosphate Ester] WZ	Sulphite Liquors W-	Vinyl Pyridine -Q-
N-Pentane W-	Pyrogard C, D W-	Sulphur W-	VV-H-910 WZ
Perchloric Acid-2N W-	Pyrogneous Acid -Z	Sulphur Chloride W-	Sulphur Trioxide, Dry W-
Perchloroethylene to 170°F W-	Pyrolube -S	Sulphur Dioxide, Wet -Z	Sulphuric Acid W-
Perchloroethylene W-	Pyrole BUAN -S	Dry -Z	Sulphuric Acid 100°F Max. W-
Pentrolatum W-	Raffinate -Q-	Liquified under pressure -Z	Sulphuric Acid (Over 100°F consult A. W. C. CO) W-
Petrolatum Oil Crude W-	Red Oil [MIL-H-5606] W-	Sulphur Trioxide, Dry W-	Wagner 21B Brake Fluid -Z
Phenol W-	RJ-1 [MIL-F-25558] W-	Sulphuric Acid W-	Water WZ
Phenol-Formaldehyde -Q-	RJ-1 [MIL-R-25576] W-	Sulphuric Acid 100°F Max. W-	Wemco C W-
Phenol(10%Aqueous) W-	Rapeseed Oil WZ	Sulphuric Acid W-	Whiskey & Wines WZ
Phenyl Ethyl Ether -Q-	SAL Ammoniac WZ	Sunsafe (Fire Resist. Hydr Fluid) W-	White Pine Oil W-
Phenyl acetic Acid (75%) -Q-	Salicylic Acid WZ	Super Shell Gas W-	White Oil W-
Phenylhydrazine W-	Santo Safe 300 W-	Sucrose Solutions W-	Wood Alcohol -Z
Phorone -Z	Sewage WZ	Swan Finch EP Lube -Q-	Wood Oil W-
Phosphoric Acid 3 Molar WZ	Silicate Esters W-	Syrup [High Sugar] W-	Wort -V-
Concentrated W-	Silicone Fluid -Z	Tallow -T-	Zinc Acetate -Z
Phosphoric Acid 45% or less, Aerated W-	Silicone Greases WZ	Tannic Acid WZ	Zinc Chloride WZ
Phosphoric Acid 45% or more, Air Free W-	Silicone Oils W-	Tar, Bituminous W-	Zinc Nitrate -T-
	Silver Nitrate WZ	Tartaric Acid W-	Zinc Phosphate -Q-
	Sinclar Opaline CX-EP Lube W-		Zinc Salts WZ
			Zinc Sulphate WZ
			Zeolites WZ



DONGSUH INDUSTRY

The DONGSUH is moving forward with a renewed spirit of service for customers.

It is designed to have both high tensile strength and flexibility simultaneously for braiding continuous filament carbon fiber having high thermal conductivity and low coefficient of friction in a unique method of DONGSUH.

O - R i n g

We will make it for customer impressed not customer satisfaction.

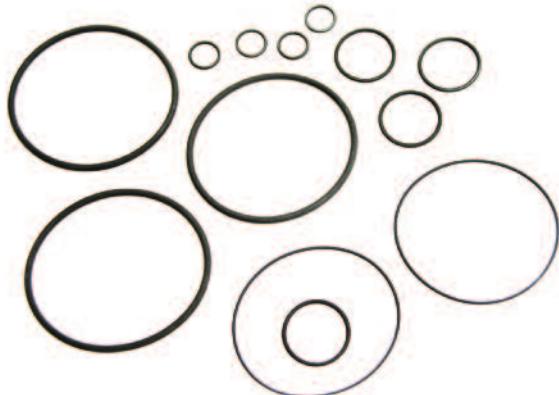
O-Ring

- 80 **ALS 1544K
O-Ring**
- 82 **TECHNICAL DATA**
- 83 **Groove Dimensions**
- 85 **AS-568A SERIES O-RING (NASA standard)**

ALS 1544 O-Ring

제품의 특징 / FEATURES OF O-RING

O-RING은 가장 기본적인 씰(Seal)로서, 홈에 조립되어 석동면과 압착에 의해 접촉되면서 반발탄성에 의하여 밀폐력을 가집니다. 첫째는 피스톤이나 로드씰처럼 내경과 외경면에 압착되는 반경방향 씰(Radial Seal)이 있고, 둘째는 위와 아랫면이 서로 압착되는 축방향씰 (Axial Seal 혹은 面씰: Face Seal)이 있습니다. O-RING은 조립과 동시에 압착되어 자동적으로 밀폐력이 형성되며 특히 고정용일 경우 수명이 길어집니다.

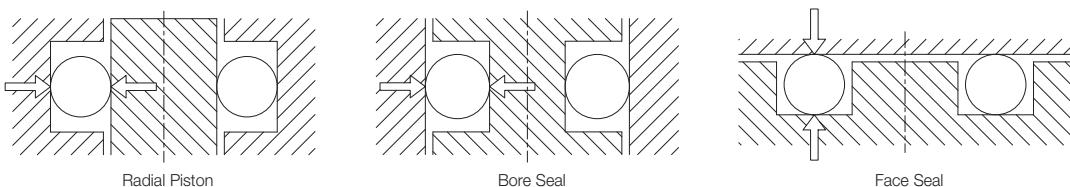


제품의 종류 / O-RING TYPE

O-rings are primarily used to prevent the loss of a fluid or gas. However, O-rings can be used as dust seals, drive belts or on rotating shafts. Most O-ring seals can be classified into one of the three arrangements shown below.

고정용(Static Seal) : 씰링 면(Sealing surface)의 방향에 따라 축방향(Axial)씰, 반경방향(Radial)씰
운동용(Dynamic Seal) : 회전용(Rotary), 왕복운동용(Reciprocating), 진동용(Oscillating)

Static Seal : Axial seal and radial seal depending on the sealing surface
Dynamic Seal : Rotary, reciprocating and oscillating type



제품의 적용(선정시 고려요소) / APPLICATION OF O-RING (IMPORTANT NOTES)

- 재질(Materials) : NBR, HNBR, EPDM, Silicone, FPM(Viton), Kalrez®, CR고무 등 온도, 사용매체 등에 따라 적정한 재질을 선정.
- 온도(Temperature) : -60°C~+300°C, 재질의 종류에 따라 다름(내열성)
- 유체(Fluid Sealed) : 액체, 기체의 종류에 따라 알맞은 재질 선정(내유성, 내화학성)
- 압력(Pressure) : 고정용일 경우, 100bar 이내(Back-up Ring 없이), 100bar 이상(Back-up Ring 사용)
운동력일 경우, 50bar 이내(Back-up Ring 없이), 50bar 이상(Back-up Ring 사용)
- 속도(Speed) : 왕복운동 최대 0.5m/s, 회전운동 최대 0.5m/s
- Materials : Choose appropriate material according to NBR, HNBR, EPDM, Silicone, FPM [Viton], Kalrez, CR rubber, temp. and other working materials.
- Temperature : -60°C~+300°C, It depends on the material type. (Heat-resistant)
- Fluid Sealed : Choose suitable material depending on fluid or air [oil-resistance and chemical-resistance]
- Pressure : For static seal, within 100bar (without Back-up Ring), above 100bar (use Back-up Ring) For dynamic seal, within 50bar (without Back-up Ring), above 50bar (use Back-up Ring)
- Speed : Reciprocating - Max. 0.5 m/s. Rotary - Max. 0.5 m/s.

Compound Specification Guide

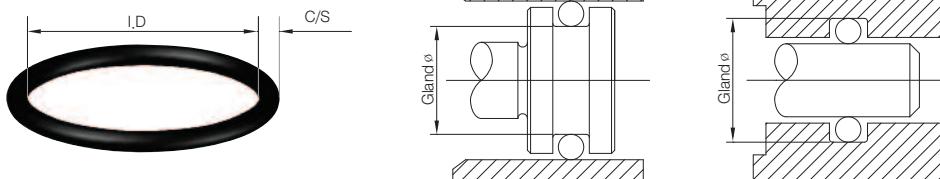
Elastomer Type	Durometer	Temperature Range	Service
Nitrile	70+/-5	-40°C to 120°C -40°F to 248°F	A general service Nitrile compound for a wide range of applications including petroleum based fluids. Nitrile compounds also have excellent resistance to compression set, tear and abrasion resistance.
Nitrile	90+/-5	-25°C to 120°C -13°F to 248°F	Generally used for higher pressures than the 70 durometer materials, while having comparable media resistance.
High Saturated Nitrile	70+/-5	-40°C to 150°C -40°F to 302°F	This is a hydrogenated Nitrile compound which provides the material with improved resistance to heat, ozone and aging. Similar applications to Nitrile but with improved mechanical properties and media resistance. Excellent for many oilfield and automotive applications. H2S resistance up to 10%.
High Saturated Nitrile	80+/-5	-40°C to 150°C -40°F to 302°F	Generally used for higher pressures than the 70 durometer materials while having comparable media resistance.
High Saturated Nitrile	90+/-5	-40°C to 150°C -40°F to 302°F	Generally used for higher pressures than the 80 durometer materials while having comparable media resistance. Improved ED resistance.
Viton®	75+/-5	-25°C to 204°C -13°F to 400°F	Genuine Viton® compounds have excellent resistance to ozone, weather, oxygen, mineral oil, fuels, hydraulic fluids, aromatics, petroleum fluids, many organic solvents and chemicals. Viton® is also used in high temperature applications. Viton® Extreme® TBR and ETP compounds are also available. TBR- Totally Base Resistant compound that provides improved performance over other TFE / Propylene polymers. ETP- Provides the excellent thermal resistance of Viton® along with significantly advanced chemical resistance.
Viton®	80+/-5	-25°C to 204°C -13°F to 400°F	Genuine Viton® is generally used for higher pressure than the 75 durometer materials while having comparable media resistance.
Perfluoroelastomer	75+/-5	-15°C to 300°C 5°F to 572°F	Perfluoroelastomer materials combine the best heat and chemical resistance performance compared to other elastomer materials.
Perfluoroelastomer	75+/-5	-4°C to 230°C 25°F to 466°F	Generally used for higher pressures than the 75 durometer materials while having comparable media resistance.
Aflas™	80+/-5	0°C to 230°C 32°F to 466°F	Tetrafluoroethylene-Propylene materials exhibit exceptional thermal and chemical resistance including hot water, steam, acids, alkaline solutions, ammonia, amines, brake fluids, petroleum fluids and sour gas. Low temperature may restrict sealing abilities.
Neoprene	70+/-5	-45°C to 135°C -49°F to 275°F	Neoprene is a general purpose material for refrigerants, ozone and weather.
Etylene-Propylene	70+/-5	-54°C to 150°C -65°F to 302°F	Ethylene-Propylene materials exhibit excellent resistance to water, steam, brake fluids and ozone.
Etylene-Propylene	80+/-5	-54°C to 150°C -65°F to 302°F	Generally used for higher pressures than 70 durometer EPDM compounds while having comparable media resistance.
Silicone	70+/-5	-55°C to 230°C -67°F to 446°F	Silicone compounds offer the widest elastomer temperature range but typically can not be used in dynamic applications or petroleum based fluids.
Fluorosilicone	70+/-5	-55°C to 200°C -67°F to 39°F	Fluorosilicone for use in petroleum and synthetic oils, greases, amines, amine- treated hydrocarbons and steam.

1. 제품의 설계 / O-RING DESIGN

설계시 고려사항 : 압력, 사용온도, 유체(Fluid)의 종류, O-RING 재질, 흡가공 치수, 표면조도 마찰계수, 윤활제, O-RING의 치수(두께,내경), 영구 압축변형율, 압착율 등 특히 압력은 O-RING 설계에 있어서 가장 중요한 고려사항 중의 하나로써, 다음 그림에서 보는 바와 같이 유체의 압력이 높으면 흡과 섭동면 사이의 틈새가 봉쇄되면서 나중에는 O-RING의 밀림, 찢김 그리고 누유현상이 일어납니다. 이러한 것을 방지하기 위해서는 틈새 치수를 줄이면, O-RING의 경도를 높입니다. 또한 O-RING의 재질을 바꾸며 BACK-UP RING을 사용합니다.

Notes for designing : Pressure, working temperature, fluid type, O-ring material, groove processing dimension, surface roughness friction coefficient, lubricant, O-Ring dimension [thickness and inside diameter], permanent compression set, squeeze, etc. and especially the pressure is one of the most important points for O-Ring designing. As can be seen in the following picture, if the fluid pressure is high, the crack between groove and sliding surface is closed causing O-Ring jam, tearing and oil leakage. To avoid such things, reduce crack dimension, increase the hardness of O-Ring, change the O-Ring material and use Back-Up Ring.

O-Ring Cross Section

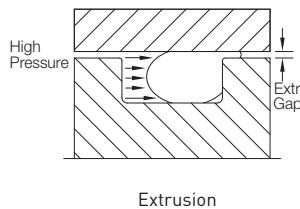


2. Extrusion Gap

Extrusion is a concern for radial seals where there is gap between the piston and the bore for a piston type seal or between the rod and the bore for a rod type seal. It is not typically a concern for face type seals where the metal parts to be sealed are in contact line-to-line. The issue is that at higher pressures and especially for softer O-ring elastomers, the O-ring can be forced by the pressure into the small gap between the piston (or rod) and the bore. Unless the bore and the piston (or rod) are ensured to remain concentric by the hardware, we have to assume that entire possible gap can shift to one side (see diagram below).

Piston Type Seal

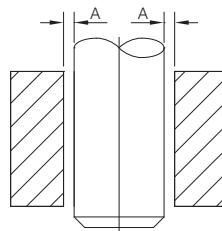
$$\text{Radial Extrusion Gap} = \frac{\text{Bore } \phi - \text{Piston } \phi}{2}$$



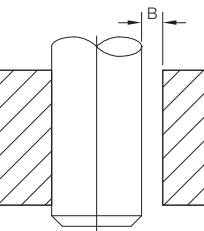
Extrusion

Rod Type Seal

$$\text{Radial Extrusion Gap} = \frac{\text{Bore } \phi - \text{Rod } \phi}{2}$$



Radial Gap (A)

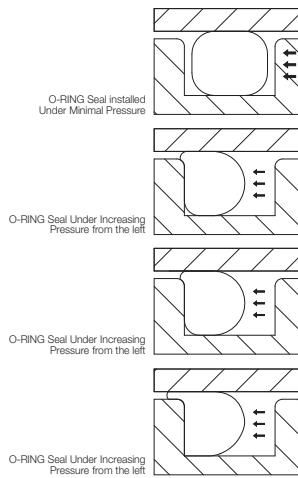


Diametrical Gap (B)

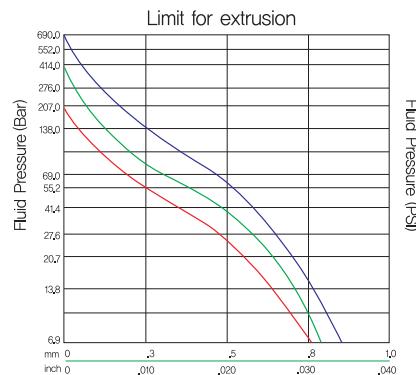
3. Limits for Extrusion

There are different methods to counter O-ring extrusion. One of these methods is to simply increase the durometer rating of the O-ring. However, as you increase the durometer, the O-ring can become less malleable. Another option would be the use of anti-extrusion devices. These are thin rings made of hard plastic materials such as PTFE, Nylon, and PEEK or a harder durometer rubber such as Nitrile or Polyurethane. Once in place these rings will provide essentially zero clearance.

The effect of pressure / 압력의 영향



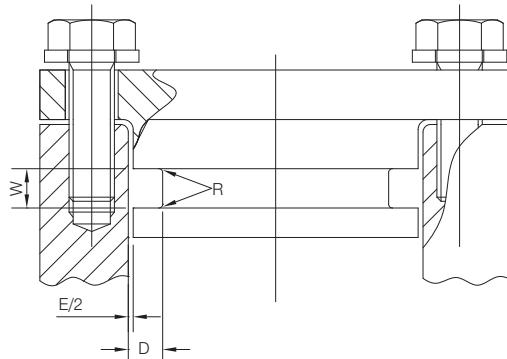
Limit for extrusion / 밀림 근계식



Crack in diameter(mm, in) Total Diametral Clearance
Relation between rubber hardness,
fluid pressure and crack in diameter

홈 치수 - ISO 3601 / Groove Dimensions

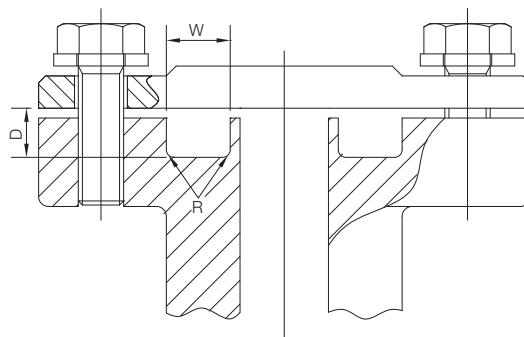
Static Radial Applications



O-Ring C/S	D	Squeeze		E	W *			E
		Groove Depth	Inches		%	Diametrical Clearance Max.	No Back-Up Ring	
0.070	0.049-0.057	0.010-0.025	14-35	0.004		0.004	0.110	0.008-0.016
0.103	0.075-0.087	0.013-0.031	13-30	0.005		0.005	0.150	0.008-0.016
0.139	0.101-0.117	0.018-0.042	13-30	0.006		0.006	0.197	0.016-0.031
0.210	0.156-0.180	0.025-0.059	12-28	0.006		0.006	0.283	0.016-0.031
0.275	0.212-0.242	0.028-0.069	10-25	0.007		0.007	0.374	0.031-0.047

* Pneumatic applications typically do not use a Back-up ring.

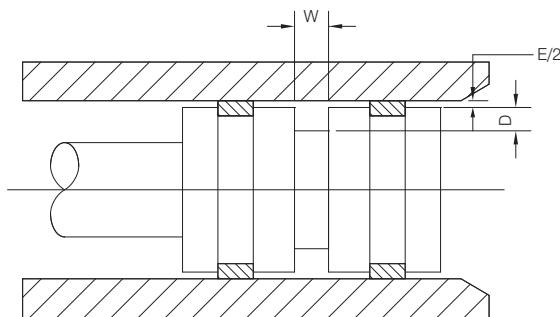
Static Axial(Face) Applications



O-Ring C/S	D	Squeeze	W			E
			Groove Width +0.008/-0.000			
0.070	0.051		21-36	0.126	0.114	0.008-0.016
0.103	0.079		19-30	0.157	0.142	0.008-0.016
0.139	0.106		17-26	0.209	0.189	0.016-0.031
0.210	0.165		15-23	0.299	0.276	0.016-0.031
0.275	0.224		13-20	0.354	0.335	0.031-0.047

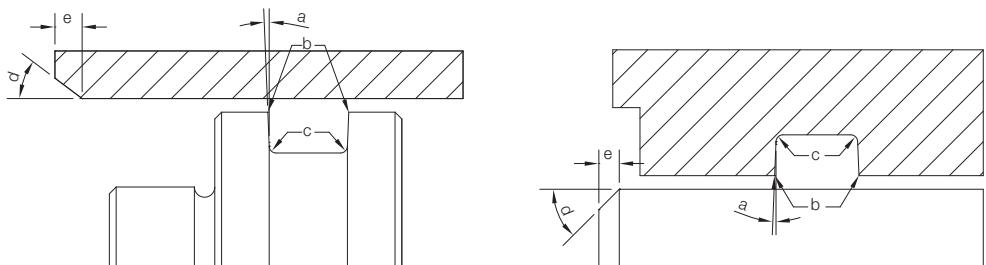
홈 치수 - ISO 3601 / Groove Dimensions

Reciprocating Applications



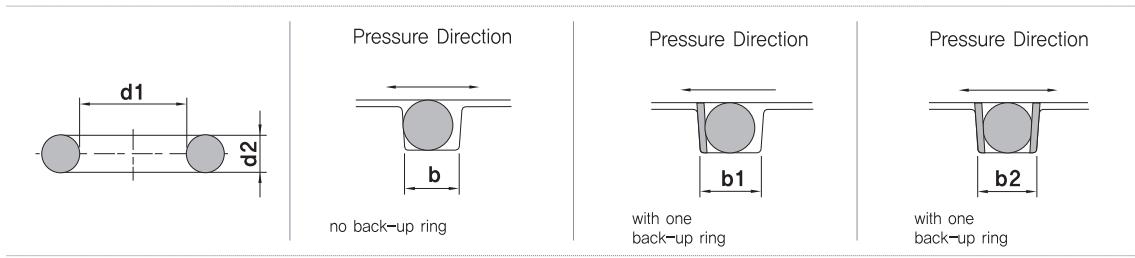
O-Ring C/S	D		Squeeze				E	W*			E		
	Groove Depth		Hydraulic		Pneumatic			Diametrical Clearance Max.	Groove Width +0.010/-0.000				
	Hydraulic	Pneumatic	Inches	%	Inches	%			No Back-up Ring	One Back-up Ring			
0.070	0.054-0.058	0.056-0.060	0.009-0.019	13-27	0.007-0.017	10-24	0.004	0.110	0.165	0.220	0.008-0.016		
0.103	0.081-0.088	0.083-0.092	0.012-0.025	12-24	0.008-0.023	8-22	0.005	0.150	0.205	0.260	0.008-0.016		
0.139	0.112-0.120	0.115-0.125	0.015-0.031	11-22	0.010-0.028	7-20	0.006	0.197	0.252	0.307	0.016-0.031		
0.210	0.173-0.182	0.177-0.190	0.023-0.042	11-20	0.015-0.038	7-18	0.006	0.283	0.354	0.429	0.016-0.031		
0.275	0.229-0.244	0.234-0.052	0.025-0.052	9-19	0.017-0.047	6-17	0.007	0.374	0.484	0.594	0.031-0.047		

* Pneumatic applications typically do not use a Back-up ring.



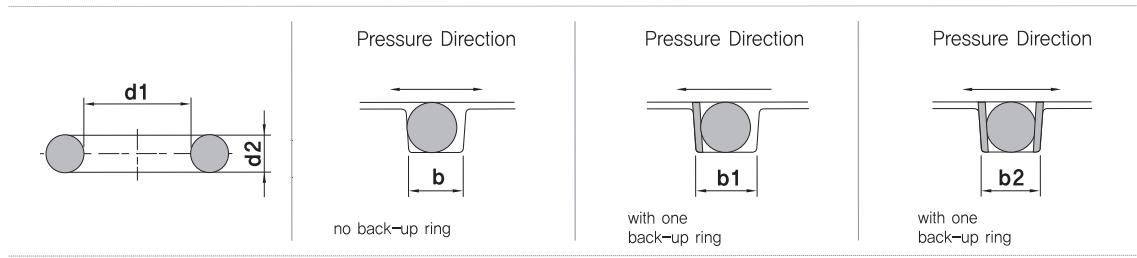
O-Ring Series	O-Ring C/S		Wall Angle	Break Edge	Radius		chamfer length(e)				
	Inch	mm			a	b	Inch	mm	Inch	mm	
	0	0.070	1.78		↑ 0-5° ↓	↑ 0.04-0.012 Inch 0.10-0.30 mm ↓	0.008-0.016	0.20-0.40	0.043	1.10	0.035
100	0.103	2.62	0.008-0.016				0.20-0.40	0.059	1.50	0.043	0.10
200	0.139	3.53	0.016-0.031				0.40-0.80	0.071	1.80	0.055	0.40
300	0.210	5.33	0.016-0.080				0.40-0.80	0.106	2.70	0.083	2.10
400	0.275	6.99	0.031-0.047				0.80-0.12	0.142	3.60	0.110	2.80

AS-568A SERIES O-RING 미국 항공우주국 표준규격 (NASA standard)

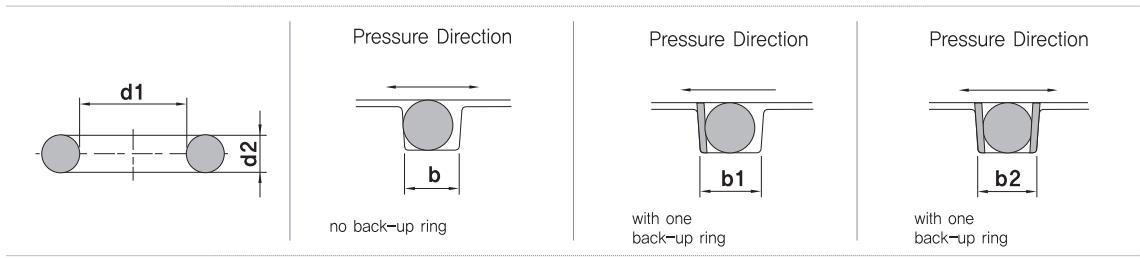


Anti Leak Nr.	d1	d2	b	b1	b2	Anti Leak Nr.	d1	d2	b	b1	b2
			+0.2 0	+0.2 0	+0.2 0				+0.2 0	+0.2 0	+0.2 0
ALS-006	2.90	1.78	2.4	3.5	4.6	ALS-119	23.47	2.62	3.6	4.7	5.8
ALS-007	3.68	1.78	2.4	3.5	4.6	ALS-120	25.07	2.62	3.6	4.7	5.8
ALS-008	4.47	1.78	2.4	3.5	4.6	ALS-121	26.64	2.62	3.6	4.7	5.8
ALS-009	5.28	1.78	2.4	3.5	4.6	ALS-122	28.24	2.62	3.6	4.7	5.8
ALS-010	6.07	1.78	2.4	3.5	4.6	ALS-123	29.82	2.62	3.6	4.7	5.8
ALS-011	7.65	1.78	2.4	3.5	4.6	ALS-124	31.42	2.62	3.6	4.7	5.8
ALS-012	9.25	1.78	2.4	3.5	4.6	ALS-125	32.99	2.62	3.6	4.7	5.8
ALS-013	10.82	1.78	2.4	3.5	4.6	ALS-126	34.59	2.62	3.6	4.7	5.8
ALS-014	12.42	1.78	2.4	3.5	4.6	ALS-127	36.17	2.62	3.6	4.7	5.8
ALS-015	14.00	1.78	2.4	3.5	4.6	ALS-128	37.77	2.62	3.6	4.7	5.8
ALS-016	15.60	1.78	2.4	3.5	4.6	ALS-129	39.34	2.62	3.6	4.7	5.8
ALS-017	17.17	1.78	2.4	3.5	4.6	ALS-130	40.94	2.62	3.6	4.7	5.8
ALS-018	18.77	1.78	2.4	3.5	4.6	ALS-131	42.52	2.62	3.6	4.7	5.8
ALS-019	20.35	1.78	2.4	3.5	4.6	ALS-132	44.12	2.62	3.6	4.7	5.8
ALS-020	21.95	1.78	2.4	3.5	4.6	ALS-133	45.69	2.62	3.6	4.7	5.8
ALS-021	23.52	1.78	2.4	3.5	4.6	ALS-134	47.29	2.62	3.6	4.7	5.8
ALS-022	25.12	1.78	2.4	3.5	4.6	ALS-135	48.90	2.62	3.6	4.7	5.8
ALS-023	26.70	1.78	2.4	3.5	4.6	ALS-136	50.47	2.62	3.6	4.7	5.8
ALS-024	28.30	1.78	2.4	3.5	4.6	ALS-137	52.07	2.62	3.6	4.7	5.8
ALS-025	29.87	1.78	2.4	3.5	4.6	ALS-138	53.64	2.62	3.6	4.7	5.8
ALS-026	31.47	1.78	2.4	3.5	4.6	ALS-139	55.25	2.62	3.6	4.7	5.8
ALS-027	33.05	1.78	2.4	3.5	4.6	ALS-140	56.82	2.62	3.6	4.7	5.8
ALS-028	34.65	1.78	2.4	3.5	4.6	ALS-141	58.42	2.62	3.6	4.7	5.8
ALS-029	37.82	1.78	2.4	3.5	4.6	ALS-142	59.99	2.62	3.6	4.7	5.8
ALS-030	41.00	1.78	2.4	3.5	4.6	ALS-143	61.60	2.62	3.6	4.7	5.8
ALS-031	44.17	1.78	2.4	3.5	4.6	ALS-144	63.17	2.62	3.6	4.7	5.8
ALS-032	47.35	1.78	2.4	3.5	4.6	ALS-145	64.77	2.62	3.6	4.7	5.8
ALS-033	50.52	1.78	2.4	3.5	4.6	ALS-146	66.34	2.62	3.6	4.7	5.8
ALS-034	53.70	1.78	2.4	3.5	4.6	ALS-147	67.95	2.62	3.6	4.7	5.8
ALS-035	56.87	1.78	2.4	3.5	4.6	ALS-148	69.52	2.62	3.6	4.7	5.8
ALS-036	60.08	1.78	2.4	3.5	4.6	ALS-149	71.12	2.62	3.6	4.7	5.8
ALS-037	63.22	1.78	2.4	3.5	4.6	ALS-150	42.69	2.62	3.6	4.7	5.8
ALS-038	66.40	1.78	2.4	3.5	4.6	ALS-151	75.87	2.62	3.6	4.7	5.8
ALS-039	69.57	1.78	2.4	3.5	4.6	ALS-152	82.22	2.62	3.6	4.7	5.8
ALS-040	72.75	1.78	2.4	3.5	4.6	ALS-153	88.57	2.62	3.6	4.7	5.8
ALS-041	75.92	1.78	2.4	3.5	4.6	ALS-154	94.92	2.62	3.6	4.7	5.8
ALS-042	82.27	1.78	2.4	3.5	4.6	ALS-155	101.27	2.62	3.6	4.7	5.8
ALS-043	88.62	1.78	2.4	3.5	4.6	ALS-156	107.62	2.62	3.6	4.7	5.8
ALS-044	94.97	1.78	2.4	3.5	4.6	ALS-157	113.97	2.62	3.6	4.7	5.8
ALS-045	101.32	1.78	2.4	3.5	4.6	ALS-158	120.32	2.62	3.6	4.7	5.8
ALS-046	107.67	1.78	2.4	3.5	4.6	ALS-159	126.67	2.62	3.6	4.7	5.8
ALS-047	114.02	1.78	2.4	3.5	4.6	ALS-160	133.02	2.62	3.6	4.7	5.8
ALS-048	120.37	1.78	2.4	3.5	4.6	ALS-161	139.37	2.62	3.6	4.7	5.8
ALS-049	126.72	1.78	2.4	3.5	4.6	ALS-162	145.72	2.62	3.6	4.7	5.8
ALS-050	133.07	1.78	2.4	3.5	4.6	ALS-163	152.07	2.62	3.6	4.7	5.8
ALS-102	1.24	2.62	3.6	4.7	5.8	ALS-164	158.42	2.62	3.6	4.7	5.8
ALS-103	2.06	2.62	3.6	4.7	5.8	ALS-165	164.77	2.62	3.6	4.7	5.8
ALS-104	2.04	2.62	3.6	4.7	5.8	ALS-166	171.12	2.62	3.6	4.7	5.8
ALS-105	3.63	2.62	3.6	4.7	5.8	ALS-167	177.47	2.62	3.6	4.7	5.8
ALS-106	4.42	2.62	3.6	4.7	5.8	ALS-168	183.82	2.62	3.6	4.7	5.8
ALS-107	5.23	2.62	3.6	4.7	5.8	ALS-169	190.17	2.62	3.6	4.7	5.8
ALS-108	6.02	2.62	3.6	4.7	5.8	ALS-170	196.52	2.62	3.6	4.7	5.8
ALS-109	7.59	2.62	3.6	4.7	5.8	ALS-171	202.87	2.62	3.6	4.7	5.8
ALS-110	9.19	2.62	3.6	4.7	5.8	ALS-172	209.22	2.62	3.6	4.7	5.8
ALS-111	10.77	2.62	3.6	4.7	5.8	ALS-173	215.57	2.62	3.6	4.7	5.8
ALS-112	12.37	2.62	3.6	4.7	5.8	ALS-174	221.92	2.62	3.6	4.7	5.8
ALS-113	13.94	2.62	3.6	4.7	5.8	ALS-175	228.27	2.62	3.6	4.7	5.8
ALS-114	15.54	2.62	3.6	4.7	5.8	ALS-176	234.62	2.62	3.6	4.7	5.8
ALS-115	17.12	2.62	3.6	4.7	5.8	ALS-177	240.97	2.62	3.6	4.7	5.8
ALS-116	18.72	2.62	3.6	4.7	5.8	ALS-178	247.32	2.62	3.6	4.7	5.8
ALS-117	20.30	2.62	3.6	4.7	5.8	ALS-201	4.34	3.53	4.8	5.8	6.8
ALS-118	21.89	2.62	3.6	4.7	5.8	ALS-202	5.94	3.53	4.8	5.8	6.8

AS-568A SERIES O-RING 미국 항공우주국 표준규격 (NASA standard)



Anti Leak Nr.	d_1	d_2	b	b_1	b_2	Anti Leak Nr.	d_1	d_2	b	b_1	b_2
			+0.2 0	+0.2 0	+0.2 0				+0.2 0	+0.2 0	+0.2 0
ALS-203	7.52	3.53	4.8	5.8	6.8	ALS-265	196.44	3.53	4.8	5.8	6.8
ALS-204	9.12	3.53	4.8	5.8	6.8	ALS-266	202.79	3.53	4.8	5.8	6.8
ALS-205	10.69	3.53	4.8	5.8	6.8	ALS-267	209.14	3.53	4.8	5.8	6.8
ALS-206	12.29	3.53	4.8	5.8	6.8	ALS-268	215.49	3.53	4.8	5.8	6.8
ALS-207	13.87	3.53	4.8	5.8	6.8	ALS-269	221.84	3.53	4.8	5.8	6.8
ALS-208	15.47	3.53	4.8	5.8	6.8	ALS-270	228.19	3.53	4.8	5.8	6.8
ALS-209	17.04	3.53	4.8	5.8	6.8	ALS-271	234.54	3.53	4.8	5.8	6.8
ALS-210	18.64	3.53	4.8	5.8	6.8	ALS-272	240.89	3.53	4.8	5.8	6.8
ALS-211	20.22	3.53	4.8	5.8	6.8	ALS-273	247.24	3.53	4.8	5.8	6.8
ALS-212	21.82	3.53	4.8	5.8	6.8	ALS-274	253.59	3.53	4.8	5.8	6.8
ALS-213	23.39	3.53	4.8	5.8	6.8	ALS-275	266.29	3.53	4.8	5.8	6.8
ALS-214	24.99	3.53	4.8	5.8	6.8	ALS-276	278.99	3.53	4.8	5.8	6.8
ALS-215	26.57	3.53	4.8	5.8	6.8	ALS-277	291.69	3.53	4.8	5.8	6.8
ALS-216	28.17	3.53	4.8	5.8	6.8	ALS-278	304.39	3.53	4.8	5.8	6.8
ALS-217	29.74	3.53	4.8	5.8	6.8	ALS-279	329.79	3.53	4.8	5.8	6.8
ALS-218	31.34	3.53	4.8	5.8	6.8	ALS-280	355.19	3.53	4.8	5.8	6.8
ALS-219	32.92	3.53	4.8	5.8	6.8	ALS-281	380.59	3.53	4.8	5.8	6.8
ALS-220	34.52	3.53	4.8	5.8	6.8	ALS-282	405.26	3.53	4.8	5.8	6.8
ALS-221	36.09	3.53	4.8	5.8	6.8	ALS-283	430.66	3.53	4.8	5.8	6.8
ALS-222	37.69	3.53	4.8	5.8	6.8	ALS-274	456.06	3.53	4.8	5.8	6.8
ALS-223	40.87	3.53	4.8	5.8	6.8	ALS-309	10.46	5.33	7.2	8.7	10.2
ALS-224	44.04	3.53	4.8	5.8	6.8	ALS-310	12.07	5.33	7.2	8.7	10.2
ALS-225	47.22	3.53	4.8	5.8	6.8	ALS-311	13.64	5.33	7.2	8.7	10.2
ALS-226	50.39	3.53	4.8	5.8	6.8	ALS-312	15.24	5.33	7.2	8.7	10.2
ALS-227	53.57	3.53	4.8	5.8	6.8	ALS-313	16.18	5.33	7.2	8.7	10.2
ALS-228	56.74	3.53	4.8	5.8	6.8	ALS-314	18.42	5.33	7.2	8.7	10.2
ALS-229	59.92	3.53	4.8	5.8	6.8	ALS-315	19.99	5.33	7.2	8.7	10.2
ALS-230	63.09	3.53	4.8	5.8	6.8	ALS-316	21.59	5.33	7.2	8.7	10.2
ALS-231	66.27	3.53	4.8	5.8	6.8	ALS-317	23.16	5.33	7.2	8.7	10.2
ALS-232	69.44	3.53	4.8	5.8	6.8	ALS-318	24.77	5.33	7.2	8.7	10.2
ALS-233	72.62	3.53	4.8	5.8	6.8	ALS-319	26.34	5.33	7.2	8.7	10.2
ALS-234	75.79	3.53	4.8	5.8	6.8	ALS-320	27.94	5.33	7.2	8.7	10.2
ALS-235	78.97	3.53	4.8	5.8	6.8	ALS-321	29.51	5.33	7.2	8.7	10.2
ALS-236	82.14	3.53	4.8	5.8	6.8	ALS-322	31.12	5.33	7.2	8.7	10.2
ALS-237	85.32	3.53	4.8	5.8	6.8	ALS-323	32.69	5.33	7.2	8.7	10.2
ALS-238	88.49	3.53	4.8	5.8	6.8	ALS-324	34.29	5.33	7.2	8.7	10.2
ALS-239	91.67	3.53	4.8	5.8	6.8	ALS-325	37.47	5.33	7.2	8.7	10.2
ALS-240	94.84	3.53	4.8	5.8	6.8	ALS-326	40.64	5.33	7.2	8.7	10.2
ALS-241	98.02	3.53	4.8	5.8	6.8	ALS-327	43.82	5.33	7.2	8.7	10.2
ALS-242	101.19	3.53	4.8	5.8	6.8	ALS-328	46.99	5.33	7.2	8.7	10.2
ALS-243	104.39	3.53	4.8	5.8	6.8	ALS-329	50.17	5.33	7.2	8.7	10.2
ALS-244	107.54	3.53	4.8	5.8	6.8	ALS-330	53.34	5.33	7.2	8.7	10.2
ALS-245	110.72	3.53	4.8	5.8	6.8	ALS-331	56.52	5.33	7.2	8.7	10.2
ALS-246	113.89	3.53	4.8	5.8	6.8	ALS-332	59.69	5.33	7.2	8.7	10.2
ALS-247	117.07	3.53	4.8	5.8	6.8	ALS-333	62.87	5.33	7.2	8.7	10.2
ALS-248	120.24	3.53	4.8	5.8	6.8	ALS-334	66.04	5.33	7.2	8.7	10.2
ALS-249	123.42	3.53	4.8	5.8	6.8	ALS-335	69.22	5.33	7.2	8.7	10.2
ALS-250	126.59	3.53	4.8	5.8	6.8	ALS-336	72.39	5.33	7.2	8.7	10.2
ALS-251	129.77	3.53	4.8	5.8	6.8	ALS-337	75.57	5.33	7.2	8.7	10.2
ALS-252	132.94	3.53	4.8	5.8	6.8	ALS-338	78.74	5.33	7.2	8.7	10.2
ALS-253	136.12	3.53	4.8	5.8	6.8	ALS-339	81.92	5.33	7.2	8.7	10.2
ALS-254	139.29	3.53	4.8	5.8	6.8	ALS-340	85.09	5.33	7.2	8.7	10.2
ALS-255	142.47	3.53	4.8	5.8	6.8	ALS-341	88.27	5.33	7.2	8.7	10.2
ALS-256	145.64	3.53	4.8	5.8	6.8	ALS-342	91.44	5.33	7.2	8.7	10.2
ALS-257	148.82	3.53	4.8	5.8	6.8	ALS-343	94.62	5.33	7.2	8.7	10.2
ALS-258	151.99	3.53	4.8	5.8	6.8	ALS-344	97.79	5.33	7.2	8.7	10.2
ALS-259	158.34	3.53	4.8	5.8	6.8	ALS-345	100.97	5.33	7.2	8.7	10.2
ALS-260	164.69	3.53	4.8	5.8	6.8	ALS-346	104.14	5.33	7.2	8.7	10.2
ALS-261	171.04	3.53	4.8	5.8	6.8	ALS-347	107.32	5.33	7.2	8.7	10.2
ALS-262	177.39	3.53	4.8	5.8	6.8	ALS-348	110.49	5.33	7.2	8.7	10.2
ALS-263	183.74	3.53	4.8	5.8	6.8	ALS-349	113.67	5.33	7.2	8.7	10.2
ALS-264	190.09	3.53	4.8	5.8	6.8	ALS-350	116.84	5.33	7.2	8.7	10.2



Anti Leak Nr.	d ₁	d ₂	b	b ₁	b ₂	Anti Leak Nr.	d ₁	d ₂	b	b ₁	b ₂
			+0.2 0	+0.2 0	+0.2 0				+0.2 0	+0.2 0	+0.2 0
ALS-351	120.02	5.33	7.2	8.7	10.2	ALS-442	183.52	6.99	9.6	12.0	14.4
ALS-352	123.19	5.33	7.2	8.7	10.2	ALS-443	189.87	6.99	9.6	12.0	14.4
ALS-353	126.37	5.33	7.2	8.7	10.2	ALS-444	196.22	6.99	9.6	12.0	14.4
ALS-354	129.54	5.33	7.2	8.7	10.2	ALS-445	202.57	6.99	9.6	12.0	14.4
ALS-355	132.72	5.33	7.2	8.7	10.2	ALS-446	215.27	6.99	9.6	12.0	14.4
ALS-356	135.89	5.33	7.2	8.7	10.2	ALS-447	227.97	6.99	9.6	12.0	14.4
ALS-357	139.07	5.33	7.2	8.7	10.2	ALS-448	240.67	6.99	9.6	12.0	14.4
ALS-358	142.24	5.33	7.2	8.7	10.2	ALS-449	253.37	6.99	9.6	12.0	14.4
ALS-359	145.42	5.33	7.2	8.7	10.2	ALS-450	266.07	6.99	9.6	12.0	14.4
ALS-360	148.59	5.33	7.2	8.7	10.2	ALS-451	278.77	6.99	9.6	12.0	14.4
ALS-361	151.77	5.33	7.2	8.7	10.2	ALS-452	291.47	6.99	9.6	12.0	14.4
ALS-362	158.12	5.33	7.2	8.7	10.2	ALS-453	304.17	6.99	9.6	12.0	14.4
ALS-363	164.47	5.33	7.2	8.7	10.2	ALS-454	316.87	6.99	9.6	12.0	14.4
ALS-364	170.82	5.33	7.2	8.7	10.2	ALS-455	329.57	6.99	9.6	12.0	14.4
ALS-365	177.17	5.33	7.2	8.7	10.2	ALS-456	342.27	6.99	9.6	12.0	14.4
ALS-366	183.52	5.33	7.2	8.7	10.2	ALS-457	354.97	6.99	9.6	12.0	14.4
ALS-367	189.87	5.33	7.2	8.7	10.2	ALS-458	367.67	6.99	9.6	12.0	14.4
ALS-368	196.22	5.34	7.2	8.7	10.2	ALS-459	380.37	6.99	9.6	12.0	14.4
ALS-369	202.57	5.33	7.2	8.7	10.2	ALS-460	393.07	6.99	9.6	12.0	14.4
ALS-370	208.92	5.33	7.2	8.7	10.2	ALS-461	405.26	6.99	9.6	12.0	14.4
ALS-371	215.27	5.33	7.2	8.7	10.2	ALS-462	417.96	6.99	9.6	12.0	14.4
ALS-372	221.62	5.33	7.2	8.7	10.2	ALS-463	430.66	6.99	9.6	12.0	14.4
ALS-373	227.97	5.33	7.2	8.7	10.2	ALS-464	443.36	6.99	9.6	12.0	14.4
ALS-374	234.32	5.33	7.2	8.7	10.2	ALS-465	456.06	6.99	9.6	12.0	14.4
ALS-375	240.67	5.33	7.2	8.7	10.2	ALS-466	468.76	6.99	9.6	12.0	14.4
ALS-376	247.02	5.33	7.2	8.7	10.2	ALS-467	481.46	6.99	9.6	12.0	14.4
ALS-377	253.37	5.33	7.2	8.7	10.2	ALS-468	494.16	6.99	9.6	12.0	14.4
ALS-378	266.07	5.33	7.2	8.7	10.2	ALS-469	506.86	6.99	9.6	12.0	14.4
ALS-379	278.77	5.33	7.2	8.7	10.2	ALS-470	522.26	6.99	9.6	12.0	14.4
ALS-380	291.47	5.33	7.2	8.7	10.2	ALS-471	557.66	6.99	9.6	12.0	14.4
ALS-381	304.17	5.33	7.2	8.7	10.2	ALS-472	582.68	6.99	9.6	12.0	14.4
ALS-382	329.57	5.33	7.2	8.7	10.2	ALS-473	608.08	6.99	9.6	12.0	14.4
ALS-383	354.97	5.33	7.2	8.7	10.2	ALS-474	633.48	6.99	9.6	12.0	14.4
ALS-384	380.37	5.33	7.2	8.7	10.2	ALS-475	658.88	6.99	9.6	12.0	14.4
ALS-385	405.26	5.33	7.2	8.7	10.2						
ALS-386	430.66	5.33	7.2	8.7	10.2						
ALS-387	456.06	5.33	7.2	8.7	10.2						
ALS-388	484.41	5.33	7.2	8.7	10.2						
ALS-389	506.86	5.33	7.2	8.7	10.2						
ALS-390	532.21	5.33	7.2	8.7	10.2						
ALS-391	557.61	5.33	7.2	8.7	10.2						
ALS-392	582.68	5.33	7.2	8.7	10.2						
ALS-393	608.08	5.33	7.2	8.7	10.2						
ALS-394	633.48	5.33	7.2	8.7	10.2						
ALS-395	658.88	5.33	7.2	8.7	10.2						
ALS-425	113.67	6.99	9.6	12.0	14.4						
ALS-426	116.84	6.99	9.6	12.0	14.4						
ALS-427	120.02	6.99	9.6	12.0	14.4						
ALS-428	123.19	6.99	9.6	12.0	14.4						
ALS-429	126.37	6.99	9.6	12.0	14.4						
ALS-430	129.54	6.99	9.6	12.0	14.4						
ALS-431	132.72	6.99	9.6	12.0	14.4						
ALS-432	135.89	6.99	9.6	12.0	14.4						
ALS-433	139.07	6.99	9.6	12.0	14.4						
ALS-434	142.24	6.99	9.6	12.0	14.4						
ALS-435	145.42	6.99	9.6	12.0	14.4						
ALS-436	148.59	6.99	9.6	12.0	14.4						
ALS-437	151.77	6.99	9.6	12.0	14.4						
ALS-438	158.12	6.99	9.6	12.0	14.4						
ALS-439	164.47	6.99	9.6	12.0	14.4						
ALS-440	170.82	6.99	9.6	12.0	14.4						
ALS-441	177.17	6.99	9.6	12.0	14.4						



DONGSUH INDUSTRY

The DONGSUH is moving forward with a renewed spirit of service for customers.

It is designed to have both high tensile strength and flexibility simultaneously for braiding continuous filament carbon fiber having high thermal conductivity and low coefficient of friction in a unique method of DONGSUH.

S - E Seal

We will make it for customer impressed not customer satisfaction.

S-E Seal

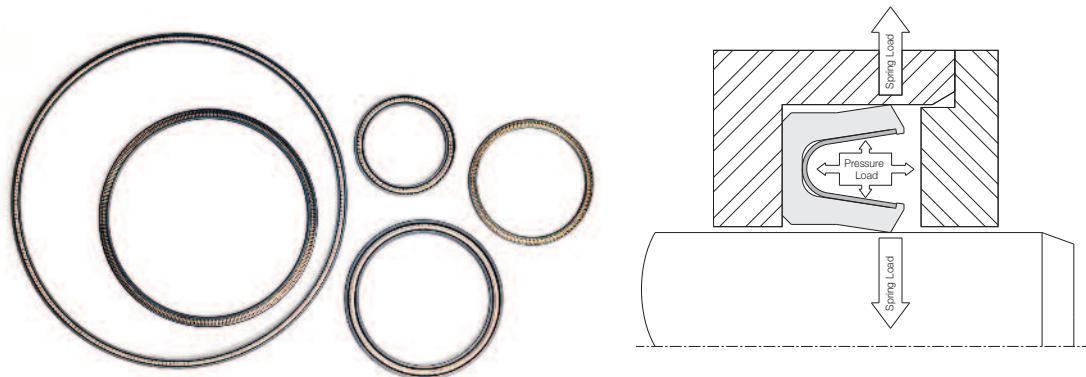
- 90 ALS 1700, 1710
S-E Seal
- 91 **TEMPERATURE, PRESSURE, EXTRUSION GAP**
- 92 **MATERIALS**
- 93 **Design Guidelines**
- 94 **ALS 1700 S-E SEAL / Cantilever Springs**
- 96 **ALS 1710 S-E SEAL / Helical Springs**
- 98 **Gland Designs and installation**

ALS 1700, 1710

Spring Energized Seal

S-E SEAL을 그랜드에 장치하면 스프링의 탄성에 의해 SEAL COVER의 LIP부위가 그랜드의 면에 눌리어 단단히 SEAL이 됩니다. 또한 유체의 압력에 의해 씰성이 높아집니다.(아래 그림 참조)

Installing S-E Seal in the gland will become solid seal as the seal cover lip part is pressed by the gland surface because of the spring elasticity. Also, the sealing performance will get better due to the fluid pressure. (See the below picture.)



특징 / Feature

- 고정용과 운동용으로 사용합니다.
- 대부분의 화학약품과 유기용제에 사용 가능합니다.
- 267°C의 극저온에서 340°C까지의 고온에 사용합니다.
- 고진공부터 고압까지 사용합니다.
- 종 유체에 대한 SEAL의 재질이 폭넓게 마련되어 있습니다.
- JIS B2406의 규격 및 AS568, DIN 규격에 의해 제작되며 특수 규격도 제작 가능합니다.
- For both static and dynamic seal
- For most chemical products and organic solvent.
- It can be used from extremely low temperature at -267°C to high temperature up to 340°C
- Wide ranges of seal materials for different fluids are available.
- It is produced according to JIS B2406 standard and AS568 and DIN spec.

유형 / Seal type

- RADIAL SEAL(왕복,회전 용도) : ALS 1700
- FACE SEAL(고정용 및 면(面)의 회전용) : ALS 1710
- RADIAL SEAL(Reciprocating,Rotary) : ALS 1700
- FACE SEAL(Static& Face Rotary) : ALS 1710

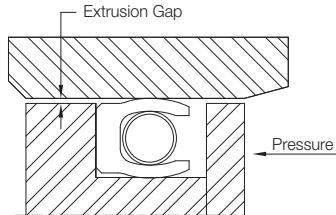
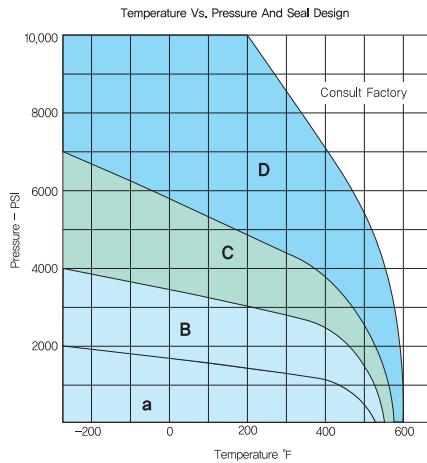
주요 사용처 / Main use

- | | | | |
|-------------------|------------------------|------------------------|--|
| • Gass turbine 엔진 | • VALVES PUMPS | • 우주선 | • PRESSURE SWITCH |
| • 적외선 시스템 | • 의료실험용 기기 | • HPLC | • ACTUATORS |
| • ICE MAKERS | • 프라스틱 사출 성형기 | • 공작기계 | • 로타리 조인트, SWEVEL JOINT |
| • 석유 화학 공장 | • 항공기 유공압 시스템 | • 진공장치 | • FILLING MACHINE |
| • 식품제조기기 | • 항공기 연료제어 라인 | • METERING | • 극저온 기기 및 GASKET |
| • ACTUATORS | • Gas turbine engine | • ICE MAKERS | • Plastic injection moulding machine |
| • Spaceship | • Infrared rays system | • VALVES PUMPS | • Medical, experimental equipments |
| • HPLC | • Petro-chemical plant | • FILLING MACHINE | • Hydraulic and pneumatic system for air plane |
| • METERING | • Food processing line | • Tooling machine | • Fuel control line for air plane |
| • Vacuum units | • PRESSURE SWITCH | • Infrared rays system | • Extremely low temperature units and gasket |

1. Temperature, Pressure, Extrusion Gap

(S-E SEAL shown for illustration only)

	Maximum Recommended Extrusion Gap				
	A	B	C	D	
 G ₁ Width	Unfilled	.004	.003	.002	 G ₂ Width
	Filled	.006	.004	.003	
 G ₁ Width	Unfilled	.006	.004	.003	 G ₂ Width
	Filled	.008	.006	.004	
 Filled Back-up	Filled Back-up	.008	.006	.004	.003
	Unfilled Back-up	.001	.008	.006	.004
	Filled Back-up	.010	.008	.006	.004
 Unfilled Back-up	Unfilled Back-up	.014	.010	.008	.006



특히 고온의 조건하에서 SEAL을 사용할 경우 EXTRUSION GAP이 아주 중요한 요소가 됩니다. EXTRUSION GAP이란 아래에 표시한 것 같이 HARDWARE 사이의 값입니다. 베어링이나 센터링을 위한 하드웨어를 사용하지 않는 경우엔 하드웨어 사이의 직경의 차가 최대한의 EXTRUSION GAP의 값이 됩니다. 이 값은 될 수 있는 한 작게 또 좌표의 값에서 커지지 않도록 설계해 주십시오. 만일 EXTRUSION GAP이 커지면 SEAL의 COVER가 그 틈새에 끼어 들어가 실패의 원인이 되기도 합니다. 더욱이 좌표와 같이 HEEL의 두께를 크게 해서 EXTRUSION GAP값을 개선하든지 BACK UP RING을 병용하든지 생각해야 합니다. BACK UP RING은 SEAL의 재질보다 땀뜻해야 합니다.

Especially, extrusion gap is most important factor in case of using seal under high-temp condition. Extrusion gap is the value of gap which is indicated at picture as below. If you do not using the bearing or centering hardware, The value of extrusion gap is the difference of diameter between the hardwares. In that case, please set it as lower as possible, and avoid increasing coordinate numbers. If you set the extrusion gap is bigger then porper size, it may cause of intrusive failure with trusting seal cover into the gap. In addition, you should deliberate whether getting improved extrusion gap value with increasing coordination value and thickness of heel or using jointly adjusting back up ring. We recommend that the material of back up ring is harder then seal's.

2. Friction Resistance & Rotary

마찰저항은 마찰계수(μ)와 SEAL에 걸리는 하중(압력과 스프링 하중)에 의해 정해집니다. 마찰에 영향을 주는 다른 요소로는 윤활, 온도, 하드웨어의 표면처리입니다. 무윤활상태에 대한 대략의 마찰계수는 본 장의 도표와 공식을 이용하여 계산할 수 있습니다.

Friction resistance is defined by coefficient of friction(μ) and load for seal (pressure and spring load). Other elements affecting the friction are lubrication, temperature and hardware surface treatment.

Approximate coefficient of friction on non-lubrication can be calculated using the table and formula provided in this page.

HOW TO CALCULATE

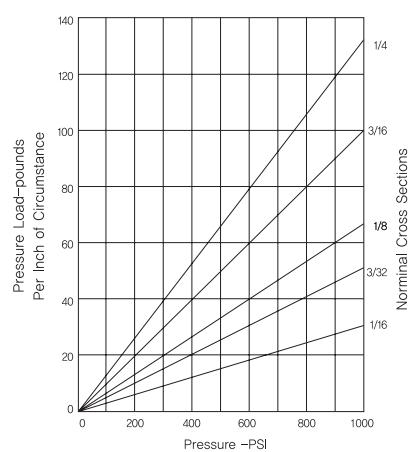
F = total load-pounds per inch of circumference (pressure load + spring load)

D = diameter of dynamic surface

$R = \frac{D}{2}$ (radius)

μ = material coefficient of friction (See Page 6)

Linear Friction (pounds) = $F \times D \times \mu \times \omega$ Frictional Torque (inch-pounds) = $F \times D \times \mu \times \omega \times R$



3. Materials

1. Seal Materials – Typical Physical Properties

Material	Color	Typical Applications & Description	Service Temperature Range °F (°C)	Tensile Strength in bar (psi) at Break	Elongation In %	Hardness Shore D
Virgin PTFE	White	Excellent for cryogenic applications. Good for gases.	-425 to +450 (-254 to 232)	315 (4575)	400	60
Modified PTFE	Turquoise	Lower creep, reduced permeability and good wear resistance.	-320 to +450 (-195 to 232)	320 (4641)	390	60
Fiberglass Filled PTFE	Gold	Excellent compressive strength and good wear resistance.	-200 to +575 (-130 to 300)	240 (3480)	190	67
Fiberglass & Moly Filled PTFE	Gray	Excellent for extreme conditions such as high pressure & temperature and for longer wear life on hardened dynamic surface.	-200 to +575 (-130 to 300)	210 (3045)	245	62
Carbon-Graphite Filled PTFE	Black	Excellent wear resistance and reduced creep.	-250 to +550 (-155 to 288)	160 (2320)	100	64
Graphite Filled PTFE	Black	Excellent for corrosive service. Low abrasion to soft shafts. Good in unlubricated service.	-250 to +550 (-155 to 288)	220 (3190)	260	60
Carbon Fiber Filled PTFE	Brown	Good for strong alkali and hydrofluoric acid. Good in water service.	-250 to +550 (-155 to 288)	220 (3190)	150	60

Material	Coefficient of Friction	Thermal Conductivity in W/mk	Coefficient of Thermal Expansion in/in/°F × 10 ⁻⁵ at 203°F	Permanent Deformation Under Load 70°F 2000psi in %	Chemical Compatibility Rating	Chemical Compatibility Rating	Chemical Compatibility Rating	FDA/NSF Compliment
					5 = Excellent	1 = fair	1 = fair	
Virgin PTFE	0.05-0.10	0.30	6.1	7.0	5	1	1	Yes
Modified PTFE	0.05-0.10	0.29	6.1	6.9	5	2	2	Yes
Fiberglass Filled PTFE	0.08-0.12	0.27	5.6	6.0	5	5	5	No
Fiberglass & Moly Filled PTFE	0.08-0.12	0.28	6.1	6.0	5	4	4	No
Carbon-Graphite Filled PTFE	0.08-0.11	0.35	4.4	2.5	5	4	4	No
Graphite Filled PTFE	0.07-0.09	0.39	6.1	3.5	5	4	3	No
Carbon Fiber Filled PTFE	0.09-0.12	0.31	7.2	1.8	4	5	5	No

2. Spring Materials

Materials

Spring Material	Application
300 Series Stainless Steel	General purpose spring material for most fluids up to 600°F (315°C). It is recommended to 400°F in corrosive media.
Inconel X750 (Cantilever and Helical)	Recommended for applications above 500°F (260°C) and is corrosion resistant in salt water or severe media.

Spring Loads Available by Cross-Section

M = Medium H = Heavy

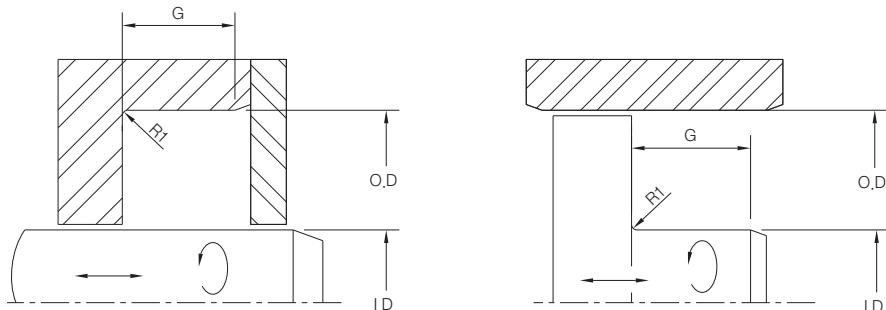
Spring Material	Spring Material	Spring Load	Spring Material Available	Cross-Section Available				
				062	093	125	187	250
S-E Seal ALS1700		M	301 Stainless Inconel X750	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
S-E Seal ALS1710		H	301 Stainless Inconel X750	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓

M = Medium

H = Heavy

4. Design Guidelines

R=0.3 max radius



METRIC SERIES

Piston & Groove Dia.		Bore & Groove Dia.		G	Cross Section	PART No.
I.D	TOL h8	O.D	TOL H8			
40	-0 -0.039	49.5	+0.039 +0	7.3	4.75	ALS1700
50	-0 -0.039	60	+0.046 +0	6.4	5	ALS1710
60	-0 -0.039	69.4	+0.046 +0	6.4	4.7	ALS1700

≈

260	-0 -0.081	275.4	+0.081 +0	10	7.7	ALS1710
270	-0 -0.081	280	+0.081 +0	6.8	5	ALS1710
450	-0 -0.097	469	+0.097 +0	12.7	9.5	ALS1710

Other dimensions and all intermediate sizes diameter including imperial (inch) sizes can be supplied.
규격외 치수의 제품도 공급 가능합니다.

5. ALS 1700 S-E Seal / Cantilever Springs

S-E 씰 캔틸레버 스프링은 평평한 금속 스트립 스톡으로 만들어집니다. 스트립 스톡은 편침되거나 화학적으로 구불 구불 한 모양으로 에칭되고 둑근 "V"모양으로 형성된다. 경량 또는 중형 스프링으로 제공됩니다. 중형 스프링은 대부분의 적용 분야에 적합하지만. 마찰력이 낮은 것이 시일능력보다 중요하면 경량 스프링을 사용할 수 있습니다.

캔틸레버 스프링은 회전 또는 왕복 운동과 관련된 동적 어플리케이션을 위해 설계되었습니다. 넓은 글랜드 허용 오차. 과도한 팽창 및 수축 또는 높은 압력으로 인한 리프트 오프로 인해 높은 편향 스프링이 필요한 정적 조건에서도 사용할 수 있습니다.

롱 빔 레그 설계는 씰의 선단 가장자리에 스프링 하중을 가하여 선택적 스크레이퍼 립을 선택했을 때 S-E 씰이 스크레이퍼 역할을 하도록 최적의 로드 위치를 만듭니다.

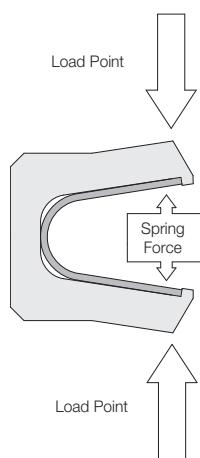
ALSI700 외팔보 스프링의 기하학적 형상은 작은 간격으로 분리 된 개별 탭을 사용하여 유연성을 제공합니다. 이 모양은 스프링이 방사상 및 축 방향 실 설계로 구부러질 수 있게 합니다.

The S-E Seal Cantilever spring is made from flat metal strip stock. The strip stock is punched or chemically etched into a serpentine pattern and formed into a rounded "V" shape. The medium spring is suitable in most applications, but the light load spring can be used if having low friction is more important than seal ability.

The cantilever spring is intended for dynamic applications involving rotary or reciprocating motion. It can also be used in static conditions when there is need for a higher deflection spring due to wide gland tolerance, excessive expansion and contraction, or lift-off due to high pressure.

The long beam leg design puts the spring load out at the leading edge of the seal, creating the best load location for the S-E Seal to act as a scraper when the optional scraper lip is selected. The geometry of the ALS1700 cantilever spring provides flexibility by utilizing individual tabs, separated by small gaps.

This shape allows the spring to flex into radial and axial seal designs



권장 응용 프로그램

- 왕복동 봉 및 피스톤
- 로타리 샤프트 < 100 sfpm
- 넓은 허용 오차 및 정렬되지 않은 땀샘 (정적)
- 연마제 (스크레이퍼 립이 지정된 경우)
- 450 °F (232.2 °C) 이상의 동적 어플리케이션

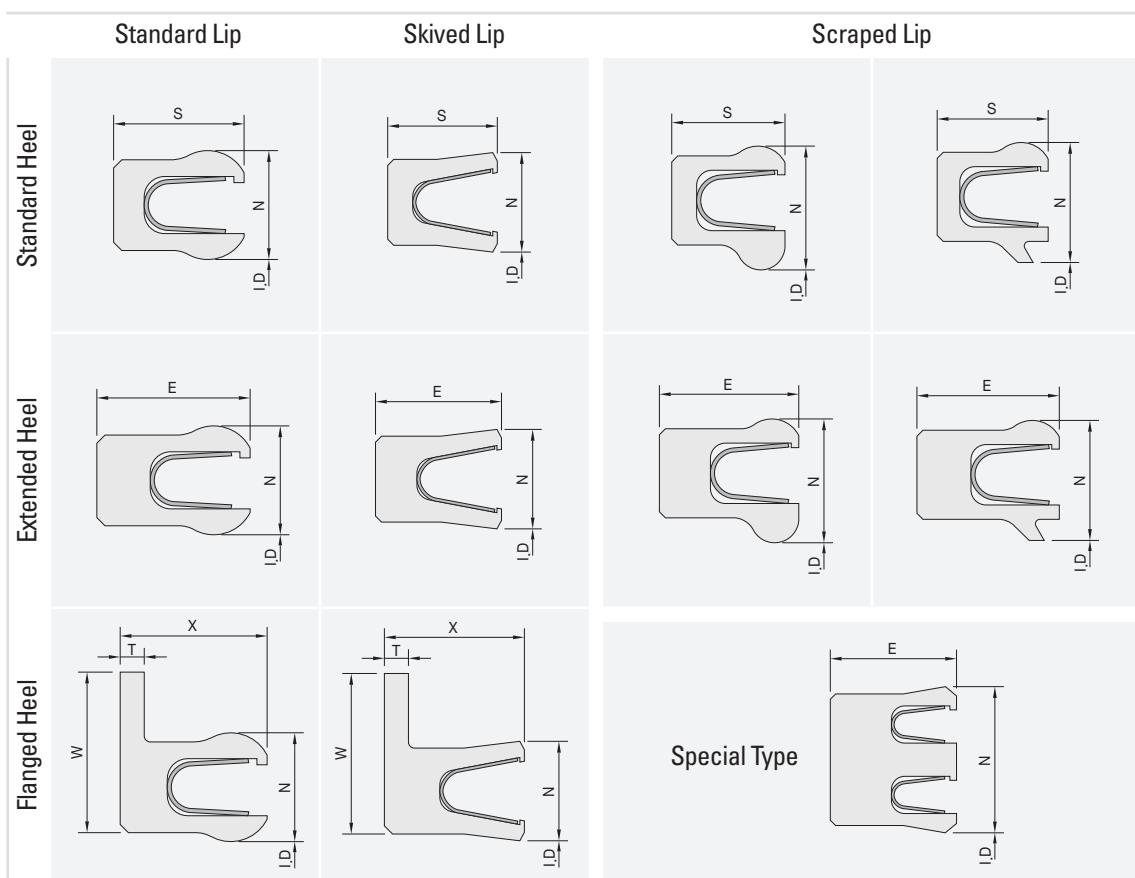
Reciprocating Applications

- Reciprocating rods & pistons
- Rotary shafts <100 sfpm
- Wide tolerance and misaligned glands (static)
- Abrasive medias (when scraper lip is designated)
- Dynamic applications above 450 °F (232.2 °C)

6. 형상 및 규격

ALS 1700은 U자형의 성형된 스프링(CANTILEVER)을 사용한 SEAL입니다. 그러므로 SEAL면에 가해지는 하중은 적고 변위량은 크게 얻을 수 있습니다. 주로 운동용 SEAL로 적당하며 JIS B2406의 전 규격(P3-P400까지)에 준합니다. 또한 CROSS SECTION(단면) 19m/m의 규격으로 SEAL 제작이 가능합니다.

ALS 1700 Seal is made of U type formed spring [CANTILEVER]. So it has less load on the seal surface while getting bigger variance. Good for dynamic seal and it meets all standards of JIS B2406 (up to B3-P400). In addition, it is possible to produce the seal in cross section 19/mm



Seal Size

JIS B2406 Nominal No.	CROSS SECTION (mm)	M	N	R	X	W	T	Inside Diameter (I.D) of Seal B diameter of Gland
P3~P10	1.5	2.1	1.8	2.8	2.8	3.0	0.5	- 0.3mm
P10A~P22	2.0	2.9	2.4	4.1	4.1	3.5	0.7	- 0.3mm
P22A~P50	3.0	3.8	3.5	5.3	5.3	4.9	0.8	- 0.3mm
P48A~P150	5.0	5.4	5.7	7.6	7.6	7.8	1.0	- 0.3mm
P150A~P400	7.5	9.0	8.6	10.5	10.2	11.2	1.3	- 0.3mm

7. ALS 1710 S-E Seal / Helical Springs

ALS1710 스프링은 나선형으로 형성된 평평한 리본 금속 스트립 스톡으로 만들어집니다. 헬리컬 스프링 설계는 높은 단위 하중으로 인해 정적 적용을 위해 설계되었습니다. 마찰과 마모가 확실한 밀봉에 대한 2 차적인 우려가 있는 경우 매우 느리거나 드문 경우의 동적 조건에서 사용할 수 있습니다.

ALS1710 스프링은 각 개별 밴드에 균등하게 분포 된 하중을 코일 사이에 매우 작은 간격으로 생성합니다. 이 단단한 간격은 거의 지속적인 부하를 제공하여 잠재적 누설 경로를 줄입니다. 이것은 높은 단위 하중과 결합하여 ALS1710을 진공 및 극저온 응용 분야에 적합하거나 압력이 너무 낮아 봉인에 에너지를 공급하지 못할 때 적합합니다.

ALS1710 스프링이 제공하는 하중은 중심선을 통해 직접 전달됩니다. FBN-H 프로파일의 립 디자인은 밀폐 계면에서 최대 반경을 가지므로 밀착력을 극대화하기 위해 접점에 최대 하중을 제공합니다. 스프링은 끝에서 용접됩니다. 씰이하드웨어에 압축 될 때 스프링 캐비티는 축 방향 스프링 성장을 허용하도록 설계됩니다.

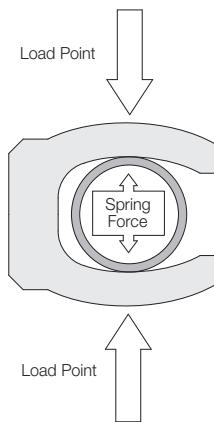
ALS1710 스프링의 상대적으로 작은 힘 범위는 넓은 글 랜드 공차, 편심 또는 오정렬이 있는 어플리케이션에 사용되지 못하도록 합니다.

The ALS1710 spring is made from flat ribbon metal strip stock that is formed into a helix shape. The helical spring design is intended for static applications due to the high unit load. It can be used in very slow or infrequent dynamic conditions when friction and wear are secondary concerns to positive sealing.

The ALS1710 spring produces evenly distributed load across each individual band, with very small gaps between the coils. This tight spacing provides near continuous load, reducing potential leak paths. This, combined with the high unit load, makes the ALS1710 well-suited for vacuum and cryogenic applications or when pressure is too low to energize the seal.

The load provided by the ALS1710 spring is directly through its center line. The lip design of the FBN-H profile is a full radius at the sealing interface, providing maximum load to the contact points to effect a tight seal. The spring is welded at the ends. When the seal is compressed into the hardware, the spring cavity is designed to allow axial spring growth.

The relatively small deflection range of the ALS1710 spring prevents it from being used in applications having wide gland tolerances, eccentricity or misalignment.



권장 응용 프로그램

- 왕복동 봉 및 피스톤
- 로타리 샤프트 < 100 sfpm
- 넓은 허용 오차 및 정렬되지 않은 땀샘 (정적)
- 연마제 (스크레이퍼 립이 지정된 경우)
- 450 °F (232.2 °C) 이상의 동적 어플리케이션

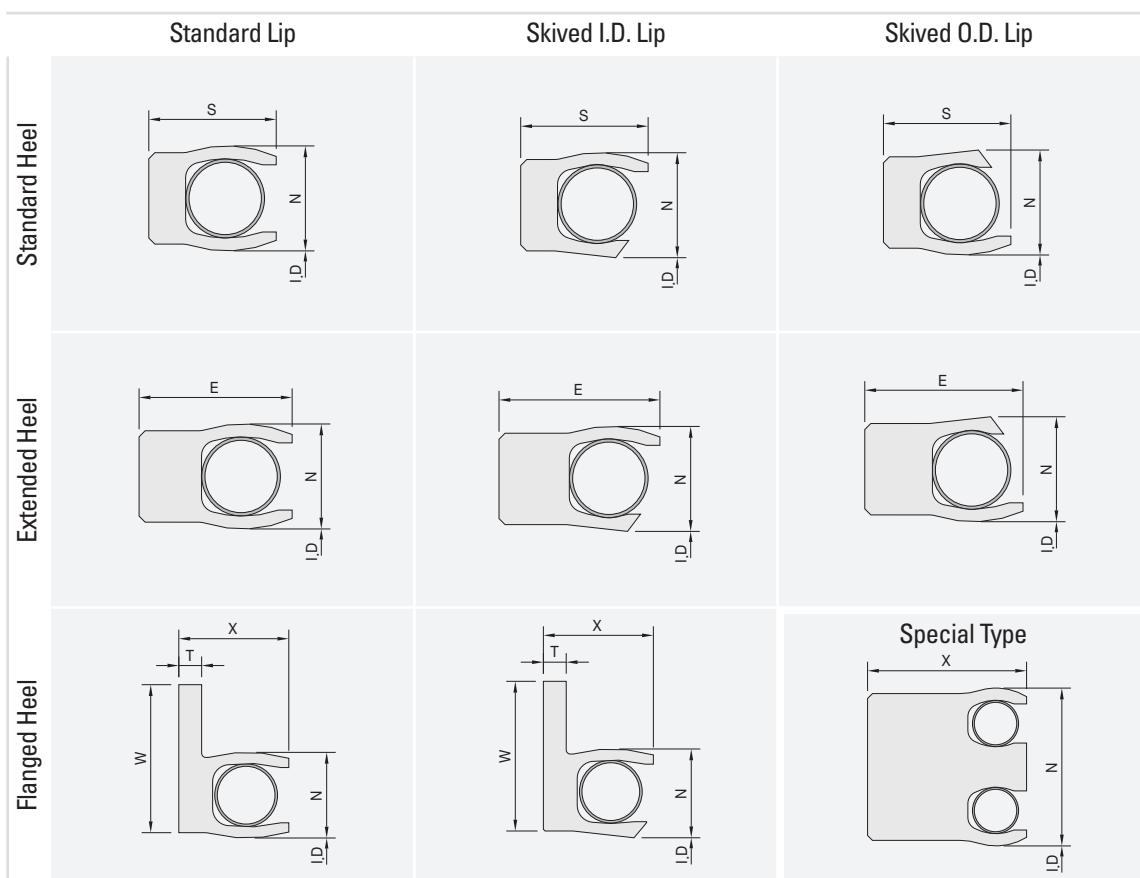
Reciprocating Applications

- Reciprocating rods & pistons
- Rotary shafts <100 sfpm
- Wide tolerance and misaligned glands (static)
- Abrasive medias (when scraper lip is designated)
- Dynamic applications above 450 °F (232.2 °C)

8. 형상 및 구조

ALS 1710은 HELICAL WOUND FLAT SPRING을 사용한 SEAL입니다. SPRING의 정적(STATIC) SEALING을 위해 높은 스프링 부하를 갖고 있으며 저속, 중속의 운동용 SEAL로 사용합니다. ALS 1700보다는 높은 부하를 갖고 있지만 THIN LIQUIDS와 GAS의 씰링에는 더 효과적입니다. ALS 1710은 스프링 대신에 O-RING을 선택적으로 사용할 수 있습니다.

ALS 1710 seal is made of helical wound flat spring. It has high spring load property for static sealing of the spring and it is used for low and high speed dynamic seal. It has higher load property than that of ALS 1700 but it is more effective in thin liquids and gas sealing. ALS 1710 can use O-Ring optionally instead of the spring.



Seal Size

JIS B2406 Nominal No.	CROSS SECTION (mm)	M	N	R	X	W	T	Inside Diameter (I.D.) of Seal B diameter of Gland
P3~P10	1.5	2.1	1.8	2.8	2.8	3.0	0.5	- 0.3mm
P10A~P22	2.0	2.9	2.4	4.1	4.1	3.5	0.7	- 0.3mm
P22A~P50	3.0	3.8	3.5	5.3	5.3	4.9	0.8	- 0.3mm
P48A~P150	5.0	5.4	5.7	7.6	7.6	7.8	1.0	- 0.3mm
P150A~P400	7.5	9.0	8.6	10.5	10.2	11.2	1.3	- 0.3mm

9. Gland Designs and Installation

1. Two-Piece Gland Installation

Heel First Seal Installation

Heel 부위로 S-E Seal을 설치하는 경우 Seal이 Lip 부위로 설치하는 경우보다 도입면 모서리가 작을 수 있습니다.

S-E Seal은 Heel 부분에 약간의 여유 공간을 두고 설계되었으며 모따기 처리됩니다.

도입부 모따기 각도를 만들 수 없는 경우 연마 된 반경을 사용할 수도 있습니다.

두 디자인 모두 매우 매끄럽고 날카로운 모서리가 없어야 인장을 손상시킬 수 있습니다.

When installing the S-E Seal with the heel, the lead-in chamfers may be smaller than when the seal must go in lips first.

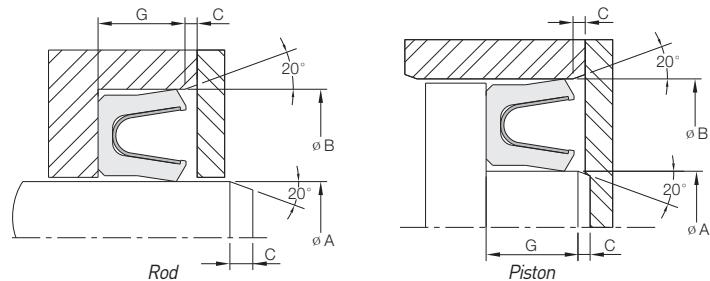
The S-E Heel is designed with a slight clearance at the heel, and is also chamfered.

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.

Heel First Recommended Lead-In Chamfer

Cross-Section Size		C Min
Nominal	Cross Section	
1/16	0.062	0.020
3/32	0.093	0.030
1/8	0.125	0.030
3/16	0.187	0.040
1/4	0.250	0.050



Lip First Seal Installation

S-E Seal을 Lip측으로 설치하는 경우. 도입면 Camfer는 Seal이 Heel에 먼저 들어가는 것보다 길어야 합니다.

S-E Seal은 설치중 손상을 방지하기 위해 추가 간격을 필요로 하는 Lip에 사전 하중 간섭을 가하도록 설계되었습니다.

계단형 고정 플레이트는 Seal을 위한 평평한 뒷받침 표면을 제공하고 Lead-In 각으로 압출되는 것을 방지해야합니다.

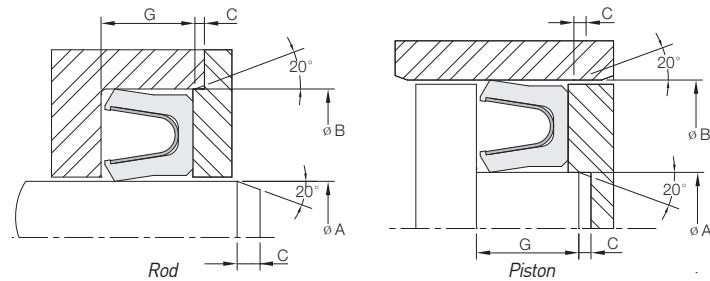
When installing the S-E Seal with the lips or pressure-side first, the lead-in chamfers need to be longer than when the seal goes in heel first.

The S-E Seal is designed with pre-load interference on the lips that require additional clearance to prevent damage during installation.

A stepped retention plate is required to provide a flat backed surface for the seal and to prevent extrusion into the lead-in angles.

Lips First Recommended Lead-In Chanfer

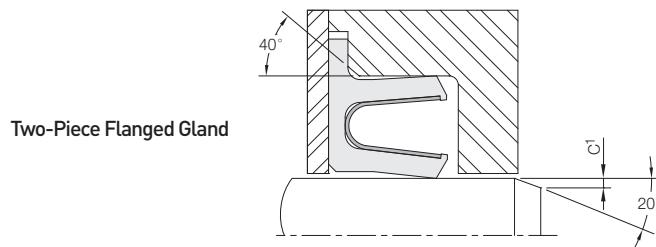
Cross-Section Size		C Min
Nominal	Cross Section	
1/16	0.062	0.020
3/32	0.093	0.030
1/8	0.125	0.030
3/16	0.187	0.040
1/4	0.250	0.050



Two-Piece Flanged Glands

플랜지 설계는 정적, 회전 또는 왕복 어플리케이션에서 사용할 수 있으며 ID에서만 동적으로 설계되었습니다. 샤프트가 Seal과 함께 회전하는 것을 방지하기 위해 플랜지를 축 방향으로 클램핑 할 수 있기 때문에 회전식 어플리케이션에서 탄월합니다. 이 여분의 안정성은 더 높은 표면 속도에서 더 많은 압력을 유지하도록 플랜지 디자인을 허용합니다.

The flanged design can be used in either static, rotary or reciprocating applications and is designed to be dynamic only on the ID. It excels in rotary applications because the flange can be clamped axially to prevent the seal from rotating with the shaft. This extra stability allows the flanged design to hold more pressure at higher surface speeds.



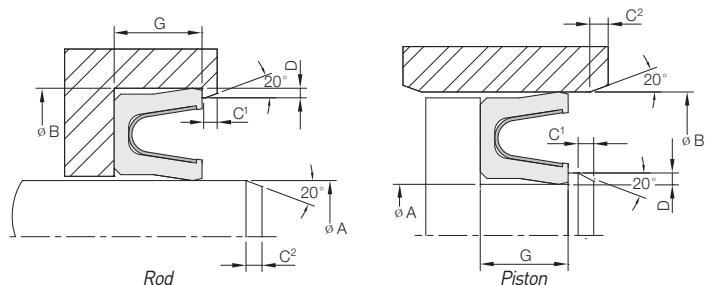
2. Step Cut Gland Installation

Step cut gland은 Seal이 개방측 또는 스프링 측에서 압력을 받을 때 사용할 수 있습니다. 이를 위해서는 Seal의 Heel 부위가 먼저가게 설치하고 Retention Step 뒤쪽에 Seal의 Lip을 끼워 넣어야합니다. Seal을 홈에 설치 한 후 조립품을 피스톤 보어 또는 로드 위에 밀어 넣을 수 있습니다.

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, 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

Nominal Cross-Section

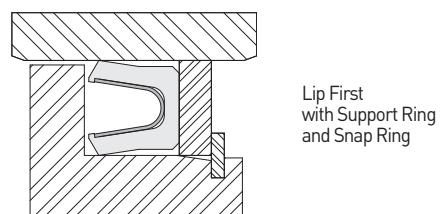
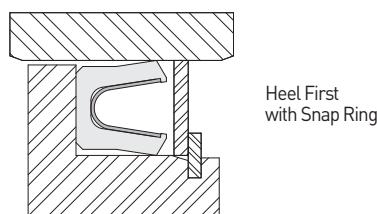
Nominal	Cross Section	C Min	C2 Min		D
			Heel First	Lips First	
1/16	0.062	0.050	0.020	0.050	0.007/0.010
3/32	0.093	0.070	0.030	0.070	0.010/0.015
1/8	0.125	0.090	0.030	0.090	0.015/0.020
3/16	0.187	0.110	0.040	0.110	0.020/0.025
1/4	0.250	0.140	0.050	0.140	0.025/0.030



3. Alternative Glands Installation

Snap Ring Retainer와 함께 Heel 부위로 설치하는 경우. Snap Ring 그루브는 Seal이 가장자리를 통과하지 않도록 감소된 직경으로 설정됩니다. 이 디자인은 로드 및 피스톤 씰 모두에 사용할 수 있습니다. Support Ring과 Snap Ring Retainer와 함께 Lip 부위로 처음 설치하는 경우. Snap Ring 그루브는 밀봉의 손상을 방지하기 위해 감소된 직경으로 설정됩니다. 피로나 파손을 방지하려면 스냅 링의 정격 하중을 고려해야합니다.

For heel installation with a snap ring retainer, the snap ring groove is set into a reduced diameter to ensure that the seal does not pass over the edges. This design can be used for both rod and piston seals. For lips first installation with a support ring and snap ring retainer, the snap-ring groove is at a reduced diameter to prevent damage to the seal. Load ratings for snap rings must be considered to prevent fatigue or failure.





DONGSUH INDUSTRY

The DONGSUH is moving forward with a renewed spirit of service for customers.

It is designed to have both high tensile strength and flexibility simultaneously for braiding continuous filament carbon fiber having high thermal conductivity and low coefficient of friction in a unique method of DONGSUH.

V - P a c k i n g

We will make it for customer impressed not customer satisfaction.

V-Packing

102 ALS 1200
V-Packing

103 TECHNICAL DATA

104 Design Guidelines

ALS 1200

V-Packing

V- 패킹 세트의 각 개별 립은 독립적으로 압력에 반응하고 자동으로 씰을 작동시킵니다.
다중 립 구성은 샤프트를 따라 압력과 효과적인 씰을 자동으로 분배합니다.

Each individual lip of a V-packing set independently reacts to pressure, and automatically effects a seal.
The multiple lip configuration automatically distributes pressure and an effective seal along the shaft.



장점 / Benefits

- 높은 가격의 Seal 실패 또는 파손 제거
- 설치비용 절감
- 정확한 Seal 사양으로 장비 가동 중단 시간 감소
- 재고비용 절감
- 낮은 마찰 / 마찰은 씰과 하드웨어 표면 사이의 미끄러짐에 대한 저항을 측정하며 마찰 재료의 마찰 계수와 전체 하중과 직접적으로 관련됩니다.
- 수명 연장 / 개별 씰링 링은 볼트 장착 시 확장되어 곤 스틀보다 최대 50% 더 긴 서비스가 제공되는 사실상 누출 방지 세트를 유지합니다.
- Elimination of costly seal failure or blowouts
- Reduced installation costs
- Reduced equipment downtime with exact seal specifications
- Reduced inventory costs
- Lower friction / Friction a measurement of the resistance to sliding between a seal and hardware surfaces, is directly related to seal material coefficient of friction and the total load.
- Longer Life / Individual sealing rings expand under bolt loading to maintain a tight, virtually leak proof set with up to 50% longer services over braided styles.

적용분야 / Application

- 컨트롤 밸브, 로드, 피스톤
- Control valves, Rod, piston

기술자료 / Technical data

- 인장 강도 : 28 ~ 35 MPa
- 연신율 : 200 ~ 400 %
- 온도 : 최대 500 °F (260 °C)
- 경도 : R25 (Rockwell)
- Tensile Strength : 28 ~ 35 MPa
- Elongation : 200 ~ 400%
- Temperature : up to 500°F (260°C)
- Hardness : R25 [Rockwell]

1. Design Parameters

Number of V-Rings by Application

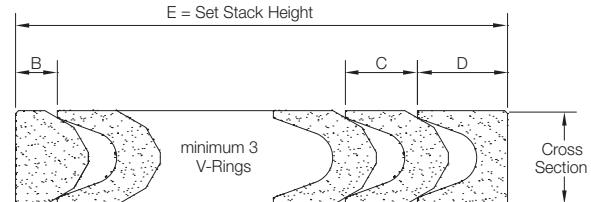
Piston Applications Diameter of Cylinder

Diameter of Cylinder	0 ~ 70 bar [0 ~ 1015 psi]		70 ~ 170 bar [1015 ~ 2465 psi]		170 ~ 280 bar [2465 ~ 4061 Psi]		280 bar and Up [4061 Psi and Up]	
	Cross Section	V-Ring Set	Cross Section	V-Ring Set	Cross Section	V-Ring Set	Cross Section	V-Ring Set
1" to 2"	1/4"	3	1/4"	4	5/16"	4	3/8"	5
2" to 3"	5/16"	3	5/16"	4	5/16"	4	3/8"	5
3" to 6"	3/8"	3	3/8"	4	3/8"	4	3/8"	5
6" to 8"	1/2"	3	1/2"	4	1/2"	4	1/2"	5
8" to 14"	5/8"	3	5/8"	4	5/8"	4	5/8"	5

Piston Applications Diameter of Cylinder

Diameter of Cylinder	0 ~ 70 bar [0 ~ 1015 psi]		70 ~ 170 bar [1015 ~ 2465 psi]		170 ~ 280 bar [2465 ~ 4061 Psi]		280 bar and Up [4061 Psi and Up]	
	Cross Section	V-Ring Set	Cross Section	V-Ring Set	Cross Section	V-Ring Set	Cross Section	V-Ring Set
1" to 2"	1/4"	4	1/4"	5	1/4"	5	5/16"	6
3" to 6"	1/4"	4	5/16"	5	3/8"	5	3/8"	6
6" to 8"	5/16"	4	3/8"	5	1/2"	5	1/2"	6
8" to 14"	3/8"	4	1/2"	5	1/2"	5	5/8"	6
14" to 24"	1/2"	4	5/8"	5	5/8"	5	3/4"	6
24" to 36"	5/8"	4	3/4"	5	3/4"	5	1"	6
36" and Up	3/4"	4	1"	5	1"	5	1"	6

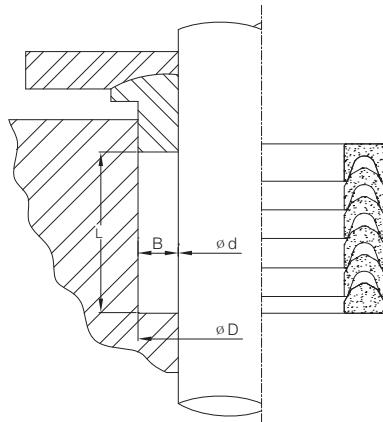
2. Stack Height Table



Piston Applications Diameter of Cylinder

Diameter of Cylinder	STACK HEIGHT		TOTAL DEPTH "E"(includes the adapter set + number of V-Ring x "C")								
	V-Ring "C"	Adapter Set ("B"+"D")	1	2	3	4	5	6	7	8	9
3/16" [0.188"]	7/64" [0.109"]	7/64" [0.109"]	7/64" [0.109"]	7/64" [0.109"]	7/64" [0.109"]	7/64" [0.109"]	7/64" [0.109"]	7/64" [0.109"]	7/64" [0.109"]	7/64" [0.109"]	7/64" [0.109"]
7/32" [0.219"]	7/64" [0.109"]	7/64" [0.109"]	7/64" [0.109"]	7/64" [0.109"]	7/64" [0.109"]	7/64" [0.109"]	7/64" [0.109"]	7/64" [0.109"]	7/64" [0.109"]	7/64" [0.109"]	7/64" [0.109"]
1/4" [0.250"]	1/4" [0.250"]	1/4" [0.250"]	1/4" [0.250"]	1/4" [0.250"]	1/4" [0.250"]	1/4" [0.250"]	1/4" [0.250"]	1/4" [0.250"]	1/4" [0.250"]	1/4" [0.250"]	1/4" [0.250"]
9/32" [0.281"]	9/32" [0.281"]	9/32" [0.281"]	9/32" [0.281"]	9/32" [0.281"]	9/32" [0.281"]	9/32" [0.281"]	9/32" [0.281"]	9/32" [0.281"]	9/32" [0.281"]	9/32" [0.281"]	9/32" [0.281"]
5/16" [0.313"]	5/16" [0.313"]	5/16" [0.313"]	5/16" [0.313"]	5/16" [0.313"]	5/16" [0.313"]	5/16" [0.313"]	5/16" [0.313"]	5/16" [0.313"]	5/16" [0.313"]	5/16" [0.313"]	5/16" [0.313"]
11/32" [0.344"]	11/32" [0.344"]	11/32" [0.344"]	11/32" [0.344"]	11/32" [0.344"]	11/32" [0.344"]	11/32" [0.344"]	11/32" [0.344"]	11/32" [0.344"]	11/32" [0.344"]	11/32" [0.344"]	11/32" [0.344"]
3/8" [0.375"]	3/8" [0.375"]	3/8" [0.375"]	3/8" [0.375"]	3/8" [0.375"]	3/8" [0.375"]	3/8" [0.375"]	3/8" [0.375"]	3/8" [0.375"]	3/8" [0.375"]	3/8" [0.375"]	3/8" [0.375"]
13/32" [0.406"]	13/32" [0.406"]	13/32" [0.406"]	13/32" [0.406"]	13/32" [0.406"]	13/32" [0.406"]	13/32" [0.406"]	13/32" [0.406"]	13/32" [0.406"]	13/32" [0.406"]	13/32" [0.406"]	13/32" [0.406"]
7/16" [0.438"]	7/16" [0.438"]	7/16" [0.438"]	7/16" [0.438"]	7/16" [0.438"]	7/16" [0.438"]	7/16" [0.438"]	7/16" [0.438"]	7/16" [0.438"]	7/16" [0.438"]	7/16" [0.438"]	7/16" [0.438"]
15/32" [0.469"]	15/32" [0.469"]	15/32" [0.469"]	15/32" [0.469"]	15/32" [0.469"]	15/32" [0.469"]	15/32" [0.469"]	15/32" [0.469"]	15/32" [0.469"]	15/32" [0.469"]	15/32" [0.469"]	15/32" [0.469"]
1/2" [0.500"]	1/2" [0.500"]	1/2" [0.500"]	1/2" [0.500"]	1/2" [0.500"]	1/2" [0.500"]	1/2" [0.500"]	1/2" [0.500"]	1/2" [0.500"]	1/2" [0.500"]	1/2" [0.500"]	1/2" [0.500"]

3. Design Guidelines



METRIC SERIES

Piston Dia.		Groove Dimensions			"B" Cross Section	PART No.
Ø d	TOL f8	Ø D	TOL H8	L		
10	-0.016 -0.043	20	-0.016 -0.043	20	20	ALS1200
12	-0.016 -0.043	12	-0.016 -0.043	12	12	ALS1200
14	-0.016 -0.043	14	-0.016 -0.043	14	14	ALS1200
16	-0.016 -0.043	16	-0.016 -0.043	16	16	ALS1200
18	-0.016 -0.043	18	-0.016 -0.043	18	18	ALS1200
20	-0.016 -0.043	20	-0.016 -0.043	20	20	ALS1200
22	-0.016 -0.043	22	-0.016 -0.043	22	22	ALS1200
24	-0.016 -0.043	24	-0.016 -0.043	24	24	ALS1200
25	-0.016 -0.043	25	-0.016 -0.043	25	25	ALS1200
26	-0.016 -0.043	26	-0.016 -0.043	26	26	ALS1200
28	-0.016 -0.043	28	-0.016 -0.043	28	28	ALS1200
30	-0.016 -0.043	30	-0.016 -0.043	30	30	ALS1200
32	-0.016 -0.043	32	-0.016 -0.043	32	32	ALS1200
36	-0.016 -0.043	36	-0.016 -0.043	36	36	ALS1200
38	-0.016 -0.043	38	-0.016 -0.043	38	38	ALS1200
40	-0.016 -0.043	40	-0.016 -0.043	40	40	ALS1200
57	-0.016 -0.043	57	-0.016 -0.043	57	57	ALS1200
58	-0.016 -0.043	58	-0.016 -0.043	58	58	ALS1200
64	-0.016 -0.043	64	-0.016 -0.043	64	64	ALS1200
158	-0.016 -0.043	158	-0.016 -0.043	158	158	ALS1200
198	-0.016 -0.043	198	-0.016 -0.043	198	198	ALS1200

Other dimensions and all intermediate sizes diameter including imperial (inch) sizes can be supplied.
규격외 치수의 제품도 공급 가능합니다.

Surface Finish

Surface roughness	Ra	Rt	RMS
Sliding Surface	$\leq 0.3\mu m$	$\leq 3\mu m$	8 RMS
Surface of Groove	$\leq 1.8\mu m$	$\leq 10\mu m$	64 RMS
Sliding Groove	$\leq 3\mu m$	$\leq 16\mu m$	125 RMS

INCH SERIES

Piston Dia.		Groove Dimensions			"B" Cross Section	PART No.
ϕd	TOL[0.001in] f8	ϕD	TOL[0.001in] H8	L		
5/16" [0.313"]	-0.5 -1.4	13/16" [0.813"]	+1.2 +0	0.785"-4.000"	1/4" [0.250"]	ALS1200
3/8" [0.375"]	-0.5 -1.4	3/4" [0.750"]	+1.2 +0	0.785"-4.000"	3/16" [0.188"]	ALS1200
3/8" [0.375"]	-0.5 -1.4	7/8" [0.875"]	+1.2 +0	0.785"-4.000"	1/4" [0.250"]	ALS1200
3/8" [0.375"]	-0.5 -1.4	1" [1.000"]	+1.2 +0	0.785"-4.000"	5/16" [0.313"]	ALS1200
1/2" [0.500"]	-0.6 -1.6	1" [1.000"]	+1.2 +0	0.785"-4.000"	3/16" [0.188"]	ALS1200
1/2" [0.500"]	-0.6 -1.6	1-1/8" [1.125"]	+1.2 +0	0.785"-4.000"	1/4" [0.250"]	ALS1200
5/8" [0.625"]	-0.6 -1.6	1-1/4" [1.250"]	+1.2 +0	0.785"-4.000"	3/16" [0.188"]	ALS1200
5/8" [0.625"]	-0.6 -1.6	1-1/2" [1.500"]	+1.2 +0	0.785"-4.000"	1/4" [0.250"]	ALS1200
3/4" [0.750"]	-0.8 -2.0	1-1/8" [1.125"]	+1.6 +0	0.785"-4.000"	1/4" [0.250"]	ALS1200
3/4" [0.750"]	-0.8 -2.0	1-3/8" [1.375"]	+1.6 +0	0.785"-4.000"	3/8" [0.375"]	ALS1200
3/4" [0.750"]	-0.8 -2.0	1-1/4" [1.250"]	+1.2 +0	0.785"-4.000"	3/16" [0.188"]	ALS1200
3/4" [0.750"]	-0.8 -2.0	1-3/8" [1.375"]	+1.6 +0	0.785"-4.000"	5/16" [0.313"]	ALS1200
7/8" [0.875"]	-0.8 -2.0	1-1/4" [1.250"]	+1.6 +0	0.785"-4.000"	3/16" [0.188"]	ALS1200
1" [1.000"]	-0.8 -2.0	1-3/8" [1.375"]	+1.6 +0	0.785"-4.000"	3/16" [0.188"]	ALS1200
1" [1.000"]	-0.8 -2.0	1-1/2" [1.500"]	+1.6 +0	0.785"-4.000"	1/4" [0.250"]	ALS1200
1" [1.000"]	-0.8 -2.0	1-5/8" [1.625"]	+1.6 +0	0.785"-4.000"	5/16" [0.313"]	ALS1200
1" [1.000"]	-0.8 -2.0	1-3/4" [1.750"]	+1.6 +0	0.785"-4.000"	3/8" [0.375"]	ALS1200
1-1/4" [1.250"]	-1.0 -2.6	1-3/4" [1.750"]	+1.6 +0	0.785"-4.000"	1/4" [0.250"]	ALS1200
1-1/4" [1.250"]	-1.0 -2.6	2" [2.000"]	+1.8 +0	0.785"-4.000"	3/8" [0.375"]	ALS1200
1-1/2" [1.500"]	-1.0 -2.6	2-1/8" [2.125"]	+1.8 +0	0.785"-4.000"	5/16" [0.313"]	ALS1200

Other dimensions and all intermediate sizes diameter including imperial (inch) sizes can be supplied.
규격외 치수의 제품도 공급 가능합니다.



DONGSUH INDUSTRY

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Metal O-Ring

We will make it for customer impressed not customer satisfaction.

Metal O-Ring

108 ALS 1545
Metal O-Ring

109 **TECHNICAL DATA**

ALS 1545

Metal O-Ring

Metal O-Ring은 내열, 내식성이 우수한 Stainless pipe를 소정의 형태로 성형하여, 양면을 맞추어 용접한 후 표면을 연마하고, 필요에 따라 표면을 각종 재료로 처리한 O-Ring입니다.

저체부하중으로 복잡한 표면상태에도 사용할 수 있어, 고온, 고압, 고진공으로 우수한 성능을 발휘하는 O-Ring입니다.

Metal O-Ring is processed in such a way forming the stainless pipe with good heat-resistance and anti-corrosion in a certain type, grinding the surface after welding according to both surface and then processing the surface with different materials depending on requirements. Due to low tightening torque, this O-Ring has the excellent capability with high temperature, high pressure and highvacuum as it can be used for complex surface condition as well.



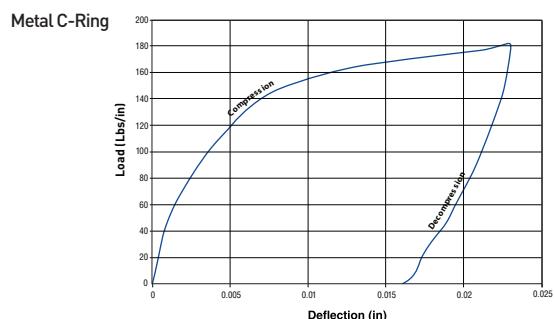
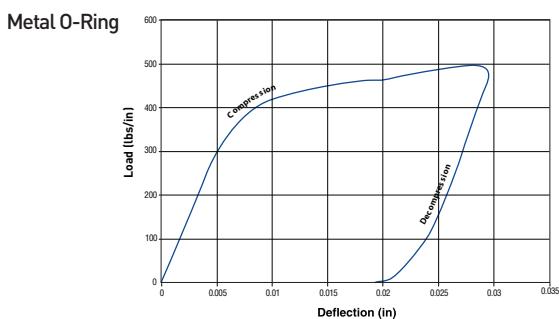
특징 / Features

- 사용온도의 범위가 넓습니다. 주재료가 Stainless Steel이므로 극저온에서 700°C의 고온까지 사용가능합니다.
- 사용압력의 범위가 넓습니다. 2,000kgf/cm²를 초과하는 초고압과 초진공에서도 사용가능합니다.
- 채부력이 매우적고 또 스페이스가 적어도 가능함으로 콤팩트한 설계를 할 수 있습니다.
- 내약품성이 좋습니다.
- 파형 이외의 특수형상도 제작이 가능합니다.
- Wide range of working temperature. Because it is made of stainless steel it can be used from extremely low temp to high temp up to 700.
- Wide range of working pressure. It can be used even at ultra high pressure and ultra vacuum condition exceeding 2,000kgf/cm².
- Extremely low and available with low space, so compact design is possible.
- Good chemical-resistance.
- Production of corrugated type and other special types is available.

소재 및 제공온도 / Materials and Service Temperature

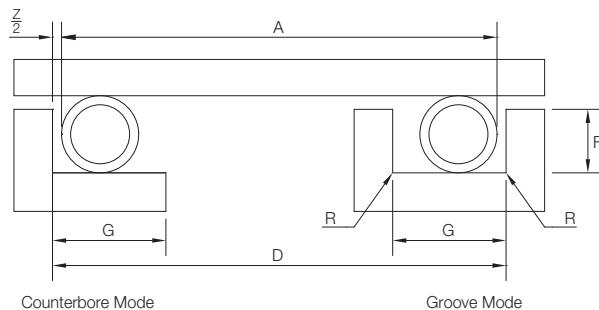
Material	Code	Plating / Coating	Temperature(°C)	Plating/Coating Thickness[mm]
STS 321	ALS1545N	None	-250-300	-
	ALS1545P	PTFE	-250-250	0.03-0.05
	ALS1545S	Silver	-300	0.03-0.05
INCONEL 600	ALS1545N	None	-500	-
	ALS1545P	PTFE	-250	0.03-0.05
	ALS1545S	Silver	-500	0.03-0.05

특성곡선 / Characteristic Curve



Metal Ring 치수 / Metal Ring Dimensions

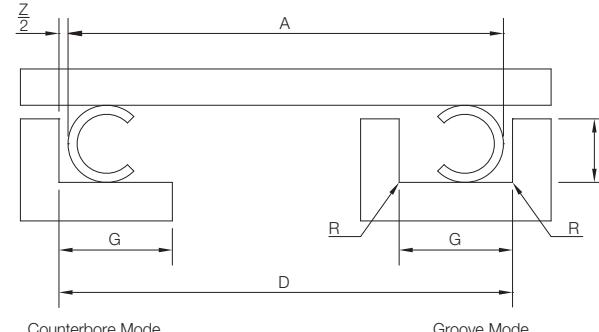
1. Metal O-Ring Dimensions



Cavity Dimensions

Nominal Cross Section	D	F	G	R
	O.D. Range Tolerance H10	Depth Range	Minimum Width	Maximum Radius
1/32	0.025 – 1.000	0.025 – 0.027	0.055	0.010
3/64	0.037 – 2.000	0.037 – 0.040	0.070	0.012
1/16	0.045 – 8.000	0.045 – 0.050	0.090	0.015
3/32	0.074 – 16.000	0.074 – 0.079	0.125	0.020
1/8	0.100 – 24.000	0.100 – 0.105	0.160	0.030
5/32	0.125 – 30.000	0.125 – 0.130	0.200	0.050
3/16	0.151 – 36.000	0.151 – 0.157	0.250	0.050
1/4	0.200 – 48.000	0.200 – 0.208	0.50	0.060

2. Metal C-Ring Dimensions



Cavity Dimensions

Nominal Cross Section	D	F	G	R
	O.D. Range Tolerance H10	Depth Range	Minimum Width	Maximum Radius
1/32	0.025 – 1.000	0.025 – 0.027	0.055	0.010
3/64	0.037 – 2.000	0.037 – 0.040	0.070	0.012
1/16	0.045 – 8.000	0.045 – 0.050	0.090	0.015
3/32	0.074 – 16.000	0.074 – 0.079	0.125	0.020
1/8	0.100 – 24.000	0.100 – 0.105	0.160	0.030
5/32	0.125 – 30.000	0.125 – 0.130	0.200	0.050
3/16	0.151 – 36.000	0.151 – 0.157	0.250	0.050
1/4	0.200 – 48.000	0.200 – 0.208	0.50	0.060
3/8	12.000 – 80.000	0.300 – 0.316	0.380	0.060
1/2	24.000 – 120.000	0.400 – 0.420	0.500	0.060



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Metal Gaskets

We will make it for customer impressed not customer satisfaction.

Metal Gaskets

112 ALS 2000Series
Metal Double Jacketed Gasket

114 ALS 2000Series
Serrated Metal Gasket

116 ALS 2000Series
Pressure Seal Ring Gasket

117 ALS 2000Series
Metal Ring Joint

118 **DIMENSION FOR TYPE "R" RING JOINT**

ALS 2000Series

Metal Double Jacketed Gasket

동서 메탈 자켓 가스켓은 금속 외동으로 내부 총전재의 비금속체로 조립됩니다. 특히 다양한 공장 (발전소, 화학, 정유소, 제철공장)에서의 열교환기, 보일러, 펌프, 고압밸브, 고온 및 심한 부식상태에 널리 사용되고 있습니다.
메탈 자켓 가스켓은 원형, 타원형, 직사각형 등의 다양한 형태 및 크기로 공급되며 수작업으로 조립합니다.
또한 여러가지 금속들을 온도, 압력, 부식상태에 따라서 사용할 수 있습니다.
최근 들어 씰링 개선을 위해 수요 증가와 함께 양면 가스켓에 흑연 및 PTFE 테이프로 접착하였습니다.
플랜지 표면의 부식으로 인하여 손상이 있는 경우 효과가 매우 좋습니다.

DONGSUH metal jacketed gaskets are fabricated with Non-Metallic for inner filler as metallic of outer shell.
They are widely used in heat exchangers, Boilers, pumps, valves with high pressure, high temperature and severe corrosion conditions for various plants. (Powers, Chemicals, Oil Refineries, Iron Plants) Metal jacketed gaskets fabricate by hand-made to various shapes and sizes as Round, Oval, oblong in order to supplying. Besides, many meterials are able to use according to temperature, pressure and corrosive conditions.
Recently for sealing improvement Graphite and PTFE tape glued together on both sides of gasket in view of increasing consumption. Effective is especially high in case of demage caused by corrosion on flange surface



STANDARD TYPE

TYPE (형태)	CROSSSECTION (단면)
Double Jacketed Gasket (DJ)	
Double Jacketed Gasket & Double Shell Gasket (이중벽 DJ)	
Double Jacketed Corrugated Gasket (파형 DJ)	
French Type Gasket (프렌치 타입)	
Round Jacketed Gasket (원형피복)	
Double Jacketed Gasket With Graphite Tape (원형피복)	

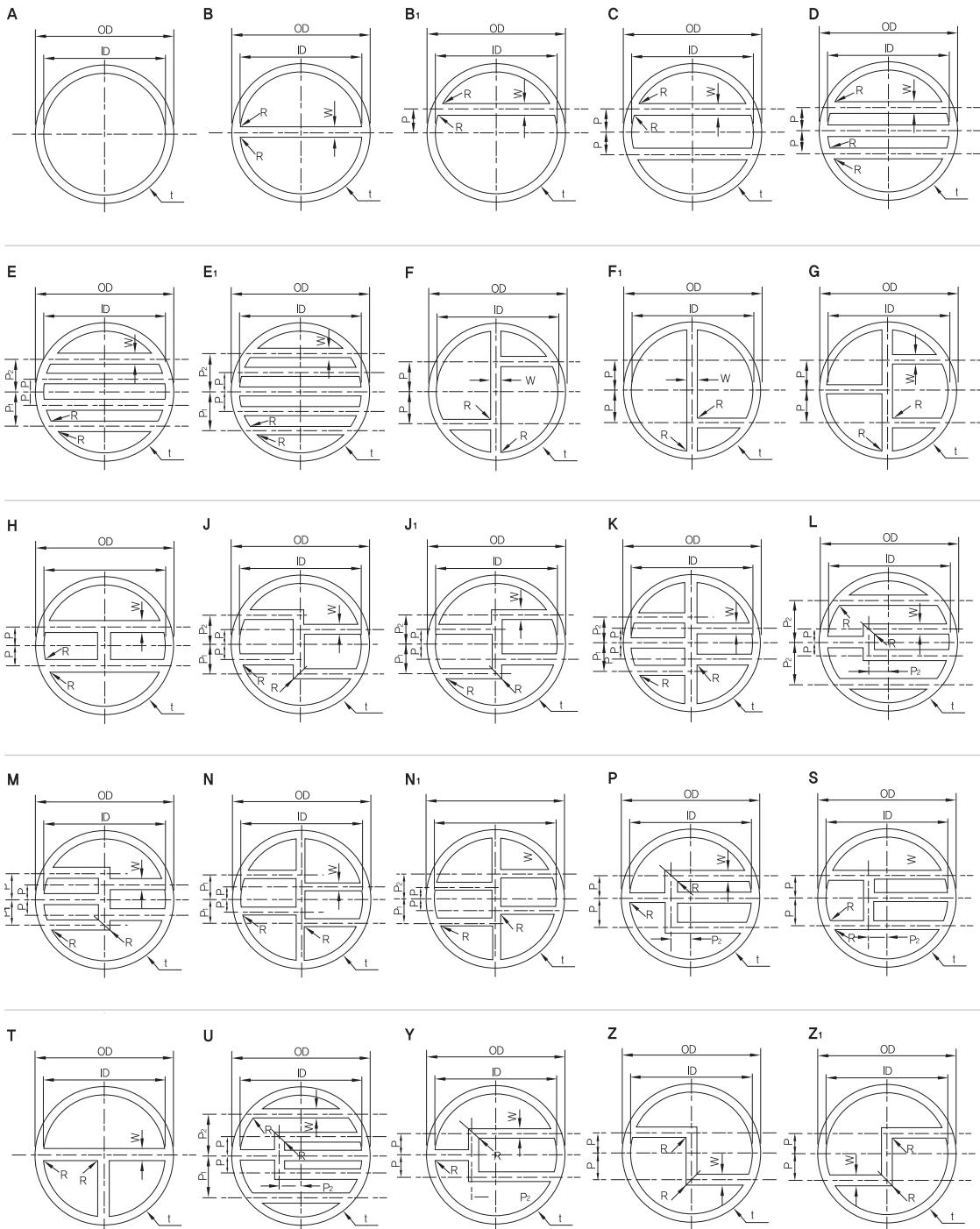
DIMENSIONAL DATA

DOUBLE JACKETED GASKET		unit : mm
Standard Thickness		3.0 or 1/8"
R		8 min
W		7 min
ℓ		2.0~3.0
L		2.5 min
a		2.0 min
Metal Thickness (금속재 두께)		0.3~0.5

DOUBLE JACKETED CORRUGATED GASKET		unit : mm
T (Gasket thickness)		3.0 min
W(Gasket width)		15.0 min
t (Corrugation height)		1.0±0.3
P (Corrugation Pitch)		6.4
Metal thickness		0.3~0.5

TOLERANCE (치수허용범위)		unit : mm
Dimensions (치수)		Tolerance (허용오차)
up to 250mm ID, OD (내외경)		±0.5
251~500mm ID, OD		±1.0
501~1000mm ID, OD		±1.5
1001mm~Id, OD		±2.0
Thickness (두께)		±0.2

열교환기 가스켓의 각종 형상 / Codes of Ribs for Metal Jacket Gasket



ALS 2000Series Serrated Metal Gasket

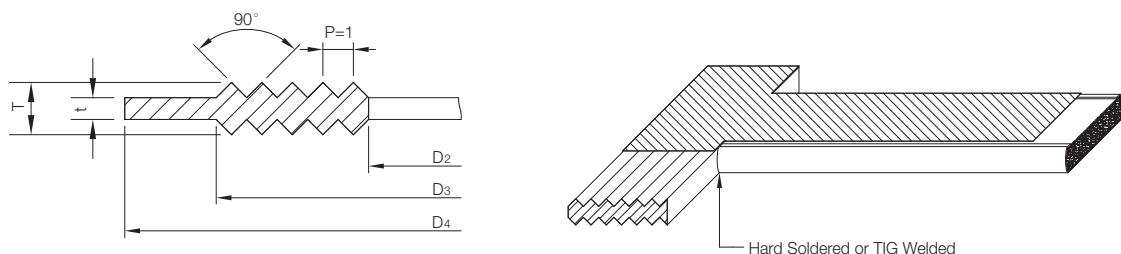
그루브(세레티드) 메탈 가스켓은 냉간 압연 금속판으로 만든 것으로 집중형 그루브가 있습니다.
단지 씰링 효과를 증대하기 위해 유효 씰링이 최소화 됩니다.
이 두가지 방식의 가스켓은 고압 및 고온의 배관 플랜지, 밸브 보닛, 압력용기, 열 교환기에 꼭넓게 사용됩니다.

Grooved(serrated) metal gasket is also made of cold rolled metal plate, but it has concentric grooves and effective sealing is minimized so as to increase sealing effect.
both of these gaskets are extensively used on pipe flanges, valve bonnets, pressure vessel, Heat exchanger at high pressure and temperature



GASKET FACTOR(M) & SEATING STRESS(Y) OF COVERING LAYER GASKET

STYLE No.	SKETCH	GASKET FACTOR(M)	SEATING STRESS(Y)
ALS 2000G-7130		2.5	2500 Psi
ALS 2000G-7230		2.5	2500 Psi
ALS 2000G-7330		4.0	9000 Psi
ALS 2000G-7430		4.0	9000 Psi
		4.5	10,000 Psi



FOR JPI, ANSI PIPE FLANGES

Flange Size (NPS)	D ₂	D ₃	Class 150			Class 300			Class 600			Class 900		
			D ₃	T	t									
1/2	25	35	47	3	2	54	3	2	54	3	2	63	3	2
3/4	33	43	57	3	2	66	3	2	66	3	2	70	3	2
1	38	51	66	3	2	73	3	2	73	3	2	79	3	2
1-1/4	48	63	76	3	2	82	3	2	82	3	2	89	3	2
1-1/2	54	73	85	3	2	95	3	2	95	3	2	98	3	2
2	73	92	104	4.5	3	111	4.5	3	111	4.5	3	142	4.5	3
2-1/2	86	105	123	4.5	3	130	4.5	3	130	4.5	3	165	4.5	3
3	108	127	136	4.5	3	149	4.5	3	149	4.5	3	168	4.5	3
3-1/2	121	140	161	4.5	3	165	4.5	3	161	4.5	3	-	-	-
4	132	157	174	4.5	3	180	4.5	3	193	4.5	3	206	4.5	3
5	160	186	196	4.5	3	215	4.5	3	241	4.5	3	247	4.5	3
6	190	216	222	4.5	3	250	4.5	3	266	6	4.5	288	6	4.5
8	238	270	279	6	4.5	307	6	4.5	320	6	4.5	358	6	4.5
10	286	324	339	6	4.5	361	6	4.5	399	6	4.5	434	6	4.5
12	343	381	409	6	4.5	422	6	4.5	456	6	4.5	498	6	4.5
14	375	413	450	6	4.5	485	6	4.5	491	6	4.5	520	6	4.5
16	425	470	514	6	4.5	539	6	4.5	564	6	4.5	574	6	4.5
18	489	533	548	6	4.5	596	6	4.5	612	6	4.5	637	8	6
20	533	584	606	6	4.5	653	6	4.5	681	8	6	697	8	6
24	641	692	716	8	6	774	8	6	789	8	6	837	8	6

NOTES: These dimensions are designed to fit the flanges specified in JPI-7S-15 and ANSI B 16.5

FOR KS/JIS PIPE FLANGES

Flange Size	10kg/cm ²					16, 20kg/cm ²					40kg/cm ²					63kg/cm ²				
	Serrated Portion		Collar			Serrated Portion		Collar			Serrated Portion		Collar			Serrated Portion		Collar		
	D ₂	D ₃	T	D ₄	t	D ₂	D ₃	T	D ₄	t	D ₂	D ₃	T	D ₄	t	D ₂	D ₃	T	D ₄	t
10	38	48	3	52	2	38	48	3	52	2	25	35	3	59	2	25	35	3	64	2
15	42	52	3	57	2	42	52	3	57	2	32	42	3	64	2	32	42	3	69	2
20	48	58	3	62	2	48	58	3	62	2	40	50	3	69	2	40	50	3	76	2
25	57	70	3	74	2	57	70	3	74	2	47	60	3	79	2	47	60	3	81	2
32	64	80	3	84	2	64	80	3	84	2	52	68	3	89	2	52	68	3	90	2
40	66	85	3	89	2	66	85	3	89	2	56	75	4.5	100	3	56	75	4.5	107	3
50	81	100	4.5	104	3	81	100	4.5	104	3	71	90	4.5	114	3	71	90	4.5	125	3
65	101	120	4.5	124	3	101	120	4.5	124	3	86	105	4.5	140	3	86	105	4.5	152	3
80	111	130	4.5	134	3	116	135	4.5	140	3	101	120	4.5	150	3	101	120	4.5	162	3
90	114	140	4.5	144	3	119	145	4.5	150	3	104	130	4.5	162	3	104	130	4.5	179	3
100	129	155	4.5	159	3	134	160	4.5	165	3	119	145	4.5	182	3	119	145	4.5	194	3
125	159	185	4.5	190	3	169	195	4.5	202	3	144	170	4.5	224	3	144	170	4.5	236	3
150	189	215	4.5	220	3	204	230	4.5	237	3	179	205	6	266	3	179	205	6	276	3
175	208	240	4.5	245	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
200	233	265	6	270	4.5	243	275	6	282	4.5	228	260	6	316	4.5	228	260	6	327	4.5
225	253	285	6	290	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
250	287	325	6	332	4.5	307	345	6	354	4.5	277	315	6	377	4.5	277	315	6	394	4.5
300	332	370	6	377	4.5	357	395	6	404	4.5	337	375	6	434	4.5	337	375	6	446	4.5
350	377	415	6	422	4.5	402	440	6	451	4.5	377	415	6	479	4.5	377	415	6	488	4.5
400	431	475	6	484	4.5	451	495	6	510	4.5	421	465	6	531	4.5	421	465	6	545	4.5
450	486	530	6	539	4.5	516	560	6	573	4.5										
500	535	585	6	594	4.5	565	615	6	627	4.5										
550	590	640	8	650	6	620	670	8	684	6										
600	640	690	8	700	6	670	720	8	734	6										

ALS 2000Series

Pressure Seal Ring Gasket

고압 및 고온 밸브 커버를 위한 자체 씰링 가스켓이 있습니다. 이 가스켓은 볼트를 조여서 최초의 씰링 응력을 받으며 원하는 씰링 압력을 만들기 위해 액체 말단 힘에 의해 반지를 방향으로 확장됩니다.

There are self sealing gaskets employed in high pressure and high temperature valve covers.

The gasket receives initial sealing stress by tightening the bolt, and is then expanded radially by the end force of the fluid to produce the required sealing pressure.



GASKET FACTOR(M) & SEATING STRESS(Y) OF COVERING LAYER GASKET

Type	Shape	Type	Shape
I		IV	
II		V	
III		VI	

ALS 2000Series

Metal Ring Joint

링 조인트 가스켓은 파이프 플랜지, 압력용기, 밸브 보닛 핸들링, 고압 증기, 가스, 열 오일, 고온의 용매증기 등에 사용되는 일종의 가압 방식의 가스켓입니다. 동서의 축적된 기술과 함께 매우 다양한 제품들을 공급함으로써 고객들은 운영 상태에 따라서 가장 적합한 것을 선택할 수 있습니다.

Ring joint gasket is a type of pressure energized gasket used on pipe flanges, pressure vessels, Valve bonnets handling, high pressure steam, gas, hot oil, solvent vapor at high temperature.

DONGSUH's experienced technology offers many different types so that customers may select the most suitable one in accordance with operating conditions.



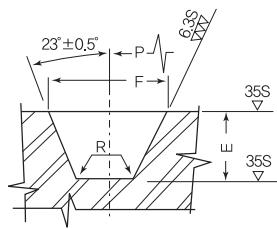
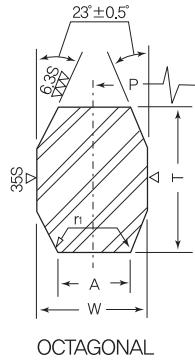
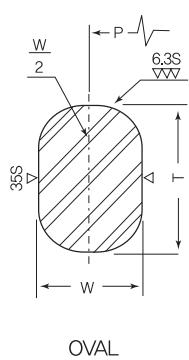
MATERIAL CODES

Material	Max. Hardness HB	Popularity					
		○	○	□	△	△	○
Carbon steel	120	○	○	○	○	○	○
Soft iron	90	○	○	○	○	○	—
Copper	60	△	—	—	—	—	○
SUS 304	160	○	○	○	○	○	△
SUS 304L	150	○	○	○	○	△	—
SUS 310S	160	○	△	△	△	—	—
SUS 316	160	○	○	○	○	—	△
SUS 316L	150	○	○	○	○	—	△
SUS 321	160	○	△	△	○	—	—
SUS 347	160	○	△	△	△	—	—
SUS 410	170	△	△	△	△	○	—
SUS 430	170	△	△	△	△	—	—
5Cr-1/2Mo	130	○	○	○	○	△	—
Monel	140	○	—	○	△	—	—
Titanium	160	○	—	○	△	—	—
Aluminium	40	△	—	—	—	○	○
Nickel	120	○	—	—	△	—	—

NOTES: ○ is popularly used. ○ is sometimes used and △ is rarely used. 주의 : 사용빈도 – ○ > ○ > △

Cross Section	Name	Description
Oval Ring Joint Gasket	ALS2000-O	This type is the original joint design, Contacts flange face at the curved surface and provides a high reliability seal, But due to its shape, it is harder to achieve accuracy of dimensions and surface finish in oval type than in octagonal one and also more expensive to make, reuse is not possible, Complies with ANSI B16, 20, AP16A, JIS F 7102 5105R, JPI-TS-23-63.
Oval Ring Joint Gasket	ALS2000-C	More economical to make and more accurate in dimensions and surface finish than oval type because it consists of straight surfaces only, But more torque load is required to flow the gasket material into imperfections on the flange facings. reuse is possible. complies with the same standards as above.
Lens Ring Gasket	ALS2000-L	Desinged to DIN 2696 Bolt load will be comparatively small, because its contact surface with flange face is spherical.
Double Cone Ring Gasket	ALS2000-DC	Auto seal type gasket, For effective sealability, aluminium sheets of 1.5~2.0mm are used together. Used for pressure vessel.
Pressure Seal Ring Gasket	ALS2359	Auto seal type gasket, it is called a seal ring when this gasket is used for valve. Used for valve bonnet pressure vessel, heat exchanger
Delta Ring Gasket	ALS2000-D	Auto seal type gasket, For effective sealability, silver is plated on surface. Used for pressure vessel.

DIMENSION FOR TYPE "R" RING JOINT



r_1 : 1.59mm when W is 22,225mm and smaller
 r_1 : 2.38mm when W is 25,400mm and larger
 (FOR FLANGES)

OVAL

OCTAGONAL

GROOVE

FOR ANSI, MSS RING TYPE JOINT FLANGES

Unit : mm

Ring No.	Applicable flange and nominal diameter												Gasket				Groove		
	JPI-7S-15,ANSI B 16.5					API Spec 6A				MSS SP-44			P [±0.177]	W [±0.203]	T[±0.39]	A [±0.203]	E [±0.30]	F [±0.203]	R [Max.]
	150 Psi	300 Psi	400 Psi	900 Psi	1500 Psi	2500 Psi	960 Psi	2000 Psi	3000 Psi	5000 Psi	10000 Psi	300 600	400 600	900 Psi					
R11		1/2										34.131	6.350	11.11	9.52	4.318	5.6	7.144	0.7
R12			1/2	1/2								39.688	7.938	14.29	12.70	5.232	6.4	8.731	0.7
R13		3/4			1/2							42.862	7.938	14.29	12.70	5.232	6.4	8.731	0.7
R14			3/4	3/4								44.450	7.938	14.29	12.70	5.232	6.4	8.731	0.7
R15	1											47.625	7.938	14.29	12.70	5.232	6.4	8.731	0.7
R16			1	1	1	1	3/4					50.800	7.938	14.29	12.70	5.232	6.4	8.731	0.7
R17	1 1/4											57.150	7.938	14.29	12.70	5.232	6.4	8.731	0.7
R18		1 1/4	1 1/4	1 1/4	1 1/4	1						60.325	7.938	14.29	12.70	5.232	6.4	8.731	0.7
R19	1 1/2											65.088	7.938	14.29	12.70	5.232	6.4	8.731	0.7
R20		1 1/2	1 1/2	1 1/2	1 1/2			1 1/2	1 1/2	1 1/2		68.262	7.938	14.29	12.70	5.232	6.4	8.731	0.7
R21		2				1 1/4						72.231	11.112	17.46	15.88	7.747	8.0	11.906	0.7
R22			2									82.550	7.938	14.29	12.70	5.232	6.4	8.731	0.7
R23				2	2		1 1/2					82.550	11.112	17.46	15.88	7.747	8.0	11.906	0.7
R24					2 1/2				2	2		95.250	11.112	17.46	15.88	7.747	8.0	11.906	0.7
R25												101.600	7.938	14.29	12.70	5.232	6.4	8.731	0.7
R26			2 1/2	2 1/2	2 1/2	2		2 1/2	2 1/2	2 1/2		101.600	11.112	17.46	15.88	7.747	8.0	11.906	0.7
R27												107.950	11.112	17.46	15.88	7.747	8.0	11.906	0.7
R28												111.125	12.700	19.05	17.46	8.661	9.6	13.494	1.5
R29		3										114.300	7.938	14.29	12.70	5.232	6.4	8.731	0.7
R30			3									117.475	11.112	17.46	15.88	7.747	8.0	11.906	0.7
R31			3	3			3		3			123.825	11.112	17.46	15.88	7.747	8.0	11.906	0.7
R32												127.000	12.700	19.05	17.46	8.661	9.6	13.494	1.5
R33	3 1/2		3 1/2									131.762	7.938	14.29	12.70	5.232	6.4	8.731	0.7
R34												131.762	11.112	17.46	15.88	7.747	8.0	11.906	0.7
R35					3					3		136.525	11.112	17.46	15.88	7.747	8.0	11.906	0.7
R36	4		4	4								149.225	7.938	14.29	12.70	5.232	6.4	8.731	0.7
R37												149.225	11.112	17.46	15.88	7.747	8.0	11.906	0.7
R38												157.162	15.875	22.22	20.64	10.490	11.2	16.669	1.5
R39												161.925	11.112	17.46	15.88	7.747	8.0	11.906	0.7
R40	5											171.450	7.938	14.29	12.70	5.232	6.4	8.731	0.7
R41			5	5			5		5			180.975	11.112	17.46	15.88	7.747	8.0	11.906	0.7
R42												190.500	19.050	25.40	23.81	12.319	12.7	19.844	1.5
R43	6											193.675	7.938	14.29	12.70	5.232	6.4	8.731	0.7
R44												193.675	11.112	17.46	15.88	7.747	8.0	11.906	0.7
R45			6	6			6		6			211.138	11.112	17.46	15.88	7.747	8.0	11.906	0.7
R46												211.138	12.700	19.05	17.46	8.661	9.6	13.494	1.5
R47												228.600	19.050	25.40	23.81	12.319	12.7	19.844	1.5
R48	8		8	8			8		8			247.650	7.938	14.29	12.70	5.232	6.4	8.731	0.7
R49												269.875	11.112	17.46	15.88	7.747	8.0	11.906	0.7
R50												269.875	15.875	22.22	20.64	10.490	11.2	16.669	1.5

FOR ANSI, MSS RING TYPE JOINT FLANGES

Unit : mm

Ring No.	Applicable flange and nominal diameter												Gasket				Groove				
	JPI-7S-15,ANSI B 16.5						API Spec 6A				MSS SP-44		P [±0.177]	W [±0.203]	T[±0.39] Oval	Octago nal	A [±0.203]	E [±0.3,0]	F [±0.203]	R (Max.)	
	150 Psi	300 600	400 Psi	900 Psi	1500 Psi	2500 Psi	%60	2000 Psi	3000 Psi	5000 Psi	10000 Psi	300 400 600	900 Psi								
R51							8						279.400	22.225	28.58	26.99	14.808	14.3	23.019	1.5	
R52	10		10		10								304.800	7.938	14.29	12.70	5.232	6.4	8.731	0.7	
R53								10	10	10			323.850	11.112	17.46	15.88	7.747	8.0	11.906	0.7	
R54										10			323.850	15.875	22.22	20.64	10.490	11.2	16.669	1.5	
R55							10						342.900	28.575	36.51	34.92	19.812	17.5	30.162	2.3	
R56	12		12	12		12		12	12	12		12	381.000	7.938	14.29	12.70	5.232	6.4	8.731	0.7	
R57													381.000	11.112	17.46	12.70	7.747	8.0	11.906	0.7	
R58													381.000	22.225	28.58	22.22	14.808	14.3	23.019	1.5	
R59													396.875	7.938	14.29	12.70	5.232	6.4	8.731	0.7	
R60	14					12							406.400	31.750	39.69	32.327	17.5	33.381	2.3		
R61			14		14							14	419.100	11.112	17.46	15.88	7.747	8.0	11.906	0.7	
R62													419.100	15.875	22.22	22.22	10.490	11.2	16.669	1.5	
R63													419.100	25.400	33.34	15.88	17.297	15.9	26.988	2.3	
R64	16							16	16			16	454.025	7.938	14.29	15.88	5.232	6.4	8.731	0.7	
R65			16										469.900	11.112	17.46	12.70	7.747	8.0	11.906	0.7	
R66													469.900	15.875	22.22	15.88	10.490	11.2	16.669	1.5	
R67													469.900	28.575	36.51	15.88	19.812	17.5	30.162	2.3	
R68													517.525	7.938	14.29	17.46	5.232	6.4	8.731	0.7	
R69													533.400	11.112	17.46	12.70	7.747	8.0	11.906	0.7	
R70			18	18		18		18	18	18		18	533.400	19.050	25.40	15.88	12.319	12.7	19.844	1.5	
R71							18						533.400	28.575	36.51	15.88	19.812	17.5	30.162	2.3	
R72	20							20	20				558.800	7.938	14.29	17.46	5.232	6.4	8.731	0.7	
R73			20		20								584.200	12.700	19.05	12.70	8.661	9.6	13.494	1.5	
R74													584.200	19.050	25.40	15.88	12.319	12.7	19.844	1.5	
R75													584.200	31.750	39.69	15.88	22.327	17.5	33.388	2.3	
R76	24		24	24		24						24	673.100	7.938	14.29	12.70	5.232	6.4	8.731	0.7	
R77													692.150	15.875	22.22	15.88	10.490	11.2	16.669	1.5	
R78													692.150	25.400	33.34	20.64	17.297	15.9	26.988	2.3	
R79													692.150	34.925	44.45	15.88	24.816	20.7	36.512	2.3	
R80													615.950	7.938	-	12.70	5.232	6.4	8.731	0.7	
R81												22	635.000	14.288	-	19.05	9.576	11.2	15.081	1.5	
R82												1	57.150	11.112	-	15.88	7.747	8.0	11.906	0.7	
-													-	-	-	-	-	-	-	-	
R84												1 1/2	63.500	11.112	-	15.88	7.747	8.0	11.906	0.7	
R85												2	79.375	12.700	-	17.46	8.661	9.6	13.494	1.5	
R86												2 1/2	90.488	15.875	-	20.64	10.490	11.2	16.669	1.5	
R87												3	100.012	15.875	-	20.64	10.490	11.2	16.669	1.5	
R88												4	123.825	19.050	-	23.81	12.319	12.7	19.844	1.5	
R89												3 1/2	114.300	19.050	-	23.81	12.319	12.7	19.844	1.5	
R90												5	155.575	22.225	-	26.99	14.080	14.3	23.019	1.5	
R91												10	260.350	31.750	-	38.10	22.327	17.5	33.338	2.3	
R92													228.600	11.112	17.46	15.88	7.747	8.0	11.906	0.7	
R93													749.300	19.050	-	23.81	12.319	12.7	19.844	1.5	
R94													800.100	19.050	-	23.81	12.319	12.7	19.844	1.5	
R95													857.250	19.050	-	23.81	12.319	12.7	19.844	1.5	
R96												32	914.400	22.225	-	26.99	14.808	14.3	23.019	1.5	
R97												34	965.200	22.225	-	26.99	14.808	14.3	23.019	1.5	
R98												36	1022.350	22.225	-	26.99	14.808	14.3	23.019	1.5	
R99												26	749.300	28.575	-	34.92	19.812	17.5	30.162	2.3	
R100								8	8				28	800.100	31.750	-	38.10	22.327	17.5	33.338	2.3
R101													30	857.250	31.750	-	38.10	22.327	17.5	33.338	2.3
R102													32	914.400	31.750	-	38.10	22.327	17.5	33.338	2.3
R103													34	965.200	34.925	-	41.28	24.816	20.7	36.512	2.3
R104													36	1022.350	34.925	-	41.28	24.816	20.7	36.512	2.3
R105																					

NOTES : 1. ASME/ANSI B 16.47 series "A" ring type joint flanges.

2. **R30 is used only for lapped joint of pressure rating 400psi and 600psi



DONGSUH INDUSTRY

The DONGSUH is moving forward with a renewed spirit of service for customers.

It is designed to have both high tensile strength and flexibility simultaneously for braiding continuous filament carbon fiber having high thermal conductivity and low coefficient of friction in a unique method of DONGSUH.

Blower Seal Kit

We will make it for customer impressed not customer satisfaction.



Blower Seal Kit

122 ALS 800
Blower Seal Kit

123 TECHNICAL DATA

ALS 800

Blower Seal Kit

LABYRINTH SEAL

비접촉식 환상 밀봉체로서 각 단 사이의 압력차이에 의하여 누설되는 것을 방지하기 위한 장치입니다. Labyrinth Seal을 통한 누설량 저감은 Seal의 형상이 유동의 저항을 증가시킬 수 있게 하는 것이 필요합니다.

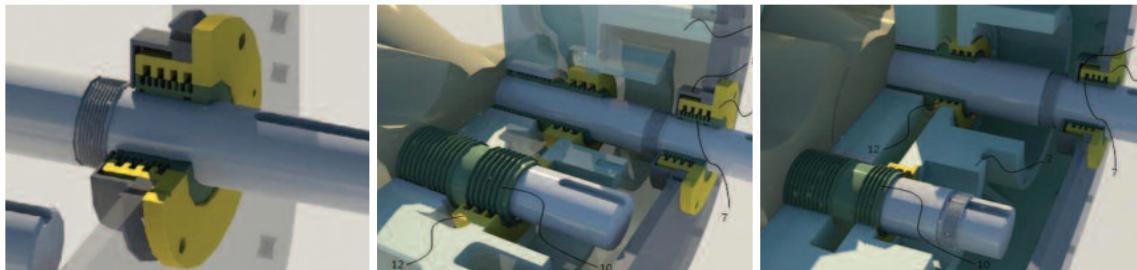
Labyrinth Seal은 스텝(step)이 있는 로터(rotor)와 다수의 이(teeth)를 포함하고 있는 스테이터(stator)로 구성됩니다. 증기는 축소부를 통과할 때 교속되고 확대부에서 압력이 감소하는 작용이 반복되어 Labyrinth 출구의 압력과 같아지므로 누설량이 감소됩니다.

This non-contact type circular sealing body prevents the leakage that is caused by pressure difference between each steps. For reduction of leakage amount through Labyrinth Seal, it is necessary to have the seal geometry increase the flow resistance. The Labyrinth Seal is consisted of rotor having step and stator having many tooth. The steam is throttled when it passes through the contraction while the pressure decreases in the expansion repeating on and on, so the leakage volume is decreased since it is equal to the pressure of Labyrinth outlet.



Composition

- 6, 12 : 로터 [ROTOR SEAL]
- 7, 10 : 스테이터 [STATOR SEAL]
- 7 : 커버 [SEAL COVER]
- 2 : 배어링 캐리어 [CARRIER]

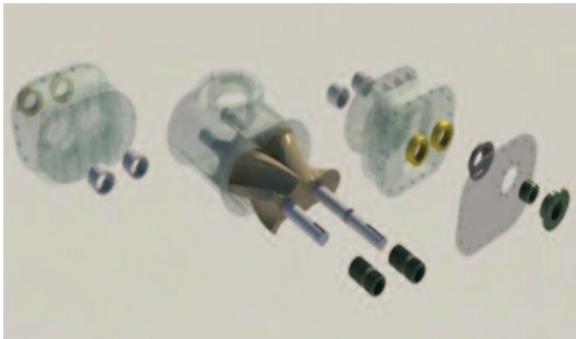


FLUIDIZING BLOWER (좌) TRANSPORT BLOWER(우) Labyrinth Seal 구조

특징 / Features

- 접촉식 오일씰 타입을 비접촉식 라비린스 씰 타입으로 구조개선을 통해 정비효율성 및 설비수명을 증대시킬 수 있습니다.
- 비접촉식 구조개선으로 반영구적으로 교체 정비주기를 증가 시킬 수 있고 외산제품 수입대체 및 납기 단축으로 인해 정비비용 절감 및 재고비용을 절감함으로 안정적인 설비운영을 확보할 수 있습니다.
- 조립용 차공구로 인해 조립 분해시 제품손상이 최소화 되고 시간단축 및 작업자 안전사고율을 감소시킬 수 있습니다.
- 비접촉식으로 오일누설을 방지. 블로어 샤프트와 접촉하지 않아 마모와 밀봉에 의한 열이 발생하지 않으며 마찰전력 손실이 일어나지 않는 점을 감안하면 오일씰 타입의 누설량의 90% 이상의 저감효과 발생.
- 라비린스 씰의 간극으로 인해 샤프트와 씰링부의 비접촉 상태로 회전체 진동에 안전성을 향상.
- Maintenance efficiency and facility's life span can be increased through the structural improvement from the contact type oil seal to the non-contact Labyrinth Seal type
- Replacement and maintenance interval can be increased semi-permanently by non-contact structural improvement while securing stable operation of the facility by saving the maintenance cost and inventory due to shortening the delivery time and foreign products import substitution.
- Product's damage can be minimized when assembling or disassembling due to assembly jigs while shortening the time and reducing the operator's safety accident rate.
- No heat by wearing and sealing is generated due to non-contact type that does not contact the blower shaft preventing the oil from leakage. Over 90% of the leakage amount in oil seal type can be reduced when considering that the loss from frictional power is not caused.
- Safety improved for rotator vibration in non-contact condition between the shaft and the sealing part due to the clearance in Labyrinth Seal.

1. Construction of Blower Seal Kit



DONGSUH BLOWER SEAL KIT (5CDL, 9CDL BLOWER OVERHAUL SEAL KIT)은 발전플랜트용 BLOWER 정비 KIT로서 2014년 남부발전㈜과 협력 개발하여 OIL-SEAL(Contact Seal)을 LABYRINTHSEAL(Non-contact Seal)로의 구조변경으로 효율을 극대화시킨 정비자재입니다.

DONGSUH Blower Seal Kit (5CDL, 9CDL BLOWER OVERHAUL SEAL KIT) is a blower maintenance kit for power generation plant and it maximized the efficiency of the oil seal (Contact Seal) by changing the structure to Labyrinth Seal (Non-contact Seal) in cooperation with KOSPO in 2014.

2. Fluidizing, Aeration, Transport Blower

Model	Facilities	Recommended
ALS808N11 (5CDL13)	Fluidizing Blower	EP Hopper 내부 유동용
	Aeration Blower	Fly Ash Silo 내부 유동용
ALS809N11 (9CDL18)	Transport Blower	비회 이송용

DONGSUH BLOWER SEAL KIT (5CDL, 9CDL BLOWER OVERHAUL SEAL KIT)은 발전플랜트용 BLOWER 정비 KIT로서 2014년 남부발전㈜과 협력 개발하여 OIL-SEAL(Contact Seal)을 LABYRINTHSEAL(Non-contact Seal)로의 구조변경으로 효율을 극대화시킨 정비자재입니다.

Fluidizing Blower Overhaul Kit					Transport Blower Overhaul Kit				
No	용도	Item No.	Description	설치수량	No	용도	Item No.	Description	설치수량
1	Fluidizing Blower Overhaul Kit	808N11-B001	BEARING BALL	4	1	Transport Blower Overhaul Kit	809N11-B001	BEARING BALL	2
2		808N11-B002	BEARING ROLLER	2	2		809N11-B002	BEARING BALL	2
3		808N11-LW09	WASHER-LOCK	2	3		809N11-B003	BEARING ROLLER	1
4		808N11-LN09	LOCK NUT (1-3/4")	2	4		809N11-B004	BEARING ROLLER	1
5		808N11-SS16	Hexagon Bolt	4	5		809N11-LW12	WASHER-LOCK	1
6		808N11-SS18	Hexagon Bolt	4	6		809N11-LN12	LOCK NUT	1
7		808N11-SS06	Wrench Bolt	9	7		809N11-LW15	WASHER-LOCK	2
8		808N11-SS12	Wrench Bolt	4	8		809N11-LN15	LOCK NUT	2
9		808N11-SS57	Wrench Bolt	11	9		809N11-SS16	Hexagon Bolt	4
10		808N11-LM12	Wrench Bolt	1	10		809N11-SS18	Hexagon Bolt	4
11		808N11-LW03	WASHER-PLAIN	4	11		809N11-SS02	Wrench Bolt	5
12		808N11-LW17	WASHER-PLAIN	1	12		809N11-SS06	Wrench Bolt	16
13		808N11-W001	WASHER-PLAIN	5	13		809N11-SS12	Wrench Bolt	4
14		808N11-S001	WEAR-RING	1	14		809N11-S573	Wrench Bolt	3
15		808N11-S010	ROTOR LABYRINTH	4	15		809N11-S577	Wrench Bolt	3
16		808N11-B010	METAL-BEARING	4	16		809N11-W49	WASHER-PLAIN	5
17		808N11-S002	SHAFT-SHIM	2	17		809N11-W001	WEAR-RING	1
18		808N11-S006	SHAFT-SHIM	2	18		809N11-S001	ROTOR LABYRINTH	2
19		808N11-C003	SHAFT-SHIM	2	19		809N11-S002	ROTOR LABYRINTH	2
20		808N11-S005	SHAFT-SHIM	2	20		809N11-B010	METAL-BEARING	2
21		808N11-S004	SHAFT-SHIM	2	21		809N11-B011	METAL-BEARING	2
22		808N11-S003	SHAFT-SHIM	2	22		809N11-S003	ROTOR SEAL	2
23		808N11-G002	SHAFT-SHIM	2	23		809N11-S004	ROTOR SEAL	2
24		808N11-G001	SHAFT-SHIM	2	24		809N11-S009	END COVER SEAL	1
25		808N11-C001	SHAFT-SHIM	2	25		809N11-C003	COVER	1
		808N11-C002	SHAFT-SHIM	2	26		809N11-S008	END SEAL	1
					27		809N11-S007	COVER SEAL	1
					28		809N11-S005	SHAFT-SHIM	2
					29		809N11-S006	SHAFT-SHIM	2
					30		809N11-G002	SHAFT-SHIM	2
					31		809N11-G001	SHAFT-SHIM	2
					32		809N11-C001	GASKET	1
							809N11-C002	GASKET	1
							809N11-H001	HOUSING	1
							809N11-C003	HOUSING SHIM	1



DONGSUH INDUSTRY

The DONGSUH is moving forward with a renewed spirit of service for customers.

It is designed to have both high tensile strength and flexibility simultaneously for braiding continuous filament carbon fiber having high thermal conductivity and low coefficient of friction in a unique method of DONGSUH.

Single Lip Spring Loaded Seal

We will make it for customer impressed not customer satisfaction.

Single Lip Spring Loaded Seal

**126 ALS8111
Single Lip Spring Loaded Seal**

123 TECHNICAL DATA

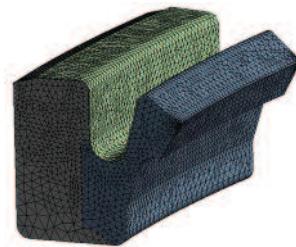
ALS8111

Single Lip Spring Loaded Seal

OIL SEAL

ALS8111-SL-SLS OIL SEAL은 PULVERIZER나 GRINDING ROLL SHAFT에 장착되어 ROLL 내부의 OIL의 누유를 막고 PULVERIZER 내부의 미분단이 GRINDING ROLL 내부로의 유입을 막는 정비용 밀봉제품으로 발전플랜트의 안정적 운영유지 및 정비에 대단히 중요한 제품입니다.

ALS8111-SL-SLS OIL SEAL is mounted on the grinding roll shaft in pulverizer to prevent the oil inside the roll from leakage and as a sealing product for maintenance to prevent the pulverized coal inside pulverizer from flowing into the grinding roll inside, the product plays the most important role for stable operation and maintenance of the power generation plant.



DIN 3760

DIN 3760/3761 describes the standardisation of design, dimensions and tolerances of Oil Seals.

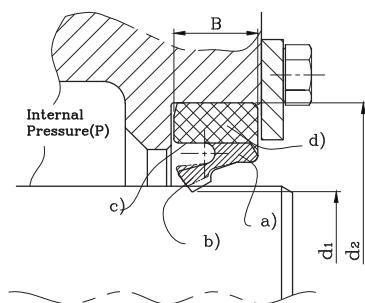
Dimensions and designations

Table 2: Interference allowance and tolerance on d_2

Outside diameter, d_2	Interference allowance ¹⁾	Tolerance on d_2 ²⁾
Up to 50	+0.3 +0.15	0.25
Over 50 up to 80	+0.35 +0.2	0.35
Over 80 up to 120	+0.35 +0.2	0.5
Over 120 up to 180	+0.45 +0.25	0.65
Over 180 up to 300	+0.45 +0.25	0.8
Over 300 up to 500	+0.55 +0.3	1.0

1) The average value for d_2 taken from a number of measurements shall not be greater than the value specified for d_2 plus the interference allowance. For seals having grooved outside surfaces, additional interference allowances are to be agreed upon.

2) The tolerance on d_2 (i.e. d_2 max - d_2 min) is to be determined by taking three or more measurements equallspaced around the circumference.



- a) Elastomeric component
- b) Metal insert
- c) Garter spring
- d) Sealing lip

Figure 1: Rotary shaft lip seal without minor lip

1. Single Lip – Spring Loaded Seal Technical Manual



DONGSUH OIL-SEAL ALS8111-SL-SLS은 중소기업청 민관공동투자 기술개발사업으로 한국남동발전㈜와 공동 개발 완료하고 기계연구원 신뢰성평가 및 발전플랜트 현장 실증화를 거쳐 신뢰성이 검증된 국산화 개발 OIL SEAL입니다.

DONGSUH OIL-SEAL ALS8111-SL-SLS is an oil seal locally developed in cooperation with KOSEP under the joint development as a technical development project through the joint investment by public and private enterprise initiated by Small & Medium Business Administration.

The product's reliability has been proved through the feasibility test at the power plant field along with the reliability test conducted by Korea Institute of Machinery & Materials.

One of the most frequently used Type of seal is the Rotary Shaft Seal.

This is generally used for sealing lubricating oil or grease in rotary shaft applications. Oil-Seal used HNBR is Non Standard Rubber Compound.

**We will be pleased to give you the information you need.
You will be surprised by our kees prices!**

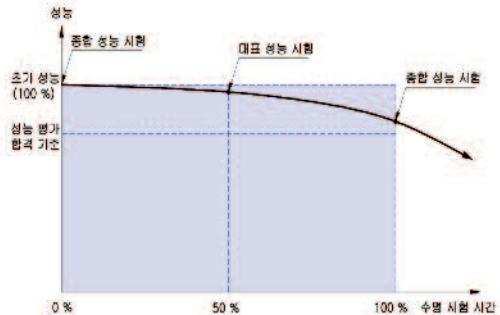
2. 신뢰성 평가 (한국기계연구원)

한국기계연구원과 협력하여 무고장시험 운전을 실시하였습니다.

아래 사진은 2013년 민관공동투자기술개발사업으로 제작된 신뢰성시험기구이며, 산출근거는 보증수명은 신뢰수준 95%로 수명26,280시간 (보증수명 3년)을 보장하는 것으로 하였습니다. 주고장 모드는 Seal의 마모로써 'Machinery Failure Analysis and Troubleshooting'에 언급된 Wear와 등가 되므로 형상모수[β] 3.0을 인용하였습니다.

3. Reliability Test (Korea Institute of Machinery & Materials - KIMM)

Zero-failure test operation has been carried out in cooperation with KIMM. Below picture shows the reliability test instruments manufactured as a technical development project through the joint investment by public and private enterprise in 2013. To guarantee the life span, the calculation is based on the confidence level 95% and life span 26,280 hours [Assurance life span: 3 years] to guarantee. Main failure was the seal wearing and since it is equal to the wearing specified in 'Machinery Failure Analysis and Troubleshooting', a shape parameter [β] 3.0 was quoted.



4. Full rubber construction as standard type oil seal, with a Finger Spring. These Only available in a limited number of sizes.

Pressure	Size(mm/inch)	Material
ALS81110-0621	Ø 355 × Ø 394 × 19.2T / 14" × 15.5" × 0.75" T	HNBR,VITON
ALS81110-3868	Ø 419 × Ø 451 × 19.2T / 16.5" × 17.75" × 0.75" T	HNBR,VITON

General Purpose.
Non-metallic seal.
Stainless Steel Finger Spring.
O.D Construction – Rubber with reinforced heel

5. Common Materials

In the standard construction, our Oil Seals are made from abrasion resistant rubber based on HNBR (Hydrogenated Acrylonitrile-Butadiene Rubber).

6. Choice OF Materials

HNBR Better heat, oil and chemical resistance than NBR. especially abrasion resistance and enhanced high temperature properties.
Moderate cost

Durometer (Hs A)	Operating Temp.	Abrasion Resistance	Surface speed(m/s)	Misalignment & Runout (mm@m/s)	Durometer (Hs A)
80	-40°C ~ 150°C	High	20	0.38 @ 5.1	0.4bar

Viton® High level of chemical resistance High temperature resistance

High cost

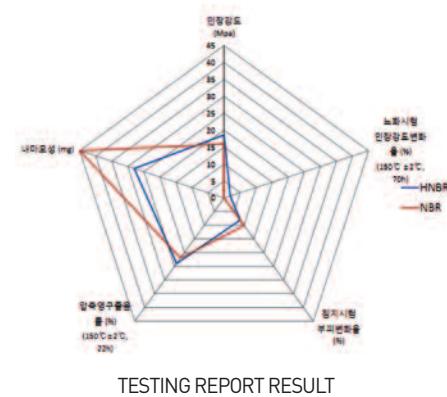
Durometer (Hs A)	Operating Temp.	Abrasion Resistance	Surface speed(m/s)	Misalignment & Runout (mm@m/s)	Durometer (Hs A)
76	-30°C ~ 180°C	High	20	0.38 @ 5.1	0.4bar

7. Technology Overview

The elastomers used to make seals were developed with a special emphasis on abrasion resistance.
In testing, our seals perform up to 60 percent better than seals made NBR

ASTM D 4060 : Wheel:CS-10, Load:1000g, Revolution:1000Cycles

	HNBR	NBR
신장률[%]	359	285
인장강도 [Mpa]	18.6	15.9
노화시험 인장강도변화율[%] (130°C ± 2°C, 70h)	1.9	-
침지시험 부피변화율[%]	8.1	10.1
압축영구줄음률[%] (150°C ± 2°C, 22h)	24	22
내마모성[mg]	28	45



8. Shaft

Shafts shall meet the requirements specified in subclauses 7.2.1 to 7.2.3 and table 6.

Table 6: Shaft lead-in chamfer

Shaft diameter, d_1	$(d_1 - d_3) \text{ } 1)$	d_1	$(d_1 - d_3) \text{ } 1)$
≤ 10	1.5	over 50 up to 70	4.0
over 10 up to 20	2.0	over 70 up to 95	4.5
over 20 up to 30	2.5	over 95 up to 130	5.5
over 30 up to 40	3.0	over 130 up to 240	7.0
over 40 up to 50	3.5	over 240 up to 500	11.0

1) If there is a shaft lead-in chamfer, its radius shall be no less than this difference.

9. Surface Roughness of Shafts

In order to ensure a tight fit between seal and shaft, the seal land (cf. subclause 7.2.3) shall have a surface roughness, R_a^* , of 0,2 to 0,8 mm or R_z^* , of 1 to 5 mm, with $R_{max}^* = 6,3$ mm.

10. Surface Hardness

The service life of seals depends on the surface hardness at the seal land. It should be at least 45 HRC. Where ingress of contaminated fluid is to be expected, or where the peripheral speed exceeds 4 m/s, the hardness should be at least 55 HRC. Where shafts are not fully hardened, the effective depth of hardening should be at least 0,3 mm. After nitriding, shafts shall be provided with a smooth surface finish.

11. Seal Land

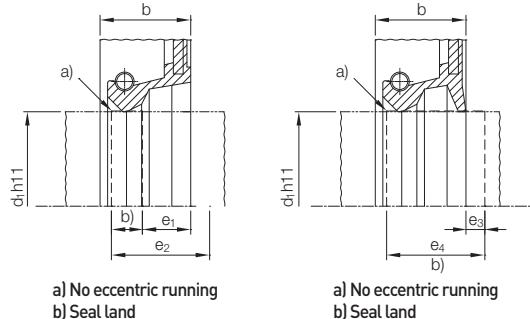
The values for surface roughness and hardness specified in subclauses 7.2.1 and 7.2.2 shall be maintained over the entire seal land, whose dimensions shall be as specified in table 7. It is essential that the shaft is not subject to eccentric running, to prevent leakage.

*¹) In accordance with ISO 4287-1: Ra – arithmetical mean deviation of the profile; Rz – ten point height of irregularities; Rmax – maximum two point height of the profile.

Seal land dimensions

b	Seal land dimensions for seals			
	with sealing lip only		with sealing lip and minor lip	
7	3.5	6.1	1.5	7.6
8	3.5	6.8	1.5	8.3
10	4.5	8.5	2	10.5
12	5	10	2	12
15	6	12	3	15
20	9	16.5	3	19.5

Seal land (notation)



12. Housing Bore

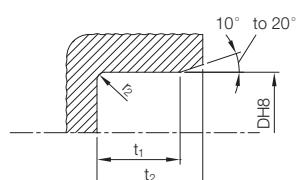
The housing bore shall be subject to a class H8 tolerance and shall have a maximum surface roughness R_a^* , of 1,6 to 6,3 μm or R_z^* , of 10 to 20 μm , with $R_{max}^* = 25 \mu\text{m}$.

The bore shall have the dimensions specified in table 8 and a lead-in chamfer of about 10 to 20°.

Housing dimensions

Nominal boredepth, b	$t_1 (0.85 \cdot b) \text{ min}$	$t_2 (b + 0.3) \text{ min}$	$r_2 \text{ max}$
7	5.95	7.3	0.5
8	6.8	8.3	
10	8.5	10.3	
12	10.3	12.3	
15	12.75	15.3	0.7
20	17	20.3	

Housing bore (notation)



*¹) In accordance with ISO 4287-1: Ra – arithmetical mean deviation of the profile; Rz – ten point height of irregularities; Rmax – maximum two point height of the profile.



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Actuator Seal Kit

We will make it for customer impressed not customer satisfaction.



Actuator Seal Kit

- 132 **Actuator Seal Kit**
- 133 **Actuator Specifications**
- 134 **TECHNICAL DATA**
- 140 **Design Guidelines**
- 147 **Installation guide**

Actuator Seal Kit

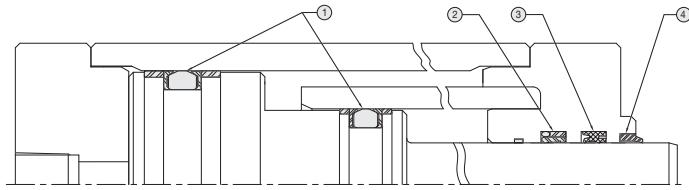
발전설비의 HP/LP Bypass System Operating Valve의 Actuator에 적용되는 Hydraulic Actuator Seal Kit로
Hydraulic Actuator Oil의 누설을 막는 Sealing 제품들로 구성됩니다.

Seal Kit 내부의 압력이 유지되게 하고 그 운동을 원활하게 안내하여 진동과 뒤틀림을 억제합니다.



Type	Seal Material						Operating Range		
	NBR	FKM	Metal	Pressure	Temperature	Speed			
				bar (psi)	°C	m/s			
1 Piston Packing	✓	✓		✓	✓		Up to 350bar (5,076 psi)	-30°C~+100°C (-22°F~212°F)	0.5 m/s
2 Piston Packing	✓	✓		✓	✓		Up to 350bar (5,076 psi)	-30°C~+100°C (-22°F~212°F)	0.5 m/s
3 Piston Packing	✓			✓		✓	Up to 350bar (5,076 psi)	-30°C~+100°C (-22°F~212°F)	0.5 m/s
4 Rod Seal				✓	✓	✓	Up to 350bar (5,076 psi)	-30°C~+100°C (-22°F~212°F)	0.5 m/s
5 Split Rod Seal	✓			✓		✓	Up to 350bar (5,076 psi)	-30°C~+100°C (-22°F~212°F)	0.5 m/s
6 Step Seal	✓			✓		✓	Up to 350bar (5,076 psi)	-30°C~+100°C (-22°F~212°F)	0.5 m/s
7 Piston Rod Seal	✓			✓			Up to 350bar (5,076 psi)	-30°C~+100°C (-22°F~212°F)	0.5 m/s
8 Excluder Seal	✓			✓		✓		-30°C~+100°C (-22°F~212°F)	0.5 m/s
9 Dust Seal				✓	✓	✓		-30°C~+100°C (-22°F~212°F)	0.5 m/s
10 Scraper Seal				✓	✓	✓		-30°C~+100°C (-22°F~212°F)	0.5 m/s
11 Dust Seal				✓			✓	-30°C~+100°C (-22°F~212°F)	0.5 m/s

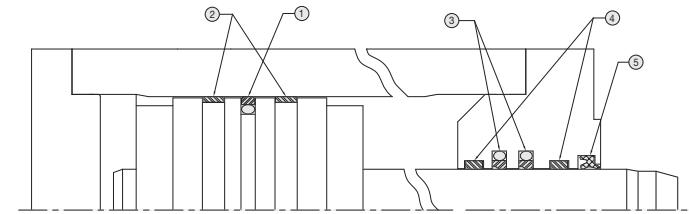
규격 / Actuator



Seal Kit 정보

No	Description
1	Piston Seal
2	Split Rod Seal
3	Rod Seal
4	Dust Seal

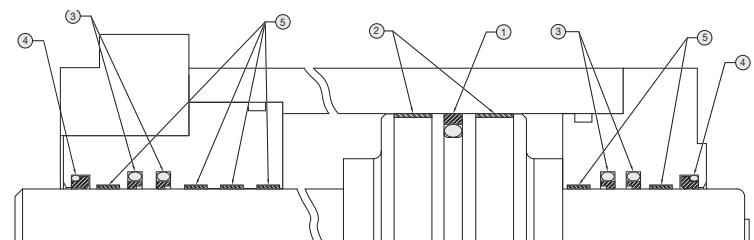
Valve Name	Actuator Type
HPBP Control V/V	AHFE 200 / 100-55 / 100
CRH-Safety V/V	AHFE 200 / 100-75 / 150
HRH-Safety V/V	AHFE 280 / 100-75 / 150



Seal Kit 정보

No	Description
1	Piston Seal
2	Wear Ring
3	Step Seal
4	Wear Ring
5	Dust Seal

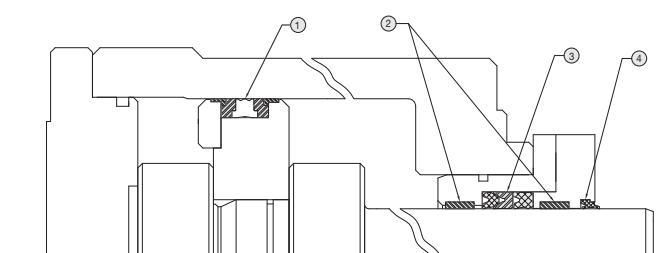
Valve Name	Actuator Type
LPBP Control V/V	SMH VC
LPBP Stop V/V	SMH VSC



Seal Kit 정보

No	Description
1	Piston Seal
2	Wear Ring
3	Step Seal
4	Wear Ring
5	Excluder Seal

Valve Name	Actuator Type
WR/ZR	HYH-2161-92
UG	HYH-2161-91



Seal Kit 정보

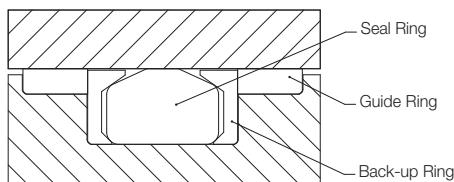
No	Description
1	Compact Seal
2	Wear Ring
3	Rod Packing
4	Dust Seal

Valve Name	Actuator Type
LPBP Control V/V	ASM-250-10 / NB64-550
LPBP Stop V/V	ASM-250-10 / NB64-500

1. Piston Seal, Compact Seal

Piston Seal과 Compact Seal은 복동 유압 실린더의 피스톤용 Seal로 사용되며, Elastomer Main Seal은 완벽한 Sealing을 제공한다. Back-Up Ring은 정적, 동적 상태에서 Elastomer Seal의 Extrusion 현상을 방지해주며, Guide Ring은 실린더내의 피스톤 Guide 역할과 실린더와 튜브사이 Transverse forces(횡력)을 흡수한다. 분할된 Guide Ring과 Back-Up Ring의 조합으로 조립 및 분해가 간편하다.

Piston Seal



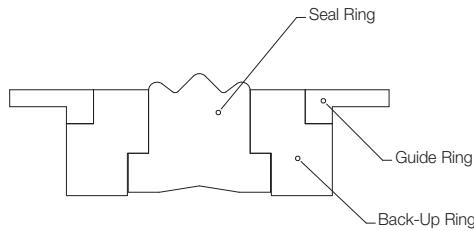
재질 / Materials

- Main Seal Ring : NBR, HNBR
- Back-Up Ring : PTFE + 총전제
- Guide Ring : PTFE + 총전제

장점 / Advantages

- 우수한 밀봉효과
- 하나의 Groove에 Sealing 및 Guiding효과로 피스톤 전체길이 최소화
- 높은 내압축성과 Main Seal Ring의 뒤틀림, 꼬임현상 방지
- 간단한 조립 및 분해가능

Compact Seal



기술자료 / Technical Data

- Pressure : Up to 35MPa
- Speed : Up to 0.5 m/s
- Temperature : -30°C ~ +100°C
- Media : 광물유 기반의 유압

2. Piston Seal

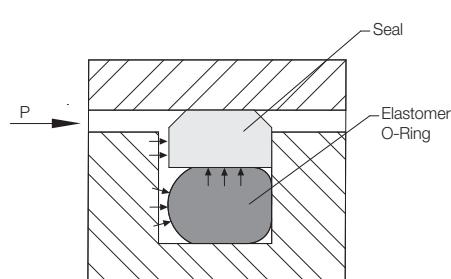
Piston Seal은 O-Ring과 함께 조합하여 사용하며, 이는 O-Ring의 압착과 함께 낮은 압력에서도 우수한 밀봉 효과를 보장한다. O-Ring은 유체에 의한 힘으로 Seal의 밀봉면에 밀착시켜 밀봉성능을 향상 시킨다. PTFE 복합소재로 저마찰로 Stick-Slip현상이 없고, 급격한 압력변화 및 운동방향 반대로 작용하여도 아무 문제없이 같은 원리로 밀봉효과를 보장한다.

재질 / Materials

- Seal : PTFE+Bronze
- O-Ring : NBR, FKM

장점 / Advantages

- 마찰이 적고, Stick-Slip현상이 없다.
- 수명이 길고, 조립이 용이. 높은 압력 하에서 뛰어난 성능
- Seal 하나로 Sealing이 가능하기 때문에 Piston의 폭을 최소화
- 다양한 작동유에서 사용이 가능
- Groove 규격은 KS B ISO 7425-1과 동일
- 비활동. 저장기간이 오래되어도 결합표면에 접착효과가 없음

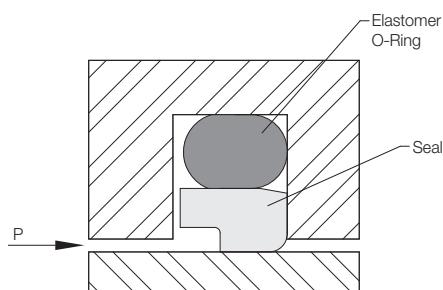


기술자료 / Technical Data

- Pressure : Up to 60MPa
- Speed : Up to 15 m/s
- Temperature : -45°C ~ +200°C
- Media : 광물유 기반의 유압 작동유. 난연제 작동유. 환경 친화적 유압유. 물 및 기타

3. Step Seal

Step Seal은 왕복운동의 Plunger와 Piston Rod의 Seal 요소로 사용된다. 유압 Seal로서는 탄성이 있는 U-Packing을 많이 사용되고 있지만. 높은 마찰과 작용압력. 온도 등에 변형 및 기능저하로 인한 누유현상이 발생하게 된다. 이러한 U-Packing은 높은 압력과 하중에서 높은 마찰과 Stick-Slip 현상으로 인한 내구성 약화 및 재질변형에 의한 누유현상이 발생한다. Step Seal은 Seal부로 압력. 마찰 및 마모문제를 해소하며. 습동면 위에서의 순간적인 고압. 충격에도 부드러운 작동을 할 수 있다.



재질 / Materials

- Seal : PTFE+Bronze
- O-Ring : NBR 70 Shore A
FKM 70 Shore A

장점 / Advantages

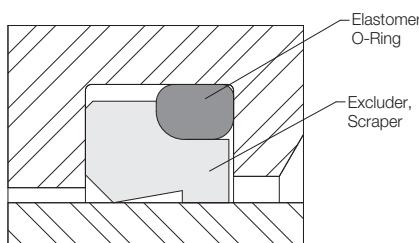
- 높은 정적. 동적 우수한 밀봉효과
- 우수한 내마찰성
- 작동시 Stick-Slip 현상이 없다.
- 높은 내마모성. 높은 동작신뢰도
- O-Ring의 재료에 따라 광범위한 사용온도. 내화학성
- 간단한 조립 및 분해가능

기술자료 / Technical Data

- Pressure : Up to 60MPa
- Speed : Up to 15 m/s
- Temperature : -45°C ~ +200°C
- Media : 광물유 기반의 유압 작동유. 난연제 작동유. 환경 친화적 유압유. 물 및 기타

4. Excluder Seal

Excluder Seal은 탄성체인 O-Ring과 PTFE 복합재 재질의 Seal로 구성되어 있으며. Scraper 기능은 Excluder Ring에 의해 수행되고. 탄성 체인 O-Ring은 일정하게 이동되는 표면에 대해 Scraper Lip을 효과적으로 밀착시키는 역할을 한다. Excluder Seal은 2개의 Lip을 통하여 왕복운동. 진동. 회전운동 등에서 외부 오염물질을 막아주며 Stick-Slip현상이 없이 Piston Rod의 오염물질을 긁어주는 역할을 한다. 또한. 피스톤에 남아 있는 유막을 제거하는 역할을 한다.



재질 / Materials

- Seal : PTFE+Bronze
- O-Ring : NBR, FKM

장점 / Advantages

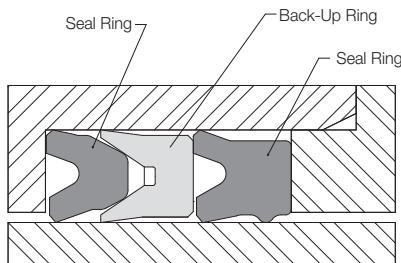
- Stick-Slip현상이 없이 탁월한 Sliding효과
- 우수한 내마찰성
- 표면에 점성물질 존재시 탁월한 Wiping효과
- 높은 내마모성. 높은 동작신뢰도
- O-Ring의 재료에 따라 광범위한 사용온도. 내화학성
- 간단한 조립 및 분해가능

기술자료 / Technical Data

- Speed : Up to 15 m/s
- Temperature : -45°C ~ +200°C
- Media : 광물유 기반의 유압 작동유. 난연제 작동유. 환경 친화적 유압유. 물 및 기타

5. Piston Rod Seal

Piston Rod Seal은 동서산업(주)에서 기존의 Piston Rod Seal의 문제점을 파악하고 개선시킨 제품으로 2개의 Elastomer Sealing 부품과 그 사이에 1개의 PTFE 복합소재의 Back-Up Ring으로 3개의 구성품으로 이루어졌으며, Open Grooves에 조립되는 단동형 밀봉부품이다.



재질 / Materials

- Main Seal Ring : NBR, HNBR
- Back-Up Ring : PTFE+Galss+Molybdenum

장점 / Advantages

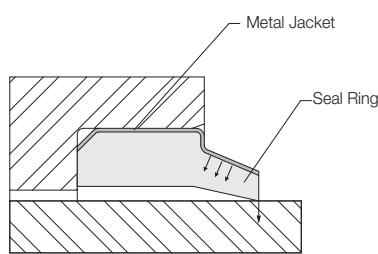
- 진동 및 충격 부하시 효과적인 Sealing
- 고압 및 저압에서의 우수한 밀봉 효과
- 간단한 조립 및 분해 가능

기술자료 / Technical Data

- Pressure : Up to 60MPa
- Speed : Up to 0.5 m/s
- Temperature : -30°C ~ +105°C
- Media : 광물유 기반의 유압 작동유, 난연제 작동유, 환경 친화적 유압유, 물 및 기타

6. Dust Seal

기존의 우레탄 재질의 Dust Seal의 전도열에 의한 Seal 손상의 문제점을 해결하기 위하여 동서산업(주)에서 개선된 제품으로 내열성과 윤활성이 높은 PTFE 복합수지를 소결하여 가공한 것으로 높은 전도열에 의한 탄화를 방지한다. 그리고 Metal Jacket의 경우 Seal의 보호하는 Jacket의 역할 뿐만 아니라 Spring의 역할도 포함하여 Lip부의 탄성력을 부여한다. Spring의 역할을 통해 Lip부의 탄성력을 제공하여 이물질 유입이 되지 않도록 기밀성을 향상시키며, 왕복운동, 진동, 회전 운동 등에서 외부 오염물질을 막아주고, Stick-Slip 현상이 없이 Piston Rod의 오염물질을 긁어주는 역할을 한다. 하우징 규격은 KS B ISO 6195 B형 Type을 따른다.



재질 / Materials

- Seal : PTFE+Galss+Molybdenum
- Jacket : Inconel X 750

장점 / Advantages

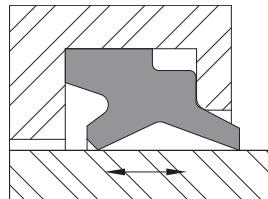
- PTFE 복합수지를 통한 내마모성 우수
- 내열성(전도열로 인한 탄화방지)
- 윤활성 우수
- Jacket의 Spring 역할로 기밀성 향상
- 금속 압착으로 Groove에 단단히 고정
- 표면에 점성물질 존재시 탁월한 Wiping 효과

기술자료 / Technical Data

- Speed : Up to 1 m/s
- Temperature : -175°C ~ +260°C
- Media : 광물유 기반의 유압 작동유, 난연제 작동유, 환경 친화적 유압유, 물 및 기타

7. Scraper Seal

Scraper Seal은 기하학적으로 다른 두 개의 부드러운 Sealing Lip으로 설계되어 있다. Scraper Lip은 먼지를 닦아내는 동시에 Rod에 Oil 유막이 잔존해 있지 않도록 설계되어 있으며. 압착이 되었을 때 한쪽 Lip은 밀봉 기능역할을 하며. 왕복운동이 적용되는 Rod와 Plunger에서 매우 유용하게 사용되어 진다.



재질 / Materials

- Standard material: HNBR, NBR, FKM

장점 / Advantages

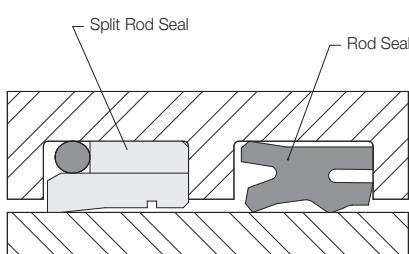
- 우수한 내마찰성
- 접착성 면지등이 있는 장소에서 우수한 효과
- 간단한 조립 및 분해가능
- 형상이 단순하다.
- 가공홀을 단순하게 설계 가능.

기술자료 / Technical Data

- Speed : Up to 1m/s
- Temperature : -30°C ~ +110°C
- Media : 광물유 기반의 유압 작동유, 난연제 작동유, 환경 친화적 유압유, 물 및 기타

8. Split Rod Seal / Rod Seal

Rod Seal 및 Split Rod Seal은 기존의 우레탄재질의 Rod Seal(U-Cup Seal)의 열경화로 인한 손상을 방지하기 위해 개선된 제품으로 고온 환경에서 우수한 밀봉제품이다. Rod Seal은 내마모성이 우수한 HNBR재질로 이루어지며, 구조적으로 실린더 내부압력에 의해 2개의 Lip부의 탄성을 유지하도록 구성되어 있다. Split Rod Seal은 절단되어 사용되어 지는 Back-up Ring과 Sealing부는 굽혀 조립되어 지며, O-Ring은 Sealing부의 Lip부에 탄성을 유지시켜주는 역할을 한다. 또한 PTFE 복합소재를 사용하여 미끄럼저항인 슬동(Stick-Slip)현상을 감소시켜 주며. 협소한 Groove에도 조립이 간편하도록 구성되어 있다. 여러 개의 Groove를 가지는 실린더의 경우 함께 사용하여도 되며. 환경조건에 따라 별도로 사용하여도 무관하다.



재질 / Materials

- Rod Seal : HNBR, NBR, FKM
- Split Rod Seal : PTFE+Bronze
- O-Ring : NBR, FKM

장점 / Advantages

- 내마모성과 내구성이 우수
- 윤활작용이 우수하다.
- 간결한 형상으로 조립, 분해가 용이하다.
- Rod의 전도된 열로 인한 Seal 손상이 없다.

기술자료 / Technical Data

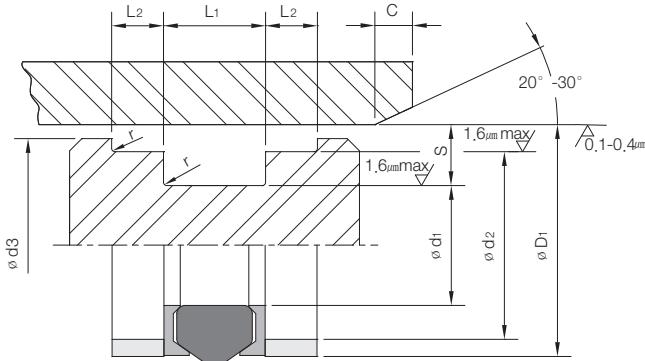
- Pressure : Up to 35MPa
- Speed : Up to 0.5 m/s
- Temperature : -30°C ~ +105°C
- Media : 광물유 기반의 유압 작동유, 난연제 작동유

Materials and fluid compatibility

Material	Intermittent material service temperature range °C	Service Fluids									
		Fluids based on mineral oils				Greases			Fuels		
		Motor oils	Hypoid gear oils	Automatic transmission fluid	ISO 6743-4 Hydraulic oils (HL HM HV)	Silicon based greases	Silicon based greases	Diesel fuel	Fuel for gasoline/petrol engines - super	Fuel for gasoline/petrol engines - normal	-
Maximum continuous service temperature in fluids °C											
NBR 70 IRHD NBR 90 IRHD Nitrile [medium]	+100 -30	+120 -30	100	90	100	100	100	100	*	*	*
FKM 70 IRHD FKM 90 IRHD Fluoro-elastomer	+200 -20	+250 -20	150	150	160	100	100	200	150	150	150
EPDM 70 IRHD EPDM 80 IRHD	+120 -50	+150 -50	NS	NS	NS	NS	NS	120	NS	NS	NS
VMQ 70 IRHD Silicone	+200 -55	+250 -55	*	*	*	*	100	*	NS	NS	NS
HNBR 75 IRHD Hydrogenated nitrile	+130 -30	+150 -30	130	110	130	100	100	130	*	*	*
FFKM Perfluoroelastomer	+200 -20	-	150	150	160	100	100	200	150	150	150
AU Polyester PU	+100 -30	+110 -30	100	100	100	100	100	100	60	60	60
EU Polyether PU	+100 -40	+110 -45	100	100	100	100	100	100	60	60	60
Polyester-Elastomer	+100 -40	+120 -40	100	100	100	100	100	100	60	60	60
PA Polyamide	+10 -40	+120 -40	100	100	100	100	100	100	60	60	60
PTFE Polytetrafluoroethylene	+200 -200	+200 -200	150	150	160	100	100	200	150	150	150

Material	Service Fluids											
	Fluids based on mineral oils						Greases			Fuels		
	ISO 6743-4 HEP fluids [Synthetic hydrocarbons]	ISO 6743-4 HPG fluids [Synthetic glycol based]	ISO 6743-4 HEES fluids [Synthetic ester based]	ISO 6743-4 HETG fluids [Vegetable oil based]	Water	Air	Brake fluids					
	+60 -5	+60 -5	+60 -30	+100 -50	+150 -0	+60 -5	+60 -10	+100 -40	+100 -50	+60 -5	+200 -2	+130 -50
Maximum continuous service temperature in fluids °C												
NBR 70 IRHD NBR 90 IRHD Nitrile [medium]	60	60	60	NS	NS	60	60	60	100	80	100	NS
FKM 70 IRHD FKM 90 IRHD Fluoro-elstimer	60	60	NS	NS	150	60	100	80	150	100	200	NS
EPDM 70 IRHD EPDM 80 IRHD	NS	NS	60	80	80	NS	NS	NS	NS	120	120	120
VMQ 70 IRHD Silicone	NS	NS	NS	NS	NS	NS	NS	NS	*	100	200	80
HNBR 75 IRHD Hydrogenated nitrile	60	60	60	NS	NS	60	60	80	130	130	130	NS
FFKM Perfluoroelastomer	60	60	60	100	150	60	100	100	150	150	200	130
AU Polyester PU	40	40	NS	NS	NS	60	60	60	100	40	40	NS
EU Polyether PU	60	60	40	NS	NS	60	80	60	100	60	80	NS
Polyester- Elastomer	60	60	NS	NS	NS	60	80	60	100	60	80	NS
PA Polyamide	60	60	60	100	100	60	100	100	100	60	80	80
PTFE Polytetrafluoroethylene	60	60	60	150	150	60	100	100	150	150	200	130

Piston Seal



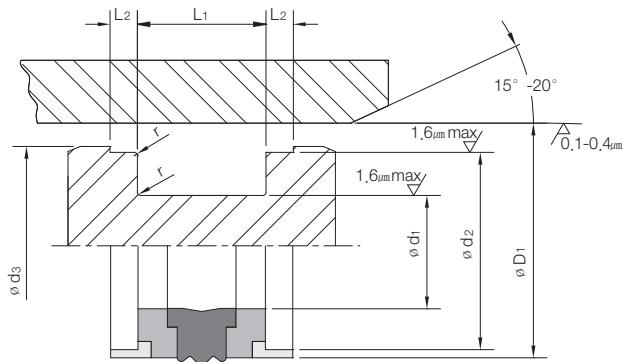
Chamfer & Radii

Groove Section ≤ S mm	5.0	7.5	8.0	10.0	12.5	15.0
Min Chamfer C mm	2.4	4.0	5.0	5.0	6.5	7.5
Max Fillet Rad r mm	0.4	0.4	0.4	0.4	0.8	0.8

Bore Dia.		Groove Dimensions						Piston Dia.		PART No.
φD ₁	TOL H11	φd ₁	TOL h10	φd ₂	TOL f9	L ₁ +0.4 +0.15	L ₂ +0.1	φd ₃	TOL h11	
≈										
100	+0.22 +0	75	-0 -0.12	93.2	-0.036 -0.123	22	6.35	98	-0 -0.22	
110	+0.22 +0	85	-0 -0.14	103.1	-0.036 -0.123	22	63.5	108	-0 -0.22	
120	+0.22 +0	95	-0 -0.14	113.1	-0.036 -0.123	22	63.5	118	-0 -0.22	
130	+0.25 +0	105	-0 -0.14	122.6	-0.043 -0.143	25	9.52	128	-0 -0.25	
135	+0.25 +0	110	-0 -0.14	127.6	-0.043 -0.143	25	9.52	133	-0 -0.25	
140	+0.25 +0	115	-0 -0.14	132.6	-0.043 -0.143	25	63.5	138	-0 -0.25	
145	+0.25 +0	120	-0 -0.14	137.6	-0.043 -0.143	25	9.52	143	-0 -0.25	
150	+0.25 +0	125	-0 -0.16	142.6	-0.043 -0.143	25	9.52	148	-0 -0.25	
155	+0.25 +0	130	-0 -0.16	147.6	-0.043 -0.143	25	9.52	153	-0 -0.25	
160	+0.25 +0	135	-0 -0.16	152.6	-0.043 -0.143	25	9.52	158	-0 -0.25	
170	+0.25 +0	145	-0 -0.16	161.7	-0.043 -0.143	25	12.7	168	-0 -0.25	
180	+0.25 +0	155	-0 -0.16	171.7	-0.043 -0.143	25	12.7	178	-0 -0.25	
190	+0.29 +0	165	-0 -0.16	181.7	-0.050 -0.165	25	12.7	188	-0 -0.29	
195	+0.29 +0	170	-0 -0.16	186.7	-0.050 -0.165	25	12.7	193	-0 -0.29	
200	+0.29 +0	175	-0 -0.16	191.6	-0.050 -0.165	25	12.7	198	-0 -0.29	
220	+0.29 +0	190	-0 -0.19	212	-0.050 -0.165	30	15	217	-0 -0.29	
250	+0.29 +0	220	-0 -0.19	242	-0.050 -0.165	30	15	247	-0 -0.29	
280	+0.29 +0	250	-0 -0.19	272	-0.056 -0.186	30	15	277	-0 -0.32	

Other dimensions and all intermediate sizes diameter including imperial (inch) sizes can be supplied.
규격외 치수의 제품도 공급 가능합니다.

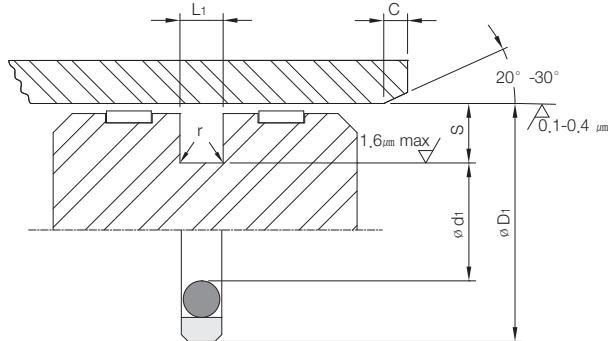
Compact Seal



Bore Dia.		Groove Dimensions							Piston Dia.		PART No.
φD ₁	TOL H9	φd ₁	TOL h9	φd ₂	TOL h9	L ₁ +0.2	L ₂ +0.1	r max	φd ₃	TOL h11	
≈											
165	+0.1 +0	140	-0 -0.1	157.6	-0 -0.1	25.4	9.5	0.8	162.5	-0 -0.25	
170	+0.1 +0	148	-0 -0.1	166	-0 -0.1	26.5	5.1	0.8	169	-0 -0.25	
175	+0.1 +0	150	-0 -0.1	166.7	-0 -0.1	25.4	12.7	0.8	172.1	-0 -0.25	
180	+0.115 +0	150	-0 -0.1	172.95	-0 -0.1	35.4	6.35	0.8	177.87	-0 -0.25	
180	+0.115 +0	155	-0 -0.1	171.7	-0 -0.1	25.4	12.7	0.8	177.1	-0 -0.25	
185	+0.115 +0	160	-0 -0.1	176.7	-0 -0.1	25.4	12.7	0.8	182.1	-0 -0.29	
190	+0.115 +0	165	-0 -0.1	181.7	-0 -0.115	25.4	1.7	0.8	187	-0 -0.29	
195	+0.115 +0	170	-0 -0.1	186.7	-0 -0.115	25.4	12.7	0.8	192	-0 -0.29	
200	+0.115 +0	175	-0 -0.1	191.6	-0 -0.115	25.4	12.7	0.8	197	-0 -0.29	
200	+0.115 +0	175	-0 -0.1	196	-0 -0.115	31.5	6.6	0.8	199	-0 -0.29	
210	+0.115 +0	185	-0 -0.115	201.6	-0 -0.115	25.4	12.7	0.8	207	-0 -0.29	
220	+0.115 +0	190	-0 -0.115	212.7	-0 -0.115	35.4	6.35	0.8	217.9	-0 -0.29	
220	+0.115 +0	195	-0 -0.115	211.6	-0 -0.115	25.4	12.7	0.8	217	-0 -0.29	
230	+0.115 +0	205	-0 -0.115	221.6	-0 -0.115	25.4	12.7	0.8	227	-0 -0.29	
240	+0.115 +0	215	-0 -0.115	231.6	-0 -0.115	25.4	12.7	0.8	237	-0 -0.29	
250	+0.13 +0	220	-0 -0.115	242.9	-0 -0.115	35.4	6.35	0.8	247.85	-0 -0.29	
250	+0.13 +0	225	-0 -0.115	241.6	-0 -0.115	25.4	12.7	0.8	247	-0 -0.29	
250	+0.13 +0	225	-0 -0.115	246.1	-0 -0.115	31.5	6.7	0.8	249	-0 -0.32	

Other dimensions and all intermediate sizes diameter including imperial (inch) sizes can be supplied.
규격외 치수의 제품도 공급 가능합니다.

Piston Seal



Maximum extrusion gap

Pressure bar	5.0	7.5	8.0	10.0
Maximum Gap mm	0.6	0.5	0.45	0.35

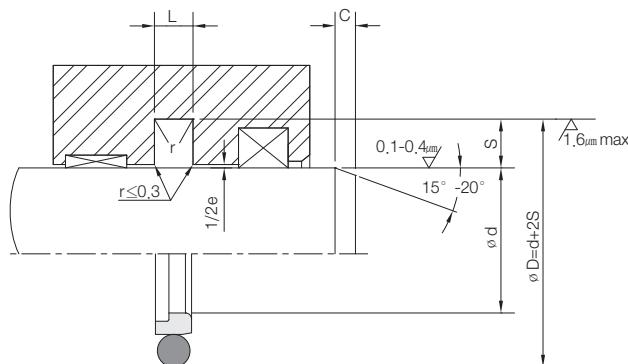
Chamfer & Radii

Groove Section ≤ S mm	3.25	5.5	7.75	10.5	12.5
Min Chamfer C mm	2.0	2.5	5.0	7.5	10.0
Max Fillet Rad r mm	0.4	0.8	1.2	1.6	2.0

Bore Dia.		Groove Dimensions			O-Ring Size No.	PART No.	Bore Dia.		Groove Dimensions			O-Ring Size No.	PART No.
øD1	TOL H9	ød1	TOL h9	L1 +0.2			øD1	TOL H9	ød1	TOL h9	L1 +0.2		
≈													
125	+0.10 +0	109.5	-0 -0.087		#347		225	+0.12 +0	204	-0 -0.115	8.1	#445	
130	+0.10 +0	114.5	-0 -0.087	6.3	#349		230	+0.12 +0	209	-0 -0.115	8.1	#445	
135	+0.10 +0	114	-0 -0.087	8.1	#425		240	+0.12 +0	219	-0 -0.115	8.1	#446	
140	+0.10 +0	119	-0 -0.087	8.1	#426		250	+0.12 +0	229	-0 -0.115	8.1	#447	
145	+0.10 +0	124	-0 -0.10	8.1	#428		260	+0.13 +0	239	-0 -0.115	8.1	#448	
150	+0.10 +0	129	-0 -0.10	8.1	#429		280	+0.13 +0	259	-0 -0.13	8.1	#449	
155	+0.10 +0	134	-0 -0.10	8.1	#431		300	+0.13 +0	279	-0 -0.13	8.1	#451	
160	+0.10 +0	139	-0 -0.10	8.1	#432		310	+0.13 +0	289	-0 -0.13	8.1	#451	
165	+0.10 +0	144	-0 -0.10	8.1	#434		320	+0.14 +0	299	-0 -0.13	8.1	#452	
170	+0.12 +0	149	-0 -0.10	8.1	#435		330	+0.14 +0	305.5	-0 -0.13	8.1	#453	
180	+0.12 +0	159	-0 -0.10	8.1	#438		340	+0.14 +0	315.5	-0 -0.114	8.1	#454	
185	+0.12 +0	164	-0 -0.10	8.1	#438		350	+0.14 +0	325.5	-0 -0.114	8.1	#454	
190	+0.12 +0	169	-0 -0.10	8.1	#439		360	+0.14 +0	335.5	-0 -0.114	8.1	#455	
200	+0.12 +0	179	-0 -0.10	8.1	#441		370	+0.14 +0	345.5	-0 -0.114	8.1	#456	
210	+0.12 +0	189	-0 -0.115	8.1	#442		380	+0.14 +0	355.5	-0 -0.114	8.1	#457	
220	+0.12 +0	199	-0 -0.115	8.1	#444		390	+0.14 +0	365.5	-0 -0.114	8.1	#457	
							400	+0.14 +0	375.5	-0 -0.114	8.1	#458	

Other dimensions and all intermediate sizes diameter including imperial (inch) sizes can be supplied.
규격외 치수의 제품도 공급 가능합니다.

Step Seal



Chamfer & Radii

Groove Section ≤ S mm	2.45	3.65	5.35	7.55	10.25
Min Chamfer C mm	2	2	3	5	7.5
Max Fillet Rad r mm	0.4	0.6	1.0	1.3	1.8

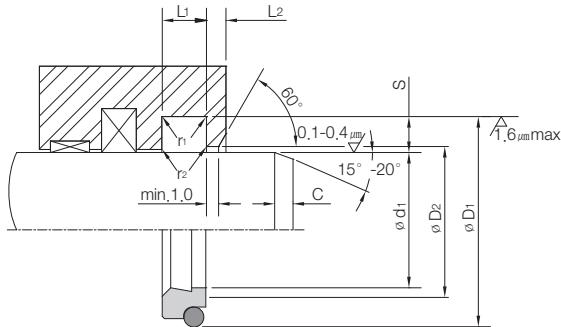
Installation dimensions-Standard recommendations

Rod Diameter ød			Groove Diameter S(mm)	Gap max. e[mm]	
Standard Application	Light Application	Heavy Duty Application		0~200 bar	200~400 bar
3 ~ 7.9	3 ~ 7.9	3 ~ 7.9	3 ~ 7.9	3 ~ 7.9	3 ~ 7.9
8 ~ 18.9	8 ~ 18.9	8 ~ 18.9	8 ~ 18.9	8 ~ 18.9	8 ~ 18.9
19 ~ 379	19 ~ 379	19 ~ 379	19 ~ 379	19 ~ 379	19 ~ 379
10 ~ 199.9	10 ~ 199.9	10 ~ 199.9	10 ~ 199.9	10 ~ 199.9	10 ~ 199.9
200 ~ 255.9	200 ~ 255.9	200 ~ 255.9	200 ~ 255.9	200 ~ 255.9	200 ~ 255.9

Bore Dia.		Groove Dimensions			O-Ring Size No.	PART No.	Bore Dia.		Groove Dimensions			O-Ring Size No.	PART No.
ød	TOL f8	øD	TOL H9	L +0.2			ød	TOL f8	øD	TOL H9	ø1 +0.2		
≈													
50	-0.025 -0.064	60.7	+0.07 +0	4.2	#227		150	-0.04 -0.10	165.1	+0.1 +0	6.3	#362	
60	-0.030 -0.076	7.07	+0.07 +0	4.2	#230		160	-0.04 -0.10	175.1	+0.1 +0	6.3	#363	
70	-0.030 -0.076	85.1	+0.09 +0	6.3	#337		170	-0.04 -0.10	185.1	+0.12 +0	6.3	#365	
80	-0.030 -0.076	95.1	+0.09 +0	6.3	#340		180	-0.04 -0.10	200.5	+0.12 +0	8.1	#445	
90	-0.03 -0.09	105.1	+0.09 +0	6.3	#343		190	-0.05 -0.12	205.1	+0.12 +0	6.3	#368	
100	-0.03 -0.09	115.1	+0.09 +0	6.3	#347		200	-0.05 -0.12	220.5	+0.12 +0	8.1	#445	
110	-0.03 -0.09	125.1	+0.1 +0	6.3	#350		210	-0.05 -0.12	230.5	+0.12 +0	8.1	#446	
120	-0.03 -0.09	135.1	+0.1 +0	6.3	#353		220	-0.05 -0.12	240.5	+0.12 +0	8.1	#447	
130	-0.04 -0.10	145.1	+0.1 +0	6.3	#356		230	-0.05 -0.12	250.5	+0.13 +0	8.1	#448	
140	-0.04 -0.10	155.1	+0.1 +0	6.3	#359		240	-0.05 -0.12	260.5	+0.13 +0	8.1	#449	

Other dimensions and all intermediate sizes diameter including imperial (inch) sizes can be supplied.
규격외 치수의 제품도 공급 가능합니다.

Excluder Seal



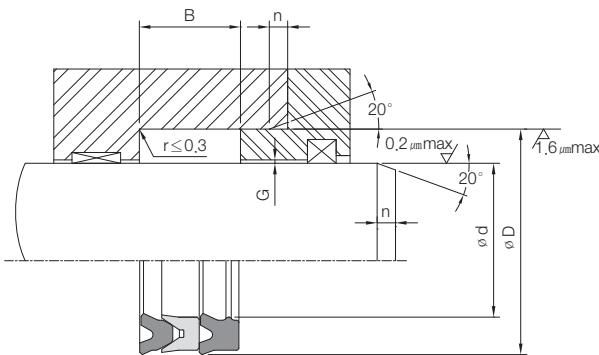
Chamfer & Radii

Groove Section ≤ S mm	3.4	4.4	6.1	8.0
Min Chamfer C mm	2	2	2.5	4
Max Fillet Rad r1 mm	0.5	0.5	0.5	0.5
Max Fillet Rad r2 mm	0.5	0.5	0.5	0.5

Rod Dia.		Groove Dimensions			Bore Dimensions			O-Ring Size No.	PART No.
ød ₁	TOL f8	øD ₁	TOL H11	L ₁ +0.2	D ₂	TOL H11	L ₂ min		
63	+0.030 +0.076	69.8	+0.019 +0	5	64.5	+0.019 +0	2	#145	
80	+0.030 +0.076	92.2	+0.022 +0	8.1	82	+0.022 +0	4	#237	
100	+0.03 +0.09	112.2	+0.022 +0	8.1	102	+0.022 +0	4	#243	
140	+0.04 +0.10	152.2	+0.025 +0	8.1	142	+0.025 +0	4	#256	
160	+0.04 +0.10	176	+0.025 +0	9.5	162.5	+0.025 +0	5	#363	

Other dimensions and all intermediate sizes diameter including imperial (inch) sizes can be supplied.
규격외 치수의 제품도 공급 가능합니다.

Piston Rod Seal

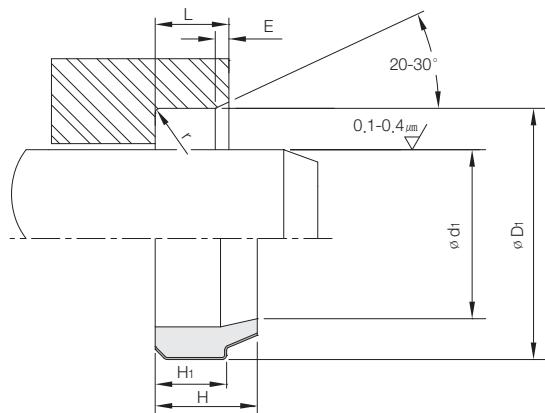


Rod Dia.		Groove Dimensions			Bore Dimensions			PART No.
ød	TOL f8	øD	TOL H10	B +0.4	G	G +0.05	n	
40	+0.025 +0.064	55	+0.012 +0	5	22.5	0.2	5	
60	+0.030 +0.076	75	+0.012 +0	8.1	22.5	0.2	5	
80	+0.036 +0.090	100	+0.014 +0	8.1	30	0.2	5	
90	+0.036 +0.090	110	+0.014 +0	8.1	30	0.2	5	
100	+0.036 +0.090	120	+0.014 +0	9.5	30	0.2	5	

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Other dimensions and all intermediate sizes diameter including imperial (inch) sizes can be supplied.
규격외 치수의 제품도 공급 가능합니다.

Dust Seal



Radii

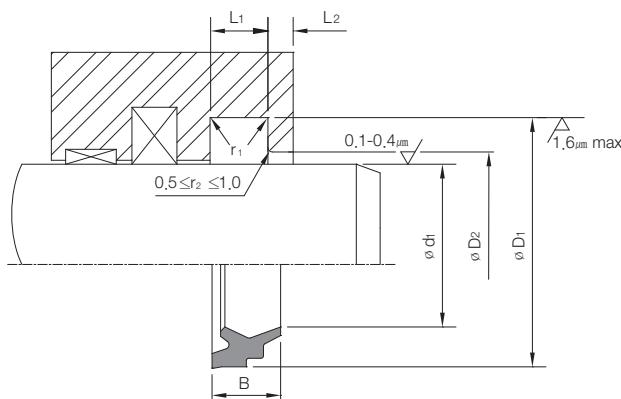
Rod Diameter $\varnothing d$ mm	≤ 19	$19 \leq$
Max Fillet Rod r mm	≤ 0.5	≤ 0.5
Min Chamfer E mm	0.5	1.0

Rod Dia.		Groove Dimensions			Width	PART No.
$\varnothing d$	TOL f9	$\varnothing D$	TOL H8	$H_1/L +0.5$	H	
20	-0.020 -0.072	30	+0.033 +0	4	6	
40	-0.025 -0.087	50	+0.039 +0	7	10	
60	-0.030 -0.104	70	+0.046 +0	7	10	
80	-0.030 -0.104	90	+0.054 +0	7	10	

Rod Dia.		Groove Dimensions			Width	PART No.
$\varnothing d$	TOL f9	$\varnothing D$	TOL H8	$H_1/L +0.5$	H	
10	-0.036 -0.123	110	+0.054 +0	7	10	
120	-0.036 -0.123	130	+0.063 +0	7	10	
140	-0.043 -0.143	155	+0.063 +0	9	12	

Other dimensions and all intermediate sizes diameter including imperial (inch) sizes can be supplied.
규격외 치수의 제품도 공급 가능합니다.

Scraper Seal



Radii & Width

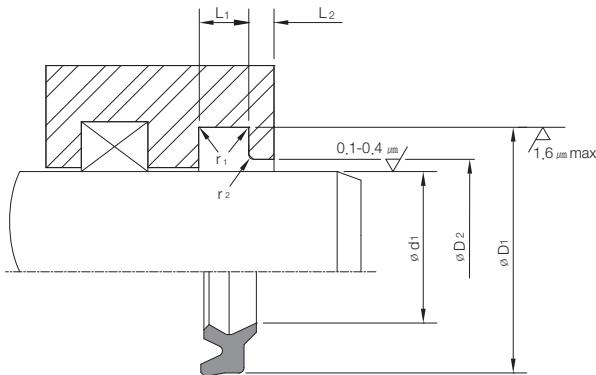
Rod Diameter $\varnothing d$ mm	≤ 00	$100 \leq$	200
Max Fillet Rod r mm	0.4	0.4	0.4
Seal Width B mm	8	11	13

Rod Dia.		Groove Dimensions			Bore Dimensions			PART No.
$\varnothing d_1$	TOL f8	$\varnothing D_1$	TOL H9	$L_1 +0.2$	$\varnothing D_2$	TOL H11	$L_2 \text{ min}$	
40	+0.025 +0.064	48	+0.06 +0	6	43.5	+0.16 +0	2	
60	+0.030 +0.076	68	+0.07 +0	6	63.5	+0.19 +0	2	
80	+0.036 +0.090	88	+0.08 +0	6	83.5	+0.22 +0	2	
100	+0.036 +0.090	108	+0.08 +0	6	103.5	+0.22 +0	2	

≈

Other dimensions and all intermediate sizes diameter including imperial (inch) sizes can be supplied.
규격외 치수의 제품도 공급 가능합니다.

Dust Seal



Chamfer & Radii

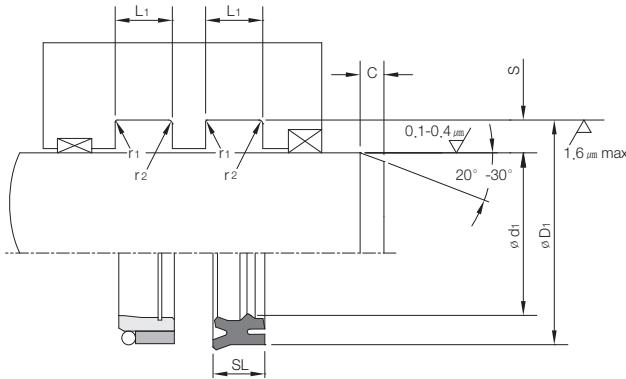
Rod Diameter ød mm	≤90	90<
Max Fillet Rod r1 mm	0.2	0.4
Max Fillet Rod r2 mm	0.4	0.4

Rod Dia.		Groove Dimensions			Bore Dimensions			PART No.
ød ₁	TOL f9	øD ₁	TOL H11	L ₁ +0.2	øD ₂	TOL H11	L ₂ min	
20	+0.020 +0.072	26	+0.13 +0	4	22.5	+0.13 +0	7	
30	+0.020 +0.072	38	+0.16 +0	5	33	+0.16 +0	8	
40	+0.025 +0.087	48	+0.16 +0	5	43	+0.16 +0	8	
50	+0.025 +0.087	58	+0.19 +0	5	53	+0.19 +0	8	
70	+0.030 +0.104	80	+0.19 +0	6	73	+0.19 +0	9.7	

≈

Other dimensions and all intermediate sizes diameter including imperial (inch) sizes can be supplied.
규격외 치수의 제품도 공급 가능합니다.

Split Rod Seal / Rod Seal



Chamfer & Radii

Rod Diameter ød mm	4.0	5.0	7.5	10.0	12.5	15.0
Min Chamfer C mm	3.0	3.5	5.0	6.5	7.0	8.0
Max Fillet Rod r1 mm	0.2	0.4	0.8	0.8	1.2	1.6
Max Fillet Rod r2 mm	0.4	0.8	1.2	1.2	1.6	2.4

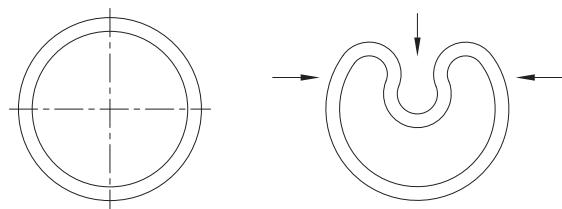
Pressure bar	160	250	400
Maximum Gap mm	0.6	0.5	0.4

Bore Dia.		Groove Dimensions			Width	PART No.	Bore Dia.		Groove Dimensions			Width	PART No.
ød	TOL f9	øD	TOL js11	L ₁ +0.25	SL		ød	TOL f9	øD	TOL js11	L ₁ +0.25	SL	
30	-0.020 -0.072	50	+0.08 +0.08	11	10		80	-0.030 -0.104	95	+0.11 +0.11	11	10	
40	-0.025 -0.087	55	+0.095 +0.095	10	9		90	-0.036 -0.123	100	+0.11 +0.11	10	9	
50	-0.025 -0.087	60	+0.095 +0.095	7	6		100	-0.036 -0.123	115	+0.11 +0.11	10	9	
60	-0.030 -0.104	70	+0.095 +0.095	11	10		110	-0.036 -0.123	125	+0.125 +0.125	10	9	
70	-0.030 -0.104	80	-0.11 -0.11	7	6		120	-0.036 -0.123	135	+0.125 +0.125	10	9	

Other dimensions and all intermediate sizes diameter including imperial (inch) sizes can be supplied.
규격외 치수의 제품도 공급 가능합니다.

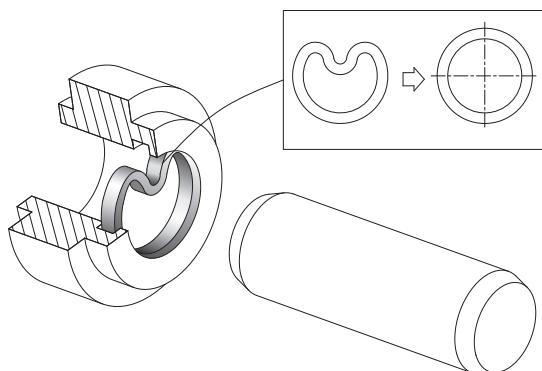
설치전

- 실린더와 피스톤 로드의 모서리를 깎아낸다.
- 날카로운 모서리, 나사부위를 모나지 않게 만든다.
- 먼지 및 불순물을 제거하고 나사판의 끝부분을 덮는다.
- 날카로운 형상의 공구사용을 피한다.
- 조립전에 Cylinder, Piston Rod와 Seal에 오일 또는 Grease를 주입한다.
- PTFE 복합소재의 제품은 80°C~120°C의 오일 또는 물에서 쉽게 팽창한 후 복원된다.



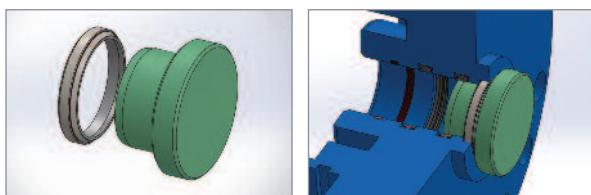
Rod Seal (ID) 설치방법

- 깨끗이 닦은 후 모든 Hardware부위, Seal 구성요소 및 Sizing Rod에 윤활유를 주입.
- 고무 또는 PTFE복합소재를 Gland Assembly 부위에 밀어 넣음.
- 먼지 및 불순물을 제거하고 나사판의 끝부분을 덮는다.
- 그림과 같이 주름이 지지 않도록 조심하여 Seal Ring을 접는다. 만일 가능하면, 조립 후 Seal Ring의 ID를 부드럽게 빼내기 위해 손가락을 사용.
- Tool을 사용하여 Bore로 넣고, 약 1분 후 Tool을 Bore에서 제거.



Dust Seal 설치방법

- 장착부와 억지끼움으로 조립되는 Dust Seal일 경우 장착시 Seal의 손상을 막기 위해 Tool을 사용.
- 수지계열의 소재인 Tool을 활용하여 Dust Seal을 Tool에 조립
- Seal이 장착된 Tool을 장착부에 조립하여 힘박음으로 설치하고, 설치가 완료되면 Tool 제거



Dust Seal 조립

SEALING DEVICE
DONGSUH®

The DONGSUH is moving forward
with a renewed sprit of service for customers.

