

# STANDARD SHAFT SEALS

## TB7

### DESCRIPTION

The TB7 profile is a shaft seal composed of a single external metal cage with a rubber coating on the inside, a primary sealing lip with an integrated spring and two additional radial and axial anti-pollution lips.

### ADVANTAGES

Good radial rigidity, particularly for large diameters

Good stability when assembled, preventing the bounce-back effect

Sealing for low and high viscosity fluids

Modern primary sealing lip with low radial forces

Protection against undesirable air contaminants

### APPLICATIONS

- All types of rotative applications
- Machine tools      Gear boxes
- Agriculture          Motors
- Construction        Pumps
- Transmission

### MATERIALS

#### Rubber

- ACM 70 - 75 Shore A
- EPDM 70 - 75 Shore A
- FKM 70 - 75 Shore A
- HNBR 70 - 75 Shore A
- NBR 70 - 75 Shore A

#### Metal cage

- Steel - AISI 1010
- Stainless steel - AISI 304
- Stainless steel - AISI 316

#### Spring

- Steel - AISI 1070 - 1090
- Stainless steel - AISI 316

### SEAL DESIGN

#### Tolerance for the outside diameter of the seal (ØD)

Bore diameter ØD1 (mm)	Apparent metal cage	Rubber coating	Coating with grooves
ØD1 ≤ 50.0	+0.10 / +0.20	+0.15 / +0.30	+0.20 / +0.40
50.0 < ØD1 ≤ 80.0	+0.13 / +0.23	+0.20 / +0.35	+0.25 / +0.45
80.0 < ØD1 ≤ 120.0	+0.15 / +0.25	+0.20 / +0.35	+0.25 / +0.45
120.0 < ØD1 ≤ 180.0	+0.18 / +0.28	+0.25 / +0.45	+0.30 / +0.55
180.0 < ØD1 ≤ 300.0	+0.20 / +0.30	+0.25 / +0.45	+0.30 / +0.55
300.0 < ØD1 ≤ 500.0	+0.23 / +0.35	+0.30 / +0.55	+0.35 / +0.65
500.0 < ØD1 ≤ 630.0	+0.23 / +0.35	+0.35 / +0.65	+0.40 / +0.75

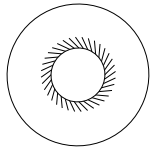
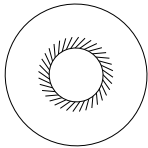
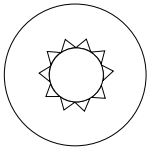
#### Roundness tolerance

Bore diameter ØD1 (mm)	Apparent metal cage	Rubber coating
ØD1 ≤ 50.0	0.18	0.25
50.0 < ØD1 ≤ 80.0	0.25	0.35
80.0 < ØD1 ≤ 120.0	0.30	0.50
120.0 < ØD1 ≤ 180.0	0.40	0.65
180.0 < ØD1 ≤ 300.0	0.25% of the outside diameter	0.80
300.0 < ØD1 ≤ 500.0	0.25% of the outside diameter	1.00
500.0 < ØD1 ≤ 630.0	-	-

#### Tolerance for the inside diameter of the seal (Ød)

Free and without constraint, the inside diameter of the sealing lip is always smaller than the diameter of the shaft. The pre-tightening or interference denotes the difference between these two values. Depending on the shaft diameter, the diameter of the sealing lip is generally considered to be less, between 0.8 and 3.5 mm.

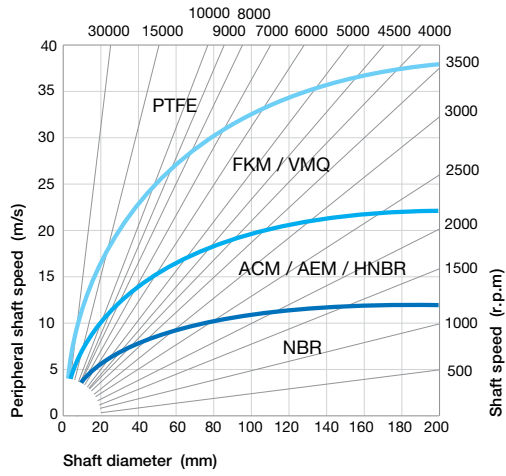
#### Pumping leads

Clockwise	Anti-clockwise	Bi-directional
		
R	L	H0

Other types of pumping leads can be created according to your specifications. Please contact our experts.

TECHNICAL DATA

Speed



The shaft seals with an additional protective lip are limited to a speed of 8 m/sec.

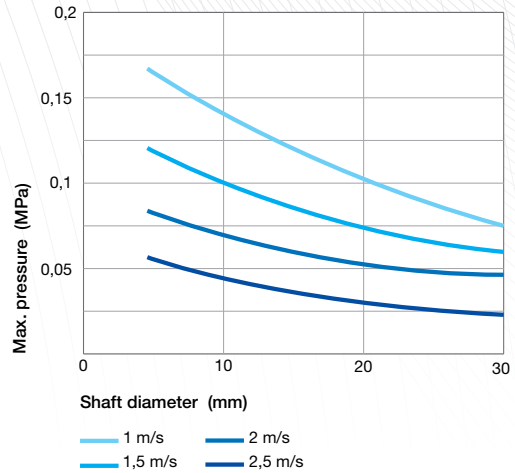
Linear speed calculation:

$$s \text{ (m/s)} = \frac{[\text{shaft } \varnothing \text{ (mm)} \times \text{speed (rpm)} \times \pi]}{60,000}$$

Pressure

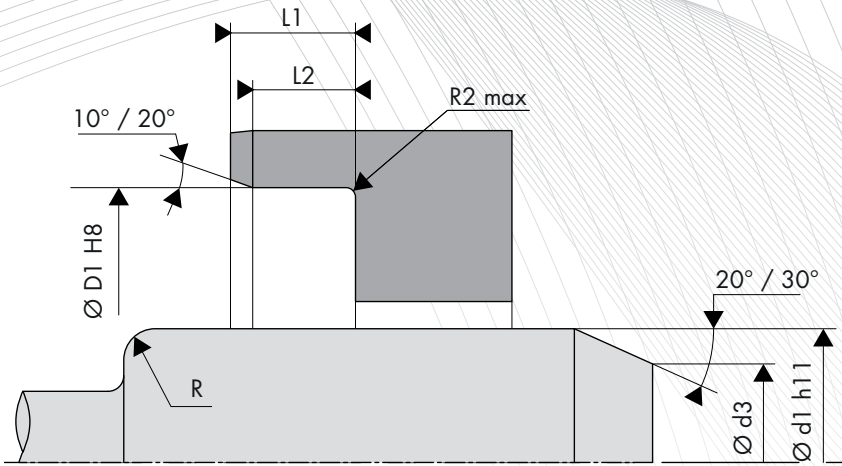
The standard shaft seals are generally used in unpressurised environments, or for pressures between 0.02 and 0.05 MPa maximum.

Higher pressures are acceptable, following testing, for standard NBR or FKM shaft seals used on a shaft of less than 30 mm.



Temperature / Media

Media		Maximum temperature depending on the materials						
		ACM	AEM	EPDM	FKM	HNBR	NBR	VMQ
Mineral oils	Oils for motors	+130°C	+130°C	-	+170°C	+130°C	+100°C	+150°C
	Oils for gearboxes	+120°C	+130°C	-	+150°C	+110°C	+80°C	+130°C
	Oils for hypoid gears	+120°C	+130°C	-	+150°C	+110°C	+80°C	-
	ATF oils	+120°C	+130°C	-	+170°C	+130°C	+100°C	-
	Hydraulic oils	+120°C	+130°C	-	+150°C	+130°C	+90°C	-
	Greases	-	+130°C	-	-	+100°C	+90°C	-
Fire-resistant fluids	HFA group - Emulsion with more than 80% water	-	-	-	-	+70°C	+70°C	+60°C
	HFB group - Opposite solution (water in oil)	-	-	-	-	+70°C	+70°C	+60°C
	HFC group - Polymer aqueous solution	-	-	+60°C	-	+70°C	+70°C	-
	HFD group - Water-free synthetic fluids	-	-	-	+150°C	-	-	-
Other fluids	EL + L heating oil	-	-	-	-	+100°C	+90°C	-
	Air	+150°C	+150°C	+150°C	+200°C	+130°C	+100°C	+200°C
	Water	-	-	+150°C	+100°C	+100°C	+90°C	-
	Water for washing	-	-	+130°C	+100°C	+100°C	+90°C	-
Temperature range	Min.	-25°C	-40°C	-45°C	-20°C	-30°C	-30°C	-60°C
	Max.	+150°C	+150°C	+150°C	+200°C	+150°C	+100°C	+200°C



## SHAFT DESIGN

### Shaft hardness

Rotation speed	Hardness in HRC
$s \leq 4.0$ m/sec	45 HRC
$4.0 < s \leq 10.0$ m/s	55 HRC
$s > 10.0$ m/sec	60 HRC

### Surface roughness

Ra *	0.2 to 0.8 $\mu\text{m}$
Rz	1.0 to 4.0 $\mu\text{m}$
Rmax	$\leq 6.3$ $\mu\text{m}$

\*Ra = 0.1  $\mu\text{m}$  for demanding applications

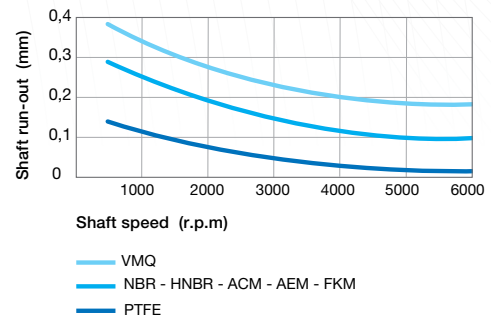
### Shaft tolerance

Shaft diameter $\varnothing d1$ (mm)	Tolerance h11 (mm)
$\varnothing d1 \leq 3.0$	-0.060 / 0
$3.0 < \varnothing d1 \leq 6.0$	-0.075 / 0
$6.0 < \varnothing d1 \leq 10.0$	-0.090 / 0
$10.0 < \varnothing d1 \leq 18.0$	-0.110 / 0
$18.0 < \varnothing d1 \leq 30.0$	-0.130 / 0
$30.0 < \varnothing d1 \leq 50.0$	-0.160 / 0
$50.0 < \varnothing d1 \leq 80.0$	-0.190 / 0
$80.0 < \varnothing d1 \leq 120.0$	-0.220 / 0
$120.0 < \varnothing d1 \leq 180.0$	-0.250 / 0
$180.0 < \varnothing d1 \leq 250.0$	-0.290 / 0
$250.0 < \varnothing d1 \leq 315.0$	-0.320 / 0
$315.0 < \varnothing d1 \leq 400.0$	-0.360 / 0
$400.0 < \varnothing d1 \leq 500.0$	-0.400 / 0

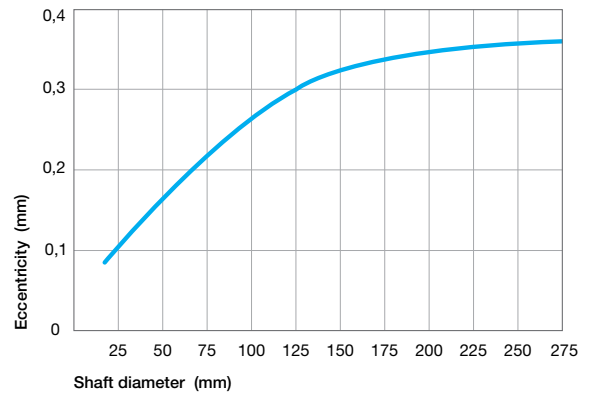
### Chamfer and radius

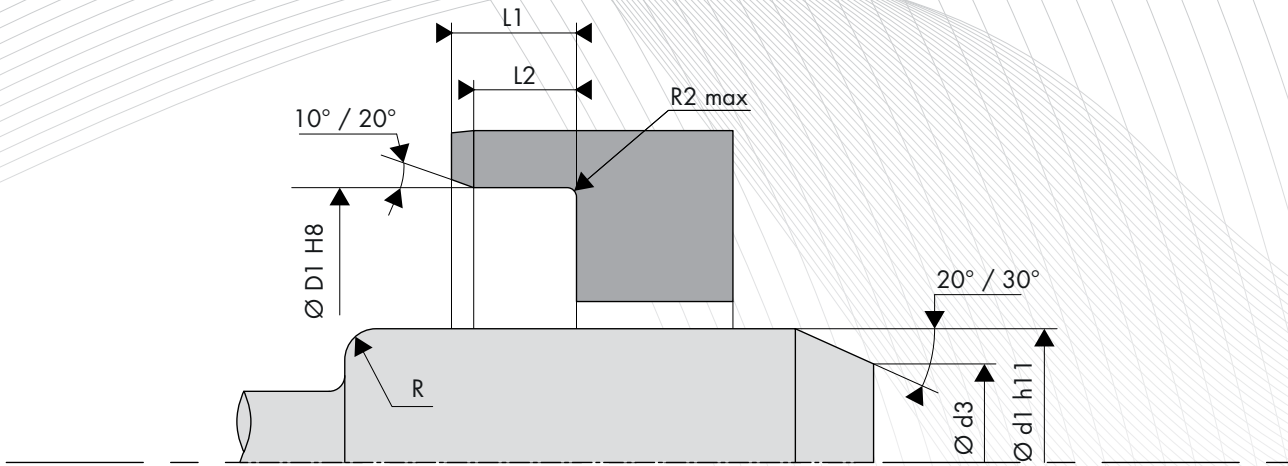
Shaft diameter $\varnothing d1$ (mm)	Chamfer diameter $\varnothing d3$ (mm)	Radius R (mm)
$\varnothing d1 \leq 10.0$	$\varnothing d1 - 1.50$	2.00
$10.0 < \varnothing d1 \leq 20.0$	$\varnothing d1 - 2.00$	2.00
$20.0 < \varnothing d1 \leq 30.0$	$\varnothing d1 - 2.50$	3.00
$30.0 < \varnothing d1 \leq 40.0$	$\varnothing d1 - 3.00$	3.00
$40.0 < \varnothing d1 \leq 50.0$	$\varnothing d1 - 3.50$	4.00
$50.0 < \varnothing d1 \leq 70.0$	$\varnothing d1 - 4.00$	4.00
$70.0 < \varnothing d1 \leq 95.0$	$\varnothing d1 - 4.50$	5.00
$95.0 < \varnothing d1 \leq 130.0$	$\varnothing d1 - 5.50$	6.00
$130.0 < \varnothing d1 \leq 240.0$	$\varnothing d1 - 7.00$	8.00
$240.0 < \varnothing d1 \leq 500.0$	$\varnothing d1 - 11.00$	12.00

### Shaft run out



### Eccentricity





## HOUSING DESIGN

### Surface roughness

Ra	0.8 to 3.2 $\mu\text{m}$
Rz	6.3 to 16.0 $\mu\text{m}$
Rmax	$\leq 16.0 \mu\text{m}$

### Housing tolerance

Bore diameter $\varnothing D_1$ (mm)	Tolerance H8 (mm)
3.0 < $\varnothing D_1$ $\leq$ 6.0	0 / +0.018
6.0 < $\varnothing D_1$ $\leq$ 10.0	0 / +0.022
10.0 < $\varnothing D_1$ $\leq$ 18.0	0 / +0.027
18.0 < $\varnothing D_1$ $\leq$ 30.0	0 / +0.033
30.0 < $\varnothing D_1$ $\leq$ 50.0	0 / +0.039
50.0 < $\varnothing D_1$ $\leq$ 80.0	0 / +0.046
80.0 < $\varnothing D_1$ $\leq$ 120.0	0 / +0.054
120.0 < $\varnothing D_1$ $\leq$ 180.0	0 / +0.063
180.0 < $\varnothing D_1$ $\leq$ 250.0	0 / +0.072
250.0 < $\varnothing D_1$ $\leq$ 315.0	0 / +0.081
315.0 < $\varnothing D_1$ $\leq$ 400.0	0 / +0.089
400.0 < $\varnothing D_1$ $\leq$ 500.0	0 / +0.097
500.0 < $\varnothing D_1$ $\leq$ 630.0	0 / +0.110

### Housing radius and width

Height H1 (mm)	Width		Radius R2 max (mm)
	L2min (H1 x 0.85)	L1min (H1 x +0.3)	
7.00	5.95	7.30	0.50
8.00	6.80	8.30	
10.00	8.50	10.30	
12.00	10.30	12.30	0.70
15.00	12.75	15.30	
20.00	17.00	20.30	

## DIMENSIONS

Part number	Shaft diameter Ød1 h11	Bore diameter ØD1 H8	Seal height H1	Seal height H2
TB7 35 x 63 x 10 x 16.5	35.00	63.00	10.00	16.50
TB7 35 x 65 x 12 x 19	35.00	65.00	12.00	19.00
TB7 38 x 74 x 11 x 18	38.00	74.00	11.00	18.00
TB7 40 x 64 x 12 x 17.5	40.00	64.00	12.00	17.50
TB7 40 x 74 x 9.5 x 15	40.00	74.00	9.50	15.00
TB7 41 x 74 x 9 x 14.5	41.00	74.00	9.00	14.50
TB7 42 x 70 x 9 x 15	42.00	70.00	9.00	15.00
TB7 44 x 72 x 7 x 10	44.00	72.00	7.00	10.00
TB7 45 x 78 x 11 x 18.5	45.00	78.00	11.00	18.50
TB7 47 x 69 x 10 x 16	47.00	69.00	10.00	16.00
TB7 47 x 80 x 10 x 16	47.00	80.00	10.00	16.00
TB7 50 x 65 x 10 x 14	50.00	65.00	10.00	14.00
TB7 50 x 82 x 8 x 11.5	50.00	82.00	8.00	11.50
TB7 52 x 70 x 9 x 15	52.00	70.00	9.00	15.00
TB7 52 x 72 x 8 x 11	52.00	72.00	8.00	11.00
TB7 54 x 76 x 8 x 11	54.00	76.00	8.00	11.00
TB7 54 x 82 x 8 x 11	54.00	82.00	8.00	11.00
TB7 56 x 78 x 7.5 x 13	56.00	78.00	7.50	13.00
TB7 57 x 81 x 8 x 11.5	57.00	81.00	8.00	11.50
TB7 58 x 76 x 6.6 x 9.5	58.00	76.00	6.60	9.50

Part number	Shaft diameter Ød1 h11	Bore diameter ØD1 H8	Seal height H1	Seal height H2
TB7 59 x 75 x 9 x 10.5	59.00	75.00	9.00	10.50
TB7 59 x 75 x 9 x 12.5	59.00	75.00	9.00	12.50
TB7 60 x 72 x 7 x 10	60.00	72.00	7.00	10.00
TB7 60 x 75 x 9 x 15	60.00	75.00	9.00	15.00
TB7 60 x 86 x 7 x 12	60.00	86.00	7.00	12.00
TB7 60 x 88 x 9.5 x 16.5	60.00	88.00	9.50	16.50
TB7 61 x 76 x 7 x 10	61.00	76.00	7.00	10.00
TB7 63 x 78 x 9 x 15	63.00	78.00	9.00	15.00
TB7 65 x 80 x 10 x 17	65.00	80.00	10.00	17.00
TB7 65 x 95 x 14 x 20.5	65.00	95.00	14.00	20.50
TB7 68 x 90 x 10 x 18	68.00	90.00	10.00	18.00
TB7 68 x 124 x 11.5 x 27	68.00	124.00	11.50	27.00
TB7 70 x 95 x 14 x 20	70.00	95.00	14.00	20.00
TB7 75 x 100 x 13 x 18	75.00	100.00	13.00	18.00
TB7 75 x 100 x 13 x 19	75.00	100.00	13.00	19.00
TB7 78 x 100 x 14 x 20	78.00	100.00	14.00	20.00
TB7 80 x 127 x 16 x 24	80.00	127.00	16.00	24.00
TB7 86 x 127 x 16 x 24	86.00	127.00	16.00	24.00
TB7 90 x 115 x 13 x 19	90.00	115.00	13.00	19.00