	ERIKS Technical Center	Document No.	
	3856-A Cincinnati Ave	Date	
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Title	O-Ring Failure Analysis
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Application

The failed o-ring was received at the Technology Center with the understanding that the seals have been used in the current tool for the past 30 years with few failures occurring after pressure tests. The O-rings are used without backups and are tested up to a pressure of 22,500 psi. The hardware is designed with very tight extrusion gaps so that no backups are necessary.

Sample Analysis

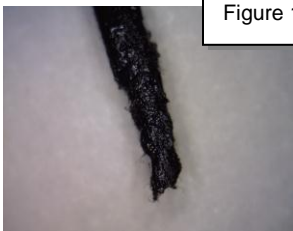


Figure 1.

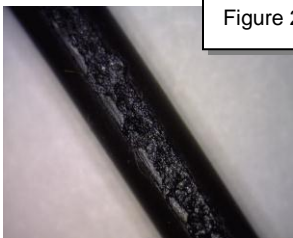


Figure 2.



Figure 3.

Material has been extruded along the circumference of the o-ring (Figure 2.) as well as in a concentrated area (arc length of approximately 1.42 inches). The extrusion along that arc length removed the material until the o-ring broke. The ends of the o-ring look to have experienced spiraling (Figure 1.).

It also appears that there is an imprint on a section of the o-ring (Figure 3.). This imprint could be caused by a feature on the hardware that is compressing the o-ring.

Summary & Recommendations

The o-ring is extruding along the entire OD, but a concentrated area is experiencing a larger amount of extrusion. At that location, the extrusion is also causing the o-ring to spiral which most likely led to the seal breaking. To decrease the change of experiencing o-ring extrusion, a smaller extrusion gap can be incorporated into the hardware design, a backup ring can be added, or the o-ring can be made from a harder material.

The information is, to the best of our knowledge, accurate and reliable to the date indicated. The above mentioned data have been obtained by tests we consider reliable. We don't assure that the same results can be obtained in other labs. Testing in actual service conditions is recommended prior to use.