Rotary Seals

Selection criteria for Rotary seals

Seal	Application	Standard	Size range	Technical data*			Material	Shaft
				Temp.** range	Speed	Pressure		
	Field of Application	ISO/DIN	mm	°C	m/s	MPa max.	Standard Seal material	Mating Surface hardness
Turcon® Roto Glyd Ring® 	Rotary distributors Pivoting motors: - Mobile hydraulic - Machine tools	ISO 7425/1 (O.S.)*** ISO 7425/2 (I.S.)***	8 – 2700 (O.S.)*** 5 – 2600 (I.S.)***	–45 to +200	1	30	T10	>55 HRc
					2	20	T40	>55 HRc
Zurcon® Roto Glyd Ring® S 	For sealing shafts, axles & rotary transmission leadthroughs with slow rotary, or oscillating movement.	ISO 7425/1	10 – 2700	–45 to +100	6.5 MPa x m/s		Z53 Z54 Z80	>55 HRc
Turcon® Roto Variseal® 	Rotary distributors Pivoting motors: - Pharmacy - Machine tools - Industry - Chemical	–	5 – 2500	–100 to +200	2	15	T40	>55 HRc
					2	5	T78	>170 HB

* The data below are maximum values, and cannot be used at the same time. The max. pressure depends on Temperature.
**Temperature range is depending on choice of Elastomer material.
***I.S = Inner Sealing O.S = Outer Sealing

Seal	Profile	B+S type	Forsheda/ Type	Standard Characteristics	Installa-tion	Retention / Clamping possibilities		Technical data*	
					Size range mm	With clamping band	With axial retention	Speed m/s	Pressure MPa max.
V-Ring 		VA	A	V–Ring Standard	2.7 – 2010		×	10	Without
		VS	S	V–Ring Extended body	4.5 – 210		×	10	Without
		VL	L	V–Ring Small profile	105 – 2025		×	10	Without
		AX	AX	V–Ring Large diameter flexible lip	200 – 2020		×	10	Without
		LX	LX	V–Ring Large diameter rigid lip	135 – 2025		×	10	Without

Rotary Seals

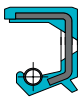
Selection criteria for Rotary seals

Seal	Type	Application	Standard	Size range	Technical data*			Material	Shaft
					Temp.** range	Speed	Pres-sure		
		Field of Application	ISO/DIN	mm	°C	m/s	MPa max.	Standard Seal material	Mating Surface hardness
Varilip®	**Varilip® Type A** 	- Pumps - Separators - Compressors - Blowers - Centrifuges	DIN 3760 ISO 6194/1 Draft ISO/DIS 16589	10 – 170	–60 to +200	40	0.5	T25	>55 HRc
								T78	>170 HB
	Varilip® Type B 	- Machine tools - Gearboxes - Mixers - Blowers	DIN 3760 ISO 6194/1 Draft ISO/DIS 16589	10 – 170	–60 to +200	20	0.5	T25	>55 HRc
								T78	>170 HB
	Varilip® Type C 	- Pumps - Machine tools - Compressors	DIN 3760 ISO 6194/1 Draft ISO/DIS 16589	10 – 170	–60 to +200	20	2	T25	>55 HRc
								T78	>170 HB
	Varilip® Type D 	- Separators - Hubs - Bearings - Mixers	DIN 3760 ISO 6194/1 Draft ISO/DIS 16589	10 – 170	–60 to +200	20	0.1	T25	>55 HRc
								T78	>170 HB
PDR		- Compressors - Vacuum pumps - Crankshaft Seals - Gearboxes - Grease retainers - Pumps	DIN 3760 ISO 6194/1 Draft ISO/DIS 16589	10–1500	–100 to +200	90	1.5	Various PTFE materials	>20 HRc

* The data below are maximum values, and cannot be used at the same time. The max. pressure depends on Temperature.
**Temperature range is depending on choice of Elastomer material.

Rotary Seals

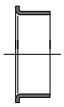
Selection criteria for Rotary seals

Seal	Profile	TSS type	Forsheda/ STEFA type	Standard Characteristics	Installation	Technical data*	
					Size range mm	Speed m/s	Pressure MPa max.
Radial Oil Seals		TRA	CB	ISO 6194/1 DIN 3760 Type A	4 – 500	30	0.05
		TRE	CC	ISO 6194/0 DIN 3760 Type AS	6 – 380	30	0.05
		TRC	BB	ISO 6194/1 DIN 3761 Type B	6 – 550	30	0.05
		TRD	BC	ISO 6194/1 DIN 3761 Type BS	15 – 400	30	0.05
		TRB	DB	ISO 6194/1 DIN 3761 Type C	20 – 760	30	0.05
		TRF	DC	ISO 6194/1 DIN 3761 Type CS	35 – 600	30	0.05
		TRD_A	1B/CC	Combined Seal Rubber at Back–face	On demand	30	0.05
		TRD_B	2B/CC	Combined Seal Rubber at Front–face	On demand	30	0.05
		TRU	–	Pressure Seal	8 – 120	10	0.5
		TRP	6CC	Pressure Seal	11 – 365	10	0.5
		TRQ_D	12CC	Pressure Seal	15 – 55	5	1.0
		TRK	CD	Low Friction, No Spring	4 – 70	10	Without
		TRG	BD	Low Friction, No Spring	4 – 70	10	Without

* The data below are maximum values, and cannot be used at the same time. The max. pressure depends on Temperature.

Rotary Seals

Selection criteria for Rotary seals

Seal	Profile	TSS type	Forsheda/ STEFA type	Standard Characteristics	Installation	Technical data*	
					Size range mm	Speed m/s	Pressure MPa max.
End Covers		YJ38	VK	End cover	16 – 230		0.05
		YJ39	–	End cover	22 – 270		0.5
Shaft Repair Kit		TS	–	Sleeve	12 – 200		–
Cassette Seals		TC5	System 500 1HH	System 500	90 – 320		0.05
		TC3	System 3000 1HHD	System 3000	130 – 150		0.05
		TC0	System 5000 1HD	System 5000	On demand		0.05

* The data below are maximum values, and cannot be used at the same time. The max. pressure depends on Temperature.

Rotary Seals

Selection criteria for Rotary seals

Seal	Profile	TSS type	STEFA type	Standard Characteristics	Installation	Technical Data*	
					Size range mm	Speed m/s	Pressure MPa max.
GAMMA-Seals		TBP	RB	GAMMA– Seal Standard	10 – 225	20	Without
		TBR	9RB	GAMMA– Seal with Labyrinth	15 – 108	20	Without
Axial Shaft Seals		TAI	–	Axial Shaft Seal inside sealing	10 – 100	30	0.01
		TAA	–	Axial Shaft Seal outside sealing	10 – 114	15	0.01

* The data below are maximum values, and cannot be used at the same time. The max. pressure depends on Temperature.

Turcon® Roto Glyd Ring®



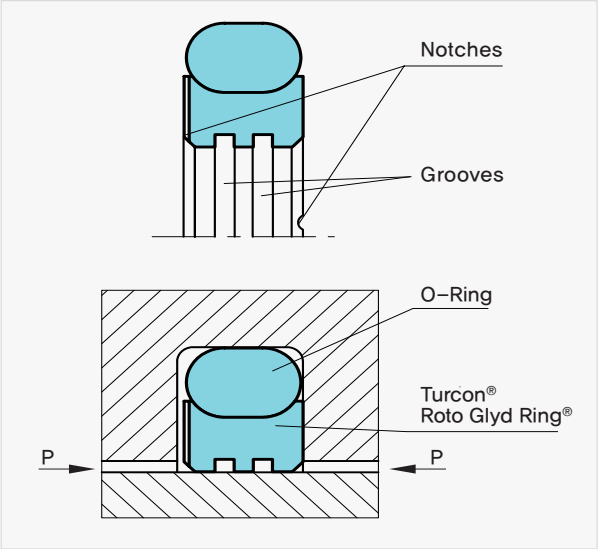
Double-Acting
Rubber Energized Plastic Faced Seal

Materials: Turcon®, Zurcon® & Elastomer



개요

Turcon® Roto Glyd Ring®은 회전체에 적용되는 복동형 Seal로서, 고체 Turcon® 재질로 탄성체인 O-Ring으로 조합되어 효과적인 Sealing 작용을 한다.



Turcon® Roto Glyd Ring®

특징

Turcon® Ring의 습동되는 부분에 하나, 또는 두 개의 오일 홈이 있어 높은 압력과 지속에 적합한 형상이다.

즉, 오일 홈은 뛰어난 윤활 효과를 가져오며 그로 인해 마찰이 지어지고, 표면 압력과 접촉 압력의 균형으로 더 나은 Sealing 효과를 가져온다.

Turcon® Ring의 뒤쪽 부분 즉, O-Ring과 접촉되는 부분은 오목하게 되어 접촉 표면을 넓게 하므로, Turcon® Ring이 축과 함께 회전될 위험을 감소시킨다.

장점

- 내, 외부 Seal의 완벽한 균형.
- 마찰계수가 낮다.
- Stick-Slip 현상이나 눌러붙음 현상이 없어, 정밀기계에 사용할 수 있다.
- 오일 홈 구성이 간단하고, 내부 공간이 적다.
- 윤활성이 뛰어나다.
- 최대 Ø2,500mm까지 적용 가능.

적용 범위

- 압력 : 최대 30MPa (300bar)
- 속도 : 최대 2 m/s
- 온도 : −45℃ ~ +200℃*
  (O-Ring 재질에 따라서)
- 매체 : 광물 베이스의 유압 작동유,
  친환경 유압유 (Bio-oils),
  기타.

※ 주의사항

- 위에 제시된 최대 수치는 같은 동작 시간대에 동시에 유효할 수는 없다.
- 최대 속도는 재질, 타입, 압력, 온도, 틈새 크기에 따라 좌우된다.
- 온도 범위 또한, 매체 조건에 따라 영향을 받는다.

*0℃ 이하의 가압이 되지 않는 적용에서는 반드시 엔지니어와 상의한다.

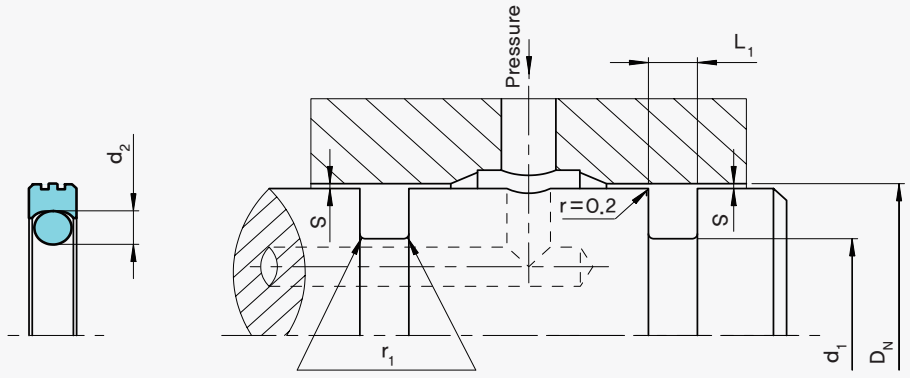
Turcon® Roto Glyd Ring®

재질 / Materials for Turcon® Roto Glyd Ring®

Material, Application Properties	Code	O-Ring Material Shore A	Code	O-Ring Operating Temp. °C*	Mating Surface Material	Mpa max.
Turcon® T40 • For all Lubricating & Non-Lubricating Hydraulic Fluids. • Water Hydraulics. • Soft Mating surfaces. • Carbon Fiber filled. Colour : Grey.	T40	NBR-70	N	-30 ~ (+100)	Steel Steel Chrome-plated (Rod) Cast iron Stainless Steel Aluminium	20
		NBR-70 Low Temp.	T	-45 ~ +80		
		FKM-70	V	-10 ~ +200		
		EPDM-70	E**	-45 ~ (+145)		
Turcon® T10 • Hydraulic and Pneumatics for all Lubricating & Non-Lubricating Fluids. • High Extrusion Resistance. • Good Chemical Resistance. • BAM Tested. • Carbon & Graphite filled. Colour : Black.	T10	NBR-70	N	-30 ~ +100	Steel Steel Chrome-plated (Rod) Stainless Steel	30
		NBR-70 Low Temp.	T	-45 ~ +80		
		FKM-70	V	-10 ~ +200		
		EPDM-70	E**	-45 ~ +145		

* The O-Ring Operating Temperature is only valid in Mineral Hydraulic Oil. (except EPDM) Highlighted Materials are standard.
** Material NOT suitable for Mineral oils. BAM : Approved by "Bundesantalt Materialprufung, Germany."

Installation Recommendation – External Sealing



Installation drawing

Installation Dimensions – Standard Recommendations

Series No.	Bore Diameter D_N H9		Groove Diameter	Groove Width	Radial Clearance S max.*		Radius	O-Ring Cross section	Number of Grooves in the Sealing Surface
	Standard Range	Available Range	d_1 h9	L_1 +0.2	10 MPa	20 MPa	r_1	d_2	
TG40	8 – 39.9	8 – 135.0	D_N – 4.9	2.20	0.15	0.10	0.40	1.78	0
TG41	40 – 79.9	14 – 250.0	D_N – 7.5	3.20	0.20	0.15	0.60	2.62	1
TG42	80 – 132.9	22 – 460.0	D_N – 11.0	4.20	0.25	0.20	1.00	3.53	1
TG43	133 – 329.9	40 – 675.0	D_N – 15.5	6.30	0.30	0.25	1.30	5.33	2
TG44	330 – 669.9	133 – 690.0	D_N – 21.0	8.10	0.30	0.25	1.80	7.00	2
TG45	670 – 999.9	670 – 999.9	D_N – 28.0	9.50	0.45	0.30	2.50	8.40	2

Provide Split Housing Grooves, according to diameter.
* At Pressures **> 10 MPa**, it is recommended that for the the Cross-section you choose the next larger profile, according to the column; "Available Range". i.e) for Bore Ø80mm : TG40 00 800-.
* At Pressures **> 30 MPa**, Use Diameter Tolerance H8/f8 (Bore/Rod) in area of seal.

주문 예

Turcon® Roto Glyd Ring®과 함께 적용되는 O-Ring 규격과 재질 선택은, 표를 참고하시기 바랍니다.

- Bore diameter : D_N = 80.0mm
- TSS Part No. TG4200800

TSS Article No. TG42 0 0800 – T40 N
- TSS Series No.
- Type (Standard)
- Bore diameter x 10**
- Quality Index (Standard)
- Material Code (Seal Ring)
- Material Code (O-Ring)

** For diameters ≥ 1000.0mm multiply only by factor 1.
Example : TG45 for diameter 1200.0mm
TSS Article No. : TG45 **X1200** – T40N.

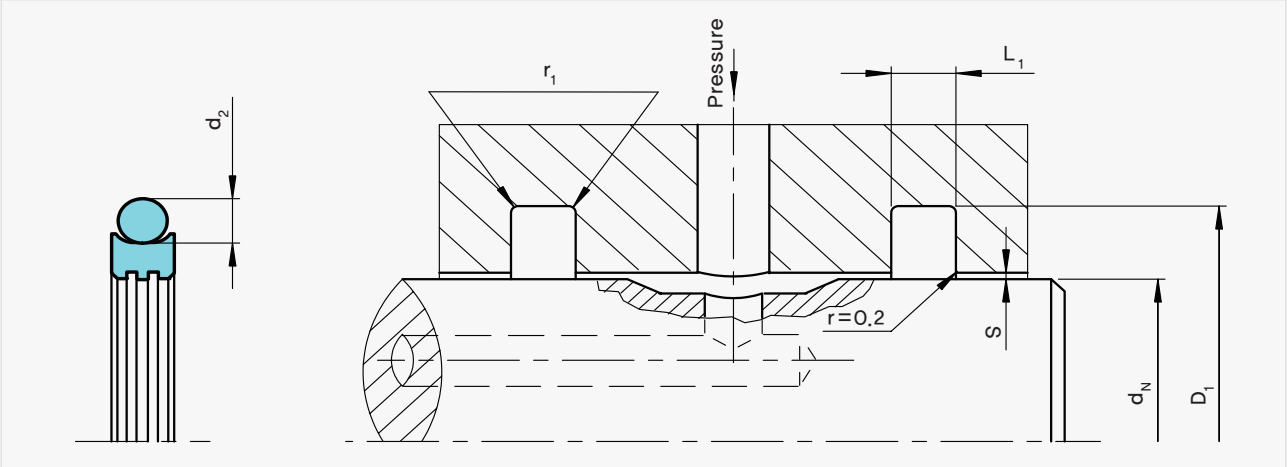
Installation Dimensions / TSS Part No.

Bore Diameter	Groove Diameter	Groove Width	TSS Part No.	O-Ring Dimensions
D_N H9	d_1 h9	L_1 +0.2		
8.0	3.1	2.2	TG4000080	2.90 × 1.78
10.0	5.1	2.2	TG4000100	4.80 × 1.80
12.0	7.1	2.2	TG4000120	6.70 × 1.80
14.0	9.1	2.2	TG4000140	8.75 × 1.80
15.0	10.1	2.2	TG4000150	9.25 × 1.78
16.0	11.1	2.2	TG4000160	10.82 × 1.78
18.0	13.1	2.2	TG4000180	12.42 × 1.78
20.0	15.1	2.2	TG4000200	14.00 × 1.78
22.0	17.1	2.2	TG4000220	17.17 × 1.78
25.0	20.1	2.2	TG4000250	18.77 × 1.78
28.0	23.1	2.2	TG4000280	21.95 × 1.78
30.0	25.1	2.2	TG4000300	25.12 × 1.78
32.0	27.1	2.2	TG4000320	26.70 × 1.78
35.0	30.1	2.2	TG4000350	29.87 × 1.78
40.0	32.5	3.2	TG4100400	31.42 × 2.62
42.0	34.5	3.2	TG4100420	32.99 × 2.62
45.0	37.5	3.2	TG4100450	36.17 × 2.62
48.0	40.5	3.2	TG4100480	39.34 × 2.62
50.0	42.5	3.2	TG4100500	40.94 × 2.62
52.0	44.5	3.2	TG4100520	44.12 × 2.62
55.0	47.5	3.2	TG4100550	45.69 × 2.62
60.0	52.5	3.2	TG4100600	52.07 × 2.62
63.0	55.5	3.2	TG4100630	53.64 × 2.62
65.0	57.5	3.2	TG4100650	56.82 × 2.62
70.0	62.5	3.2	TG4100700	61.60 × 2.62
75.0	67.5	3.2	TG4100750	66.34 × 2.62
80.0	69.0	4.2	TG4200800	66.27 × 3.53

Installation Dimensions / TSS Part No.

Bore Diameter	Groove Diameter	Groove Width	TSS Part No.	O-Ring Dimensions
D_N H9	d_1 h9	L_1 +0.2		
85.0	74.0	4.2	TG4200850	72.62 × 3.53
90.0	79.0	4.2	TG4200900	78.97 × 3.53
95.0	84.0	4.2	TG4200950	82.14 × 3.53
100.0	89.0	4.2	TG4201000	88.49 × 3.53
105.0	94.0	4.2	TG4201050	91.67 × 3.53
110.0	99.0	4.2	TG4201100	98.02 × 3.53
115.0	104.0	4.2	TG4201150	101.19 × 3.53
120.0	109.0	4.2	TG4201200	107.54 × 3.53
125.0	114.0	4.2	TG4201250	113.89 × 3.53
130.0	119.0	4.2	TG4201300	117.07 × 3.53
135.0	119.5	6.3	TG4301350	116.84 × 5.33
140.0	124.5	6.3	TG4301400	123.19 × 5.33
150.0	134.5	6.3	TG4301500	132.72 × 5.33
160.0	144.5	6.3	TG4301600	142.24 × 5.33
170.0	154.5	6.3	TG4301700	151.77 × 5.33
180.0	164.5	6.3	TG4301800	164.47 × 5.33
190.0	174.5	6.3	TG4301900	170.82 × 5.33
200.0	184.5	6.3	TG4302000	183.52 × 5.33
210.0	194.5	6.3	TG4302100	189.87 × 5.33
220.0	204.5	6.3	TG4302200	202.57 × 5.33
230.0	214.5	6.3	TG4302300	208.92 × 5.33
240.0	224.5	6.3	TG4302400	221.62 × 5.33
250.0	234.5	6.3	TG4302500	234.32 × 5.33
280.0	264.5	6.3	TG4302800	266.07 × 5.33
300.0	284.5	6.3	TG4303000	278.77 × 5.33
320.0	304.5	6.3	TG4303200	304.17 × 5.33
350.0	329.0	8.1	TG4403500	329.57 × 7.00
400.0	379.0	8.1	TG4404000	267.67 × 7.00
420.0	399.0	8.1	TG4404200	393.07 × 7.00
450.0	429.0	8.1	TG4404500	417.96 × 7.00
480.0	459.0	8.1	TG4404800	456.06 × 7.00
500.0	479.0	8.1	TG4405000	468.76 × 7.00
600.0	579.0	8.1	TG4406000	582.68 × 7.00
700.0	672.0	9.5	TG4507000	670.00 × 8.40

Installation Recommendation – Internal Sealing



Installation drawing

Installation Dimensions – Standard Recommendations

Series No.	Rod Diameter d_N f8/h9		Groove Diameter	Groove Width	Radial Clearance S max.*		Radius	O-Ring Cross section	Number of Grooves in the Sealing Surface
	Standard Range	Available Range	D_1 H9	L_1 +0.2	10 MPa	20 MPa	r_1	d_2	
TG30	6 – 18.9	6 – 130.0	d_N + 4.9	2.20	0.15	0.10	0.40	1.78	0
TG31	19 – 37.9	10 – 245.0	d_N + 7.5	3.20	0.20	0.15	0.60	2.62	1
TG32	38 – 199.9	19 – 455.0	d_N + 11.0	4.20	0.25	0.20	1.00	3.53	1
TG33	200 – 255.9	38 – 655.0	d_N + 15.5	6.30	0.30	0.25	1.30	5.33	2
TG34	256 – 649.9	120 – 655.0	d_N + 21.0	8.10	0.30	0.25	1.80	7.00	2
TG35	650 – 999.9	650 – 999.9	d_N + 28.0	9.50	0.45	0.30	2.50	8.40	2

Provide Split Housing Grooves, according to diameter; see Table LXX.

*At Pressures **> 10 MPa**, it is recommended that for the the Cross-section you choose the next larger profile, according to the column; "Available Range". i.e) for Bore Ø80mm : TG33 00 800-.

*At Pressures **> 30 MPa**, Use Diameter Tolerance H8/f8 (Bore/Rod) in area of seal.

주문 예

Turcon® Roto Glyd Ring®과 함께 적용되는 O-Ring 규격과 재질 선택은, 표를 참고하시기 바랍니다.

- Rod diameter : d_N = 80.0mm
- TSS Part No. TG3200800

TSS Article No. TG32 0 0800 – T40 N
- TSS Series No.
- Type (Standard)
- Rod diameter x 10**
- Quality Index (Standard)
- Material Code (Seal Ring)
- Material Code (O-Ring)

** For diameters ≥1000.0mm multiply only by factor 1.
Example : TG35 for diameter 1200.0mm
TSS Article No. : TG35 **X1200** – T40N.

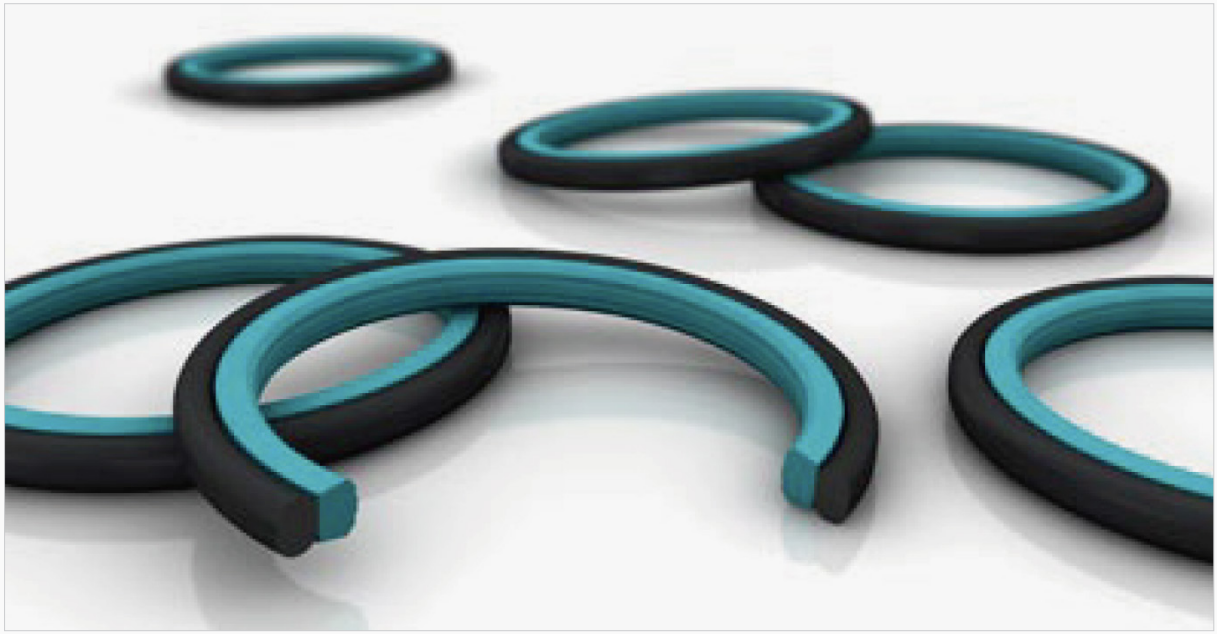
Installation Dimensions / TSS Part No.

Rod Diameter	Groove Diameter	Groove Width	TSS Part No.	O-Ring Dimensions
d_N f8/h9	D_1 H9	L_1 +0.2		
6.0	10.9	2.2	TG3000060	7.65 × 1.78
8.0	12.9	2.2	TG3000080	9.50 × 1.80
10.0	14.9	2.2	TG3000100	11.80 × 1.80
12.0	16.9	2.2	TG3000120	14.00 × 1.78
14.0	18.9	2.2	TG3000140	15.60 × 1.78
15.0	19.9	2.2	TG3000150	17.17 × 1.78
16.0	20.9	2.2	TG3000160	17.17 × 1.78
18.0	22.9	2.2	TG3000180	18.77 × 1.78
20.0	27.5	3.2	TG3100200	21.89 × 2.62
22.0	29.5	3.2	TG3100220	25.07 × 2.62
25.0	32.5	3.2	TG3100250	28.24 × 2.62
28.0	35.5	3.2	TG3100280	31.42 × 2.62
30.0	37.5	3.2	TG3100300	32.99 × 2.62
32.0	39.5	3.2	TG3100320	34.59 × 2.62
35.0	42.5	3.2	TG3100350	37.77 × 2.62
36.0	43.5	3.2	TG3100360	39.34 × 2.62
40.0	51.0	4.2	TG3200400	44.04 × 3.53
42.0	53.0	4.2	TG3200420	47.22 × 3.53
45.0	56.0	4.2	TG3200450	50.39 × 3.53
48.0	59.0	4.2	TG3200480	53.57 × 3.53
50.0	61.0	4.2	TG3200500	53.57 × 3.53
52.0	63.0	4.2	TG3200520	56.74 × 3.53
55.0	66.0	4.2	TG3200550	59.92 × 3.53
56.0	67.0	4.2	TG3200560	59.92 × 3.53
60.0	71.0	4.2	TG3200600	63.09 × 3.53
63.0	74.0	4.2	TG3200630	66.27 × 3.53
65.0	76.0	4.2	TG3200650	69.44 × 3.53

Installation Dimensions / TSS Part No.

Rod Diameter	Groove Diameter	Groove Width	TSS Part No.	O-Ring Dimensions
d_N f8/h9	D_1 H9	L_1 +0.2		
70.0	81.0	4.2	TG3200700	75.79 × 3.53
75.0	86.0	4.2	TG3200750	78.97 × 3.53
80.0	91.0	4.2	TG3200800	85.32 × 3.53
85.0	96.0	4.2	TG3200850	88.49 × 3.53
90.0	101.0	4.2	TG3200900	94.84 × 3.53
95.0	106.0	4.2	TG3200950	101.19 × 3.53
100.0	111.0	4.2	TG3201000	104.37 × 3.53
105.0	116.0	4.2	TG3201050	110.72 × 3.53
110.0	121.0	4.2	TG3201100	113.89 × 3.53
115.0	126.0	4.2	TG3201150	120.24 × 3.53
120.0	131.0	4.2	TG3201200	123.42 × 3.53
125.0	136.0	4.2	TG3201250	129.77 × 3.53
130.0	141.0	4.2	TG3201300	136.12 × 3.53
135.0	146.0	4.2	TG3201350	139.29 × 3.53
140.0	151.0	4.2	TG3201400	145.64 × 3.53
150.0	161.0	4.2	TG3201500	151.99 × 3.53
160.0	171.0	4.2	TG3201600	164.69 × 3.53
170.0	181.0	4.2	TG3201700	177.39 × 3.53
180.0	191.0	4.2	TG3201800	183.74 × 3.53
190.0	201.0	4.2	TG3201900	196.44 × 3.53
200.0	215.5	6.3	TG3302000	208.92 × 5.33
210.0	225.5	6.3	TG3302100	215.27 × 5.33
220.0	235.5	6.3	TG3302200	227.97 × 5.33
240.0	255.5	6.3	TG3302400	247.02 × 5.33
250.0	265.5	6.3	TG3302500	253.37 × 5.33
280.0	301.0	8.1	TG3402800	291.47 × 7.00
300.0	321.0	8.1	TG3403000	304.17 × 7.00
320.0	341.0	8.1	TG3403200	329.57 × 7.00
350.0	371.0	8.1	TG3403500	354.97 × 7.00
360.0	381.0	8.1	TG3403600	367.67 × 7.00
400.0	421.0	8.1	TG3404000	405.26 × 7.00
420.0	441.0	8.1	TG3404200	430.66 × 7.00
450.0	471.0	8.1	TG3404500	456.06 × 7.00
480.0	501.0	8.1	TG3404800	494.16 × 7.00
500.0	521.0	8.1	TG3405000	506.86 × 7.00
600.0	621.0	8.1	TG3406000	608.08 × 7.00
700.0	728.0	9.5	TG3507000	713.00 × 8.40

Zurcon® Roto Glyd Ring® S



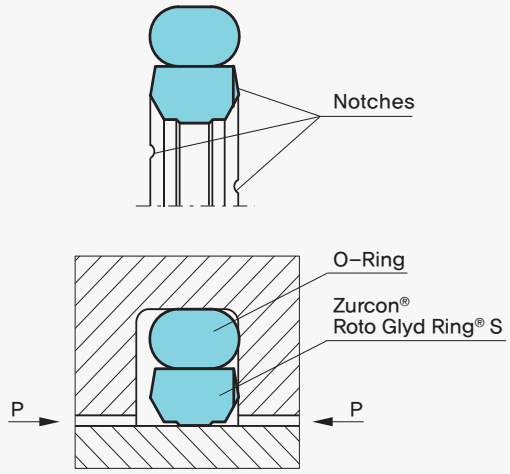
Double-Acting
Rubber Energized Plastic Faced Seal

Materials: Zurcon® & Elastomer

개요

Zurcon® Roto Glyd Ring® S는 Shafts, Axles, Bores, Rotary Transmisson, Journals, Swivels 등의 진동, 또는 회전 운동에 사용된다.

이 씰은 양쪽 방향의 압력을 막아주는 복동용 씰이다.



Zurcon® Roto Glyd Ring® S

Zurcon® 재질의 Ring과 고무 O-Ring으로 구성되어 있다. 이 Seal의 형상은 고압, 그리고 저속에서 사용될 수 있도록 특별히 설계되었다.

Pat Pending : DE 101 45914 A1
WO 03/027545 A1

재질

Material	Pressure (MPa)	p x v (MPa x m/s)	Temperature (°C)
Zurcon® Z53	40	6.5	−30 / +100
Zurcon® Z54	30	6.5	−30 / +100
Zurcon® Z80	30	6.5	−30 / +80

장점

- 내경용, 외경용으로 구성.
- 낮은 마찰.
- Stick-Slip 현상이 없고, Sticking이 없다.
- 높은 내마모성과 치수 안정성이 좋다.
- 홈 가공이 쉽고, 홈의 크기가 작다.
- Z80 재질로 내경 2,600mm, 외경 2,700mm까지 공급이 가능하다.

적용 분야

- 저속 회전, 또는 진동이 있는 축, 엑슬, 회전 전동 유도 장치.
- 압력하에 회전 속도가 증가하는 회전체.
  예) Rotary Indexing Tables.
- 고압하에 Swivel과 같은 회전체.
  예) Damping Units.

적용 범위

- 압력 : 최대 40 MPa
- 속도 : 6.5 MPa x m/s 까지.
- 가속 : 0.9 m/s
  (특별한 조건인 경우, 기술팀에 문의 바람.)
- 온도 : −30 ℃ ~ +100 ℃
- 매체 : 미네랄 오일,
  합성, 순수 에스테르, HEES, HETG +60 ℃,
  Z80은 윤활성이 낮은 유체, 또는 공기와 같은 환경에 사용되는 재질.

※ 주의사항

- 위에 제시된 최대 수치는 같은 동작 시간대에 동시에 유효할 수는 없다.
- 최대 속도는 재질, 타입, 압력, 온도, 틈새 크기에 따라 좌우된다.
- 온도 범위 또한, 매체 조건에 따라 영향을 받는다.
- +60 ℃ 이상에서 지속적인 작동을 할 때, 압력과 속도는 제한된다.

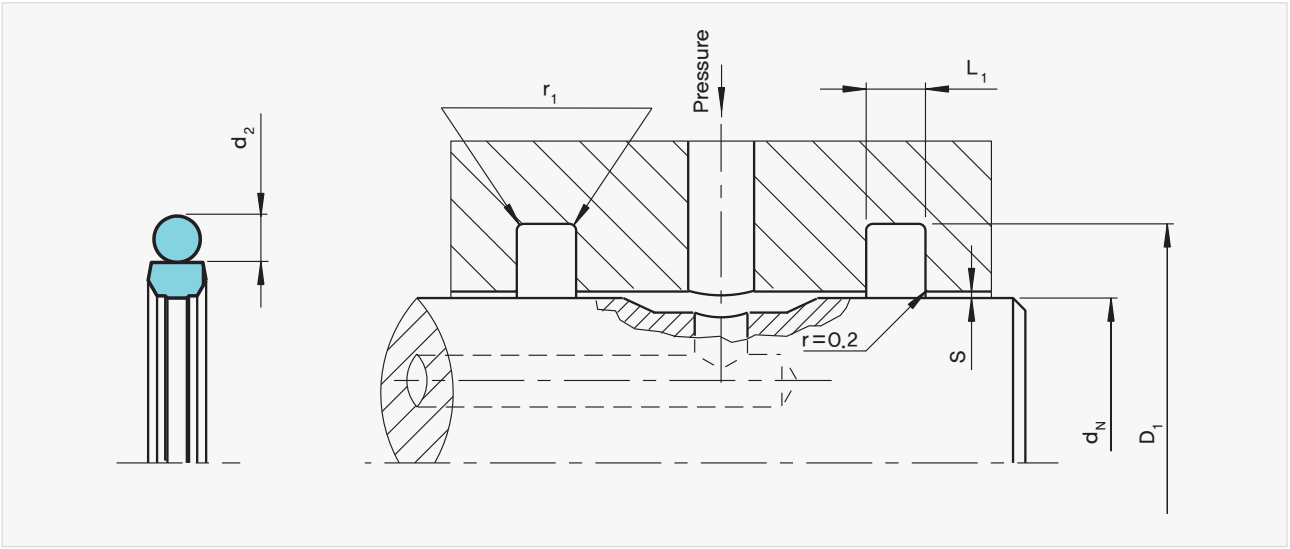
재질 / Materials for Zurcon® Roto Glyd Ring® S

Material, Application Properties	Code	O-Ring Material Shore A	Code	O-Ring Operating Temp. °C*	Mating Surface Material	Mpa max. Dynamic
Zurcon® Z53 • For Lubricating Hydraulic Fluids. • **High Abrasion Resistance.** • **High Extrusion Resistance.** • Limited Chemical Resistance. • Cast Polyurethane. Colour : **Yellow to Light brown.**	Z53	NBR–70	N	–30 ~ +100	Steel Steel Chrome–plated Cast iron Stainless Steel Ceramic coating	40
		NBR–70 Low Temp.	T	–45 ~ +80		
Zurcon® Z54 • For Lubricating Hydraulic Fluids. • **Good Abrasion Resistance.** • **Good Extrusion Resistance.** • Limited Chemical Resistance. • Cast Polyurethane. Colour : **Turquoise.**	Z54	NBR–70	N	–30 ~ +100	Steel Steel Chrome–plated Cast iron Stainless Steel Ceramic coating	30
		NBR–70 Low Temp.	T	–45 ~ +80		
Zurcon® Z80 • For Lubricating & Non–Lubricating Hydraulic Fluids.** • High Abrasion Resistance. • Very good Chemical Resistance. • Limited Temperature Resistance. • FDA Compliance. • UHMWPE (Ultra High Molecular Weight Polyethylene) Colour : **White to Off–white.**	Z80	NBR–70	N	–30 ~ +80	Steel Steel Chrome–plated Stainless Steel Aluminium Bronze Ceramic coating	30
		NBR–70 Low Temp.	T	–45 ~ +80		
		FKM–70	V	–10 ~ +80		

* The O–Ring Operating Temperature is only valid in Mineral Hydraulic Oil.
** e.g) Coolant Fluids.

Highlighted Materials are standard.

Installation Recommendation – Shaft Sealing



Installation drawing

Installation Dimensions – Standard Recommendations

Series No.	Shaft Diameter d_N f8/h9		Groove Diameter	Groove Width	Radial Clearance S max.*		Radius	O-Ring Cross section
	Standard Range	Available Range	D_1 H9	L_1 +0.2	10 MPa	30 MPa	r_1	d_2
TG50	12 – 18.9	10 – 18.9	d_N + 4.9	2.20	0.20	0.10	0.40	1.78
TG51	19 – 37.9	12 – 59.9	d_N + 7.5	3.20	0.25	0.15	0.60	2.62
TG52	38 – 132.9	19 – 199.9	d_N + 11.0	4.20	0.30	0.20	1.00	3.53
TG53	133 – 255.9	38 – 329.9	d_N + 15.5	6.30	0.35	0.25	1.30	5.33
TG54	256 – 649.9	120 – 655.0	d_N + 21.0	8.10	0.40	0.25	1.80	7.00
TG55	650 – 999.9	650 – 999.9	d_N + 28.0	9.50	0.50	0.30	2.50	8.40

*For max. Temperature = 60℃ at the seal.

Zurcon® Roto Glyd Ring® S

주문 예

Zurcon® Roto Glyd Ring®S와 함께 적용되는 O-Ring 규격과 재질 선택은, 표를 참고하시기 바랍니다.
Complete with O-Ring, Shaft Sealing, Series TG52

- Shaft diameter : d_N = 80.0mm
- TSS Part No. TG5200800

TSS Article No. TG52 0 0800 – Z54 N

- TSS Series No.
- Type (Standard)
- Shaft diameter x 10**
- Quality Index (Standard)
- Material Code (Seal Ring)
- Material Code (O-Ring)

** For diameters ≥1000.0mm multiply only by factor 1.
Example : TG55 for diameter 1200.0mm
TSS Article No. : TG55 **X1200** – Z54N.

Installation Dimensions / TSS Part No.

Shaft Diameter	Groove Diameter	Groove Width	TSS Part No.	O-Ring Dimensions
d_N f8/h9	D_1 H9	L_1 +0.2		
10.0	**14.9**	**2.2**	**TG5000100**	**11.80 x 1.80**
12.0	**16.9**	**2.2**	**TG5000120**	**14.00 x 1.78**
14.0	**18.9**	**2.2**	**TG5000140**	**15.60 x 1.78**
15.0	19.9	2.2	TG5000150	17.17 x 1.78
16.0	**20.9**	**2.2**	**TG5000160**	**18.77 x 1.78**
16.0	**23.5**	**3.2**	**TG5100160**	**18.72 x 2.62**
18.0	**22.9**	**2.2**	**TG5000180**	**20.35 x 1.78**
18.0	**25.5**	**3.2**	**TG5100180**	**21.89 x 2.62**
20.0	**27.5**	**3.2**	**TG5100200**	**23.47 x 2.62**
22.0	**29.5**	**3.2**	**TG5100220**	**25.07 x 2.62**
25.0	**32.5**	**3.2**	**TG5100250**	**28.24 x 2.62**
28.0	**35.5**	**3.2**	**TG5100280**	**31.42 x 2.62**
30.0	37.5	3.2	TG5100300	32.99 x 2.62
32.0	**39.5**	**3.2**	**TG5100320**	**34.59 x 2.62**
32.0	**43.0**	**4.2**	**TG5200320**	**36.09 x 3.53**
35.0	42.5	3.2	TG5100350	37.77 x 2.62
36.0	**43.5**	**3.2**	**TG5100360**	**37.77 x 2.62**
36.0	**47.0**	**4.2**	**TG5200360**	**40.87 x 3.53**
38.0	**49.0**	**4.2**	**TG5200380**	**44.04 x 3.53**
40.0	**51.0**	**4.2**	**TG5200400**	**47.22 x 3.53**
42.0	53.0	4.2	TG5200420	47.22 x 3.53

The Shaft diameters printed in **bold** type conform to the recommendations of ISO 3320.

Installation Dimensions / TSS Part No.

Shaft Diameter	Groove Diameter	Groove Width	TSS Part No.	O-Ring Dimensions
d_N f8/h9	D_1 H9	L_1 +0.2		
45.0	**56.0**	**4.2**	**TG5200450**	**50.39 x 3.53**
48.0	59.0	4.2	TG5200480	53.57 x 3.53
48.0	63.5	6.3	TG5300480	56.52 x 5.33
50.0	**61.0**	**4.2**	**TG5200500**	**53.57 x 3.53**
50.0	**65.5**	**6.3**	**TG5300500**	**56.52 x 5.33**
52.0	63.0	4.2	TG5200520	56.74 x 3.53
55.0	66.0	4.2	TG5200550	59.92 x 3.53
55.0	70.5	6.3	TG5300550	62.87 x 5.33
56.0	**67.0**	**4.2**	**TG5200560**	**59.92 x 3.53**
60.0	71.0	4.2	TG5200600	66.27 x 3.53
60.0	75.5	6.3	TG5300600	66.04 x 5.33
63.0	**74.0**	**4.2**	**TG5200630**	**69.44 x 3.53**
63.0	**78.5**	**6.3**	**TG5300630**	**69.22 x 5.33**
65.0	76.0	4.2	TG5200650	69.44 x 3.53
65.0	80.5	6.3	TG5300650	72.39 x 5.33
70.0	**81.0**	**4.2**	**TG5200700**	**75.79 x 3.53**
70.0	**85.5**	**6.3**	**TG5300700**	**75.57 x 3.53**
75.0	86.0	4.2	TG5200750	82.15 x 3.53
75.0	90.5	6.3	TG5300750	81.92 x 5.33
80.0	**91.0**	**4.2**	**TG5200800**	**85.32 x 3.53**
80.0	**95.5**	**6.3**	**TG5300800**	**88.27 x 5.33**
85.0	96.0	4.2	TG5200850	91.67 x 3.53
85.0	100.5	6.3	TG5300850	91.44 x 5.33
90.0	**101.0**	**4.2**	**TG5200900**	**94.84 x 3.53**
90.0	**105.5**	**6.3**	**TG5300900**	**97.79 x 5.33**
92.0	**103.0**	**4.2**	**TG5200920**	**98.02 x 5.33**
95.0	106.0	4.2	TG5200950	101.19 x 3.53
95.0	110.5	6.3	TG5300950	100.97 x 5.33
100.0	**111.0**	**4.2**	**TG5201000**	**107.54 x 3.53**
100.0	**115.5**	**6.3**	**TG5301000**	**107.32 x 5.33**
105.0	116.0	4.2	TG5201050	110.72 x 3.53
110.0	**121.0**	**4.2**	**TG5201100**	**117.07 x 3.53**
115.0	126.0	4.2	TG5201150	120.24 x 3.53

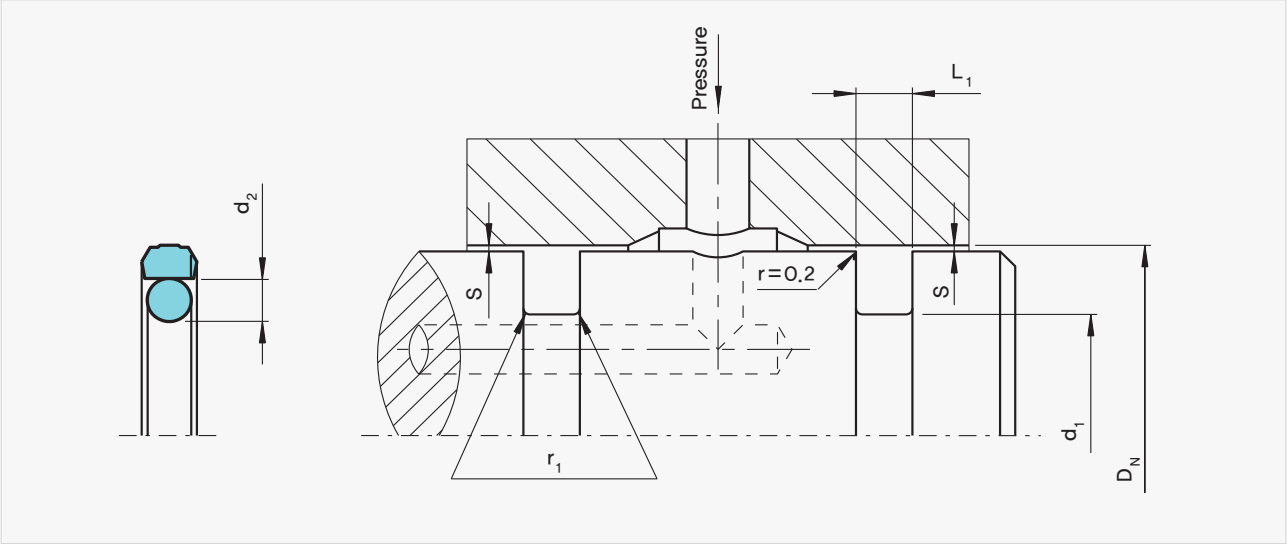
The Shaft diameters printed in **bold** type conform to the recommendations of ISO 3320.

Installation Dimensions / TSS Part No.

Shaft Diameter	Groove Diameter	Groove Width	TSS Part No.	O-Ring Dimensions
d_N f8/h9	D_1 H9	L_1 +0.2		
120.0	131.0	4.2	TG5201200	126.59 x 3.53
125.0	**136.0**	**4.2**	**TG5201250**	**129.77 x 3.53**
130.0	141.0	4.2	TG5201300	136.12 x 3.53
130.0	145.5	6.3	TG5301300	139.07 x 5.33
135.0	150.5	6.3	TG5301350	142.24 x 5.33
138.0	153.5	6.3	TG5301380	145.42 x 5.33
140.0	**155.5**	**6.3**	**TG5301400**	**148.59 x 5.33**
145.0	160.5	6.3	TG5301450	151.77 x 5.33
150.0	165.5	6.3	TG5301500	158.12 x 5.33
160.0	**175.5**	**6.3**	**TG5301600**	**170.82 x 5.33**
170.0	185.5	6.3	TG5301700	177.17 x 5.33
180.0	**195.5**	**6.3**	**TG5301800**	**189.87 x 5.33**
190.0	205.5	6.3	TG5301900	202.57 x 5.33
200.0	**215.5**	**6.3**	**TG5302000**	**208.92 x 5.33**
210.0	225.5	6.3	TG5302100	221.62 x 5.33
220.0	**235.5**	**6.3**	**TG5302200**	**227.97 x 5.33**
240.0	255.5	6.3	TG5302400	247.02 x 5.33
250.0	**265.5**	**6.3**	**TG5302500**	**258.00 x 5.30**
280.0	**301.0**	**8.1**	**TG5402800**	**291.47 x 7.00**
300.0	321.0	8.1	TG5403000	310.00 x 7.00
320.0	**341.0**	**8.1**	**TG5403200**	**329.57 x 7.00**
350.0	371.0	8.1	TG5403500	365.00 x 7.00
360.0	**381.0**	**8.1**	**TG5403600**	**375.00 x 7.00**
400.0	421.0	8.1	TG5404000	412.00 x 7.00
420.0	441.0	8.1	TG5404200	430.66 x 7.00
450.0	471.0	8.1	TG5404500	462.00 x 7.00
480.0	501.0	8.1	TG5404800	494.16 x 7.00
500.0	521.0	8.1	TG5405000	515.00 x 7.00
600.0	621.0	8.1	TG5406000	615.00 x 7.00
700.0	728.0	9.5	TG5507000	713.00 x 8.40

The Shaft diameters printed in **bold** type conform to the recommendations of ISO 3320.

Installation Recommendation – Bore Sealing



Installation drawing

Installation Dimensions – Standard Recommendations

Series No.	Bore Diameter D_N H9		Groove Diameter	Groove Width	Radial Clearance S max.*		Radius	O-Ring Cross section
	Standard Range	Available Range	d_1 h9	L_1 +0.2	10 MPa	30 MPa	r_1	d_2
TG60	12 – 19.9	10 – 24.9	D_N – 4.9	2.20	0.20	0.10	0.40	1.78
TG61	20 – 39.9	14 – 69.9	D_N – 7.5	3.20	0.25	0.15	0.60	2.62
TG62	40 – 132.9	22 – 199.9	D_N – 11.0	4.20	0.30	0.20	1.00	3.53
TG63	133 – 255.9	40 – 329.9	D_N – 15.5	6.30	0.35	0.25	1.30	5.33
TG64	256 – 669.9	133 – 690.0	D_N – 21.0	8.10	0.40	0.25	1.80	7.00
TG65	670 – 999.9	670 – 999.9	D_N – 28.0	9.50	0.50	0.30	2.50	8.40

*For Max. Temperature = 60℃ at the seal.

Zurcon® Roto Glyd Ring® S

주문 예

Zurcon® Roto Glyd Ring®S와 함께 적용되는 O-Ring 규격과 재질 선택은, 표를 참고하시기 바랍니다.

- Bore diameter : D_N = 80.0mm
- TSS Part No. TG6200800

TSS Article No. TG62 0 0800 – Z54 N

- TSS Series No.
- Type (Standard)
- Bore diameter x 10**
- Quality Index (Standard)
- Material Code (Seal Ring)
- Material Code (O-Ring)

** For diameters ≥1000.0mm multiply only by factor 1.
Example : TG65 for diameter 1200.0mm
TSS Article No. : TG65 **X1200** – Z54N.

Installation Dimensions / TSS Part No.

Bore Diameter D_N H9	Groove Diameter d_1 h9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Dimensions
12.0	**7.1**	**2.2**	**TG6000120**	**7.65 x 1.78**
14.0	9.1	2.2	TG6000140	9.25 x 1.78
15.0	10.1	2.2	TG6000150	10.82 x 1.78
16.0	**11.1**	**2.2**	**TG6000160**	**10.82 x 1.78**
18.0	13.1	2.2	TG6000180	13.20 x 1.80
20.0	**12.5**	**3.2**	**TG6100200**	**12.37 x 2.62**
22.0	14.5	3.2	TG6100220	13.94 x 2.62
25.0	**17.5**	**3.2**	**TG6100250**	**17.12 x 2.62**
28.0	20.5	3.2	TG6100280	20.29 x 2.62
30.0	22.5	3.2	TG6100300	23.47 x 2.62
32.0	24.5	3.2	TG6100320	25.07 x 2.62
35.0	27.5	3.2	TG6100350	28.24 x 2.62
40.0	**29.0**	**4.2**	**TG6200400**	**29.74 x 3.53**
42.0	31.0	4.2	TG6200420	31.32 x 3.53
45.0	34.0	4.2	TG6200450	34.52 x 3.53
48.0	37.0	4.2	TG6200480	37.69 x 3.53
50.0	**39.0**	**4.2**	**TG6200500**	**40.87 x 3.53**
52.0	41.0	4.2	TG6200520	42.00 x 3.50
55.0	44.0	4.2	TG6200550	44.04 x 3.53
60.0	49.0	4.2	TG6200600	50.39 x 3.53
63.0	**52.0**	**4.2**	**TG6200630**	**53.34 x 3.53**
65.0	49.5	6.3	TG6300650	50.17 x 5.33
70.0	59.0	4.2	TG6200700	59.92 x 3.53
75.0	64.0	4.2	TG6200750	65.00 x 3.50

The Shaft diameters printed in **bold** type conform to the recommendations of ISO 3320.

Installation Dimensions / TSS Part No.

Bore Diameter	Groove Diameter	Groove Width	TSS Part No.	O–Ring Dimensions
D_N H9	d_1 h9	L_1 +0.2		
80.0	**64.5**	**6.3**	**TG6300800**	**66.04 x 5.33**
80.0	**69.0**	**4.2**	**TG6200800**	**69.44 x 3.53**
84.0	**73.0**	**4.2**	**TG6200840**	**72.62 x 3.53**
85.0	74.0	4.2	TG6200850	75.79 x 3.53
90.0	79.0	4.2	TG6200900	78.97 x 3.53
95.0	84.0	4.2	TG6200950	85.32 x 3.53
100.0	**89.0**	**4.2**	**TG6201000**	**91.67 x 3.53**
105.0	94.0	4.2	TG6201050	94.84 x 3.53
110.0	99.0	4.2	TG6201100	101.19 x 3.53
115.0	104.0	4.2	TG6201150	104.37 x 3.53
120.0	109.0	4.2	TG6201200	110.72 x 3.53
125.0	**114.0**	**4.2**	**TG6201250**	**113.89 x 3.53**
130.0	119.0	4.2	TG6201300	120.24 x 3.53
135.0	119.5	6.3	TG6301350	120.02 x 5.33
140.0	124.5	6.3	TG6301400	126.37 x 5.33
150.0	134.5	6.3	TG6301500	135.89 x 5.33
150.0	139.0	4.2	TG6201500	139.29 x 3.53
160.0	**144.5**	**6.3**	**TG6301600**	**145.42 x 5.33**
170.0	154.5	6.3	TG6301700	158.12 x 5.33
180.0	164.5	6.3	TG6301800	164.47 x 5.33
190.0	174.5	6.3	TG6301900	177.17 x 5.33
200.0	**184.5**	**6.3**	**TG6302000**	**189.87 x 5.33**
210.0	194.5	6.3	TG6302100	196.22 x 5.33
220.0	204.5	6.3	TG6302200	208.92 x 5.33
230.0	214.5	6.3	TG6302300	215.27 x 5.33
240.0	224.5	6.3	TG6302400	227.92 x 5.33
250.0	**234.5**	**6.3**	**TG6302500**	**240.67 x 5.33**
280.0	259.0	8.1	TG6402800	260.00 x 7.00
300.0	279.0	8.1	TG6403000	280.00 x 7.00
320.0	**299.0**	**8.1**	**TG6403200**	**300.00 x 7.00**
350.0	329.0	8.1	TG6403500	329.57 x 7.00
400.0	**379.0**	**8.1**	**TG6404000**	**380.37 x 7.00**
420.0	399.0	8.1	TG6404200	400.00 x 7.00
450.0	429.0	8.1	TG6404500	430.66 x 7.00
480.0	459.0	8.1	TG6404800	462.00 x 7.00
500.0	**479.0**	**8.1**	**TG6405000**	**481.38 x 7.00**
600.0	579.0	8.1	TG6406000	582.68 x 7.00
700.0	672.0	9.5	TG6507000	670.00 x 8.40

The Shaft diameters printed in **bold** type conform to the recommendations of ISO 3320.

Turcon® Roto Variseal®

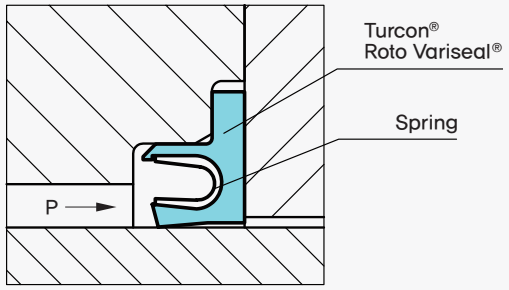


Single-Acting

Materials : Turcon®, Zurcon®

개요

Turcon® Roto Variseal®은 U-형태의 Seal Jacket과 부식에 저항성이 있는 V-형태의 스프링으로 구성되어 있는 단동형 Seal이다. 비대칭 형태로 Lip이 긴 쪽 부분은 축이 회전할 때, 함께 회전되지 않도록 플랜지 역할을 해준다.



Turcon® Roto Variseal®

특징

운동용 Lip은 바깥쪽 고정용 Lip보다 짧으며 그로 인해 Sealing이 더 좋고, 마찰이 적다.

금속 스프링은 저압, 또는 압력이 없는 경우에도 기본적인 밀폐력을 유지시키며, Seal과 Spring의 재질 조화로 인하여 유.공압 분야 이외의 화학, 제약 및 식품산업 등 폭넓은 분야에 응용된다.

특히, 이러한 분야에 응용될 때는 살균이 가능하며 Seal의 스프링 홈에 오염 물질이 침투되는 것을 방지하기 위해 실리콘 겔로 채운 Hi-Clean으로 특수 처리된다. Hi-Clean으로 처리된 것은 Compound Code에 "D"로 표기된다. 예) T40SD

재질

모든 재질들은 생리학적으로 안전하며 냄새가 없고, 맛에 영향을 끼치지 않는다.

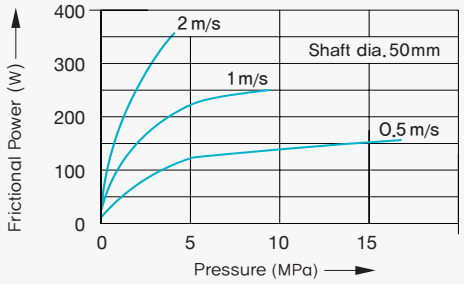
표준 재질 :

- Seal Ring : Turcon® T40
- Spring : 스테인레스 강 재질, No.14310 (AISI301)

(식품 및 의약품 분야 : FDA에 승인된 재질 사용.)

장점

- 내 화학성이 뛰어나다.
- 마찰계수가 낮다.
- Stick-Slip 현상이나 눌러붙음 현상이 없어, 정밀기계에 사용할 수 있다.
- 식품원료, 제약 및 의약 매체와 접촉 시, 오염되지 않는다.
- 살균이 가능하다.



Frictional Power for Turcon® Roto Variseal®

적용 범위

- 압력 : for Dynamic loads = 15 MPa
  for Static loads = 25 MPa
- 속도 : 회전용 = 최대 2 m/s
- 온도 : −100 ℃ ~ +260 ℃
  (특별히 낮은 온도일 경우, 문의 바람.)
- 유체 : 거의 모든 유체,
  화학약품,
  Gas,
  진공.

※ 주의사항

- 위에 제시된 최대 수치는 같은 동작 시간대에 동시에 유효할 수는 없다.
- 최대 속도는 재질, 타입, 압력, 온도, 틈새 크기에 따라 좌우된다.
- 온도 범위 또한, 매체 조건에 따라 영향을 받는다.

재질 / Materials for Turcon® Roto Variseal®

Material, Application Properties	Code	Spring Material	Code	Operating Temp. °C*	Mating Surface Material	Mpa max.
Turcon® T40 • For all Lubricating & Non-Lubricating Hydraulic Fluids. • Water Hydraulics. • Soft Mating Surfaces. • Carbon Fiber filled. Colour : Grey.	T40	Spring Material AISI 301	S	−100 ~ +260	Steel Steel Chrome-plated (Rod) Cast iron Stainless Steel Aluminium Bronze Alloys	15
Turcon® T78 • For all Lubricated & Non-Lubricated applications. • Soft Mating Surfaces. • Aromatic Polymer. Colour : Tan to Dark brown.	T78	Spring Material AISI 301	S	−100 ~ +260	Steel Steel Chrome-plated (Rod) Cast iron Stainless Steel	5

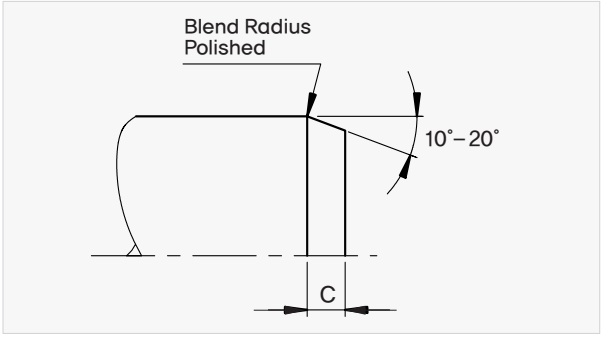
Highlighted Materials are standard.

표면 조도 / Surface Roughness

Recommended Maximum Surface Roughness (μm)		
Media	**Shaft surface***	**Static Groove surface**
Cryogenic & Low Molecular gases, Hydrogen, Helium, Freon, Oxygen, Nitrogen.	R_{max} = 1.0 μm R_z = 0.63 μm R_a = 0.1 μm	R_{max} = 3.5 μm R_z = 2.2 μm R_a = 0.3 μm
Low Viscosity fluids, Water, Alcohols, Hydrazine, Gaseous, Nitrogen, Natural gas, Skydrol, Air.	R_{max} = 2.5 μm R_z = 1.6 μm R_a = 0.2 μm	R_{max} = 5.0 μm R_z = 3.5 μm R_a = 0.6 μm
High Viscosity fluids, Hydraulic oils, Crude oil, Gear oil, Sealants, Glue, Milkproducts.	R_{max} = 2.5 μm R_z = 1.6 μm R_a = 0.2 μm	R_{max} = 6.5 μm R_z = 5.0 μm R_a = 0.8 μm

*The Sealing Surface must be free from Spiral Grooves.
The Material Contact Area R_{mr} should be approx. 50 ~ 70%, determined at a Cut Depth c = 0.25 x R_z relative to a reference line of $C_{ref.}$ 5%.

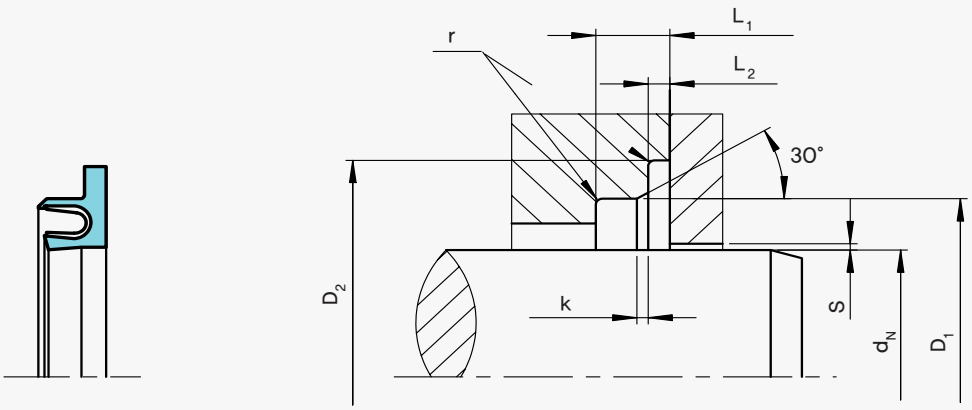
Lead-in Chamfer



Lead-in Chamfer on Shaft

Series	Lead-in Chamfers Length C min.
TVM1	4.5
TVM2	5.0
TVM3	8.0
TVM4	12.0

Installation Recommendation



Installation drawing

Installation Dimensions – Standard Recommendations

Series No.	Rod Diameter d_N f8/h9		Groove Diameter		Groove Width		Lead-in Chamfer	Radial	Radial Clearances S max.		
	Standard Range d_N f8/h9	Available* Range d_N f8/h9	D_1 H9	D_2 H10	L_1 min.	L_2	k	r	<2 MPa	<10 MPa	<20 MPa
TVM1	5.0 – 19.9	20.0 – 200.0	$d_N + 5.0$	$d_N + 9.0$	3.6	$0.85_{+0\,/\,-0.1}$	0.8	0.3	0.25	0.15	0.10
TVM2	20.0 – 39.9	10.0 – 400.0	$d_N + 7.0$	$d_N + 12.5$	4.8	$1.35_{+0\,/\,-0.15}$	1.1	0.4	0.35	0.20	0.15
TVM3	40.0 – 399.9	20.0 – 700.0	$d_N + 10.5$	$d_N + 17.5$	7.1	$1.80_{+0\,/\,-0.20}$	1.4	0.5	0.50	0.25	0.20
TVM4	400.0 – 999.9	35.0 – 999.9	$d_N + 14.0$	$d_N + 22.0$	9.5	$2.80_{+0\,/\,-0.20}$	1.6	0.5	0.60	0.30	0.25

*Available on request.

Application of Seal series outside of the Standard Range can impair Seal performance & stability, and should only be made after careful testing and evaluation.

주문 예

Turcon® Roto Variseal®

- TSS Series No. TVM3
- Rod diameter : d_N = 80.0mm
- TSS Part No. TVM300800

TSS Article No. TVM3 0 0800 – T40 S (D)

- TSS Series No.
- Type (Standard)
- Rod diameter x 10*
- Quality Index (Standard)
- Material Code (Seal Ring)
- Material Code (Spring)
- Hi-Clean** (Option)

* For diameters ≥ 1000.0mm multiply only by factor 1.
Example : TVM4 for diameter 1200.0mm
TSS Article No. : TVM4 **X1200** – T40S.

**Roto Variseal® are available with the Spring Groove filled with high temperatures Silicone.

Installation Dimensions / TSS Part No.

Rod Diameter	Groove Diameter		Groove Width	TSS Part No.
d_N f8/h9	D_1 H9	D_2 H10	L_1	
5.0	10.0	14.0	3.6	TVM100050
6.0	11.0	15.0	3.6	TVM100060
8.0	13.0	17.0	3.6	TVM100080
10.0	15.0	19.0	3.6	TVM100100
12.0	17.0	21.0	3.6	TVM100120
14.0	19.0	23.0	3.6	TVM100140
15.0	20.0	24.0	3.6	TVM100150
16.0	21.0	25.0	3.6	TVM100160
18.0	23.0	27.0	3.6	TVM100180
20.0	27.0	32.5	4.8	TVM200200
22.0	29.0	34.5	4.8	TVM200220
25.0	32.0	37.5	4.8	TVM200250
28.0	35.0	40.5	4.8	TVM200280
30.0	37.0	42.5	4.8	TVM200300
32.0	39.0	44.5	4.8	TVM200320
35.0	42.0	47.5	4.8	TVM200350
36.0	43.0	48.5	4.8	TVM200360
40.0	50.5	57.5	7.1	TVM300400
42.0	52.5	59.5	7.1	TVM300420
45.0	55.5	62.5	7.1	TVM300450
48.0	58.5	65.5	7.1	TVM300480
50.0	60.5	67.5	7.1	TVM300500
52.0	62.5	69.5	7.1	TVM300520
55.0	65.6	72.5	7.1	TVM300550
56.0	66.5	73.5	7.1	TVM300560
60.0	70.5	77.5	7.1	TVM300600
63.0	73.5	80.5	7.1	TVM300630
65.0	75.5	82.5	7.1	TVM300650
70.0	80.5	87.5	7.1	TVM300700
75.0	85.5	92.5	7.1	TVM300750
80.0	90.5	97.5	7.1	TVM300800
85.5	95.5	102.5	7.1	TVM300850
90.0	100.5	107.5	7.1	TVM300900
95.0	105.5	112.5	7.1	TVM300950
100.0	110.5	117.5	7.1	TVM301000
105.0	115.5	122.5	7.1	TVM301050

Rod Diameter	Groove Diameter		Groove Width	TSS Part No.
d_N f8/h9	D_1 H9	D_2 H10	L_1	
110.0	120.5	127.5	7.1	TVM301100
115.0	125.5	132.5	7.1	TVM301150
120.0	130.5	137.5	7.1	TVM301200
125.0	135.5	142.5	7.1	TVM301250
130.0	140.5	147.5	7.1	TVM301300
135.0	145.5	152.5	7.1	TVM301350
140.0	150.5	157.5	7.1	TVM301400
150.0	160.5	167.5	7.1	TVM301500
160.0	170.5	177.5	7.1	TVM301600
170.0	180.5	187.5	7.1	TVM301700
180.0	190.5	197.5	7.1	TVM301800
190.0	200.5	207.5	7.1	TVM301900
200.0	210.5	217.5	7.1	TVM302000
210.0	220.5	227.5	7.1	TVM302100
220.0	230.5	237.5	7.1	TVM302200
230.0	240.5	247.5	7.1	TVM302300
240.0	250.5	257.5	7.1	TVM302400
250.0	260.5	267.5	7.1	TVM302500
280.0	290.5	297.5	7.1	TVM302800
300.0	310.5	317.5	7.1	TVM303000
320.0	330.5	337.5	7.1	TVM303200
350.0	360.5	367.5	7.1	TVM303500
360.0	370.5	377.5	7.1	TVM303600
420.0	434.0	442.0	9.5	TVM404200
450.0	464.0	472.0	9.5	TVM404500
480.0	494.0	502.0	9.5	TVM404800
500.0	514.5	522.0	9.5	TVM405000
600.0	614.5	622.0	9.5	TVM406000
700.0	714.5	722.0	9.5	TVM407000

Other dimensions and all intermediate sizes up to 2,500mm diameter, including inch sizes can be supplied.

Turcon® Varilip® PDR



Rotary Application

Materials : Turcon®

Turcon® Varilip® PDR

개요

Turcon® Varilip® PDR Seal은 기존의 탄성 재질로 구성된 회전용 Shaft Seal의 한계를 극복할 수 있도록 설계되었다. 이 제품은 최적의 재질과 특별한 설계를 이용해 각 적용 환경에 맞는 최적의 Sealing 성능을 제공한다.

일반적인 탄성 재질의 회전용 Shaft Seal은 탄성체가 갖는 온도 범위, 속도 부하, 내산성, 내압으로 인해 적용 환경에 한계가 있다. 게다가 윤활이 불충분할 경우, 적용에 제한이 있다.

Turcon® Varilip® PDR 회전용 Seal은 마찰이 적은 특성으로 Stick-Slip 현상이 없고, 발열이 적고 높은 적용 속도를 갖고 있다.

Turcon® 재질은 제조 중에 소결하는 동안, 뒤틀린 상이 다시 원래대로 복원하려 하는 성질이 있다. 이러한 특성은, Sealing Lip이 축 위에 하중을 주는 역할을 하며 하중을 주기 위한 Spring의 사용을 필요치 않게 한다.

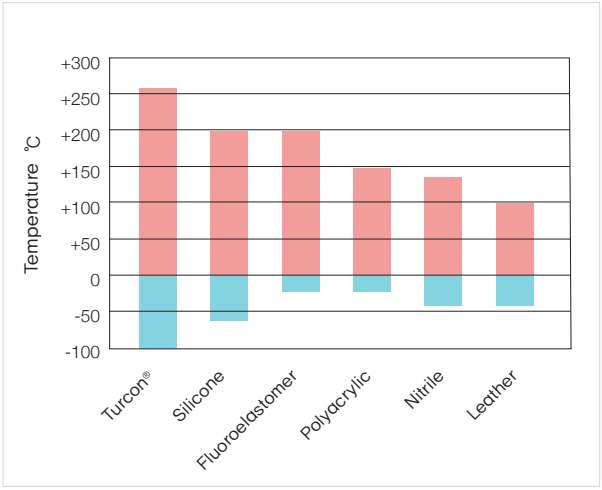
특징

PDR은 정밀하게 가공된 금속 몸체와 Turcon® 재질의 Sealing Lip으로 이루어져 있다.

금속 몸체를 압입하여 만들기에, 몸체와 Lip 사이에 Gasket이 필요하지 않다. 이러한 구성은, Sealing-System의 내화학성과 사용 온도 범위를 증가시킨다.

필요한 경우, Turcon® Varilip® PDR의 Turcon® Lip을 유체 특성에 따라 구성할 수 있다.

이러한 구성은 한 방향으로 회전하는 축에 향상된 Seal-ing을 제공하는 결과를 가져온다. 이러한 특성은 Lip의 유연성을 증가시켜, Turcon® Lip과 축 사이에서 축의 부하를 방지하고, 열에 의한 마모를 줄인다.



다양한 재질의 최대/최소 온도.

재질

• Sealing Lip

Rotary Shaft Seal에서의 중요한 점은 Sealing Lip으로 사용되는 재질은 적절한 기능을 해야 한다. 이러한 이유로 TSS는 검증된 Turcon® 재질을 기반으로 특별한 재질을 개발해왔다.

특히, 마찰과 마모 특성을 중점을 두어, 높은 주속에서도 우수한 Sealing 성능을 제공한다.

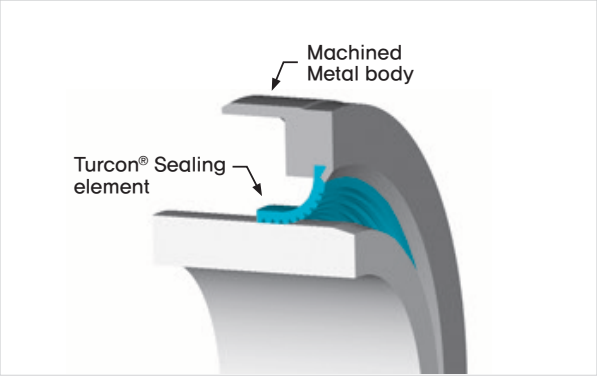
다음 표는, Turcon® Varilip® PDR에서 선택할 수 있는 재질이다. 추가적으로 특별한 적용 환경을 위해 요청하면 Compound들을 개발할 수 있다.

• Metal Body

Turcon® Varilip® PDR은 우선적으로 SUS 304L 재질을 선택하게 된다. 일반적인 범위에서 다른 재질로는 SUS 316L Zinc-Plate (연강)을 선택할 수 있다.

다음 표에는 이 재질들의 코드를 나타내고 있다. 다른 특별한 재질은 요청할 수 있다.

명심할 점은, 다른 재질은 SUS 304L에 비해 재고와 추가적인 공정에 의해 Lead-Time이 늘어날 수 있다.



Turcon® Varilip® PDR

Sealing Lip 재질

Meterial, Application Properties	Code	Operating Temp.		Mating Surface Material	MPa/psi max.
		°C	°F		
Turcon® T25 • Standard material exceptional wear & friction characteristics. • For Lubricated running. e.g) Oil, Grease, Glass Fiber, Lubricant. Colour : Grey.	T25	−60 ~ +200	−76 ~ +392	min. 55 HRc At low pressure & up to 4 m/s (788 fpm), min. 45 HRc	2 MPa 290 psi
Turcon® T40 • For all Lubricating & Non-Lubricating Fluids, especially Water. • Used for Medium-hard Shafts in applications where there is risk of Shaft wear. • Carbon Fiber filled. Colour : Grey.	T40	−60 ~ +200	−76 ~ +392	min. 30 HRc	2 MPa 290 psi
Turcon® T78 • Particularly Good Running behavior permits use with Dry-running, or Poor Lubrication and in conjunction with Soft Shaft Surfaces. e.g) Stainless Steel Shafts in Food, Pharmaceutical and Chemical Industries. • Aromatic Polymer. Colour : Tan to Dark brown.	T78	−60 ~ +200	−76 ~ +392	min. 55 HB	0.2 MPa 29 psi
Turcon® M83 • Specially designed for Dry-running applications. • Particularly good results in applications for the Semicon Industry. • Can also be used Lubricated. • Glass Fiber, Pigment. Colour : Yellow.	M83	−60 ~ +200	−76 ~ +392	min. 55 HRc	2 MPa 290 psi

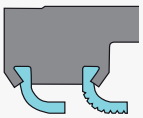
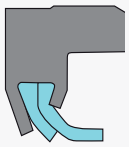
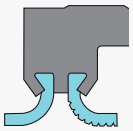
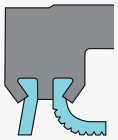
다른 Turcon 재질들은 주문 시, 코드를 기입하여 요청할 수 있으며 FDA에 적합한 재질도 요청할 수 있다.

Metal Body 재질

Code	Material
1	Stainless Steel 304
2	Stainless Steel 316
3	Unavailable
4	Mild Steel (Zinc Plated)
5	Aluminium

Highlighted Materials are preferred.

종류 / Types

Seal	Description
Type A / Type 1 	Type–A – Sealing Lip이 1개로 고무 재질의 Seal이 견디기 어려운 온도, 마찰 윤활이 충분하지 않은 일반 산업환경에 적합하며, 압력은 5bar 까지이다. 냉각과 윤활이 충분할 경우, 90m/s 까지 사용이 가능하다.
Type B / Type 3 	Type–B – 매체가 오염되어 있거나 높은 Sealing (Zero Leak에 가깝게)을 요할 때, 선택하는 타입이다. Type–B는 Back–Up Sealing Lip을 통해 2차 Sealing을 제공한다. 압력은 5bar 까지이다.
Type C / Type 4 	Type–C – 고압 환경을 요구하는 환경에서 선택할 수 있으며, Sealing Lip을 강화하여 압력은 10bar 까지 사용 가능하다.
Type D / Type 5 	Type–D – 압력이 양쪽에서 작용할 때 사용한다. 각 5bar 까지 허용할 수 있으며 한 가지의 Seal로 2개의 유체를 Sealing 하는 것이 가능하다.
Type G / Type 6 	Type–G – Type D와 비슷하지만 완전히 누운 Lip 보다 접촉이 없는 외부의 Lip을 가지고 있다. 이러한 부분은 토크와 힘의 손실을 최소화 하여 이물질이 System 내부로 침입하는 것을 확실히 막아, 효과적인 Sealing을 제공한다.

Design Guidelines

Housing

Turcon® Varilip® PDR의 설치 규격은 국제 표준 ISO 6194/1과 ISO 16589를 따른다.

Housing의 공차는 H8로 되어 있으며 표면조도는 Ra 기준, 최대 0.8㎛ 이내 여야 한다.

만약, 이 값을 만족하지 못한다면 Sealant 혹은, 접착제를 사용할 것을 권장하며 다른 방법으로는 외경부에 O-Ring 혹은, 고무 커버를 장착하는 것도 해결 방법이 될 수 있다.

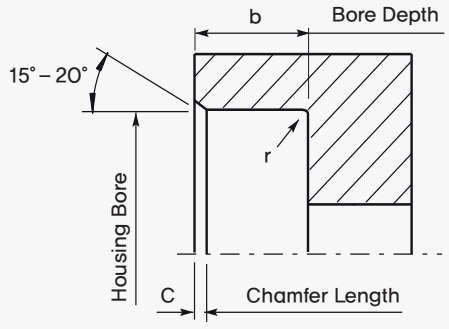
Shaft

Shaft 가공 공차는 h11을 따른다. (아래 표 참조)
표면조도 Ra 기준, 0.2～0.4㎛를 권장한다.

Shaft의 경도는 55Hrc 이상을 일반적으로 권장하지만 압력, 속도와 Sealing Lip의 재질에 따라서 낮은 값도 허용할 수 있다.

Housing Installation Dimensions

Bore Diameter				Tolerance	
Over		To		H8	$\times 10^{-3}$
mm	in	mm	in	mm	in
10	0.394	18	0.787	+.027 – 0	0.0011
18	0.787	30	1.181	+.033 – 0	0.0013
30	1.181	50	1.969	+.039 – 0	0.0015
50	1.969	80	3.150	+.046 – 0	0.0018
80	3.150	120	4.724	+.054 – 0	0.0021
120	4.724	180	7.087	+.063 – 0	0.0025
180	7.087	250	9.843	+.072 – 0	0.0028
250	9.843	315	12.402	+.081 – 0	0.0032
315	12.402	400	15.748	+.089 – 0	0.0035



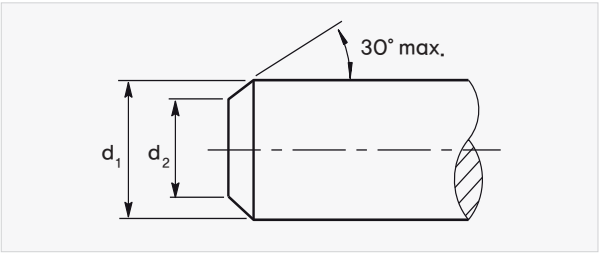
Housing Design Schematic

Housing Design Data

Seal width	Up to 10 (mm)	Over 10(mm)
Min. Bore Depth (b)	b + 0.5 (0.0197 in)	b + 1.0 (0.0394 in)
Chamfer Length (c)	0.70 ～ 1.00 (0.028 in ～ 0.04 in)	1.20 ～ 1.50 (0.047 in ～ 0.06 in)
Max. Corner Rad. (r)	0.40 (0.0157 in)	0.40 (0.0157 in)

Shaft Installation Dimensions

Shaft Diameter (mm)				Tolerance	
Over		To		h11	h11
mm	in	mm	in	mm	in
6	0.236	10	0.394	+0 –.900	+0 – 0.0035
10	0.394	18	0.787	+0 –.110	+0 – 0.0043
18	0.787	30	1.181	+0 –.130	+0 – 0.0051
30	1.181	50	1.969	+0 –.160	+0 – 0.0063
50	1.969	80	3.150	+0 –.190	+0 – 0.0075
80	3.150	120	4.724	+0 –.220	+0 – 0.0087
120	4.724	180	7.087	+0 –.250	+0 – 0.0098
180	7.087	250	9.843	+0 –.290	+0 – 0.0114
250	9.843	315	12.402	+0 –.320	+0 – 0.0126
315	12.402	400	15.748	+0 –.360	+0 – 0.0142

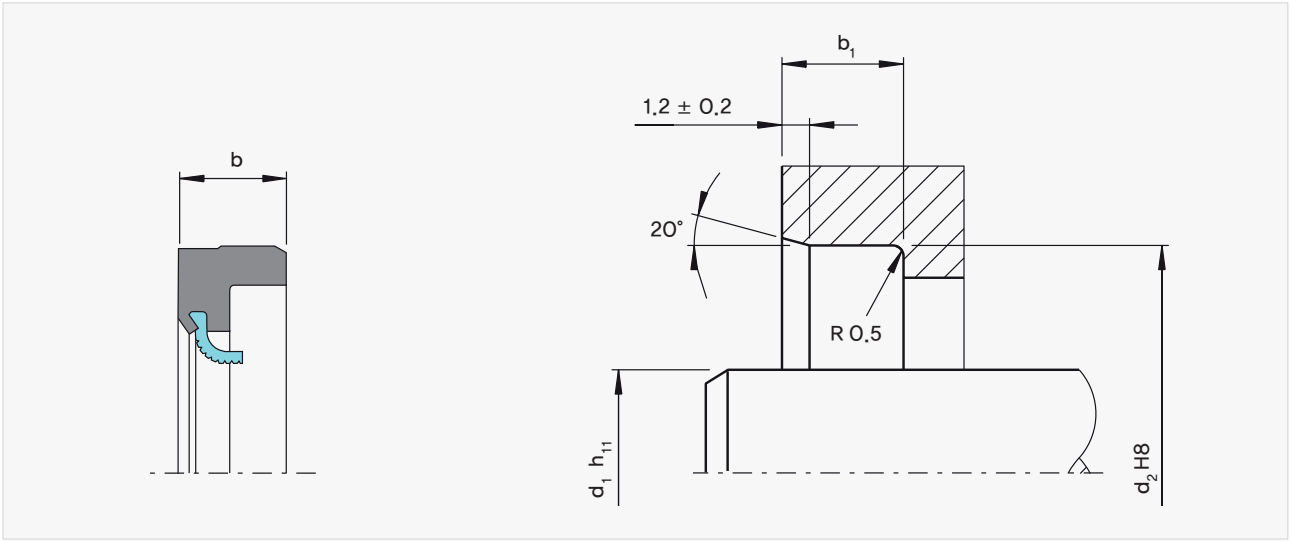


Shaft Lead-in Chamfer

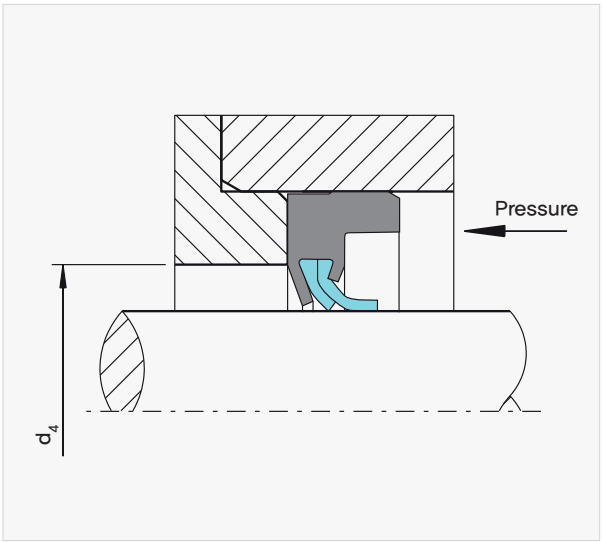
Shaft Lead-in Chamfer Data

d_1	d_1	d_1 - d_2	d_1 - d_2
mm	in	mm	in
< 10	0.4	1.5	0.06
10 – 20	0.4 – 0.8	2.0	0.08
20 – 30	0.8 – 1.2	2.5	0.10
30 – 40	1.2 – 1.6	3.0	0.12
40 – 50	1.6 – 2.0	3.5	0.14
50 – 70	2.0 – 2.8	4.0	0.16
70 – 95	2.8 – 3.7	4.5	0.18
95 – 130	3.7 – 5.1	5.5	0.22
130 – 240	5.1 – 9.4	7.0	0.28
240 – 300	9.4 – 11.8	11.0	0.43

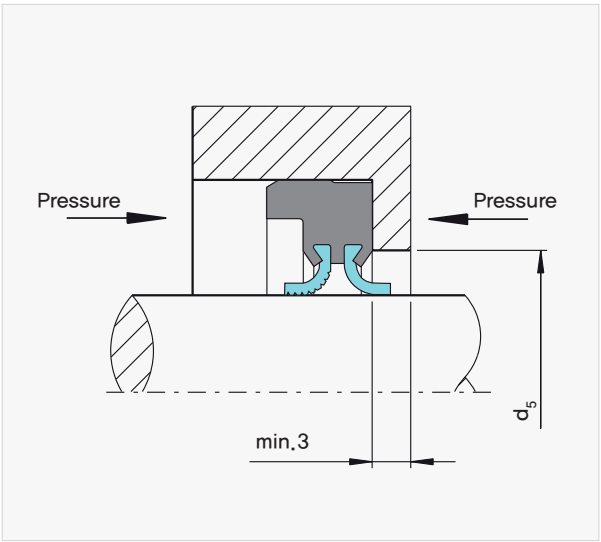
Installation Recommendation



Installation drawing for Pressure up to 0.5 MPa (73 psi)



Installation for Pressure from 0.5 MPa (73 psi) up to 1MPa (145 psi)



Installation type for Fluid Separation at Pressures up to 0.5 MPa (145 psi)

설치 이후 권장사항

1. 도장 (Painting)

Seal의 Lip 부분에 도료가 묻지 않도록 Masking 처리를 해야 한다.
아울러 Vent 혹은, Drain 부의 구멍도 같이 처리하며 도장을 위한 열처리 시,
Seal의 재질을 고려하여 높은 온도를 받지 않도록 처리해야 한다.

2. 시운전 혹은, 세척

시운전과 세척 시, Seal이 갖고 있는 Spec을 벗어나지 않는 범위에서 해야 한다.
(예: 압력, 속도, 내산성)

Installation Dimensions / TSS Part No.

Sizes				TSS Part No.			
d_1 (mm)	d_2 (mm)	b (mm) exc. TJB	b (mm) TJB		b_1 min (mm)	d_4 max (mm)	d_5 min (mm)
6	16	7	10	TJ_1_0060	7.3 / 10.3	10	9.6
6	22	7	10	TJ_2_0060	7.3 / 10.3	10	9.6
7	22	7	10	TJ_1_0070	7.3 / 10.3	11	10.6
8	22	7	10	TJ_1_0080	7.3 / 10.3	12	11.6
8	24	7	10	TJ_2_0080	7.3 / 10.3	12	11.6
9	22	7	10	TJ_1_0090	7.3 / 10.3	13	12.6
9	24	7	10	TJ_2_0090	7.3 / 10.3	13	12.6
9	26	7	10	TJ_3_0090	7.3 / 10.3	13	12.6
10	22	7	10	TJ_1_0100	7.3 / 10.3	14	13.6
10	24	7	10	TJ_2_0100	7.3 / 10.3	14	13.6
10	25	7	10	TJ_3_0100	7.3 / 10.3	14	13.6
10	26	7	10	TJ_4_0100	7.3 / 10.3	14	13.6
11	22	7	10	TJ_1_0110	7.3 / 10.3	15	14.6
11	26	7	10	TJ_2_0110	7.3 / 10.3	15	14.6
12	22	7	10	TJ_1_0120	7.3 / 10.3	16	15.6
12	24	7	10	TJ_2_0120	7.3 / 10.3	16	15.6
12	25	7	10	TJ_3_0120	7.3 / 10.3	16	15.6
12	28	7	10	TJ_4_0120	7.3 / 10.3	16	15.6
12	30	7	10	TJ_5_0120	7.3 / 10.3	16	15.6
14	24	7	10	TJ_1_0140	7.3 / 10.3	18	17.6
14	28	7	10	TJ_2_0140	7.3 / 10.3	18	17.6
14	30	7	10	TJ_3_0140	7.3 / 10.3	18	17.6
14	35	7	10	TJ_4_0140	7.3 / 10.3	18	17.6
15	26	7	10	TJ_1_0150	7.3 / 10.3	19	18.6
15	30	7	10	TJ_2_0150	7.3 / 10.3	19	18.6
15	32	7	10	TJ_3_0150	7.3 / 10.3	19	18.6
15	35	7	10	TJ_4_0150	7.3 / 10.3	19	18.6
16	28	7	10	TJ_1_0160	7.3 / 10.3	20	19.6
16	30	7	10	TJ_2_0160	7.3 / 10.3	20	19.6
16	32	7	10	TJ_3_0160	7.3 / 10.3	20	19.6
16	35	7	10	TJ_4_0160	7.3 / 10.3	20	19.6
17	28	7	10	TJ_1_0170	7.3 / 10.3	21	20.6
17	30	7	10	TJ_2_0170	7.3 / 10.3	21	20.6
17	32	7	10	TJ_3_0170	7.3 / 10.3	21	20.6
17	35	7	10	TJ_4_0170	7.3 / 10.3	21	20.6
17	40	7	10	TJ_5_0170	7.3 / 10.3	21	20.6
18	30	7	10	TJ_1_0180	7.3 / 10.3	22	21.6
18	32	7	10	TJ_2_0180	7.3 / 10.3	22	21.6
18	35	7	10	TJ_3_0180	7.3 / 10.3	22	21.6
18	40	7	10	TJ_4_0180	7.3 / 10.3	22	21.6

*어떤 경우에는, Sealing Lip이 가장자리 끝으로 돌출된 경우도 있을 수 있습니다.
*표기된 치수 외에 제품도 공급이 가능합니다. (단, 추가 비용이 발생할 수 있음.)

Installation Dimensions / TSS Part No.

Sizes				TSS Part No.			
d_1 (mm)	d_2 (mm)	b (mm) exc. TJB	b (mm) TJB		b_1 min (mm)	d_4 max (mm)	d_5 min (mm)
20	30	7	10	TJ_1_0200	7.3 / 10.3	24	23.6
20	32	7	10	TJ_2_0200	7.3 / 10.3	24	23.6
20	35	7	10	TJ_3_0200	7.3 / 10.3	24	23.6
20	40	7	10	TJ_4_0200	7.3 / 10.3	24	23.6
20	47	7	10	TJ_5_0200	7.3 / 10.3	24	23.6
22	32	7	10	TJ_1_0220	7.3 / 10.3	26	25.6
22	35	7	10	TJ_2_0220	7.3 / 10.3	26	25.6
22	40	7	10	TJ_3_0220	7.3 / 10.3	26	25.6
22	47	7	10	TJ_4_0220	7.3 / 10.3	26	25.6
24	35	7	10	TJ_1_0240	7.3 / 10.3	28	27.6
24	37	7	10	TJ_2_0240	7.3 / 10.3	28	27.6
24	40	7	10	TJ_3_0240	7.3 / 10.3	28	27.6
24	47	7	10	TJ_4_0240	7.3 / 10.3	28	27.6
25	35	7	10	TJ_1_0250	7.3 / 10.3	29	28.6
25	40	7	10	TJ_2_0250	7.3 / 10.3	29	28.6
25	42	7	10	TJ_3_0250	7.3 / 10.3	29	28.6
25	47	7	10	TJ_4_0250	7.3 / 10.3	29	28.6
25	52	7	10	TJ_5_0250	7.3 / 10.3	29	28.6
26	37	7	10	TJ_1_0260	7.3 / 10.3	30	29.6
26	42	7	10	TJ_2_0260	7.3 / 10.3	30	29.6
26	47	7	10	TJ_3_0260	7.3 / 10.3	30	29.6
28	40	7	10	TJ_1_0280	7.3 / 10.3	32	31.6
28	47	7	10	TJ_2_0280	7.3 / 10.3	32	31.6
28	52	7	10	TJ_3_0280	7.3 / 10.3	32	31.6
30	40	7	10	TJ_1_0300	7.3 / 10.3	34	33.6
30	42	7	10	TJ_2_0300	7.3 / 10.3	34	33.6
30	47	7	10	TJ_3_0300	7.3 / 10.3	34	33.6
30	52	7	10	TJ_4_0300	7.3 / 10.3	34	33.6
30	62	7	10	TJ_5_0300	7.3 / 10.3	34	33.6
32	45	7	10	TJ_1_0320	7.3 / 10.3	36	35.6
32	45	8	10	TJ_2_0320	8.3 / 10.3	36	35.6
32	47	7	10	TJ_3_0320	7.3 / 10.3	36	35.6
32	47	8	10	TJ_4_0320	8.3 / 10.3	36	35.6
32	52	7	10	TJ_5_0320	7.3 / 10.3	36	35.6
32	52	8	10	TJ_6_0320	8.3 / 10.3	36	35.6
35	47	7	10	TJ_1_0350	7.3 / 10.3	39	38.6
35	50	7	10	TJ_2_0350	7.3 / 10.3	39	38.6
35	50	8	10	TJ_3_0350	8.3 / 10.3	39	38.6
35	52	7	10	TJ_4_0350	7.3 / 10.3	39	38.6
35	52	8	10	TJ_5_0350	8.3 / 10.3	39	38.6
35	55	8	10	TJ_6_0350	8.3 / 10.3	39	38.6
35	62	7	10	TJ_7_0350	7.3 / 10.3	39	38.6

Installation Dimensions / TSS Part No.

Sizes				TSS Part No.			
d_1 (mm)	d_2 (mm)	b (mm) exc. TJB	b (mm) TJB		b_1 min (mm)	d_4 max (mm)	d_5 min (mm)
36	47	7	10	TJ_1_0360	7.3 / 10.3	40	39.6
36	50	7	10	TJ_2_0360	7.3 / 10.3	40	39.6
36	52	7	10	TJ_3_0360	7.3 / 10.3	40	39.6
36	62	7	10	TJ_4_0360	7.3 / 10.3	40	39.6
38	52	7	10	TJ_1_0380	7.3 / 10.3	42	41.6
38	55	7	10	TJ_2_0380	7.3 / 10.3	42	41.6
38	55	8	10	TJ_3_0380	8.3 / 10.3	42	41.6
38	58	8	10	TJ_4_0380	8.3 / 10.3	42	41.6
38	62	7	10	TJ_5_0380	7.3 / 10.3	42	41.6
38	62	8	10	TJ_6_0380	8.3 / 10.3	42	41.6
40	52	7	10	TJ_1_0400	7.3 / 10.3	44	43.6
40	55	7	10	TJ_2_0400	7.3 / 10.3	44	43.6
40	55	8	10	TJ_3_0400	8.3 / 10.3	44	43.6
40	62	7	10	TJ_4_0400	7.3 / 10.3	44	43.6
40	62	8	10	TJ_5_0400	8.3 / 10.3	44	43.6
40	72	7	10	TJ_6_0400	7.3 / 10.3	44	43.6
42	55	8	10	TJ_1_0420	8.3 / 10.3	46	45.6
42	62	8	10	TJ_2_0420	8.3 / 10.3	46	45.6
42	72	8	10	TJ_3_0420	8.3 / 10.3	46	45.6
45	60	8	10	TJ_1_0450	8.3 / 10.3	49	48.6
45	62	8	10	TJ_2_0450	8.3 / 10.3	49	48.6
45	65	8	10	TJ_3_0450	8.3 / 10.3	49	48.6
45	72	8	10	TJ_4_0450	8.3 / 10.3	49	48.6
48	62	8	10	TJ_1_0480	8.3 / 10.3	52	51.6
48	72	8	10	TJ_2_0480	8.3 / 10.3	52	51.6
50	65	8	10	TJ_1_0500	8.3 / 10.3	54	53.6
50	68	8	10	TJ_2_0500	8.3 / 10.3	54	53.6
50	72	8	10	TJ_3_0500	8.3 / 10.3	54	53.6
50	80	8	10	TJ_4_0500	8.3 / 10.3	54	53.6
52	68	8	10	TJ_1_0520	8.3 / 10.3	56	55.6
52	72	8	10	TJ_2_0520	8.3 / 10.3	56	55.6
55	70	8	10	TJ_1_0550	8.3 / 10.3	59	58.6
55	72	8	10	TJ_2_0550	8.3 / 10.3	59	58.6
55	80	8	10	TJ_3_0550	8.3 / 10.3	59	58.6
55	85	8	10	TJ_4_0550	8.3 / 10.3	59	58.6
56	70	8	10	TJ_1_0560	8.3 / 10.3	60	59.6
56	72	8	10	TJ_2_0560	8.3 / 10.3	60	59.6
56	80	8	10	TJ_3_0560	8.3 / 10.3	60	59.6
56	85	8	10	TJ_4_0560	8.3 / 10.3	60	59.6
58	72	8	10	TJ_1_0580	8.3 / 10.3	62	61.6
58	80	8	10	TJ_2_0580	8.3 / 10.3	62	61.6

Installation Dimensions / TSS Part No.

Sizes				TSS Part No.			
d_1 (mm)	d_2 (mm)	b (mm) exc. TJB	b (mm) TJB		b_1 min (mm)	d_4 max (mm)	d_5 min (mm)
60	75	8	10	TJ_1_0600	8.3 / 10.3	64	63.6
60	80	8	10	TJ_2_0600	8.3 / 10.3	64	63.6
60	85	8	10	TJ_3_0600	8.3 / 10.3	64	63.6
60	90	8	10	TJ_4_0600	8.3 / 10.3	64	63.6
62	85	10	10	TJ_1_0620	10.3	68	66.4
62	90	10	10	TJ_2_0620	10.3	68	66.4
63	85	10	10	TJ_1_0630	10.3	69	67.4
63	90	10	10	TJ_2_0630	10.3	69	67.4
65	85	10	10	TJ_1_0650	10.3	71	69.4
65	90	10	10	TJ_2_0650	10.3	71	69.4
65	100	10	10	TJ_3_0650	10.3	71	69.4
68	90	10	10	TJ_1_0680	10.3	74	72.4
68	100	10	10	TJ_2_0680	10.3	74	72.4
70	90	10	10	TJ_1_0700	10.3	76	74.4
70	95	10	10	TJ_2_0700	10.3	76	74.4
70	100	10	10	TJ_3_0700	10.3	76	74.4
72	95	10	10	TJ_1_0720	10.3	78	76.4
72	100	10	10	TJ_2_0720	10.3	78	76.4
75	95	10	10	TJ_1_0750	10.3	81	79.4
75	100	10	10	TJ_2_0750	10.3	81	79.4
78	100	10	10	TJ_1_0780	10.3	84	82.4
80	100	10	10	TJ_1_0800	10.3	86	84.4
80	110	10	10	TJ_2_0800	10.3	86	84.4
85	110	12	12	TJ_1_0850	12.4	91	89.4
85	120	12	12	TJ_2_0850	12.4	91	89.4
90	110	12	12	TJ_1_0900	12.4	96	94.4
90	120	12	12	TJ_2_0900	12.4	96	94.4
95	120	12	12	TJ_1_0950	12.4	101	99.4
95	125	12	12	TJ_2_0950	12.4	101	99.4
100	120	12	12	TJ_1_1000	12.4	106	104.4
100	125	12	12	TJ_2_1000	12.4	106	104.4
100	130	12	12	TJ_3_1000	12.4	106	104.4
105	130	12	12	TJ_1_1050	12.4	111	109.4
105	140	12	12	TJ_2_1050	12.4	111	109.4
110	130	12	12	TJ_1_1100	12.4	116	114.4
110	140	12	12	TJ_2_1100	12.4	116	114.4
115	140	12	12	TJ_1_1150	12.4	121	119.4
115	150	12	12	TJ_2_1150	12.4	121	119.4
120	150	12	12	TJ_1_1200	12.4	126	124.4
120	160	12	12	TJ_2_1200	12.4	126	124.4
125	150	12	12	TJ_1_1250	12.4	131	129.4
125	160	12	12	TJ_2_1250	12.4	131	129.4

Installation Dimensions / TSS Part No.

Sizes				TSS Part No.			
d_1 (mm)	d_2 (mm)	b (mm) exc. TJB	b (mm) TJB		b_1 min (mm)	d_4 max (mm)	d_5 min (mm)
130	160	12	12	TJ_1_1300	12.4	136	134.4
130	170	12	12	TJ_2_1300	12.4	136	134.4
135	170	12	12	TJ_1_1350	12.4	141	139.4
140	170	15	15	TJ_1_1400	15.4	148	147
145	175	15	15	TJ_1_1450	15.4	153	152
150	180	15	15	TJ_1_1500	15.4	158	157
160	190	15	15	TJ_1_1600	15.4	168	167
170	200	15	15	TJ_1_1700	15.4	178	177

*어떤 경우에는 Sealing Lip이 가장자리 끝으로 돌출된 경우도 있을 수 있습니다.
*표기된 치수 외에 제품도 공급이 가능합니다. (단, 추가비용이 발생할 수 있음.)

Special Designs – Turcon® Varilip® PDR

표준 범위에서 특별한 환경을 충족하도록 설계된 Seal을 사용할 수 있으며,
표준이 아닌 하우징과 축을 사용하는 환경도 가능합니다.

Clamped Design

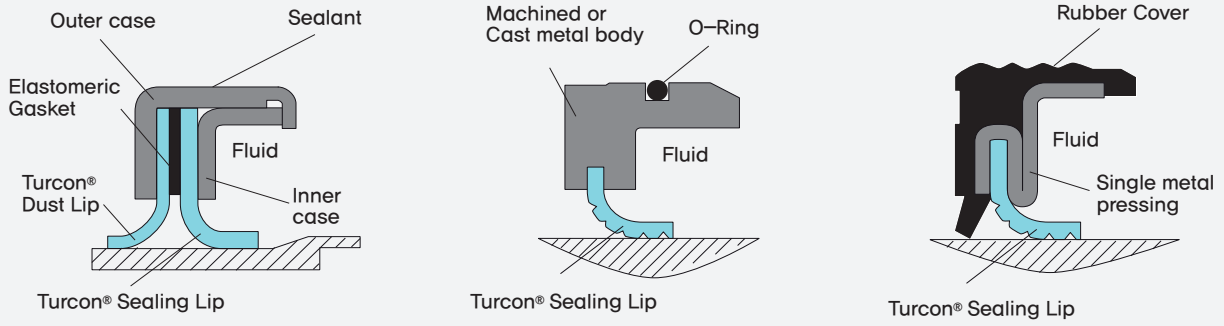
하우징 공차가 지나치게 과도한 경우.

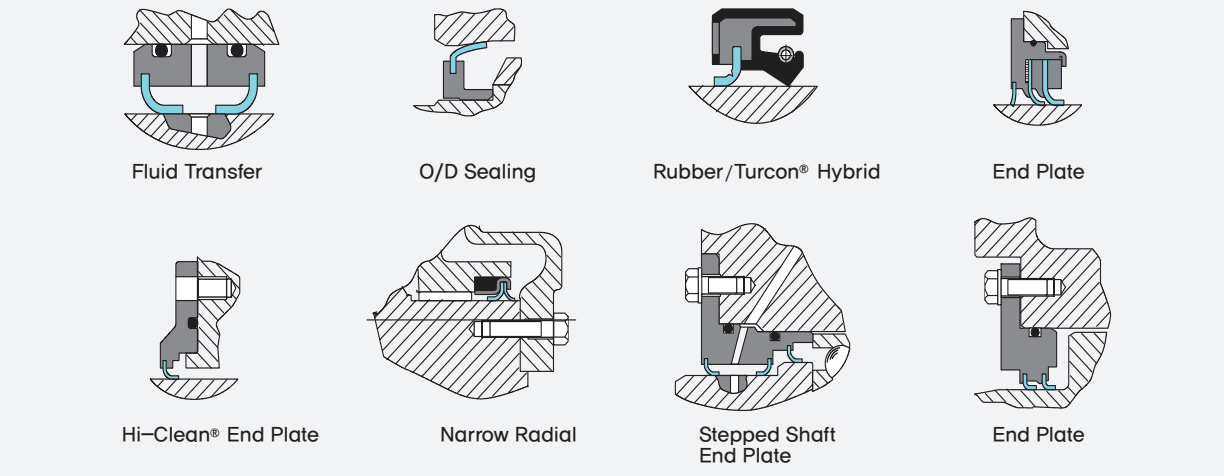
O-Ring Design

하우징에 약간에 간섭이 있도록 조립 하는 경우.

Single Shell Design

낮은 압력에서 하우징 표면 처리가 불량한 경우.





Applications of Turcon® Varilip® PDR – Special Designs

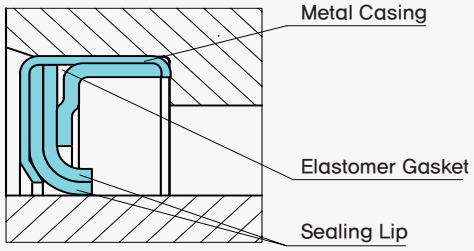
개요

탄성체 Sealing Lip을 가지고 있는 일반 Oil Seal은 압력, 온도, 유체 등의 조건에 따라 적용 범위가 한정된다.

TSS에서는 Turcon®이라는 특수 재질을 이용하여 회전용 Seal인 Varilip®을 개발함으로 일반 Oil Seal의 한계점을 극복했다.

Varilip®의 특징은 저-마찰과 Stick-Slip 현상이 없다는 것이며, 이로 인해 발열을 줄이며 높은 속도에서도 적용이 가능하다. Varilip®은 DIN 3760/ISO 6194/1과 호환성이 있다.

Varilip®은 구조적인 문제로 Mechanical Seal의 적용이 불가능할 때, 압력 Seal로서 사용된다.



Varilip®, Type A

특징

Varilip®은 비철금속 스프링과 일체형으로 되어 있다. Type A에서 볼 수 있는 것처럼 축과 Sealing Lip과의 간섭, 하우징과 메탈케이스, Turcon® Sealing Lip과의 연속적인 결합으로 Sealing이 된다.

장점

- 적은 마찰의 Seal 재질.
- Stick-Slip이 없는 운동.
- 넓은 온도 범위. (−60℃ ~ +200℃)
- 높은 압력 성능. (2MPa)
- 넓은 유체 성능.
- 화학물질에 영향을 받지 않는다.
- 표준 Oil Seal 설치 홈에 적합하다.

적용 분야

- 펌프
- 세퍼레이터
- 송풍기
- 원심 분리기
- 기어 박스
- 기계 장비
- 허브
- 믹서
- 베어링

적용 범위

본 자료에서 주어진 압력, 온도, 속도의 한계가 동시에 작용되어서는 안 되며 유체의 종류 및 특성, 열 발생, 축 상태 등의 조건이 적용 한계의 영향을 준다.

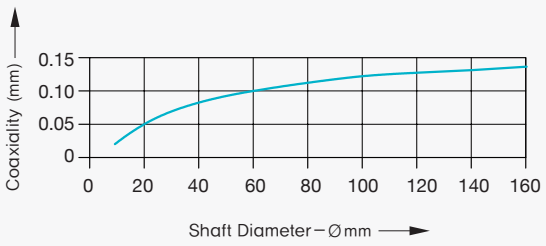
아래의 P×V 값은 축경 30에서 170까지 적용 시, 참고.

- 충분한 윤활 : 3 (MPa × m/s) 까지.
- 불충분한 윤활 : 1.5 (MPa × m/s) 까지.
- 우수한 냉각 : 10 (MPa × m/s) 까지.

※ 주의사항

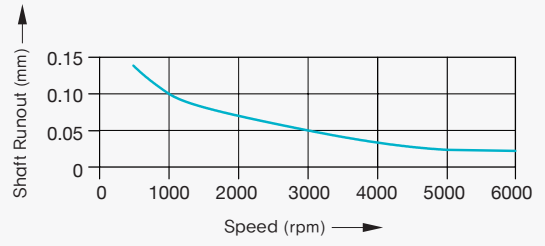
- 위에 제시된 최대 수치는 같은 동작 시간대에 동시에 유효할 수는 없다.
- 최대 속도는 재질, 타입, 압력, 온도, 틈새 크기에 따라 좌우된다.
- 온도 범위 또한, 매체 조건에 따라 영향을 받는다.

Coaxiality Tolerance



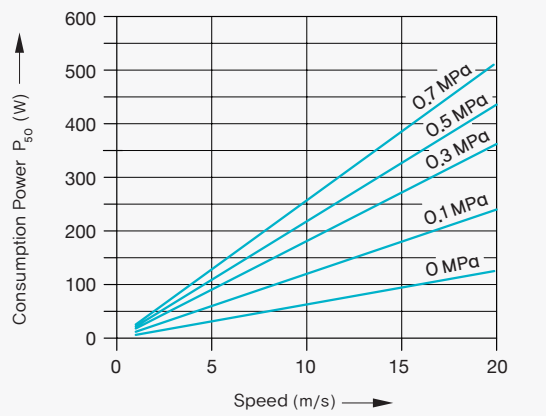
Coaxiality Tolerance

Shaft Runout Tolerance



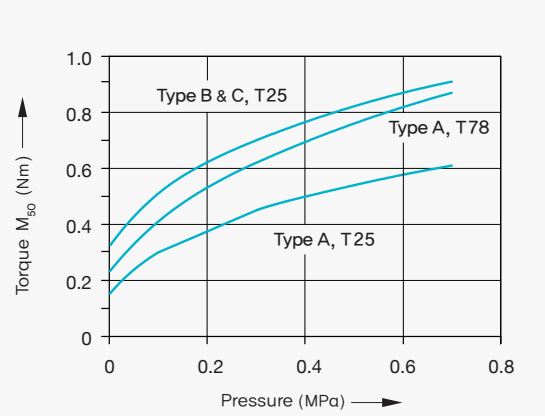
Max. Shaft Runout

Power Consumption, Dry running



Power Consumption on a 50mm Shaft-Ø

Torque



Power Consumption on a 50mm Shaft-Ø

표면 조도 / Surface Roughness

Surface Roughness µm		
	Shaft surface	Housing bore
$R_{max.}$	1.00 – 4.00	< 10.0
R_z	0.63 – 2.50	< 6.3
R_a	0.10 – 0.40	< 1.6

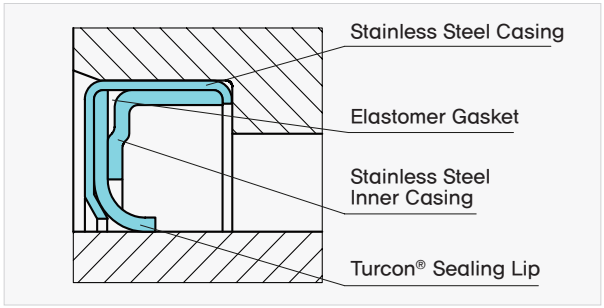
재질

탄성체 Sealing Lip을 가지고 있는 일반 Oil Seal은 압력, 온도, 유체 등의 조건에 따라 적용 범위가 한정된다.

TSS에서는 Turcon®이라는 특수 재질을 이용하여 회전용 Seal인 Varilip®을 개발함으로 일반 Oil Seal의 한계점을 극복했다.

Varilip®의 특징은 마찰이 적고, Stick-Slip 현상이 없으며 이로 인해 발열 현상이 감소되어 높은 속도에서도 적용이 가능하다. Varilip®은 DIN 3760/ISO 6194/1과 호환성이 있다.

Varilip®은 구조적인 문제로 Mechanical Seal의 적용이 불가능할 때, 압력 Seal로서 사용된다.



Materials for Varilip®

Sealing Lip 재질

- **Turcon® T25**
  내마모성과 낮은 마찰특성이 있는 표준 재질로서 넓은 온도범위와 대부분의 유체에 저항력이 있다.
  축 경도 55HRC 하에서 우수한 결과가 나온다.
  낮은 압력, 속도 4m/s일 경우 45HRC면 충분하다.

- **Turcon® T78**
  무윤활 또는 불충분한 윤활하에서 사용되며 특히, 축의 재질이 부드러운 경우에 사용된다.
  예) SUS재질이 사용되어져야 하는 화학산업분야.
  축 경도는 170HB보다 낮아서는 안된다.

Mating surface	Application Limits	Material
> 55 HRC	Pressure < 2 MPa	Turcon® T25
> 30 HRC	Pressure < 2 MPa	Turcon® T40
> 170 HB	Pressure < 0.2MPa	Turcon® T78

Metal-Case 재질

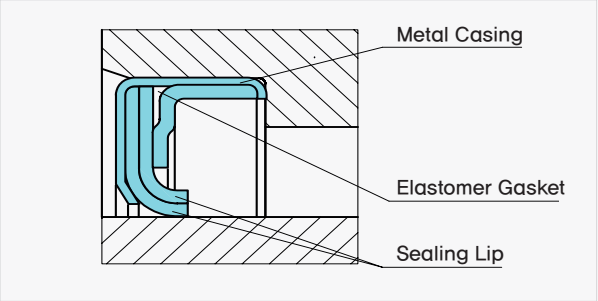
Medium	Material	Material Code
Oil, Greases, Air/Gases, Water, Vapour, Solvents, Foodstuffs	Stainless Steel Material No.1.4301 AISI 304	1
Acids, Caustics, Seawater	Acid-Resistant Stainless Steel Material No.1.4436 AISI 316	2
	Acid-Resistant Stainless Steel Material No.1.4571 AISI 316 Ti	3*

*Only for type A, C & D, up to max. 90mm outside diameter.

Gasket 재질

Medium	Temperature	Material	Code
Air, Water, Oils, Greases	Nitrile-Elastomer −30 ~ +110°C	NBR	N
Air, Water, Vapour, Foodstuffs, Alcohols	Ethylene Propylene Elastomer −60 ~ +150°C	EPDM	E
Air, Water, Oils, Greases, Solvents, Acids, Caustics	Fluoro Elastomer −20 ~ +200°C	FPM	V

종류 / Types

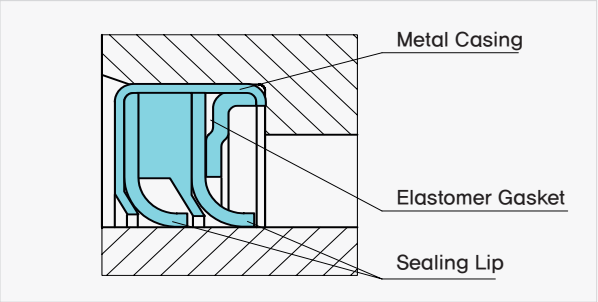


Turcon® Varilip®, Type A

Type A

최대 압력 5 Bar까지 사용하며 표준 산업용에 적합한 One-Lip Seal이다.

40m/s의 속도 범위까지 사용할 수 있다.

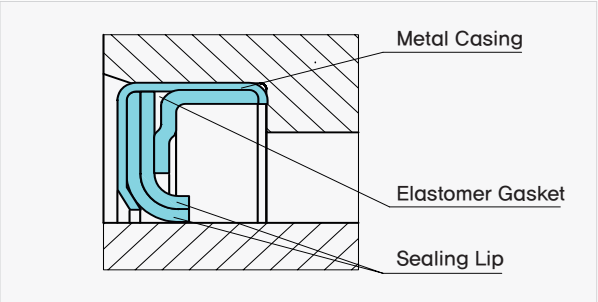


Varilip®, Type B

Type B

우수한 Sealing이 요구되는 환경이나 심하게 오염된 유체를 Sealing할 때, 적합하다.

Type A 보다 큰 안정성을 준다.

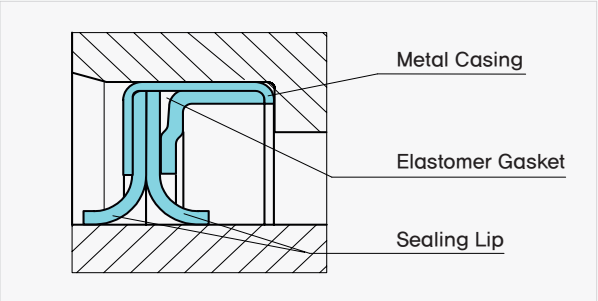


Varilip®, Type C

Type C

보다 높은 압력이 작용 시, 사용된다.

Sealing Lip의 강화로 20bar까지 사용할 수 있다.



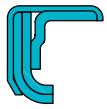
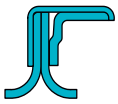
Varilip®, Type D

Type D

양쪽 방향의 압력 및 유체 Sealing에 적합하다.

다른 하나의 Lip으로 Wiper 기능을 수행한다.

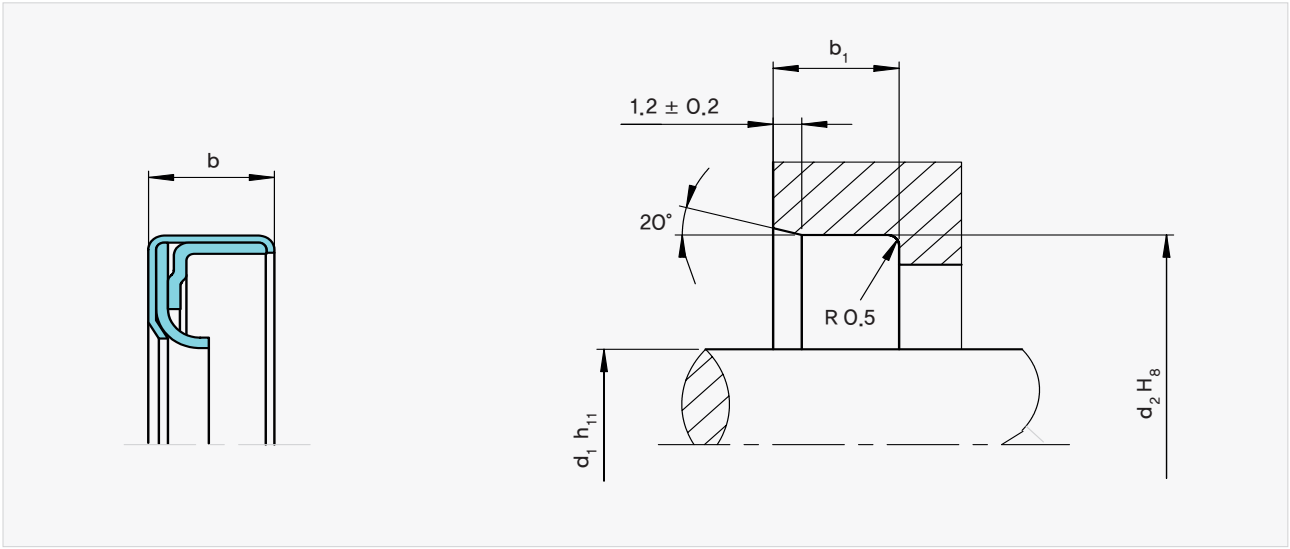
적용 범위 / Technical Data

Seal	Technical data			Technical behavior			
Type	Pressure MPa (bar)	Temperature range °C	Speed m/s	Friction	Medium Compatibility	Dynamic Sealing Performance	Service Life
Varilip® A 	0.5 (5)	−60 ~ +200	40	A	A	B	B
Varilip® B 	0.5 (5)	−60 ~ +200	20	B	A	A	A
Varilip® C 	2.0 (20)	−60 ~ +200	20	C	A	B	A
Varilip® D 	0.1 (1)	−60 ~ +200	20	B	A	B	B

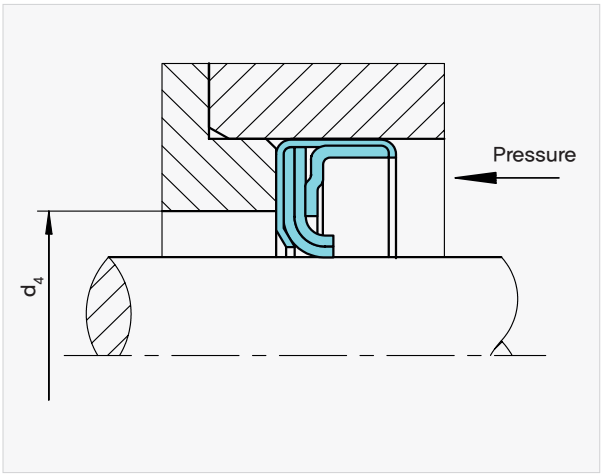
For special applications, such as e.g) in vacuum operation, gas applications, etc, please contact HANSUNG.

A : Very Good
B : Good
C : Satisfactory

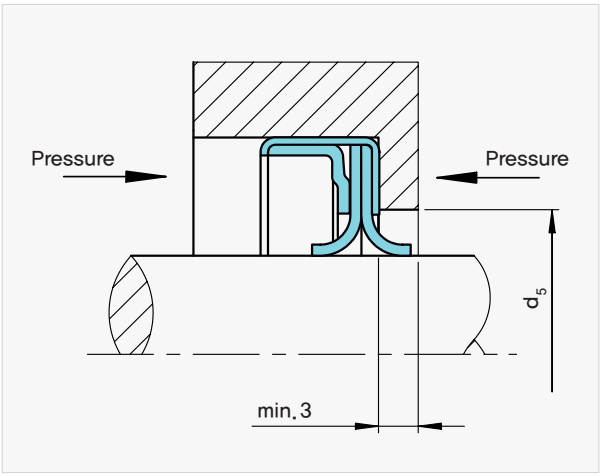
Installation Recommendation



Installation drawing for pressure up to 0.2 MPa



Installation drawing for pressure from 0.2 MPa up to MPa



Installation for Type D

주문 예

Turcon® Varilip®

- TSS Series No. TP A
- Shaft diameter : d_1 = 30.0mm
- Groove diameter : d_2 = 47.0mm
- Seal Width : b = 7mm
- TSS Part No. TPA300300

TSS Article No. TP A3 0 0300 – T25 1 V

- Type + Cross section
- Type (Standard)
- Shaft - Ø x 10
- Quality Index (Standard)
- Material Code (Sealing Lip)
- Material Code (Casing)
- Material Code (Gasket)

For other types by analogy :
Order No. TP B 300300 – T25 1V
TP C 300300 – T25 1V
TP D 300300 – T25 1V

Installation Dimensions / TSS Part No.

Sizes			TSS Part No.	b_1 min.	d_4 max.	d_5 min.
d_1	d_2	b				
6	16	7	TP_100060	7.3	10	9.6
8	22	7	TP_100080	7.3	12	11.6
10	22	7	TP_100100	7.3	14	13.6
10	25	7	TP_300100	7.3	14	13.6
10	26	7	TP_400100	7.3	14	13.6
12	22	7	TP_100120	7.3	16	15.6
12	25	7	TP_300120	7.3	16	15.6
12	30	7	TP_500120	7.3	16	15.6
14	24	7	TP_100140	7.3	18	17.6
14	30	7	TP_300140	7.3	18	17.6
15	26	7	TP_100150	7.3	19	18.6
15	30	7	TP_200150	7.3	19	18.6
15	35	7	TP_400150	7.3	19	18.6
16	28	7	TP_100160	7.3	20	19.6
16	30	7	TP_200160	7.3	20	19.6
16	35	7	TP_400160	7.3	20	19.6
18	30	7	TP_100180	7.3	22	21.6
18	35	7	TP_300180	7.3	22	21.6
20	30	7	TP_100200	7.3	24	23.6
20	35	7	TP_300200	7.3	24	23.6
20	40	7	TP_400200	7.3	24	23.6
22	35	7	TP_200220	7.3	26	25.6
22	40	7	TP_300220	7.3	26	25.6
22	47	7	TP_400220	7.3	26	25.6
25	35	7	TP_100250	7.3	29	28.6
25	40	7	TP_200250	7.3	29	28.6
25	42	7	TP_300250	7.3	29	28.6
25	47	7	TP_400250	7.3	29	28.6
25	52	7	TP_500250	7.3	29	28.6
28	40	7	TP_100280	7.3	32	31.6
28	47	7	TP_200280	7.3	32	31.6
28	52	7	TP_300280	7.3	32	31.6
30	40	7	TP_100300	7.3	34	31.6
30	42	7	TP_200300	7.3	34	33.6
30	47	7	TP_300300	7.3	34	33.6
30	52	7	TP_400300	7.3	34	33.6
32	45	7	TP_100320	7.3	36	35.6
32	47	7	TP_300320	7.3	36	35.6
32	52	7	TP_500320	7.3	36	35.6

Installation Dimensions / TSS Part No.

Sizes			TSS Part No.	b_1 min.	d_4 max.	d_5 min.
d_1	d_2	b				
35	47	7	TP_100350	7.3	39	38.6
35	50	7	TP_200350	7.3	39	38.6
35	52	7	TP_400350	7.3	39	38.6
35	55	8	TP_600350	8.3	39	38.6
38	55	7	TP_200380	7.3	42	41.6
38	62	7	TP_500380	7.3	42	41.6
40	52	7	TP_100400	7.3	44	43.6
40	55	7	TP_200400	7.3	44	43.6
40	62	7	TP_400400	7.3	44	43.6
42	55	8	TP_100420	8.3	46	45.6
42	62	8	TP_200420	8.3	46	45.6
45	60	8	TP_100450	8.3	49	48.6
45	62	8	TP_200450	8.3	49	48.6
45	65	8	TP_300450	8.3	49	48.6
48	62	8	TP_100480	8.3	52	51.6
50	65	8	TP_100500	8.3	54	53.6
50	68	8	TP_200500	8.3	54	53.6
50	72	8	TP_300500	8.3	54	53.6
55	70	8	TP_100550	8.3	59	58.6
55	72	8	TP_200550	8.3	59	58.6
55	80	8	TP_300550	8.3	59	58.6
60	75	8	TP_100600	8.3	64	63.6
60	80	8	TP_200600	8.3	64	63.6
60	85	8	TP_300600	8.3	64	63.6
63	85	10	TP_100630	10.3	69	67.4
65	85	10	TP_100650	10.3	71	69.4
65	90	10	TP_200650	10.3	71	69.4
70	90	10	TP_100700	10.3	76	74.4
70	95	10	TP_200700	10.3	76	74.4
75	95	10	TP_100750	10.3	81	79.4
75	100	10	TP_200750	10.3	81	79.4
80	100	10	TP_100800	10.3	86	84.4
80	110	10	TP_200800	10.3	86	84.4
85	110	12	TP_100850	12.4	91	89.4
85	120	12	TP_200850	12.4	91	89.4
90	110	12	TP_100900	12.4	96	94.4
90	120	12	TP_200900	12.4	96	94.4
95	120	12	TP_100950	12.4	101	99.4
95	125	12	TP_200950	12.4	101	99.4
100	120	12	TP_101000	12.4	106	104.4
100	125	12	TP_201000	12.4	106	104.4
100	130	12	TP_301000	12.4	106	104.4

Installation Dimensions / TSS Part No.

Sizes			TSS Part No.	b_1 min.	d_4 max.	d_5 min.
d_1	d_2	b				
105	130	12	TP_101050	12.4	111	109.4
110	130	12	TP_101100	12.4	116	114.4
110	140	12	TP_201100	12.4	116	114.4
115	140	12	TP_101150	12.4	121	119.4
120	150	12	TP_101200	12.4	126	124.4
125	150	12	TP_101250	12.4	131	129.4
130	160	12	TP_101300	12.4	136	134.4
135	170	12	TP_101350	12.4	141	139.4
140	170	15	TP_101400	15.4	148	147.0
145	175	15	TP_101450	15.4	153	152.0
150	180	15	TP_101500	15.4	158	157.0
160	190	15	TP_101600	15.4	168	167.0
170	200	15	TP_101700	15.4	178	177.0

V-Ring



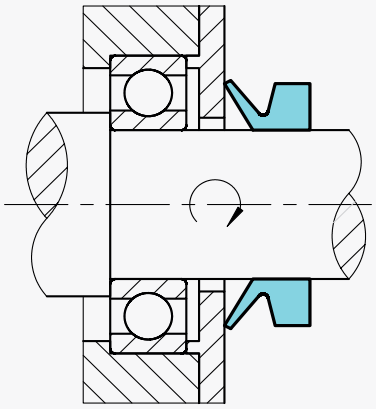
Rotary Application

Materials : Elastomer

개요

V-Ring은 고무 탄성체로서 압력의 작용이 없는 곳에서 축과 베어링에 밀폐를 효과적으로 한다.

V-Ring은 원심력으로 인하여 내부로부터 오일, 그라이스 등이 누유되는 것을 방지하고 외부에서 물이 튀는 것, 먼지, 오염 물질로부터 보호하는 기능을 한다.



V-Ring의 작동 원리

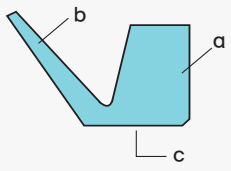
구성

V-Ring은 몸체, 가장자리, 주축으로 구성되어 있고, 축과 같이 회전한다.

The Seal Body (a)
Seal의 실제 몸체로서 축과 같이 회전하면서 압착, 고정한다.

The Sealing Lip (b)
고정되어 있는 접촉 표면과 수직으로 Sealing 하는 역할을 한다.

The Pivot (c)
Seal Body와 Sealing Lip 사이를 연결하는 스프링 역할을 하며 압력이 주어질 때, Sealing Lip의 이동을 일정하게 유지시킨다.



Seal
Cross-section
a) Seal Body
b) Sealing Lip
c) Pivot

장점

- Shaft Seal로서 매우 경제적이고 효과적이다.
- 설계 및 조립이 용이하고 작은 공간에서 사용할 수 있다.
- 축의 경도 및 표면 조도를 배제한다.
- 설비가 단순하며 축이 마모되지 않는다.
- 마찰이 적으며 수명이 길다.
- 오염 물질을 연속적으로 방지하는 역할을 한다.
- 저속, 중속, 고속에서 사용하기 적당하다.

적용 범위

- 압력 : 압력의 작용이 없는 곳.
- 속도 : 최대 8 m/s
  ≧ 8 m/s (축이 보호 되었을 때.)
  ≧ 12 m/s (축과 반경이 보호 되었을 때.)
- 온도 : −40℃ ~ +180℃
  (탄성체 재질에 의존.)

적용 분야

V-Ring은 먼지, 오염물질, 윤활유, 오일, 물 등으로부터 보호가 필요한 모든 설비에 적용된다.

- 기계공학
- 화학공학
- 토목공학, 건설 장비
- 자동차 공학
- 가정용품
- 농기계
- 선박
- 전기모터와 스위치
- 기계공구
- 화전 분쇄기
- 제철소
- 시멘트 장비

표면 조도

- R_{max} : 10.0 ~ 16.0μm
- R_z : 6.3 ~ 10.0μm
- R_a : 1.6 ~ 3.2μm

V-Ring

종류

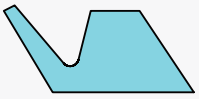
• VA Type
일반형

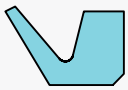
• VS Type
몸체 폭은 VA 보다 약 50%가 크며, 뒤쪽에 경사로 설계되어 고속 회전 시, 접착력 증가를 보강시킴.

• VL Type
특별히 작은 공간에서 사용되는 작은 구조의 특성을 지님.

• VE Type
고부하에서 사용할 수 있도록 설계됨.


Seal type VA


Seal type VS


Seal type VL


Seal type VE

재질

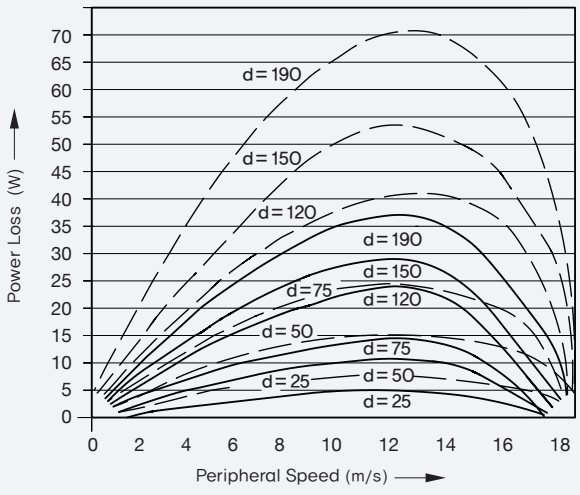
니트릴 부타디엔 고무 (NBR) :

• **경도** : 60 Shore A
• **온도** : −40℃ ~ +100℃
• **매체** : 광물유, 공기, 물, 그리이스, 에멀젼.

불소 고무 (FPM) :

• **경도** : 65 Shore A
• **온도** : −20℃ ~ +180℃
• **매체** : 광물유, 합성유, 그리이스, 산, 알카리 용액.

TSS Code	Old Code (Forsheda)	Type of Rubber	Characteristics
N6T50	NBR 510	Nitrile	For general use.
N7T50	NBR 555	Nitrile	Heavy-duty conditions. Good wear & abrasion resistance.
N6T5C	NBR 562	Nitrile	Low friction.
H7T50	HNBR 576	Hydrogen-ated Nitile	Hypoid oils at high temperature.
E7T50	EPDM 762	Ethylene Propylene	Good weather & ozone resistance, used with special chemi-cals such as acetone, ammonium carbonate & benzaldehyde.
VDT50	FKM 900	Fluorinated	Very high temper-ature and chemical resistance.



〈Power Loss as a function of peripheral speed for various sizes〉

—— V-Rings in Low Friction Nitrile (N6T5C)
- - - V-Rings for General use (N6T50)

d = Shaft diameter (mm)

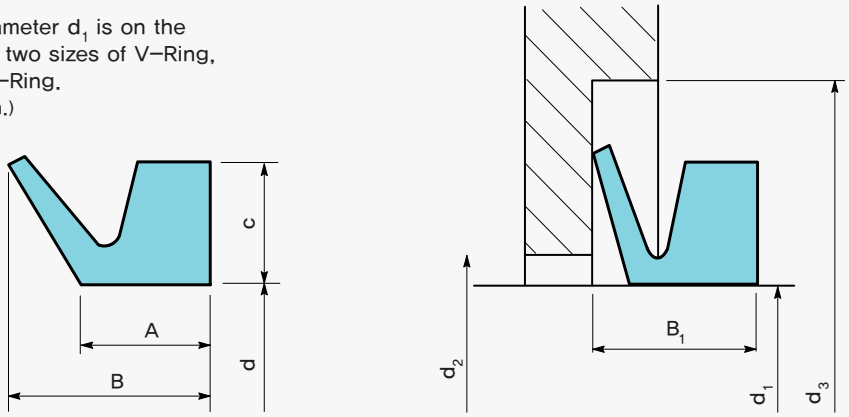
Technical Data :

• Dry Running
• Mating Surface Steel, Unhardended

Speed와 Power Loss (Watt) 상관표

Installation Recommendation – V–Ring, Type A

When the Shaft Diameter d_1 is on the boundary between two sizes of V–Ring, select the larger V–Ring.
(All dimensions in mm.)



Installation drawing

주문 예

V–Ring의 규격과 재질 선택은, 표를 참고하시기 바랍니다.

- Type A
- Shaft diameter = 30.0mm
- Material Code : N6T50 (Nitrile Elastomer)

TSS Article No. TWVA00300 – N6T50

TSS Part No.

Quality Index (Standard)

Material Code. (Standard)

Corresponding to FORSHEDA ref. V–30A NBR510

V-Ring

Installation Dimensions / TSS Part No.

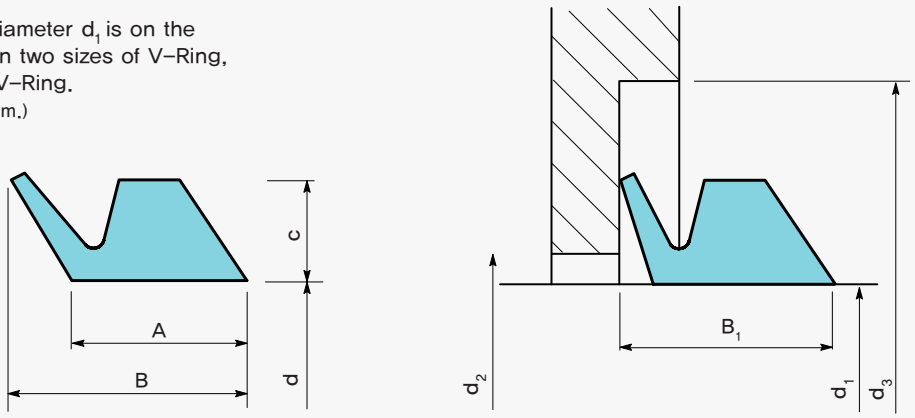
For shaft diameter d_1	Inside diameter d	Height of cross section c	Dimension A	Free width B	Maximum d_2	Minimum d_3	Fitted width B_1	V-Ring FORSHE-DA Ref.	TSS Part No.
2.7 – 3.5	2.5	1.5	2.1	3.0	d_1 + 1	d_1 + 4	2.5 ± 0.3	V–3A	TWVA00030
3.5 – 4.5	3.2	2	2.4	3.7	d_1 + 1	d_1 + 6	3.0 ± 0.4	V–4A	TWVA00040
4.5 – 5.5	4	2	2.4	3.7	d_1 + 1	d_1 + 6	3.0 ± 0.4	V–5A	TWVA00050
5.5 – 6.5	5	2	2.4	3.7	d_1 + 1	d_1 + 6	3.0 ± 0.4	V–6A	TWVA00060
6.5 – 8.0	6	2	2.4	3.7	d_1 + 1	d_1 + 6	3.0 ± 0.4	V–7A	TWVA00070
8.0 – 9.5	7	2	2.4	3.7	d_1 + 1	d_1 + 6	3.0 ± 0.4	V–8A	TWVA00080
9.5 – 11.5	9	3	3.4	5.5	d_1 + 1	d_1 + 9	4.5 ± 0.6	V–10A	TWVA00100
11.5 – 12.5	10.5	3	3.4	5.5	d_1 + 1	d_1 + 9	4.5 ± 0.6	V–12A	TWVA00120
12.5 – 13.5	11.7	3	3.4	5.5	d_1 + 1	d_1 + 9	4.5 ± 0.6	V–13A	TWVA00130
13.5 – 15.5	12.5	3	3.4	5.5	d_1 + 1	d_1 + 9	4.5 ± 0.6	V–14A	TWVA00140
15.5 – 17	14	3	3.4	5.5	d_1 + 1	d_1 + 9	4.5 ± 0.6	V–16A	TWVA00160
17.5 – 19	16	3	3.4	5.5	d_1 + 1	d_1 + 9	4.5 ± 0.6	V–18A	TWVA00180
19 – 21	18	4	4.7	7.5	d_1 + 2	d_1 + 12	6.0 ± 0.8	V–20A	TWVA00200
21– 24	20	4	4.7	7.5	d_1 + 2	d_1 + 12	6.0 ± 0.8	V–22A	TWVA00220
24 – 27	22	4	4.7	7.5	d_1 + 2	d_1 + 12	6.0 ± 0.8	V–25A	TWVA00250
27 – 29	25	4	4.7	7.5	d_1 + 2	d_1 + 12	6.0 ± 0.8	V–28A	TWVA00280
29 – 31	27	4	4.7	7.5	d_1 + 2	d_1 + 12	6.0 ± 0.8	V–30A	TWVA00300
31 – 33	29	4	4.7	7.5	d_1 + 2	d_1 + 12	6.0 ± 0.8	V–32A	TWVA00320
33 – 36	31	4	4.7	7.5	d_1 + 2	d_1 + 12	6.0 ± 0.8	V–35A	TWVA00350
36 – 38	34	4	4.7	7.5	d_1 + 2	d_1 + 12	6.0 ± 0.8	V–38A	TWVA00380
38 – 43	36	5	5.5	9.0	d_1 + 2	d_1 + 15	7.0 ± 1.0	V–40A	TWVA00400
43 – 48	40	5	5.5	9.0	d_1 + 2	d_1 + 15	7.0 ± 1.0	V–45A	TWVA00450
48 – 53	45	5	5.5	9.0	d_1 + 2	d_1 + 15	7.0 ± 1.0	V–50A	TWVA00500
53 – 58	49	5	5.5	9.0	dv + 2	d_1 + 15	7.0 ± 1.0	V–55A	TWVA00550
58 – 63	54	5	5.5	9.0	d_1 + 2	d_1 + 15	7.0 ± 1.0	V–60A	TWVA00600
63 – 68	58	5	5.5	9.0	d_1 + 2	d_1 + 15	7.0 ± 1.0	V–65A	TWVA00650
68 – 73	63	6	6.8	11.0	d_1 + 3	d_1 + 18	9.0 ± 1.2	V–70A	TWVA00700
73 – 78	67	6	6.8	11.0	d_1 + 3	d_1 + 18	9.0 ± 1.2	V–75A	TWVA00750
78 – 83	72	6	6.8	11.0	d_1 + 3	d_1 + 18	9.0 ± 1.2	V–80A	TWVA00800
83 – 88	76	6	6.8	11.0	d_1 + 3	d_1 + 18	9.0 ± 1.2	V–85A	TWVA00850
88 – 93	81	6	6.8	11.0	d_1 + 3	d_1 + 18	9.0 ± 1.2	V–90A	TWVA00900
93 – 98	85	6	6.8	11.0	d_1 + 3	d_1 + 18	9.0 ± 1.2	V–95A	TWVA00950
98 – 105	90	6	6.8	11.0	d_1 + 3	d_1 + 18	9.0 ± 1.2	V–100A	TWVA01000
105 – 115	99	7	7.9	12.8	d_1 + 4	d_1 + 21	10.5 ± 1.5	V–110A	TWVA01100
115 – 125	108	7	7.9	12.8	d_1 + 4	d_1 + 21	10.5 ± 1.5	V–120A	TWVA01200
125 – 135	117	7	7.9	12.8	d_1 + 4	d_1 + 21	10.5 ± 1.5	V–130A	TWVA01300
135 – 145	126	7	7.9	12.8	d_1 + 4	d_1 + 21	10.5 ± 1.5	V–140A	TWVA01400
145 – 155	135	7	7.9	12.8	d_1 + 4	d_1 + 21	10.5 ± 1.5	V–150A	TWVA01500
155 – 165	144	8	9.0	14.5	d_1 + 4	d_1 + 24	12.0 ± 1.8	V–160A	TWVA01600
165 – 175	153	8	9.0	14.5	d_1 + 4	d_1 + 24	12.0 ± 1.8	V–170A	TWVA01700
175 – 185	162	8	9.0	14.5	d_1 + 4	d_1 + 24	12.0 ± 1.8	V–180A	TWVA01800
185 – 195	171	8	9.0	14.5	d_1 + 4	d_1 + 24	12.0 ± 1.8	V–190A	TWVA01900
195 – 210	180	8	9.0	14.5	d_1 + 4	d_1 + 24	12.0 ± 1.8	V–199A	TWVA01990

Installation Dimensions / TSS Part No.

For shaft diameter d_1	Inside diameter d	Height of cross section c	Dimension A	Free width B	Maximum d_2	Minimum d_3	Fitted width B_1	V-Ring FORSHE-DA Ref.	TSS Part No.
190 – 210	180	15	14.3	25.0	d_1 + 10	d_1 + 45	20.0 ± 4.0	V–200A	TWVA02000
210 – 235	198	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–220A	TWVA02200
235 – 265	225	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–250A	TWVA02500
265 – 290	247	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–275A	TWVA02750
290 – 310	270	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–300A	TWVA03000
310 – 335	292	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–325A	TWVA03250
335 – 365	315	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–350A	TWVA03500
365 – 390	337	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–375A	TWVA03750
390 – 430	360	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–400A	TWVA04000
430 – 480	405	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–450A	TWVA04500
480 – 530	450	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–500A	TWVA05000
530 – 580	495	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–550A	TWVA05500
580 – 630	540	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–600A	TWVA06000
630 – 665	600	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–650A	TWVA06500
665 – 705	630	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–700A	TWVA07000
705 – 745	670	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–725A	TWVA07250
745 – 785	705	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–750A	TWVA07500
785 – 830	745	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–800A	TWVA08000
830 – 875	785	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–850A	TWVA08500
875 – 920	825	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–900A	TWVA09000
920 – 965	865	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–950A	TWVA09500
965 – 1015	910	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1000A	TWVAX1000
1015 – 1065	955	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1050A	TWVAX1050
1065 – 1115	1000	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1100A	TWVAW1100
1115 – 1165	1045	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1150A	TWVAW1150
1165 – 1215	1090	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1200A	TWVAW1200
1215 – 1270	1135	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1250A	TWVAW1250
1270 – 1320	1180	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1300A	TWVAW1300
1320 – 1370	1225	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1350A	TWVAW1350
1370 – 1420	1270	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1400A	TWVAW1400
1420 – 1470	1315	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1450A	TWVAW1450
1470 – 1520	1360	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1500A	TWVAW1500
1520 – 1570	1405	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1550A	TWVAW1550
1570 – 1620	1450	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1600A	TWVAW1600
1620 – 1670	1495	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1650A	TWVAW1650
1670 – 1720	1540	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1700A	TWVAW1700
1720 – 1770	1585	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1750A	TWVAW1750
1770 – 1820	1630	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1800A	TWVAW1800
1820 – 1870	1675	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1850A	TWVAW1850
1870 – 1920	1720	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1900A	TWVAW1900
1920 – 1970	1765	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–1950A	TWVAW1950
1970 – 2020	1810	15	14.3	25.0	d_1 + 10	d_1 +45	20.0 ± 4.0	V–2000A	TWVAW2000

Installation Recommendation – V-Ring, Type S

When the Shaft Diameter d_1 is on the boundary between two sizes of V-Ring, select the larger V-Ring.
(All dimensions in mm.)



Installation drawing

주문 예

V-Ring의 규격과 재질 선택은, 표를 참고하시기 바랍니다.

- Type S
- Shaft diameter = 30.0mm
- Material Code : N6T50 (Nitrile Elastomer)

TSS Article No. TWVS00300 – N6T50

TSS Part No.

Quality Index (Standard)

Material Code. (Standard)

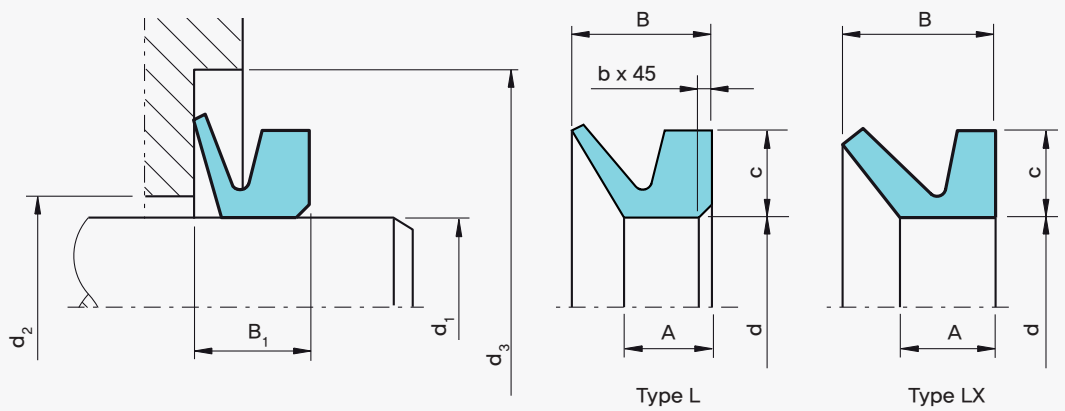
Corresponding to FORSHEDA ref. V-30S NBR 510

Installation Dimensions / TSS Part No.

For shaft diameter d_1	Inside diameter d	Height of cross section c	Dimension A	Free width B	Maximum d_2	Minimum d_3	Fitted width B_1	V-Ring FORSHE-DA Ref.	TSS Part No.
4.5 – 5.5	4	2	3.9	5.2	d_1 + 1	d_1 + 6	4.5 ± 0.4	V–5S	TWVS00050
5.5 – 6.5	5	2	3.9	5.2	d_1 + 1	d_1 + 6	4.5 ± 0.4	V–6S	TWVS00060
6.5 – 8.0	6	2	3.9	5.2	d_1 + 1	d_1 + 6	4.5 ± 0.4	V–7S	TWVS00070
8.0 – 9.5	7	2	3.9	5.2	d_1 + 1	d_1 + 6	4.5 ± 0.4	V–8S	TWVS00080
9.5 – 11.5	9	3	5.6	7.7	d_1 + 1	d_1 + 9	6.7 ± 0.6	V–10S	TWVS00100
11.5 – 13.5	10.5	3	5.6	7.7	d_1 + 1	d_1 + 9	6.7 ± 0.6	V–12S	TWVS00120
13.5 – 15.5	12.5	3	5.6	7.7	d_1 + 1	d_1 + 9	6.7 ± 0.6	V–14S	TWVS00140
15.5– 17.5	14	3	5.6	7.7	d_1 + 1	d_1 + 9	6.7 ± 0.6	V–16S	TWVS00160
17.5 – 19	16	3	5.6	7.7	d_1 + 1	d_1 + 9	6.7 ± 0.6	V–18S	TWVS00180
19 – 21	18	4	7.9	10.5	d_1 + 2	d_1 + 12	9.0 ± 0.8	V–20S	TWVS00200
21– 24	20	4	7.9	10.5	d_1 + 2	d_1 + 12	9.0 ± 0.8	V–22S	TWVS00220
24 – 27	22	4	7.9	10.5	d_1 + 2	d_1 + 12	9.0 ± 0.8	V–25S	TWVS00250
27 – 29	25	4	7.9	10.5	d_1 + 2	d_1 + 12	9.0 ± 0.8	V–28S	TWVS00280
29 – 31	27	4	7.9	10.5	d_1 + 2	d_1 + 12	9.0 ± 0.8	V–30S	TWVS00300
31 – 33	29	4	7.9	10.5	d_1 + 2	d_1 + 12	9.0 ± 0.8	V–32S	TWVS00320
33 – 36	31	4	7.9	10.5	d_1 + 2	d_1 + 12	9.0 ± 0.8	V–35S	TWVS00350
36 – 38	34	4	7.9	10.5	d_1 + 2	d_1 + 12	9.0 ± 0.8	V–38S	TWVS00380
38 – 43	36	5	9.5	13.0	d_1 + 2	d_1 + 15	11.0 ± 1.0	V–40S	TWVS00400
43 – 48	40	5	9.5	13.0	d_1 + 2	d_1 + 15	11.0 ± 1.0	V–45S	TWVS00450
48 – 53	45	5	9.5	13.0	d_1 + 2	d_1 + 15	11.0 ± 1.0	V–50S	TWVS00500
53 – 58	49	5	9.5	13.0	d_1 + 2	d_1 + 15	11.0 ± 1.0	V–55S	TWVS00550
58 – 63	54	5	9.5	13.0	d_1 + 2	d_1 + 15	11.0 ± 1.0	V–60S	TWVS00600
63 – 68	58	5	9.5	13.0	d_1 + 2	d_1 + 15	11.0 ± 1.0	V–65S	TWVS00650
68 – 73	63	6	11.3	15.5	d_1 + 3	d_1 + 18	13.5 ± 1.2	V–70S	TWVS00700
73 – 78	67	6	11.3	15.5	d_1 + 3	d_1 + 18	13.5 ± 1.2	V–75S	TWVS00750
78 – 83	72	6	11.3	15.5	d_1 + 3	d_1 + 18	13.5 ± 1.2	V–80S	TWVS00800
83 – 88	76	6	11.3	15.5	d_1 + 3	d_1 + 18	13.5 ± 1.2	V–85S	TWVS00850
88 – 93	81	6	11.3	15.5	d_1 + 3	d_1 + 18	13.5 ± 1.2	V–90S	TWVS00900
93 – 98	85	6	11.3	15.5	d_1 + 3	d_1 + 18	13.5 ± 1.2	V–95S	TWVS00950
98 – 105	90	6	11.3	15.5	d_1 + 3	d_1 + 18	13.5 ± 1.2	V–100S	TWVS01000
105 – 115	99	7	13.1	18.0	d_1 + 4	d_1 + 21	15.5 ± 1.5	V–110S	TWVS01100
115 – 125	108	7	13.1	18.0	d_1 + 4	d_1 + 21	15.5 ± 1.5	V–120S	TWVS01200
125 – 135	117	7	13.1	18.0	d_1 + 4	d_1 + 21	15.5 ± 1.5	V–130S	TWVS01300
135 – 145	126	7	13.1	18.0	d_1 + 4	d_1 + 21	15.5 ± 1.5	V–140S	TWVS01400
145 – 155	135	7	13.1	18.0	d_1 + 4	d_1 + 21	15.5 ± 1.5	V–150S	TWVS01500
155 – 165	144	8	15.0	20.5	d_1 + 4	d_1 + 24	18.0 ± 1.8	V–160S	TWVS01600
165 – 175	153	8	15.0	20.5	d_1 + 4	d_1 + 24	18.0 ± 1.8	V–170S	TWVS01700
175 – 185	162	8	15.0	20.5	d_1 + 4	d_1 + 24	18.0 ± 1.8	V–180S	TWVS01800
185 – 195	171	8	15.0	20.5	d_1 + 4	d_1 + 24	18.0 ± 1.8	V–190S	TWVS01900
195 – 210	180	8	15.0	20.5	d_1 + 4	d_1 + 24	18.0 ± 1.8	V–199S	TWVS01990

V-Ring

Installation Recommendation – V-Ring, Type L / LX



Installation drawing

When the Shaft Diameter d_1 is on the boundary between two sizes of V-Ring, select the larger V-Ring.
(All dimensions in mm.)

Installation Dimensions

Type	c	A	B	b	B_1	d_3 min.	d_2 max.
L	6.5	6	10.5	1	8 ± 1.5	d_1 + 20	d_1 + 5
LX	5	5.4	8.5	0	6.8 ± 1.1	d_1 + 15	d_1 + 4

주문 예

V-Ring의 규격과 재질 선택은, 표를 참고하시기 바랍니다.

- Type L
- Shaft diameter = 205mm
- Material Code : N6T50 (Nitrile Elastomer)

TSS Article No. TWVL00200 – N6T50

TSS Part No.

Quality Index (Standard)

Material Code. (Standard)

Corresponding to FORSHEDA ref. V-200L NBR510

Installation Dimensions / TSS Part No.

Shaft Diameter d_1	Inside Diameter d	V-Ring FORSHEDA Ref.	TSS Part No. Type L	TSS Part No. Type LX
105 – 115	99	V–110L	TWVL01100	
115 – 125	108	V–120L	TWVL01200	
125 – 135	117	V–130L	TWVL01300	
135 – 145	126	V–140L/LX	TWVL01400	TWLX01400
145 – 155	135	V–150L/LX	TWVL01500	TWLX01500
155 – 165	144	V–160L/LX	TWVL01600	TWLXV1600
165 – 175	153	V–170L/LX	TWVL01700	TWLXV1700
175 – 185	162	V–180L/LX	TWVL01800	TWLXV1800
185 – 195	171	V–190L/LX	TWVL01900	TWLXV1900
195 – 210	182	V–200L/LX	TWVL02000	TWLXV2000
210 – 233	198	V–220L/LX	TWVL02200	TWLXV2200
233 – 260	225	V–250L/LX	TWVL02500	TWLXV2500
260 – 285	247	V–275L/LX	TWVL02750	TWLXV2750
285 –310	270	V–300L/LX	TWVL03000	TWLXV3000
310 – 335	292	V–325L/LX	TWVL03250	TWLXV3250
335 – 365	315	V–350L/LX	TWVL03500	TWLXV3500
365 – 385	337	V–375L/LX	TWVL03750	TWLXV3750
385 – 410	360	V–400L/LX	TWVL04000	TWLXV4000
410 – 440	382	V–425L/LX	TWVLV4250	TWLXV4250
440 – 475	405	V–450L/LX	TWVLV4500	TWLXV4500
475 – 510	450	V–500L/LX	TWVLV5000	TWLXV5000
510 – 540	472	V–525L/LX	TWVLV5250	TWLXV5250
540 – 575	495	V–550L/LX	TWVLV5500	TWLXV5500
575 – 625	540	V–600L/LX	TWVLV6000	TWLXV6000
625 – 675	600	V–650L/LX	TWVLV6500	TWLXV6500
675 – 710	630	V–700L/LX	TWVLV7000	TWLXV7000
710 – 740	670	V–725L/LX	TWVLV7250	TWLXV7250
740 – 775	705	V–750L/LX	TWVLV7500	TWLXV7500
775 – 825	745	V–800L/LX	TWVL08000	TWLXV8000
825 – 875	785	V–850L/LX	TWVLV8500	TWLXV8500
875 – 925	825	V–900L/LX	TWVLV9000	TWLXV9000
925 – 975	865	V–950L/LX	TWVLV9500	TWLXV9500
975 – 1025	910	V–1000L/LX	TWVLW1000	TWLXW1000
1025 – 1075	955	V–1050L/LX	TWVLW1050	TWLXW1050
1075 – 1125	1000	V–1100L/LX	TWVLW1100	TWLXW1100
1125 – 1175	1045	V–1150L/LX	TWVLW1150	TWLXW1150
1175 – 1225	1090	V–1200L/LX	TWVLW1200	TWLXW1200
1225 – 1275	1135	V–1250L/LX	TWVLW1250	TWLXW1250
1275 – 1325	1180	V–1300L/LX	TWVLW1300	TWLXW1300

V-Ring

Installation Dimensions / TSS Part No.

Shaft Diameter d_1	Inside Diameter d	V-Ring FORSHEDA Ref.	TSS Part No. Type L	TSS Part No. Type LX
1325 – 1375	1225	V–1350L/LX	TWVLW1350	TWLXW1350
1375 – 1425	1270	V–1400L/LX	TWVLW1400	TWLXW1400
1425 – 1475	1315	V–1450L/LX	TWVLW1450	TWLXW1450
1475 – 1525	1360	V–1500L/LX	TWVLW1500	TWLXW1500
1525 – 1575	1405	V–1550L/LX	TWVLW1550	TWLXW1550
1575 – 1625	1450	V–1600L/LX	TWVLW1600	TWLXW1600
1625 – 1675	1495	V–1650L/LX	TWVLW1650	TWLXW1650
1675 – 1725	1540	V–1700L/LX	TWVLW1700	TWLXW1700
1725 – 1775	1585	V–1750L/LX	TWVLW1750	TWLXW1750
1775 – 1825	1630	V–1800L/LX	TWVLW1800	TWLXW1800
1825 – 1875	1675	V–1850L/LX	TWVLW1850	TWLXW1850
1875 – 1925	1720	V–1900L/LX	TWVLW1900	TWLXW1900
1925 – 1975	1765	V–1950L/LX	TWVLW1950	TWLXW1950
1975 – 2025	1810	V–2000L/LX	TWVLW2000	TWLXW2000