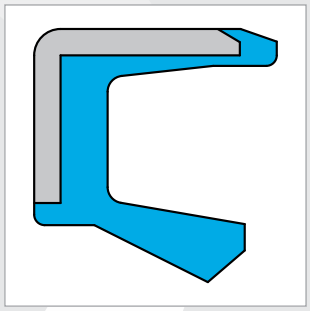
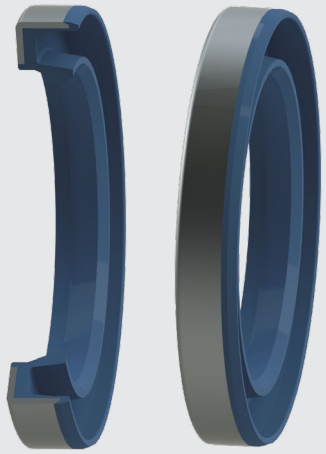


STANDARD SHAFT SEALS
VBR



DESCRIPTION

The VBR profile is a shaft seal composed of a single external metal cage with a rubber coating on the inside and the end of the cage, and a primary sealing lip without spring.

ADVANTAGES

Good radial rigidity, particularly for large diameters

Good stability when assembled, preventing the bounce-back effect

Improved static sealing

Good thermal expansion compensation

Good heat transfer

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

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

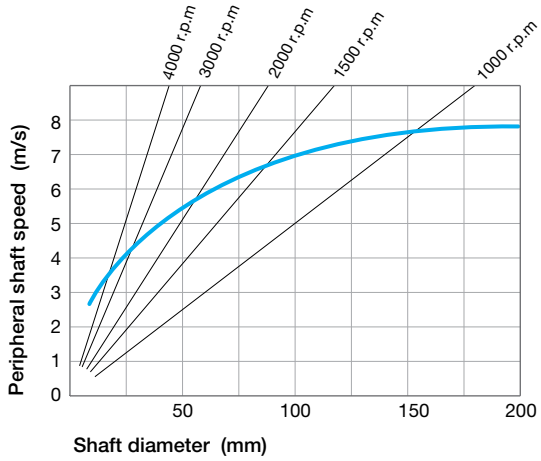
Bore diameter ØD1 (mm)	Apparent metal cage	Rubber coating
ØD1 ≤ 50.0	0.18	0.25
50.0 < ØD1 ≤ 80.0	0.25	0.35
80.0 < ØD1 ≤ 120.0	0.30	0.50
120.0 < ØD1 ≤ 180.0	0.40	0.65
180.0 < ØD1 ≤ 300.0	0.25% of the outside diameter	0.80
300.0 < ØD1 ≤ 500.0	0.25% of the outside diameter	1.00
500.0 < ØD1 ≤ 630.0	-	-

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:

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

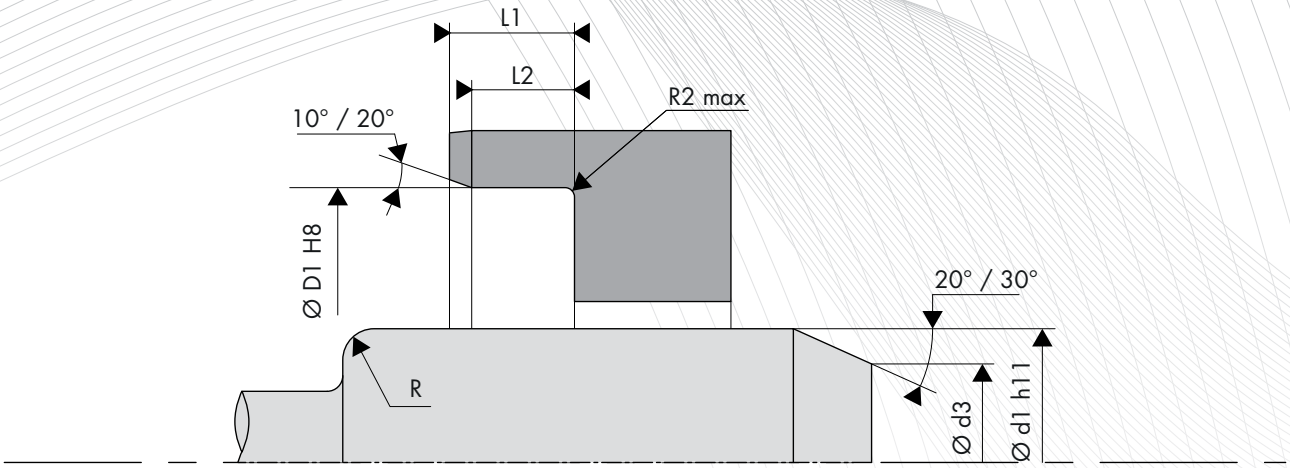
Pressure

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 ≤ 4.0 m/sec	45 HRC
4.0 < s ≤ 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

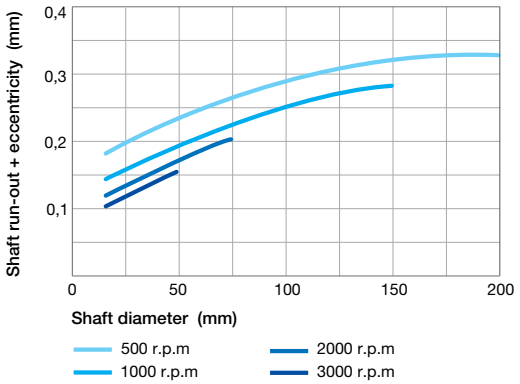
Shaft tolerance

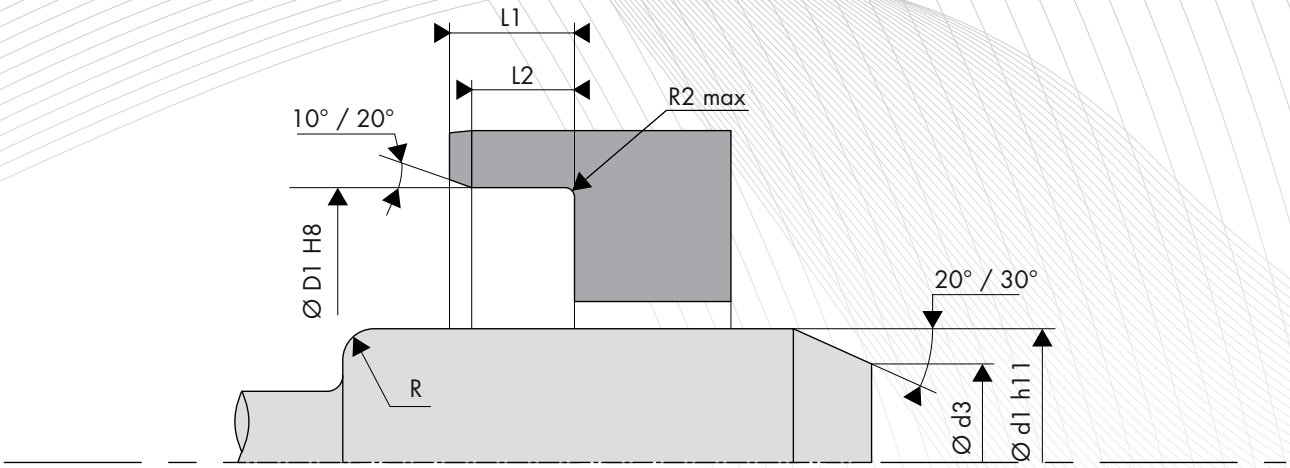
Shaft diameter Ød1 (mm)	Tolerance h11 (mm)
Ød1 ≤ 3.0	-0.060 / 0
3.0 < Ød1 ≤ 6.0	-0.075 / 0
6.0 < Ød1 ≤ 10.0	-0.090 / 0
10.0 < Ød1 ≤ 18.0	-0.110 / 0
18.0 < Ød1 ≤ 30.0	-0.130 / 0
30.0 < Ød1 ≤ 50.0	-0.160 / 0
50.0 < Ød1 ≤ 80.0	-0.190 / 0
80.0 < Ød1 ≤ 120.0	-0.220 / 0
120.0 < Ød1 ≤ 180.0	-0.250 / 0
180.0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

Chamfer and radius

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

Shaft run out and 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	