

STANDARD SHAFT SEALS

VCW



DESCRIPTION

The VCW profile is a shaft seal composed of a single metal cage with rubber grooves on the outside of the cage and a primary sealing lip without a spring.

ADVANTAGES

- Very good static sealing
- Very good thermal expansion compensation
- Greater roughness is allowed in the housing
- Reduced risk of corrosion
- Easy to assemble with very limited bounce-back effect
- Sealing for high viscosity fluids
- Primary sealing lip generating low levels of friction and heat

APPLICATIONS

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

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

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

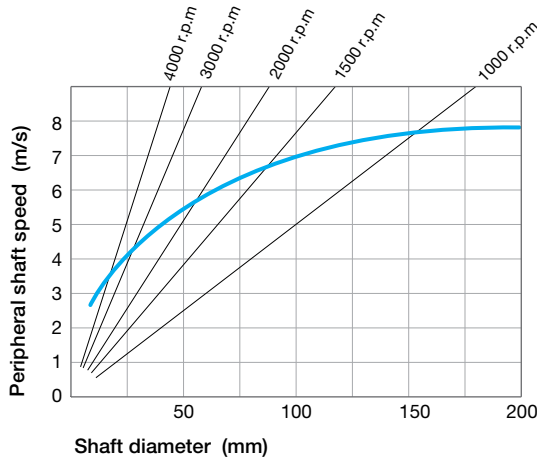
Bore diameter ØD1 (mm)	Apparent metal cage	Rubber coating
ØD1 ≤ 50.0	0.18	0.25
50.0 < ØD1 ≤ 80.0	0.25	0.35
80.0 < ØD1 ≤ 120.0	0.30	0.50
120.0 < ØD1 ≤ 180.0	0.40	0.65
180.0 < ØD1 ≤ 300.0	0.25% of the outside diameter	0.80
300.0 < ØD1 ≤ 500.0	0.25% of the outside diameter	1.00
500.0 < ØD1 ≤ 630.0	-	-

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:

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

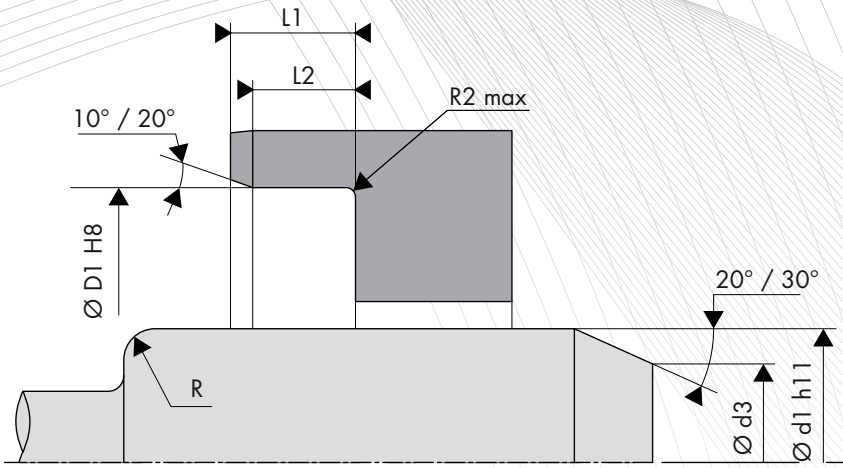
Pressure

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
$s \leq 4.0$ 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 μm
Rz	1.0 to 4.0 μm
Rmax	≤ 6.3 μm

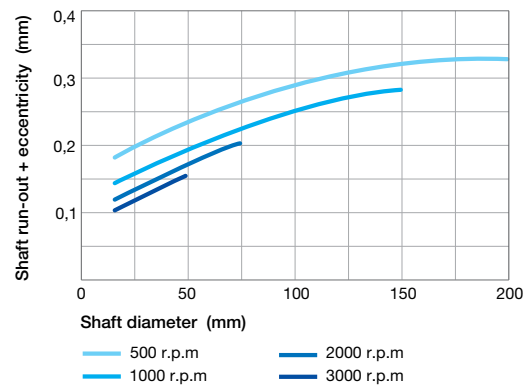
Chamfer and radius

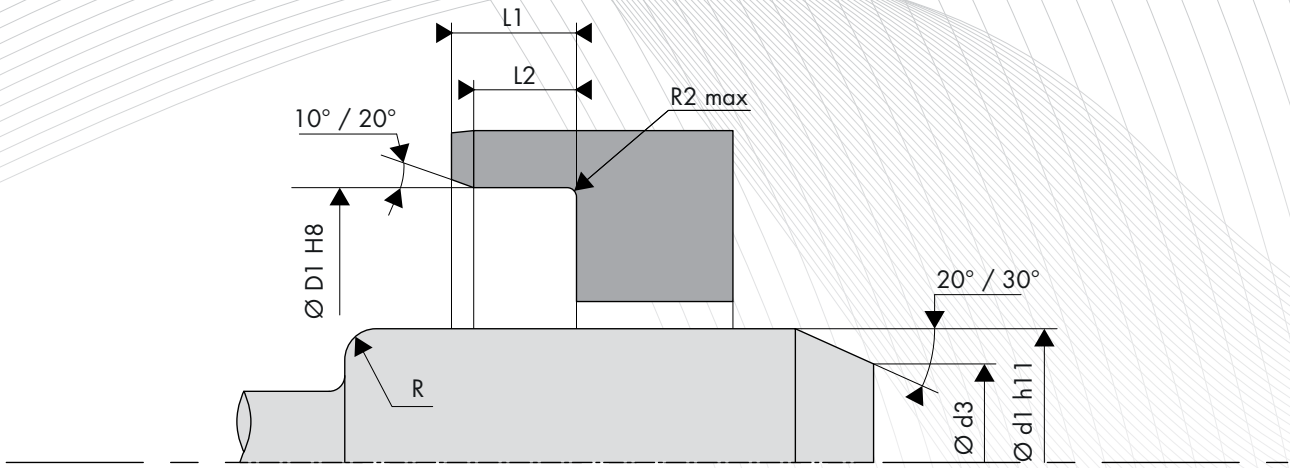
Shaft diameter $\varnothing d1$ (mm)	Chamfer diameter $\varnothing d3$ (mm)	Radius R (mm)
$\varnothing d1 \leq 10.0$	$\varnothing d1 - 1.50$	2.00
$10.0 < \varnothing d1 \leq 20.0$	$\varnothing d1 - 2.00$	2.00
$20.0 < \varnothing d1 \leq 30.0$	$\varnothing d1 - 2.50$	3.00
$30.0 < \varnothing d1 \leq 40.0$	$\varnothing d1 - 3.00$	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 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

Shaft run out and eccentricity





HOUSING DESIGN

Surface roughness

Ra	1.6 to 6.3 μm
Rz	10.0 to 25.0 μm
Rmax	$\leq 25.0\ \mu\text{m}$

Housing tolerance

Bore diameter $\varnothing D1$ (mm)	Tolerance H8 (mm)
$3.0 < \varnothing D1 \leq 6.0$	0 / +0.018
$6.0 < \varnothing D1 \leq 10.0$	0 / +0.022
$10.0 < \varnothing D1 \leq 18.0$	0 / +0.027
$18.0 < \varnothing D1 \leq 30.0$	0 / +0.033
$30.0 < \varnothing D1 \leq 50.0$	0 / +0.039
$50.0 < \varnothing D1 \leq 80.0$	0 / +0.046
$80.0 < \varnothing D1 \leq 120.0$	0 / +0.054
$120.0 < \varnothing D1 \leq 180.0$	0 / +0.063
$180.0 < \varnothing D1 \leq 250.0$	0 / +0.072
$250.0 < \varnothing D1 \leq 315.0$	0 / +0.081
$315.0 < \varnothing D1 \leq 400.0$	0 / +0.089
$400.0 < \varnothing D1 \leq 500.0$	0 / +0.097
$500.0 < \varnothing D1 \leq 630.0$	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	

DIMENSIONS

Part number	Shaft diameter Ød1 h11	Bore diameter ØD1 H8	Seal height H1
VCW 6 x 15 x 3.3	6.00	15.00	3.30
VCW 7 x 15 x 5	7.00	15.00	5.00
VCW 8 x 12 x 3	8.00	12.00	3.00
VCW 8 x 14 x 4	8.00	14.00	4.00
VCW 8 x 15 x 3	8.00	15.00	3.00
VCW 9 x 13 x 3	9.00	13.00	3.00
VCW 9 x 16 x 3	9.00	16.00	3.00
VCW 10 x 14 x 3	10.00	14.00	3.00
VCW 10 x 17 x 3	10.00	17.00	3.00
VCW 12 x 16 x 3	12.00	16.00	3.00
VCW 12 x 18 x 3	12.00	18.00	3.00
VCW 12 x 19 x 3	12.00	19.00	3.00
VCW 13 x 19 x 3	13.00	19.00	3.00
VCW 14 x 20 x 3	14.00	20.00	3.00
VCW 14 x 21 x 3	14.00	21.00	3.00
VCW 14 x 22 x 3	14.00	22.00	3.00
VCW 14 x 22 x 4	14.00	22.00	4.00
VCW 14 x 26 x 3	14.00	26.00	3.00
VCW 15 x 21 x 3	15.00	21.00	3.00
VCW 16 x 22 x 3	16.00	22.00	3.00
VCW 16 x 24 x 3	16.00	24.00	3.00
VCW 16 x 25 x 3	16.00	25.00	3.00
VCW 17 x 23 x 3	17.00	23.00	3.00
VCW 17 x 25 x 3	17.00	25.00	3.00
VCW 18 x 24 x 3	18.00	24.00	3.00
VCW 18 x 24 x 4	18.00	24.00	4.00
VCW 18 x 26 x 4	18.00	26.00	4.00
VCW 20 x 26 x 3	20.00	26.00	3.00
VCW 20 x 26 x 4	20.00	26.00	4.00
VCW 20 x 28 x 4	20.00	28.00	4.00
VCW 22 x 28 x 4	22.00	28.00	4.00
VCW 22 x 30 x 4	22.00	30.00	4.00
VCW 24 x 32 x 4	24.00	32.00	4.00
VCW 25 x 32 x 4	25.00	32.00	4.00
VCW 25 x 34 x 4	25.00	34.00	4.00
VCW 25 x 35 x 4	25.00	35.00	4.00
VCW 27 x 35 x 4	27.00	35.00	4.00
VCW 28 x 35 x 4	28.00	35.00	4.00

Part number	Shaft diameter Ød1 h11	Bore diameter ØD1 H8	Seal height H1
VCW 28 x 37 x 4	28.00	37.00	4.00
VCW 30 x 37 x 4	30.00	37.00	4.00
VCW 30 x 38 x 4	30.00	38.00	4.00
VCW 30 x 40 x 4	30.00	40.00	4.00
VCW 30 x 42 x 9	30.00	42.00	9.00
VCW 30 x 50 x 5	30.00	50.00	5.00
VCW 30 x 55 x 5	30.00	55.00	5.00
VCW 30 x 56 x 5	30.00	56.00	5.00
VCW 31 x 38 x 4	31.00	38.00	4.00
VCW 32 x 42 x 4	32.00	42.00	4.00
VCW 33 x 40 x 3	33.00	40.00	3.00
VCW 35 x 40 x 10	35.00	40.00	10.00
VCW 35 x 42 x 4	35.00	42.00	4.00
VCW 35 x 45 x 4	35.00	45.00	4.00
VCW 35 x 45 x 5	35.00	45.00	5.00
VCW 37 x 47 x 4	37.00	47.00	4.00
VCW 38 x 45 x 4	38.00	45.00	4.00
VCW 38 x 48 x 4	38.00	48.00	4.00
VCW 40 x 47 x 4	40.00	47.00	4.00
VCW 40 x 50 x 4	40.00	50.00	4.00
VCW 40 x 52 x 5	40.00	52.00	5.00
VCW 42 x 52 x 4	42.00	52.00	4.00
VCW 42 x 55 x 6	42.00	55.00	6.00
VCW 45 x 50 x 4	45.00	50.00	4.00
VCW 45 x 52 x 4	45.00	52.00	4.00
VCW 45 x 55 x 4	45.00	55.00	4.00
VCW 45 x 71 x 5	45.00	71.00	5.00
VCW 46 x 54 x 4	46.00	54.00	4.00
VCW 46 x 58 x 5	46.00	58.00	5.00
VCW 47 x 57 x 3	47.00	57.00	3.00
VCW 50 x 58 x 4	50.00	58.00	4.00
VCW 50 x 62 x 5	50.00	62.00	5.00
VCW 53 x 65 x 5	53.00	65.00	5.00
VCW 63 x 75 x 5	63.00	75.00	5.00
VCW 68 x 78 x 3	68.00	78.00	3.00
VCW 70 x 78 x 5	70.00	78.00	5.00
VCW 80 x 95 x 5	80.00	95.00	5.00
VCW 90 x 105 x 5	90.00	105.00	5.00