Seal data sheet

TR/VA/ML/PTV

The TR/VA/ML/PTV seal is a very flexible axial shaft seal developed based on SKF / TENUTE experience over the years to properly operate in applications without pressure. As usual for axial shaft seals or V-rings, the seal rotates with the shaft. The sealing lip is equipped with an exclusive antifriction band patented with number PCT/EP2006/004962.

The seal body is completely made of rubber with a garter spring embedded in the seal back and the cross section consists of three main parts:

To avoid the typical “waves” shown by the standard TR/VA design, the embedded garter spring in the seal body helps to keep the seal in the right position on the shaft during rotation without the need of a radial retaining.

Due to the shape of the sealing lip and the resilience of the polymer used, the TR/VA/ML/PTV seal compensates both for angular deviations as well as axial displacement between the shaft and the sealing surface. Due to the PTV antifriction layer the seal features a very low coefficient of friction and an excellent wear resistance, providing a significantly increased seal lifetime.

The hinge connects the elastic sealing lip with the solid body. It works as a spring between the seal body and the sealing lip. It enables a constant pressure of the sealing lip onto the mating surface.

Exclusive features of TR/VA/ML/PTV seals are:

- Antifriction material vulcanized during the process according to patent PCT/EP2006/004962
- Resistance to possible shaft misalignments, angular deviations as well as axial displacements
- Embedded garter spring to avoid typical “waves”
- Mounting without the external clamping band possible for low speed applications only
- Significantly reduced friction and consequent temperature decrease
- Extended seal lifetime due to increased wear resistance

Possible size range for TR/VA/ML/PTV seals: $ØSHAFT_{min}$ = 35 mm; $ØSHAFT_{max}$ = 2 000 mm (please also see the drawing at the next page).

Materials

The standard material for the TR/VA/ML/PTV is a nitril elastomer (NBR), but for particular applications, the TR/VA/ML/PTV can be manufactured in different materials like hydrogenated nitril elastomer (HNBR), silicone elastomer (VMQ) or fluorocarbon elastomer (FKM). The table below shows working temperature ranges (minimum, maximum, peak (*)) applicable to each type of compound.

Material	Temperature		Recommended circumferential shaft speed
	min	max	max
	°C	°C (*)	m/s
NBR	-30	+100 (+120)	20
HNBR	-40	+150 (+175)	30
VMQ	-50	+200 (+250)	30
FKM	-20	+200 (+250)	30

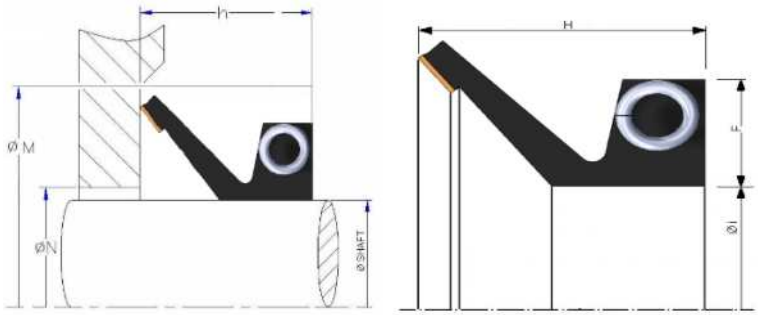
The PTFE compounds used for the TR/VA/ML/PTV coating design may vary depending on the applications demand. The table below shows the most used ones with the relative coefficients of friction. For more details, please contact the TENUTE Technical Department / SKF Seals Application Engineering.

Material	Coefficient of friction
PTFE Virgin	0,06
PTV / MoS_2 (1*)	0,08
PG (2*)	0,11
PB (3*)	0,13
PB / MoS_2 (4*)	0,13

1* ... PTFE with glass and molybdenum bisulfide
2* ... PTFE with carbon and graphite
3* ... PTFE with bronze
4* ... PTFE with bronze and molybdenum bisulfide

Assembly of TR/VA/ML/PTV seals

The left drawing shows the details of the housing dimensions and the assembly of the TR/VA/ML/PTV seal. In the right-hand drawing you can see the seal cross section and related dimensions. Please also refer to the table at the next page.



Due to the embedded spring the seal can be mounted without the external clamping band that normally is necessary for axial shaft seals to keep the seal in position.

Due to the reduced elasticity at the back of the seal based on the embedded garter spring, the range of use of TR/VA/ML/PTV for different shaft sizes is not as wide as the one of the TR/VA standard model. It depends on the shaft sizes, but the range is anyhow within 3 mm (for the smaller shaft sizes) and 10 mm (for the largest shaft sizes).

Particular applications or requirements different from those details shall be agreed with the TENUTE Technical Department / SKF Seals Application Engineering.

ØSHAFT		ØN	ØM	h	H	F
Over	Up to	max	min			
mm	mm	mm	mm	mm	mm	mm
19	38	ØSHAFT + 2	ØSHAFT + 12	6 ±0,8	7,5	4
38	68	ØSHAFT + 3	ØSHAFT + 15	7 ±1,0	9	5
68	105	ØSHAFT + 4	ØSHAFT + 18	9 ±1,2	11	6
105	155	ØSHAFT + 4	ØSHAFT + 21	10,5 ±1,5	12,8	7
155	210	ØSHAFT + 5	ØSHAFT + 24	12 ±1,8	14,5	8
210	2 020	ØSHAFT + 10	ØSHAFT + 45	20 ±4,0	25	15

Surface finishing

The table below shows the most common working conditions. Particular applications or requirements different from those details shall be agreed with the TENUTE Technical Department / SKF Seals Application Engineering.

Circumferential shaft speed		Surface roughness Ra		Media	Surface hardness	Recommended PTFE filler
Over	Up to	Over	Up to		Over	
m/s	m/s	µm	µm		HRC	
	1	2,0	2,5	Dust, grease	40	PG
1	5	1,6	2,0	Water splashes, Scale, dust, grease	40	PB
5	10	0,8	1,6	Oil and/or water splashes, grease	40	PB
10	15	0,4	0,8	Water, dust	40	PG
15		0,4	0,8	Oil, water, scale, fibre	60	PB

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