

ORD Problem Solved!

Identifying Spiral Failure

What is it?

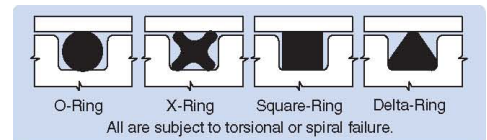
Spiral failure is defined as a type of O-ring failure caused when a seal becomes “hung-up” at one point on its diameter, sliding and rolling at the same time. It twists as the seal device cycles, causing the ring to develop a series of deep spiral cuts on the surface. This type of failure is often found on long stroke hydraulic piston seals and rod seals.

The name “spiral” was given to this type of failure because when it occurs, the seal looks like it has been cut about halfway through the O-ring cross section in a spiral or corkscrew pattern. On occasion, a seal can be twisted in half, without showing the spiral pattern, but normally the same factors cause the break.

A small amount of twisting is not detrimental to an O-ring. True spiral failure occurs after the seal has been excessively twisted, but not broken, and subjected to relatively high pressure. The twisted seal is then forced into the sharp corner at the clearance gap by pressure which puts additional stress on this portion of the seal.

Torsional or spiral failure is not limited to the O-ring or torus type seal. Square, delta, four-leaf clover, and other cross sectional shapes are prone to fail by twisting if the proper conditions exist.

For more information on this or other O-ring topics, please contact a Parker Applications Engineer at 859-335-5101.



Application Success Story

Application:

Piston seal in soap dispenser.



Problem:

The customer manufactures a multipurpose cleaning agent, which is sold in five pound buckets. The packaging line had to be shut down every four to eight hours to replace a standard 2-341 nitrile O-ring installed in a dynamic piston groove.

The customer was lubricating the o-ring with grease to improve seal life, however the cleaning agent dissolved the grease in only a few hours. This resulted in rapid spiral failure of the o-ring.

Parker Solution:

Parker recommended compound N1090-85, an internally-lubed abrasion-resistant carboxylated nitrile. This o-ring did not need to be greased, and would better resist spiral failure.

Outcome:

After 35 hours of continuous operation, the equipment was torn down for inspection. The N1090-85 o-rings showed no sign of wear or damage.

Ultimately, the customer was able to extend the o-ring life to a routine six-month maintenance cycle. Annual savings in reduced maintenance and down time were estimated at over \$100,000.

