FlatSeal™ Guide 4

Optimized Gasket Geometry

Background

Soft flat gaskets based on fibers, graphite, PTFE or mica, require a certain level of surface pressure to perform their task as reliably and effectively as possible. The higher the level of surface pressure, the better the gasket compensates for unevenness. This ensures a high level of tightness in the application (see FlatSeal™ Guide 1 - Fundamentals of Flat Gasket Technology).

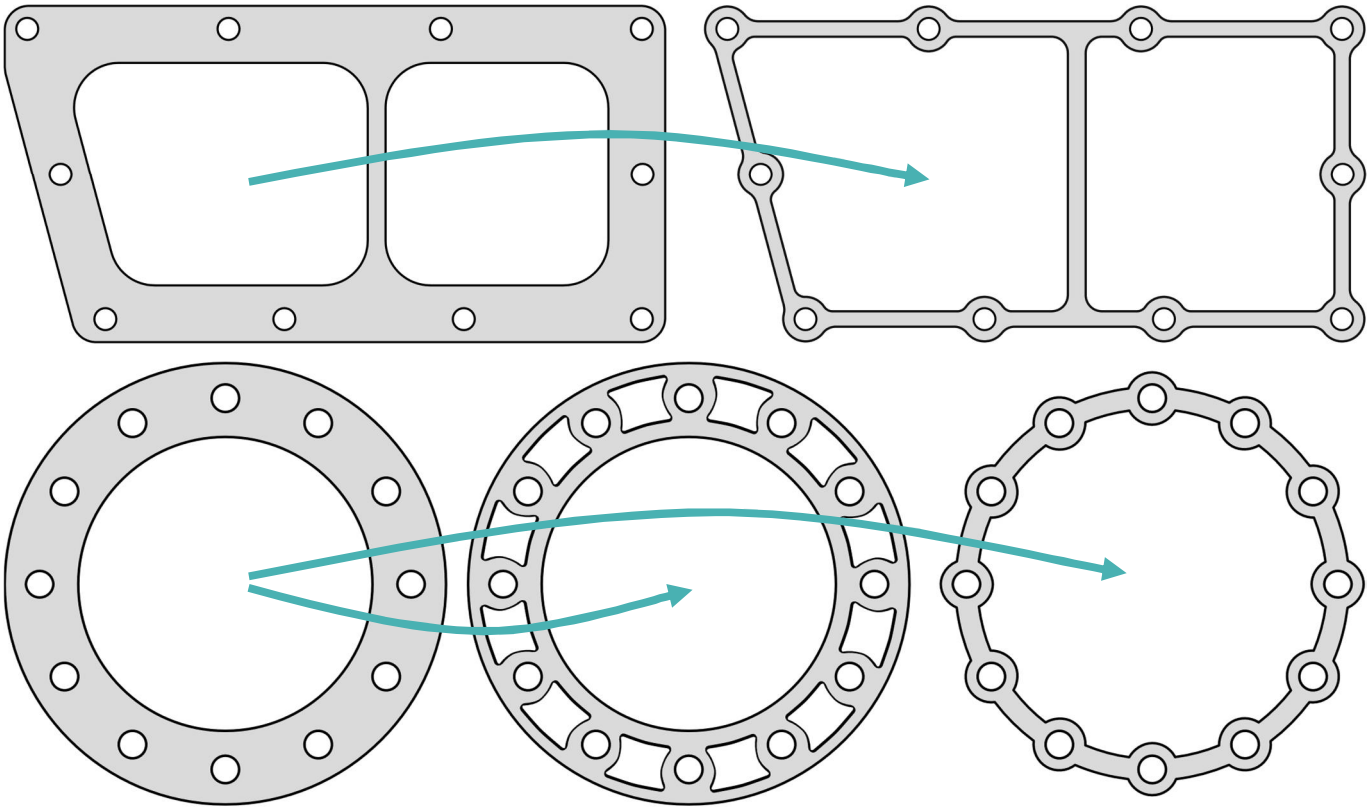
The amount of surface pressure to be achieved depends mainly on two factors: The available bolt force and the gasket area to be compressed. In many applications, boundary conditions, such as bolt size, number of bolts and bolt material, may not be able to be changed. Here are suggestions on how the geometry of the gasket can be changed to produce an optimized sealing system.

Different Options for Geometry Optimization

In principle, any seal can have their geometry optimized. The main aim is to avoid unnecessarily large areas or gasket widths. For example, ‘pockets’ can be introduced into an otherwise very large sealing surface or gasket widths can be reduced.

Depending on the gasket thickness and material, a minimum gasket width of 8 to 10 mm should not be undercut. The ratio of gasket thickness to gasket width should not fall below a ratio of approximately 1:5. This also depends on the gasket material used and the specific application. In any case, an unnecessarily wide gasket width should be avoided.

The following sketches illustrate the principle:



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Calculation Example

Area of original geometry	A_0	1000 mm²
Surface pressure of original geometry	Q_0	15 MPa
Optimized area	A_1	600 mm²
Area reduced by	$= \frac{A_0 - A_1}{A_0} * 100$	**40 %**
Optimized surface pressure	$Q_1 = \frac{Q_0}{A_1/A_0} = \frac{Q_0}{1 - 40\%}$	25 MPa
Increase of surface pressure	$= \frac{Q_1 - Q_0}{Q_0} * 100$	**67 %**

Area reduced by	[%]	10	20	30	40	50	60	70	80
Increase of surface pressure	[%]	11	25	43	67	100	150	233	400

Further Information

Other FlatSeal™ Guides deal with the following basic topics:

FlatSeal™ Guide 1 – Fundamentals of Flat Gasket Technology
FlatSeal™ Guide 2 – Choice of Sealing Material
FlatSeal™ Guide 3 – Installation Instructions
FlatSeal™ Guide 4 – Optimized Gasket Geometry
FlatSeal™ Guide 5 – Lubrication of Bolts
FlatSeal™ Guide 6 – Roughness of Sealing Surfaces
FlatSeal™ Guide 7 – Service Life of Sealing Systems
FlatSeal™ Guide 8 – Shelf Life of Sealing Materials
FlatSeal™ Guide 9 – Tolerances Cut Parts
FlatSeal™ Guide 10 – Temperature Test