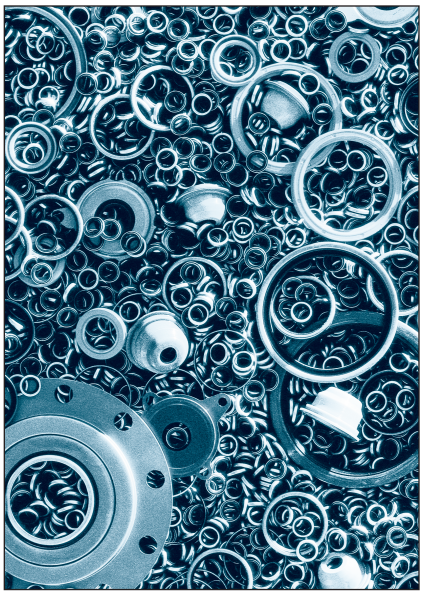


The seal itself is only one of three parts comprising a seal assembly. The other two are the shaft, which rides against the seal creating a dynamic sealing surface; and the bore, into which the seal is pressed creating a static sealing interface. Shaft and bore must meet specific requirements relative to the seal in order for the assembly to function properly.

SHAFT

Four factors concerning the shaft must be considered: material hardness, chamfer, surface finish, and tolerance.

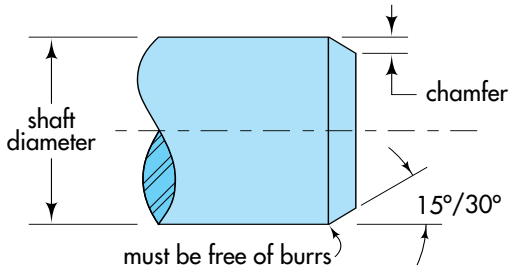
SHAFT HARDNESS

For best results, the shaft should be of a medium carbon steel, SAE 1035-1045. Stainless steel and hard-plated surfaces such as chrome or nickel plate also work well. Minimum hardness should be Rockwell C30. Shafts of soft materials such as brass, bronze, aluminum alloys, or zinc are not recommended.

SHAFT CHAMFER

A lead-in angle on the shaft ensures against damage occuring while the seal is being installed. The diagram below shows recommended shaft chamfer.

SHAFT CHAMFER RECOMMENDATION



SHAFT DIAMETER	CHAMFER
up to 1.000	.045
1.001 to 2.000	.070
2.001 to 3.000	.080
3.001 to 4.000	.093
4.001 to 5.000	.110
5.001 to 6.000	.130
6.001 to 10.000	.140

SHAFT TOLERANCE

Shaft tolerances for different shaft sizes are listed in the table below. Other design considerations often require tighter tolerances (such as bearing-fit tolerances) than those shown below.

SHAFT TOLERANCE RECOMMENDATION

DIAMETER (inches)	TOLERANCE
up to 4.000	± .003
4.001 to 6.000	± .004
6.001 to 10.000	± .005

SHAFT SURFACE FINISH

Surface finish greatly affects the degree of wear on the seal lip. deVries International recommends a surface finish of 10 to 20 Ra measured along the axis of the shaft. We also recommend that this finish be created by plunge grinding the surface. This will prevent a machine lead on the shaft which would accelerate lip wear and possibly pump fluid under the seal lip.

SURFACE FINISH CONVERSION: MICRO-INCH TO MICRO-METER					
MICRO-INCH	MICRO-METER	MICRO-INCH	MICRO-METER	MICRO-INCH	MICRO-METER
4	0.1	32	0.8	100	2.5
8	0.2	40	1.0	125	3.2
10	0.25	50	1.25	160	4.0
16	0.4	63	1.6	200	5.0
20	0.5	80	2.0	250	6.3

BORE

The same four factors which concern the shaft apply to the bore as well: surface finish, hardness, chamfer, and tolerance.

BORE FINISH

A bore surface that is too rough may cause leakage between the bore and the seal. Here are the maximum bore finishes recommended for metal and rubber-covered outside diameter seals:

BORE SURFACE FINISH RECOMMENDATION	
Metal OD	20–80 Ra
Rubber-Covered OD	63–150 Ra

BORE HARDNESS

There is no minimum Rockwell hardness recommended for the bore. However, steel and cast iron provide good bore surfaces for both rubber-covered and metal OD seals. When the bore is of softer metals or plastic, deVries International recommends using a rubber-covered rather than a metal OD seal.

BORE CHAMFER

As with the shaft, a lead-in angle helps prevent damage during installation. The diagram below shows recommended bore chamfer.

BORE CHAMFER RECOMMENDATION