The Design of the Shaft

Proper application design assures proper sealing performance. Using the following guide will ensure the best possible sealing environment.

Shaft Material and Finish

Seals perform best on medium to high carbon steel (SAE 1035, 1045) or stainless steel. The shaft must be hardened to Rockwell C45 minimum. We recommend the shaft to be machined to a surface roughness of 0.20 to 0.8 µm Ra (8 to 32 µin Ra). This shaft finish can be best obtained by plunge grinding.

Shaft Tolerance in Inches

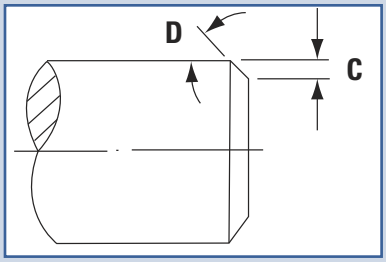
Nominal Shaft Diameter	Tolerance
up to 4.000	+/- 0.003
4.000 to 6.000	+/- 0.004
6.000 to 10.000	+/- 0.005
over 10.000	+/- 0.006

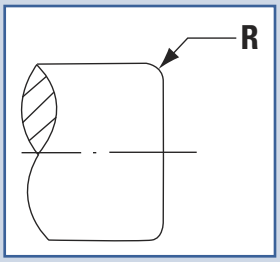
Shaft Tolerance in Metric

Nominal Shaft Diameter	Tolerance
0 to 3	+ 0.000 / -0.060
3 to 6	+ 0.000 / -0.075
6 to 10	+ 0.000 / -0.090
10 to 18	+ 0.000 / -0.110
18 to 30	+ 0.000 / -0.130
30 to 50	+ 0.000 / -0.160
50 to 80	+ 0.000 / -0.190
80 to 120	+ 0.000 / -0.220
120 to 180	+ 0.000 / -0.250
180 to 250	+ 0.000 / -0.290
250 to 315	+ 0.000 / -0.320
315 to 400	+ 0.000 / -0.360
400 to 500	+ 0.000 / -0.400

Shaft Lead-in Chamfer

The end of the shaft must be chamfered, corners must be rounded, free from burrs and sharp edges to protect seals from damage during assembly.





Shaft Diameter (mm)	C (mm)	R (mm)	D
up to 30.0	1.5	4.5	15°
30.1 to 80.0	2.0		
80.1 to 120.0	2.5	6.0	
120.1 to 250.0	3		
250.1 to 500.0	5	9.5	

Shaft Diameter (inches)	C (inches)	R (inches)	D
up to 1.182	0.060	0.177	15°
1.183 to 3.151	0.079		
3.152 to 4.726	0.098	0.236	
4.727 to 9.846	0.118		
9.847 to 19.693	0.197	0.374	

Shaft Eccentricty

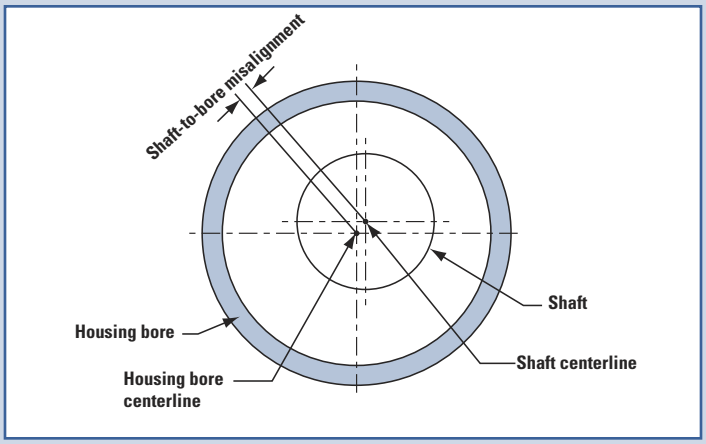
There are two types of shaft eccentricities that affect the seal's performance. They are Shaft to Bore Misalignment and Dynamic Run-Out.

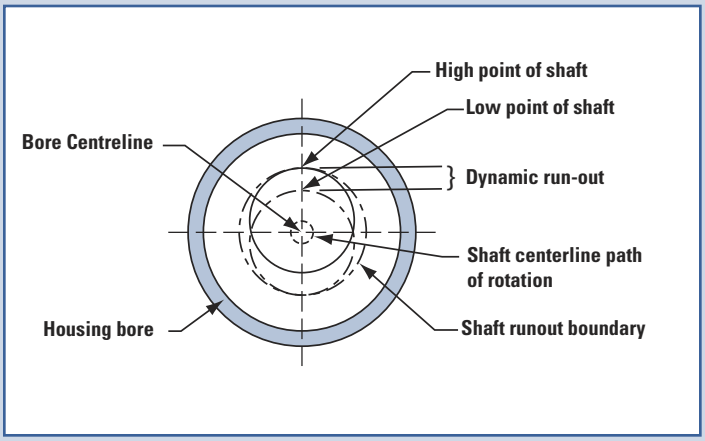
Shaft-to-Bore Misalignment

Shaft-to-bore misalignment is the distance that the centre of shaft rotation is from the centre of the bore. This situation causes excess sealing lip wear, and poor contact between the lip and shaft on the opposite side.

Dynamic Run-Out

Dynamic run-out is twice the distance the centre of shaft is displaced from the actual centre of rotation. Meaning that the shaft is not rotating around its centre, causing the lip to flex in and out in order to maintain shaft contact. In the extreme the lip will not be able to provide the required seal.





Shaft Eccentricty Limits