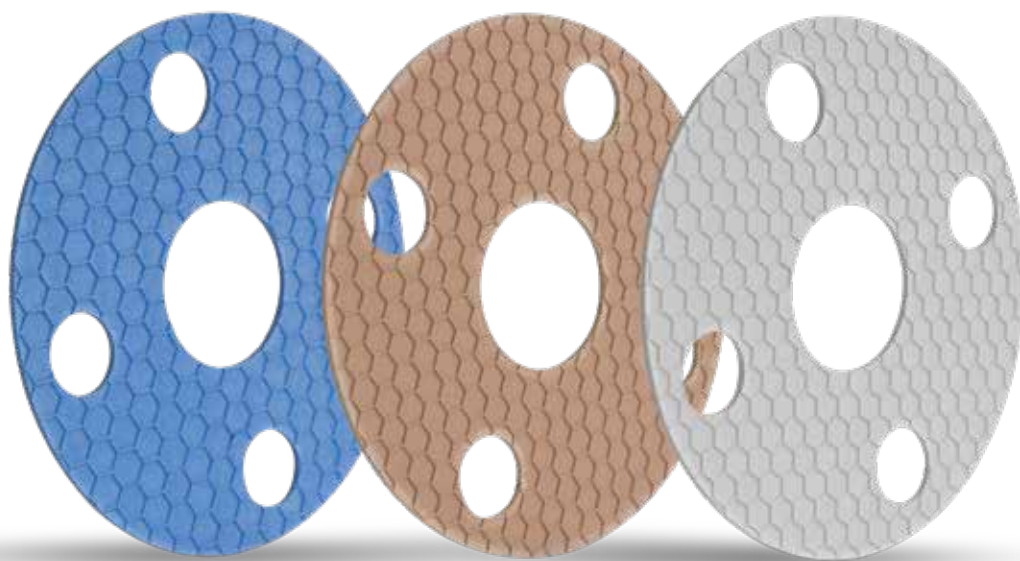


Garlock
an EnPro Industries family of companies

Garlock GYLON EPIX[®]

The next generation in PTFE gasketing



Leaders in Sealing Integrity

GASKETING CHALLENGES

WHY GASKETS FAIL

GYLON EPIX® is a patented family of PTFE gaskets designed to solve many of the industry's most common gasketing challenges, such as poor load retention, old worn flanges or equipment that was not designed with the gasket joint in mind.

IMPROPER BOLT LOAD SOLVED



Non-metallic (FRP) flanges provide a cost effective piping option for chemical services. However the low allowable torque is an issue when process media eliminates rubber (elastomeric) gaskets as an option, and PTFE is required.

PERFECT FOR AGGRESSIVE & CORROSIVE MEDIA



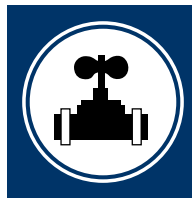
End-users are often frustrated by gaskets that leak, particularly when they are responsible for containing aggressive and corrosive chemicals throughout the plant.

POOR FLANGE CONDITIONS ADDRESSED



Replacing or repairing worn, damaged or misaligned flanges can result in costly downtime. A sealing solution that can work in less-than-perfect flanges would solve this problem.

GASKET SELECTION SIMPLIFIED



Having more than one thickness results in more inventory, as well as confusion when it comes time for an operator to select a gasket. One thickness that covers all sizes is beneficial.

INTRODUCING GYLON EPIX®

The perfect solution for imperfect flanges

A BETTER SOLUTION

GYLON EPIX® is a family of gaskets that effectively seals a broader range of applications and is more forgiving during the installation process. GYLON EPIX® allows the end user to save valuable turn-around time, reduce re-work, and lower costs, helping them to finish ahead of schedule and under budget.

IMPROPER BOLT LOAD SOLVED



ENGINEERED SURFACE PROFILE

- » Helps achieve a seal in poor flange conditions
- » Engineered surface profiles concentrate load resulting in stress optimization
- » Testing shows effective sealing in flanges with .010" and .020" deep scoring

PERFECT FOR AGGRESSIVE & CORROSIVE MEDIA



TRUSTED MATERIALS

- » Made from traditional GYLON® PTFE which eliminates the need for most customers to re-qualify
- » Chemical resistant, proven with aggressive and corrosive media
- » Available in sheet and discreet forms and can be dovetailed

POOR FLANGE CONDITIONS ADDRESSED



EXCELLENT SEALABILITY

- » Helps to mitigate the effects of improper bolt load
- » Up to 10x more compressibility than traditional PTFE gaskets
- » Effectively seals liquids at stresses as low as 300-600 psi
- » Suitable for FRP flange applications

GASKET SELECTION SIMPLIFIED



UNIVERSAL THICKNESS

- » Helps avoid improper gasket selection
- » Offered in one thickness - 3/32" (2.4mm) that provides the conformability of thicker 1/8" (3.2mm) gaskets, and the improved blowout resistance, load retention and sealability of 1/16" (1.6mm) thick gaskets

The GYLON EPIX® Difference

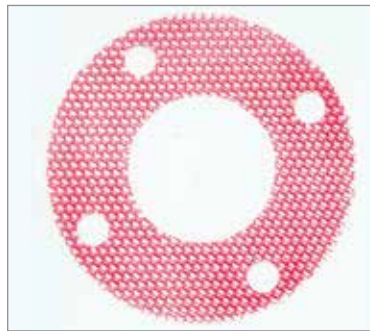
GYLON EPIX® provides superior functional performance by combining the traditional attributes of GYLON® with an innovative surface design. It offers broader applicability in worn and pitted flanges than traditional PTFE. In addition, GYLON EPIX® delivers the sealing and load retention properties of $1/16$ " and the conformability of $1/8$ ". The hexagonal profile provides improved compressibility and recovery. The profiled surface reduces the contact area during initial compression to concentrate the compressive force of the flange for improved sealability.

LOAD RETENTION & CONCENTRATED GASKET STRESS

GYLON EPIX® is able to distribute the load more evenly and prevent areas of low loading.



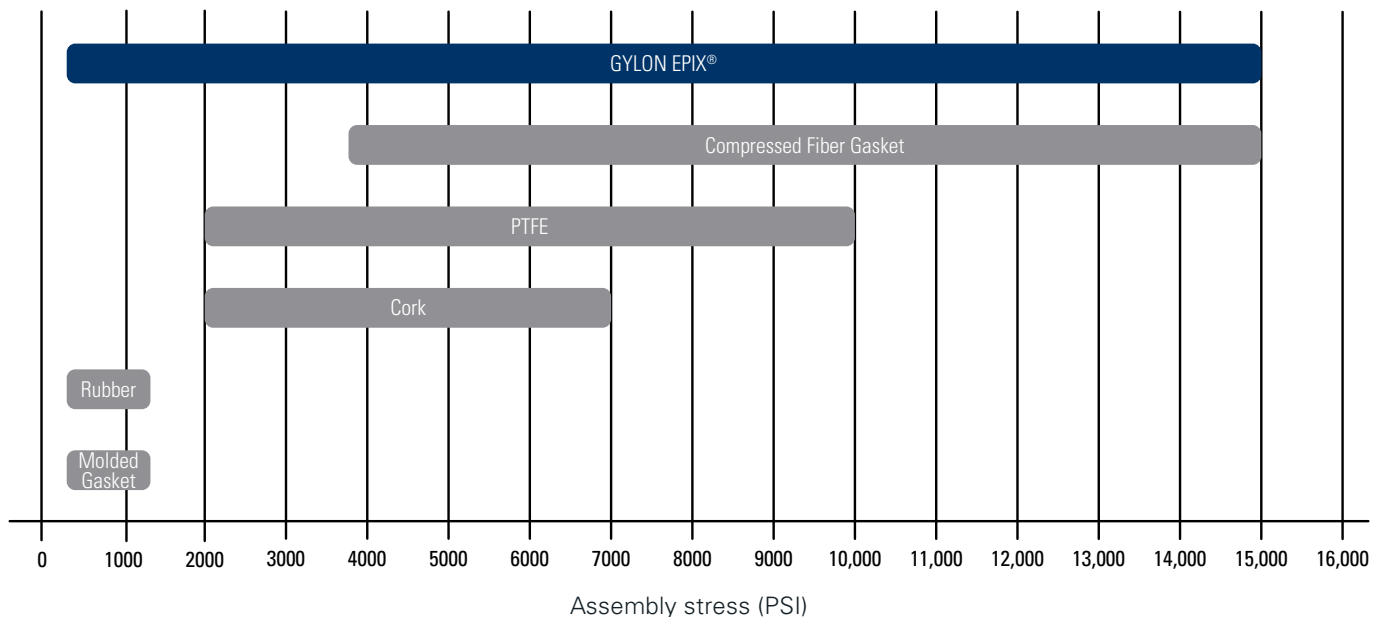
Traditional GYLON®



GYLON EPIX®

While the traditional gasket saw areas of lower stress (white and light red areas), the hexagonal pattern in GYLON EPIX® concentrated the stress more evenly across the entire gasket.

TYPICAL ASSEMBLY STRESS RANGE RECOMMENDED FOR COMMON GASKET TYPES



GYLON EPIX® Styles



GYLON EPIX® STYLE 3500

Silica filled PTFE

APPLICATIONS

- » Strong Acids
- » Solvents
- » Hydrocarbons
- » Water
- » Steam
- » Chlorine
- » Cryogenics

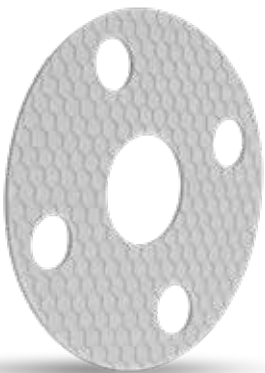


GYLON EPIX® STYLE 3504

Aluminosilicate Microsphere filled PTFE

APPLICATIONS

- » Most acids and some caustics
- » Hydrocarbons
- » Solvents
- » Water
- » Refrigerants
- » Cryogenics



GYLON EPIX® STYLE 3510

Barium Sulfate filled PTFE

APPLICATIONS

- » Strong caustics
- » Moderate acids
- » Chlorine
- » Gases
- » Monomers
- » Steam
- » Hydrocarbons
- » Cryogenics
- » Aluminum fluoride

CASE STUDIES



CHEMICAL

Chloralkali & Chlorine Processor

BACKGROUND

This plant site has both flat face FRP and lap joint nickel pipe flanges. Overtightening and rupturing of their gaskets was a common issue, while alternate solutions were generally unreliable in FRP flanges due to low bolt torque allowed. The customer needed to consolidate to the fewest number of gaskets that would be suitable for chloralkali process media, metal lap joint flanges and FRP flanges. The customer also desired a gasketing option that was available in sheet form, to give them the flexibility to produce any size and shape gasket.

OPERATING CONDITIONS

Temperature: 194°F (90°C) - 203°F (95°C)
Application: Raised face lap joint nickel and flat face FRP flanges
Media: Potassium hydroxide and catholite
Pressure: 50 - 70 psig (3.4 - 4.8 bar-g)
Size: 6" ring and full face gaskets

SOLUTION

GYLON EPIX® Style 3510



MINING

Copper Refining

BACKGROUND

The gas shut off globe valve flanges were a chronic source of leakage. Not only were the flanges 8"-150# flat face, which are notorious for having marginal bolt loading, but the faces were also worn and damaged due to age. These two issues made it difficult for the customer to achieve a tight reliable seal with the PTFE and utility grade compressed fiber gasket materials historically used at the facility.

OPERATING CONDITIONS

Temperature: Ambient
Application: 8"-150# flat face flanges - globe valve in main gas feed line
Media: Natural gas
Pressure: 60 psig (4.1 bar-g)

SOLUTION

GYLON EPIX® Style 3500

CASE STUDIES



FOOD PROCESSING

Food & Beverage

BACKGROUND

The customer's chemical treatment vessel had nonstandard rectangular flanges with a limited number of bolts. The limited bolting resulted in inadequate compression to seal the gasket and the non-standard shape made the use of a molded engineered gasket unfeasible. Previously the customer was using expanded PTFE, which leaked from the time it was first installed but, because they were unable to find a better alternative, they simply accepted the leakage.

OPERATING CONDITIONS

Temperature: 86°F (30°C) - 104°F (40°C)
Application: Custom rectangular flange
Media: Dilute caustic soda
Pressure: 50 psig (3.4 barg)

SOLUTION

GYLON EPIX® Style 3504



PULP & PAPER

Paper Board/Packaging

BACKGROUND

The two main media used at this paper board and paper packaging plant are white liquor and wash stock. The 8"-150# stainless steel ball valve used in caustic liquor service and the 24"-150# stainless steel gate valve in the wash stock were both a source of chronic leaks. The customer had attempted several times unsuccessfully to seal the valve flange connections with metal inserted PTFE, e-PTFE tape and EPDM rubber. The attempts were not only costly in downtime, but also created several safety and housekeeping issues for the facility.

OPERATING CONDITIONS

Temperature: 100°F (37°C) - 115°F (46°C)
Application: Stainless steel valve flange
Media: Caustic white liquor & wash stock
Pressure: 85 psig (5.9 barg)

SOLUTION

GYLON EPIX® Style 3510

TECHNICAL DATA

GENERAL SEALING CHARACTERISTICS

	Style 3500 EPX	Style 3504 EPX	Style 3510 EPX
Color	Fawn	Blue	Off-White
Composition	PTFE w/ silica	PTFE w/ aluminosilicate microspheres	PTFE w/ barium sulfate
Temperature range			
Minimum:	-450°F (-268°C)	-450°F (-268°C)	-450°F (-268°C)
Operating:	400°F (204°C)	400°F (204°C)	400°F (204°C)
Maximum:	500°F (260°C)	500°F (260°C)	500°F (260°C)
Pressure			
Operating:	750 psig (52 bar-g)	750 psig (52 bar-g)	750 psig (52 bar-g)
Maximum:	1200 psig (83 bar-g)	1200 psig (83 bar-g)	1200 psig (83 bar-g)
PxT, max. - psig x °F (bar-g x °C)			
	3/32" (2.4mm)	350,000 (12,000)	350,000 (12,000)
Compressibility Range (ASTM F36) %	47	52	43
Recovery (ASTM F36) %	>17	>25	>18
Tensile Strength psi (ASTM D1708) (N/mm ²)	2,000 (14)	2,000 (14)	2,000 (14)
Bacterial Growth	Will not support		

GYLON EPIX® APPROVALS & CERTIFICATIONS

	Style 3500 EPX	Style 3504 EPX	Style 3510 EPX
FDA	X	X	X
USDA	X		
ADI/TSE Free	X	X	X
USP VI <87>	X	X	X
USP VI <88>	X	X	X
USP VI <661>		X	
REACH	X	X	X
RoHS 3	X	X	X

Additional certificates for individual styles are available upon request

AVAILABLE SIZES

	Style 3500 EPX	Style 3504 EPX	Style 3510 EPX
Thickness - inch (mm)	3/32" (2.4mm)	3/32" (2.4mm)	3/32" (2.4mm)
Tolerance - inch (mm)	+/- 0.008 (0.2mm)	+/- 0.008 (0.2mm)	+/- 0.008 (0.2mm)
Sheet Sizes - inch (m)	60"x 60" (1.5m x 1.5m)	60"x 60" (1.5m x 1.5m)	60"x 60" (1.5m x 1.5m)

INSTALLATION RECOMMENDATIONS

FACTORS AFFECTING GASKET PERFORMANCE

A gasket has one basic function: to create a positive seal between two relatively stationary parts. The gasket must do a number of different jobs well to function properly - first, create an initial seal; second, maintain the seal over a desired length of time; third, be easily removed and replaced. Varying degrees of success are dependent on how well the gasket does the following:

1. Seals system fluid.
2. Chemically resists the system fluid to prevent serious impairment of its physical properties.
3. Deforms enough to flow into the imperfections on the gasket seating surfaces to provide intimate contact between the gasket and the sealing surfaces.
4. Withstands system temperatures without serious impairments of its performance properties.
5. Is resilient and creep resistant enough to maintain an adequate portion of the applied load.
6. Has sufficient strength to resist crushing under the applied load, and maintain its integrity when being handled and installed.
7. Does not contaminate the system fluid.
8. Does not promote corrosion of the gasket seating surfaces.
9. Is easily and cleanly removable at the time of replacement.

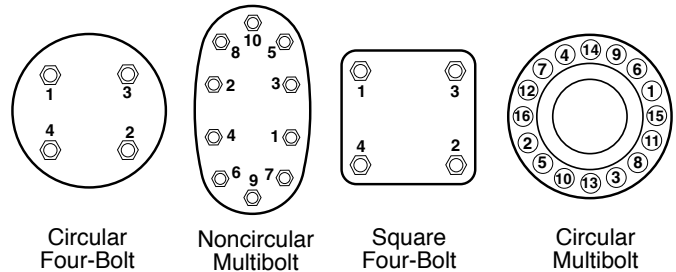
During the gasket product selection process that follows, we recommend that these nine (9) factors be used as a checklist from the viewpoint of the user's degree of need for each factor and the manufacturer's degree of compliance.

INSTALLATION

A few simple precautionary measures must be observed during installation to ensure the most satisfactory joint.

- » The features of GYLON EPIX® significantly improve many of the properties, such as compressibility, recovery, load retention, sealability, etc. over traditional PTFE gasketing. Proper installation practices are still critical to achieving optimum performance from GYLON EPIX® gaskets; consult torque requirements in the tables provided in this publication.
- » For optimum performance the sealing surface should be no less than ½" wide.
- » Center the gasket on the flange. This is extremely vital where raised faces are involved.
- » Be sure surface finish and flatness are satisfactory.
- » Tighten the bolts to compress the gasket uniformly. This means going from side to side around the joint. See correct bolting pattern below.
- » Use a torque wrench, well-lubricated fasteners, and hardened flat washers to ensure correct initial loading.
- » All bolts should be tightened in one-third increments, according to proper bolting patterns.
- » Make a final check pass at the target torque value moving consecutively from bolt to bolt.
- » Re-torque 12 to 24 hours after initial installation, whenever possible. All applicable safety standards including lockout/tag-out procedures should be observed.
- » Never use liquid or metallic based anti-stick or lubricating compounds on the gaskets. Premature failure could occur as a result.

CORRECT BOLTING PATTERN



BOLT TORQUE VALUES FOR GYLON EPIX®

ASME B16.5 150# RAISED FACE FLANGES WITH A193 GRADE B7 BOLTS

Nom. Pipe Size inches	# of bolts	Size of Bolts inches	Internal Pressure psig	Minimum Torque ft. lbs.	Preferred Torque ft. lbs.
2	4	5/8	300	52	120
2½	4	5/8	300	61	120
3	4	5/8	300	89	120
3½	8	5/8	300	50	120
4	8	5/8	300	63	120
5	8	¾	300	88	200
6	8	¾	300	111	200
8	8	¾	300	150	200
10	12	7/8	300	141	320
12	12	7/8	300	187	320
14	12	1	300	238	490
16	16	1	300	226	490
18	16	1 1/8	300	336	710
20	20	1 1/8	300	296	710
24	20	1 ¼	300	422	1000

Minimum torque values based on a minimum gasket stress of 3600 psi.

Preferred torque values based on a maximum gasket stress of 15,000 psi or 60,000 psi bolt stress, whichever occurs first.

Contact Garlock Application Engineering if flanges are non-metallic or if bolt grade is other than A193 B7.

ASME B16.5 300# RAISED FACE FLANGES WITH A193 GRADE B7 BOLTS

Nom. Pipe Size inches	# of bolts	Size of Bolts inches	Internal Pressure psig	Minimum Torque ft. lbs.	Preferred Torque ft. lbs.
2	8	5/8	800	35	108
2½	8	¾	800	45	141
3	8	¾	800	66	200
3½	8	¾	800	74	200
4	8	¾	800	94	200
5	8	¾	800	117	200
6	12	¾	800	99	200
8	12	7/8	800	160	320
10	16	1	800	185	490
12	16	1 1/8	800	269	710
14	20	1 1/8	800	234	652
16	16	1 ¼	800	328	912
18	24	1 ¼	800	371	1000
20	24	1 ¼	800	409	1000
24	24	1 ½	800	579	1552

Minimum torque values based on a minimum gasket stress of 4800 psi to 5600 psi (depending on flange size).

Preferred torque values based on a maximum gasket stress of 15,000 psi or 60,000 psi bolt stress, whichever occurs first.

Contact Garlock Application Engineering if flanges are non-metallic or if bolt grade is other than A193 B7.

GUIDANCE FOR GYLON EPIX®

In 150# Flat Face Smooth Fiber Reinforced Plastic (FRP) Flanges¹

Nominal Size (Inch)	Torque (ft.lbs.)		
	3500 EPX	3504 EPX	3510 EPX
1	7	7	14
1.5	9	9	19
2	16	16	33
3	24	24	49
4	16	16	33
6	23	23	46
8	33	33	66
10	32	32	64
12	47	47	93
14	67	67	134
16	60	60	120
18	66	66	132
20	62	62	124
24	87	87	173
26 - 48	GYLON EPIX® can be used for these sizes. Consult with Garlock Applications Engineering for bolt torque guidance.		

150# Flat Face Smooth FRP Flange Sealability Testing – 150 psig Ambient Water

¹ The table above shows the torque values required to achieve 300 psi gasket stress (3500 EPX and 3504 EPX) and 600 psi gasket stress (3510 EPX), and are applicable for 150# flat face FRP flanges with smooth faces (no surface profiles or raised features). These minimum stress values were determined by testing the three GYLON EPIX® styles in a 6" Class 150 FRP flange test rig with water at 150 psig and 180°F and in laboratory test fixtures. Consult applications engineering if the flanges are PVC/CPVC and/or have a profiled finish. Never exceed the maximum allowable torque published by the FRP flange manufacturer. Doing so could result in flange/equipment damage.



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