

# STANDARD SHAFT SEALS

## KBCW

### DESCRIPTION

The KBCW 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 without a 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 high viscosity fluids
- Primary sealing lip generating low levels of friction and heat
- 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

### 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

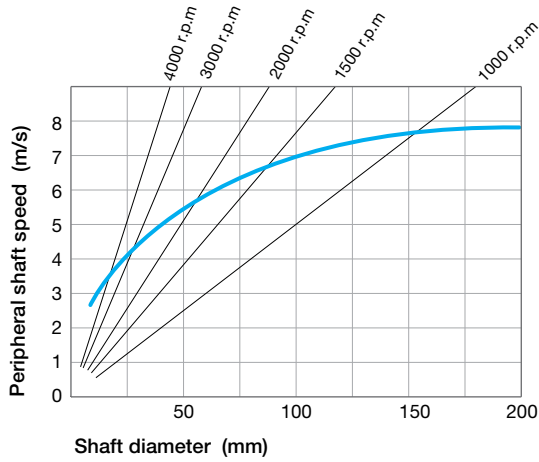
Bore diameter ØD1 (mm)	Apparent metal cage	Rubber coating
ØD1 ≤ 50.0	0.18	0.25
50.0 < ØD1 ≤ 80.0	0.25	0.35
80.0 < ØD1 ≤ 120.0	0.30	0.50
120.0 < ØD1 ≤ 180.0	0.40	0.65
180.0 < ØD1 ≤ 300.0	0.25% of the outside diameter	0.80
300.0 < ØD1 ≤ 500.0	0.25% of the outside diameter	1.00
500.0 < ØD1 ≤ 630.0	-	-

#### 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.

**TECHNICAL DATA**

**Speed**



Linear speed calculation:

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

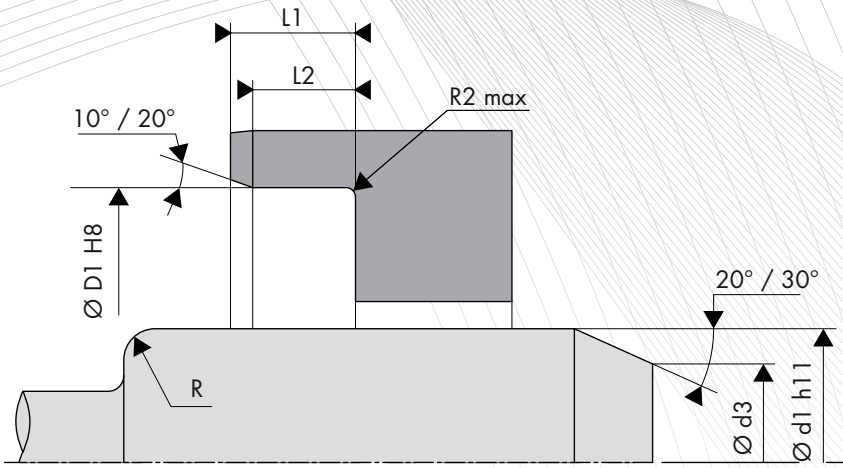
**Pressure**

Standard shaft seals with a primary sealing lip and no spring are used only in pressurised environments.

We recommend using shaft seals with springs for use in pressurised environments between 0.02 and 0.05 MPa (max).

**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
$s \leq 4.0 \text{ m/sec}$	45 HRC
$4.0 < s \leq 10.0 \text{ m/s}$	55 HRC
$s > 10.0 \text{ m/sec}$	60 HRC

### Surface roughness

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

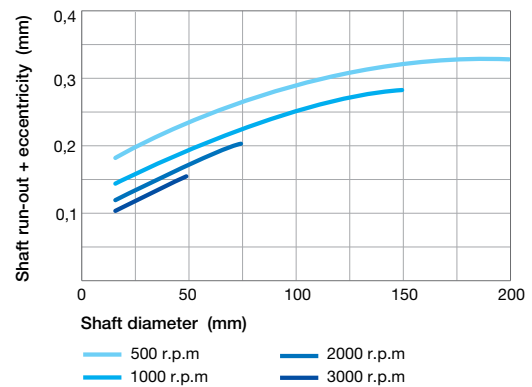
### Chamfer and radius

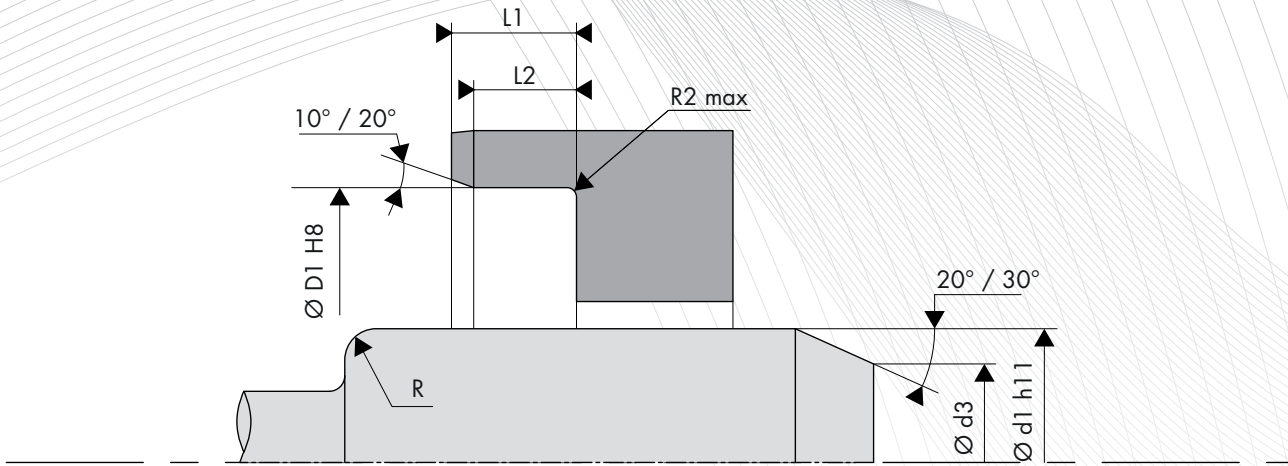
Shaft diameter $\text{Ø}d1$ (mm)	Chamfer diameter $\text{Ø}d3$ (mm)	Radius R (mm)
$\text{Ø}d1 \leq 10.0$	$\text{Ø}d1 - 1.50$	2.00
$10.0 < \text{Ø}d1 \leq 20.0$	$\text{Ø}d1 - 2.00$	2.00
$20.0 < \text{Ø}d1 \leq 30.0$	$\text{Ø}d1 - 2.50$	3.00
$30.0 < \text{Ø}d1 \leq 40.0$	$\text{Ø}d1 - 3.00$	3.00
$40.0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

### Shaft tolerance

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

### Shaft run out and 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	
15.00	12.75	15.30	0.70
20.00	17.00	20.30	