

Garlock Valve Packing

Valve packing and fugitive emission control products



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Valve Packing: Fugitive Emissions Control Products

WHAT TO DO FOR EFFICIENT FUGITIVE EMISSION CONTROL?

Fugitive emissions from valves are the largest contributor to the fugitive emissions of any plant processing volatile organic compounds (VOC) and hazardous air pollutants (HAP). A majority of the fugitive emissions in petrochemical plants are a result of valve gland leakage. This leakage, in most cases, can be prevented with correct maintenance and with the use of high performance compression packing.

WHAT IS THE ENHANCED LEAK DETECTION AND REPAIR PROGRAM AND HOW CAN OUR PRODUCTS AND EXPERTISE HELP?

Enhanced LDAR is used by the Environmental Protection Agency (EPA), describing actions that plants must take to attain and go beyond regulatory compliance. Enhanced LDAR covers a number of elements such as quality control, training, monitoring, repairs and most notably, equipment upgrades.

These upgrades include, requiring use of “low leak”* or low emission (LE) compression packing. Garlock pioneered the development of (LE) packing in the 1980s and has continued to refine and widen its product offering through the years. Our sealing solutions meet or exceed the requirements of many recognized international standards and we offer our limited performance warranty on these products. Our highly trained technical support experts can help you find the most appropriate solution and supply precious advice.

WARRANTY

Garlock will warranty that these sets will provide leakage rates no greater than 100 ppm above background in VOC service for a period of 5 years, when installed and maintained in accordance with Garlock installation instructions and warranty conditions**.



Valve Packing: Fugitive Emissions Control Products

STYLE 1303-FEP

Garlock Style 1303-FEP combines the low emissions performance of engineered sets with the flexibility and convenience that comes with spool stock compression packing.



ENVIRONMENTAL VALUE

» This Garlock valve stem packing product has been tested to Fugitive Emission Standards ISO-15848-1 and API 622 2nd Ed., demonstrating Garlock's superior sealing performance.

SPECIFICATIONS

Construction	High-purity GRAPH-LOCK® flexible graphite and 0.004" INCONEL® filament
Temperature	-328°F (-200°C) to 850°F (455°C) atmosphere; to 1,200°F (650°C) steam**
pH range	0-14 (except strong oxidizers)
Pressure	to 4,500 psi (310 bar)

*INCONEL® is a registered trademark of Inco Alloys International, Inc.

** For applications over 1,000°F (538°C), please contact Garlock Applications Engineering

ADVANTAGES & FEATURES

High performance	Style 1303-FEP has been engineered to deliver compliance to the most stringent VOC (volatile organic compounds) and VHAP (volatile hazardous air pollutant) emission regulations.
Easy to use	This single spool stock packing is a quick efficient solution for on the spot field maintenance and repair. It is available in ring sets as well for convenience in planned or scheduled maintenance.
Safety	This Style has proven itself as class leading sealing solution and is well recognized in hydrocarbon and chemical processing industries. It is a reliable solution, ideally suited for valve stem sealing and is fire safety tested.

Valve Packing: Fugitive Emissions Control Products

GARLOCK STYLE 212-ULE VALVE STEM SPOOL PACKING

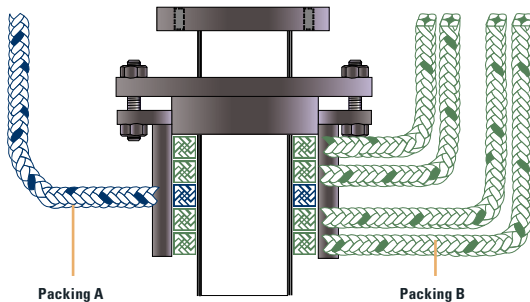
Optimized performance and planning with a convenient easy to use spool box product. 212-ULE offers the fire safety and chemical resistance of our other low emission valve stem packing products.



HOW TO INSTALL 212-ULE*

When packing a valve, pack 2 rings of "Packing B", then one ring of "Packing A", then 2 additional rings of "Packing B", giving you a B-B-A-B-B configuration (or 212). This minimizes valve emissions and reduces torque actuation forces. For stuffing boxes deeper than 5 rings, please order Garlock Style 1998-EZ Bushing.

IDEAL SET CONFIGURATION



ADVANTAGES & FEATURES

- Easy to use** Style 212-ULE is easy to cut and install. It is conveniently supplied in a dispenser box package with color coded instructions.
- Lower your costs** Cut inventory dollars and reduce outage schedules without sacrificing performance. Outage planning is easier than ever with 212-ULE box showing the amount of typical valve that can be repacked. A few boxes of different cross section sizes allow for quick response and efficient coverage of outage requirements.
- Low stem friction** Style 212-ULE combines two packing types to lower friction while maintaining optimal sealing performance.

SPECIFICATIONS

Temperature	-328°F (-200°C) to 1,200°F (650°C) steam • 850°F (455°C) atmosphere
pH range	0-14 (except strong oxidizers)
Pressure, Max	to 4,500 psig (310 bar)

*NOTE: For applications over 1,000°F (538°C), please contact Garlock Applications Engineering

212-ULE BOX ORDERING INFORMATION

Average Number of Valves Packed						
Packing Cross Section	Style B		Style A		Average Stem Diameter	Avg Number of Valves Packed
	Ft	Lbs	Ft	Lbs		
1/8	65.5	0.8	16.4	0.3	0.375	125
3/16	127.6	3.6	31.9	0.9	0.625	150
1/4	98.2	4.3	24.5	0.9	1	75
5/16	50.7	3.0	12.7	0.8	1.625	25
3/8	45.2	3.5	11.3	1.0	2.5	15
7/16	38.6	4.3	9.7	1.0	3.25	10
1/2	22.3	3.8	5.6	0.7	3.75	5
9/16	26.5	4.9	6.6	1.2	4.5	5
5/8	29.5	7.4	7.4	1.5	5	5

Valve Packing: Fugitive Emissions Control Products

9000-EVSP LE

Style 9000 EVSP LE is configured to optimize performance in fugitive emission application. This field proven set design allows a precise fit and an easy installation.



SPECIFICATIONS

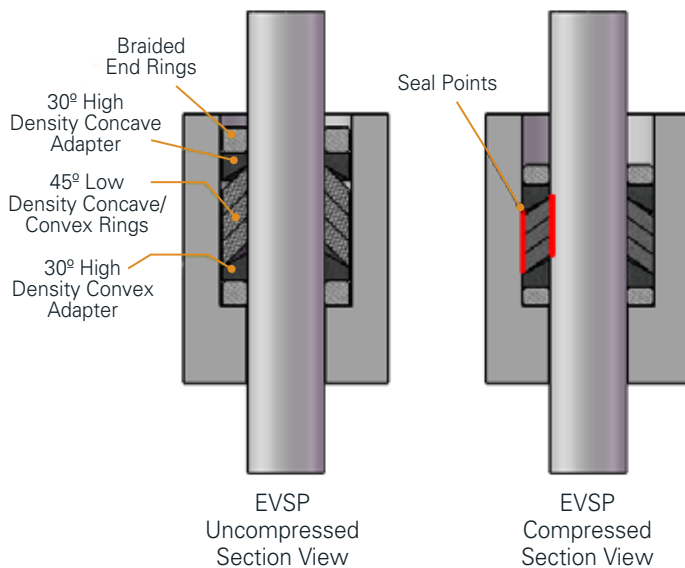
Construction	GRAPH-LOCK® rings of high-purity diamond texturized graphite tape, in cup and cone configuration; end rings made from Garlock 1303-FEP
Temperature	-328°F (-200°C) to 850°F (455°C) atmosphere to 1,200°F (650°C) steam
pH range	0-14 (except strong oxidizers)
Pressure	to 10,000 psi plus (690 bar)

ADVANTAGES & FEATURES

Forgiveness	Our ring set with patented cup and cone design, delivers higher precision fit to optimize field performance.
Cost effectiveness	The EVSP design permits a controlled radial expansion to create an effective seal against both valve stem and bore. This engineered set can be used to seal older more worn valves. Emission compliance can be achieved without necessarily replacing valves or the maintenance expense of bringing the valves back to manufacturer's specifications.
Safety	This Style is fire safety tested and chemical resistant. It is well recognized in hydrocarbon and chemical processing industries as a reliable and ideally suited solution for low emission valve stem sealing.

ENVIRONMENTAL VALUE

- » This Garlock valve stem packing product has proven itself to be an efficient and reliable solution to improve air quality by lowering VOC (volatile organic compounds) and VHAP (volatile hazardous air pollutant) emissions.



Fugitive Emissions Standard compliance:

ISO-15848-1

* Patent #4,328,974

Valve Packing: Fugitive Emissions Control Products

9001-QUICKSET® LE - LOW EMISSION

- » This QUICKSET® version is configured to offer the best fugitive emissions sealing performance in shallow stuffing boxes
- » The field proven Garlock “cup and cone” design permits a controlled radial expansion to create an effective seal against both valve stem and bore
- » This engineered set is well suited to seal older or more worn valves. Emissions compliance can often be achieved without the expenses of bringing the valves back to manufacturer’s specifications

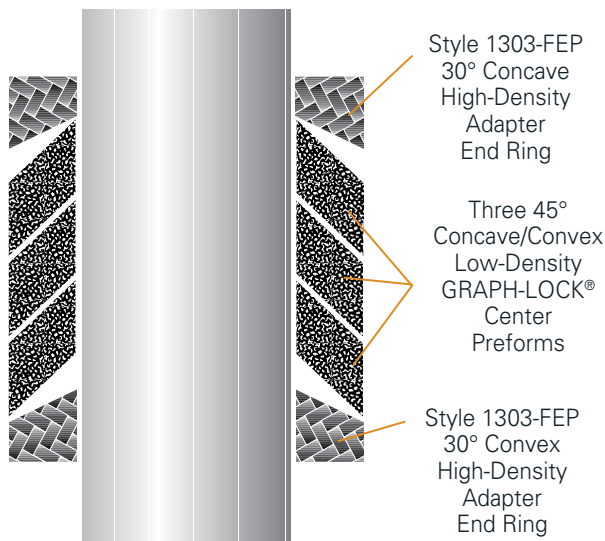


SPECIFICATIONS

Construction	Die-formed cup and cone rings combined with die-formed, high-density Style 1303-FEP end rings with active and passive corrosion inhibitors.
Temperature	-328°F (-200°C) to 850°F (455°C) atmosphere to 1,200°F (650°C) steam
pH range	0-14 (except strong oxidizers)
Pressure	to 10,000 psi plus (690 bar)

STANDARD COMPLIANCE

API-622 2nd Edition: <100 PPMv, No-adjustment
Fire tested to API-589, API-607 4th Edition



QUICKSET® 9001 Typical Ring Arrangement

Also available with 1303-DRY adapter rings to optimize oxidation resistance at higher temperatures

STYLE 1998 EZ BUSHING

"Bushing on a Spool"

- » Style 1998 EZ-Bushing was designed for use as a bushing material with the convenience of being readily available in bulk form and custom cut to length on site
- » This not only minimizes downtime but also reduces inventory investment of custom machined bushings
- » Low stem friction
- » Environmentally friendly packaging
- » Pack stuffing boxes without ordering special carbon or stainless bushings
- » Easily removed from stuffing box
- » Easy to use dispensing box



SPECIFICATIONS

Construction	INCONEL® reinforced
Temperature	to 850°F (455°C)
pH range	2-11

*NOTE: Recommended for use as a bushing material only

For technical assistance, call 1-877-GARLOCK or email questions to: gst.packingapps@garlock.com

Valve Packing: Power Generation, Steam

9001-QUICKSET® DT

- » QUICKSET® version configured to offer consistent sealing performance over a wide temperature range in shallow stuffing boxes.
- » The compact design of QUICKSET® helps reduce valve stem friction over other taller set designs, resulting in a more efficient, less costly use of plant resources to control actuated valves.

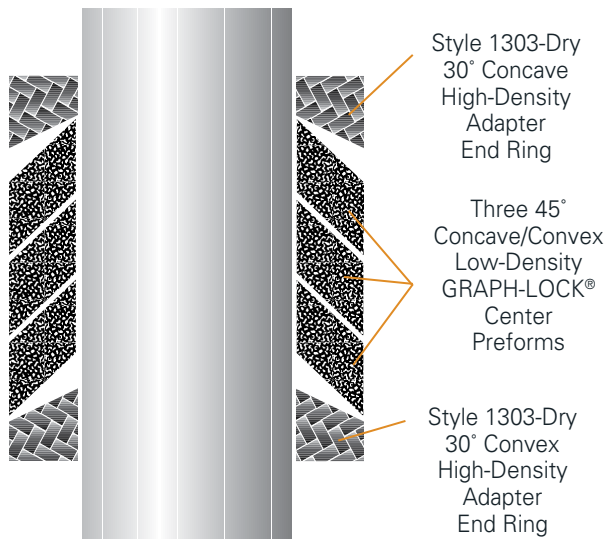


SPECIFICATIONS

Construction	Die-formed cup and cone rings combined with die-formed, high-density Style 1303-DRY end rings with active and passive corrosion inhibitors.
Temperature	-328°F (-200°C) to 850°F (455°C) atmosphere to 1,200°F (650°C) steam
pH range	0-14 (except strong oxidizers)
Pressure	to 10,000 psi plus (690 bar)

STANDARD COMPLIANCE:

- » Fire Tested to API-589, API-607*



9001 QUICKSET® DT Ring Arrangement

*API-607 4th. Ed.

9000-EVSP

- » Field proven Garlock “Cup and Cone” design allowing radial expansion and conformability to accommodate valves that may not be in ideal condition.
- » Excellent oxidation resistance in high temperature steam applications.
- » Well suited to seal new and older control valves. Desired operational performance can often be achieved without the expenses of bringing the valves back to manufacturer’s specifications.
- » Plant resources to control actuated valves can therefore be used more efficiently and economically.



- Choice of end rings: Style 98 (general service); Styles G-700 or 1398 (power generation) ; Style 1303 Dry for maximum range of temperature.

SPECIFICATIONS

Construction	Die-formed cup and cone rings combined with die-formed, high-density Style 98 end rings with active and passive corrosion inhibitors.
Temperature	-328°F (-200°C) to 850°F (455°C) atmosphere to 1,200°F (650°C) steam
pH range	0-14 (except strong oxidizers)
Pressure	to 10,000 psi plus (690 bar)

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Valve Packing: Power Generation, Steam

STYLE 1298

Your premium sealing solution for steam pressure service.

- » This packing will offer a steady performance over a wide range of temperature and pressure for your power generation application. It will stay conformable, flexible and will seal even under high glen load pressure.
- » The combination of high ends components used in the style 1298 allows the packing to conform to stem and bore to seal efficiently for a longer period. The Individually impregnated yarns enhance sealability, resistance to chemical and eliminate possible stem scoring to improve the equipment operation and life.
 - › Remains dimensionally stable at high temperatures
 - › Great resistance to chemical and solvent
 - › Improve equipment operation and life.



SPECIFICATIONS

Construction	PBI yarn with encapsulated wire reinforced (Inconel) braided over a flexible LATTICE BRAID® carbon yarn core
Temperature	to 850°F (455°C) atmosphere to 1,200°F (650°C) steam
pH range	0-12
Pressure	to 4,500 psi (310 bar)

STYLE 1200PBI

A field proven product designed for steam pressure service in the power generation industry.

- » Constructed with Inconel wire encapsulated in fiber that improves equipment operation and life.
- » The flexible surface allows for the packing to conform to stem and bore to seal efficiently for a longer period.
- » Remains dimensionally stable at high temperatures
- » Excellent resistance to chemicals and solvents.



SPECIFICATIONS

Construction	PBI yarn with encapsulated wire reinforced (Inconel) braided over extruded plastic core with wire reinforcement (Inconel)
Temperature	to 850°F (455°C) atmosphere to 1,200°F (650°C) steam
pH range	0-12 (except strong oxidizers)
Pressure	to 2,500 psi plus (172 bar)

Inconel is a registered trademark of Special Metals Corporation group of companies

For technical assistance, call 1-877-GARLOCK or email questions to: gst.packingapps@garlock.com

Valve Packing: Power Generation, Steam

STYLE 5882

The power generation industry is challenged with achieving leak free valve sealing combined with responsive and smooth valve actuation. Our 5882 Series product offering addresses these industry needs with an easy to install, stable, low friction valve stem packing.



OPTIMIZING FRICTION & STRUCTURAL STABILITY

Low friction products offerings:

- » Garlock Style 5882 is constructed from a high quality carbon fiber core and a PTFE shell, optimizing the low friction qualities of PTFE and the structural integrity of high quality carbon fiber. Packing is available in spool stock and die formed ring sets for end user convenience.
- » Style 5882 LSP is a combination set of GRAPH-LOCK® and Style 5882 rings for nuclear applications.

ADVANTAGES

Low Friction	Up to 20% lower friction than leading competing products made from innovative materials and technology.
Customizable: Material & Bushings	All standard sizes available. These products can be formed to almost any dimensions. We offer custom fabricated carbon bushings for optimizing box depth and set performance.
Simplified Planning	Planning for an outage? Formed sets provide you with a convenient way to know you have exactly what you need.
Quality	Use of highest quality and purity materials combined with our workmanship allows us to provide consistent and reliable products for safety and performance.

BENEFITS

- » Potential cost reduction by reducing size of required actuator
- » In service solution for undersized actuators in trouble applications
- » Convenience of die formed or mandrel cut spool stock

LOW FRICTION TEST RESULTS

- » Gland stress of 3560 psi
- » Representative 1.5 cycle from 250 cycle test. Full test results available through Garlock Engineering
- » No pressure

CONFIGURATIONS

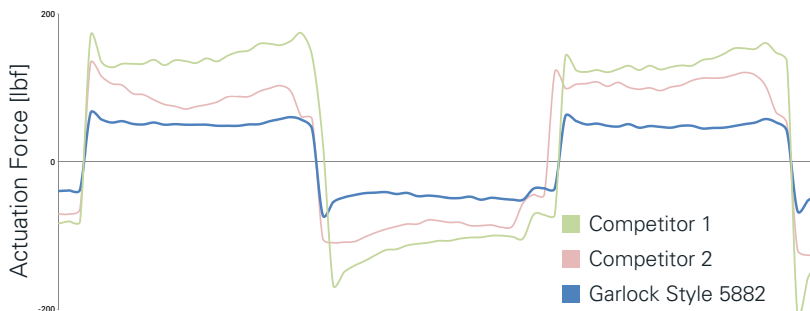
- » **Continuous**
 - Style 5882 Spool
- » **Discrete**
 - Style 5882 die formed, bevel cut rings
 - Style 5882 LSP
 - Die formed engineered graphite
 - Style 5882 end rings

IDEAL FOR:

- AOV (Air Operated Valves)
- » Steam
 - » Water
 - » Process Control
 - » Air

SPECIFICATIONS

Construction	PTFE fiber over braided carbon core
Temperature	-200°F (-130°C) to 550°F (288°C)
pH range	0-14
Pressure	to 3500 psi (242 bar) in valves**



Valve Packing Performance Enhancement Accessories

HIGH PURITY CARBON BUSHINGS

Our testing has determined that the optimal number of rings to seal a valve stem is between 5 and 7. Any less than 5 rings increases the chance of leaks, any more than 7 puts too much drag on the stem. Garlock uses high purity carbon bushings or Style 1998 EZ-Bushing to shorten deep stuffing boxes like those that are typically found in older valves. When combined with our radially expanding valve stem solutions, our high purity bushings allow excellent sealing with low actuation force which enables old, manual valves to be fit with air actuators and seal like new. Further, our bushings are made to such exacting material and dimensional standards that they can even be certified for nuclear service.

Bushings can also be made from 1303-DRY. While this approach adds some friction to the stem, it is an ideal choice when the valve stuffing box depth cannot be determined prior to repacking.

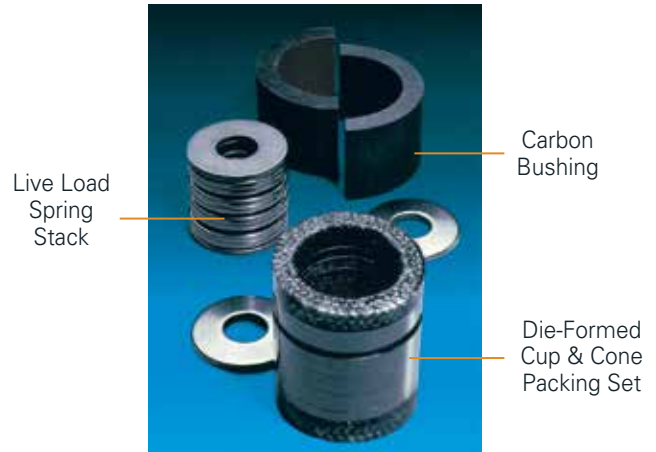
LIVE LOADING HARDWARE

Even with its densified graphite construction, an EVSP set can consolidate by up to 2% over its service life. While this is not an issue for valves that can be easily monitored and adjusted, it does pose a problem for valves that are off the routine maintenance path. Additionally some service conditions, like severe temperature swings or frequent opening and closing, can accelerate consolidation. Garlock's solution for those types of applications is Live Loading.

Live Loading can compensate for packing consolidation of up to 3% and, when used with EVSP, can virtually eliminate the need for adjustment. It does not however, put a constant compressive force on the seal. If you use live loading with a braided packing like 1303-FEP, it will significantly extend the time between adjustments but adjustments will still be required.

We stock a wide range of spring washers so we can respond to most needs within 48 hours.

For technical assistance, call 1-877-GARLOCK or email questions to: gst.packingapps@garlock.com



RECOMMENDED IN THE FOLLOWING CONDITIONS:

- » Valves with difficult access
- » High degree of thermal cycling
- » "Critical" to operation of facility
- » Frequently actuated
- » Control valves
- » Controlled emissions levels
- » High levels of packing consolidation

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.

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.

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