

# STANDARD SHAFT SEALS

## TBCW



### DESCRIPTION

The TBCW profile is a shaft seal composed of a single external metal cage with rubber grooves covering half of the outside of the cage, a primary sealing lip with integrated spring and an additional anti-pollution lip.

### ADVANTAGES

- Good radial rigidity, particularly for large diameters
- Good stability when assembled, preventing the bounce-back effect
- Good static sealing
- Good thermal expansion compensation
- Good heat transfer
- Easy to assemble with very limited 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.

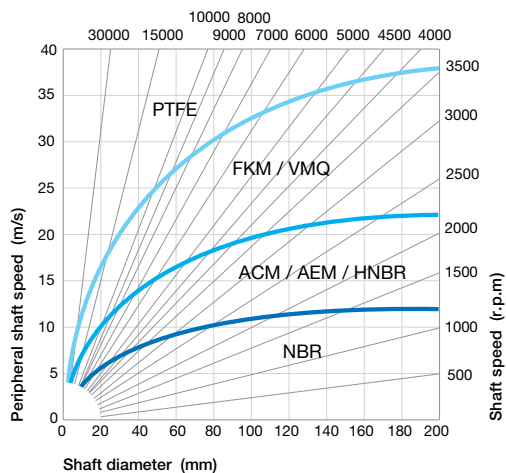
#### Pumping leads

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.

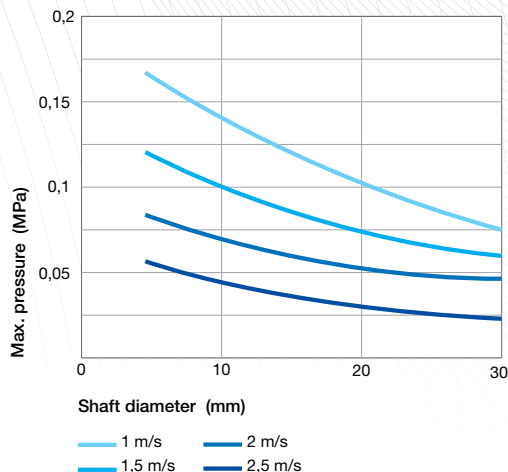
Linear speed calculation:

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

### Pressure

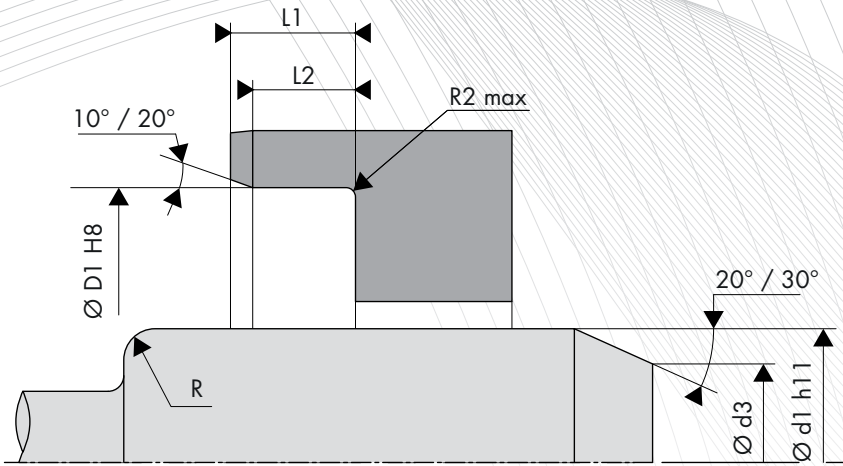
The standard shaft seals are generally used in unpressurised environments, or for pressures between 0.02 and 0.05 MPa maximum.

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

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

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

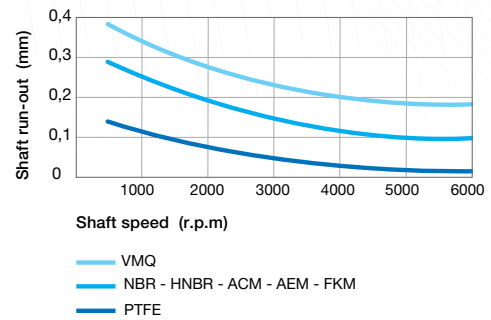
### Shaft tolerance

Shaft diameter $\text{Ød1}$ (mm)	Tolerance h11 (mm)
$\text{Ød1} \leq 3.0$	-0.060 / 0
$3.0 < \text{Ød1} \leq 6.0$	-0.075 / 0
$6.0 < \text{Ød1} \leq 10.0$	-0.090 / 0
$10.0 < \text{Ød1} \leq 18.0$	-0.110 / 0
$18.0 < \text{Ød1} \leq 30.0$	-0.130 / 0
$30.0 < \text{Ød1} \leq 50.0$	-0.160 / 0
$50.0 < \text{Ød1} \leq 80.0$	-0.190 / 0
$80.0 < \text{Ød1} \leq 120.0$	-0.220 / 0
$120.0 < \text{Ød1} \leq 180.0$	-0.250 / 0
$180.0 < \text{Ød1} \leq 250.0$	-0.290 / 0
$250.0 < \text{Ød1} \leq 315.0$	-0.320 / 0
$315.0 < \text{Ød1} \leq 400.0$	-0.360 / 0
$400.0 < \text{Ød1} \leq 500.0$	-0.400 / 0

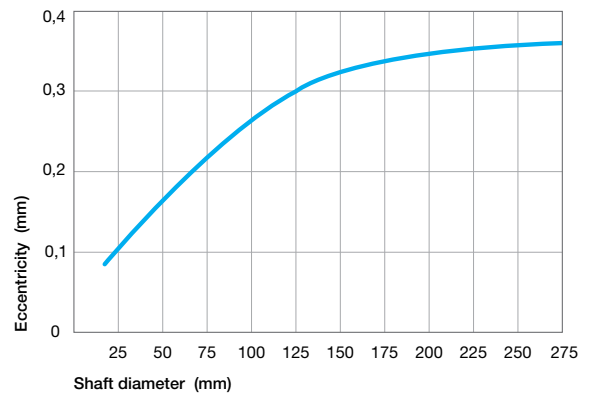
### Chamfer and radius

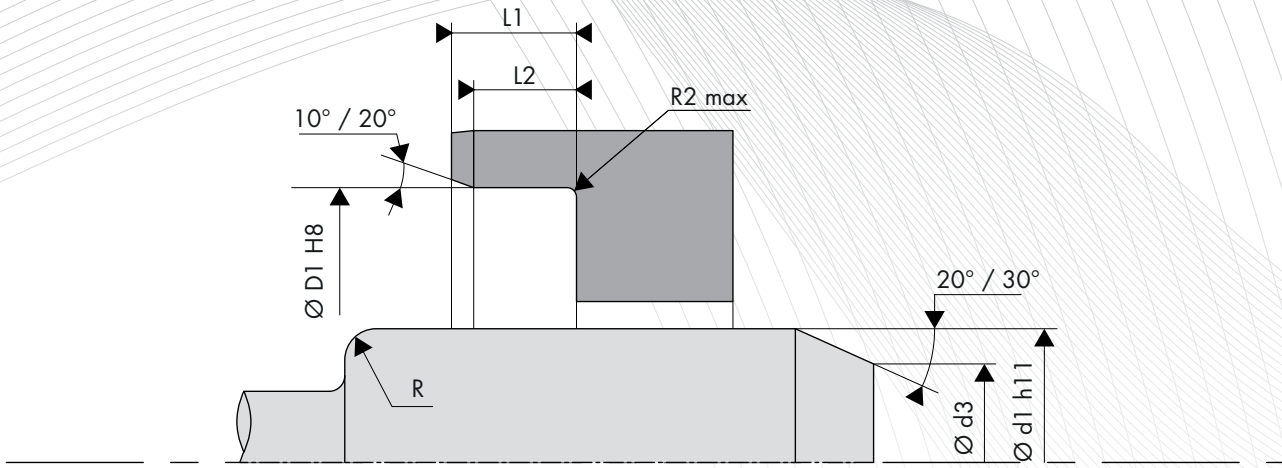
Shaft diameter $\text{Ød1}$ (mm)	Chamfer diameter $\text{Ød3}$ (mm)	Radius R (mm)
$\text{Ød1} \leq 10.0$	$\text{Ød1} - 1.50$	2.00
$10.0 < \text{Ød1} \leq 20.0$	$\text{Ød1} - 2.00$	2.00
$20.0 < \text{Ød1} \leq 30.0$	$\text{Ød1} - 2.50$	3.00
$30.0 < \text{Ød1} \leq 40.0$	$\text{Ød1} - 3.00$	3.00
$40.0 < \text{Ød1} \leq 50.0$	$\text{Ød1} - 3.50$	4.00
$50.0 < \text{Ød1} \leq 70.0$	$\text{Ød1} - 4.00$	4.00
$70.0 < \text{Ød1} \leq 95.0$	$\text{Ød1} - 4.50$	5.00
$95.0 < \text{Ød1} \leq 130.0$	$\text{Ød1} - 5.50$	6.00
$130.0 < \text{Ød1} \leq 240.0$	$\text{Ød1} - 7.00$	8.00
$240.0 < \text{Ød1} \leq 500.0$	$\text{Ød1} - 11.00$	12.00

### Shaft run out



### Eccentricity





## HOUSING DESIGN

### Surface roughness

Ra	0.8 to 3.2 µm
Rz	6.3 to 16.0 µm
Rmax	≤16.0 µm

### Housing tolerance

Bore diameter ØD1 (mm)	Tolerance H8 (mm)
3.0 < ØD1 ≤ 6.0	0 / +0.018
6.0 < ØD1 ≤ 10.0	0 / +0.022
10.0 < ØD1 ≤ 18.0	0 / +0.027
18.0 < ØD1 ≤ 30.0	0 / +0.033
30.0 < ØD1 ≤ 50.0	0 / +0.039
50.0 < ØD1 ≤ 80.0	0 / +0.046
80.0 < ØD1 ≤ 120.0	0 / +0.054
120.0 < ØD1 ≤ 180.0	0 / +0.063
180.0 < ØD1 ≤ 250.0	0 / +0.072
250.0 < ØD1 ≤ 315.0	0 / +0.081
315.0 < ØD1 ≤ 400.0	0 / +0.089
400.0 < ØD1 ≤ 500.0	0 / +0.097
500.0 < ØD1 ≤ 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
TBCW 10 x 27 x 8	10.00	27.00	8.00
TBCW 20 x 31 x 7.3	20.00	31.00	7.30
TBCW 25 x 36 x 7.3	25.00	36.00	7.30
TBCW 25 x 37 x 7	25.00	37.00	7.00
TBCW 26 x 41 x 6	26.00	41.00	6.00
TBCW 30 x 52 x 7	30.00	52.00	7.00
TBCW 35 x 48 x 7	35.00	48.00	7.00
TBCW 35 x 52 x 7	35.00	52.00	7.00
TBCW 40 x 56 x 7	40.00	56.00	7.00
TBCW 40 x 56 x 10	40.00	56.00	10.00
TBCW 42 x 56 x 7	42.00	56.00	7.00
TBCW 42 x 62 x 7	42.00	62.00	7.00
TBCW 42 x 65 x 12	42.00	65.00	12.00
TBCW 45 x 60 x 9	45.00	60.00	9.00
TBCW 45 x 62 x 8	45.00	62.00	8.00
TBCW 45 x 65 x 10	45.00	65.00	10.00
TBCW 45 x 67 x 13	45.00	67.00	13.00
TBCW 45 x 75 x 12	45.00	75.00	12.00
TBCW 48 x 80 x 8	48.00	80.00	8.00
TBCW 51 x 65 x 7	51.00	65.00	7.00
TBCW 58 x 75 x 15.5	58.00	75.00	15.50

Part number	Shaft diameter Ød1 h11	Bore diameter ØD1 H8	Seal height H1
TBCW 60 x 85 x 10	60.00	85.00	10.00
TBCW 74 x 88 x 8	74.00	88.00	8.00
TBCW 75 x 90 x 10	75.00	90.00	10.00
TBCW 75 x 100 x 17	75.00	100.00	17.00
TBCW 77 x 100 x 11.5	77.00	100.00	11.50
TBCW 85 x 105 x 12	85.00	105.00	12.00
TBCW 86 x 104 x 11	86.00	104.00	11.00
TBCW 88 x 108 x 11	88.00	108.00	11.00
TBCW 90 x 110 x 12	90.00	110.00	12.00
TBCW 90 x 120 x 13	90.00	120.00	13.00
TBCW 95 x 113 x 10	95.00	113.00	10.00
TBCW 100 x 115 x 12	100.00	115.00	12.00
TBCW 100 x 120 x 13	100.00	120.00	13.00
TBCW 100 x 124 x 13	100.00	124.00	13.00
TBCW 100 x 130 x 13	100.00	130.00	13.00
TBCW 120 x 150 x 15	120.00	150.00	15.00
TBCW 125 x 150 x 14	125.00	150.00	14.00
TBCW 127 x 150 x 13	127.00	150.00	13.00
TBCW 130 x 160 x 15	130.00	160.00	15.00
TBCW 145 x 175 x 14	145.00	175.00	14.00
TBCW 180 x 200 x 12	180.00	200.00	12.00