

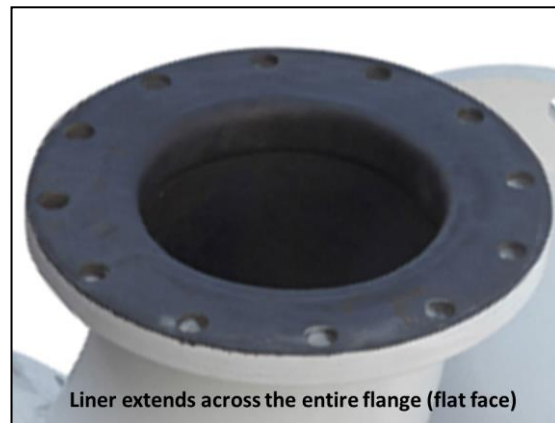
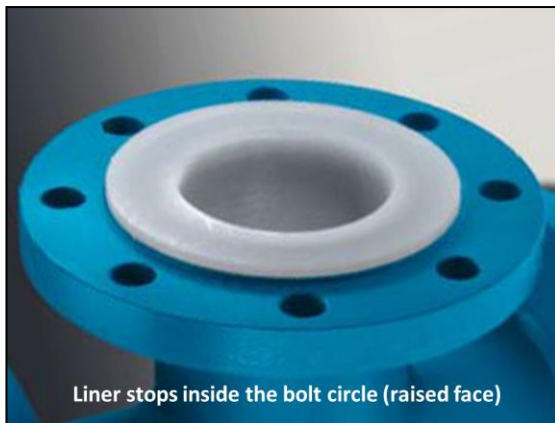
Technical Bulletin

To: General Distribution
From: Applications Engineering
Subject: Gasket Selection for Lined Pipe Flanges

Date: November 12, 2019

Gaskets for Lined Pipe Flanges

We are often asked for gasket recommendations for lined pipe flanges. In general, linings are typically used to provide improved chemical resistance, permeation resistance, and/or abrasion resistance. Common liner materials are polymers (PTFE, FEP, PFA, etc.), elastomers or rubber (natural, EPDM, neoprene, etc.), or glass. The main piping and flanges are commonly made of metal (carbon steel, stainless steel, etc.) or a non-metallic material called FRP (Fiber Reinforced Plastic) or GRE (Glass Reinforced Epoxy). In most cases the liner inside the pipe extends up and across the face of the flanges and either stops inside of the bolt circle (simulating a raised face flange contact area), or extends to the outer diameter of the flange and has bolt holes.



Many polymer and rubber lined pipe manufacturers recommend assembling the flanges without a gasket, sealing one liner against another. Gaskets are typically recommended if a lined pipe is mated to a valve, or to a non-lined pipe flange, or if a joint is opened and reassembled.

Polymer Lined METAL Flanges (PTFE, FEP, PFA, etc.)

Polymer liners provide chemical resistance and permeation resistance. Gaskets for flanges with this type of liner need to provide comparable chemical resistance to that of the liner. The gaskets also need to be soft enough to avoid compressing the liner, and easily sealed, as these flanges typically have low allowable torque. Also keep in mind, once assembled the connection now has TWO sources of relaxation because



the liners on each flange along with the gasket are in compression. So retorquing before start up is highly recommended.

This type of liner is commonly found not only in piping, but flow meters as well. As shown in the picture to the right, the liner typically stops inside the bolt circle, and creates a raised face contact surface.

In general with polymer lined pipe flanges or meters GYLON® 3545 is the product most frequently recommended as it provides excellent chemical resistance, it's highly compressible, and seals at lower stresses. Also, in most cases the flange connections are 150# or 300# class, which a non-metallic gasket such as GYLON® 3545 would be suitable for. If higher pressure classes are encountered please contact Garlock Applications Engineering.



PTFE Lined Flow Meter

Polymer Lined NON-METALLIC Flanges (PTFE, FEP, PFA, etc.)

Like the metal flange versions, polymer lined non-metallic piping and flanges are used for chemical resistance and permeation resistance. However, the non-metallic piping and flanges, which are typically FRP (Fiber Reinforced Plastic), typically have much lower allowable torque values.

The liner also can stop inside the bolt circle, creating a raised face contact area, or extend across the entire face.

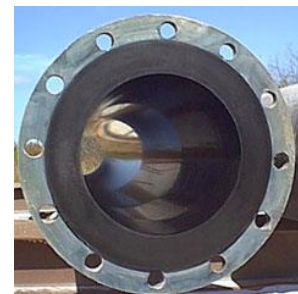


In many cases a STRESS SAVER® type gasket is the best option for these connections, as these gaskets are designed to seal at the extremely low available assembly stresses that can be generated. It is important to confirm that the torques do not exceed max stress recommendations for rubber STRESS SAVER® gaskets in the configurations that may have a raised face liner. GYLON EPIX™ is also an option if the liner material is rigid enough and the flange faces are smooth. Getting the maximum allowable torque values from the flange manufacturer is the first step in the selection process.

Elastomer (Rubber) Lined Flanges (natural, EPDM, neoprene, etc.)

Elastomer or rubber linings can provide chemical and permeation resistance, but the other more common reason for this type of liner is abrasion resistance in industries like mining where slurries are prevalent. The rubber lining often stops inside the bolt circle as well, creating a raised face contact area. In addition, the rubber used for the lining is typically lower durometer (<80 shore A), and it is very common for these flanges to be assembled without a gasket.

That being said, there are customers that do require gaskets. The reason being they likely had problems with the liners sticking together and tearing



when the connection was opened at one point. The challenge then becomes selecting a gasket that will prevent sticking/tearing, can withstand the system pressure, and is suitable for the service media.

We believe the best solution to this challenge is a THIN gasket (1/32" or 1/64") made from GYLON® Style 3522. The Style 3522 material has very good permeation resistance, and when kept thin, it minimizes the amount of outward force that can be generated at the inner edge by the system pressure. Also, the Style 3522 is pure PTFE, so it provides exceptional chemical resistance and will not stick to the rubber lining on the flange face.

As with polymer lined flanges, contact Garlock Applications Engineering if flange classes over 300# are encountered.

Glass Lined Flanges

Glass lining is commonly used for chemical and permeation resistance in the chemical, food and pharmaceutical industries. The smooth impervious nature of the glass lining make it an ideal choice for piping and equipment used for manufacturing batches of products, as the glass surface can be quickly and easily cleaned / decontaminated.

However, the lining has its challenges as well. Not only is the glass brittle and easily damaged, the allowable torque while not as low as polymer or rubber lined flanges, tends to be less than ideal. In addition the sealing surfaces, which are usually stub end type (see image to the right) create a raised face contact area that tends to be very smooth and in some cases uneven, or wavy. Therefore the sealing solution has to be very compressible / conformable, resistance to the process fluid and able to seal at lower stresses.



Historically customers have reported great success with GYLON® 3545 and 3504, as these products provide the level of conformability needed to seal these smooth and sometimes uneven surfaces. GYLON EPIX™ is worth consideration as well, as these products provide the proven performance of traditional GYLON styles with as much as 10x improvement in compressibility, which is key with these glass lined surfaces.

Installation

Regardless of the liner type it is important to always consult the flange / equipment manufacturer for proper installation practices and torque values. Once this information is gathered please feel free to contact Garlock Applications Engineering at 315-597-7350 to discuss the application and for assistance is selecting the best sealing solution.

Matt Tones – Sr. Applications Engineer, Gasketing