

TR/5/ML

The TR/5/ML seal is a rotary shaft seal developed based on SKF / TENUTE experience in co-operation with customers/users, who tested it on their machinery.



TR/5/ML seal is characterized by a particularly flexibly and robust lip. The body of the seal has a good rigidity, thanks to the metal cases vulcanized in the shoulder. It also has the advantage of no shrinkage under temperature humidity and ageing. Similar to the TR/3/M design, The TR/5/ML seal can be installed without a retainer plate and does not shrink over time. Dimensions and tolerances are according to German Standard DIN 3760. The spring area is designed to avoid any accidental coming out of the spring from the lip.

The maximum pressure, the seal can cope with, is 6 bar at a circumferential speed of 5 m/s.

Exclusive features of TR/5/ML seals are:

- Reduced radial force on the shaft
- Increased pressure capability up to 6 bar
- Possibility of assembly without retainer plate
- Reduced friction and consequent temperature decrease
- Protected spring to avoid slipping/popping out from groove
- Reduced spring preload
- Absence of external metallic parts and consequent prevention of damages to housing bore

Possible size range for TR/5/ML seals: $\varnothing d_{\min} = 25 \text{ mm}$; $\varnothing D_{\max} = 1\,350 \text{ mm}$ (please also see the drawing at the next page)

Materials

The standard material for the TR/5/ML is nitril elastomer NBR added with PTFE, but for particular working conditions the seals also are available in hydrogenated nitril elastomer (HNBR), fluorocarbon elastomer (FKM) or silicone elastomer (VMQ) materials. Other combinations are available on request.

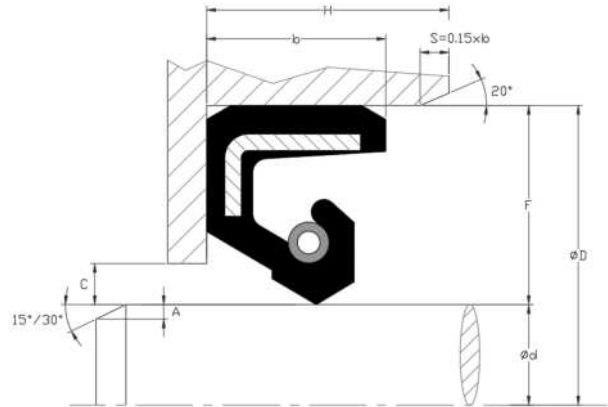
The table below shows working temperature ranges (minimum, maximum, peak (*)) applicable to each type of compound as well as possible spring configurations.

Material	Temperature		Standard spring	Special spring	Recommended circumferential shaft speed	Misalignment
	min	max				
	°C	°C (*)			m/s	
NBR	-30	+100 (+120)	Carbon steel	AISI 302	15	According to cross section
HNBR	-40	+150 (+175)	Carbon steel	AISI 302	20	
VMQ	-50	+200 (+250)	Carbon steel	AISI 302	25	
FKM	-20	+200 (+250)	AISI 302	AISI 316	25	

Assembly of TR/5/ML seals

The drawing shows the details of the housing dimensions and the assembly of the TR/5/ML seal.

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



$C_{\text{maximum}} = 0,2 \times F$ (for high pressure applications) up to $0,5 \times F$ (for lower pressure – max. 0,4 bar – applications)

Shaft and housing diameter tolerance

Shaft diameter Ød		Tolerance	Housing diameter ØD		Tolerance
Over	Up to		Over	Up to	
mm	mm		mm	mm	
25	1 000	h11	45	1 350	H8
1 000	1 290	h10			

Housing height tolerance and chamfers

Housing height			Shaft chamfer			Housing chamfer
b	H	Tolerance	Ød	Up to mm	A minimum	S
mm	mm	mm	Over mm		mm	
Up to 10	b + 0,3	+0,2 / 0	25	50	1,5	
Over 10	b + 0,4	+0,3 / 0	50	250	3	
			250	800	4,5	S = 0,15 x b
			800	1 350	6	

Shaft and housing surface finishing

A roughness of Ra from 0,2 to 0,6 μm is recommended for the shaft in standard applications, while in case of high speeds, a finishing to Ra from 0,2 to 0,4 μm is recommended. Plunge grinding is required. For the housing bore a finish turning is sufficient.

Shaft hardness

Up to 15 m/s	Over 15 m/s
40 HRC	50 HRC and above

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