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Flange Insulation

Sealing Methods

There are three primary static sealing methods in use today; the flat gasket. And the molded elastomer seal.

The *Flat Gasket* is the oldest of the three. Where reusability is not required and where the possibility of some leakage can be tolerated, the flat gasket may be the best choice. However, this approach has several limitations. Refer to Figure 1.

Figure 1

1. Bolt loads and flange deflections “squeeze” the gasket (cold flow) causing permanent distortion.

2. Retorquing may be required.

3. Flange separation exposes larger area to pressure and allows fluid to attack gasket material. The gasket may also swell and disintegrate due to absorption of fluid.

4. Flat gaskets are also subject to sudden ruptures as well as “seepage” and “weepage”.

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The *O-Ring* in the groove represents a marked improvement over the flat gasket for installation where little or no leakage can be tolerated. Refer to Figure 2.

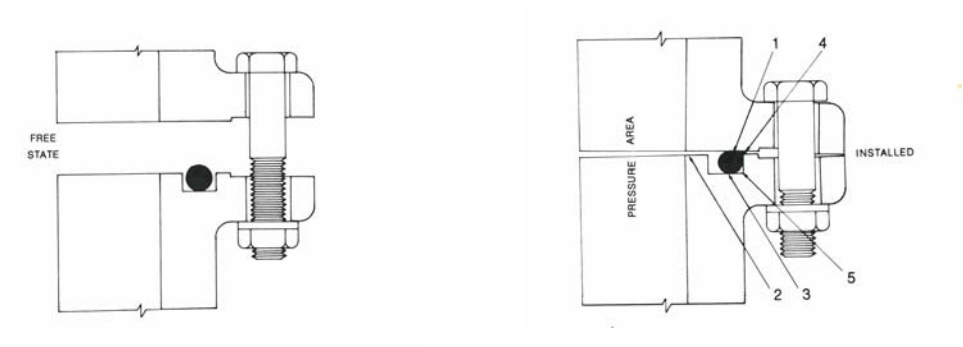

Figure 2

1. Although O-Rings are relatively inexpensive, the precise groove machining along with time-consuming assembly render this method rather costly.

2. A major drawback is that it is possible to close the joint without the O-Ring being in position. This error might not be detected until the system is in operation.

3. A large surface area of the O-Ring is exposed to fluid attack.

4. Pressure fluctuations can cause portions of the O-Ring to be “nibbled” away.

5. Stress concentrations may develop due to groove in flange.

It is best suited to circular configurations because of the elasticity of the rubber is forever trying to return the O-Ring to its original shape….round.

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The *Molded Elastomer Seal* represents a significant improvement over both the flat gasket and the O-Ring in the groove for near zero leakage static sealing. Refer to Figure 3.

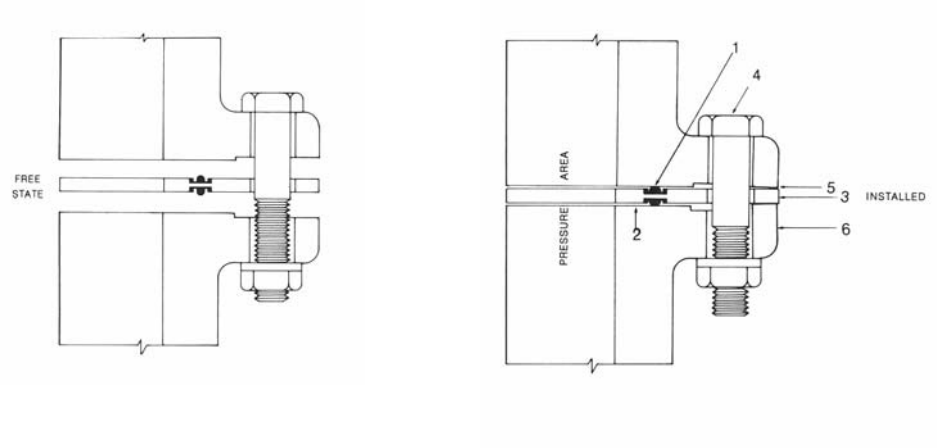

Figure 3

1. Sealing element molded precisely in place.
2. Limited area of seal exposed to fluid attack.
3. Can be visibly inspected after assembly.
4. No retorquing required.
5. No special machining required.
6. Reduced flange loads permitting reduced flange thickness, smaller bolts, smaller bolt circle.

Types of Gaskets:

Type E – Full Face Gaskets

Full face gaskets completely cover the flange face from flange bed to outside diameter. Full face gaskets are used on flat faced flanges, however, can be used with a raised flat face flange to eliminate debris building up in raised area causing a short. See Figure 4.

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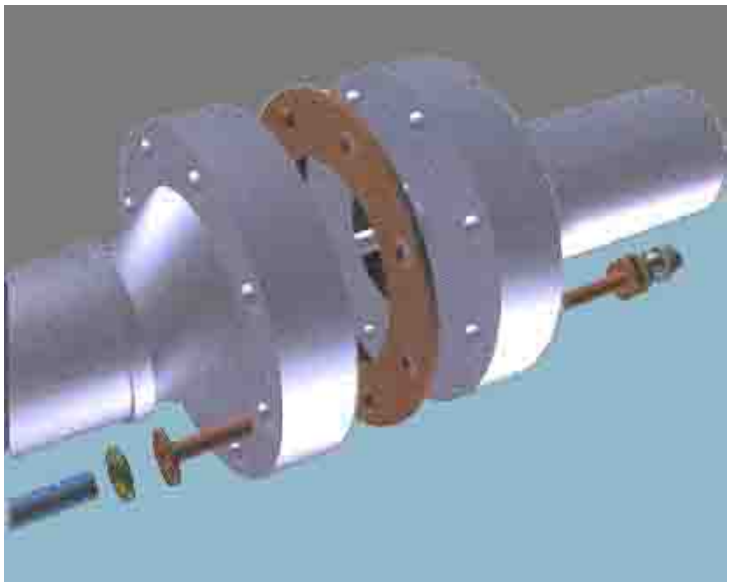

Figure 4 – Type "E" Flange and Gasket

Type F – Ring Gasket

Ring Gaskets are designed to set inside the bolt circle and are most commonly used with raised face flanges. See Figure 5.

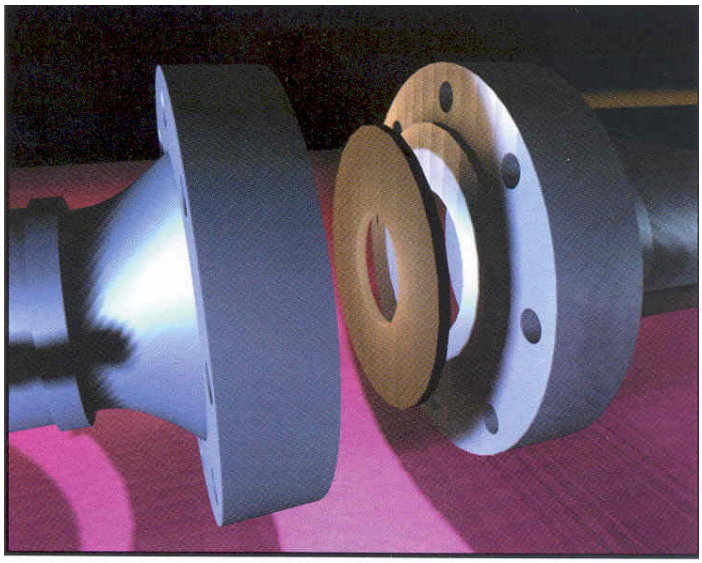

Figure 5 – Type "F" Flange and Gasket

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Type D – Ring Type Joint (RTJ)

The RTJ is an oval phenolic gasket designed to work specifically with RTJ grooved Flanges. RTJ gaskets are sized by R-number.

A neoprene filler gasket is sometimes used to set on the I.D. of the RTJ gasket to the I.D. of the flange bore. This is to eliminate debris bridging across and causing a short. The RTJ's are made from plates of phenolic, therefore, the gas pressure would be paralleled to the grain allowing the RTJ to work with pressures up to 2,500 PSI. See Figure 6.

Figure 6 – RTJ Gasket

Type D – BX

BX gaskets are an octagonal shape phenolic gasket designed to work specifically with a BX grooved flange. BX gaskets are machined from phenolic tubing; therefore, the gas pressure would be perpendicular to the grain, allowing the gasket to withstand pressures up to 15,000 PSI.

BX gaskets are supplied with an asbestos-fill gasket which is placed from the O.D. of the BX to inside the bolt circle. See Figure 7.

Figure 7 – BX Gasket

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"Jock" O-Ring Type

The "Jock" O-Ring gasket can be a full face (Type E) or ring gasket (Type F) configuration. The "Jock" has a high-energy O-Ring elastomer seal that compresses and expands to fill any voids as the flange is tightened. The totally encapsulated sealing element prevents gasket blow-out. The O-Ring provides a positive, constant seal with zero environmental leakage. Complete contact of flange and retainer prevents fire failure and reduces exposure of the seal to service fluids and environment. The confined O-Ring seal allows zero "m" and "y" factors to be achieved.

On special request, the "Jock" gasket can replace most sizes of RTJ and BX gaskets. With the versatility of changing the sealing element or the retainer material, the "Jock" can be utilized in most any application. See Figure 8.

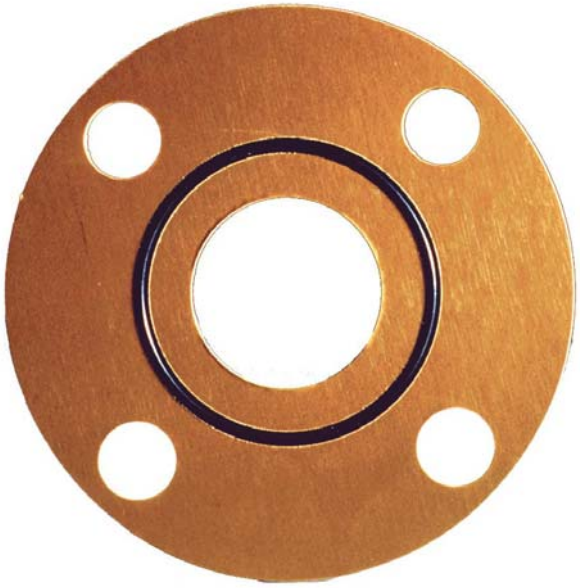

Figure 8 – "Jock" Gasket

Insulating Washers

Central's standard insulating washers are manufactured from CE Pgenolic. The maximum operating temperature is approximately 225° F with a compression strength of 36,400 PSI and a dielectric strength of 300 VPM. Our high temperature insulating washer has a maximum operating temperature of 450° F.

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Insulating Sleeves

Central offers insulating sleeves in a variety of materials. Our most standard include Mylar, High Density Polyethylene, Phenolic and Nomex. They are designed to easily be inserted in the bolt hole leaving ample room for the bolt, even when the bolt holes are misaligned. The wall thickness is 1/32" and can be provided for bolt sizes from ½" to 3-1/2".

Molded One-Piece Sleeve & Washer

The one-piece sleeve and washer reduces handling (many loose parts) and make-up problems in the field. One glance and an inspector can easily tell if the flange has been properly insulated. A Minlon material should be used because of its high compression strength and superior toughness. A one-piece sleeve and washer is most generally used for one-side flange insulation in that we mold it in a sleeve length that is on an average, significantly longer than the thickness of a single flange. They can be cut to size for two-side insulation. The maximum operating temperature is 250° F, dielectric strength 420 VPM and compression strength 19,000 PSI.