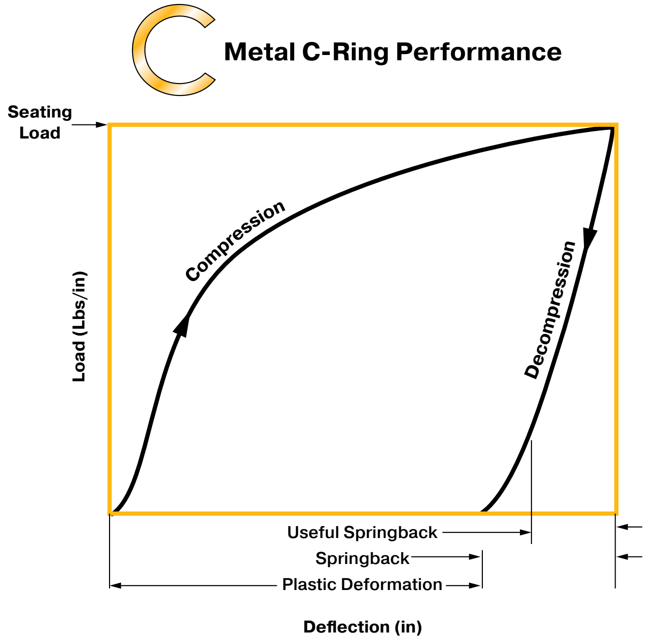
Performance Data



Load, Deflection and Springback

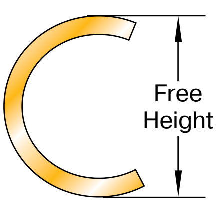
All metal seals, except for metal wire rings, are designed to undergo both plastic and elastic deformation when installed. (Wire rings are essentially limited to plastic deformation only.)

Plastic deformation of the jacket, or O-ring tubing, enlarges the contact area, or "footprint," to bridge across surface imperfections or tool marks in the mating surfaces. It also creates a reduced gradient in the load/deflection curve to permit a wide tolerance in the working height, resulting in a robust sealing process. High integrity sealing is ensured by the ductile outer layer or coating which, being inelastic and of low compressive yield strength, flows into and fills the mating surface crevices.

Elastic deformation provides elastic recovery or "springback" to maintain good sealing, despite separation of the mating surfaces due to the effects of thermal cycling, flange rotation, applied mechanical or hydrostatic loads or creep.

Terminology

Free Height: The cross-sectional height of an uncompressed seal. This is conventionally stated before platings or coatings.

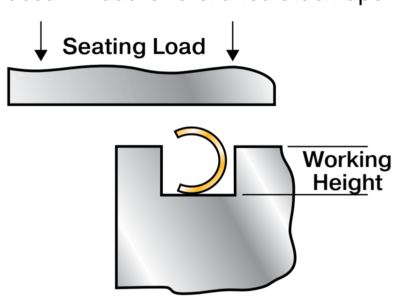


Seating Load: The load required to compress a seal to the working height. For convenience, all loads are conventionally stated per unit circumferential length. Generally, a higher seating load will ensure greater leak tightness.

Springback: The difference between the working height and the (reduced) free height after all applied loads have been released: this represents the total elastic recovery of the seal.

Useful Springback: That portion of the spring-back curve where the load exceeds 20-25% of the load at working height. Below this, the load may be insufficient to maintain good seal performance.

Working Height: The cross-sectional height of an installed seal, which is equivalent to the groove depth. Many metal seals allow wide tolerance in the permissible working height to accommodate tolerance stack ups.



Working, Proof and Burst Pressures: The working pressures given in this design guide are the maximum for both steady-state and cyclical pressures (subject to fatigue considerations) with the groove to seal diametrical clearances recommended in Section C. Where high pressure transients are expected, or installed seals are subject to a proof test (as part of a 100% acceptance test, not a type test), designers should select a metal seal with a working pressure sufficient to accommodate such high pressure exposures.

Burst testing may be performed at pressures higher than the rated working pressure. Experience has shown that pressure energized metal seals will seal effectively at pressures significantly beyond their working pressure, although some permissible permanent deformation of the seal may occur.

Leakage failure may occur at extremely high pressures, however, this is typically the result of flange or joint separation or distortion, due to the high hydrostatic loads under such conditions. The onset of leakage will be detected when such flange separation exceeds the useful springback of the seal.

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Load, Deflection and Springback

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