

Garlock

GYLON EPIX[®]

The next level in PTFE gasketing



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The GYLON® Story

Family of PTFE Gasketing

GYLON® family history

When PTFE* was developed in 1938, the importance of the material to industrial sealing was quickly recognized because of the tremendous chemical resistance characteristics. While use of PTFE as a gasket material increased in industrial applications, complaints about certain properties started to build: skive marks made initial sealing difficult, cold flow caused leakage and premature failure, and temperature/pressure cycling was a problem.

Resistance to cold flow

These drawbacks were eliminated when Garlock introduced GYLON® Fawn, Style 3500, in 1967. The GYLON® process minimizes creep and cold flow normally associated with PTFE products, while retaining other positive characteristics of PTFE. GYLON® Fawn was so innovative that it received Chemical Processing magazine's Vaaler Award in 1968. As the variety and quantity of industrial chemicals increased, Garlock realized that new products would be required to serve the growing market. Two additional GYLON® styles were introduced to meet those demands: GYLON® Style 3504, and GYLON® Style 3510.

High pressure service, chemical compatibility

As production demands increased, pipe hammering and/or pressure spikes became more common. GYLON® Series HP 3560 and HP 3561 were designed to meet those extreme conditions. These perforated stainless steel-inserted GYLON® gasket materials outperform any other gasketing available for high pressure service where chemical compatibility is a concern.

* PTFE – polytetrafluoroethylene

Unlimited sizes and dimensions

With growing concern over fugitive emissions, the traditional dovetailing method of creating larger sized gaskets no longer met many customer demands. In response, Garlock created the Welded GYLON® process. Welded GYLON® eliminated dovetail leak paths and allowed the use of large gaskets without handling problems or premature blowout. Today, GYLON® gaskets can be thermally bonded (without the use of any adhesive or low melt temperature polymers) to any size or dimension; another breakthrough for Garlock gasketing.

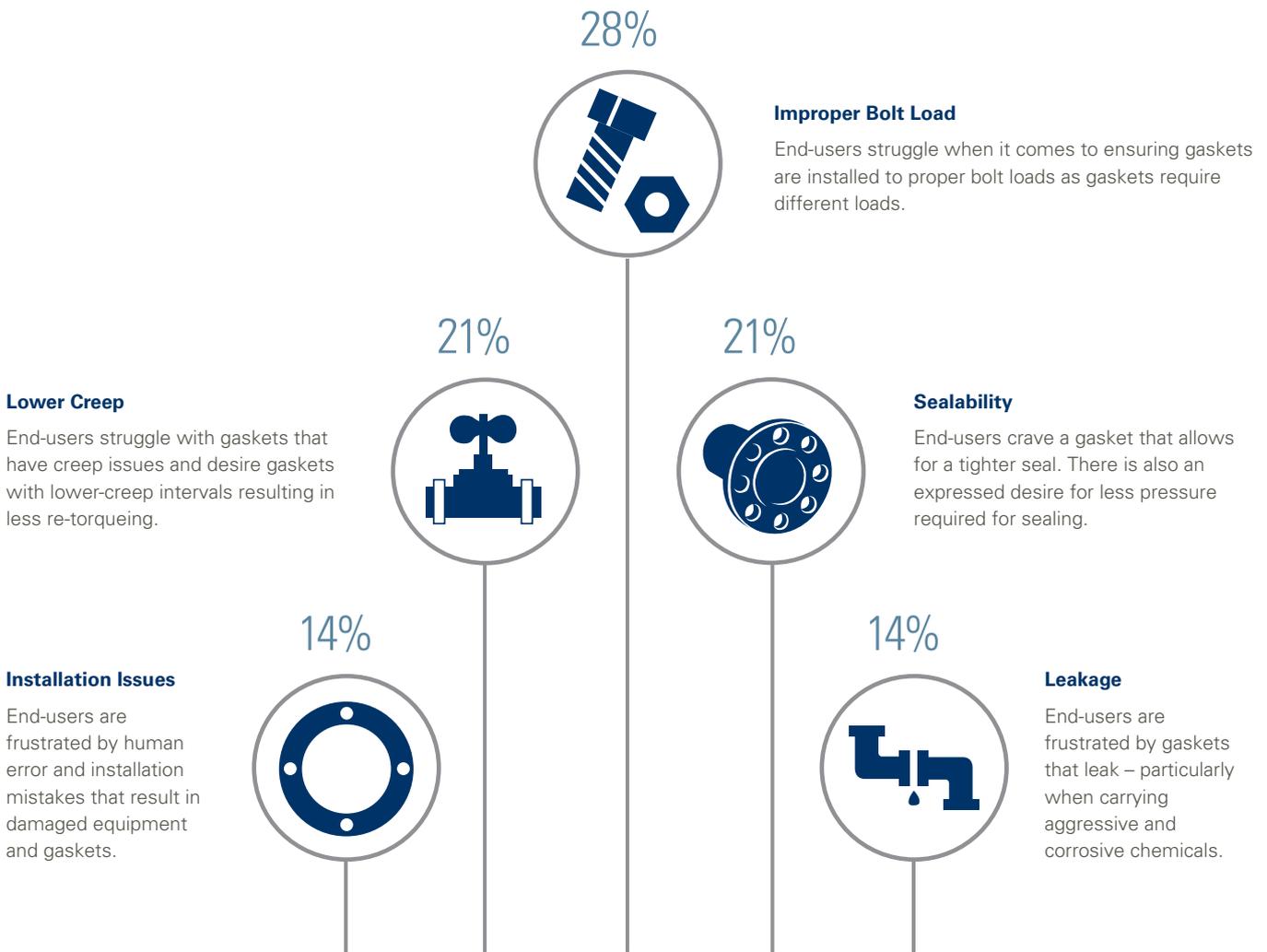
In times where environmental safety combined with cost savings gets more and more important, the well-known performance is not enough anymore. With the next level of gasketing GYLON EPIX® is ready for the changing environment.

Gasketing Challenges

We heard

We made a survey and asked decision maker in the industry about their common gasketing challenges and found the following

% = Proportion of respondents named the particular challenge



Through the use of a 3rd party research firm, we consulted “gasket specialists” at our end users to assess the decision making process currently in place when it comes to gaskets used in flanged pipes, challenges faced with their current gaskets, frequency of plant shutdowns for maintenance, frequency of scheduled maintenance, etc.

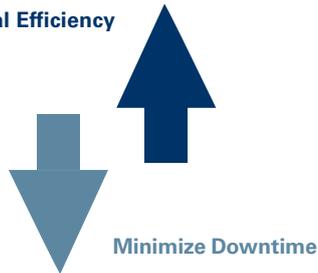
Industry Challenges

We understood

We understand your goals

People or machines sitting idle results in products not being made, which affects your bottom line. Garlock is dedicated to helping our customers minimize downtime and increase operational efficiency.

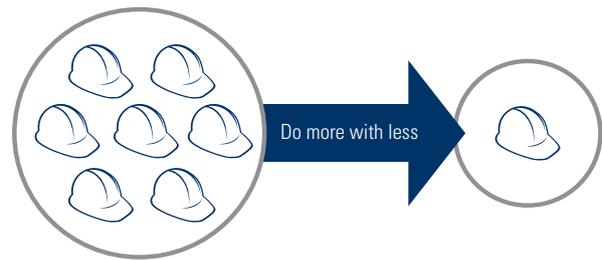
Increase Operational Efficiency



The right combination of people, processes and technology align to optimize your business performance.

Challenges

- » Conflicting
- » Understaffing
- » Under trained maintenance
- » Outsourced labor



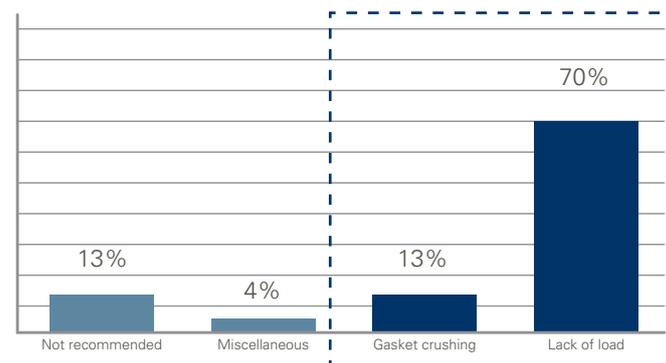
Reliability engineers are now responsible for a lot more equipment or areas of the plant than in the past.

Gasketing misconception

In a world where we are bombarded with the belief that “more is better” sealing science contradicts that theory with facts that shows “thinner is better” when it comes to gaskets, as they provide improved load retention, pressure resistance and sealability. Yet thicker gaskets have their place for uneven, worn or damaged sealing surfaces. So how does a person make the right choice?

What if there was a product that could do both?

Why gaskets fail - review of a hundred failed gaskets



% = Proportion of failure type

83% of gasket failures are due to installation errors

Introducing GYLON EPIX®

Next level gasketing

There is a better way

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.

Inventory simplification

Offered in one universal thickness, 3/32" (2,4mm), eliminating the need to stock a variety of material thicknesses with different stress requirements. This translates to reduced inventory and better sheet utilization. Decreases time and effort to uphold and re-work plant standards.

Improved load retention

GYLON EPIX® features a hexagonal surface profile that provides the torque retention and blowout resistance of a thin gasket and the ability to adapt to irregular surfaces of a thicker gasket.



Trusted material

Made from the same PTFE material as standard GYLON® products it eliminates the need for most customers to qualify the new GYLON EPIX® products.

Patented hexagonal profile

Patented hexagonal profile creates superb sealing and ability to conform to imperfect flange surfaces.

GYLON EPIX®

Enhanced sealing performance

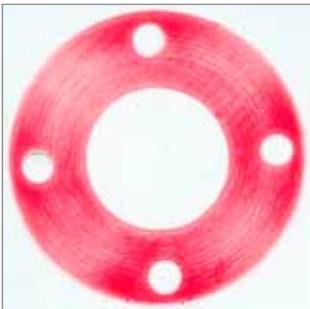
GYLON EPIX®

GYLON EPIX® is a newly developed family of PTFE gaskets. It is manufactured using a patented, profiled surface based on our proven GYLON® Standard, Blue and White, to create highly conformable materials for optimum sealing performance.

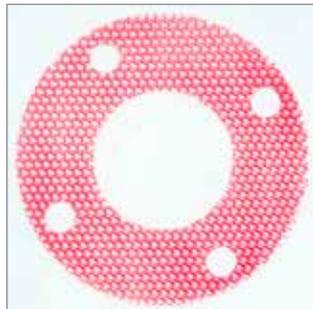
The innovative GYLON EPIX® provides superior functional performance by combining the traditional attributes of GYLON® with an innovative surface design. It offers a broader range of applications than traditional PTFE gaskets. GYLON EPIX® delivers the sealing and load retention properties of 1/16" and 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 and to generate high-density-zones within the material, for improved sealability.

Designed for increased compressibility, GYLON EPIX® improves performance in misaligned flanges. The consolidation of two thicknesses to one reduces the need to inventory multiple thicknesses. Doing so, GYLON EPIX® also reduces time and effort to uphold and re-work plant standards and piping class calculations. Garlock is dedicated to providing real sealing solutions that meet real world sealing needs. With an improved design, color-coded materials and a single thickness, GYLON EPIX® makes sealing easier.

The GYLON EPIX® difference

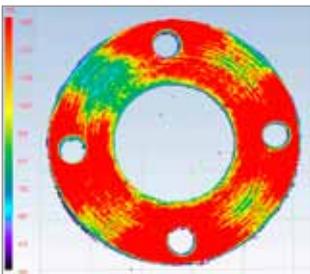


Traditional restructured PTFE

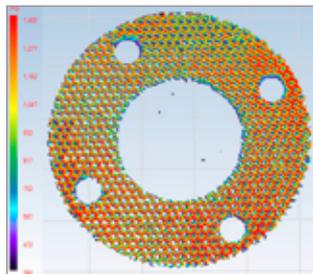


GYLON EPIX®

GYLON EPIX® and a traditional full face gasket were installed in a 3"-150# flat face flange at 120 ft.lbs. with pressure sensitive film. The film revealed that the traditional material saw heavier loading near and around the bolts, and lighter loading at the points furthest from the bolts. The GYLON EPIX® was able to distribute the load more evenly and prevent the low loading phenomenon.



Traditional restructured PTFE



GYLON EPIX®

The pressure sensitive film was then analyzed with special software that translate the various shades of red into a full color spectrum that provides a better visualization of the stresses that were developed on each of the gaskets. Again, while the traditional gasket saw areas of lower stress (green and blue areas), the hexagonal pattern in the GYLON EPIX® concentrated and distributed the stress more evenly across the entire gasket.

GYLON EPIX®

Our GYLON EPIX® Styles

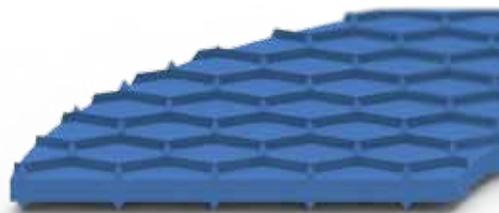
GYLON EPIX® Style 3501-E

GYLON EPIX® Style 3501-E is a high performance, silica filled PTFE sheet material designed for use with strong acids, solvents, hydrocarbons, and other aggressive media. GYLON EPIX® Style 3501-E withstands a wide range of chemicals for extended service in a wide variety of applications.



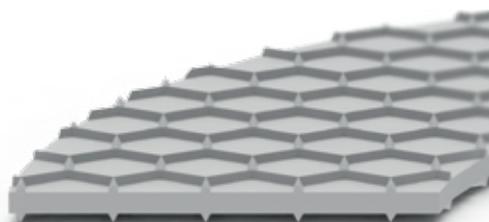
GYLON EPIX® Style 3504

GYLON EPIX® Style 3504 is a high performance, aluminosilicate microsphere filled PTFE sheet material designed for use in moderate concentrations of acids, and caustics, as well as hydrocarbons, refrigerants, and more. GYLON EPIX® Style 3504 withstands a wide range of chemicals for extended service in a wide variety of applications.



GYLON EPIX® Style 3510

GYLON EPIX® Style 3510 is a high performance, barium sulfate filled PTFE gasketing material. GYLON EPIX® Style 3510 is designed for use where initiating and maintaining an extremely tight seal is critical; these applications include: strong caustics and moderate acids, chlorine, gases, water, steam, hydrocarbons and cryogenics. GYLON EPIX® Style 3510 withstands a wide range of chemicals for extended service in a wide variety of applications.



Technical Information

Several characteristics and sizes

General sealing characteristics

	GYLON EPIX® Style 3501-E	GYLON EPIX® Style 3504	GYLON EPIX® Style 3510
Color	Brick-Red	Blue	White
Composition	PTFE w/ silica	PTFE w/ aluminosilicate	PTFE w/ barium sulfate
Temperature range			
Minimum:	-268°C (-450°F)	-268°C (-450°F)	-268°C (-450°F)
Ideal Operating Limit:	204°C (400°F)	204°C (400°F)	204°C (400°F)
Maximum:	See pressure / Temperature ratings graph		
Pressure			
Ideal Operating Limit:	52 bar (750 psig)	52 bar (750 psig)	52 bar (750 psig)
Maximum:	See pressure / Temperature ratings graph		
Load Retention (DIN 52913)	50%	50%	50%
Compressibility (ASTM F 36)	47%	52%	43%
Recovery (ASTM F 36)	17%	25%	18%
Tensile strength (ASTM D 1708)	8,3 MPa (1 200 psi)	10,3 MPa (1 500 psi)	8,3 MPa (1 200 psi)
Sealability (ASTM F 37 B) Fuel A:* Internal pressure = 0,7 bar (9,8 psig) Gasket load = 6,9 MPa (1 000 psi)	0,2 ml/hr.	0,2 ml/hr.	0,2 ml/hr.
Sealability (ASTM F 37 B) Nitrogen* Internal pressure = 2 bar (30 psig) Gasket load = 20,7 MPa (3 000 psi)	0,25 ml/hr.	0,15 ml/hr.	0,2 ml/hr.
Gas permeability (DIN 3535/6) mg/m-sec	< 0,0005	< 0,0005	< 0,0005
Gas permeability (DIN 3535/4) cc/min	< 0,006	< 0,006	< 0,006

*0,2" inner diameter x 1,20" outer diameter test gasket size

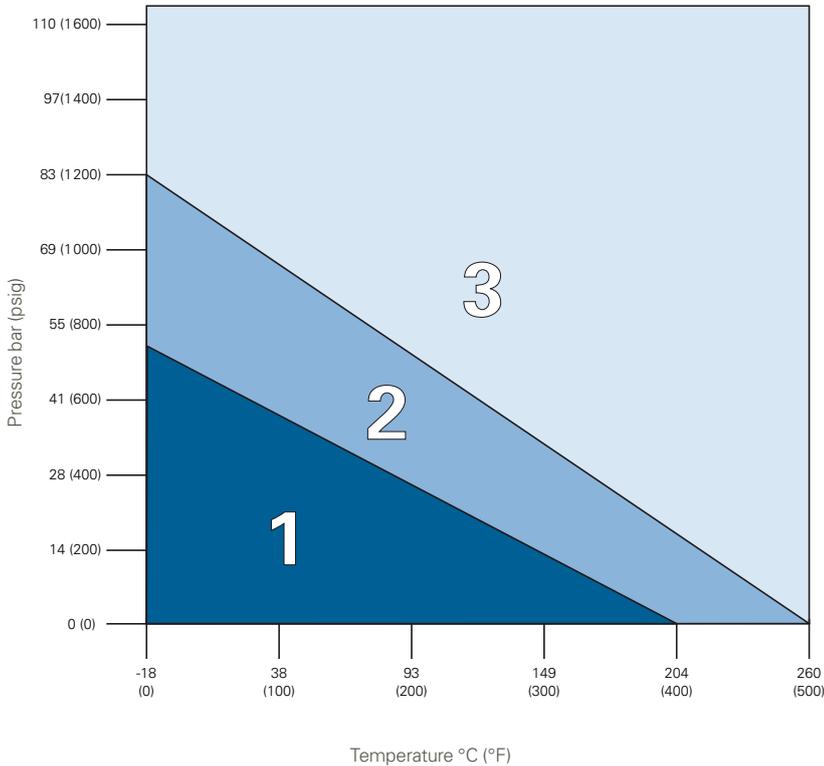
Available sizes

	GYLON EPIX® Style 3501-E	GYLON EPIX® Style 3504	GYLON EPIX® Style 3510
Thickness	2,4 mm	2,4 mm	2,4 mm
Tolerance	0,2 mm	0,2 mm	0,2 mm
Sheet Sizes	1,5 m x 1,5 m	1,5 m x 1,5 m	1,5 m x 1,5 m

Technical Information

Operating range and certificates

Pressure/Temperature ratings



Legend:

1. Suitable for use if chemically compatible and installed using Garlock’s recommended installation practices and assembly stresses.
2. Please consult Garlock Applications Engineering to confirm the suitability with your service conditions.
3. Generally not suitable - please consult Garlock Applications Engineering to confirm the suitability with your service conditions.

Approvals & Certifications

	GYLON EPIX® Style 3501-E	GYLON EPIX® Style 3504	GYLON EPIX® Style 3510
FDA	X	X	X
ADI/TSE Free	X	X	X
USP VI <87>		X	X
USP VI <88>		X	X
USP VI <661>		X	
REACH	X	X	X
RoHS 3	X	X	X
TA Luft	X	X	X
Blow-out proof	X	X	X
DIN EN 13555	X	X	X

Additional certificates for individual styles are available upon request.

Technical Information

DIN EN 13555 characteristics

DIN EN 13555 characteristics

		Test Method	Units	GYLON EPIX® Style 3501-E	GYLON EPIX® Style 3504	GYLON EPIX® Style 3510
Maximum tolerated assembly stress in accordance to DIN EN 13555 Q_{max}	20°C (68°F)	EN 13555	MPa (psi)	230 (33 350)	200 (29 000)	230 (33 350)
	100°C (212°F)	EN 13555	MPa (psi)	200 (29 000)	120 (17 400)	160 (23 200)
	150°C (302°F)	EN 13555	MPa (psi)	200 (29 000)	100 (14 500)	140 (20 300)
	200°C (392°F)	EN 13555	MPa (psi)	180 (26 100)	80 (11 600)	120 (17 400)
	250°C (482°F)	EN 13555	MPa (psi)	160 (23 200)	60 (8 700)	100 (14 500)
Minimum stress Q_{min} (L=0,01) needed during installation to reach 0,01 [mg / (s * m)]	10-40 bar (150-600 psig)	EN 13555	MPa (psi)	5 (725)	5 (725)	5 (725)
	80 bar (1 160 psig)	EN 13555	MPa (psi)	12 (1 740)	10 (1 450)	10 (1 450)
Maximum Sealability Class at 20°C (68°F) at 20 MPa (2 900 psi) Assembly stress	10-20 bar (145-290 psig)	EN 13555	L[mg/(s*m)]	1,0x10 ⁻⁴	1,0x10 ⁻⁴	1,0x10 ⁻⁴
	40-80 bar (580-1 160 psig)	EN 13555	L[mg/(s*m)]	1,0x10 ⁻³	1,0x10 ⁻³	1,0x10 ⁻³
Maximum sealability class at 20°C (68°F) at 160 MPa (23 200 psi) assembly stress	40 bar (580 psig)	EN 13555	L[mg/(s*m)]	1,0x10 ⁻⁶	1,0x10 ⁻⁵	1,0x10 ⁻⁵
	Corresponding pressure		Initial Assembly Stress (QA)	Residual Assembly Stress	Residual Assembly Stress	Residual Assembly Stress
Initial & Residual Assembly Stress Q_{min} required to achieve sealability of 0,01 [mg/(s*m)] (In accordance with DIN EN 13555 test method)	10 bar (150 psig)		10 MPa (1 450 psi)	3 MPa (435 psi)	3 MPa (435 psi)	3 MPa (435 psi)
	20 bar (300 psig)		10 MPa (1 450 psi)	4 MPa (580 psi)	4 MPa (580 psi)	4 MPa (580 psi)
	40 bar (600 psig)		10 MPa (1 450 psi)	5 MPa (725 psi)	5 MPa (725 psi)	5 MPa (725 psi)
	80 bar (1 160 psig)		20 MPa (2 900 psi)	10 MPa (1 450 psi)	10 MPa (1 450 psi)	10 MPa (1 450 psi)

Note: All leak testing regarding DIN EN 13555 was performed with helium gas.

Example Cases

Grease Production - GYLON EPIX® Style 3501-E

Food Industries

A manufacturer of Oleo related products like fatty acids, glycerin, dimers, monomers, isostearics, fatty alcohols and triacetin.

Operating Conditions

1. Media: Polysaturated fatty acid, and coolant in the other compartment.
2. Thermocycles between 20°C and 220°C
3. Size: Inner diameter = 260mm / Outer diameter = 745mm
4. Temperature: up to 260°C short periods, 220°C continuous
5. Pressure: 6 bar (87psi)

Challenges faced

The customer has had leakage issues with the spiral heat exchanger which is fastened by outside mounted clamping screws. The screws only apply low load, and the system is subjected to daily thermocycling. The previously used gaskets had to be exchanged frequently and were cut to pieces by the spiral separation bars. Shutting down the heat exchanger is costly as this also stops steam distribution to the whole facility.

Solution

Since the installation of GYLON EPIX® Style 3501-E, the sealability of whole heat exchanger system has been significantly improved, increasing the whole plant availability. After 6 months of seamless operation, the system was opened and the general appearance inspected. The gasket was found to be in excellent condition. No dismantling, no misplacement, no cutting, no discolourization, no effect becoming brittle could be found and the gasket was not sticking to flanges at all. The customer is very pleased with the results and has specified GYLON EPIX® Style 3501-E for this application.



Multinational chemical processing - GYLON EPIX® Style 3504

Chemical

Multinational Chemical Processor.

Operating Conditions

1. Media: 25% sulfuric acid and some hydrogen peroxide
2. Temperature: Ambient
3. Pressure: 2-3 bar
4. Size: DN200 PN10 (8"-150#)"

Challenges faced

Extremely corrosive and toxic media, sulfuric acid and hydrogen peroxide, are being handled. In addition, the customer reported that several of the non-metallic (FRP) flanges were misaligned, which made it difficult to achieve and maintain an effective seal long term. There was the possibility of degradation of the metal-rubber gasket.

Solution

Two GYLON EPIX® Style 3504 test gaskets were installed and inspected ten months later at the scheduled outage. The impression of the flanges was clearly visible showing that the gasket conformed to the flange misaligned faces. GYLON EPIX® Style 3504 showed absolutely no sign of any chemical attack or leakage during the evaluation period.

Garlock GYLON EPIX® Style 3504 showed no degradation. It is made from premium grade restructured PTFE material to ensure reliable performance.



Example Cases

Chloralkali and chlorine processing - GYLON EPIX® Style 3510

Chemical

Large Chloralkali and Chlorine Processor and supplier.

Operating Conditions

1. Media: Potassium hydroxide, Catholyte
2. Temperature: 90 - 95 °C
3. Pressure: 50 to 70 psig
4. Size: 6" ring and full face gaskets

Challenges faced

The primary motivation to consider a new gasket was the customer's need to consolidate to the fewest number of gaskets that would be good in chloralkali process media, metal lap joint flanges and FRP flanges. The customer also desired a gasket that would come in sheet form, to give them the flexibility to produce any size and shape of gasket desired.

Solution

GYLON EPIX® Style 3510 was selected for its ability to seal the customer's flange types and compatibility with the range of chemical media found in chloralkali processes.

GYLON EPIX® Style 3510 was installed and provided leak free service after a trial period of one year, proving to be the ideal sealing solution for this application.



Monomer production - GYLON EPIX® Style 3510

Chemical

The customer is a producer of monomers and other feed stocks for the manufacture of coatings, adhesives and sealants.

Operating Conditions

1. Media: Meth-acrylic, acrylic, hypo-phosphorous, 25% sodium hydroxide which is diluted 50% with water and methanesulfonic acid (MSA). MSA is considered particularly aggressive
2. Temperature: 10 - 21 °C
3. Pressure: 50 psig to 60 psig (3.4 bar to 4.1 bar)
4. Size: Nominal pipes sizes of 1", 1-1/2", 2", 3", and 4"

Challenges faced

The customer's maintenance personnel had been using virgin PTFE and spiral wound gaskets but with no predictable reliability. Leakage issues, prompted the search for better sealing solutions. Ideally they desired one gasket to be used in all applications which included monomers, strong caustics and acids.

Solution

GYLON EPIX® Style 3510 was installed and is still performing reliably and without leaks.

GYLON EPIX® Style 3510 has helped to decrease the number of gaskets needed to seal the range of service conditions.



Note:
Properties/applications shown throughout this brochure are typical. Your specific application should not be undertaken without independent study and evaluation for suitability. For specific application recommendations consult Garlock. Failure to select the proper sealing products could result in property damage and/or serious personal injury. Performance data published in this brochure has been developed from field testing, customer field reports and/or in-house testing. While the utmost care has been used in compiling this brochure, we assume no responsibility for errors. Specifications subject to change without notice. This edition cancels all previous issues. Subject to change without notice GARLOCK is a registered trademark for packings, seals, gaskets, and other products of Garlock.
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