

## SHAFT SEALS WITH A TYPE 5 STOP VC5

### DESCRIPTION

The VC5 profile is a shaft seal composed of a staggered metal cage with a rubber coating, an external stop and a primary sealing lip without a spring.

### ADVANTAGES

- Very good static sealing
- Very good thermal expansion compensation
- Precise positioning when stopped
- Greater roughness is allowed in the housing
- Reduced risk of corrosion
- 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
- Transmissions
- 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

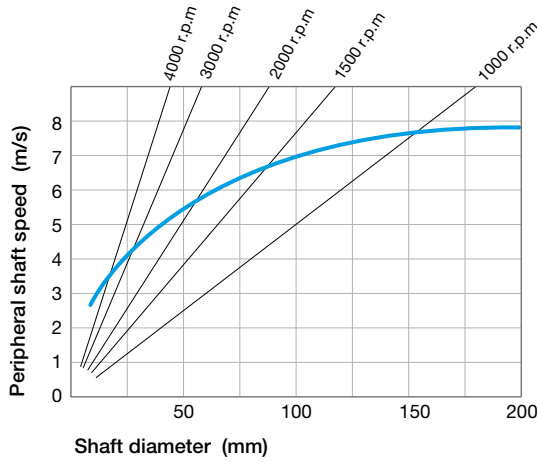
Bore diameter ØD1 (mm)	Apparent metal cage	Rubber coating
ØD1 ≤ 50.0	0.18	0.25
50.0 < ØD1 ≤ 80.0	0.25	0.35
80.0 < ØD1 ≤ 120.0	0.30	0.50
120.0 < ØD1 ≤ 180.0	0.40	0.65
180.0 < ØD1 ≤ 300.0	0.25% of the outside diameter	0.80
300.0 < ØD1 ≤ 500.0	0.25% of the outside diameter	1.00
500.0 < ØD1 ≤ 630.0	-	-

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

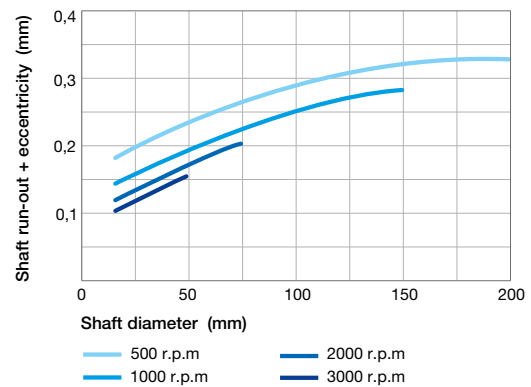
### Shaft tolerance

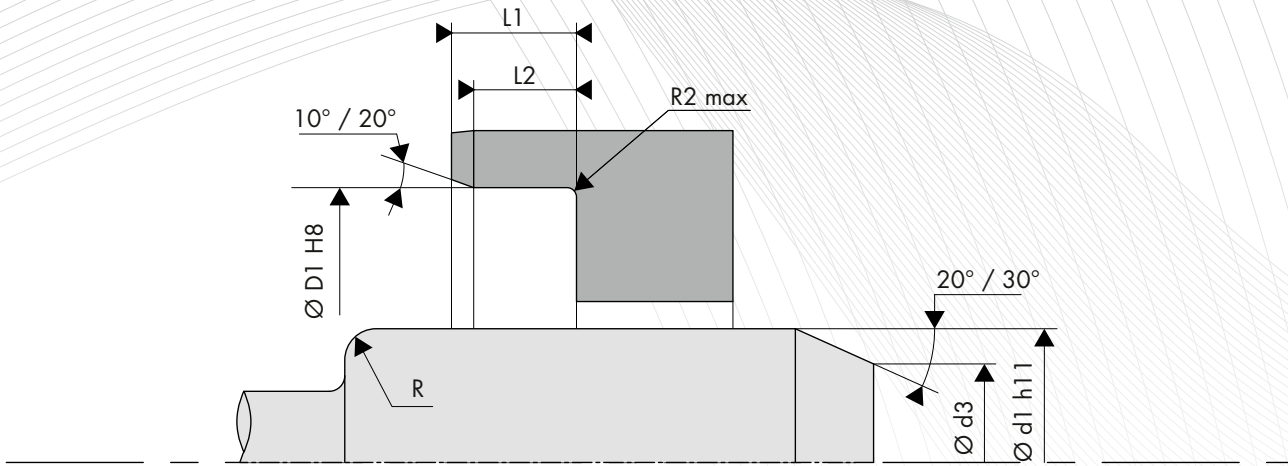
Shaft diameter $\varnothing d1$ (mm)	Tolerance h11 (mm)
$\varnothing d1 \leq 3.0$	-0.060 / 0
$3.0 < \varnothing d1 \leq 6.0$	-0.075 / 0
$6.0 < \varnothing d1 \leq 10.0$	-0.090 / 0
$10.0 < \varnothing d1 \leq 18.0$	-0.110 / 0
$18.0 < \varnothing d1 \leq 30.0$	-0.130 / 0
$30.0 < \varnothing d1 \leq 50.0$	-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	1.6 to 6.3 $\mu\text{m}$
Rz	10.0 to 25.0 $\mu\text{m}$
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	