Common Causes of O-Ring Failure:

**Chemical Degradation**
Description: The seal may exhibit many signs of degradation including blisters, cracks, voids or discoloration. In some cases, the degradation is observable only by measurement of physical properties.
Contributing Factors: Incompatibility with the chemical and/or thermal environment.

**Installation Damage**
Description: The seal or parts of the seal may exhibit small cuts, nicks or gashes.

**Overcompression**
Description: The seal exhibits parallel flat surfaces (corresponding to the contact areas) and may develop circumferential splits within the flattened surfaces.
Contributing Factors: Improper design – failure to account for thermal or chemical volume changes, or excessive compression.

**Extrusion/Nibbling**
Description: The seal develops ragged edges, generally on the low pressure side. This condition is more likely with high pressure systems.

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

**Explosive Decompression**
Description: The seal exhibits blisters, pits or pocks 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: Rapid pressure changes. Low-modulus/hardness elastomer.

**Abrasion**
Description: The seal or parts of the seal exhibit a flat surface parallel to the direction of motion. Loose particles and scours may be found on the seal surface.

**Contamination**
Description: The seal exhibits foreign material on the surface within the cross section.
Contributing Factors: Process environment deposition. Reactions or degradation of the elastomer.

**Compression Set**
Description: The seal exhibits a flat-sided cross section, the flat sides corresponding to the mating seal surfaces.

**Plasticizer Extraction**
Description: This failure is often very difficult to detect from examination of the seal. The seal may exhibit a decrease in cross-sectional size.
Contributing Factors: 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: 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: Elastomer thermal properties. Excessive temperature excursions or cycling.

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