

## STANDARD SHAFT SEALS

# VB



### DESCRIPTION

The VB profile is a shaft seal composed of a single external metal cage with an internal rubber coating and a primary sealing lip without a spring.

### ADVANTAGES

Good radial rigidity, particularly for large diameters

Good stability when assembled, preventing the 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

Stainless steel - AISI 304

Stainless steel - AISI 316

### SEAL DESIGN

#### Tolerance for the outside diameter of the seal ( $\varnothing D$ )

Bore diameter $\varnothing D1$ (mm)	Apparent metal cage	Rubber coating	Coating with grooves
$\varnothing D1 \leq 50.0$	+0.10 / +0.20	+0.15 / +0.30	+0.20 / +0.40
$50.0 < \varnothing D1 \leq 80.0$	+0.13 / +0.23	+0.20 / +0.35	+0.25 / +0.45
$80.0 < \varnothing D1 \leq 120.0$	+0.15 / +0.25	+0.20 / +0.35	+0.25 / +0.45
$120.0 < \varnothing D1 \leq 180.0$	+0.18 / +0.28	+0.25 / +0.45	+0.30 / +0.55
$180.0 < \varnothing D1 \leq 300.0$	+0.20 / +0.30	+0.25 / +0.45	+0.30 / +0.55
$300.0 < \varnothing D1 \leq 500.0$	+0.23 / +0.35	+0.30 / +0.55	+0.35 / +0.65
$500.0 < \varnothing D1 \leq 630.0$	+0.23 / +0.35	+0.35 / +0.65	+0.40 / +0.75

#### Roundness tolerance

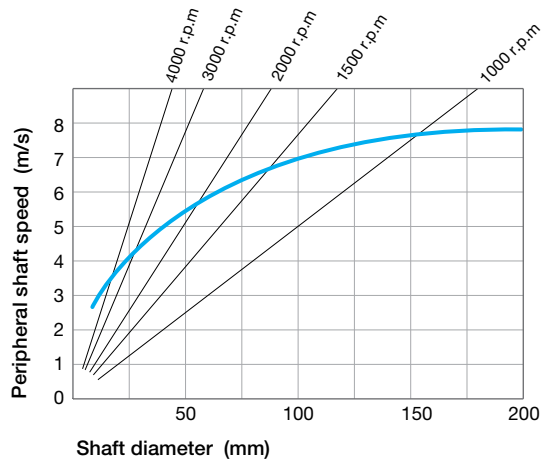
Bore diameter $\varnothing D1$ (mm)	Apparent metal cage	Rubber coating
$\varnothing D1 \leq 50.0$	0.18	0.25
$50.0 < \varnothing D1 \leq 80.0$	0.25	0.35
$80.0 < \varnothing D1 \leq 120.0$	0.30	0.50
$120.0 < \varnothing D1 \leq 180.0$	0.40	0.65
$180.0 < \varnothing D1 \leq 300.0$	0.25% of the outside diameter	0.80
$300.0 < \varnothing D1 \leq 500.0$	0.25% of the outside diameter	1.00
$500.0 < \varnothing D1 \leq 630.0$	-	-

#### Tolerance for the inside diameter of the seal ( $\varnothing d$ )

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:

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

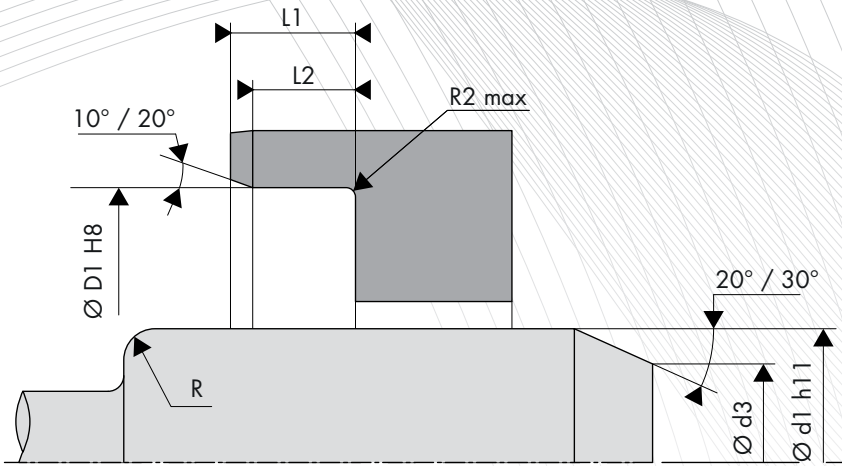
### Pressure

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

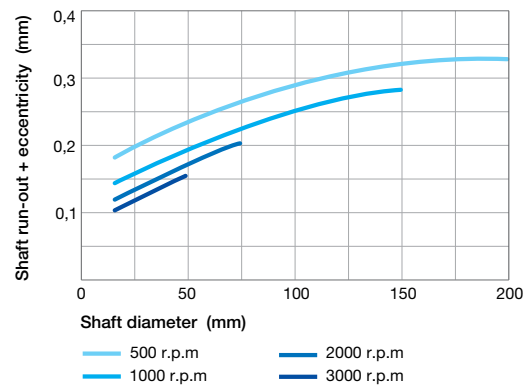
### Shaft tolerance

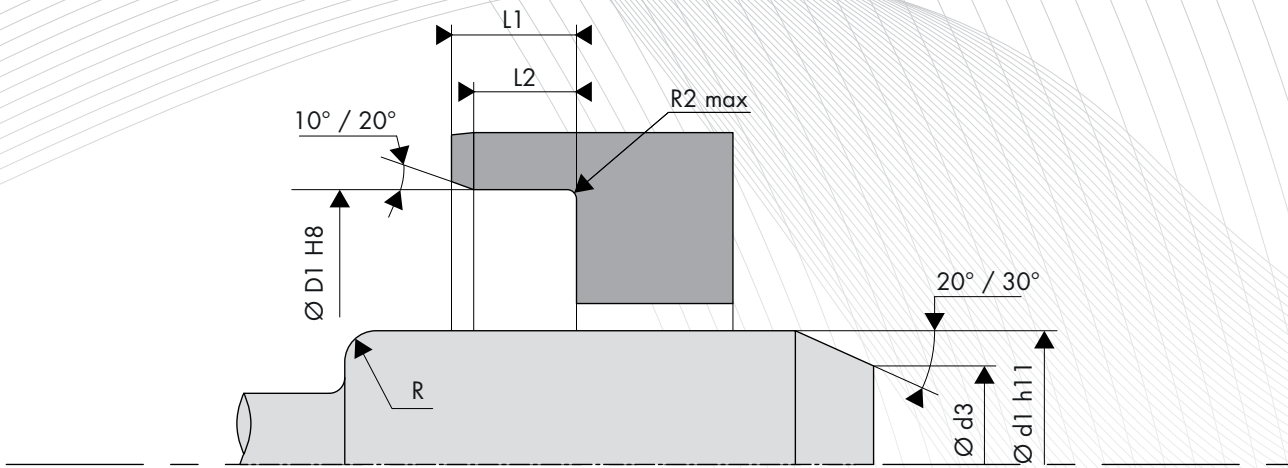
Shaft diameter $\varnothing d1$ (mm)	Tolerance h11 (mm)
$\varnothing d1 \leq 3.0$	-0.060 / 0
$3.0 < \varnothing d1 \leq 6.0$	-0.075 / 0
$6.0 < \varnothing d1 \leq 10.0$	-0.090 / 0
$10.0 < \varnothing d1 \leq 18.0$	-0.110 / 0
$18.0 < \varnothing d1 \leq 30.0$	-0.130 / 0
$30.0 < \varnothing d1 \leq 50.0$	-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 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 $\varnothing D1$ (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
VB 5 x 9 x 2	5.00	9.00	2.00
VB 6 x 10 x 2	6.00	10.00	2.00
VB 6 x 12 x 2	6.00	12.00	2.00
VB 7 x 11 x 2	7.00	11.00	2.00
VB 8 x 12 x 3	8.00	12.00	3.00
VB 8 x 14 x 4	8.00	14.00	4.00
VB 9 x 13 x 3	9.00	13.00	3.00
VB 10 x 14 x 3	10.00	14.00	3.00
VB 10 x 15 x 3	10.00	15.00	3.00
VB 10 x 16 x 4	10.00	16.00	4.00
VB 10 x 17 x 3	10.00	17.00	3.00
VB 11 x 15 x 3	11.00	15.00	3.00
VB 11 x 17 x 3	11.00	17.00	3.00
VB 12 x 16 x 3	12.00	16.00	3.00
VB 12 x 18 x 3	12.00	18.00	3.00
VB 12 x 18 x 5	12.00	18.00	5.00
VB 12 x 19 x 3	12.00	19.00	3.00
VB 12 x 20 x 5	12.00	20.00	5.00
VB 13 x 20 x 5	13.00	20.00	5.00
VB 13 x 32 x 10.5	13.00	32.00	10.50
VB 14 x 18 x 3	14.00	18.00	3.00
VB 14 x 20 x 3	14.00	20.00	3.00
VB 14 x 22 x 3	14.00	22.00	3.00
VB 14 x 22 x 4	14.00	22.00	4.00
VB 14 x 24 x 4	14.00	24.00	4.00
VB 15 x 19 x 3	15.00	19.00	3.00
VB 15 x 21 x 2	15.00	21.00	2.00
VB 15 x 21 x 3	15.00	21.00	3.00
VB 15 x 22 x 4	15.00	22.00	4.00
VB 15 x 32 x 6	15.00	32.00	6.00
VB 16 x 22 x 3	16.00	22.00	3.00
VB 16 x 24 x 3	16.00	24.00	3.00
VB 16 x 24 x 4	16.00	24.00	4.00
VB 16 x 30 x 4.5	16.00	30.00	4.50
VB 17 x 23 x 3	17.00	23.00	3.00
VB 17 x 25 x 5	17.00	25.00	5.00
VB 18 x 24 x 4	18.00	24.00	4.00
VB 18 x 26 x 4	18.00	26.00	4.00
VB 19 x 27 x 4	19.00	27.00	4.00
VB 20 x 26 x 4	20.00	26.00	4.00
VB 20 x 28 x 4	20.00	28.00	4.00
VB 22 x 28 x 4	22.00	28.00	4.00
VB 22 x 30 x 4	22.00	30.00	4.00
VB 22 x 32 x 3	22.00	32.00	3.00
VB 25 x 32 x 4	25.00	32.00	4.00
VB 25 x 32 x 5	25.00	32.00	5.00
VB 25 x 33 x 4	25.00	33.00	4.00
VB 25 x 34 x 5	25.00	34.00	5.00
VB 25 x 35 x 4	25.00	35.00	4.00
VB 25 x 35 x 5	25.00	35.00	5.00
VB 25 x 38 x 4	25.00	38.00	4.00
VB 25 x 39 x 6.5	25.00	39.00	6.50
VB 26 x 31 x 3	26.00	31.00	3.00

Part number	Shaft diameter Ød1 h11	Bore diameter ØD1 H8	Seal height H1
VB 26 x 34 x 4	26.00	34.00	4.00
VB 27 x 35 x 4	27.00	35.00	4.00
VB 28 x 35 x 2.5	28.00	35.00	2.50
VB 28 x 35 x 3	28.00	35.00	3.00
VB 28 x 35 x 4	28.00	35.00	4.00
VB 28 x 37 x 6	28.00	37.00	6.00
VB 28 x 38 x 4	28.00	38.00	4.00
VB 28 x 39 x 6.4	28.00	39.00	6.40
VB 29 x 36 x 8	29.00	36.00	8.00
VB 29 x 38 x 4	29.00	38.00	4.00
VB 30 x 35 x 3	30.00	35.00	3.00
VB 30 x 36 x 2.5	30.00	36.00	2.50
VB 30 x 37 x 4	30.00	37.00	4.00
VB 30 x 37 x 5	30.00	37.00	5.00
VB 30 x 38 x 4	30.00	38.00	4.00
VB 30 x 40 x 4	30.00	40.00	4.00
VB 30 x 42 x 4	30.00	42.00	4.00
VB 30 x 45 x 4	30.00	45.00	4.00
VB 30 x 45 x 6	30.00	45.00	6.00
VB 31 x 37 x 3	31.00	37.00	3.00
VB 32 x 42 x 4	32.00	42.00	4.00
VB 32 x 45 x 4	32.00	45.00	4.00
VB 33 x 40 x 3	33.00	40.00	3.00
VB 34 x 40 x 5	34.00	40.00	5.00
VB 34 x 41 x 4	34.00	41.00	4.00
VB 34 x 44 x 5	34.00	44.00	5.00
VB 35 x 41 x 2.5	35.00	41.00	2.50
VB 35 x 42 x 4	35.00	42.00	4.00
VB 35 x 44 x 4	35.00	44.00	4.00
VB 35 x 45 x 4	35.00	45.00	4.00
VB 35 x 45 x 6	35.00	45.00	6.00
VB 37 x 47 x 4	37.00	47.00	4.00
VB 38 x 43 x 3	38.00	43.00	3.00
VB 38 x 45 x 4	38.00	45.00	4.00
VB 38 x 48 x 4	38.00	48.00	4.00
VB 40 x 47 x 4	40.00	47.00	4.00
VB 40 x 50 x 4	40.00	50.00	4.00
VB 40 x 54 x 5	40.00	54.00	5.00
VB 42 x 52 x 4	42.00	52.00	4.00
VB 43 x 53 x 4	43.00	53.00	4.00
VB 45 x 50 x 3	45.00	50.00	3.00
VB 45 x 52 x 4	45.00	52.00	4.00
VB 45 x 54 x 3	45.00	54.00	3.00
VB 46 x 55 x 10.5	46.00	55.00	10.50
VB 46 x 58 x 5	46.00	58.00	5.00
VB 50 x 55 x 4	50.00	55.00	4.00
VB 50 x 58 x 4	50.00	58.00	4.00
VB 60 x 70 x 5	60.00	70.00	5.00
VB 60 x 75 x 4	60.00	75.00	4.00
VB 78 x 95 x 3.9	78.00	95.00	3.90
VB 90 x 100 x 5	90.00	100.00	5.00
VB 125 x 140 x 7	125.00	140.00	7.00
VB 130 x 145 x 7	130.00	145.00	7.00