Advancing the Science of Sealing™

RUBBER PRODUCTS CAPABILITIES GUIDE

Garlock
SEALING TECHNOLOGIES®

an EnPro Industries company

GARLOCK MILESTONES

GARLOCK HISTORY

For more than 100 years, Garlock has stood at the forefront of fluid sealing technology. Our history of growth and success is rooted in our commitment to deliver the most innovative sealing solutions and unparalleled service to the world's processing industries.

Embodied by a community of over 1500 employees in 13 global operations, and supported by a network of authorized distributors in 79 countries, Garlock stands today as an organization poised for continued global growth and success.

With a dedication to provide comprehensive solutions to the unique and specific sealing needs of every major industry, and a focus on serving our global customers at the local level, we have consistently been able to offer more industrial sealing solutions than any other company in the world.

GARLOCK'S LEGACY

Over a century ago, Olin J. Garlock devised a better way to seal piston rods in industrial steam engines. From there Garlock was born. Founded in 1887 in Palmyra, New York, Garlock has since become the leading force in the fluid sealing industry and a cornerstone company in the EnPro Industries family.

Today, high-performance Garlock sealing solutions and custom-designed products for unique applications are used by almost every major industry in the world. These broad product offerings allow us to fulfill customers' needs more completely than any other company.

MANUFACTURING

Garlock Sealing Technologies has ten global manufacturing facilities which collectively produce the world's broadest range of fluid sealing products specifically designed for industrial applications. Our focus on Total Customer Value and Lean manufacturing drive our capability to provide premier products which provide excellent value to our customers. To support future development, innovations in manufacturing and product development are guided by our goal of being the world's premier fluid sealing company.

1886

Olin J. Garlock introduces cotton duck and rubber packing rings to improve on the jute and rope packings used for steam engine piston rods and the Garlock Packing Company is born.

1923

Garlock introduces CHEVRON® throttle packing, providing an automatic seal under pressure fluctuations and overload, a major advance for locomotive steam cylinders and pistons.

1928

Garlock introduces KLOZURE® Model 23, one of the first synthetic rubber oil seals for improved flexibility, durability and lubricant retention in equipment with rotating shafts.

1932

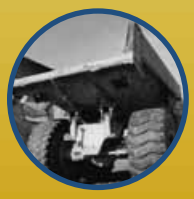
Garlock begins supplying the first molded rubber products for use in water, steam and gas piping systems.

1940

Garlock enters the expansion joint business to better serve the power generation, chemical processing, HVAC, pulp and paper, water and waste industries.

1942

Garlock supplies specialized seals and diaphragms for the U.S. Navy war fleet and successfully develops synthetic rubber compounds that meet War Production Board specifications.



1958

Garlock enters into its largest OEM partnership producing steering assembly coupling discs for GMC Truck's Saginaw Division.

ADVANCING THE SCIENCE OF SEALING™

Throughout its long history, Garlock's name has become synonymous for innovation. Garlock has introduced many industry firsts, such as GYLON® gasketing, BLUE-GARD® non-asbestos compressed fiber gasketing, carbon fiber compressed gasketing, CHEVRON® v-rings, elastomeric expansion joints, and Garlock EVSP® seal introduced as the first low emission stem seal. The formulations of the first asbestos-free gasketing and packing products in the late 1970s helped further solidify Garlock's technological leadership in the fluid sealing industry.

Garlock continues to develop the next-generation sealing technologies that are changing the way processing industries meet their sealing requirements. By combining the most innovative products with unparalleled service, Garlock is able to meet the unique and specific needs of our customers at every point to increase plant productivity and decrease unnecessary costs.

ACQUISITIONS TIME LINE

In early 1996, Garlock acquired Furon's metal gasket business in Houston, Texas. The metallic gasket operation designs and manufactures gaskets for high-temperature applications, primarily as replacement components in the chemical processing and refining industries.

In early 1998, Garlock acquired the Sealing Division of Groupe Carbone Lorraine. Through this acquisition, Garlock gained high-performance metal seal product offerings and manufacturing facilities located in St. Etienne, and Montbrison, France and Colombia, South Carolina.

In 2003, EnPro Industries added Pikotek as a business unit in the area of sealing technologies which complements the Garlock Sealing Technologies offerings. Pikotek is a manufacturer of critical service flange gaskets and electrical flange isolation kits for cathodic protection.

2007

Completion of new Klozure building

Introduction of Sage GYLON® gasketing — the next level of high performance PTFE gasketing.

2006

Garlock introduces MULTI-SWELL™ Style 3760 Gasketing, HYDRA-JUST™ Engineered Sealing Solution, and the XPS Mechanical Seal

2005

Introduction of the MILL-RIGHT™ Family

2003

Garlock introduces GYLON® GEN2™ gasketing.

The GUARDIAN™ Bearing Isolator was introduced featuring no internal metal to metal contact.

1967

Garlock introduces the revolutionary GYLON® family of Blue, Fawn and Off-White gasketing, designed to resist chemical attack and seal under low bolt loads without the cold flow problems of conventional PTFE gaskets.

1973

Garlock introduces THERMOSIL™ texturized woven fiberglass and THERMO-CERAM™ woven fiber fabric as safe alternatives to asbestos gaskets in superheated and corrosive applications.

1980

Garlock introduces the BLUE-GARD® family, the world's first compressed non-asbestos gasketing, specially formulated for effective sealing for saturated steam, caustics and more.

1982

Garlock launches the revolutionary EQUALIZER™ labyrinth seal bearing protection system.

MANUFACTURING CAPABILITIES

— RUBBER PRODUCTS

Compounding

- Committed to meet customers' specific material requirements for their diverse needs
- Materials are manufactured to comply with customers' chemical and physical characteristics
- Providing custom mixing with state-of-the-art equipment

Materials

- Nitrile
- Ethylene (EPDM)
- Nylon
- Aflas
- Butyl
- Silicone
- PTFE
- Urethane
- Natural Rubber
- Fluoroelastomer
- Styrene Butadiene (SBR)
- Hydrogenated Nitrile (HNBR)

MANUFACTURING CAPABILITIES

— RUBBER PRODUCTS

Molding

Garlock specializes in precision molded products that encompass a high standard of quality. We can produce your product to meet commercial or precision RMA standards. With over 50 presses available, platen size is never an issue.

Available platen sizes:

- Compression and Transfer Moldings

20” x 20”	40” x 40”	48” x 15ft
32” x 32”	60” x 60”	48” x 28ft

- Vertical Rubber Injection Molding

14” x 18”	32” 43”

- Horizontal Plastic Injection Molding

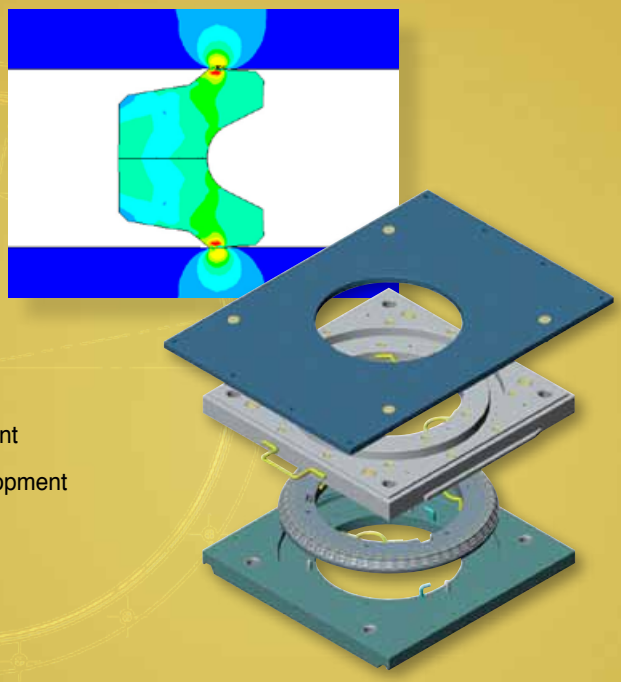
12” x 16”	16” x 20”	32” x 36”

Rubber Bonding

Garlock is recognized as the industrial leader, providing a superior bond with a wide array of elastomers to multiple materials.

- Rubber to fabric
- Rubber to metal
- Rubber to plastic
- Rubber to PTFE

ENGINEERING & TESTING



Engineering

- Product Engineering
- Process Engineering
- Applications Engineering

Design

- 3D Solid Modeling
- Dynamic Simulation
- FEA: Linear Analysis

R & D

- New Product Development
- Specialty Material Development
- Process Development

LABORATORY CAPABILITIES

Chemical and Materials Lab

Specializing in the characterization and analysis of fibers, fillers and polymers for non-metallic gasket and sealing materials. Included in the footprint of this lab is a 500 square foot "wet lab" which not only serves as a platform for traditional general chemical analysis but also as a sample preparation area for samples destined to be analyzed by more sophisticated thermal and optical analysis techniques. This lab is also used to conduct immersions of samples in corrosive or toxic chemicals, prior to testing in the Physical Test Lab, and also serves as a venue for screening new materials for possible use in gasket and sealing compositions.

Compound Lab

Focused on micro-scale rubber production this 1,200 square foot lab is used to produce small batches of experimental or custom made compounds and to study the results of small changes in formulation or processing.

Physical Lab

The physical lab specializes in testing physical properties of raw materials and polymeric composites. The Physical Test Lab has the ability to test material in many different environments and liquid media. Our extensive test capabilities include but are not limited to:

Gasket Testing

- Tensile ASTM F- 152
- Compressibility ASTM F- 36
- Recovery ASTM F- 36
- Density ASTM F- 1315
- Creep Relaxation ASTM F- 38
- Anti Stick ASTM F- 38
- Oil and Fuel Immersion ASTM F-146
- Flexibility ASTM F- 147
- Micro Tensile ASTM D-1708

Rubber Testing

- Hardness ASTM D-2240
- Tensile/ Elongation ASTM D-412
- Specific Gravity ASTM D- 792
- Mooney Viscosity ASTM D-1646
- Rheometer ASTM D2084
- Compression Set ASTM D- 395B
- Air/Fuel/Oil Aging ASTM D- 471
- Coefficient of friction ASTM D- 1894
- Low Temp. Brittleness ASTM D- 746

Functional Test Lab

Designed to conduct performance characterization tests for both static and dynamic sealing products. Sealing products can be evaluated under normal or accelerated operating conditions utilizing standardized or customer specific procedures. Testing capabilities include:

- ARLA – Aged Relaxation, Leakage, Adhesion
- HOBT – Hot Blowout Test
- DIN 3535 Sealability
- Helium Mass Spectrometer Leak Detectors
- DIN 52913 Torque Retention
- Mil-G-24696 Part “B” steam, hot oil, hot water
- Steam Stand – long term steam exposure for gaskets
- Slurry loop performance test – for compression packing
- Rotating Seal Test – accelerated life test for mechanical seals and compressing packing
- Environmental Chamber – gasket performance at high and low temperatures, oil swell test
- Expansion Joint life cycle and burst test

QUALITY YOU CAN DEPEND ON

Garlock Quality

TCV is our culture of continuous, everyday improvement that focuses on Total Customer Value by eliminating waste in the pursuit of perfection.

Garlock continually monitors its progress towards perfection by measuring key performance indicators including:

- Low customer complaint and return levels
- Zero delivery defects
- Continued scrap reduction
- High customer satisfaction rating
- Strong delivery performance

Employee Involvement

Central to our goal of achieving perfection is employee involvement. Since the implementation of our TCV initiative we have certified over 85 hourly and salaried employees as Lean Leaders. These Lean Leaders have directly contributed to:

- 85 employees certified to lead projects
- Over 125 kaizen events completed
- 50% of employees participating in Kaizens

Quality Management Systems

Our quality management systems include:

- ISO 9001:2000 Registered
  - Since 1992
  - Registrar: QMI
- Compliance to 10CFR50B / 10CFR21 (Nuclear QA)
- Compliance to QMS requirements from our aerospace customers.

AUTHORIZED REPRESENTATIVE

CLEAN AIR Excellence Awards

WARNING:
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.
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