

# **PILAFLON®**

## PILAFLON®

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### **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. (The characteristics of this are specialized for the application, therefore the Pilaflon product does not have all the characteristics.)

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, improving sliding characteristics	
Heat resistant resin	Improves strength and abrasion resistance	
Molybdenum disulfide	Used as a solid lubricant, improving sliding characteristics	

Main Pilaflon material · Characteristic list · · · · · · P3
• Rod packing (P / # 4391 $\sim$ 4)
• Piston ring & Rider ring (P / # 4370 & 4371) · · · · · · · · · · · · P6 (Piston ring for reciprocating compressor etc.)
• HiP seal (P / # 4368) · · · · · P7 (Self-sealing seal combining Pilafron 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.

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## **Material & Characteristics**

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

(Measured values at 25 ° C)

Materials	Main filler	Characteristics	Hue	Specific gravity	Expansion coefficient X10 <sup>-5</sup> /°C	Tensile strength N/mm²	Elongation %	Compressive Strength N/mm²	Compressive modulus X 10 <sup>3</sup> N / mm <sup>2</sup>	Hardness
W2	Unfilled	Clean, Chemical & heat resistant, excellent in high abstractability.	White	2.18	MD 13.4 CD 12.0	CD 27.4	CD 310	MD 5.2	MD 0.4	Durometer D55
G2	Glass fiber Low amount	Due to the use of glass fiber with high strength and high toughness as filler material, dimensional	Grayish white	2.24	MD 13.2 CD 7.5	CD 20.6	CD 265	MD 7.0	MD0.8	Durometer D62
G3	Glass fiber High amount	stability and cold flow resistance are improved according to filling amount. On the other hand, characteristics such as conformability are reduced.	Grayish white	2.25	MD 12.3 CD 6.1	CD 15.7	CD 235	MD 8.04	MD 1.0	Durometer D64
Н3	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	2.29	MD 14.0 CD 7.7	CD 18.5	CD 273	MD 8.1	MD 0.9	Durometer D67
H4A	Heat resistant resin	H4 series contains heat resistant resin excellent	Yellowish pink	2.07		CD 20.1	CD 265			Durometer D65
H4C	Heat resistant resin Carbon black	in strength and abrasion resistance, while maintaining the flexibility of PTFE, it improves abrasion resistance.	Gray black	1.88	MD 8.9 CD 7.9	CD 9.9	CD 159	MD 9.3	MD 1.1	Durometer D68
H4F	Heat resistant resin Carlbon fiber Graphite powder	We offer high-strength H4F blended with carbon fiber as a variation, and low friction	Gray black	1.98	MD 15.5 CD 8.0	CD 13.8	CD 166	MD 8.5	MD 0.85	Durometer D65
H4R	Heat resistant resin Graphite powder	H4C and H4R filled with carbon-based solid lubricant.	Gray black	2.00		CD 15.7	CD 230			Durometer D64
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	4.07	MD 11.1 CD 9.3	CD 15.7	CD 127	MD 7.3	MD 0.75	Durometer D69
R2	Carbon black Glass fiber	R2 · R3 is filled with solid lubricated carbon black to improve sliding characteristics.	Black	2.24	MD 13.6 CD 7.9	CD 14.3	CD 229	MD 8.7	MD 1.0	Durometer D68
R3	Carbon black	(R2 improves cold flow resistance by using glass fiber further)	Black	2.13	MD 12.1 CD 7.3	CD 14.7	CD 111	MD 9.6	MD 1.1	Durometer D71
R4	Carbon fiber	R4 improves cold flow resistance at high temperature by filling with carbon fiber while maximizing PTFE characteristics.	Black	2.05	MD 14.3 CD 4.9	CD 16.9	CD 224	MD 9.4	MD 0.95	Durometer D67
Y2A	Heat resistant resin	Y series has excellent sliding characteristics in dry condition with engineering plastic. Y2A is particularly low in aggressiveness	Ocher color	1.95	MD 15.0 CD 14.0	CD 17.1	CD 235			Durometer D65
Y3A	PPS resin	to counterparts, Y3A is strong and an excellent abrasion resistant.	Black	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.

PILLAR No. 4391~4

## PILAFLON® Rod Packing

PILLAR No. 4370&4371

# PILAFLON® Piston Ring & Rider Ring

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 garantees 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.

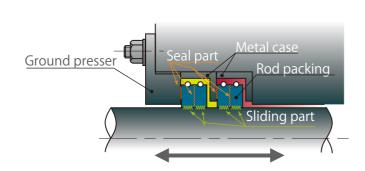


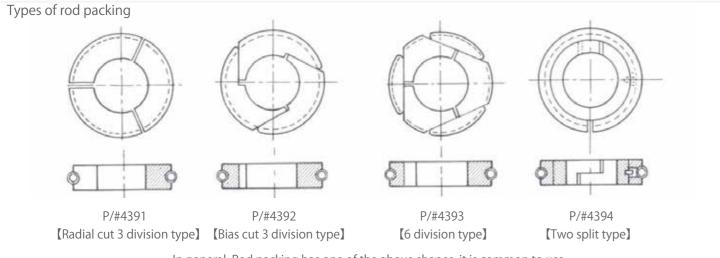
## **Features**

- Spring is included in the split structure, which makes the seal parts maintenance simple without 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 guarantee sealability and longer lifespan.

## **Rod Packing**

Reciprocating air pressure device mounting image





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

Rod Packing

When the gland part is sealed by rod packing, it is necessary to be designed taking into conideration 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 liquid.

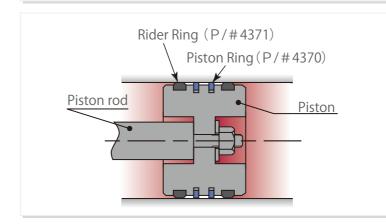
The piston ring works as a sealing material, and the rider ring's function is to correct the head swing of the piston.

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

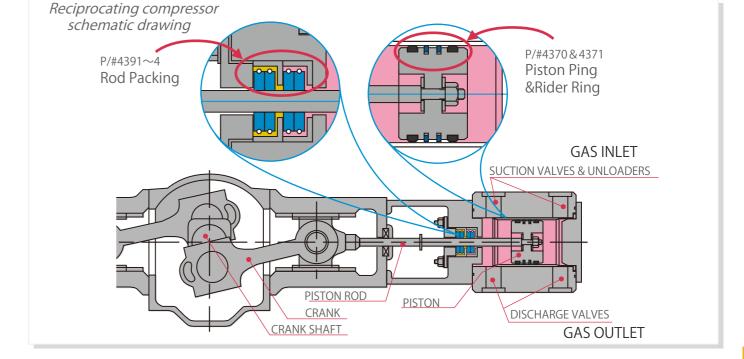


## Features

- 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 filler Main characteristics	
НЗ	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



# PILLAR No.

## PILAFLON® **HiP Seal**

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.

Due to its excellent characteristics, it prevents leakage in many types of equipment such as reciprocating machine, gasket in a static machine, shaft sealing part in a low-speed rotating equipment, and it can not be easily dealt with by other sealing methods.

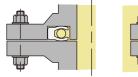


## Features

- 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.

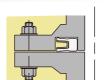
Pilaflon No.	Main filler	Characteristics		
W2	Unfilled	Excellent sealing in cryogenic temperature		
НЗ	Glass fiber • Molybdenum disulfide	Can be used for rotating as well as static parts		
R4	Carbon fiber	Suitable for high temperature and pressure applications		
H4A	Heat resistant resin	Excellent sliding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

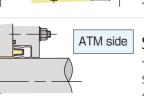
## Structures / Types



Process side





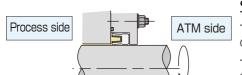


## Suitable applications

- · When cryogenic fluid is sealed.
- · When more tightening surface pressure is required.
- · When sealing part requires high chemical resistance.
- · When contamination countermeasures are required.



· When there is a problem due to sealing property, life span, counterpart material wear, etc. with O-ring alone or O-ring + slipper ring



## Suitable applications

- · 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.

Reciprocating Machine

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

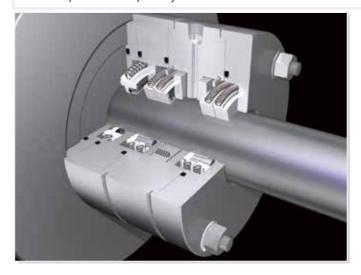
Please inquire the equipment conditions / required specifications etc. beforehand.

## PILLAR No. **4392S**

## PILAFLON® **Gland Seal Unit**

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**

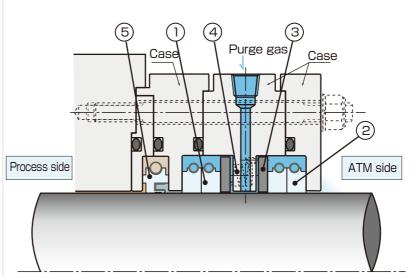
• Segment seals, including spring parts, are easy to be replaced. Moreover, retightening is also unnecessary.

### 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.



It is possible to select two split structures if necessary

### Parts' Functions

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)

purge gas from leaking to the atmosphere

It does not have a sealing function.

The segment seal is pressed against the case via a sliding plate to prevent the occurrence shaft shakes or when shaft elongation occurs.

By limiting the amount of fluid contacting 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, 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 simultaneously has various performances required for dry sliding bearings, such as excellent compactness and 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.(-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 applications

• Valve stem, Plunger, pump

Main Pilaflon material used for V ring set

Pilaflon No.	o. Main filler Characteristics				
W2	Unfilled	Unfilled PTFE makes both purity and slidability possible to be achieved.			
НЗ	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

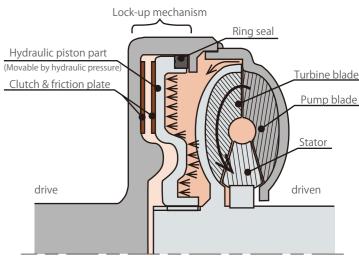
Pilaflon No.	Temperature (℃)	Maximum pressure (MPaG)
W2	-70~+100	7.0
Н3	-30~+150	15.0
R4	-30~+200	20.0

# 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 simultaneously fluid pressure and sealing performance.





Conceptual diagram of torque converter (with lockup clutch mechanism)

## 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)
НЗ	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

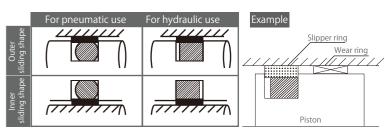
# PILLAR No. 4376

# 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



## Pilaflon HiP Seal

## PILAFLON®

PILLAR No. 4368 (Unit:mm)								
Types and sections		Type 10	B	<del>-</del>	Type 12	0.0 B	Type 13	I.D. B. B. C.
		Type 20  B  Q		Type 22 T		Type 23 W		
Туре	è	S-3	S-5	S-7.5	S-5	S-7.5	S-5	S-7.5
Nominal diam		15~75	25~150	60~400	50~150	150~400	50~150	150~400
4040	W	3.8	6.2	8.9	6.2	8.9	6.2	8.9
10~13	В	4.2	6.7	10	6.7	10	6.7	10
	10/	2.8	4.8	7.3	4.8	7.3	4.8	7.3
20~23	W B	3.3 4.2	5.7	8.4 10	5.7 6.7	8.4 10	5.7	8.4
2023	T		6.7	7.2		7.2	6.7	10 7.2
		2.7	4.8		4.8 5	7.5	4.8 5	7.5
Groove size	<u> </u>	4.7	7.5	11	7.5	11	7.5	1.5
010070 3120	G max	0.08	0.1	0.14	0.1	0.14	0.1	0.14
Mounting groove section		Innoveida	RO.2 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	press. press. singular singula	For inside pressur	Gmax 11HQ	less R0.2	

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. 43	68 S-3Type
---------------	------------

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

R No. 4368 S	, , , ,	Type 10	and 20		Type 12	and 22	Type 13	and 22
	HiP seal in	ner diameter		ng groove	HiP	Mounting groove	HiP	Mounting gro
Number	Type 10	Shape 20	Inner diameter	Outer diameter	Outer diameter	Outer diameter	Outer diameter	Outer diamet
	I.D	I.D	d	D D	O.D	D D	I.D	d 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 25.

### PILLAR No. 4368 S-7 5 Type

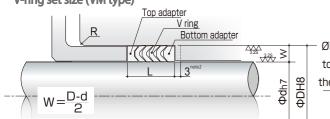
		Type 1	0 and 20	Type 12	2 and 22	Type 13 and 23		
lumber	HiP seal in	ner diameter	Mountir	ng groove	HiP	Mounting groove	HiP	Mounting groo
nullibel	Type 10	Type 20	Inner diameter	Outer diameter	Outer diameter	Outer diameter	Outer diameter	Outer diamet
	´İ.D	´İ.D	d	D	O.D	D	I.D	d
-7.5-150	148.6	149.1	150	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-7.5-233	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-7.5-203	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-7.5-273 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-7.5-200 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-7.5-293	298.6	299.1	300	315	315	315	300	300
S-7.5-300 S-7.5-315	313.6	314.1	315	330	330	330	315	315
S-7.5-310	318.6	319.1	320	335	335	335	320	320
S-7.5-320 S-7.5-335	333.6	334.1	335	350	350	350	335	335
S-7.5-333	338.6	339.1	340	355	355	355	340	340
S-7.5-340 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-7.5-360 S-7.5-375	373.6	374.1	375	390	390	390	375	375
S-7.5-375 S-7.5-385	373.6	374.1	375	400	400	400	375 385	375
S-7.5-385 S-7.5-400	398.6	384.1	400	415	400	415	400	400
5-7.5-400 odel HiP 10 can b				415	410	410	400	400

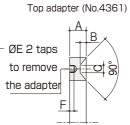
## Pilaflon V-ring

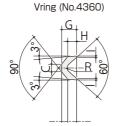
## **Pilaflon Slipper Ring**

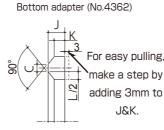
(Unit:mm)

## V-ring set size (VM type) R Bottom adapter









드비ㅣ	×	×     ^		
<del>'    </del>				J&k
	=		H	
	$W = \frac{D-d}{2}$	D: Box diameter d	l: Shaft diameter	
Pillar No. 4	361,4360,4	4362		(Unit:mm)

 10.5
 2.8
 3
 M4-4.5
 9.1
 5.8
 0.5
 1.5
 6.3
 3.0

 11.0
 2.5
 4
 M6-6
 9.0
 6.0
 0.5
 1.5
 6.0
 3.0

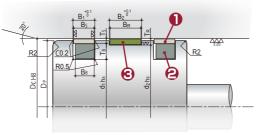
13.0 3.4 5 M6-6 11.5 7.5 0.6 2.5 9.0 5.0 14.0 3.4 6 M6-6 12.0 8.0 0.6 3.0 9.0 5.0 15.0 3.8 6 M6-6 13.0 8.5 0.7 3.5 9.5 5.0

Width		V rin	g (n) Installe	d VS Lengt	h (L)		L
W		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

- 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.

## For hydraulic cylinder (SO type)



<b>0</b>	1	B <sub>1</sub> <sup>0.1</sup>	Round shape(need)
	D, H8	Bs	ds hr
Pillar No. 4376			

Inner sliding type for pneumatic cylinder (SAI type)

<b>Pillar</b>	No. 4	376										(Unit	: mm)
									Mate	erial			
Cylinder			Piston			F	TFE fille		Synt	hetic rub	ber	Fabric bas	ed phenol
						1	<ol> <li>Slipper ring</li> </ol>			<li>2 Packing</li>			ar ring
Dc	Dp	d1	d2	B1	B2	Ds	Bs	Ts	dв	Вв	Тв	Br	TR
31.5	31	21.5	26.5			31.65			21.4				
35.5	35	25.5	30.5	4.0	10	35.65		2.0	25.4	3.0		10	
40	39.5	30	35			40.20			29.9		3.3		
45	44.5	34	40			45.20			33.9				
50	49.5	39	45	1		50.25			38.9			1	
56	55.5	43	51	1	15	56.25			42.9			15	2.5
60	59.5	47	55	5.0		60.25	4.9		46.9	4.0			
63	62.5	50	58	3.0		63.25	7.0	2.5	49.9	7.0	4.4		
70	69.5	57	65	1	l	70.30		2.5	56.9		7.7		
71	70.5	58	66	1	20	71.30			57.9			20	
80	79.5	67	75			80.30		1	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		5.5		3.0
112	111.5	96	106	6.0		112.45	5.9		95.8	4.5			
120	119.5	104	114	ļ	30	120.50			103.8			30	
125	124.4	107	118		"	125.50			106.8			"	
130	129.4	112	123			130.50		ļ	111.8		6.6		3.5
140	139.4	122	133	8.0	35	140.55	7.9		121.8	6.0	0.0	35	0.0
150	149.4	132	143	0.0		150.60	7.0	3.0	131.8	0.0		- 00	
160	159.4	140	153		40	160.65		"."	139.8			40	
170	169.4	150	163	9.0	<u>``</u>	170.70			149.8	7.0	7.7		
180	179.4	160	172			180.70		1	159.8			1	
190	189.4	168	182		45	190.80		l	167.8			45	4.0
200	199.4	178	192	10.0		200.80		l	177.8	8.0	8.8		
224	223.4	202	216	1 .0.0	50	224.90		l	201.8	0.0	5.0	50	
250	249.4	228	242		55	251.00			227.8			55	

1. For the shaft diameter 48 or less, please divide the housing.

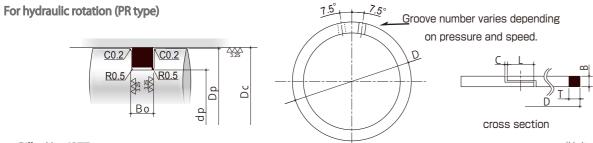
- 1. ① 's standard material is Pilaflon G 2, R 4. ②'s standard material is NBR.
- 3. The wear ring ③ has a joint configuration (straight).
  4. Cylinder dimensions are conform to JIS B 8354.
  5. Ds is the free special diameter dimension of the slipper ring.
- dB is the inner diameter dimension when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

ш	10	10.4	16		9.95			P12	140	140.8	154	7.5	139.55	2	7.4	P140	i
ш	12	12.4	18	1	11.95			P14	145	145.8	159	7.5	144.55	2	7.4	P145	i
ш	15	15.4	21	3.2	14.95		3.1	P16	150	150.9	170		149.55			P155	i
	18	18.4	24	1	17.90	1		P20	155	155.9	175		154.5			P160	i
	20	20.4	26		19.90	'		P22	160	160.9	180		159.5			P165	i
	22	22.4	30		21.90			P24	165	165.9	185		164.5			P170	i
	25	25.4	33		24.90			P26	170	170.9	190		169.45			P175	i
ш	28	28.4	36		27.90			P30	175	175.9	195		174.45			P180	1
	30	30.6	39		29.90			P32	180	180.9	200		179.45			P185	1
	32	32.6	41	1	31.90			P35	185	185.9	205		184.4			P190	i
	35	35.6	44	4.7	34.85		4.6	P38	190	190.9	210		189.4			P195	1
H	38	38.6	47	1	37.85	1.5		P40	195	195.9	215		194.4			P200	i
H	40	40.6	49		39.85	1.5		P42	200	200.9	220		199.4			P205	
	42	42.6	51		41.85			P45	210	210.9	230		209.35			P215	1
ш	45	45.6	54		44.85			P48	220	220.9	240		219.3			P225	ı
	48	48.6	57		47.85			P50	230	230.9	250		229.3			P235	
Ш	50	50.6	64	1	49.85			P53	240	240.9	260		239.25			P245	ı
ш	55	55.6	69	l	54.80			P56	250	250.9	270	11	249.25	2.5	10.9	P255	ı
	60	60.6	74	l	59.80			P63	260	261	280		259.2			P265	
	65	65.8	79	l	64.80			P67	270	271	290		269.15			P275	ı
	70	70.8	84	ļ	69.75			P71	280	281	300		279.15			P285	
	75	75.8	89	ļ	74.75			P75	290	291	310		289.1			P295	
Н	80	80.8	94	ļ	79.75			P80	300	301	320		299.1			P300	
	85	85.8	99	ļ	84.70			P85	310	311	330		309.05			P315	
	90	90.8	104	7.5	89.70	2	7.4	P90	320	321	340		319			P320	
	95	95.8	109	1	94.70			P95	330	331	350		329			P335	
Ш	100	100.8	114	ļ	99.70			P102	340	341	360		338.95			P340	
Ш	105	105.8	119	ļ	104.65			P105	350	351	370		348.95			P355	
	110	110.8	124	ļ	109.65			P112	360	361	380		358.9			P360	
	115	115.8	129	l	114.65			P115	370	371	390		368.85			P375	
	120	120.8	134		119.60			P120	380	381	400		378.85			P385	
	125	125.8	139	Į.	124.60			P125	390	391	410		388.8			P385	

### 2. Ds is the free inner diameter of the slipper ring.

# Pilaflon Ring Seal





Pillar No	. 4377											(1	Jnit:mm
		Cylinder	and piston					F	Pilaflon ring s	eal			
Size	Dc Hs	Dp ±0,2	dp ±0.1	Bo ±0,1	D	L	Т		Material H3			Material D	5
	DC FIS	Db9-	up ±0.1	PO0.	U			В	С	C tolerance	В	С	C toleranc
30	30	29	22		30				0.5			0.5	
35	35	34	27	l	35	8	3.0		0.5	± 0.2		0.6	± 0.2
40	40	39	32	]	40		3.0		0.6			0.7	
45	45	44	37	]	45			]	0.7	1		0.8	1
50	50	49	40	1	50				0.8			0.9	1
55	55	54	45	1	55	1			0.9			1.0	1
60	60	59	50	4.0	60	1		3.9	0.9	1	3.9	1.1	1
65	65	64	55	1 7.0	65	1		] 5.5	1.0	1	3.5	1.1	1
70	70	69	60	1	70	10	4.0		1.1	± 0.3		1.2	± 0.3
75	75	74	65	1	75		7.0		1.2	1		1.3	1
80	80	79	70	1	80	1			1.3	1		1.4	1
85	85	84	75	1	85	1			1.3	1		1.5	1
90	90	89	80	1	90	1			1.4	1		1.6	1
95	95	94	85		95				1.5			1.7	
100	100	99	88	ļ.	100	1			1.6	1		1.8	4
105	105	104	93	ļ.	105	1			1.6	1		1.8	4
110	110	109	98	l	110	1			1.7	1		1.9	4
115	115	114	103	1	115	1			1.8	± 0.4		2.0	± 0.4
120	120	119	108	4.5	120	12	5.0	4.4	1.9		4.4	2.1	1
125	125	124	113		125				2.0			2.2	4
130	130	129	118	l	130	ļ			2.0	ł		2.3	4
135	135	134	123	l	135	1			2.1		ļ	2.4	-
140	140	139	128	-	140	1		l	2.2	1		2.5	-
145	145	144	133		145			<b>-</b>	2.3	1		2.5	-
150 155	150 155	149 154	136 141	ł	150 155	1		l	2.3	1		2.6	-
	160	154	141	ł	160	15		l	2.4	1		2.7	1
160 165	165	164	151	1	165	1		l	2.6	1		2.8	1
170	170	169	156	1	170		ł	l	2.0	± 0.6		3.0	± 0.6
170	175	174	161	5.0	175	1	6.0	4.9	2.7	± 0.6	4.9	3.0	₹ 0.0
180	180	174	166	3.0	180	1	0.0	4.9	2.7	1	4.9	3.1	1
185	185	184	171	1	185	18		l	2.9	1		3.2	1
190	190	189	176	1	190	1 '0		l	3.0	1		3.3	1
195	195	194	181	ł	195	1		l	3.0	1		3.4	1
200	200	194	186	ł	200	1		l	3.0	1		3.4	1

### External sliding type for pneumatic cylinder (SAO type)

			, 2/6.				
Pillar	No. 4	1376					
Cylinder		Piston		1	Slipper	ring	②O-ring
Dc	Dρ	d1	B1	Ds	Ts	Bs	JISB2401
10	9.6	5		10.05			P5
12	11.6	7	2.5	12.05		2.4	P7
15	14.6	10		15.05			P10
18	17.6	12		18.05			P12
20	19.6	14		20.1	1.0		P14
22	21.6	16	3.2	22.1		3.1	P16
25	24.6	19		25.1			P18
28	27.6	22		28.1			P22
30	29.6	22		30.1		l	P22A
32	31.4	23		32.1			P22A
35	34.4	26		35.15			P26
38	37.4	29		38.15			P29
40	39.4	31		40.15			P31
42	41.4	33	4.7	42.15	1.5	4.6	P32
45	44.4	36		45.15	1.5		P36
48	47.4	39		48.15			P39
50	49.4	41		50.15			P41
55	54.4	46		55.2			P46
60	59.4	51		60.2			P50
65	64.3	51		65.2			P50A
70	69.3	56		70.25			P56
75	74.3	61		75.25			P60
80	79.3	66		80.25			P65
85	84.3	71		85.3			P71
90	89.3	76		90.3			P75
95	94.3	81		95.3			P80
100	99.3	86	7.5	100.3	2.0	7.4	P85
105	104.3	91		105.35			P90
110 115	109.3 114.3	96 101		110.35 115.35			P95 P100
120	114.3	101		120.4			P100
120	119.3	110		125.4			P105
130	129.3	116		130.4			P110
135	134.3	121		135.4			P115
140	139.3	126		140.45			P120
140	139.3	120		140.45			P125

						(Unit	: mm)
Cylinder		Piston		①SI	ipper ri	ng	②O-ring
Dc	Dp	d1	B1	Ds	Ts	Bs	JISB2401
145	144.3	131		145.45			P130
150	149.3	136		150.45			P135
155	154.3	141	7.5	155.45	2.0	7.4	P140
160	159.3	146		160.45			P145
165	164.3	151		165.45			P150
170	169.2	150		170.45			P150A
175	174.2	155		175.45			P155
180	179.2	160		180.45			P160
185	184.2	165		185.6			P165
190	189.2	170		190.6			P170
195	194.2	175		195.6			P175
200	199.2	180		200.6			P180
210	109.2	190		210.65			P190
220	219.2	200		220.7			P200
230	229.2	210		230.7			P210
240	239.2	220		240.75			P220
250	249.2	230		250.75			P230
260	259.1	240		260.8			P240
270	269.1	250		270.85			P250
280	279.1	260	11	280.85	2.5	10.9	P260
290	289.1	270		290.9			P270
300	299.1	280		300.9			P280
310	309.1	290		310.95			P290
320	319.1	300		321			P300
330	329.1	310		331			P300
340	339.1	320		341.05			P320
350	349.1	330		351.05			P320
360	359.1	340		361.1			P340
370	369.1	350		371.15			P340
380	379.1	360		381.15			P360
390	389.1	370		391.2			P360
400	399.1	380		401.2			P375
410	409.1	390		411.25			P385
420	419.1	400		421.3			P400

Note: Ds is the external size of the slipper ring when it is released.



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

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