

PILLAR

PILAFLON®

Overview of Pilaflon

PTFE (polytetrafluoroethylene) is a unique plastic material that has many advantages such as low friction, chemical resistance, heat resistance, insulation, etc. It is an essential material in a wide range of industries.

Nippon Pillar Packing is proud of mastering the use of PTFE. It made it possible to get the best of PTFE characteristics with a variety of fillers, Mixing, molding of raw materials, baking processing, quality control, and technology based on a long experience.

Pilaflon[®] is a registered trademark of Nippon Pillar Packing Co., Ltd., which is a generic name of applied products based on PTFE.

Main characteristics of PTFE

The main characteristics of PTFE are shown in the table below.

Chemical resistance	Low coefficient of friction	Low dielectric constant
Thermal stability	Non-stickiness	Flame retardance
Purity	Weatherability	Nonabsorptive

Main filler of Pilaflon[®]

Filler name	Filler characteristics
Glass fiber	Improves mechanical strength and cold flow resistance
Carbon fiber	Increases the mechanical strength
Carbon black	Used as a solid lubricant, to improve sliding characteristics
Heat resistant resin	Improves strength and abrasion resistance
Molybdenum disulfide	Used as a solid lubricant, to improve sliding characteristics

- Main Pilaflon material · Characteristic list P3
- Rod packing (P / # 4391 ~ 4) P5
(Segment module for pneumatic and reciprocating equipment)
- Piston ring & Rider ring (P / # 4370 & 4371) P6
(Piston ring for reciprocating compressor etc.)
- HiP seal (P / # 4368) P7
(Self-sealing seal combining Pilaflon rings and metal springs etc.)
- Gland seal Unit (P / # 4392S) P8
(Rotary shaft sealing unit combining segment and HiP Seal)
- LBP Curl Bearing (P / # 4822) P9
(Dry sliding bearing)
- V-Ring set (P / # 4360S) P9
- Ring seal (P / # 4377) P10
(For hydraulic rotary equipment)
- Slipper ring (P / # 4376) P10
(For reciprocating motion)

※Pilaflon products described in this catalog are application examples of PTFE.

We also support processing materials such as round bars, molding with special filling materials etc.

Besides Pilaflon products, Nippon Pillar Packing has many solutions such as Mechanical Seal, Gland Packing, Gasket, etc.
Please contact us in case of any sealing trouble.

Appendix

- HiP seal dimension table P11
- V-Ring size table P13
- Ring seal dimension table P13
- Slipper ring size table P14

Pilaflon materials: Choosing the material is an important phase in using Pilaflon products.

Materials	Main filler	Characteristics	Hue
W2	Unfilled	Clean, Chemical & heat resistant, excellent in high abstractability.	White
G2	Glass fiber Low amount	Due to the use of glass fiber with high strength and high toughness as filler material, dimensional stability and cold flow resistance are improved according to filling amount. On the other hand, characteristics such as conformability are reduced.	Grayish white
G3	Glass fiber High amount		Grayish white
H3	Glass fiber Molybdenum disulfide	In addition to cold flow resistance due to glass fiber filling, molybdenum disulfide filling reduces friction which makes it suitable for sliding materials.	Gray black
H4A	Heat resistant resin	H4 series contains heat resistant resin excellent in strength and abrasion resistance, while maintaining the flexibility of PTFE, it improves abrasion resistance. We offer high-strength H4F blended with carbon fiber as a variation, and low friction H4C and H4R filled with carbon-based solid lubricant.	Yellowish pink
H4C	Heat resistant resin Carbon black		Gray black
H4F	Heat resistant resin Carbon fiber Graphite powder		Gray black
H4R	Heat resistant resin Graphite powder		Gray black
D5	Bronze powder Molybdenum disulfide	Bronze powder with self-lubricating property and excellent reforming heat and solid lubricant Sliding material grade filled with molybdenum disulfide. It has both wears resistance and hardness / strength.	Copper black
R2	Carbon black Glass fiber	R2 · R3 is filled with solid lubricated carbon black to improve sliding characteristics. (R2 improves cold flow resistance by using glass fiber further)	Black
R3	Carbon black		Black
R4	Carbon fiber	R4 improves cold flow resistance at high temperature by filling with carbon fiber while maximizing PTFE characteristics.	Black
Y2A	Heat resistant resin	Y series has excellent sliding characteristics in dry condition with engineering plastic. Y2A is particularly low in aggressiveness to counterparts, Y3A is strong and an excellent abrasion resistant.	Ocher color
Y3A	PPS resin		Black

(Measured values at 25 ° C)

Specific gravity -----	Expansion coefficient X 10 ⁻⁵ / °C	Tensile strength N / mm ²	Elongation %	Compressive Strength N / mm ²	Compressive modulus X 10 ³ N / mm ²	Hardness -----
2.18	MD 13.4 CD 12.0	CD 27.4	CD 310	MD 5.2	MD 0.4	Durometer D55
2.24	MD 13.2 CD 7.5	CD 20.6	CD 265	MD 7.0	MD 0.8	Durometer D62
2.25	MD 12.3 CD 6.1	CD 15.7	CD 235	MD 8.04	MD 1.0	Durometer D64
2.29	MD 14.0 CD 7.7	CD 18.5	CD 273	MD 8.1	MD 0.9	Durometer D67
2.07	-----	CD 20.1	CD 265	-----	-----	Durometer D65
1.88	MD 8.9 CD 7.9	CD 9.9	CD 159	MD 9.3	MD 1.1	Durometer D68
1.98	MD 15.5 CD 8.0	CD 13.8	CD 166	MD 8.5	MD 0.85	Durometer D65
2.00	-----	CD 15.7	CD 230	-----	-----	Durometer D64
4.07	MD 11.1 CD 9.3	CD 15.7	CD 127	MD 7.3	MD 0.75	Durometer D69
2.24	MD 13.6 CD 7.9	CD 14.3	CD 229	MD 8.7	MD 1.0	Durometer D68
2.13	MD 12.1 CD 7.3	CD 14.7	CD 111	MD 9.6	MD 1.1	Durometer D71
2.05	MD 14.3 CD 4.9	CD 16.9	CD 224	MD 9.4	MD 0.95	Durometer D67
1.95	MD 15.0 CD 14.0	CD 17.1	CD 235	-----	-----	Durometer D65
1.84	MD 16.6 CD 6.8	CD 16.6	CD 7	-----	-----	Durometer D70

Note: 1. The numbers shown in the above table are representative values of measured data, not standards.

2. Compressive strength and stress value at 1% deformation are shown.

3. MD of each data indicates molding direction and CD is measurement value perpendicular to molding direction.

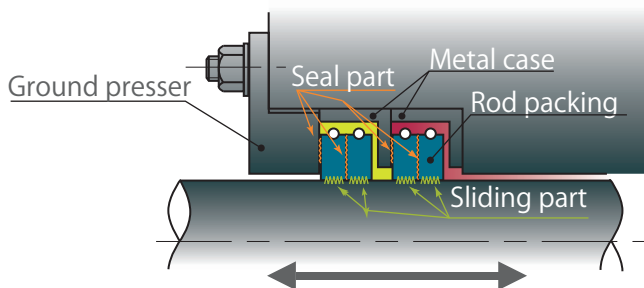
Pilaflon Rod Packing was developed for sealing the gland of the piston rod of a pneumatic device such as a reciprocating compressor. It can be used without lubrication which guarantees longer life compared to metallic seals. In general, Pilaflon Rod Packing is used with a set of 3 or 6 split pilaflon processed products and springs.

Features

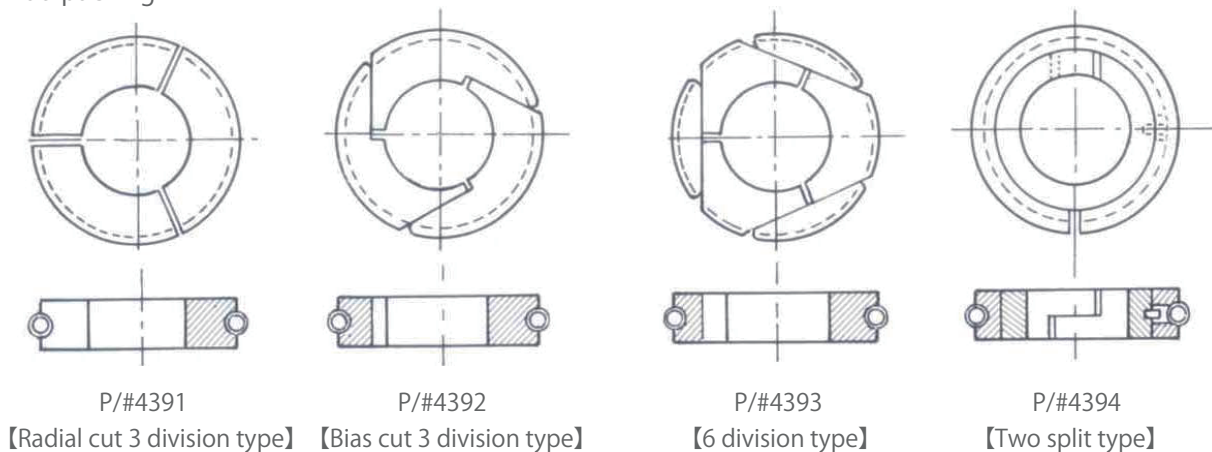
- Spring is included in the split structure, which makes the seal parts maintenance simple without the need for disassembling the equipment.
- Structure makes the shaft embrace by the spring, which can follow more axis swing compared to other ground part sealing methods (e.g. Gland Packing).
- Material selection and the structure have a large degree of freedom which guarantees sealability and longer lifespan.

Rod Packing

Reciprocating air pressure device mounting image



Types of rod packing



In general, Rod packing has one of the above shapes. it is common to use in the following combinations: P/# 4391 + P/# 4392, P/# 4392 × 2, P/# 4391 + P/# 4393.

Rod Packing

When the gland part is sealed by rod packing, it is necessary to be designed taking into consideration the material selection, combination pattern, set form, etc.

- Please inquire the equipment conditions / required specifications etc. beforehand.

Pilaflon Piston Ring & Rider Ring have been developed for reciprocating compressor, and reciprocating pump for chemical liquids.

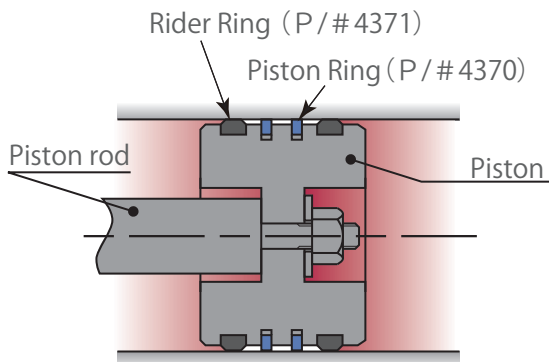
The piston ring works as a sealing material, and the rider ring's function is to correct the head swing of the piston.

By dividing the function, it became possible to achieve both sealability and long service life.

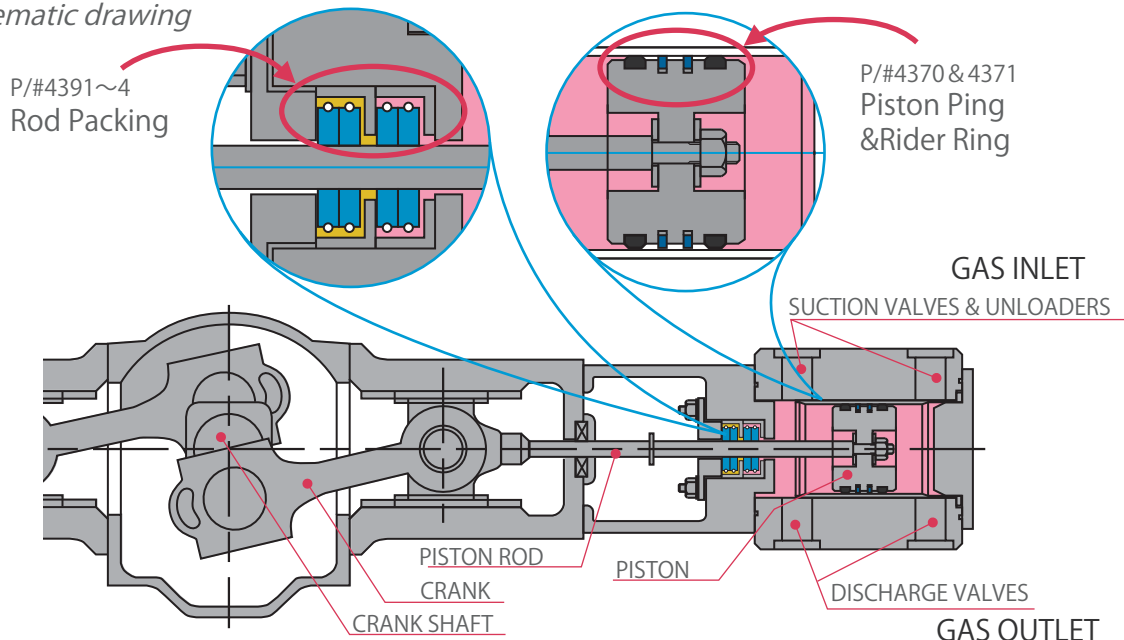
Features

- Compared with carbon and phenolic resin ring, it has less abrasion due to gas and it is superior in nonbrittleness.
- Excellent sliding characteristics and excellent abrasion resistance. (Ideal for oilless reciprocating compressor.)
- Optimum filler materials are chosen depending on conditions and fluid.

Pilaflon No.	Main filler	Main characteristics	Fluid application
H3	Glass fiber/ Molybdenum disulfide	Low friction Low heat generation	General purpose
D5	Bronze powder/ Molybdenum disulfide	Low compressive strain	For high pressure/ high PV
G3	Glass fiber	Oxidation resistance/ flame retardancy	For oxygen
R3	Carbon black	Chemical resistance	Various chemical gases
H4C	Heat resistant resin/ Carbon black	Wear resistance/ mechanical strength	High PV condition
H4F	Heat resistant resin/Carbon fiber/Graphite powder	Wear resistance/ mechanical strength	High PV condition
Y3A	PPS resin	Wear resistance/ Heat resistance	For dry gas and high PV



*Reciprocating compressor
schematic drawing*



Pilaflon HiP seal is a self-sealing product developed in a way to use sliding properties of PTFE : Flexibility and compliance of elastomer O-ring.
Thanks to its excellent characteristics, it prevents leakage in many types of equipments such as reciprocating machine, gasket in a static machine, shaft sealing part in a low-speed rotating equipment, and in situations where other sealing methods fail.



Features

- Elastomer O-ring corresponds to wide temperature range from extremely low to high temperature range.
- It is resistant to heat cycle loading and can maintain stable seal performance for a long time.
- High sealability can be obtained with small sliding resistance as compared with PTFE V-ring.
- There is a degree of freedom in design in order to obtain a balance between sealability and an optimum life span considering application and conditions.

Pilaflon No.	Main filler	Characteristics
W2	Unfilled	Excellent sealing in cryogenic temperature
H3	Glass fiber • Molybdenum disulfide	Can be used for rotating as well as static parts
R4	Carbon fiber	Suitable for high temperature and pressure applications
H4A	Heat resistant resin	Excellent sliding characteristics
Y2A	Heat resistant resin	Scratch resistant mating material

Structures / Types

Static Equipment		Suitable applications <ul style="list-style-type: none"> • When cryogenic fluid is sealed. • When more tightening surface pressure is required. • When sealing part requires high chemical resistance. • When contamination countermeasures are required.
Reciprocating Machine		Suitable applications <ul style="list-style-type: none"> • When there is a problem due to sealing property, life span, counterpart material wear, etc. with O-ring alone or O-ring + slipper ring
Rotating Equipment		Suitable applications <ul style="list-style-type: none"> • Compact, when it is necessary to achieve a certain level of sealability and lifespan. • It is effective to use another shaft seal system as the main seal and use it as an auxiliary seal.

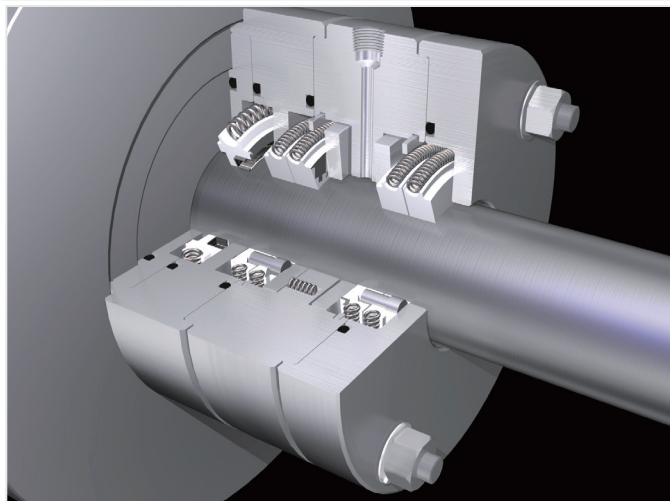
Pilaflon HiP seal

In order to use the HiP seal under optimal conditions, it is necessary to design it individually based on the usage environment.

- Please inquire the equipment conditions / required specifications etc. beforehand.

Pilaflon Gland Seal Unit is a shaft seal unit that makes full use of the performance as a segment seal. In general, shaft sealing methods use mechanical seal and gland packing. This Gland Seal Unit is particularly suitable for powered rotating equipment, which is difficult to seal for reasons such as dry operation and large runout.

In recent years, the use as a countermeasure, against shaft seal contamination, increased thanks to the pilaflon's purity and lubrication characteristics.

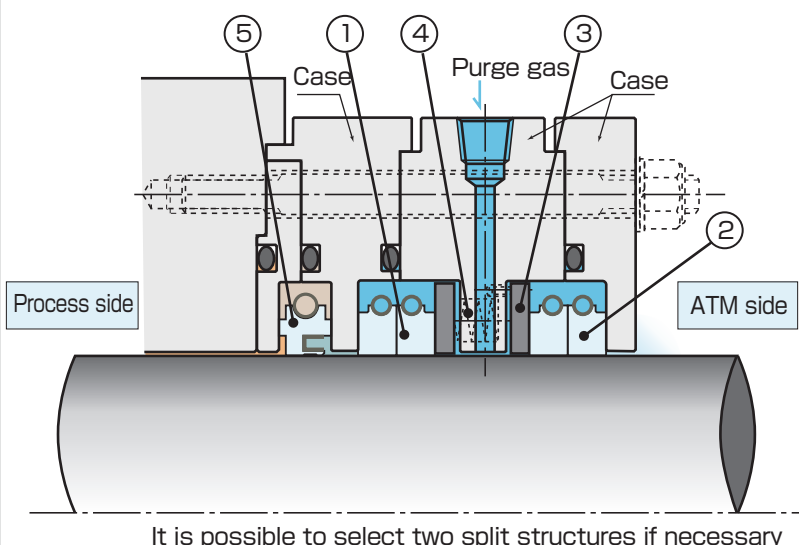


Features

- **Resists to axial movement : no wear of shaft and sleeve**
Since the segment seal is not fixed to the shaft or the case, it can show flexibly toward shaft's vibration, elongation etc.
- **Excellent maintenance**
Segment seals, including spring parts, are easy to be replaced. Moreover, retightening is also unnecessary.
- **Dry compatible · Less contamination**
Because the segment seal member uses pilaflon, it can be used without lubrication and does not contaminate the internal fluid, which is also advantageous for contamination prevention.

Rotating machine for powder equipment / Application example of gland part seal

- Rotary equipment such as rotary valve, dryer.
- Low-speed rotating equipment for powder resin, elastomer raw material, etc.
- Vertical agitator, reaction vessel etc.



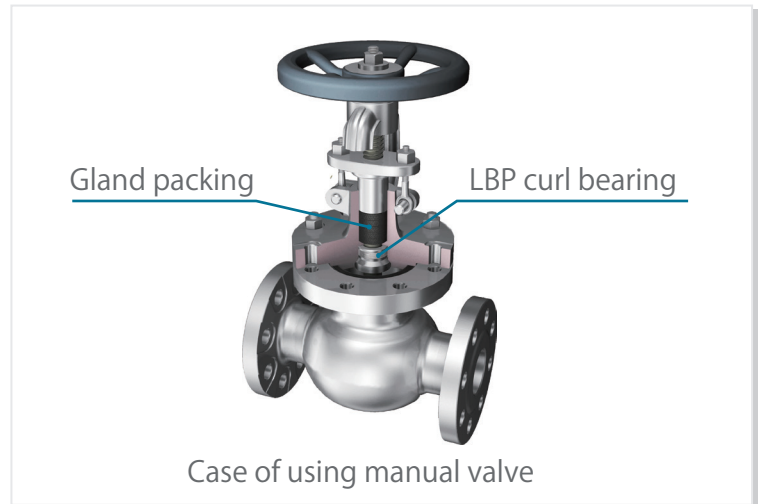
Parts' Functions

1. Segment seal (A)
Main seal of 4392S. It is to prevent leakage of substances in cans with a purge gas. It rotates together with the shaft and has a structure that slides on the end face of the segment seal and the case or spring stopper in order to reduce aggression to the shaft.
2. Segment seal (B)
Its function, same as ①, is to prevent the purge gas from leaking to the atmosphere side.
3. Sliding plate
It does not have a sealing function.
4. Spring
The segment seal is pressed against the case via a sliding plate to prevent the occurrence of a clearance on the seal surface when the shaft shakes or when shaft elongation occurs.
5. Hip seal
By limiting the amount of fluid contacting the segment seal, it improves the performance and life of the main seal (segment seal).

PILLAR No. 4822

PILAFLON® LBP Curl Bearing (Dry sliding bearing)

LBP curl bearings are dry plain bearings made of stainless steel punched metal and Pilaflon. Wear-resistant, high-sliding properties, and cold-flow grade Pilaflon are bonded in thin plates then cut and curled. Compared to general dry sliding bearings, it is a revolutionary product that has various performances required for dry sliding bearings, such as excellent compactness, as well as durability at high surface pressure.



Features

- It can be used under high pressure (~ 70 MPa).
- Coefficient of friction is small and "stick slip" hardly occurs.
- Thermal expansion can be kept low.
- It can be used over a wide temp. range (-200 °C ~+200°C).
- It has an excellent chemical, solvent, and Weather resistance.

PILLAR No. 4360 S

PILAFLON® V-Ring set

In recent years, various high-performance elastomer materials have been developed. V-ring set, made from PTFE, achieves both wear resistance and without affecting the sealability. In addition, with various fillers, it is possible to specialize performance on customer's required specifications.



Main Pilaflon material used for V ring set

Pilaflon No.	Main filler	Characteristics
W2	Unfilled	Unfilled PTFE makes both purity and slidability possible to be achieved.
H3	Glass fiber Molybdenum disulfide	Effective in making wear resistance and high sliding property.
R4	Carbon fiber	Recommended in case of high temperature / pressure when it is required to resist to cold flow.

Pilaflon materials and use cases

Pilaflon No.	Temperature (°C)	Maximum pressure (MPaG)
W2	-70~+100	7.0
H3	-30~+150	15.0
R4	-30~+200	20.0

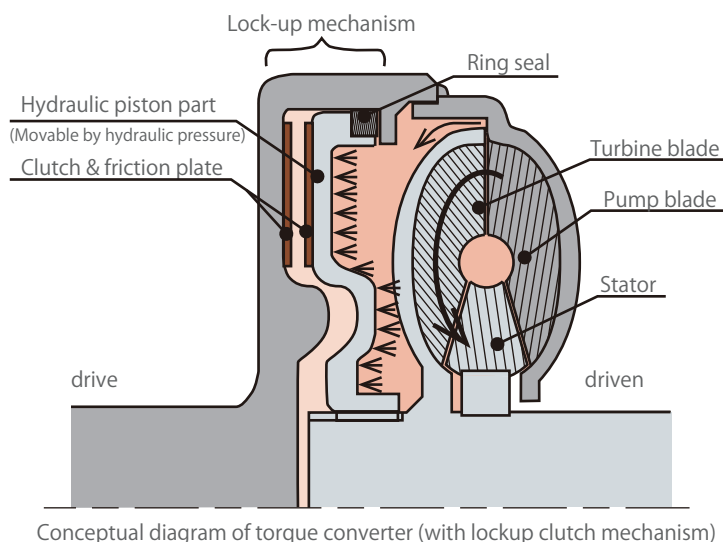
Main applications

- Valve stem, Plunger, pump

PILLAR No. 4377

PILAFLON® Ring Seal

Pilaflon ring seals are seal parts made of Piraflon® that seal fluids such as torque converter, fluid clutch, and fluid coupling. Compared to metal ring seals, this seal presents many advantages e.g., it protects shafts and housings. Using Nippon Pillar's extensive experience, it is possible to maintain fluid pressure as well as sealing performance.



Features

- Since the sealing material itself has lubricity, breakage, abnormal wear, etc. do not occur in oil film shortage.
- Excellent abrasion resistance that guarantees long life.
- Low friction, as well as an extremely low torque loss at startup.

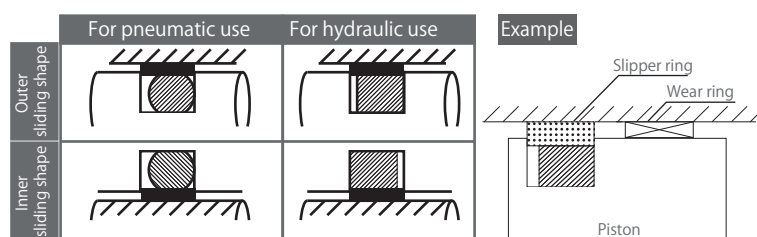
Pilaflon No.	Main filler	Pressure classification (MPaG)	PV value (MPaG · cm/s)	Max. TEMP (°C)
H3	Glass fiber Molybdenum disulfide	~2.0	~980	120
D5	Bronze powder molybdenum disulfide	2.0~2.9	980~2940	120
R4	Carbon fiber	~2.9	~4410	120

PILLAR No. 4376

PILAFLON® Slipper Ring (For reciprocating motion)

Pilaflon Slipper Ring is a reciprocating seal part that combines the self-lubricity of Pilaflon and elasticity of elastomer. Regardless of hydraulic or pneumatic pressure, it demonstrates high performance as a piston seal. The elastomer has a square and a round cross section. The square section is for hydraulic pressure while the round section is used for pneumatic pressure.

Pilaflon No.	Main filler	Characteristics
Y2A	Heat resistant resin	Excellent abrasion resistance under no lubrication and no damage to the mating material.
G2	Glass fiber	Excellent abrasion resistance under oil
R4	Carbon fiber	Excellent cold flow resistance and brittleness resistance under high pressure



Types and sections		Type 10			Type 12		Type 13	
		Type 20			Type 22		Type 23	
Type		S-3	S-5	S-7.5	S-5	S-7.5	S-5	S-7.5
Nominal diameter range		15~75	25~150	60~400	50~150	150~400	50~150	150~400
10~13	W	3.8	6.2	8.9	6.2	8.9	6.2	8.9
	B	4.2	6.7	10	6.7	10	6.7	10
	T	2.8	4.8	7.3	4.8	7.3	4.8	7.3
20~23	W	3.3	5.7	8.4	5.7	8.4	5.7	8.4
	B	4.2	6.7	10	6.7	10	6.7	10
	T	2.7	4.8	7.2	4.8	7.2	4.8	7.2
Groove size	H	--	--	--	5	7.5	5	7.5
	L	4.7	7.5	11	7.5	11	7.5	11
	G max	0.08	0.1	0.14	0.1	0.14	0.1	0.14
Mounting groove section		Inner side sliding			For inside pressure		For outside pressure	

Note: Please refer to the following dimensional table below to check HiP seal inner diameter / outer diameter - mounting part inner diameter / outer diameter.

PILLAR No. 4368 S-3Type

(Unit : mm)

Number	Type 10 and 20			
	HiP Seal inner diameter		Mounting groove	
	Type 10 I.D	Type 20 I.D	Inner diameter d	Outer diameter D
S-3-15	14.2	14.7	15	21
S-3-16	15.2	15.7	16	22
S-3-17	16.2	16.7	17	23
S-3-18	17.2	17.7	18	24
S-3-20	19.2	19.7	20	26
S-3-21	20.2	20.7	21	27
S-3-22	21.2	21.7	22	28
S-3-22.4	21.6	22.1	22.4	28.4
S-3-24	23.2	23.7	24	30
S-3-25	24.2	24.7	25	31
S-3-25.5	24.7	25.2	25.5	31.5
S-3-26	25.2	25.7	26	32
S-3-28	27.2	27.7	28	34
S-3-29	28.2	28.7	29	35
S-3-29.5	28.7	29.2	29.5	35.5
S-3-30	29.2	29.7	30	36
S-3-31.5	30.7	31.2	31.5	37.5
S-3-32	31.2	31.7	32	38
S-3-34	33.2	33.7	34	40
S-3-35	34.2	34.7	35	41
S-3-35.5	34.7	35.2	35.5	41.5
S-3-36	35.2	35.7	36	42
S-3-38	37.2	37.7	38	44
S-3-39	38.2	38.7	39	45
S-3-40	39.2	39.7	40	46
S-3-42	41.2	41.7	42	48
S-3-44	43.2	43.7	44	50
S-3-45	44.2	44.7	45	51
S-3-46	45.2	45.7	46	52
S-3-48	47.2	47.7	48	54
S-3-49	48.2	48.7	49	55
S-3-50	49.2	49.7	50	56
S-3-52	51.2	51.7	52	58
S-3-53	52.2	52.7	53	59
S-3-55	54.2	54.7	55	61
S-3-56	55.2	55.7	56	62
S-3-58	57.2	57.7	58	64
S-3-60	59.2	59.7	60	66
S-3-63	62.2	62.7	63	69
S-3-65	64.2	64.7	65	71
S-3-67	66.2	66.7	67	73
S-3-70	69.2	69.7	70	76
S-3-71	70.2	70.7	71	77
S-3-75	74.2	74.7	75	81

PILLAR No. 4368 S-5 Type

(Unit : mm)

Number	Type 10 and 20				Type 12 and 22		Type 13 and 23	
	HiP seal inner diameter		Mounting groove		Outer diameter O.D	Mounting groove Outer diameter D	HiP Outer diameter I.D	Mounting groove Outer diameter d
	Type 10 I.D	Shape 20 I.D	Inner diameter d	Outer diameter D				
S-5-30	28.8	29.3	30	40	---	---	---	---
S-5-31.5	30.3	30.8	31.5	41.5	---	---	---	---
S-5-32	30.8	31.3	32	42	---	---	---	---
S-5-34	32.8	33.3	34	44	---	---	---	---
S-5-35	33.8	34.3	35	45	---	---	---	---
S-5-35.5	34.3	34.8	35.5	45.5	---	---	---	---
S-5-36	34.8	35.3	36	46	---	---	---	---
S-5-38	36.8	37.3	38	48	---	---	---	---
S-5-39	37.8	38.3	39	49	---	---	---	---
S-5-40	38.8	29.3	40	50	---	---	---	---
S-5-42	40.8	41.3	42	52	---	---	---	---
S-5-45	43.8	44.3	45	55	---	---	---	---
S-5-46	44.8	45.3	46	56	---	---	---	---
S-5-48	46.8	47.3	48	58	---	---	---	---
S-5-49	47.8	48.3	49	59	---	---	---	---
S-5-50	48.8	49.3	50	60	60	60	50	50
S-5-52	50.8	51.3	52	62	62	62	52	52
S-5-53	51.8	52.3	53	63	63	63	53	53
S-5-55	53.8	54.3	55	65	65	65	55	55
S-5-56	54.8	55.3	56	66	66	66	56	56
S-5-58	56.8	57.3	58	68	68	68	58	58
S-5-60	58.8	59.3	60	70	70	70	60	60
S-5-63	61.8	62.3	63	73	73	73	63	63
S-5-65	63.8	64.3	65	75	75	75	65	65
S-5-67	65.8	66.3	67	77	77	77	67	67
S-5-70	68.8	69.3	70	80	80	80	70	70
S-5-71	69.8	70.3	71	81	81	81	71	71
S-5-75	73.8	74.3	75	85	85	85	75	75
S-5-80	78.8	79.3	80	90	90	90	80	80
S-5-85	83.8	84.3	85	95	95	95	85	85
S-5-90	88.8	89.3	90	100	100	100	90	90
S-5-95	93.8	94.3	95	105	105	105	95	95
S-5-100	98.8	99.3	100	110	110	110	100	100
S-5-102	100.8	101.3	102	112	112	112	102	102
S-5-105	103.8	104.3	105	115	115	115	105	105
S-5-110	108.8	109.3	110	120	120	120	110	110
S-5-112	110.8	111.3	112	122	122	122	112	112
S-5-115	113.8	114.3	115	125	125	125	115	115
S-5-120	118.8	119.3	120	130	130	130	120	120
S-5-125	123.8	124.3	125	135	135	135	125	125
S-5-130	128.8	129.3	130	140	140	140	130	130
S-5-132	130.8	131.3	132	142	142	142	132	132
S-5-135	133.8	134.3	135	145	145	145	135	135
S-5-140	138.8	139.3	140	150	150	150	140	140
S-5-145	143.8	144.3	145	155	155	155	145	145
S-5-150	148.8	149.3	150	160	160	160	150	150

Note: Model HiP 10 can be manufactured to a minimum nominal diameter of 25mm.

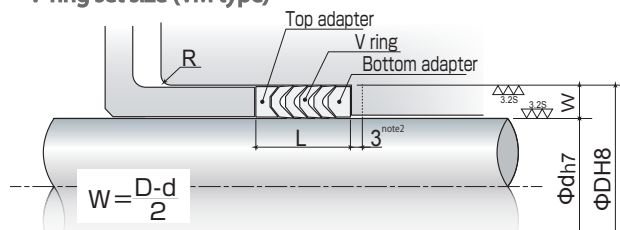
PILLAR No. 4368 S-7.5 Type

(Unit : mm)

Number	Type 10 and 20				Type 12 and 22		Type 13 and 23	
	HiP seal inner diameter		Mounting groove		Outer diameter O.D	Mounting groove Outer diameter D	HiP Outer diameter I.D	Mounting groove Outer diameter d
	Type 10 I.D	Type 20 I.D	Inner diameter d	Outer diameter D				
S-7.5-150	148.6	149.1	150	165	165	165	150	150
S-7.5-155	153.6	154.1	155	170	170	170	155	155
S-7.5-160	158.6	159.1	160	175	175	175	160	160
S-7.5-165	163.6	164.1	165	180	180	180	165	165
S-7.5-170	168.6	169.1	170	185	185	185	170	170
S-7.5-175	173.6	174.1	175	190	190	190	175	175
S-7.5-180	178.6	179.1	180	195	195	195	180	180
S-7.5-185	183.6	184.1	185	200	200	200	185	185
S-7.5-190	188.6	189.1	190	205	205	205	190	190
S-7.5-195	193.6	194.1	195	210	210	210	195	195
S-7.5-200	198.6	199.1	200	215	215	215	200	200
S-7.5-205	203.6	204.1	205	220	220	220	205	205
S-7.5-209	207.6	208.1	209	224	224	224	209	209
S-7.5-210	208.6	209.1	210	225	225	225	210	210
S-7.5-215	213.6	214.1	215	230	230	230	215	215
S-7.5-220	218.6	219.1	220	235	235	235	220	220
S-7.5-225	223.6	224.1	225	240	240	240	225	225
S-7.5-230	228.6	229.1	230	245	245	245	230	230
S-7.5-235	233.6	234.1	235	250	250	250	235	235
S-7.5-240	238.6	239.1	240	255	255	255	240	240
S-7.5-245	243.6	244.1	245	260	260	260	245	245
S-7.5-250	248.6	249.1	250	265	265	265	250	250
S-7.5-255	253.6	254.1	255	270	270	270	255	255
S-7.5-260	258.6	259.1	260	275	275	275	260	260
S-7.5-265	263.6	264.1	265	280	280	280	265	265
S-7.5-270	268.6	269.1	270	285	285	285	270	270
S-7.5-275	273.6	274.1	275	290	290	290	275	275
S-7.5-280	278.6	279.1	280	295	295	295	280	280
S-7.5-285	283.6	284.1	285	300	300	300	285	285
S-7.5-290	288.6	289.1	290	305	305	305	290	290
S-7.5-295	293.6	294.1	295	310	310	310	295	295
S-7.5-300	298.6	299.1	300	315	315	315	300	300
S-7.5-315	313.6	314.1	315	330	330	330	315	315
S-7.5-320	318.6	319.1	320	335	335	335	320	320
S-7.5-335	333.6	334.1	335	350	350	350	335	335
S-7.5-340	338.6	339.1	340	355	355	355	340	340
S-7.5-355	353.6	354.1	355	370	370	370	355	355
S-7.5-360	358.6	359.1	360	375	375	375	360	360
S-7.5-375	373.6	374.1	375	390	390	390	375	375
S-7.5-385	383.6	384.1	385	400	400	400	385	385
S-7.5-400	398.6	399.1	400	415	415	415	400	400

Note: Model HiP 10 can be manufactured to a minimum nominal diameter of 60mm.

V-ring set size (VM type)

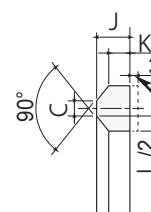
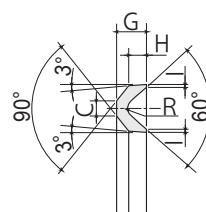
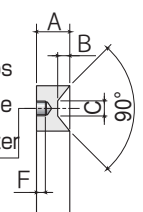


Top adapter (No.4361)

Vring (No.4360)

Bottom adapter (No.4362)

ØE 2 taps
to remove
the adapter



For easy pulling,
make a step by
adding 3mm to
J&K.

$$W = \frac{D-d}{2}$$

D: Box diameter d: Shaft diameter

Pillar No. 4360S

(Unit: mm)

Width W	1	2	3	4	5	6	L
2.5	7.2	9.2	11.2	13.2	15.2	17.2	2.0
3.0	8.4	10.6	12.8	15.0	17.2	19.4	2.2
3.5	8.7	11.2	13.7	16.2	18.7	21.2	2.5
4.0	9.6	12.4	15.2	18.0	20.8	23.6	2.8
4.5	10.4	13.5	16.6	19.7	22.8	25.9	3.1
5.0	12.6	15.9	19.2	22.5	25.8	29.1	3.3
5.5	13.4	17.0	20.6	24.2	27.8	31.4	3.6
6.0	14.1	17.9	21.7	25.5	29.3	33.1	3.8
6.5	15.1	19.4	23.7	28.0	32.3	36.6	4.3
7.0	16.1	20.8	25.5	30.2	34.9	39.6	4.7
7.5	17.0	22.1	27.2	32.3	37.4	42.5	5.1
8.0	17.8	23.2	28.6	34.0	39.4	44.8	5.4
8.5	18.6	24.3	30.0	35.7	41.4	47.1	5.7
9.0	19.5	25.5	31.5	37.5	43.5	49.5	6.0
9.5	20.3	26.6	32.9	39.2	45.5	51.8	6.3
10.0	21.0	27.5	34.0	40.5	47.0	53.5	6.5
10.5	21.6	28.1	34.9	41.7	48.5	55.3	6.8
11.0	21.5	28.5	35.5	42.5	49.5	56.5	7.0
11.5	33.3	30.6	37.9	45.2	52.5	59.8	7.3
12.0	24.2	31.8	39.4	47.0	54.6	62.2	7.6
12.5	25.0	32.9	40.8	48.7	56.6	64.5	7.9
13.0	26.7	34.8	42.9	51.0	59.1	67.2	8.1
14.0	28.2	36.8	45.4	54.0	62.6	71.2	8.6
15.0	29.9	39.1	48.3	57.5	66.7	75.9	9.2

1. Mark ΔL indicates the increment when a V-ring is added.
2. If you draw a drawer step to the bottom adapter, the total length increases by 3 mm.
3. Changing the total length L=>changing the adapter.

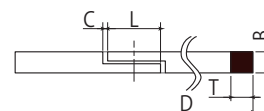
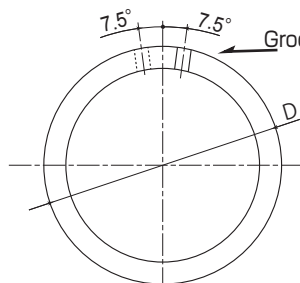
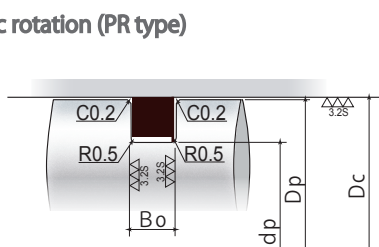
Pillar No. 4361/4360/4362

(Unit: mm)

Width W	Top adapter (VMT)				V Ring (VM)				Bottom adapter (VMB)			
	A	B	C	E-F	G	H	I	R	J	K	L	
2.5	3.0	0.6	1	--	2.5	1.8	0.2	--	2.8	2.0	2	
3.0	4.0	0.8	1	--	3.0	2.0	0.2	0.3	3.0	2.0	2	
3.5	4.0	1.1	1	--	3.5	2.3	0.2	0.4	3.3	2.0	2	
4.0	4.5	1.3	1	--	4.0	2.5	0.3	0.5	3.5	2.0	3	
4.5	5.0	1.4	1	--	4.6	2.8	0.3	0.7	3.8	2.0	3	
5.0	6.0	1.2	2	M3-3	4.5	3.0	0.3	0.8	4.5	3.0	3	
5.5	6.5	1.4	2	M3-3	5.1	3.3	0.3	1.0	4.8	3.0	3	
6.0	7.0	1.7	2	M3-3	5.5	3.5	0.3	1.0	5.0	3.0	3	
6.5	7.5	2.0	2	M3-3	6.3	4.0	0.3	1.0	5.3	3.0	4	
7.0	8.0	2.2	2	M4-4.5	6.8	4.3	0.4	1.2	5.5	3.0	4	
7.5	8.5	2.4	2	M4-4.5	7.5	4.7	0.4	1.2	5.8	3.0	4	
8.0	9.0	2.1	3	M4-4.5	7.5	5.0	0.4	1.2	5.5	3.0	4	
8.5	9.5	2.4	3	M4-4.5	8.1	5.3	0.4	1.2	5.8	3.0	4	
9.0	10.0	2.6	3	M4-4.5	8.5	5.5	0.5	1.5	6.0	3.0	4	
9.5	10.5	2.8	3	M4-4.5	9.1	5.8	0.5	1.5	6.3	3.0	4	
10.0	11.0	2.5	4	M6-6	9.0	6.0	0.5	1.5	6.0	3.0	5	
10.5	11.0	2.8	4	M6-6	9.6	6.3	0.5	1.5	6.3	3.0	5	
11.0	11.0	3.0	4	M6-6	10.0	6.5	0.5	1.7	6.5	3.0	5	
11.5	11.5	2.7	5	M6-6	10.1	6.8	0.5	1.7	7.3	4.0	5	
12.0	12.0	2.9	5	M6-6	10.5	7.0	0.6	2.0	7.5	4.0	5	
12.5	12.5	3.2	5	M6-6	11.1	7.3	0.6	2.0	7.8	4.0	5	
13.0	13.0	3.4	5	M6-6	11.5	7.5	0.6	2.5	9.0	5.0	5	
14.0	14.0	3.4	6	M6-6	12.0	8.0	0.6	3.0	9.0	5.0	5	
15.0	15.0	3.8	6	M6-6	13.0	8.5	0.7	3.5	9.5	5.0	6	

Pilaflon Ring Seal

For hydraulic rotation (PR type)



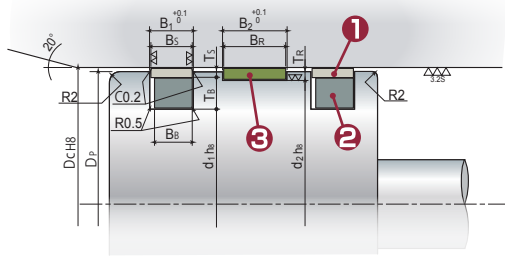
cross section

Pillar No. 4377

(Unit: mm)

Size	Cylinder and piston				Pilaflon ring seal								
	Dc H8	Dp ± 0.02	dp ± 0.1	Bo ± 0.1	D	L	T	Material H3			Material D5		
								B	C	C tolerance	B	C	C tolerance
30	30	29	22	4.0	30	8	3.0	3.9	0.5	± 0.2	3.9	0.5	± 0.2
35	35	34	27		35				0.6			0.6	
40	40	39	32		40				0.7			0.7	
45	45	44	37		45				0.8			0.8	
50	50	49	40		50				0.9			0.9	
55	55	54	45		55				1.0			1.0	
60	60	59	50		60				1.1			1.1	
65	65	64	55		65				1.2			1.2	
70	70	69	60		70				1.3			1.3	
75	75	74	65		75				1.4			1.4	
80	80	79	70	80	1.5	1.5	4.0	3.9	± 0.3	3.9	± 0.3		
85	85	84	75	85	1.6	1.6							
90	90	89	80	90	1.7	1.7							
95	95	94	85	95	1.8	1.8							
100	100	99	88	100	1.9	1.9							
105	105	104	93	105	2.0	2.0							
110	110	109	98	110	2.1	2.1							
115	115	114	103	115	2.2	2.2							
120	120	119	108	120	2.3	2.3							
125	125	124	113	125	2.4	2.4							
130	130	129	118	4.5	130	12	5.0	4.4	± 0.4	4.4	± 0.4		
135	135	134	123		135							2.5	2.5
140	140	139	128		140							2.6	2.6
145	145	144	133		145							2.7	2.7
150	150	149	136		150							2.8	2.8
155	155	154	141		155							2.9	2.9
160	160	159	146		160							3.0	3.0
165	165	164	151		165							3.1	3.1
170	170	169	156		170							3.2	3.2
175	175	174	161		175							3.3	3.3
180	180	179	166	5.0	180	15	6.0	4.9	± 0.6	4.9	± 0.6		
185	185	184	171		185							3.4	3.4
190	190	189	176		190							3.5	3.5
195	195	194	181		195							3.6	3.6
200	200	199	186		200							3.7	3.7

For hydraulic cylinder (SO type)



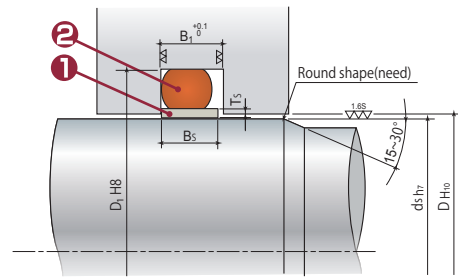
Pillar No. 4376

(Unit : mm)

Cylinder	Piston				Material									
	Dc	Dp	d1	d2	B1	B2	PTFE filler		Synthetic rubber		Fabric based phenol		Wear ring	
							① Slipper ring	② Packing	③ Wear ring					
Dc	Dp	d1	d2	B1	B2	Ds	Bs	Ts	ds	Bs	Ts	Br	Tr	
31.5	31	21.5	26.5	4.0	10	31.65		2.0	21.4	3.0	3.3	10		
35.5	35	25.5	30.5			35.65			25.4					
40	39.5	30	35			40.20			29.9					
45	44.5	34	40			45.20			33.9					
50	49.5	39	45			50.25			38.9					
56	55.5	43	51		15	56.25			42.9			15	2.5	
60	59.5	47	55			60.25	4.9	2.5	46.9	4.0	4.4			
63	62.5	50	58			63.25			49.9					
70	69.5	57	65		20	70.30			56.9			20		
71	70.5	58	66			71.30			57.9					
80	79.5	67	75			80.30			66.9					
90	89.5	75	84			90.30			74.9					
100	99.5	85	94		25	100.40			84.9			25		
110	109.5	94	104			110.45			93.8					
112	111.5	96	106			112.45	5.9		95.8	4.5	5.5			
120	119.5	104	114		30	120.50			103.8			30		
125	124.4	107	118			125.50			106.8					
130	129.4	112	123			130.50			111.8					
140	139.4	122	133		8.0	140.55	7.9	3.0	121.8	6.0	6.6	35	3.5	
150	149.4	132	143			150.60			131.8					
160	159.4	140	153		40	160.65			139.8			40		
170	169.4	150	163		9.0	170.70			149.8	7.0	7.7			
180	179.4	160	172			180.70			159.8					
190	189.4	168	182			190.80			167.8			45	4.0	
200	199.4	178	192			200.80			177.8					
224	223.4	202	216		10.0	224.90			201.8	8.0	8.8	50		
250	249.4	228	242			251.00			227.8			55		

- ①'s standard material is Pilaflon G 2, R 4.
- ②'s standard material is NBR.
- The wear ring ③ has a joint configuration (straight).
- Cylinder dimensions are conform to JIS B 8354.
- Ds is the free special diameter dimension of the slipper ring.
- ds is the inner diameter dimension when it is outside the packing.

Inner sliding type for pneumatic cylinder (SAI type)



Pillar No. 4376

(Unit : mm)

Shaft	Housing			① Slipper ring				② O-ring JISB2401				Shaft			① Slipper ring				② O-ring JISB2401			
	d	D	D1	B1	ds	Ts	Bs	P12	P14	P16	P18	d	D	D1	B1	ds	Ts	Bs	P12	P14	P16	P18
10	10.4	16			9.95							140	140.8	154	7.5	139.55	2	7.4				
12	12.4	18			11.95							145	145.8	159		144.55						
15	15.4	21			14.95							150	150.9	170		149.55						
18	18.4	24			17.90							155	155.9	175		154.5						
20	20.4	26			19.90							160	160.9	180		159.5						
22	22.4	30			21.90							165	165.9	185		164.5						
25	25.4	33			24.90							170	170.9	190		169.45						
28	28.4	36			27.90							175	175.9	195		174.45						
30	30.6	39			29.90							180	180.9	200		179.45						
32	32.6	41			31.90							185	185.9	205		184.4						
35	35.6	44			34.85							190	190.9	210		189.4						
38	38.6	47			37.85							195	195.9	215		194.4						
40	40.6	49			39.85							200	200.9	220		199.4						
42	42.6	51			41.85							210	210.9	230		209.35						
45	45.6	54			44.85							220	220.9	240		219.3						
48	48.6	57			47.85							230	230.9	250		229.3						
50	50.6	64			49.85							240	240.9	260		239.25						
55	55.6	69			54.80							250	250.9	270	11	249.25	2.5	10.9				
60	60.6	74			59.80							260	261	280		259.2						
65	65.8	79			64.80							270	271	290		269.15						
70	70.8	84			69.75							280	281	300		279.15						
75	75.8	89			74.75							290	291	310		289.1						
80	80.8	94			79.75							300	301	320		299.1						
85	85.8	99			84.70							310	311	330		309.05						
90	90.8	104			89.70							320	321	340		319						
95	95.8	109			94.70							330	331	350		329						
100	100.8	114			99.70							340	341	360		338.95						
105	105.8	119			104.65							350	351	370		348.95						
110	110.8	124			109.65							360	361	380		358.9						
115	115.8	129			114.65							370	371	390		368.85						
120	120.8	134			119.60							380	381	400		378.85						
125	125.8	139			124.60							390	391	410		388.8						
130	130.8	144			129.60							400	401	420		398.8						
135	135.8	149			134.55																	

- For the shaft diameter 48 or less, please divide the housing.
- Ds is the free inner diameter of the slipper ring.

External sliding type for pneumatic cylinder (SAO type)

Pillar No. 4376

(Unit : mm)

Cylinder		Piston			① Slipper ring			② O-ring JISB2401			Cylinder		Piston			① Slipper ring			② O-ring JISB2401				
Dc	Dp	d ₁	B ₁	D _s	T _s	B _s						Dc	Dp	d ₁	B ₁	D _s	T _s	B _s					
10	9.6	5	2.5	10.05			1.0	2.4	P7			145	144.3	131	7.5		145.45				P130		
12	11.6	7		12.05					P5			150	149.3	136		150.45			P135				
15	14.6	10		15.05					P10			155	154.3	141		155.45			P140				
18	17.6	12		18.05					P12			160	159.3	146		160.45			P145				
20	19.6	14		20.1					P14			165	164.3	151			165.45			P150			
22	21.6	16	3.2	22.1				3.1	P16			170	169.2	150			170.45			P150A			
25	24.6	19		25.1			P18				175	174.2	155	175.45			P155						
28	27.6	22		28.1			P22				180	179.2	160	180.45			P160						
30	29.6	22		30.1			P22A				185	184.2	165	185.6			P165						
32	31.4	23		32.1					P22A			190	189.2	170			190.6			P170			
35	34.4	26		35.15					P26			195	194.2	175			195.6			P175			
38	37.4	29		38.15					P29			200	199.2	180			200.6			P180			
40	39.4	31		40.15					P31			210	109.2	190			210.65			P190			
42	41.4	33	4.7	42.15			1.5	4.6	P32			220	219.2	200			220.7			P200			
45	44.4	36		45.15					P36			230	229.2	210	230.7			P210					
48	47.4	39		48.15					P39			240	239.2	220	240.75			P220					
50	49.4	41		50.15					P41			250	249.2	230	250.75			P230					
55	54.4	46		55.2					P46			260	259.1	240			260.8			P240			
60	59.4	51		60.2					P50			270	269.1	250			270.85			P250			
65	64.3	51		65.2					P50A			280	279.1	260	11		280.85	2.5	10.9	P260			
70	69.3	56		70.25					P56			290	289.1	270						290.9			P270
75	74.3	61		75.25					P60			300	299.1	280						300.9			P280
80	79.3	66		80.25					P65			310	309.1	290						310.95			P290
85	84.3	71		85.3					P71			320	319.1	300			321			P300			
90	89.3	76		90.3					P75			330	329.1	310			331			P300			
95	94.3	81		95.3					P80			340	339.1	320			341.05			P320			
100	99.3	86	7.5	100.3			2.0	7.4	P85			350	349.1	330			351.05			P320			
105	104.3	91		105.35					P90			360	359.1	340	361.1			P340					
110	109.3	96		110.35					P95			370	369.1	350	371.15			P340					
115	114.3	101		115.35					P100			380	379.1	360	381.15			P360					
120	119.3	106		120.4					P105			390	389.1	370			391.2			P360			
125	124.3	11		125.4					P110			400	399.1	380			401.2			P375			
130	129.3	116		130.4					P115			410	409.1	390			411.25			P385			
135	134.3	121		135.4					P120			420	419.1	400			421.3			P400			
140	139.3	126		140.45					P125														



Follow the instructions, before installation and operation, for your safety.

*Specifications and dimensions are subject to change without prior notice.

*The data on this catalogue are solely for your reference and are not to be construed as constituting a warranty.

*PILAFロン® is a registered trademark of Nippon Pillar Packing Co., Ltd.

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