MARCO RUBBER & PLASTICS

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O-Ring Gland General Design Considerations

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O-Ring Squeeze Compression (O-Ring C/S) - Gland Depth / (O-Ring C/S)	▪ Face seal:20-30% ▪ Static Male/Female: 18-25% ▪ Reciprocating: 10-20% ▪ Rotary: 0-10%
O-Ring Installed Stretch (Groove Diameter) - (O-Ring ID)(O-Ring ID)	▪ General rule is 0-5% ▪ Excessive stretch can overstress material, thin cross section, and reduces % squeeze ▪ % cross section reduction due to stretch about half of the % ID stretch
O-Ring Application Pressure Vs. O-Ring Gland Clearance Gap Size	▪ Excessive clearance and or pressure can result in sealextrusion and failure ▪ Durometer vs. Pressure and Clearance Gap Chart ▪ Consider use of Back-Ups or product selection with large gaps or > pressure
O-Ring Tolerances	▪ Tolerances should be considered for the O-Ring and the gland ▪ Can impact sealing performance and life
O-Ring Gland Surface Finish	▪ Seal material must fill in voids in surface ▪ Static surfaces - 32Ra to seal liquid -16Ra to seal gas ▪ Dynamic Surfaces: 8 to 16Ra ▪ Too rough of a surface can result in abrasion or spiraling, even with a static seal ▪ Lower durometer materials can be used to seal rough surface finishes
O-Ring Gland Sharp Corners	▪ Corners should be chanpfered to limit damage during seal installation
O-Ring Gland Fill % **O-Ring Volume) / (Gland Volume)**	▪ Gland volume vs. O-Ring volume ▪ About 25% void space or 75% nominal fill ▪ Need space in groove to allow for volume swell, thermal expansion, and increasing width due to squeeze ▪ Narrower groove for sealing vacuum or gas ▪ O-Ring can extrude into clearance gap or get squeezed in two directions
O-Ring Eccentricity & Side Loading	▪ Too much squeeze on one side and not enough on the other or none at all ▪ Can open too wide a clearance gap and result in extrusion of one portion of seal leading to leaks

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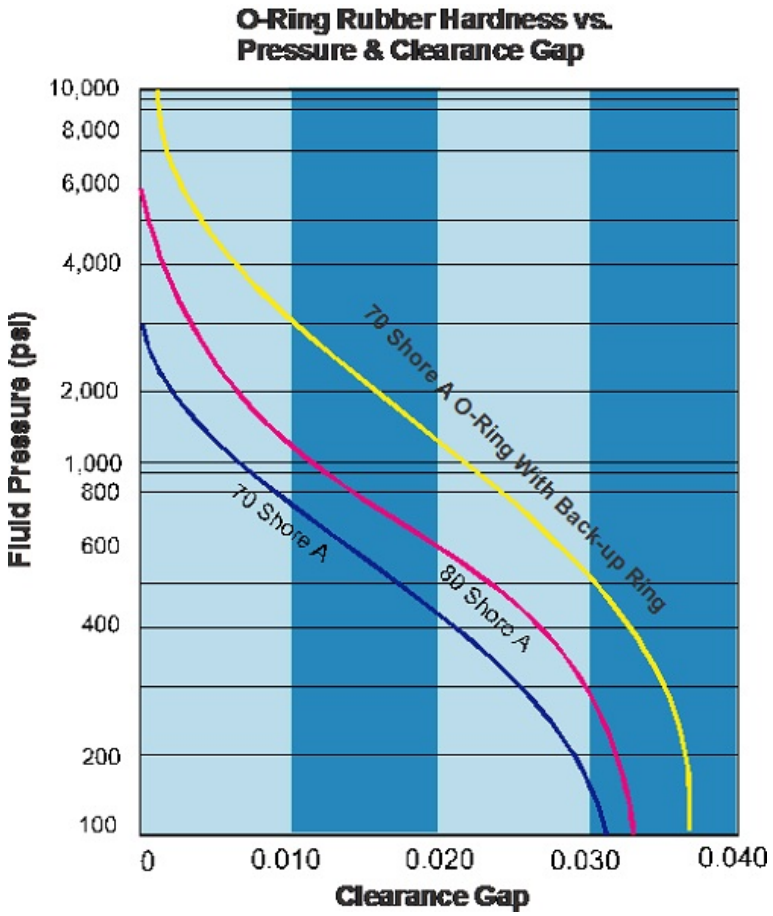
High Pressure Extrusion

Most o-rings are designed to operate at pressures up to 1,500 psi. At higher pressures, the material must have enough strength to resist extruding into the clearance gap. The chart shows the recommended combined limits of clearance, gap, material hardness and system pressure differential. To avoid extrusion at high temperature, reduce the extrusion gap, increase the seal material hardness or add a back-up ring to the o-ring but will require a wider gland.



Pressure Cycling

Cycling pressure can cause the o-ring to move back and forth within the gland. This motion can damage seals with low abrasion resistant materials. A higher durometer or an abrasion resistant material is recommended for these applications.