

Shaft Recommendations

Material — Manville recommends a shaft material of carbon steel with a minimum hardness of Rockwell C30 (30 Rc). Soft materials such as bronze, aluminum or plastic should be avoided because they are susceptible to grooving and will cause premature seal failure. If a soft shaft material must be used, a Quick Sleeve or Wear Sleeve can be installed over the soft shaft material to provide a durable sealing surface.

Shaft Finish — Manville recommends a plunge ground finish of 8 to 17 $\mu\text{in Ra}$ (0.20 to 0.43 $\mu\text{m Ra}$) with zero lead. A shaft finish significantly smoother or rougher will shorten the service life of the seal. For additional information on shaft finish refer to **Page 2-6**.

Shaft Profile — The shaft profile should include a lead-in chamfer per the following example. The leading edge helps prevent lip roll-back and spring dumping. The leading edge and trailing edges should be free of burrs or sharp edges that could cut the contact point of the seal lip. See **Table 2-2a** on **Page 2-8** for recommended minimum chamfer length.

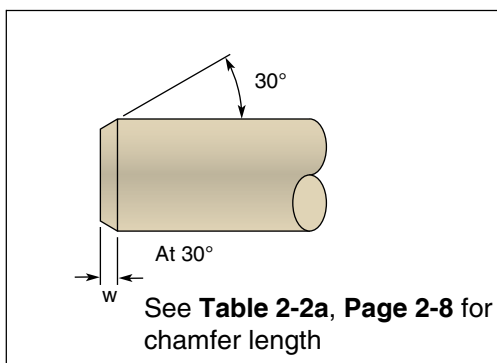


Figure 5-1. Shaft Profile

Shaft Tolerance — To ensure the proper lip-to-shaft interference is maintained, shaft diameters should fall within the tolerances specified in **Tables 5-1** and **5-2**. Shafts significantly over the tolerance will increase the underlip temperatures and lead to premature failure. An undersized shaft compromises the amount of lip interference available to maintain a positive seal.

Table 5-1. Shaft Tolerance for Inch/Fractional

Shaft Diameter	Tolerance
Up to 4.000"	$\pm .003$ "
4.001 – 6.000"	$\pm .004$ "
6.001 – 10.000"	$\pm .005$ "
Over 10.000"	$\pm .006$ "

Table 5-2. Shaft Tolerance for Metric*

Shaft Diameter	Tolerance
Up to 10 mm	+0 to -.09 mm
Over 10 – 18	+0 to -.11 mm
Over 18 – 30	+0 to -.13 mm
Over 30 – 50	+0 to -.16 mm
Over 50 – 80	+0 to -.19 mm
Over 80 – 120	+0 to -.22 mm
Over 120 – 180	+0 to -.25 mm
Over 180 – 250	+0 to -.29 mm
Over 250 – 315	+0 to -.32 mm
Over 315 – 400	+0 to -.36 mm
Over 400 – 500	+0 to -.40 mm

*ISO Standard 286-2, h11

Housing Recommendations

Material — The most commonly used materials for seal housings are steel and cast iron. Care must be taken when softer housing materials such as aluminum, bronze or plastic are used.

Housing Finish — A finish range of 40 to 100 $\mu\text{in Ra}$ (1.0 to 2.5 $\mu\text{m Ra}$) is recommended. The Clipper seal is more tolerant of housing finishes that are toward the upper limit than metal OD seals.

Housing Profile — A lead-in chamfer per the following example is highly recommended for all seal housings. The chamfer aligns the seal during installation and helps prevent the seal from cocking. Both corners of the chamfer should be free of burrs and sharp edges to eliminate OD damage during installation.

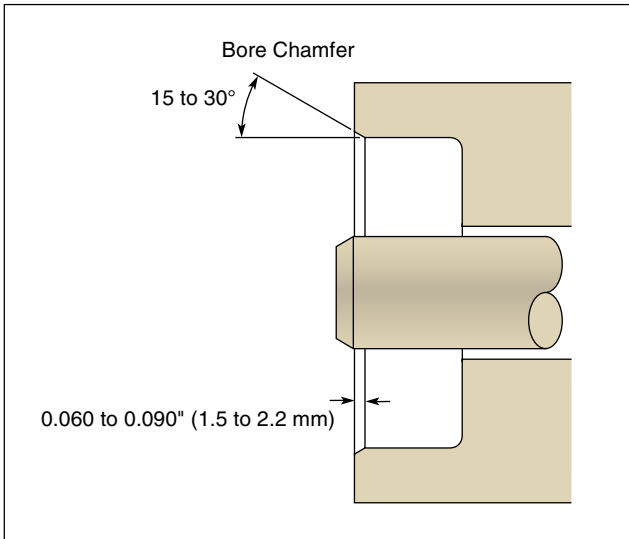


Figure 5-2. Housing Profile

Housing Tolerance — The diametrical tolerance of the housing for Clipper Oil Seals should be within the limits specified below.

Table 5-3. Housing Tolerance for Inch/Fractional

Bore Diameter	Diameter Tolerance H1	Diameter Tolerance STH1	Depth Tolerance (-0/+)
Up to 5.9	$\pm.002$	$\pm.002$	+ .031
6.0 – 15.9	$\pm.005$	$\pm.002$	+ .062
16.0 – 30.9	$\pm.008$	$\pm.005$	+ .062
Over 31.0	$\pm.010$	$\pm.005$	+ .062

Table 5-4. Housing Tolerance for Metric

Bore Diameter	Diameter Tolerance H1	Diameter Tolerance STH1	Depth Tolerance (-0/+)
Up to 150.0	$\pm.05$	$\pm.05$	+ .8
151 – 403	$\pm.13$	$\pm.05$	+ 1.5
404 – 785	$\pm.20$	$\pm.13$	+ 1.5
Over 786	$\pm.25$	$\pm.13$	+ 1.5