Environmental compliance is an objective that every company shares, but one that is particularly important to chemical and hydrocarbon processing facilities. According to the Ecological Society of America (ESA) half of all fugitive emissions come from these two process industries. The same ESA study identifies valve stem leaks as the leading source of fugitive emissions, accounting for 60% of emissions. To that end Garlock has created products whose sole purpose is to dramatically reduce fugitive valve stem emissions.

Environmental compliance is just one reason to cut emissions though. If a facility is already meeting mandated emissions level, why go farther? The answer is that while an active Leak Detection and Repair (LDAR) program has the obvious benefit of bringing your operation into compliance with environmental standards it also produces a stream of tangible and intangible benefits that go far beyond merely satisfying environmental regulations.

For example, cutting emissions improves production yields which, in turn increases operating profits.

Further, in an age of Marketable Pollution Permits, cutting emissions below mandated levels allow an operation to sell its unused emissions units. This not only improves operating profits, but creates a competitive advantage in that it increases the cost of competitors’ operations.

Operating efficiency is also improved as a result of creating a safer, and therefore more productive, workplace. Fewer lost time accidents and a proactive environmental program will also help your operation be perceived as the employer of choice and as a leader in the community.
GENERAL SEALING GUIDE
Garlock makes single, double and tandem seals for pumps and rotating equipment. We engineer and manufacture specialty seals for severe services, off design equipment and special operational circumstances. Single seals are the most economical, but double and tandem seals can exempt equipment from monthly inspections, have longer life, give early warning of failure, and have predictive failure for scheduled maintenance. Double seals are best for dirty products, abrasive/suspended solids, poor lubricating products, and pumps prone to cavitation. Tandem seals are best for high pressures, and pumps that must continue functioning to complete operations.

REDUCE THE CAPITAL COSTS OF COMPLIANCE
Garlock sealing products enable you to bring equipment into compliance through economical retrofitting. Capital costs associated with parts replacement are eliminated or significantly reduced.
GENERAL SEALING GUIDE
In addition to mechanical factors, the selection of a gasket product is based primarily on:

- Temperature at the gasketed joint
- Nature of the media
- The internal pressure of the media

For maintenance, repair and operating users, choose the styles with optimum physical properties with the major emphasis on sealability, creep relaxation, compressibility, recovery, and any other desired properties. As a general rule, thinner gaskets seal better.

BOLTED FLANGE CONNECTIONS
Optimizing the performance of a bolted flange connection requires an understanding of the equipment design. Historically flanges have been constructed of metal, such as carbon steel, cast iron, stainless steel or other exotic metals. However, innovations in polymers and polymer processing techniques have resulted in lighter-weight, lower cost alternative piping systems. While these polymer piping systems are extremely chemically resistant, the flanges are not as strong as traditional metallic flanges, resulting in limited torque.

Selecting a gasket based on the system media, and the operating temperature and pressure alone is not enough. It is imperative to factor in the available compressive stress to ensure the gasket is not under or over compressed.

Installation of the gasket is a crucial factor in the performance of a flange assembly. Garlock conducted a study of one-hundred gaskets returned for evaluation, and found that nearly 70% of the failures were due to lack of load often caused by poor installation. If not properly installed, gaskets can be subject to premature failure, resulting in product release.

Flange connections, like all equipment, perform best when they are properly maintained. Developing and implementing a flange assembly preventative maintenance program is yet another way to prevent dangerous and costly product releases.

AVOID COSTLY SHUTDOWNS
The detection of fugitive VOC emissions often results in the need for an unscheduled shutdown for emergency repairs. Garlock sealing products offer long service life, low maintenance and superior design to help keep your operation up and running.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valves</td>
<td>60%</td>
</tr>
<tr>
<td>Compressors</td>
<td>9.8%</td>
</tr>
<tr>
<td>Drains</td>
<td>8.9%</td>
</tr>
<tr>
<td>Relief Valves</td>
<td>4.5%</td>
</tr>
<tr>
<td>Flanges</td>
<td>5.3%</td>
</tr>
<tr>
<td>Pumps</td>
<td>11.5%</td>
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</tbody>
</table>

Equipment requiring sealing compliance.
Compression Packing

Garlock Expandable Valve Stem Packing or EVSP is the ideal solution for applications where fugitive emissions have to be less than 100 PPM, where fire safety or chemical resistance are required or where adjusting the packing load is not feasible.

- Outstanding sealing characteristics surpass the emission standards of today and will meet the standards of tomorrow, helping to keep you in compliance longer.
- Low friction design allows for easy actuation and results in a more efficient use of instrument air plant resources.
- Superior radial expansion seals old, worn valves, achieving emissions compliance throughout the plant without the capital cost of replacing valves.

Style 1303-FEP

When measuring the stuffing boxes of all the valves prior to installation is not a realistic option, Garlock Style 1303-FEP spool stock is a great alternative to EVSP. This proprietary wire reinforced graphite packing provides the low emissions levels of an engineered set with the installation flexibility and speed that comes from braided packing.

- The wire reinforced construction makes for a long lasting valve packing that requires minimal adjustment while delivering superior emissions control.
- Wire reinforcement will not score the stem or add excessive stem friction.
- Available on spool stock, reducing inventory and potential downtime.

Applies to:
Pumps  Valves  Flanges

Mechanical Seals

P/S® II (Triple Lip Seal)
Garlock’s triple lip cartridge seal, which utilizes proprietary GYLON® sealing elements, is highly effective in the toughest of applications. The P/S® II has been used extensively in a variety of highly viscous services including: Asphalt, Molasses, Adhesives, Polymers, Styrene, Oil and Syrup.

- Pressure handling to 150 PSI
- Temperature range from -40° F to 400° F
- Repair kit is available for easy field repair
- Standard Material of Construction: 316SS Gland, 316 HMC Sleeve, Fluoroelastomer o-rings & GYLON® Lips

3-D Mixer Seal
The 3-D seal is custom designed seal which incorporates proprietary GYLON to allow the seal to be used as a dry running or lubricated seal. The floating design of the flexible housing in the 3-D seal compensates for radial and axial movement.

- Pressure handling to 150 PSI
- Temperature range to 480°F
- Movement capability 1” Total Indicated Runout and 1” Total Axial Movement

GMP I (Single Cartridge Seal)
The GMP-I is a balanced single cartridge seal used in a broad range of applications. This seal is designed to fit standard ANSI pumps with no modifications required.

- Pressure handling to 300 PSI
- Temperature range from -40° F to 400° F
- Repair kit is available for easy field repair
- Standard Material of Construction: 316SS Gland, 316 HMC Sleeve, Fluoroelastomer o-rings & Carbon vs Silicon Carbide seal faces

GMP II (Double Cartridge Seal)
The GMP-II is a double balanced cartridge seal used on a wide range of applications. This seal is designed to fit standard ANSI pumps with no modifications required.

- Pressure handling to 300 PSI
- Temperature range from -40° F to 400° F
- Repair kit is available for easy field repair
- Standard Material of Construction: 316SS Gland, 316 HMC Sleeve, Fluoroelastomer o-rings & Carbon vs Silicon Carbide seal faces

Applies to:
Pumps  Valves  Flanges
FLEXSEAL® Lo-Load Spiral Wound
Garlock Lo-Load spiral wound gaskets provide the superior sealing capabilities of a standard spiral wound gasket for flange connections with low available assembly stresses. Available in a wide range of spiral wound designs and materials of construction providing numerous configuration options from one product.

- Compensates for weak flange designs, enhancing plant and personnel safety.
- Complies with ASME B16.20 dimensions.

Non-Metallic Gasketing

Style G-9900
G-9900 is the most versatile compressed gasket material on the market today. Ideally suited for saturated steam, water, inert gases, aliphatic hydrocarbons, oils, and gasoline.

- Patented design enables G-9900 to perform in temperatures to 650°F, pressures to 2,000 psi and a PxT maximum of 700,000, even during thermal cycling.
- Has passed API 607 and stringent Garlock fire test standards.

HOCHDRUCK® Style 3128 Gasket
HOCHDRUCK® is manufactured by a patented process without the use of adhesives, which tend to weaken load retention properties at elevated temperatures. HOCHDRUCK® is easier and safer to handle compared to other metal inserted graphite sheet products resulting in less breakage and fewer cuts to user’s fingers and hands.

- Extremely high compressive strength; can replace metal gaskets in many applications.
- Has passed modified API 607 and ISO 10497-BS 6755 fire test.

GYLON® Gasketing Style 3510
Garlock GYLON® Gasketing Style 3510 (Off white) provides a very wide general fluid resistance. It is particularly suited for service against strong chemicals such as potassium hydroxide and sodium hydroxide, hydrogen fluoride, aluminum fluoride and chrome plating solutions.

- For temperatures to 500°F, pressures to 1,200 psi and a PxT maximum of 350,000.
- Limitless gasket size capability due to a patented thermal bonding process.

Applies to:
Pumps  Valves  Flanges

Metallic Gaskets

EDGE® Spiral Wound Gasket
The Garlock EDGE® gasket seals at lower bolt stress while virtually eliminating the problem of inward radial buckling, which can result in contamination of the process stream.

- Stabil-Lock™: Anti-radial buckling design for sealing integrity and protection of critical components.
- Controlled density winding process reduces the amount of compressive stress required to properly seal the gasket.

Tandem Seal™
The Tandem Seal fulfills the requirements for a gasket with chemical resistance and fire safety in a single gasket, providing improved service life.

- Maximum chemical resistance
- Fire safe design

Kammprofile
The Kammprofile Gasket is especially well suited for use in heat exchangers and other large diameter applications where a rigid, semi-metallic design is desired for blowout resistance and ease of installation.

- Superior Tightness - Longer life, less maintenance, reduced emissions.
- Easy to Handle and Install - Rigid core facilitates easy handling, and reduces the chance of seal damage when dealing with large diameters.
LOW LOAD PRODUCT RECOMMENDATIONS

Non-Metallic Gasketing

STRESS SAVER® XP
- Raised, molded sealing rings reduce the contact surface area of the gasket by as much as 75%. Less surface area means the Stress Saver can seal with lower torques.
- Lower seating stress than expanded PTFE makes it an ideal choice for non-metallic flanges.
- Fluoroelastomer provides resistance to severe chemicals covering a large variety of applications.

MULTI-SWELL™ Style 3760 Gasket
- Ability to conform to surface irregularities allows for retrofitting vs replacement.
- Proprietary swell characteristics generate its own compressive load in light weight flange design such as gear boxes, access covers, and fragile pipe flanges.
- More compressible than standard fiber gaskets.

GYLON® Style 3545 Gasket
- Highly compressible PTFE outer layers seal under low bolt load.
- Ability to conform to surface irregularities allows for retrofitting vs replacement.
- Excellent chemical compatibility with strong caustics, strong acids, solvents and hydrocarbons.

Metallic Gasketing

FLEXSEAL® Low Load Spiral Wound Gasket
- Compensates for weak flange designs, enhancing plant and personnel safety.
- Ensures bolt stresses do not exceed 25,000psi for compliance with ASME 31.3 and PV and B codes.
- High tightness level achieved with minimal compressive load.
- Complies with ASME B16.20 dimensions.
Environmental Stewardship

Garlock is committed to helping our customers achieve quantifiable cost savings and improved manufacturing output while simultaneously enabling them to protect our environment for future generations. This philosophy is part of everything we do from manufacturing our products to re-engineering our own internal facilities and processes in order to conserve natural resources, reduce operating expenses, and protect our environment for future generations.

To date Garlock invested more than $3 million to replace a volatile organic compound (VOC), with a more environmentally friendly material in its production of gasket material, eliminating annual air emissions of 120 tons in the process. Use of the new material also resulted in improved process yields, products that seal 20 percent better and a healthier work environment.

Garlock continues to transition its manufacturing complex into a 21st-century prototype for manufacturing and energy efficiency. Environmental benefits of this project include use of water piped in from nearby Canandaigua Lake for comfort and process cooling, producing significant annual savings with no adverse impact on the environment.

Other conservation features include: closed-loop process equipment saving up to 20,000 gallons of water per day, the use of nontreated water for production processes, separation of the storm water system, and creation of green spaces to reduce runoff.

The new production facilities also feature high-efficiency, water-cooled chillers with ultrasonic humidification, reflective roofs to reduce heat loading, and highly insulative exterior panels.

Garlock Sealing Technologies remains committed to providing products that are environmentally safe in and of themselves and that offer our customers cost-effective compliance solutions.

Environmental Stewardship