

STANDARD SHAFT SEALS

TC7

DESCRIPTION

The TC7 profile is a shaft seal composed of a single metal cage with a rubber coating, a primary sealing lip with an integrated spring and additional radial and axial anti-pollution lips.

ADVANTAGES

- Very good static sealing
- Very good thermal expansion compensation
- Greater roughness is allowed in the housing
- Reduced risk of corrosion
- Sealing for low and high viscosity fluids
- Modern primary sealing lip with low radial forces
- 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

Spring

- Steel - AISI 1070 - 1090
- 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.

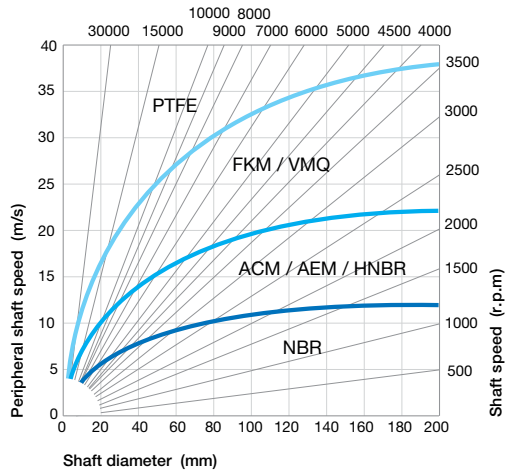
Pumping leads

Clockwise	Anti-clockwise	Bi-directional
R	L	H0

Other types of pumping leads can be created according to your specifications. Please contact our experts.

TECHNICAL DATA

Speed



The shaft seals with an additional protective lip are limited to a speed of 8 m/sec.

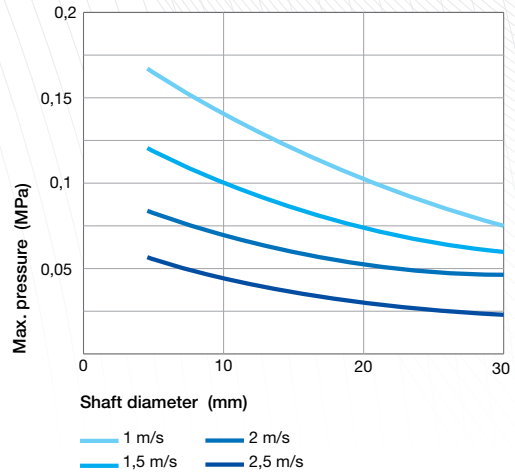
Linear speed calculation:

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

Pressure

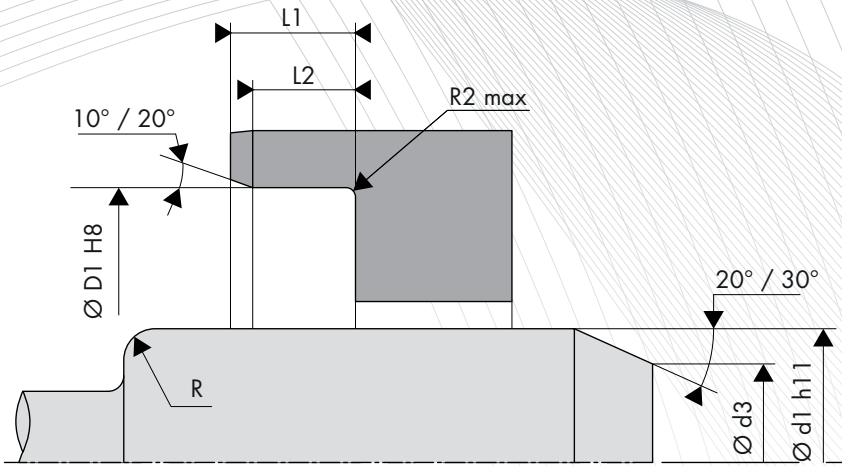
The standard shaft seals are generally used in unpressurised environments, or for pressures between 0.02 and 0.05 MPa maximum.

Higher pressures are acceptable, following testing, for standard NBR or FKM shaft seals used on a shaft of less than 30 mm.



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

*Ra = 0.1 μm for demanding applications

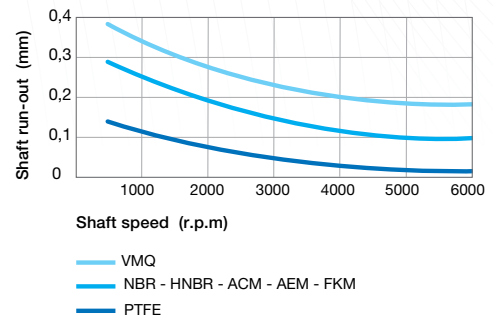
Shaft tolerance

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

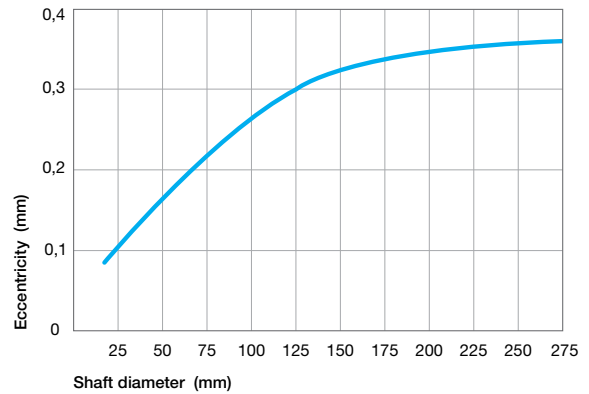
Chamfer and radius

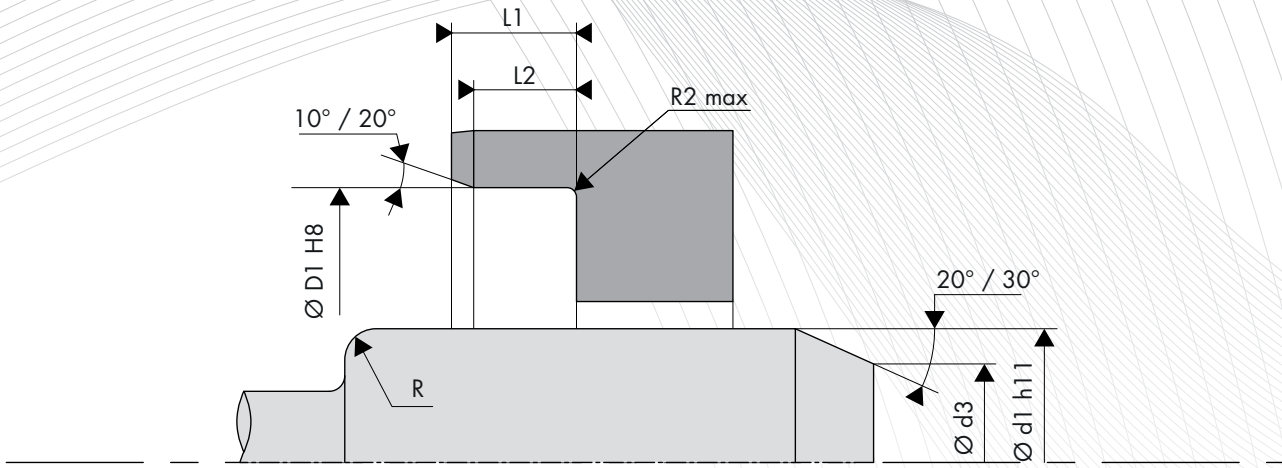
Shaft diameter $\varnothing d1$ (mm)	Chamfer diameter $\varnothing d3$ (mm)	Radius R (mm)
$\varnothing d1 \leq 10.0$	$\varnothing d1 - 1.50$	2.00
$10.0 < \varnothing d1 \leq 20.0$	$\varnothing d1 - 2.00$	2.00
$20.0 < \varnothing d1 \leq 30.0$	$\varnothing d1 - 2.50$	3.00
$30.0 < \varnothing d1 \leq 40.0$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



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	0.70
15.00	12.75	15.30	
20.00	17.00	20.30	

DIMENSIONS

Part number	Shaft diameter Ød1 h11	Bore diameter ØD1 H8	Seal height H1	Seal height H2
TC7 10 x 18 x 5 x 7	10.00	18.00	5.00	7.00
TC7 11 x 17 x 4 x 6	11.00	17.00	4.00	6.00
TC7 12 x 20 x 5 x 10	12.00	20.00	5.00	10.00
TC7 12 x 22 x 5 x 10	12.00	22.00	5.00	10.00
TC7 15 x 26 x 5 x 10	15.00	26.00	5.00	10.00
TC7 17 x 28 x 5 x 10	17.00	28.00	5.00	10.00
TC7 18 x 32 x 5 x 8	18.00	32.00	5.00	8.00
TC7 24 x 38 x 8 x 12	24.00	38.00	8.00	12.00
TC7 33 x 56 x 8.8 x 15	33.00	56.00	8.80	15.00
TC7 34 x 54 x 8 x 11.5	34.00	54.00	8.00	11.50
TC7 34 x 54 x 9 x 15.5	34.00	54.00	9.00	15.50
TC7 34 x 63 x 9 x 15.5	34.00	63.00	9.00	15.50
TC7 35 x 54 x 8 x 11.5	35.00	54.00	8.00	11.50
TC7 35 x 55 x 9 x 15.5	35.00	55.00	9.00	15.50
TC7 35 x 56 x 7.5 x 11.5	35.00	56.00	7.50	11.50
TC7 35 x 56 x 8 x 11.5	35.00	56.00	8.00	11.50
TC7 35 x 56 x 9 x 12.5	35.00	56.00	9.00	12.50
TC7 35 x 56 x 9 x 15	35.00	56.00	9.00	15.00
TC7 35 x 56 x 10 x 13.5	35.00	56.00	10.00	13.50
TC7 35 x 57 x 9 x 15	35.00	57.00	9.00	15.00
TC7 35 x 58 x 8 x 11	35.00	58.00	8.00	11.00
TC7 35 x 58 x 10 x 13	35.00	58.00	10.00	13.00
TC7 35 x 61 x 9 x 13.5	35.00	61.00	9.00	13.50
TC7 35 x 62 x 8 x 11.5	35.00	62.00	8.00	11.50
TC7 35 x 63 x 10 x 22	35.00	63.00	10.00	22.00
TC7 35 x 67 x 12 x 18	35.00	67.00	12.00	18.00
TC7 35 x 68 x 9 x 12.5	35.00	68.00	9.00	12.50
TC7 35 x 69 x 8 x 13	35.00	69.00	8.00	13.00
TC7 35 x 76 x 9 x 12.5	35.00	76.00	9.00	12.50
TC7 37 x 64 x 11 x 16	37.00	64.00	11.00	16.00
TC7 37 x 65 x 10 x 17	37.00	65.00	10.00	17.00
TC7 37 x 67 x 10 x 17	37.00	67.00	10.00	17.00
TC7 38 x 50 x 8 x 13	38.00	50.00	8.00	13.00
TC7 38 x 54 x 8 x 11.5	38.00	54.00	8.00	11.50
TC7 38 x 54 x 9 x 15	38.00	54.00	9.00	15.00
TC7 38 x 54 x 9 x 15.5	38.00	54.00	9.00	15.50
TC7 38 x 56 x 9 x 15	38.00	56.00	9.00	15.00
TC7 38 x 58 x 10 x 17	38.00	58.00	10.00	17.00
TC7 38 x 63 x 9 x 15	38.00	63.00	9.00	15.00
TC7 39 x 68 x 9 x 15.5	39.00	68.00	9.00	15.50
TC7 39 x 68 x 16 x 22.5	39.00	68.00	16.00	22.50
TC7 40 x 56 x 8 x 9.5	40.00	56.00	8.00	9.50
TC7 40 x 56 x 8 x 11.5	40.00	56.00	8.00	11.50
TC7 40 x 56 x 8 x 13	40.00	56.00	8.00	13.00
TC7 40 x 56 x 9 x 15.5	40.00	56.00	9.00	15.50
TC7 40 x 58 x 7 x 12	40.00	58.00	7.00	12.00
TC7 40 x 58 x 8 x 11.5	40.00	58.00	8.00	11.50
TC7 40 x 58 x 9 x 13.5	40.00	58.00	9.00	13.50
TC7 40 x 58 x 9 x 14	40.00	58.00	9.00	14.00
TC7 40 x 58 x 9.5 x 15	40.00	58.00	9.50	15.00

Part number	Shaft diameter Ød1 h11	Bore diameter ØD1 H8	Seal height H1	Seal height H2
TC7 40 x 62 x 8 x 11.5	40.00	62.00	8.00	11.50
TC7 40 x 63 x 8 x 11.5	40.00	63.00	8.00	11.50
TC7 40 x 64 x 9 x 15	40.00	64.00	9.00	15.00
TC7 40 x 65 x 11.5 x 18.1	40.00	65.00	11.50	18.10
TC7 40 x 68 x 9 x 12.5	40.00	68.00	9.00	12.50
TC7 40 x 70 x 12 x 16	40.00	70.00	12.00	16.00
TC7 40 x 74 x 10 x 17	40.00	74.00	10.00	17.00
TC7 41 x 59 x 10 x 16.5	41.00	59.00	10.00	16.50
TC7 41 x 61 x 8 x 13	41.00	61.00	8.00	13.00
TC7 41 x 63 x 9 x 12.5	41.00	63.00	9.00	12.50
TC7 41 x 69 x 8.5 x 16	41.00	69.00	8.50	16.00
TC7 41 x 74 x 11 x 17.5	41.00	74.00	11.00	17.50
TC7 42 x 59 x 6 x 10.5	42.00	59.00	6.00	10.50
TC7 42 x 63 x 9 x 12.3	42.00	63.00	9.00	12.30
TC7 43 x 63 x 12 x 19	43.00	63.00	12.00	19.00
TC7 44 x 60 x 7 x 10	44.00	60.00	7.00	10.00
TC7 44 x 60 x 9 x 13	44.00	60.00	9.00	13.00
TC7 44 x 62 x 7 x 11.5	44.00	62.00	7.00	11.50
TC7 44 x 62 x 7.8 x 13	44.00	62.00	7.80	13.00
TC7 44 x 74 x 11 x 16.5	44.00	74.00	11.00	16.50
TC7 44 x 80 x 7 x 12.5	44.00	80.00	7.00	12.50
TC7 45 x 61 x 8 x 10	45.00	61.00	8.00	10.00
TC7 45 x 62 x 10 x 15.5	45.00	62.00	10.00	15.50
TC7 45 x 64 x 9 x 11.5	45.00	64.00	9.00	11.50
TC7 45 x 68 x 12.5 x 19.5	45.00	68.00	12.50	19.50
TC7 45 x 80 x 10 x 16.5	45.00	80.00	10.00	16.50
TC7 50 x 68 x 9 x 15	50.00	68.00	9.00	15.00
TC7 50 x 70 x 10 x 16	50.00	70.00	10.00	16.00
TC7 54 x 70 x 6 x 10	54.00	70.00	6.00	10.00
TC7 58 x 75 x 9 x 14.5	58.00	75.00	9.00	14.50
TC7 58 x 78 x 10 x 14	58.00	78.00	10.00	14.00
TC7 58 x 102 x 11 x 19	58.00	102.00	11.00	19.00
TC7 58 x 103 x 12 x 19.5	58.00	103.00	12.00	19.50
TC7 60 x 83 x 14 x 21.5	60.00	83.00	14.00	21.50
TC7 65 x 88 x 12 x 18.5	65.00	88.00	12.00	18.50
TC7 65 x 90 x 9 x 13	65.00	90.00	9.00	13.00
TC7 70 x 95 x 13 x 20	70.00	95.00	13.00	20.00
TC7 75 x 95 x 10 x 14	75.00	95.00	10.00	14.00
TC7 75 x 97 x 9 x 13	75.00	97.00	9.00	13.00
TC7 75 x 100 x 13 x 20	75.00	100.00	13.00	20.00
TC7 80 x 105 x 9.5 x 11.5	80.00	105.00	9.50	11.50
TC7 80 x 105 x 12 x 18.5	80.00	105.00	12.00	18.50
TC7 90 x 110 x 9 x 11.5	90.00	110.00	9.00	11.50
TC7 100 x 120 x 13 x 18	100.00	120.00	13.00	18.00
TC7 116 x 146 x 12 x 18	116.00	146.00	12.00	18.00
TC7 122 x 150 x 12 x 18	122.00	150.00	12.00	18.00
TC7 125 x 150 x 12 x 18	125.00	150.00	12.00	18.00
TC7 125 x 155 x 14 x 23	125.00	155.00	14.00	23.00
TC7 135 x 165 x 14 x 20	135.00	165.00	14.00	20.00
TC7 145 x 170 x 12 x 16	145.00	170.00	12.00	16.00