



Housing Design

Hallite Seals' product data sheets give information indicating the allowable extrusion gap a seal can see at pressure during its working life. The extrusion gap can be calculated using the tolerance build ups within the cylinder and any dilation that may occur under pressure.

Maximum extrusion gap = F max (see drawing below).
F max is the maximum extrusion gap for the seal

Minimum metal to metal clearance = F min (see drawing below).

F min for cylinders with minimal side loading should be > 0.1mm (0.004").

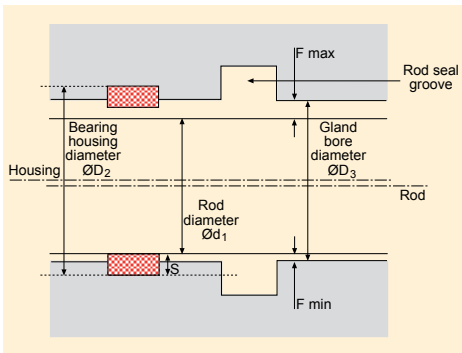
Rods

Maximum extrusion gap

$$F \text{ max} = \frac{(\text{ØD}_3 \text{ max} + \text{ØD}_2 \text{ max})}{2} - S \text{ min} - \text{Ød}_1 \text{ min}$$

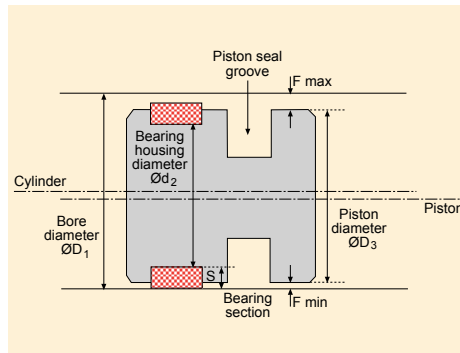
Minimum metal to metal clearance (extrusion gap)

$$F \text{ min} = S \text{ min} - \frac{(\text{ØD}_2 \text{ max} - \text{ØD}_3 \text{ min})}{2}$$



Rod Bearing

Note: Rod is not concentric with gland, because of clearances. (shown exaggerated)



Piston Bearing

Note: Piston is not concentric with cylinder bore, because of clearances. (shown exaggerated)

Pistons

Maximum extrusion gap

$$F \text{ max} = \text{ØD}_1 \text{ max} - S \text{ min} - \frac{(\text{Ød}_3 \text{ min} + \text{Ød}_2 \text{ min})}{2} + \text{dilation}$$

Minimum metal to metal clearance (extrusion gap)

$$F \text{ min} = S \text{ min} - \frac{(\text{Ød}_3 \text{ max} - \text{Ød}_2 \text{ min})}{2}$$

Calculate both F max and F min. Ensure the F min is greater than 0.1mm (0.004") and F max is less than the maximum extrusion gap stated on the seal data sheet at the application's working pressure.

For built-in metal bearings, the extrusion gap calculation is simpler.

For F max:

$$\text{Rod} = \text{ØD}_3 \text{ max} - \text{Ød}_1 \text{ min} + \text{dilation}$$

$$\text{Piston} = \text{ØD}_1 \text{ max} - \text{Ød}_3 \text{ min} + \text{dilation}$$

F min must be zero

Extrusion is closely linked to pressure and temperature. In general, the best seal performance and life is provided by specifying the smallest possible extrusion gap.

The figures shown for the extrusion gap within the operating conditions of Hallite's product data sheets, relate to the maximum permissible, worst case situation with the gap all on one side.

