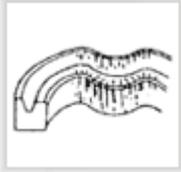


Seal Failure Causes

Possible Causes of Seal Failure

Examples of Seal Failures & Their Causes			
Type of Failure	Visible Condition	Probable Cause	Possible Cure
Hardening	 <p>Hardening of the dynamic face causing glazing and cracks</p>	Heat generated by high speed	Slow stroke speed Use alternative seal device
	 <p>Hardening of the whole seal. Loss of elasticity</p>	High fluid temperature. Deterioration of fluid. Compatibility of seal to fluid	Lower oil temperature. Renew Fluid. Change to different seal compound
Wear	 <p>Dynamic face is worn to glossy mirror-like finish</p>	Insufficient lubrication	Check oil viscosity. Use alternative seal device.
	<p>Wear on dynamic lip is egg-shaped</p>	Rod or piston bore not concentric	Hone to within seal specs. Replace worn rod or cylinder tube.
	 <p>Abnormal wear on one side of the dynamic lip</p>	Worn bearing or wear ring. Excessive lateral load	Replace bearings. Increase bearing area.

Scarring	 <p>Cut or dent on the lip</p>	Storage on a nail or peg. Improper installation tool.	Store flat in a plastic bag in a closed cardboard box. Installation tools should not have sharp edges
Scarring	 <p>Scratches on the dynamic side</p>	Scars on the rod or bore. Foreign material in fluid.	Hone, polish, and de-burr metal parts. Flush system.
Swelling	 <p>Material soft and misshaped</p>	Absorption of fluid. Fluid and seal are incompatible. Water in system.	Change seal compound or system fluid. Flush system.
Deterioration	 <p>Cracks and loss of elasticity. Material easily crumbles.</p>	High fluid temperature. Exposure to ozone or sunlight.	Lower oil temperature. Store seals away from sunlight and arc welding area.
Grooving	 <p>Axial cuts on the dynamic side</p>	Metal chips or other foreign material in system. Imploding air bubbles.	Flush system. Bleed air from system.
Extrusion	 <p>Extruded material on dynamic side of heel</p>	Gap between mating surfaces too wide. Worn bearings. Pressure extreme.	Employ back-up ring. Replace bearings. Use alternative seal.

		Uneven support surface. Undersized back-up ring.	Machine surface. Correct back-up size.
	Extruded material on static side of seal.		
Fracturing		Excessive back pressure	Check relief valves
	Chunks of material torn from dynamic side		
		Explosion of residual air at high pressure. "Dieseling"	Check maximum pressure. Bleed air from system.
	Pressure side of seal burned and broken.		
		Frequent high pressure shocks or spikes. Low temperature start-up	Use alternative style seal. Warm system before applying pressure.
Long cracks in the "V" portion of the seal			
	Deterioration of material and/or fluid	Use alternative material or seal. Flush system.	
Breaking off of entire dynamic side			