Common Causes of O-Ring Failure:

Chemical Degradation
Description: The seal may exhibit many signs of degradation including blisters, cracks, voids or discolouration. In some cases, the degradation is observable only by measurement of physical properties.
Contributing Factors:
- Incompatibility with the chemical and/or thermal environment.
- Excessive temperature. Process environment changes, or excessive compression.
- Improper design – failure to account for thermal or chemical volume changes, or excessive compression.
- Improper or improperly cured elastomer. High vacuum levels. Low-modulus/hardness elastomer. Elastomer thermal instability. Slow reciprocating speed. Imprecise gland or gland fill.

Installation Damage
Description: The seal or parts of the seal may exhibit small cuts, nicks or gashes.
Contributing Factors:
- Contamination. Inadequate lubrication. Radiation or other air pollutants. Excessive seal gland or gland surface finish. Inadequate lubrication. Weathering or ozone cracking is characterized by small surface cracks perpendicular to the line). Excessive gland width. Irregular or rough gland surface finish. Inadequate lubrication.

Overcompression
Description: The seal exhibits flat-sided cross section, the flat sides corresponding to the mating seal surfaces.
Contributing Factors:
- Overcompression. Excessive stress. Incompletely cured elastomer. Improper design – failure to account for thermal or chemical volume changes, or excessive compression.
- Improper or improperly cured elastomer. High vacuum levels. Low-modulus/hardness elastomer. Elastomer thermal instability. Slow reciprocating speed. Imprecise gland or gland fill.

Extrusion/Nibbling
Description: The seal exhibits cuts or marks which spiral around its circumference.
Contributing Factors:

Spiral Failure
Description: The seal exhibits cuts or marks which spiral around its circumference.
Contributing Factors:

Explosive Decompression
Description: The seal exhibits blisters, pits or pock marks on its surface. Absorption of gas at high pressure and the subsequent rapid decrease in pressure. The absorbed gas blisters and ruptures the elastomer surface as the pressure is rapidly removed.
Contributing Factors:

Abrasion
Description: The seal or parts of the seal exhibit a flat surface parallel to the direction or motion. Loose particles and scrapes may be found on the surface within the cross section.
Contributing Factors:
- Abrasion. Sharp edges on glands or glands. Improper or improperly sized elastomer. Improper installation (static). Slow reciprocating speed.
- Contamination. Inadequate lubrication. Radiation or other air pollutants. Excessive seal gland or gland surface finish. Inadequate lubrication.

Contamination
Description: The seal exhibits foreign material on the surface within the cross section.
Contributing Factors:

Compression Set
Description: The seal exhibits a flat-sided cross section, the flat sides corresponding to the mating seal surfaces.
Contributing Factors:
- Compression Set. Excessive compression. Excessive temperature. Incompletely cured elastomer. Improper design – failure to account for thermal or chemical volume changes, or excessive compression.
- Improper or improperly cured elastomer. High vacuum levels. Low-modulus/hardness elastomer. Elastomer thermal instability. Slow reciprocating speed. Imprecise gland or gland fill.

Plasticizer Extraction
Description: This failure is often very difficult to detect from examination of the seal. It may exhibit a decrease in cross-sectional size.
Contributing Factors:
- Plasticizer Extraction. Improper or improperly cured elastomer. High vacuum levels. Low hardness/plasticized elastomer.

Weathering/Ozone Cracking
Description: Occurring in seals exposed to ozone, UV radiation, or other air pollutants, weather or ozone cracking is characterized by small surface cracks perpendicular to the direction of stress.
Contributing Factors:
- Weathering/Ozone Cracking. Exposure to ozone, UV radiation or other air pollutants. Excessive seal stretch.

Thermal Degradation
Description: The seal may exhibit radial cracks located on the highest temperature surfaces. In addition, certain elastomers may exhibit signs of softening—a shiny surface as a result of excessive temperatures.
Contributing Factors:
- Thermal Degradation. Excessively high temperature. Excessive temperature excursions or cycling.

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