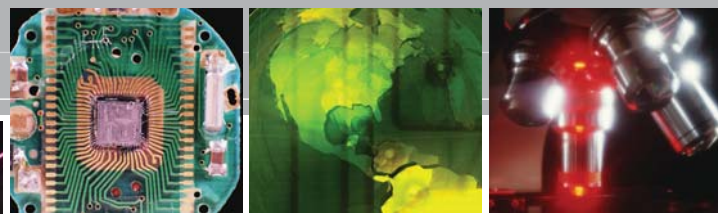


# Mechanical Seals

Carbon Graphite Nr.KDST-2008



[www.kdseal.co.kr](http://www.kdseal.co.kr)  
[www.kdseal.co.kr](http://www.kdseal.co.kr)

# 인사말

극동씰테크(주)는 국내에서 유일하게 Rubber Bellows Mechanical Seal을 Full Line으로 생산하는 업체입니다.

국내에서 통용되는 전 규격의 Mechanical Seal을 ISO 3069, DIN 24960, KS B 1566 기준에 입각해 표준 생산하는 업체로서 설계에서 제작까지 국내 최대 약 2,200여종을 규격 생산합니다.

국내 유일의 고품질, 고밀도의 Carbon, Graphite 응용제품을 생산하는 업체입니다.

지속적인 연구와 기술개발로 소수 기술선진국의 전유물이었던 고품질, 고밀도의 탄소재(Carbon, Graphite)응용제품을 소재 생산에서 기능성 완성품까지 대량생산기술을 보유하고, 국내 최초로 내마모성 Mechanical Seal Ring재, 가스미터기의 Carbon Valve 및 Seat, 주유기의 Carbon Sheet, 고밀도 Carbon Bushing, Bearing 등 박판·고굴절 탄소재 제품을 최첨단 Injection 공법 및 Press공법으로 대량생산하고 있습니다.

생산제품의 균일한 품질을 위한 일괄 공정관리가 가능한 업체입니다.

Mechanical Seal의 설계에서 Rubber Bellows 작업, Press 작업, Carbon·Graphite Seal Ring재 및 기계구조용 응용제품의 생산, 안정화 작업, 소결 작업까지 자체 보유기술 및 장비로 균일한 고품질의 제품생산이 가능하며, 소재에서 완제품까지 사용환경에 따른 최상의 재질적용을 할 수 있는 업체입니다.

## 연혁

**2008** · 주유기용 탄소재 로타리 밸브 국산화 개발

**2007** · 해수유입 방지용 시스템 개발  
· 자동차 연료전자용 탄소재시트 개발  
· 소형펌프용 탄소재 무급유 베어링 국산화 개발  
· 자동차 컴프레셔용 고속회전용 Mechanical seal 국산화 개발  
· 병역특례업체 선정

**2006** · 자동차 캐리어(대차)용 고밀도 탄소재 국산화 개발  
· 자동차 Alternator용 고밀도 탄소재 Vane 개발  
· 무급유 탄소재 Bearing, roller, valve 국산화 개발

**2005** · 원자력발전소 부품정비업체 자격획득  
· 탄소재 특허 등록(6건)  
· Cold Press용 고밀도 탄소재 개발  
· 해수용 고압펌프용 Mechanical seal 국산화 개발  
· 한진해운 보수용 Mechanical seal 공급업체 선정  
· 고속회전 선박엔진용 Mechanical seal 국산화 개발

**2004** · 부품·소재 전문기업 선정  
· 고밀도 탄소재 매연저감장치(E.G.R Valve) 개발  
· 자동차 캐리어용 고밀도 탄소재 Roller 국산화 개발  
· 전자기 연료펌프용 Mechanical seal 공급업체 선정

**2003** · 벤처기업 선정  
· 버스 냉동기용 고밀도 탄소재 개발  
· Injection용 탄소재 및 공법개발  
· 탄소재 특허 등록(1건)  
· 해수(海水)용 진공펌프용 Mechanical seal 국산화  
· B&W, MTU 선박엔진용 Mechanical seal 국산화 개발

**2002** · QS 9000 인증  
· 탄소재 적용 Mechanical seal 제조기술 수출(Thailand)  
· 고순도 Pitch 응용 탄소재 국산화 개발  
· 전차(장갑차) 연료 펌프용 Mechanical seal 국산화 개발

**2001** · INNO-BIZ 기업 선정  
· 고순도 Mesophase pitch 국산화 개발  
· 탄소재 특허 등록(2건)  
· 선박엔진용 연료펌프 및 Coolant pump용 Seal 국산화 개발  
· 현대상선 보수용 Mechanical seal 공급업체 선정  
· 방산 협력업체 지정

**2000** · ISO 9001 인증 기술경쟁력 우수업체 선정  
· 주유기 탄소재 시트 및 부시 국산화 개발  
· 오·폐수용 Mechanical seal 국산화 개발  
· Hot press용 탄소재 국산화 개발

· 항공·우주 기술개발 주관기업 선정  
· 정부기관 Mechanical seal 품질등급(R) 획득

# Greetings

KD Seal Tech Co.,Ltd. headquartered at Gyeongbuk Province, Korea, has pioneered the development and production in the fields of Carbon and Graphite application products as a sole manufacturer of High-density Carbon materials in Korea over twenty years.

Such superior-quality products made by KD Seal Tech Co.,Ltd. are the ones which are applied and manufactured in accordance with the high technology methods such as injection, Extrusion, Hot Pressing and Cold Pressing, etc.

And KD Seal Tech Co.,Ltd. is much proud to make complete control from the optimum materials to the top-quality end products by each process.

Based on such mechanisms, we are able to manufacture high-refraction and good quality thin plate products.

Our complete control of whole system by each process also enables us to supply all our customers with the excellent quality products which are entirely complied with required usages.

Please refer to the following description for your better understanding about our mechanisms.

In brief, KD Seal Tech Co.,Ltd. takes pride its this prestigious reputation in the fields of Carbon and Graphite Application Products at home and abroad as well.

We can assure you that we will exert ourselves to intensify the research activities for advanced Quality improvement that will upgrade our status accordingly.

Your consistent cooperation and support would be greatly appreciated.

Thank you very much for your kind attention.

Very truly yours.

Representative Young Soon Lee

## Certification & Certification Status

- |      |  |
|------|--|
| 2008 | Localized by developing Rotary Valves of Carbon materials for Lubricators.   |
| 2007 | Developed Systems for holding back the Seawaters.<br>Developed Sheet of Carbon materials for Fuel Cells of Automobiles.<br>Localized by developing non-refueling Bearings of Carbon materials for small-sized Pumps.<br>Localized by developing Mechanical Seals of high speed rotation for Automobile Compressors.<br>Selected as a Company of the Military Service Exception.                                |
| 2006 | Localized by developing high density Carbon materials for Automobile Carriers.<br>Developed Vanes of high Carbon materials for Automobile Alternators.<br>Localized by Developing Bearings, Rollers and Valves of non-refueling Carbon materials.<br>Registered as a supplier of Mechanical seal and Carbon products for Korea Hydro & Nuclear Power Co.,Ltd.<br>Export prospect small and medium enterprises. |
| 2005 | Carbon Material Patent : 5 cases<br>Registered as a supplier of Mechanical seal, Carbon & Graphite products for Nuclear Power Plant  |
| 2004 | Corporation elected by INNO-BIZ(the Small and Medium Business Administration),<br>Elected as a corporation specialized on parts and materials, Carbon & Graphite material Patent : 2 cases   |
| 2003 | Elected as Venture company, Carbon & Graphite material Patent : 3 cases<br>Elected as a technical development corporation for aircraft supporting parts, and as a supplier of air force supporting parts.  |
| 2002 | QS-9000 certification, Carbon & Graphite material Patent : 2 cases   |
| 2001 | ISO 9001 certification<br>Elected as Competitive Technology corporation (the Small and Medium Business Administration)<br>Elected as a supplier of parts for Nuclear Power Plant   |
| 2000 | Registered as a Cooperation company for Defense industrial company<br>Elected as a supplier of navy supporting parts (Warship, Submarine)<br>Elected as a supplier of army supporting parts (Tank, Truck, Missile)   |

## Industrial Type Mechanical Seals



## Carbon Application Products

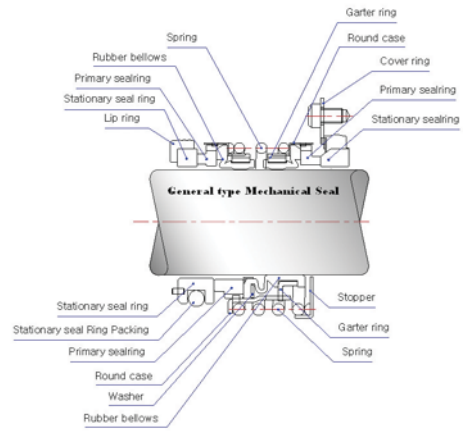
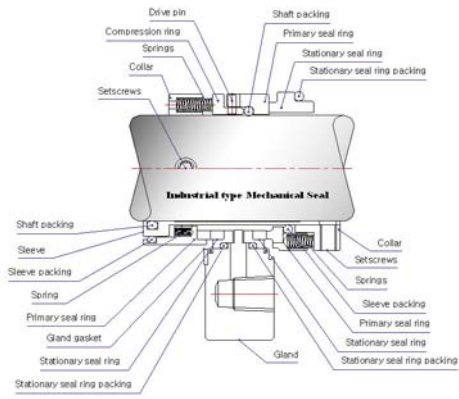


## ■ Wear Resistance Materials



## ■ General Type Mechanical Seals





## Shaft Packing



**O-Ring**



**Bellows**



**V-Ring**

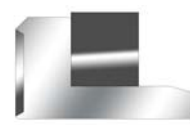


**Wedge-Ring**



**Square-Ring**

## Stationary Seal Ring



# Mechanical Seal Identification

Mechanical Seal are Identification to the following criteria

## KDS-035-AGPFN

품명	규격	재질
NAME	SPEC	MATERIALS

### Code-1 Stationary / 고정자 형성

A	One O-Ring	C	O-Ring mount	E	L-Sharp
B	Two O-Ring	D	Square mount	F	Lip ring

### Code-2 Stationary materials / 고정자 구성재질

G	SiC solid	J	Ceramic solid	M	Tungsten carbide solid
H	SiC plated	K	Ceramic plated	N	Tungsten carbide plate
I	Carbon graphite	L	Alumina oxide coated	O	Tungsten carbide coated

### Code-3 Primary seal ring materials / 회전자 구성재질

P	SiC solid	T	Ceramic solid	X	Tungsten carbide solid
Q	SiC plated	U	Ceramic plated	Y	Tungsten carbide plate
R	Carbon graphite	V	Alumina oxide coated	Z	Tungsten carbide coated
S	Copper allye	W	Stellite coated	A	Special

### Code-4 Secondary seal ring materials / 패키징 구성재질

B	FPM O-ring	F	EP(EPR) Bellows	J	NBR O-Ring
C	FPM Bellows	G	EP(EPR) Packing	K	NBR Bellows
D	FPM Packing	H	PTFE Packing	L	NBR Packing
E	EP(EPR) O-Ring	I	PTFE Bellows	M	Special

### Code-5 Body, retainer, spring materials / 몸체, 스프링 구성재질

N	SUS 304	Q	Titanium	T	
O	SUS 316L	R	Copper allyed steel	U	
P	Hastelloy C	S	Capenter 20	V	Special



KUO / KUT



KBO / KBT



UUO / UUT



USO



BG



SWO / SWL



CH4



LHO / LHS



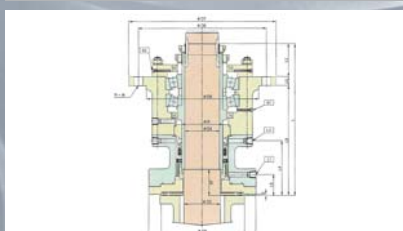
MBO



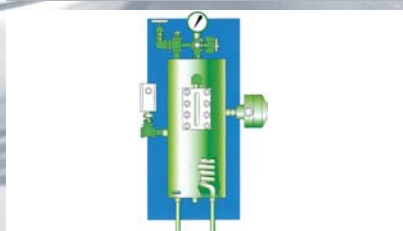
SJD



CTD

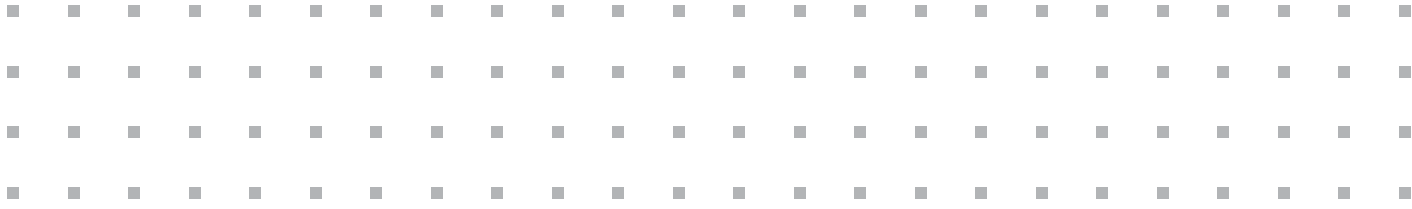


KDSU



KDST





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## ▶ Industrial type Mechanical Seals

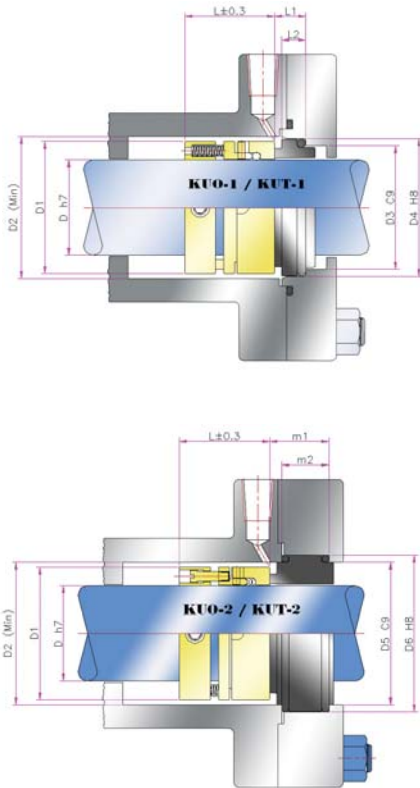


# KUO KUO with o-ring

# KUT KUT with PTFE packing



Unbalance multi spring ISO3069 / DIN24960



KUO Dimension Table

mm	inch	D1	D2	D3	D4	D5	D6	L	L1	L2	m1	m2
20		34.0	36.0	29.0	35.0	36.0	42.0	35.0	11.5	8.5	23.0	18.0
22	7/8	36.0	38.0	31.0	37.0	38.0	44.0	35.0	11.5	8.5	23.0	18.0
25	1	39.0	41.0	34.0	40.0	41.0	47.0	35.0	11.5	8.5	23.0	18.0
28	1-1/8	42.0	44.0	37.0	43.0	44.0	50.0	35.0	11.5	8.5	23.0	18.0
30		44.0	46.0	39.0	45.0	46.0	52.0	35.0	11.5	8.5	23.0	18.0
32	1-1/4	46.0	48.0	42.0	48.0	48.0	54.0	35.0	11.5	8.5	23.0	18.0
35	1-3/8	49.0	51.0	44.0	50.0	51.0	57.0	35.0	11.5	8.5	23.0	18.0
38	1-1/2	54.0	58.0	49.0	56.0	58.0	64.0	38.0	14.0	11.0	25.0	20.0
40		56.0	60.0	51.0	58.0	60.0	66.0	38.0	14.0	11.0	25.0	20.0
42		58.0	62.0	54.0	61.0	62.0	68.0	38.0	14.0	11.0	25.0	20.0
45	1-3/4	61.0	65.0	56.0	63.0	65.0	71.0	38.0	14.0	11.0	25.0	20.0
48	1-7/8	64.0	68.0	59.0	66.0	68.0	74.0	38.0	14.0	11.0	25.0	20.0
50	2	66.0	70.0	62.0	70.0	70.0	76.0	39.0	15.0	12.0	25.0	20.0
55		71.0	75.0	67.0	75.0	75.0	81.0	40.0	15.0	12.0	25.0	20.0
60	2-3/8	78.0	85.0	72.0	80.0	85.0	91.0	41.0	15.0	12.0	28.0	22.0
65		83.0	90.0	77.0	85.0	90.0	96.0	41.0	15.0	12.0	28.0	22.0
70	2-3/4	90.0	95.0	83.0	92.0	95.0	101.0	42.0	18.0	15.0	30.0	24.0
75		95.0	104.0	88.0	97.0	104.0	110.0	42.0	18.0	15.0	30.0	24.0
80	3-1/8	100.0	109.0	95.0	105.0	109.0	115.0	42.0	18.2	15.2	31.0	25.0
85	3-3/8	105.0	114.0	100.0	110.0	114.0	120.0	43.0	18.2	15.2	31.0	25.0
90		110.0	119.0	105.0	115.0	119.0	125.0	45.0	18.2	15.2	31.0	25.0
95	3-3/4	115.0	124.0	110.0	120.0	124.0	130.0	45.0	18.2	15.2	31.0	25.0
100		120.0	129.0	115.0	125.0	129.0	135.0	45.0	18.2	15.2	31.0	25.0

This series is typical mechanical seal type utilizing multi spring and is made possible by the accumulation of experience and our own studies in material and application techniques.

Application Range (적용범위)			Particulars of type (특징)	Compatible Seal Liquid (적용유체)
Pressure(max)	[KUO] 12kg/cm <sup>2</sup> G	[KUT] 10kg/cm <sup>2</sup> G	Inside unbalance seal	Non crystallizing acid
Temperature	-20°C~200°C	-60°C~250°C	Multi-spring type	Alkali
Velocity (max)	15m/sec	15m/sec	KUO: O-Ring type	Salt
Viscosity (max)	300cp	300cp	KUT: P.T.F.E-packing type	Low viscosity oil
Slurry (max)	0.5%	0.3%		Low slurry water etc.

# KBO

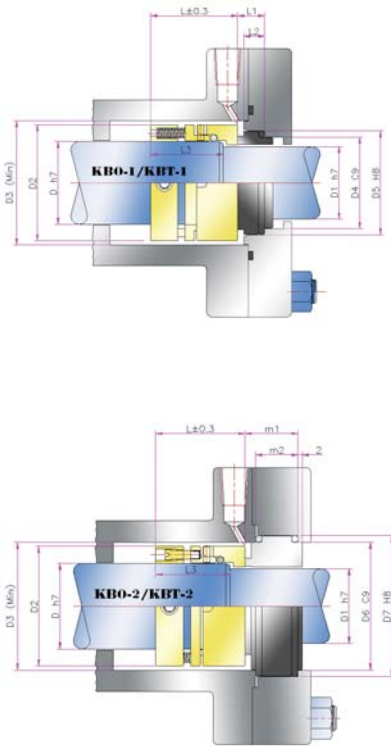
KBO with o-ring

# KBT

KBT with PTFE packing



Balance multi spring ISO3069 / DIN24960



**KBO Dimension Table**

mm	inch	D1	D2	D3	D4	D5	D6	D7	L	L1	L2	L3	m1	m2
20		16.0	34.0	36.0	23.0	27.0	36.0	42.0	44.0	10.0	7.0	36.0	23.0	18.0
22	7/8	18.0	36.0	38.0	27.0	33.0	38.0	44.0	44.0	11.5	8.5	36.0	23.0	18.0
24	15/16	20.0	38.0	40.0	29.0	35.0	40.0	46.0	44.0	11.5	8.5	36.0	23.0	18.0
26		22.0	40.0	42.0	31.0	37.0	42.0	48.0	44.0	11.5	8.5	36.0	23.0	18.0
28	1- 1/8	24.0	42.0	44.0	33.0	39.0	44.0	50.0	44.0	11.5	8.5	36.0	23.0	18.0
30	1-3/16	25.0	44.0	46.0	34.0	40.0	46.0	52.0	44.0	11.5	8.5	36.0	23.0	18.0
33		28.0	47.0	49.0	37.0	43.0	49.0	55.0	44.0	11.5	8.5	36.0	23.0	18.0
35	1- 3/8	30.0	49.0	51.0	39.0	45.0	57.0	63.0	44.0	11.5	8.5	36.0	23.0	18.0
38	1- 1/2	32.0	54.0	58.0	42.0	48.0	58.0	64.0	47.0	11.5	8.5	39.0	25.0	20.0
40		35.0	56.0	60.0	44.0	50.0	60.0	66.0	47.0	11.5	8.5	39.0	25.0	20.0
43		38.0	59.0	63.0	49.0	56.0	63.0	69.0	47.0	14.0	11.0	39.0	25.0	20.0
45	1- 3/4	40.0	61.0	65.0	51.0	58.0	65.0	71.0	47.0	14.0	11.0	39.0	25.0	20.0
48	1- 7/8	43.0	64.0	68.0	54.0	61.0	68.0	74.0	47.0	14.0	11.0	39.0	25.0	20.0
50	2	45.0	66.0	70.0	56.0	63.0	70.0	76.0	48.0	15.0	12.0	40.0	25.0	20.0
55		50.0	71.0	75.0	62.0	70.0	75.0	81.0	49.0	15.0	12.0	40.0	25.0	20.0
60	2- 3/8	55.0	78.0	85.0	67.0	75.0	85.0	91.0	50.0	15.0	12.0	41.0	28.0	22.0
65		60.0	83.0	90.0	72.0	80.0	90.0	96.0	50.0	15.0	12.0	41.0	28.0	22.0
70	2- 3/4	65.0	90.0	95.0	77.0	85.0	95.0	101.0	51.0	18.0	15.0	42.0	30.0	24.0
75		70.0	95.0	104.0	83.0	92.0	104.0	110.0	51.0	18.0	15.0	42.0	30.0	24.0
80	3- 1/8	75.0	100.0	109.0	88.0	97.0	109.0	115.0	51.0	18.2	15.2	42.0	31.0	25.0
85	3- 3/8	80.0	105.0	114.0	95.0	105.0	114.0	120.0	52.0	18.2	15.2	43.0	31.0	25.0
90		85.0	110.0	119.0	100.0	110.0	119.0	125.0	54.0	18.2	15.2	45.0	31.0	25.0
95	3- 3/4	90.0	115.0	124.0	105.0	115.0	124.0	130.0	54.0	18.2	15.2	45.0	31.0	25.0
100		95.0	120.0	129.0	110.0	120.0	129.0	135.0	54.0	18.2	15.2	45.0	31.0	25.0

The balance design on the KBO, KBT also works better in aggressive, abrasive and viscous fluids.

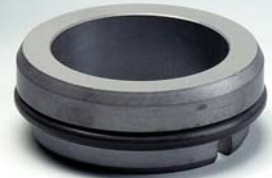
Application Range (적용범위)			Particulars of type (특징)	Compatible Seal Liquid (적용유체)
Pressure(max)	[KBO] 30kg/cm <sup>2</sup> G	[KBT] 30kg/cm <sup>2</sup> G	Inside balance seal	Non crystallizing acid
Temperature	-20°C~200°C	-60°C~250°C	Multi-spring type	Alkali
Velocity (max)	20m/sec	20m/sec	High Pressure	Salt
Viscosity (max)	300cp	300cp	KBO: O-Ring type	Low viscosity oil
Slurry (max)	0.5%	0.3%	KBT: P.T.F.E-packing type	Low slurry water etc.

# UUO

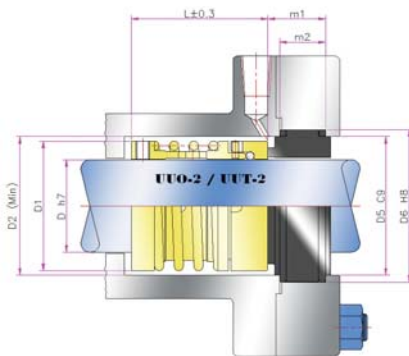
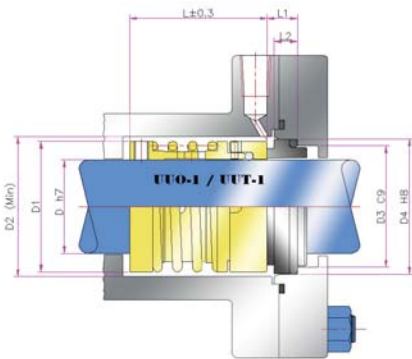
UUO with o-ring

# UUT

UUT with PTFE packing



Unbalance single spring ISO3069 / DIN24960



UUO Dimension Table

mm	inch	D1	D2	D3	D4	D5	D6	L	L1	L2	m1	m2
20		34.0	36.0	29.0	35.0	36.0	42.0	46.0	11.5	8.5	23.0	18.0
22	7/8	36.0	38.0	31.0	37.0	38.0	44.0	46.0	11.5	8.5	23.0	18.0
25	1	39.0	41.0	34.0	40.0	41.0	47.0	48.0	11.5	8.5	23.0	18.0
28	1-1/8	42.0	44.0	37.0	43.0	44.0	50.0	50.0	11.5	8.5	23.0	18.0
30		44.0	46.0	39.0	45.0	46.0	52.0	50.0	11.5	8.5	23.0	18.0
32	1-1/4	46.0	48.0	42.0	48.0	48.0	54.0	50.0	11.5	8.5	23.0	18.0
35	1-3/8	49.0	51.0	44.0	50.0	51.0	57.0	54.0	11.5	8.5	23.0	18.0
38	1-1/2	54.0	58.0	49.0	56.0	58.0	64.0	57.0	14.0	11.0	25.0	20.0
40		56.0	60.0	51.0	58.0	60.0	66.0	59.0	14.0	11.0	25.0	20.0
42		58.0	62.0	54.0	61.0	62.0	68.0	59.0	14.0	11.0	25.0	20.0
45	1-3/4	61.0	65.0	56.0	63.0	65.0	71.0	59.0	14.0	11.0	25.0	20.0
48	1-7/8	64.0	68.0	59.0	66.0	68.0	74.0	59.0	14.0	11.0	25.0	20.0
50	2	66.0	70.0	62.0	70.0	70.0	76.0	62.0	15.0	12.0	25.0	20.0
55		71.0	75.0	67.0	75.0	75.0	81.0	63.0	15.0	12.0	25.0	20.0
60	2-3/8	78.0	85.0	72.0	80.0	85.0	91.0	66.0	15.0	12.0	28.0	22.0
65		83.0	90.0	77.0	85.0	90.0	96.0	70.0	15.0	12.0	28.0	22.0
70	2-3/4	90.0	95.0	83.0	92.0	95.0	101.0	71.0	18.0	15.0	30.0	24.0
75		95.0	104.0	88.0	97.0	104.0	110.0	75.0	18.0	15.0	30.0	24.0
80	3-1/8	100.0	109.0	95.0	105.0	109.0	115.0	75.0	18.2	15.2	31.0	25.0
85	3-3/8	105.0	114.0	100.0	110.0	114.0	120.0	80.0	18.2	15.2	31.0	25.0
90		110.0	119.0	105.0	115.0	119.0	125.0	80.0	18.2	15.2	31.0	25.0
95	3-3/4	115.0	124.0	110.0	120.0	124.0	130.0	85.0	18.2	15.2	31.0	25.0
100		120.0	129.0	115.0	125.0	129.0	135.0	85.0	18.2	15.2	31.0	25.0

This series is typical mechanical seal type utilizing multi spring and is made possible by the accumulation of experience and our own studies in material and application techniques.

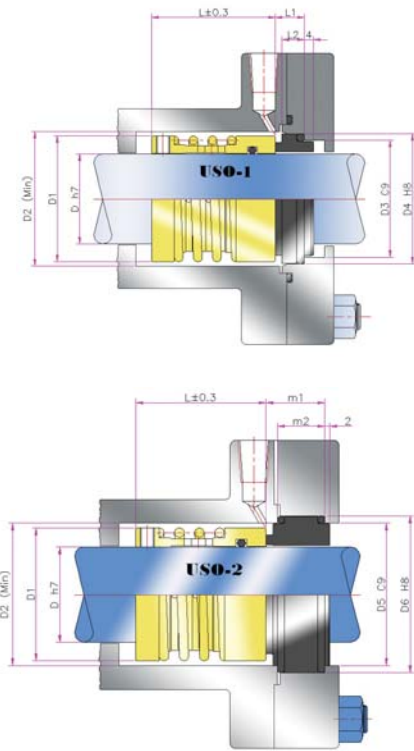
Application Range (적용범위)			Particulars of type (특징)	Compatible Seal Liquid (적용유체)
Pressure(max)	[UUO] 10kg/cm <sup>2</sup> G	[UUT] 10kg/cm <sup>2</sup> G	Inside unbalance seal Single-spring type UUO: O-Ring type UUT: P.T.F.E-packing type	crystallizing acid Alkali Salt High viscous polymer High slurry fluid Oil pulp Paing etc.
Temperature	-20°C~200°C	-60°C~250°C		
Velocity (max)	10m/sec	20m/sec		
Viscosity (max)	300000cp	150000cp		
Slurry (max)	7%	1%		

# USO

USO with o-ring



Unbalance single spring ISO3069 / DIN24960



USO Dimension Table

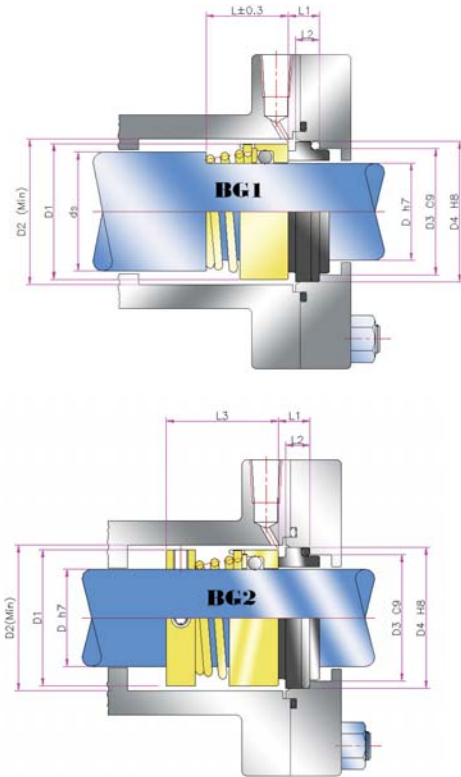
mm	inch	D1	D2	D3	D4	D5	D6	L	L1	L2	m1	m2
20		34.0	36.0	29.0	35.0	36.0	42.0	39.0	11.5	8.5	23.0	18.0
22	7/8	36.0	38.0	31.0	37.0	38.0	44.0	39.0	11.5	8.5	23.0	18.0
25	1	39.0	41.0	34.0	40.0	41.0	47.0	41.0	11.5	8.5	23.0	18.0
28	1-1/8	42.0	44.0	37.0	43.0	44.0	50.0	43.0	11.5	8.5	23.0	18.0
30		44.0	46.0	39.0	45.0	46.0	52.0	43.0	11.5	8.5	23.0	18.0
32	1-1/4	46.0	48.0	42.0	48.0	48.0	54.0	43.0	11.5	8.5	23.0	18.0
35	1-3/8	49.0	51.0	44.0	50.0	51.0	57.0	47.0	11.5	8.5	23.0	18.0
38	1-1/2	54.0	58.0	49.0	56.0	58.0	64.0	51.0	14.0	11.0	25.0	20.0
40		56.0	60.0	51.0	58.0	60.0	66.0	53.0	14.0	11.0	25.0	20.0
42		58.0	62.0	54.0	61.0	62.0	68.0	53.0	14.0	11.0	25.0	20.0
45	1-3/4	61.0	65.0	56.0	63.0	65.0	71.0	53.0	14.0	11.0	25.0	20.0
48	1-7/8	64.0	68.0	59.0	66.0	68.0	74.0	53.0	14.0	11.0	25.0	20.0
50	2	66.0	70.0	62.0	70.0	70.0	76.0	58.0	15.0	12.0	25.0	20.0
55		71.0	75.0	67.0	75.0	75.0	81.0	59.0	15.0	12.0	25.0	20.0
60	2-3/8	78.0	85.0	72.0	80.0	85.0	91.0	61.0	15.0	12.0	28.0	22.0
65		83.0	90.0	77.0	85.0	90.0	96.0	65.0	15.0	12.0	28.0	22.0
70	2-3/4	90.0	95.0	83.0	92.0	95.0	101.0	66.0	18.0	15.0	30.0	24.0
75		95.0	104.0	88.0	97.0	104.0	110.0	70.0	18.0	15.0	30.0	24.0
80	3-1/8	100.0	109.0	95.0	105.0	109.0	115.0	70.0	18.2	15.2	31.0	25.0
85	3-3/8	105.0	114.0	100.0	110.0	114.0	120.0	75.0	18.2	15.2	31.0	25.0
90		110.0	119.0	105.0	115.0	119.0	125.0	75.0	18.2	15.2	31.0	25.0
95	3-3/4	115.0	124.0	110.0	120.0	124.0	130.0	80.0	18.2	15.2	31.0	25.0
100		120.0	129.0	115.0	125.0	129.0	135.0	80.0	18.2	15.2	31.0	25.0

It USO types with various combinations of materials for answering a wide variety of needs.  
Single-spring type offering a wide number of variations.

Application Range (적용범위)	Particulars of type (특징)	Compatible Seal Liquid (적용유체)
<p>[USO]</p> <p>Pressure(max) 10kg/cm<sup>2</sup>G</p> <p>Temperature -20°C~200°C</p> <p>Velocity (max) 10m/sec</p> <p>Viscosity (max) 300,000cp</p> <p>Slurry (max) 7%</p>	<p>Inside unbalance seal</p> <p>Single-spring type</p> <p>USO: O-Ring type</p>	<p>crystallizing acid</p> <p>Alkali</p> <p>Salt</p> <p>High viscous polymer</p> <p>High slurry fluid</p> <p>Oil pulp</p> <p>Paing</p> <p>etc.</p>



Unbalance conical spring ISO3069 / DIN24960



**BG Dimension Table**

mm	inch	D1	D2	D3	D4	ds	L	L1	L2	L3
18		32.0	34.0	27.0	33.0	23.0	22.0	11.5	8.5	32.0
20		34.0	36.0	29.0	35.0	26.0	24.0	11.5	8.5	34.0
22	7/8	36.0	38.0	31.0	37.0	28.0	26.0	11.5	8.5	36.0
25	1	39.0	41.0	34.0	40.0	31.0	26.0	11.5	8.5	36.0
28	1- 1/8	42.0	44.0	37.0	43.0	35.0	26.0	11.5	8.5	36.0
30		44.0	46.0	39.0	45.0	37.0	26.0	11.5	8.5	36.0
32	1- 1/4	46.0	48.0	42.0	48.0	39.0	28.0	11.5	8.5	38.0
35	1- 3/8	49.0	51.0	44.0	50.0	43.0	28.0	11.5	8.5	38.0
38	1- 1/2	54.0	58.0	49.0	56.0	47.0	31.0	14.0	11.0	41.0
40		56.0	60.0	51.0	58.0	49.0	34.0	13.0	11.0	46.0
45	1- 3/4	61.0	65.0	56.0	63.0	55.0	37.0	13.0	11.0	49.0
50	2	66.0	70.0	62.0	70.0	61.0	43.0	15.0	12.0	55.0
55		71.0	75.0	67.0	75.0	66.0	49.0	15.0	12.0	61.0
60	2- 3/8	78.0	85.0	72.0	80.0	71.0	55.0	15.0	12.0	67.0
65		83.0	90.0	77.0	85.0	77.0	55.0	15.0	12.0	67.0

The BG series seal range features a spring loaded Ceramic, TC, SiC seal face. They are cost effective for basic applications such as circulating pumps for water and heating system.

Application Range (적용범위)	Particulars of type (특징)	Compatible Seal Liquid (적용유체)
<p>[BG]</p> <p>Pressure(max) 10kg/cm<sup>2</sup>G</p> <p>Temperature -20℃~200℃</p> <p>Velocity (max) 10m/sec</p> <p>Viscosity (max) 1500cp</p> <p>Slurry (max) 7%</p>	<p>Inside unbalance seal</p> <p>Conical-spring</p> <p>Short-working length</p>	<p>Alkali</p> <p>Sanitary pump seal</p> <p>etc.</p>

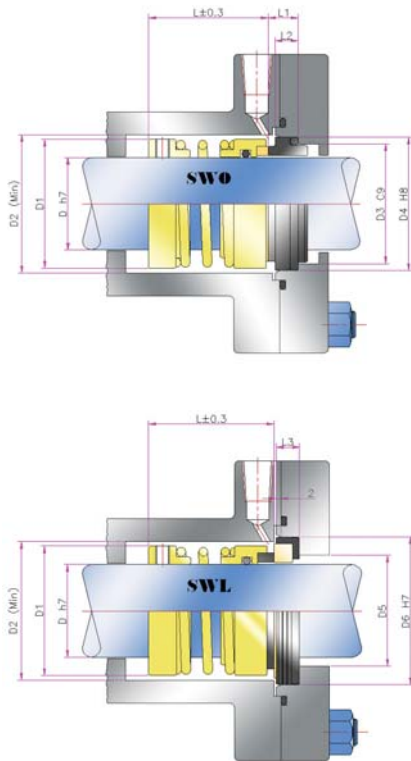
# SWO SWL

SWO with o-ring

SWL with lip ring



Unbalance single spring ISO3069 / DIN24960



SWO Dimension Table

mm	inch	D1	D2	D3	D4	D5	D6	L	L1	L2	L3
20		34.0	36.0	29.0	35.0	33.0	38.0	37.0	11.5	8.5	8
22	7/8	36.0	38.0	31.0	37.0	35.0	40.0	37.0	11.5	8.5	8
25	1	39.0	41.0	34.0	40.0	39.0	44.0	39.0	11.5	8.5	9
28	1- 1/ 8	42.0	44.0	37.0	43.0	40.0	46.0	41.0	11.5	8.5	9
30		44.0	46.0	39.0	45.0	44.0	50.0	41.0	11.5	8.5	9
32	1- 1/ 4	46.0	48.0	42.0	48.0	48.0	54.0	41.0	11.5	8.5	9
35	1- 3/ 8	49.0	51.0	44.0	50.0	52.0	58.0	45.0	11.5	8.5	9
38	1- 1/ 2	54.0	58.0	49.0	56.0	54.0	60.0	49.0	14.0	11.0	10
40		56.0	60.0	51.0	58.0	58.0	64.0	51.0	14.0	11.0	10
42		58.0	62.0	54.0	61.0			51.0	14.0	11.0	
45	1- 3/ 4	61.0	65.0	56.0	63.0	56.0	66.0	51.0	14.0	11.0	10
48	1- 7/ 8	64.0	68.0	59.0	66.0			51.0	14.0	11.0	
50	2	66.0	70.0	62.0	70.0	62.0	72.0	56.0	15.0	12.0	10
55		71.0	75.0	67.0	75.0			57.0	15.0	12.0	
60	2- 3/ 8	78.0	85.0	72.0	80.0			59.0	15.0	12.0	
65		83.0	90.0	77.0	85.0			63.0	15.0	12.0	
70	2- 3/ 4	90.0	95.0	83.0	92.0			64.0	18.0	15.0	
75		95.0	104.0	88.0	97.0			68.0	18.0	15.0	
80	3- 1/ 8	100.0	109.0	95.0	105.0			68.0	18.2	15.2	
85	3- 3/ 8	105.0	114.0	100.0	110.0			73.0	18.2	15.2	
90		110.0	119.0	105.0	115.0			73.0	18.2	15.2	
95	3- 3/ 4	115.0	124.0	110.0	120.0			78.0	18.2	15.2	
100		120.0	129.0	115.0	125.0			78.0	18.2	15.2	

The SW series seals are designed for application in the medium pressure and, stress range and within operating limits, can be universally used in pump.

Application Range (적용범위)			Particulars of type (특징)	Compatible Seal Liquid (적용유체)
Pressure(max)	[SWO] 12kg/cm <sup>2</sup> G	[SWL] 12kg/cm <sup>2</sup> G	Inside unbalance seal Single-spring type SWO: O-Ring type SWL: Lip-Ring type	crystallizing acid Alkali Salt High viscous polymer High slurry fluid Oil pulp Paing etc.
Temperature	-20°C~200°C	-20°C~200°C		
Velocity (max)	10m/sec	10m/sec		
Viscosity (max)	150000cp	100000cp		
Slurry (max)	5%	5%		

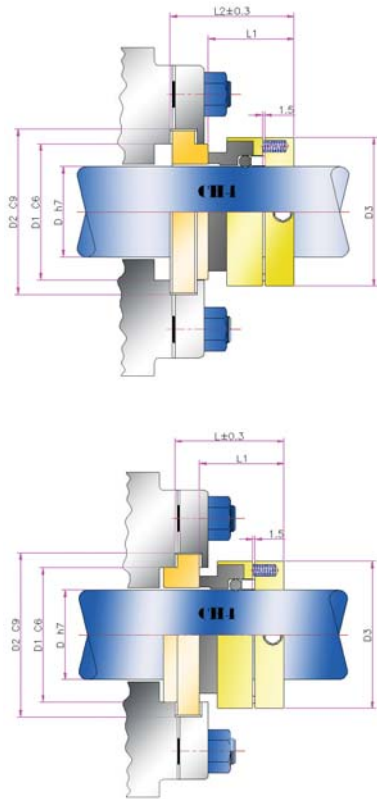
# CH4

L-sharp seal ring

Outside seal



Unbalance multi spring ISO3069 / DIN24960



CH4 Dimension Table

mm	inch	D1	D2	D3	L	L1	L2
25	1	41.5	54.5	50.8	49.0	38.0	55.5
28	1- 1/ 8	45.0	57.5	54.0	49.0	38.0	55.5
30		46.5	63.0	57.2	49.0	38.0	55.5
32	1- 1/ 4	48.0	60.5	57.2	49.0	38.0	55.5
35	1- 3/ 8	51.0	62.5	60.3	49.0	38.0	55.5
38	1- 1/ 2	58.5	69.5	63.5	49.0	38.0	55.5
40		60.5	73.5	66.7	49.0	38.0	55.5
42		62.5	73.5	69.9	49.0	38.0	55.5
45	1- 3/ 4	64.0	80.0	69.9	49.0	38.0	55.5
48	1- 7/ 8	68.0	83.0	73.0	49.0	38.0	55.5
50	2	70.0	89.5	76.2	49.0	38.0	55.5
55		73.5	96.0	79.4	49.0	38.0	55.5
60	2- 3/ 8	78.0	99.5	85.7	49.0	38.0	55.5
65		85.0	105.0	92.1	49.0	38.0	55.5

External mounted rotary units for chemical service.  
No metal parts touch the fluid sealed for sealing corrosive fluid at moderate pressure

Application Range (적용범위)	Particulars of type (특징)	Compatible Seal Liquid (적용유체)
<p>[CH4]</p> <p>Pressure(max) 8kg/cm<sup>2</sup>G</p> <p>Temperature -30℃~200℃</p> <p>Velocity (max) 10m/sec</p> <p>Viscosity (max) 100cp</p> <p>Slurry (max) 0.1%</p>	<p>Outside unbalance seal</p> <p>Multi-spring type</p>	<p>Strongly corrosive fluid etc.</p>

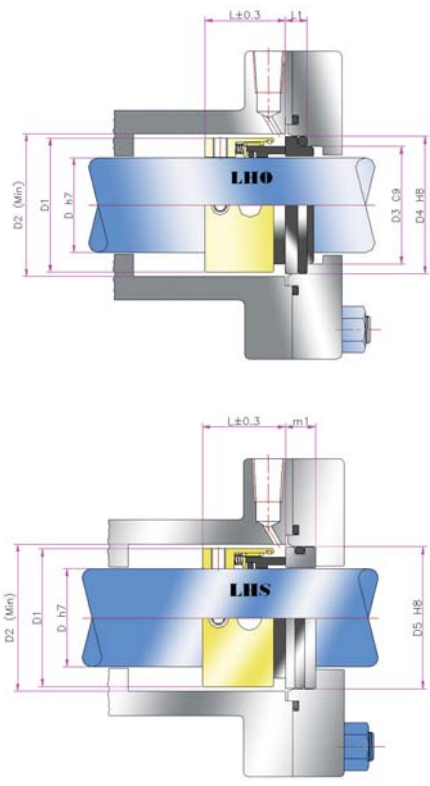


# LHO LHO o-ring mount type

# LHS LHS square mount type



Unbalance multi spring ISO3069 / DIN24960



LHO Dimension Table

mm	inch	D1	D2	D3	D4	D5	L	L1	m1
25	1	39.0	41.0	34.0	40.0	40.0	28.0	9.5	11.2
28	1-1/8	42.0	44.0	37.0	43.0	43.0	28.0	9.5	11.2
30		44.0	46.0	39.0	45.0	45.0	30.0	9.5	11.2
32	1-1/4	46.0	48.0	42.0	48.0	48.0	30.0	9.5	11.2
35	1-3/8	49.0	51.0	44.0	50.0	50.0	30.0	9.5	11.2
38	1-1/2	54.0	58.0	49.0	56.0	56.0	30.0	10.5	11.2
40		56.0	60.0	51.0	58.0	58.0	32.0	10.5	12.8
42		58.0	62.0	54.0	61.0	61.0	32.0	10.5	12.8
45	1-3/4	61.0	65.0	56.0	63.0	63.0	32.0	10.5	12.8
48	1-7/8	64.0	68.0	59.0	66.0	66.0	32.0	10.5	12.8
50	2	66.0	70.0	62.0	70.0	70.0	34.0	12.5	12.8
55		71.0	75.0	67.0	75.0	75.0	34.0	12.5	14.3
60	2-3/8	78.0	85.0	72.0	80.0	80.0	34.0	12.5	14.3
65		83.0	90.0	77.0	85.0	85.0	36.0	12.5	15.9
70	2-3/4	90.0	95.0	83.0	92.0	92.0	38.0	14.5	15.9
75		95.0	104.0	88.0	97.0	97.0	40.0	14.5	15.9
80	3-1/8	100.0	109.0	95.0	105.0	105.0	42.0	15.0	19.9
85	3-3/8	105.0	114.0	100.0	110.0	110.0	44.0	15.0	19.9

The LHO, KHS seals feature o-ring secondary sealing elements. The seals are constructed for ease of assembly, disassembly, and the prevention of loose component parts damage.

Application Range (적용범위)		Particulars of type (특징)	Compatible Seal Liquid (적용유체)
	[LHO]		
Pressure(max)	12kg/cm <sup>2</sup> G	Inside unbalance seal	Non crystallizing acid
Temperature	-30°C~200°C	Multi-spring type	Alkali
Velocity (max)	20m/sec	Independent on direction of rotation	Salt
Viscosity (max)	300cp	Ease of installation	Low viscosity oil
Slurry (max)	0.3%		Low slurry water etc.
	[LHS]		
Pressure(max)	10kg/cm <sup>2</sup> G		
Temperature	-50°C~220°C		
Velocity (max)	20m/sec		
Viscosity (max)	300cp		
Slurry (max)	0.3%		

# MBO

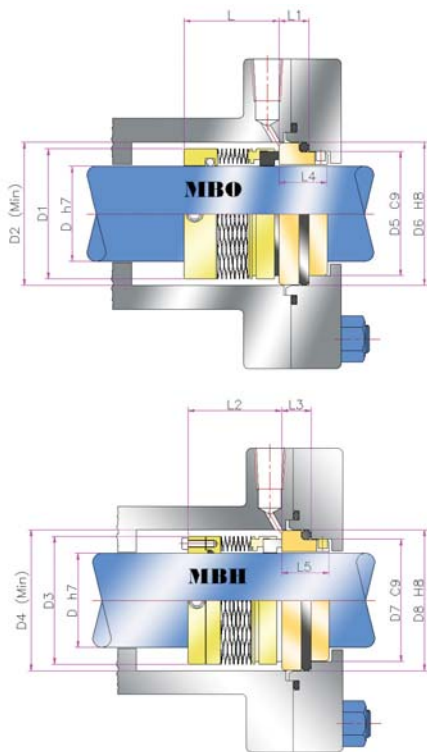
MBO o-ring mount type

# MBH

MBH for high press with flexfoil



Metal bellows ISO3069 / DIN24960



MBO Dimension Table

mm	D1	D2	D3	D4	D5	D6	D7	D8	L	L1	L2	L3	L4	L5
20	36.5	40.0	38.0	40.0	29.0	35.0	34.0	40.0	30.5	7.0	46.5	11.5	14.0	19.5
22	36.5	42.0	40.0	42.0	31.0	37.0	37.0	43.0	30.5	7.0	46.5	11.5	14.0	19.5
25	39.7	47.0	43.0	47.0	34.0	40.0	39.0	45.0	28.5	11.5	46.5	11.5	19.5	19.5
28	42.9	50.0	46.0	50.0	37.0	43.0	42.0	48.0	31.0	11.5	46.5	11.5	19.5	19.5
30	46.0	52.0	48.0	52.0	39.0	45.0	44.0	50.0	31.0	11.5	46.5	11.5	19.5	19.5
32	46.0	54.0	50.0	54.0	42.0	48.0	49.0	56.0	31.0	11.5	46.5	14.0	19.5	22.0
35	49.2	57.0	53.0	57.0	44.0	50.0	51.0	58.0	31.0	11.5	46.5	14.0	19.5	22.0
38	52.4	61.0	56.0	61.0	49.0	56.0	54.0	61.0	31.0	14.0	46.5	14.0	22.0	22.0
40	55.6	64.0	58.0	64.0	51.0	58.0	56.0	63.0	31.0	14.0	47.5	14.0	22.0	22.0
42	58.7	66.0	60.0	66.0	54.0	61.0	59.0	66.0	31.0	14.0	47.5	14.0	22.0	22.0
45	61.9	69.0	63.0	69.0	56.0	63.0	62.0	70.0	31.0	14.0	47.5	15.0	22.0	23.0
48	65.1	72.0	66.0	72.0	59.0	66.0	65.0	73.0	31.0	14.0	47.5	15.0	22.0	23.0
50	65.1	76.0	70.0	76.0	62.0	70.0	67.0	75.0	32.5	15.0	47.5	15.0	23.0	23.0
55	71.4	81.0	75.0	81.0	67.0	75.0	72.0	80.0	32.5	15.0	47.5	15.0	23.0	23.0
60	74.6	85.0	80.0	85.0	72.0	80.0	77.0	85.0	37.5	15.0	53.0	15.0	23.0	23.0
65	84.1	90.0	87.0	90.0	77.0	85.0	83.0	92.0	37.5	15.0	53.0	18.0	23.0	26.0
70	87.3	95.0	92.0	95.0	83.0	92.0	88.0	97.0	42.0	18.0	53.0	18.0	26.0	26.0
75	95.3	104.0	97.0	104.0	88.0	97.0	95.0	105.0	42.0	18.0	52.8	18.2	26.0	26.2
80	101.6	109.0	102.0	109.0	95.0	105.0	100.0	110.0	41.8	18.2	52.8	18.2	26.2	26.2
85	104.8	114.0	107.0	114.0	100.0	110.0	105.0	115.0	41.8	18.2	53.8	18.2	26.2	26.2
90	111.1	119.0	112.0	119.0	105.0	115.0	110.0	120.0	46.8	18.2	53.8	17.2	26.2	25.2
95	114.3	124.0	117.0	124.0	110.0	120.0	115.0	125.0	47.8	17.2	53.8	17.2	26.2	25.2
100	120.7	129.0	122.0	129.0	115.0	125.0	122.2	134.3	47.8	17.2	54.0	20.0	26.2	30

The MB series metal bellows mechanical seals are made for chemical process, petrochemical process and refinery. Hastelloy C construction provides maximum corrosion resistance in the toughest process service.

Application Range (적용범위)			Particulars of type (특징)	Compatible Seal Liquid (적용유체)
Pressure(max)	[MBO] 20kg/cm <sup>2</sup> G	[MBH] 10kg/cm <sup>2</sup> G	Metal Bellows seal	Hot oil
Temperature	-30°C~220°C	-50°C~400°C	High pressure	salt
Velocity (max)	25m/sec	25m/sec	Vibration and flexibility of excellence	Hydrocarbon
Viscosity (max)	1000cp	1000cp	MBO: Low temperature	Waste pulp solutions
Slurry (max)	0.5%	0.5%	MBH: High temperature	Alkali
				crystallizing acid
				Hot-molten fluid
				etc.

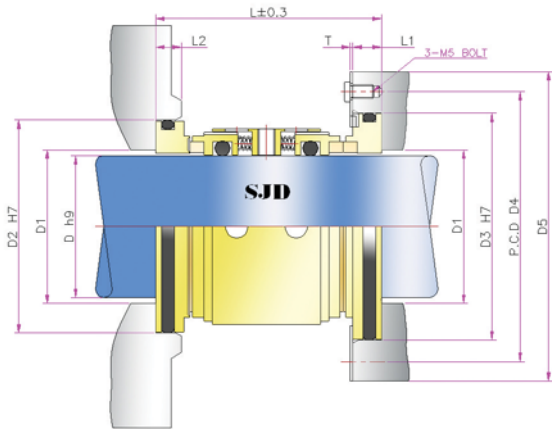
# SJD

Double Seal faces

Box type



Unbalance multi spring ISO3069 / DIN24960



SJD Dimension Table

mm	D1	D2	D3	D4	D5	L	L1	L2	T
30	33.0	44.0	57.0	70.0	82.0	60.0	9.0	8.0	1
35	38.0	54.0	57.0	70.0	82.0	60.0	9.0	9.0	1
40	43.0	68.0	70.0	85.0	100.0	65.0	10.0	9.0	1
45	48.0	68.0	70.0	90.0	105.0	65.0	10.0	9.0	1
50	53.0	75.0	80.0	95.0	109.0	75.0	10.0	9.0	1
55	58.0	80.0	85.0	100.0	115.0	75.0	12.0	12.0	1
60	63.0	85.0	95.0	105.0	120.0	85.0	13.0	15.0	1
65	68.0	90.0	100.0	110.0	125.0	85.0	13.0	15.0	1
70	73.0	95.0	105.0	115.0	130.0	85.0	13.0	15.0	1
75	78.0	100.0	110.0	120.0	135.0	90.0	13.0	15.0	1
80	83.0	105.0	115.0	125.0	140.0	90.0	13.0	15.0	1
85	88.0	110.0	120.0	130.0	145.0	95.0	15.0	15.0	1
90	93.0	115.0	125.0	135.0	150.0	95.0	15.0	15.0	1

Torque transmission ensures full mobility and adaptation of the sealing surface even with small run-outs.  
Double acting unbalanced multiple spring

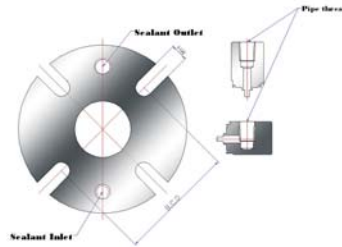
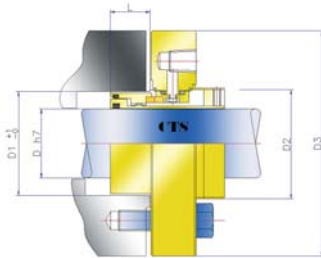
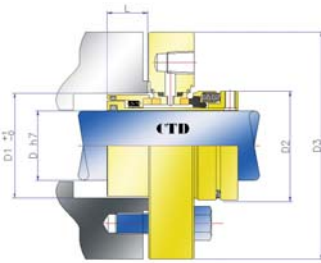
Application Range (적용범위)	Particulars of type (특징)	Compatible Seal Liquid (적용유체)
[SJD] Pressure(max) 15kg/cm <sup>2</sup> G Temperature -20°C~200°C Velocity (max) 10m/sec Viscosity (max) 300cp Slurry (max) 0.1%	Inside unbalance seal Multi-spring type Double Seal faces Box type Independent on direction of rotation	Non crystallizing acid Alkali Salt Low viscosity oil Low slurry water etc.

# CTD CTS

Cartridge single seal



Cartridge double seal ISO3069 / DIN24960



CTD Dimension Table

mm	D1	D2	D3	L	HW	B.C.D	
20	39.0	44.0	105.0	38.5	14.0	69.0	86.0
25	44.0	49.0	105.0	38.5	14.0	74.0	86.0
30	49.0	54.0	105.0	38.5	14.0	79.0	86.0
35	54.0	59.0	115.0	38.5	14.0	84.0	96.0
40	59.0	64.0	130.0	38.5	14.0	89.0	111.0
45	64.0	69.0	140.0	39.5	14.0	94.0	121.0
50	69.0	74.0	140.0	39.5	14.0	99.0	121.0
55	74.0	79.0	155.0	39.5	17.0	110.0	131.0
60	79.0	84.0	155.0	39.5	17.0	115.0	131.0
65	84.0	89.0	165.0	39.5	17.0	120.0	141.0
70	95.0	100.0	200.0	43.5	17.0	131.0	176.0
75	100.0	105.0	205.0	43.5	17.0	136.0	181.0
80	105.0	110.0	210.0	43.5	17.0	141.0	186.0
85	110.0	115.0	215.0	43.5	17.0	146.0	190.0
90	115.0	120.0	220.0	43.5	21.0	158.0	190.0
95	120.0	125.0	225.0	43.5	21.0	163.0	195.0
100	125.0	130.0	230.0	43.5	21.0	168.0	200.0
110	135.0	140.0	240.0	43.5	25.0	185.0	204.0
120	145.0	150.0	250.0	43.5	25.0	195.0	214.0
130	155.0	160.0	260.0	43.5	25.0	205.0	224.0
140	165.0	170.0	270.0	43.5	25.0	215.0	234.0
150	175.0	180.0	280.0	43.5	25.0	225.0	244.0

Self-aligning double or single seal.

Balanced inboard seal permits a wide range of barrier fluid pressure to handle a variety of application.

Application Range (적용범위)		Particulars of type (특징)	Compatible Seal Liquid (적용유체)
	[CTD]		
Pressure(max)	25kg/cm <sup>2</sup> G	CTD: Double cartridge balance seal	Non crystallizing acid
Temperature	-30°C~220°C	CTS: Single cartridge balance seal	Alkali
Velocity (max)	30m/sec	Multi-spring type	Salt
Viscosity (max)	300000cp	Ease of installation	Hydrocarbon
Slurry (max)	7%	Extreme corrosion resistance	High slurry fluid
	[CTS]	Fits narrow stuffing boxes	Hot water
		Impeller adjustment in service	etc.
		Cartridge mounted	

# BMS



# NVL



# YSL



# DFK



# KBO

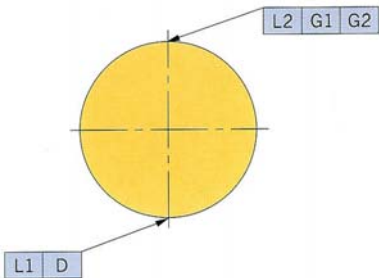
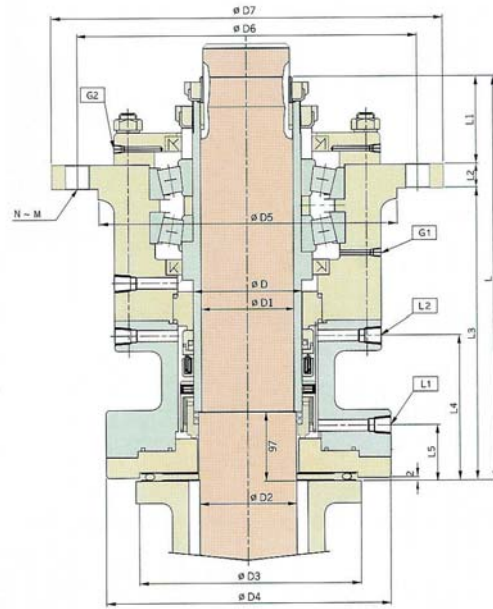


# FBS



- BMS
- NVL
- YSL
- DFK
- KBO
- FBS

# KDSU



No.	Service	Connection	Remark
L1	Sealant oil inlet	PT 3/8"	
L2	Sealant oil outlet	PT 3/8"	
D	Drain	PT 3/8"	
C1	Grease inlet	PT 1/4"	
C2	Grease outlet	PT 1/4"	

**KDSU Dimension Table**

SIZE	D	D1	D2	D3	D4	D5	D6	D7	L	L1	L2	L3	L4	L5	L6	N	M
UNIT20~60	60	40	50	145	180	185	210	235	303	60	20	223	128	40	47	6	14
UNIT20~80	80	60	70	165	220	230	255	295	319	60	22	237	132	40	53	8	18
UNIT20~90	90	70	80	175	235	245	270	310	333	65	22	246	132	40	56	8	18
UNIT20~100	100	80	90	200	262	275	313	360	357	65	22	270	142	50	70	12	22
UNIT20~120	120	100	110	220	295	310	360	400	371	70	22	279	142	50	72	12	22
UNIT20~140	140	120	130	225	315	350	400	440	379	70	22	287	142	50	72	12	22

### Agitator Seals/DIN 28141

Under severe operating conditions a double acting seal is usually preferred, requiring a suitable buffer fluid-preferably clean soft water because of its good heat transfer qualities.

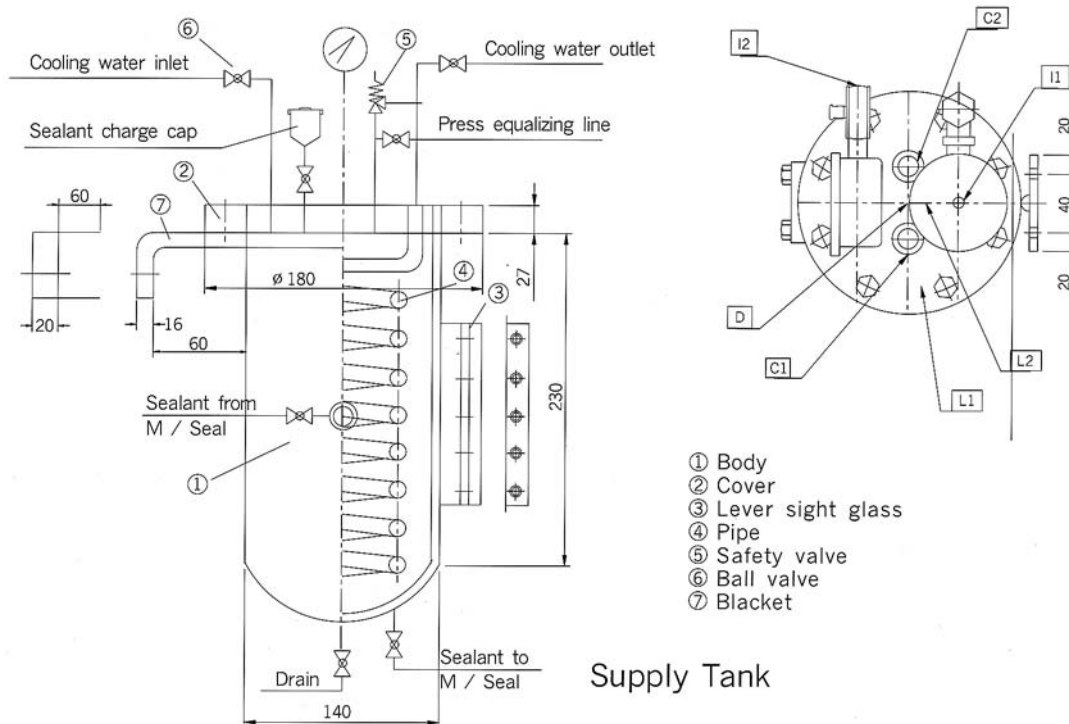
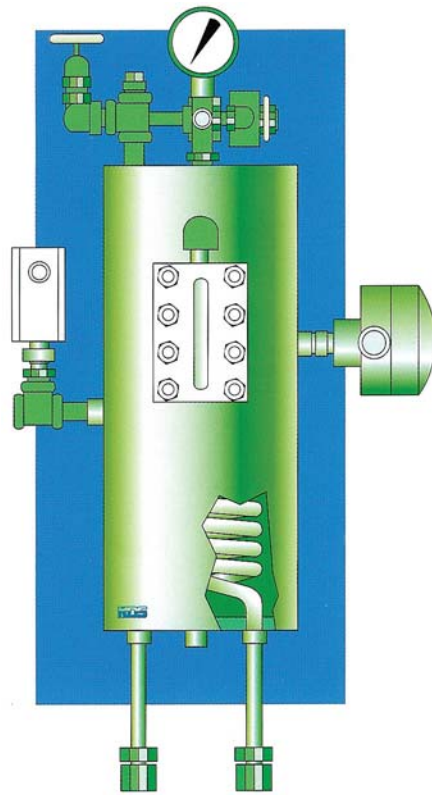
### Operating Limit

Pressure : Full vacuum up to 16 bar

Temperature : Max. 260° C

# KDST

Supplytank



Supply Tank

## Supply Tank

High temperatures, abrasive conditions and the corrosive qualities of liquids must be considered for the proper operation and service life of a seal.

KD Seal Tech Co.,Ltd can make recommendations for your total sealing system by incorporating bypass flushing, liquid supply tank and other auxiliary equipment for all common API and ANSI piping plans or custom installations.



A4A / A4C



B2



F10 / F20



FKD



EPC



ND



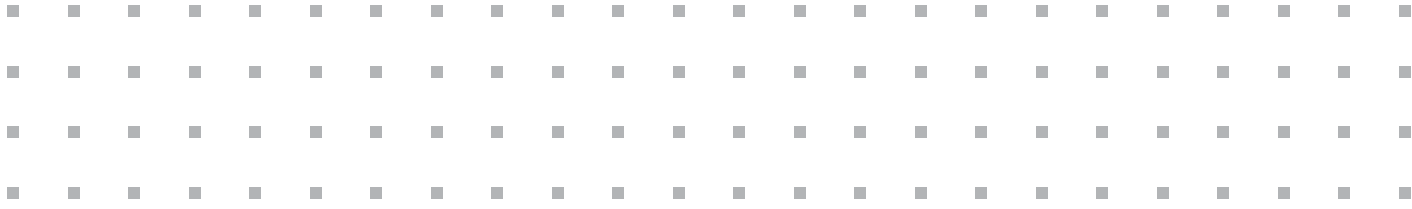
C2 / MG



J2







# Contents

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- 30 EPC / EPA / EPL
- 31 ND
- 32 C2 / MG
- 33 J2



## ▶ General type mechanical seals

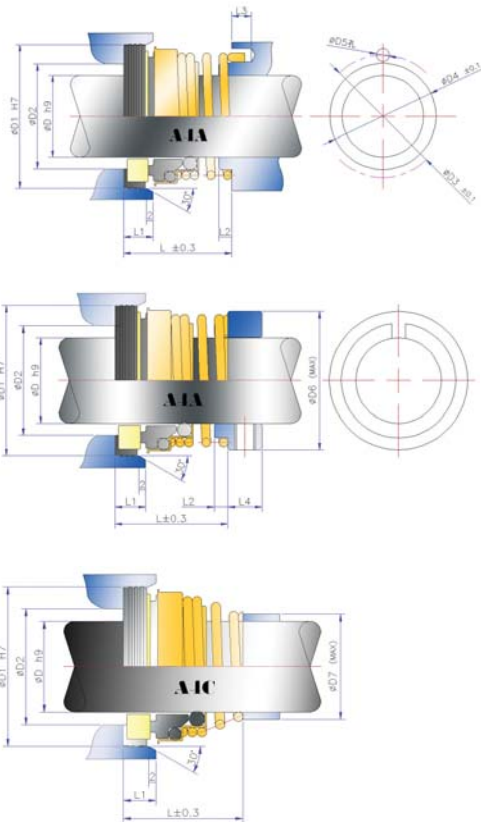


# A4A

# A4C A4C Conical spring



Elastomer rubber o-ring



A4A / A4C Dimension Table

D	D1	D2	D3	D4	D5	D6	D7	L	L1	L2	L3	L4
8.0	21.0	13.0	13.0	16.0	2.5	18.5	12.0	18.0	7.0	2.0	4.0	8.0
10.0	24.0	16.0	17.0	20.0	2.5	22.5	14.0	23.0	7.0	2.0	4.0	8.0
12.0	26.0	17.0	19.0	22.5	3.0	24.5	16.0	24.0	7.0	2.0	4.0	8.0
12.5	26.0	17.0	19.0	22.5	3.0	24.5	17.0	24.0	7.0	2.0	4.0	8.0
13.0	26.0	17.0	19.0	22.5	3.0	24.5	17.0	24.0	7.0	2.0	4.0	9.0
14.0	30.0	21.0	21.0	24.5	3.0	28.5	18.0	25.0	7.0	3.0	4.0	9.0
15.0	28.0	21.0	21.0	24.5	3.0	28.5	19.0	25.0	7.0	3.0	4.0	9.0
16.0	32.0	22.0	24.0	28.5	4.0	30.5	20.0	27.0	8.0	3.0	4.0	9.0
18.0	35.0	25.0	27.0	31.5	4.0	33.5	22.0	29.0	8.0	3.0	4.0	10.0
19.0	35.0	25.0	27.0	31.5	4.0	33.5	23.0	29.0	8.0	3.0	4.0	10.0
20.0	38.0	27.0	29.0	33.5	4.0	35.5	24.0	31.0	8.0	3.0	5.0	10.0
22.0	40.0	29.0	30.0	34.5	4.0	37.5	26.0	32.0	8.0	4.0	6.0	10.0
25.0	44.0	32.0	33.0	37.5	4.0	40.5	29.0	33.0	9.0	4.0	6.0	10.0
28.0	46.0	34.0	36.0	40.5	4.0	44.5	32.0	34.0	9.0	4.0	6.0	12.0
30.0	50.0	38.0	39.0	44.5	5.0	47.5	35.0	35.0	9.0	4.0	6.0	12.0
32.0	54.0	40.0	42.0	47.5	5.0	51.5	37.0	37.0	9.0	4.0	6.0	12.0
35.0	58.0	44.0	45.0	50.5	5.0	55.5	40.0	40.0	10.0	4.0	6.0	12.0
38.0	60.0	46.0	48.0	53.5	5.0	57.5	43.0	42.0	10.0	5.0	7.0	12.0
40.0	64.0	48.0	50.0	56.5	6.0	59.5	45.0	43.0	10.0	5.0	7.0	12.0
45.0	66.0	52.0	55.0	61.5	6.0	65.5	50.0	45.0	10.0	5.0	7.0	14.0
50.0	72.0	58.0	60.0	66.5	6.0	70.5	55.0	47.0	10.0	5.0	7.0	14.0

A variety of seal options employing this general design are available.  
Non-clogging conical spring enhances dependability.

Application Range	Character	Useful
(standard) • Pressure : -650mmHg ~ 7kg/cm <sup>2</sup> G • Temperature : -20°C ~ 100°C • Velocity : 15m/sec	•A4A : Single spring type •A4C : Conical spring type •Single spring •Unbalance	• Oil transfer pump for Lathe and Milling • Coding water pump, food and drinking water transfer pump • 절삭유, 부동액 이송펌프(선반, 밀링 등의 가공장비) • 식·음료 이송펌프, 산(Acid)·알카리(Akali)성 유체 이송펌프

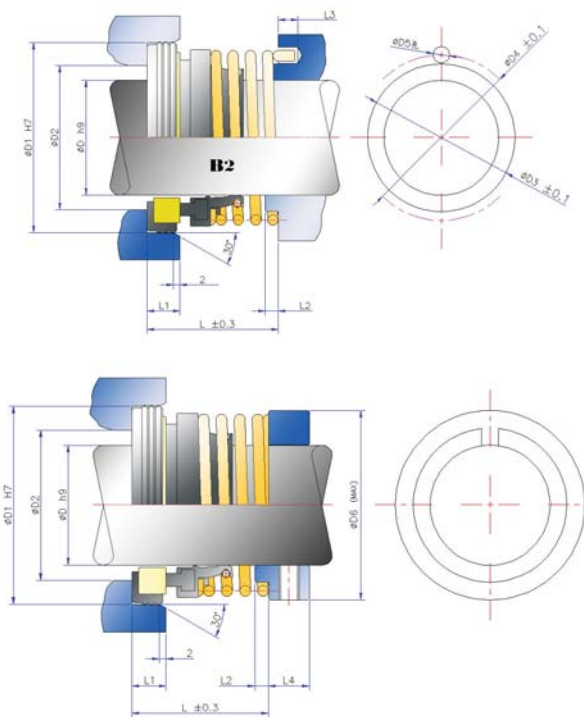
• 내유성, 내한성, 내열성이 탁월한 재질의 사용으로 안정성, 내구성이 탁월하다.

# B2

## B2 carbon seal ring



Elastomer rubber bellows Non-pusher design



B2 Dimension Table

D	D1	D2	D3	D4	D5	D6	L	L1	L2	L3	L4
8.0	21.0	13.0	13.0	16.0	2.5	18.5	18.0	7.0	2.0	4.0	8.0
10.0	24.0	16.0	17.0	20.0	2.5	22.5	23.0	7.0	2.0	4.0	8.0
12.0	26.0	17.0	19.0	22.5	3.0	24.5	24.0	7.0	2.0	4.0	8.0
12.5	26.0	17.0	19.0	22.5	3.0	24.5	24.0	7.0	2.0	4.0	8.0
13.0	26.0	17.0	19.0	22.5	3.0	24.5	24.0	7.0	2.0	4.0	9.0
14.0	30.0	21.0	21.0	24.5	3.0	28.5	25.0	7.0	3.0	4.0	9.0
15.0	28.0	21.0	21.0	24.5	3.0	28.5	25.0	7.0	3.0	4.0	9.0
16.0	32.0	22.0	24.0	28.5	4.0	30.5	27.0	8.0	3.0	4.0	9.0
18.0	35.0	25.0	27.0	31.5	4.0	33.5	29.0	8.0	3.0	4.0	10.0
19.0	35.0	25.0	27.0	31.5	4.0	33.5	29.0	8.0	3.0	4.0	10.0
20.0	38.0	27.0	29.0	33.5	4.0	35.5	31.0	8.0	3.0	5.0	10.0
22.0	40.0	29.0	30.0	34.5	4.0	37.5	32.0	8.0	4.0	6.0	10.0
25.0	44.0	32.0	33.0	37.5	4.0	40.5	33.0	9.0	4.0	6.0	10.0
28.0	46.0	34.0	36.0	40.5	4.0	44.5	34.0	9.0	4.0	6.0	12.0
30.0	50.0	38.0	39.0	44.5	5.0	47.5	35.0	9.0	4.0	6.0	12.0
32.0	54.0	40.0	42.0	47.5	5.0	51.5	37.0	9.0	4.0	6.0	12.0
35.0	58.0	44.0	45.0	50.5	5.0	55.5	40.0	10.0	4.0	6.0	12.0
38.0	60.0	46.0	48.0	53.5	5.0	57.5	42.0	10.0	5.0	7.0	12.0
40.0	64.0	48.0	50.0	56.5	6.0	59.5	43.0	10.0	5.0	7.0	12.0
45.0	66.0	52.0	55.0	61.5	6.0	65.5	45.0	10.0	5.0	7.0	14.0
50.0	72.0	58.0	60.0	66.5	6.0	70.5	47.0	10.0	5.0	7.0	14.0

The B2 type is easy to assemble and disassemble.  
Flexible rubber bellows seal, general pumps and rotary equipment for general use.

Application Range	Character	Useful
(standard) • Pressure : $\phi 20$ 미만 : $-650\text{mmHg} \sim 3\text{kg/cm}^2\text{G}$ $\phi 22$ 이상 : $-500\text{mmHg} \sim 5\text{kg/cm}^2\text{G}$ • Temperature : $-20^\circ\text{C} \sim 100^\circ\text{C}$ • Velocity : $5\text{m/sec}$	• Single spring type • Elastomer rubber bellows • S2 : Copper alloyed steel	• Forming water pump • Circulation pump for Boiler • 농·공업용 양수기(엔진, 모터, 경운기), 식·음료 이송펌프 • 엔진 냉각수 순환펌프, 보일러 순환(급수)펌프

• 양산 셀의 대표격으로 다양한 용도로 사용되며 가격이 저렴하다.

# F10

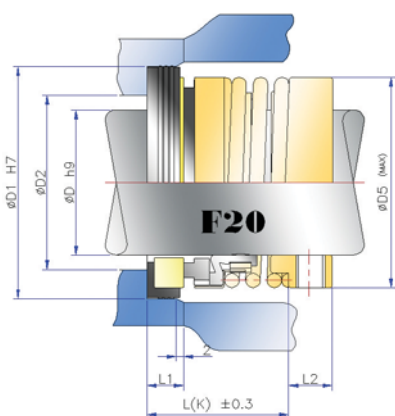
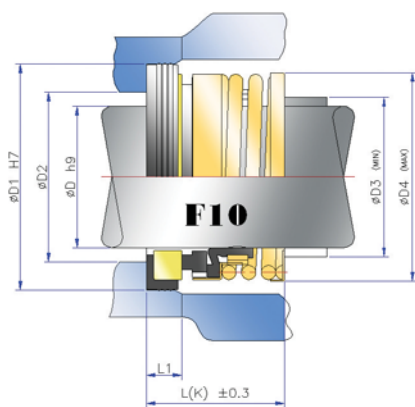
F10 with stopper

# F20

F20 with collar



Elastomer rubber bellows Non-pusher design



F10 / F20 Dimension Table

D	D1	D2	D3	D4	D5	L	K	L1	L2
12.0	26.0	17.0	16.0	26.0	26.0	24.0	26.0	7.0	8.0
14.0	30.0	21.0	18.0	28.0	28.0	25.0	28.5	7.0	9.0
15.0	28.0	21.0	19.0	28.0	28.0	25.0	27.0	7.0	9.0
16.0	32.0	22.0	20.0	30.0	30.0	27.0	30.0	8.0	9.0
18.0	35.0	25.0	22.0	32.5	32.5	26.0	32.0	8.0	10.0
19.0	35.0	25.0	23.0	32.5	32.5	26.0	32.0	8.0	10.0
20.0	38.0	27.0	24.0	35.5	35.5	28.0	28.5	8.0	10.0
22.0	40.0	29.0	26.0	37.5	37.5	28.0	28.0	8.0	10.0
25.0	44.0	32.0	29.0	42.0	42.0	29.0	32.5	9.0	10.0
28.0	46.0	34.0	32.0	45.5	45.5	30.0	32.5	9.0	12.0
30.0	50.0	38.0	35.0	48.0	48.0	31.0	40.0	9.0	12.0
32.0	54.0	40.0	37.0	50.0	50.0	33.0	40.0	9.0	12.0
35.0	58.0	44.0	40.0	54.5	54.5	36.0	41.5	10.0	12.0
38.0	60.0	46.0	43.0	58.5	58.5	37.0	39.0	10.0	12.0
40.0	64.0	48.0	45.0	62.5	62.5	38.0	38.0	10.0	12.0
45.0	66.0	52.0	50.0	66.5	66.5	40.0	41.0	10.0	14.0
50.0	72.0	58.0	55.0	72.5	72.5	42.0	44.0	10.0	14.0

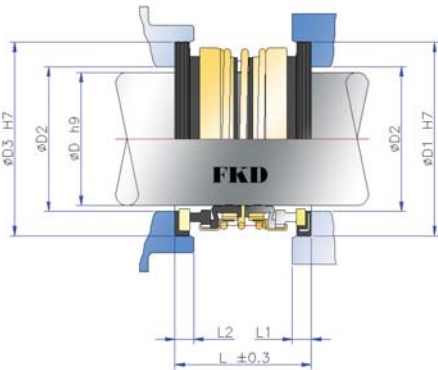
The F10, F20 type are designed for application in the medium pressure and stress range and, within its operating limits, can be universally used in pumps, just one bellows units per diameter can be used for all installation lengths.

Application Range	Character	Useful
(standard) • Pressure : -720mmHg ~ 7kg/cm <sup>2</sup> G • Temperature : -20°C ~ 100°C • Velocity : 5m/sec	• F10 : Spring with stopper • F20 : Spring with collar • Elastomer rubber bellows • Independent of direction of rotation	• Vacuum pump, Cooling water pump • Oil transfer pump, Dyeing pump • 고압용 소방펌프, 유류(휘발유, 경유, 등유, 중유 등)이송펌프 • 농 · 공업용수 이송펌프, 염색기(래피드기)용 펌프

• Anti rotating 방식으로 설계되어 탁월한 안정성이 보장되며 유체에 따라 다양한 소재를 적용하여 사용할 수 있다.

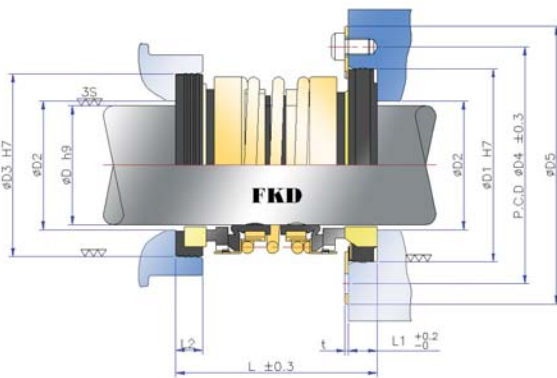


Elastomer rubber bellows Non-pusher design



FKD (A type) Dimension Table

D	D1	D2	D3	D4	D5	L	L1	L2	t
14.0	32.0	17.0	32.0	/	/	43.0	7.0	7.0	/
15.0	34.0	18.0	30.0	/	/	42.0	7.0	7.0	/
20.0	44.0	23.0	38.0	60.0	72.0	50.0	7.0	7.0	1.0
25.0	50.0	28.0	44.0	60.0	72.0	50.0	7.0	7.0	1.0
30.0	57.0	33.0	44.0	70.0	82.0	60.0	9.0	7.0	1.0
35.0	57.0	38.0	54.0	80.0	94.0	60.0	8.5	8.0	1.0
40.0	70.0	43.0	68.0	85.0	100.0	65.0	10.0	9.0	1.2
45.0	70.0	48.0	68.0	90.0	105.0	65.0	10.0	9.0	1.0
50.0	80.0	53.0	75.0	95.0	109.0	70.0	9.5	12.0	1.2



FKD (B type) Dimension Table

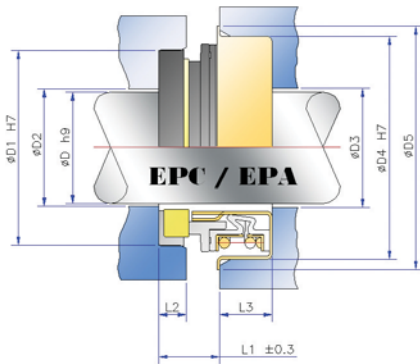
D	D1	D2	D3	D4	D5	L	L1	L2	t
14.0	30.0	20.0	30.0	/	/	36.0	5.0	5.0	/
15.0	30.0	20.0	30.0	/	/	36.0	5.0	5.0	/
16.0	30.0	20.0	30.0	/	/	36.0	5.0	5.0	/
20.0	44.0	23.0	38.0	60.0	72.0	49.0	7.0	7.0	1.0
25.0	50.0	28.0	44.0	60.0	72.0	51.0	7.0	7.0	1.0
30.0	57.0	33.0	50.0	70.0	82.0	59.0	9.0	8.0	1.0
35.0	64.0	38.0	58.0	80.0	94.0	61.0	9.0	9.0	1.2
40.0	70.0	43.0	64.0	85.0	100.0	64.5	11.0	9.0	1.2
45.0	70.0	48.0	66.0	90.0	105.0	65.0	10.0	9.0	1.0
50.0	80.0	53.0	72.0	95.0	109.0	69.5	10.0	9.0	1.2

The FK series are easy to assemble and disassemble.

Flexible rubber bellows seal for pumps and rotary equipments for general use, where the liquid tents to produce scale on seal area.

Application Range	Character	Useful
(standard) • Pressure : $\phi 20$ 미만 : -500mmHg ~ 2kg/cm <sup>2</sup> G $\phi 20$ 이상 : -500mmHg ~ 3kg/cm <sup>2</sup> G • Temperature : -20°C ~ 70°C • Velocity : 5m/sec	• FKD : Double seal face • FKS : Single seal face(SIC vs SIC)	• Submersible pump, Waste water pump, Dewatering pump • 수중펌프, 오·폐수펌프, 탈수(배수)펌프 • 내알카리펌프, 슬러리펌프(시멘트, 모래, 벨)

• 이송 유체의 종류에 따라 최상의 재질을 적용할 수 있으며 슬러리(돌가루, 시멘트, 모래, 벨)를 이송하는 펌프에는 내마모성이 탁월한 SIC소재를 적용하여 긴 수명을 보장한다.



**EPC / EPA Dimension Table**

D4	D	D1	D2	D3	D5	L1	L2	L3
28.5	~13	25.0	14.0	14.2	31.7	10.2	5.0	8.0
30.0	~13	25.0	14.0	14.2	35.0	10.2	5.0	7.8
36.5	~17	31.0	18.0	18.2	41.3	11.8	5.0	8.0
38.0	~20	35.0	21.0	21.4	43.7	11.0	5.0	9.5
40.0	~20	35.0	21.0	21.4	43.7	11.0	5.0	9.5
46.0	~25	44.0	29.0	26.4	51.0	15.0	7.0	10.0
52.0	~30	48.0	32.0	31.0	57.0	16.0	8.0	11.0

**EPL Dimension Table**

D4	D	D1	D2	D3	D5	D6	L1	L2	L3
32.0	~13	25.0	14.0	14.2	31.7	20.0	19.2	5.0	8.5
41.0	~17	31.0	18.0	18.2	41.3	22.0	21.8	5.0	9.5
40.0	~20	35.0	21.0	21.4	43.7	25.0	21.0	5.0	9.5
45.0	~20	35.0	21.0	21.4	43.7	30.0	22.5	5.0	11.0
52.0	~25	44.0	29.0	26.4	51.0	35.0	27.0	7.0	11.5
58.0	~30	48.0	32.0	31.0	57.0	40.0	29.0	8.0	12.5

Cassette design which does not contact shaft.

This design has excellent internal and external pressure capabilities and is directly interchangeable with competitive seals.

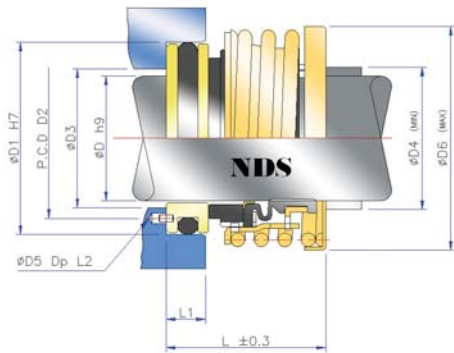
EPJ : One piece construction allows for fast high volume production line in installation fully unitized designs are available.

Application Range	Character	Useful
(standard) • Pressure : -500mmHg ~ 3kg/cm <sup>2</sup> G • Temperature : -20°C ~ 100°C • Velocity : 10m/sec	• Single spring type • Flexible rubber bellows • EPL : Round case with lip ring	• Automotive cooling water pump, Submersible pump • Oil circulating pump, Engine water pump for farming • 자동차 쿨링 워터펌프, 수중(잠수)펌프 • 엔진(모터)양수기용

• 스프링장치부가 고정되어 있는 고정형 씰로서 고속회전하는 엔진(모터)이 장착된 제품에 많이 사용

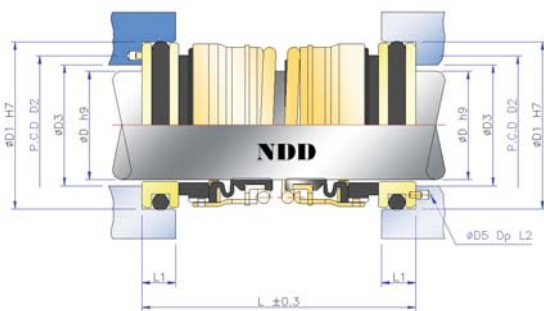


Elastomer rubber bellows Non-pusher design



**NDS Dimension Table** - sizes in millimeters (Single seal face)

D	D1	D2	D3	D4	D5	D6	L	L1	L2
20.0	38.0	27.0	23.0	24.0	3.0	41.0	34.0	8.0	3.0
22.0	40.0	29.0	25.0	26.0	3.0	47.0	34.0	9.0	3.0
25.0	44.0	33.0	28.0	29.0	3.0	47.0	34.0	9.0	3.0
28.0	46.0	35.0	31.0	32.0	3.0	55.0	36.0	9.0	3.0
30.0	50.0	39.0	33.0	35.0	3.0	55.0	36.0	9.0	3.0
32.0	54.0	42.0	36.0	37.0	3.0	55.0	38.0	9.0	3.0
35.0	58.0	45.0	39.0	40.0	3.0	59.0	38.0	10.0	3.0
38.0	60.0	48.0	42.0	43.0	3.0	62.0	40.0	10.0	3.0
40.0	64.0	50.0	44.0	45.0	3.0	67.0	42.0	10.0	3.0
45.0	66.0	55.0	49.0	50.0	3.0	73.0	42.0	10.0	3.0
50.0	72.0	60.0	54.0	55.0	3.0	81.0	42.0	10.0	3.0
55.0	77.0	65.0	59.0	60.0	3.0	86.0	48.0	11.0	3.0
60.0	84.0	70.0	64.0	65.0	3.0	94.0	50.0	11.0	3.0
65.0	89.0	75.0	69.0	70.0	3.0	100.0	56.0	12.0	3.0
70.0	94.0	80.0	74.0	75.0	3.0	107.0	56.0	12.0	3.0



**NDS Dimension Table** - sizes in millimeters (Double seal face)

D	D1	D2	D3	D4	D5	D6	L	L1	L2
28.5	44.450	36.9	31.6	33.3	3.0	51.0		12.0	3.0
36.5	52.375	44.8	39.5	41.3	3.0	60.0		12.0	3.0
45.0	66.0	55.0	49.0	50.0	3.0	73.0		10.0	3.0

NDS, NDD Seals are standard units with a full convolution elastomeric bellows. Non-clogging single coil spring enhances dependability.

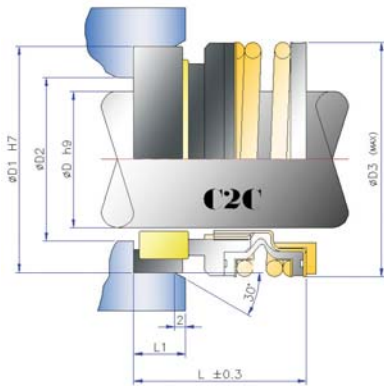
Application Range	Character	Useful
(standard) • Pressure : -500mmHg ~ 10kg/cm <sup>2</sup> G • Temperature : -30°C ~ 100°C • Velocity : 10m/sec	• NDS : Single seal face • NDD : Double seal face	• Fuel oil transfer pump, Cooling water pump for engine, Compressor for refrigerator • 연료 이송펌프, 엔진 냉각순환수 펌프 • 냉동기 콤프레사

• 내유성, 내한성, 내열성이 탁월한 재질의 사용으로 안정성, 내구성이 탁월하다.

# C2 MG

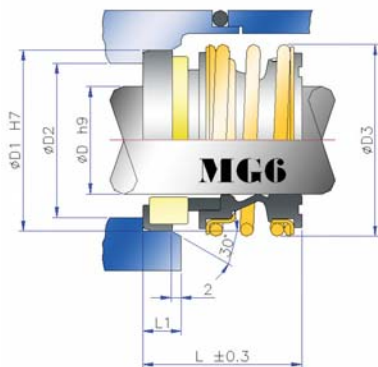


Elastomer rubber bellows Non-pusher design



C2C Dimension Table

D	D1	D2	D3	L	L1
16.0	32.0	19.0	31.0	25.0	8.0
19.0	34.5	22.0	35.0	28.5	9.5
25.0	41.5	28.0	43.0	30.5	10.0



MG6 Dimension Table

D	D1	D2	D3	L	L1
16.0	27.0	23.0	28.5	23.6	6.0

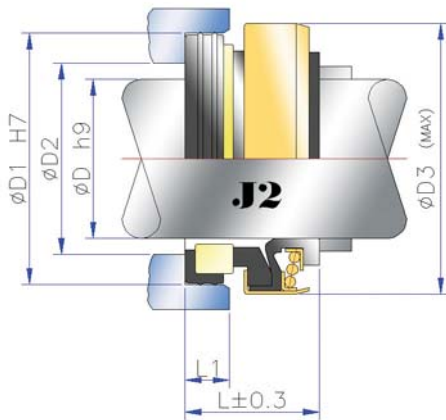
Factory assembled, self-contained high production shaft seal for fast, easy production line in installation and replacement. Incorporates full convolution elastomeric bellows for maximum flexibility for compensation of shaft movement, vibration and wear.

Application Range	Character	Useful
(standard) • Pressure : -500mmHg ~ 5kg/cm <sup>2</sup> G • Temperature : -20°C ~ 100°C • Velocity : 5m/sec	• Single spring type • Flexible rubber bellows	• Submersible pump, swimming pool • Oil transfer pump • 수중(잠수)펌프, 풀장용 펌프 • 절삭유(냉각수) 이송펌프

• 축의 유동이 있거나 진동이 있는 장치의 밀봉에 적합하며 장착거리가 짧아 소형 대용량 펌프에 적합하다.



# J2



J2 Dimension Table

D	D1	D2	D3	L	L1
8.0	22.0	10.0	20.0	14.5	4.5
25.0	39.5	27.0	43.0	21.0	7.0

The larger cross section coupled with the half convoluted design of the rubber diaphragm enables the seal to accept a certain degree of eccentricity, misalignment.

Application Range	Character	Useful
(standard) • Pressure : -720mmHg ~ 5kg/cm <sup>2</sup> G • Temperature : -20°C ~ 100°C • Velocity : 10m/sec	• J1W : Wave Spring • J2C : Conical single • Flexible rubber bellows	• Vacuum pump, sea water pump • Oil transfer pump, General fluids pump • 진공펌프, 배수(탈수) 펌프 • 오일 이송펌프, 절삭유(부동액) 이송용 펌프

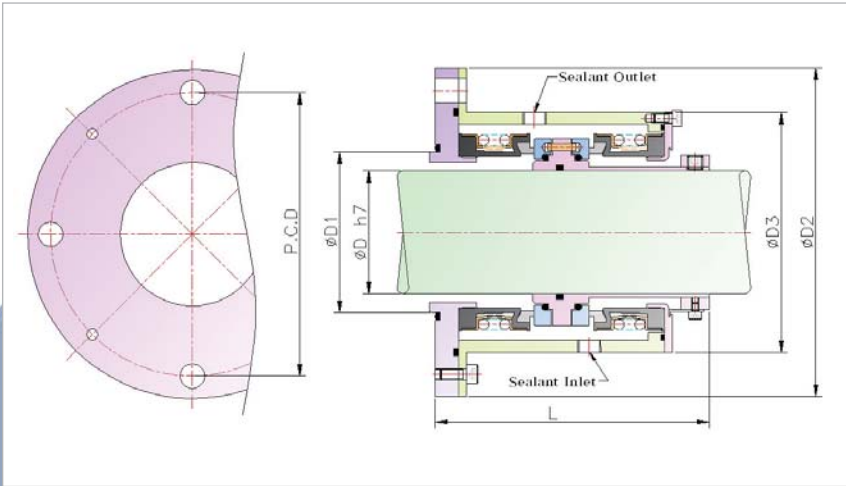
• 진공펌프, 가전제품(세탁기 등), 절삭유 펌프 등 비교적 장착장이 짧은 펌프에 적용

# Bilge-waste water protect system



KS B 1566, ISO 3069, DN 24960 기준에 입각하여 제조된 Seal Ring System(BWPS)은 동력을 발생시키는 기관실의 엔진과 연결된 Shaft가 선미부문의 벽을 관통하여 연결된 스크루를 회전시켜 추진력을 얻게 되는데 샤프트의 회전에 필요한 선체와의 간극을 통해 유입되는 해수를 Cartridge type의 Box Seal을 선체벽부와 Shaft 를 동시에 감싸는 구조로 장착하여 간극을 없애 해수유입을 완벽하게 차단하고 별도의 순환수 탱크와 엔진의 측면에 붙어있는 Cooling water pump의 냉각수 또는 순환수를 인위적으로 Cartridge내로 순환시켜 밀봉장치의 Seal face에서 발생하는 마찰열을 상쇄시키고 해수밀봉부의 Seal Face 파손 시 에도 Cartridge내 순환수의 압력으로 선내로 유입되는 해수를 원천적으로 차단하여 기관실 침수로 인한 선박의 침몰을 방지하는 다중 안전장치로 선박의 운전환경에 영향을 받지 않고 지속적인 밀봉기능이 자동으로 수행 되도록 하는 자동화 밀봉장치이다.

이울러, 기관실로 유입된 해수는 기관실내 Fuel oil, Engine oil, 각종 윤활유등과 혼합되며 재사용이 불가능한 오염물질로 기관실내에 축적되며 이를 빌지(Bilge)라고 하며, 빌지는 기관실 내부를 부식시키는 원인이 되고 있으며 이것이 바다로 지속적으로 배출되어 심각한 해양오염의 주범이 되는 혼합 폐수를 원천봉쇄하여 심각하고 지속적인 해수오염으로 인한 환경파괴를 근본적으로 방지할 수 있는 환경 친화적인 시스템이다.



Dimension Table

Shaft Dia	D1	D2	D3	P.C.D	L
30	50	130	84	110	119
33	53	133	87	113	119
35	55	135	89	115	119
38	58	138	92	118	119
40	60	140	94	120	119
43	63	148	102	128	125
45	65	150	104	130	125
48	68	153	107	133	125
50	70	155	109	135	125
53	73	158	112	138	125
55	75	160	114	140	125
60	80	169	123	149	145
65	85	174	128	154	145
70	90	179	133	159	145
75	95	184	138	164	145
80	100	189	143	169	145
85	105	194	148	174	145
90	110	204	158	184	170
95	115	209	163	189	170
100	120	220	174	200	170
110	130	231	185	211	195
120	140	243	197	223	195
130	150	254	208	234	220
140	160	265	219	245	220
150	170	277	231	257	220
160	180	265	219	245	245
170	190	277	231	257	245
180	200	288	242	268	270
190	210	299	253	279	270
200	220	310	264	290	270



## Mechanical Seals for Compressor

(컴프레서용)



## Mechanical Seals for Vacuum Pump

(진공펌프용)



## Submersible Aerator

(수중포기)



## Mechanical Seals for Circulatory Pump

(순환펌프)



## Cooling water circulation pump Seal for Engine

(냉각순환펌프)



# Certification

## 인/증 현황



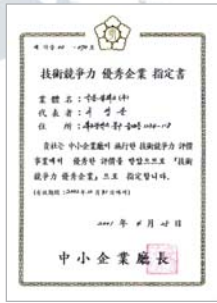
ISO 9001 인증  
(Certified ISO 9001)



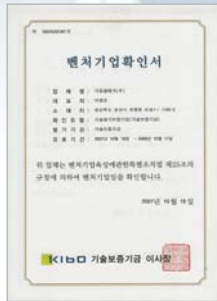
QS 9000 인증  
(Certified QS 9000)



TS 16949 인증  
(Certified TS 16949)



기술경쟁력 우수업체 선정  
(Designated a highly technology competitive company)



벤처기업 선정  
(Designated a Venture company)



INNO-BIZ  
(혁신기술보유) 기업 선정  
(Designated a technological innovation company)



항공, 우주 기술개발  
주관기업 선정  
(Designated a supplier for aerospace parts)



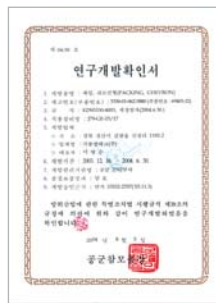
부품, 소재 전문  
생산기업 선정  
(Designated a parts, materials product company)



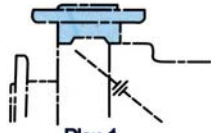
원자력 발전소 부품 공급업체 선정(R 등급 보유)  
(Seal & Carbon products supplier for Nuclear Plants)

# Development Status

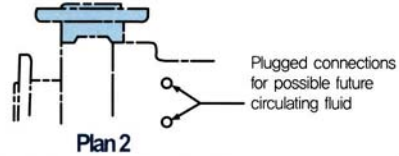
## 개발/현황



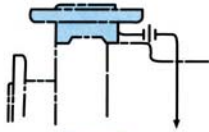
## Piping for Primary Seals



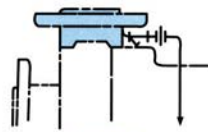
**Plan 1**  
Integral (internal) recirculation from pump discharge to seal



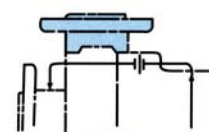
**Plan 2**  
Dead-ended seal box with no circulation of flush fluid. Water-cooled box jacket, and throat bushing required unless otherwise specified.



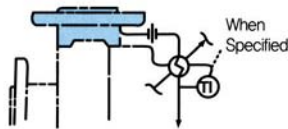
**Plan 11**  
Recirculation from pump case through orifice to seal.



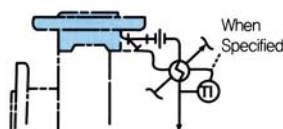
**Plan 12**  
Recirculation from pump case through strainer and orifice to seal.



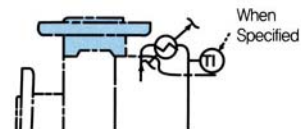
**Plan 13**  
Recirculation from seal chamber through orifice and back to pump suction.



**Plan 21**  
Recirculation from pump case through orifice and cooler to seal.

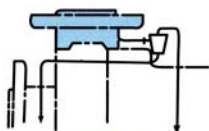


**Plan 22**  
Recirculation from pump case through strainer, orifice, and cooler to seal.

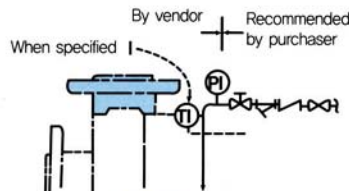


**Plan 23**  
Recirculation from seal with pumping ring through cooler and back to seal.

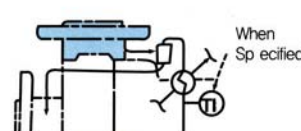
### Dirty or special Pumpage



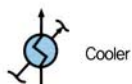
**Plan 31**  
Recirculation from pump case through cyclone separator delivering clean fluid to seal and fluid with solids back to pump suction.



**Plan 32**  
Injection to seal from external source of clean fluid (see note 2).



**Plan 41**  
Recirculation from pump case through cyclone separator delivering clean fluid through cooler to seal and fluid with solids back to pump suction.



Cooler



Pressure gage with block valve



Dial thermometer



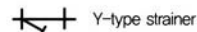
Pressure switch with block valve



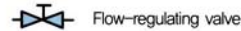
Cyclone separator



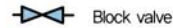
Flow indicator



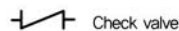
Y-type strainer



Flow-regulating valve



Block valve



Check valve



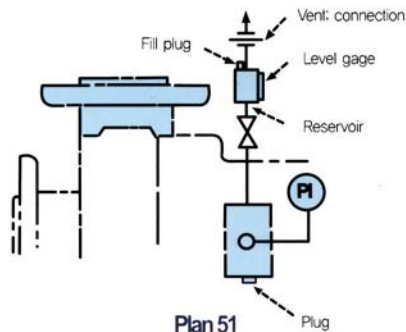
Orifice

#### Note :

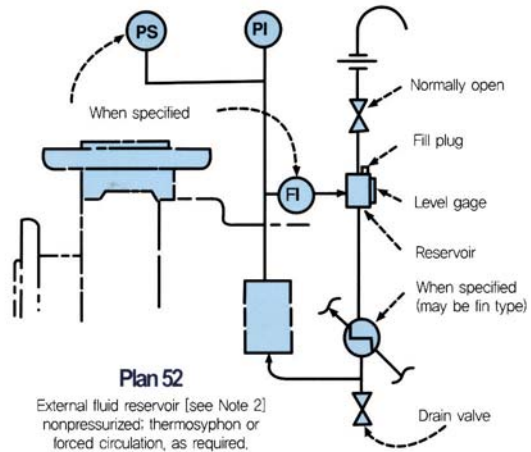
1. These plans represent commonly used systems. Other variations and systems are available and should be specified in detail by the purchaser or mutually agreed upon by the purchaser and the vendor.
2. For Plan 32, the purchaser shall specify the fluid characteristics, and the vendor shall specify the volume (gallons per minute) and pressure (pounds per square inch gage) required.

# CENTRIFUGAL PUMPS FOR GENERAL REFINERY SERVICES

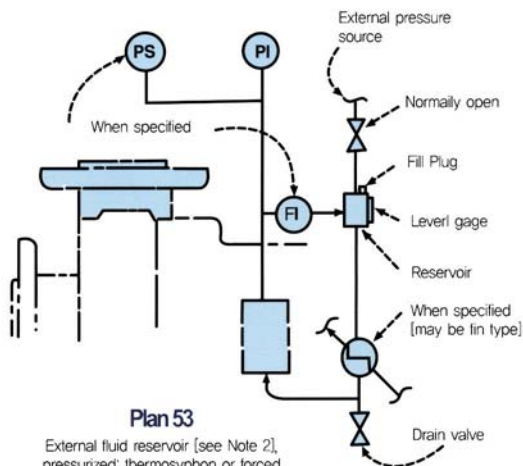
## Piping for Throttle Bushing, Auxiliary Seal Device, or Double Seal, Tandem Seals



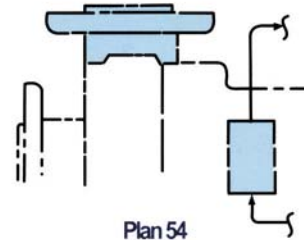
**Plan 51**  
Deed-ended blanks (usually methanol; see Note 2).



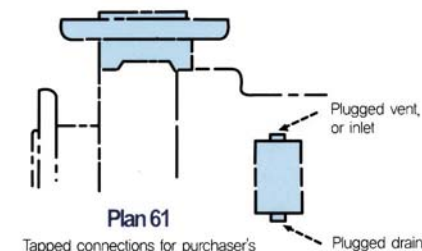
**Plan 52**  
External fluid reservoir [see Note 2] nonpressurized; thermosyphon or forced circulation, as required.



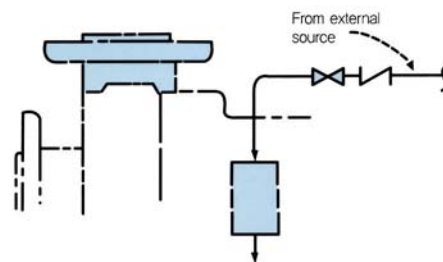
**Plan 53**  
External fluid reservoir [see Note 2], pressurized; thermosyphon or forced circulation, as required.



**Plan 54**  
Circulation of clean fluid from an external system [see Note 2].



**Plan 61**  
Tapped connections for purchaser's use: Note 2 shall apply when purchaser is to supply fluid [steam, gas, water, etc.] to auxiliary sealing device.



**Plan 52**  
External fluid quench [steam, gas, water, etc. see Note 2].

### Notes:

1. These plans represent commonly used systems. Other variations and systems are available and should be specified in detail by the purchaser or mutually agreed upon by the purchaser and the vendor.
2. The purchaser shall specify the fluid characteristics when supplemental seal fluid is provided, the vendor shall specify the volume (gallons per minute) and pressure (pounds per square inch gage) required, where these are factors.
3. See Figure D-2 for explanation of symbols not specified here.



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