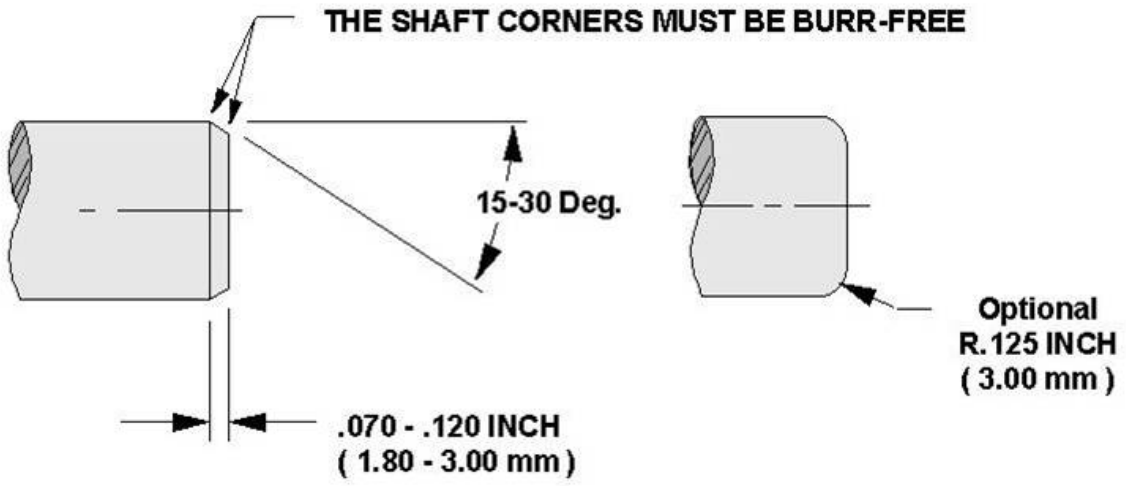
Shaft Requirements

Shaft Configurations

A burr free chamfer or radius is required as illustrated below.



Shaft Diameter

Shaft Diameter (Inches)	Chamfer	Radius	Preferred Length @ 15 deg.	Preferred Length @ 30 deg.
Up to 4.000	.093	.188	.347	.156
4.001 to 7.000	.125	.250	.466	.218
7.001 to 40.000	.188	.375	.702	.323
40.001 and Larger	.250	.500	.933	.433

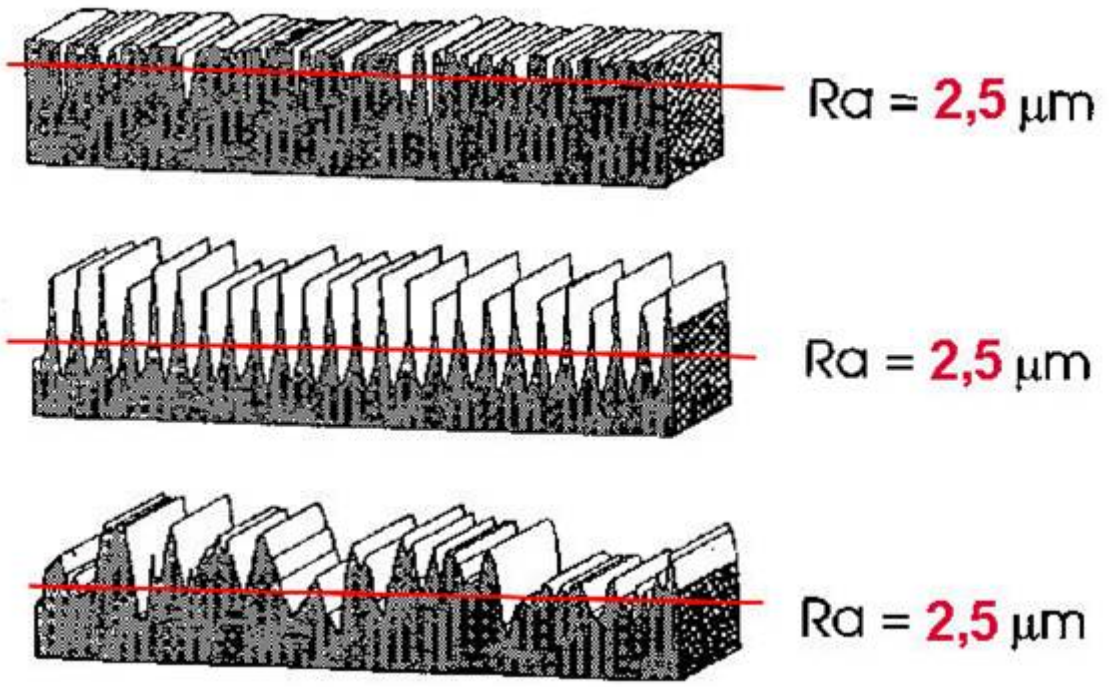
Shaft Diameter (Millimeters)	Chamfer	Radius	Preferred Length @ 15 deg.	Preferred Length @ 30 deg.
Up to 100.000	2.500	4.500	8.500	4.000
100.100 to 180.000	3.000	6.000	11.500	5.000
180.100 to 1000.00	5.000	9.500	18.000	8.000
1000.100 and Larger	6.500	12.700	24.000	11.000

Shaft Material/Finish/Hardness

Seal perform best on medium to high carbon steel (SAE 1035, 1045) or stainless steel. Soft shafts with good chrome-plated or nickel-plated surfaces, properly finished are also acceptable. Soft materials such as brass, zinc, aluminum, magnesium, or plastics are not recommended except at low shaft surface speeds (less than 0.50 M/S 100 FPM) and clean environments. Shafts could be hardened to Rockwell C30 or higher to prevent handling damage or abrasive wear.

For optimum sealing performance, new industry research recommends that seal countersurfaces should be plunge ground to 9-17 micro inches Ra roughness (0.23-0.43 micro-meters) with a machine lead angle of 0 +/-0.05 degrees. However, shaft finish may still be a cause of seal failure even when this standard is held within the limit. This is because Ra does not describe the surface profile. Within the same Ra value, the shaft surface may have very different profiles.

Different Finishes With the Same Ra

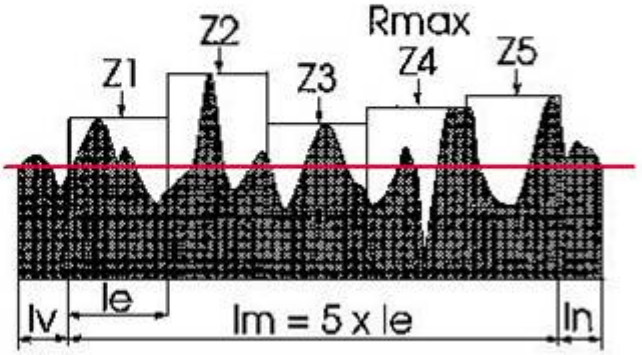


To fully characterize the shaft surface, two additional parameters should be observed.

Rz (DIN) -

- The arithmetic average of the maximum peak-to-valley height of roughness values Z1 to Z5 within five consecutive sampling lengths le over the assesment length of the filtered profile

- According to DIN 4768/1

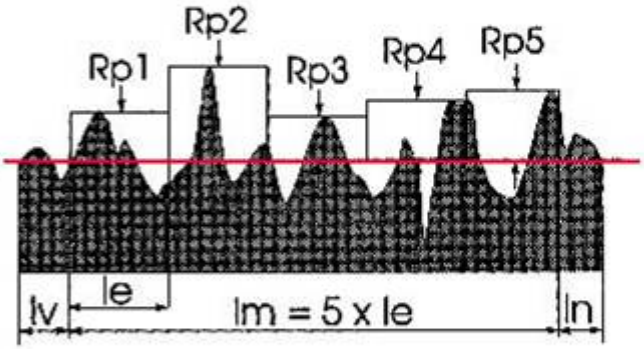


$$R_z = \frac{1}{5}(Z1 + Z2 + Z3 + Z4 + Z5)$$

Rpm -

- The arithmetic average value of the five single highest peaks above the mean line Rp1-Rp5, similar to the Rz(DIN) definition specified in DIN 4768.

- According to DIN 4762/1E, ISO/DIS 4287/1



$$Rpm = \frac{1}{5}(Rp1 + Rp2 + Rp3 + Rp4 + Rp5)$$

Shaft Eccentricity

Two types of shaft eccentricity effect seal performance; both must be considered.

Shaft to Bore Misalignment (STBM) - The amount by which the shaft is off center, with respect to the bore's center. STBM is caused by machining and assembly inaccuracies. To measure, attach a dial indicator to the shaft (between the shaft and the bore), rotate the shaft and read the indicator. STBM is half of the total indicator reading (TIR).

Dynamic Run-Out - The amount by which the shaft does not rotate around the true center. Misalignment, shaft bending, lack of shaft balance and other manufacturing inaccuracies are common causes. To measure, slowly rotate the shaft and read the the total movement (TIR) of a dial indicator that is attached to the bore and held against the side of the shaft.