Garlock
an EnPro Industries family of companies

Garlock Hydraulic Components

Reciprocating equipment needs

Leaders in Sealing Integrity

Garlock Hydraulic Components

Garlock has been the leading manufacturer of industrial sealing products since 1887. The Hydraulic Components division has the experience, technology and products to meet the demanding needs found in today's reciprocating equipment.

- CHEVRON®: the original vee ring packing, now available in Deep Vee Ring design
- Style 9220 GARTHANE® U-Seals: strong, flexible, and durable
- Polytop and SLUDGE-PAK® Sets: unique combinations for difficult service
- LUBRIKUP® : Oil production packing & cups
- Well Service Packing: Long lasting plunger pump packing for cementing and hydraulic fracturing

CONTENTS

CHEVRON®, GARTHANE®, MARBLOCK®, and SLUDGE-PAK® are registered trademarks of Garlock

CHEVRON® Packing

AUTOMATIC SEALING SYSTEM

Garlock CHEVRON® packing is the original automatic hydraulic and pneumatic design for sealing rods, pistons and plungers. The distinctive and exclusive hinge-like action of each CHEVRON® ring permits immediate reaction even to minor pressure changes. Each individual lip of a CHEVRON® packing set independently reacts to pressure, and automatically effects a seal. The multiple lip configuration automatically distributes pressure and an effective seal along the shaft. The proprietary design of Garlock CHEVRON® packing also permits an automatic reaction to pressure shock and overloads. Once Garlock CHEVRON® packing has been selected and installed, it will seal effectively and automatically.

FEATURES	ADVANTAGES
Multiple sealing lips	» Automatically distribute system pressure » Offers "back-up" sealing rings
Hinged design	» Vee rings automatically react to increasing/decreasing pressure » Makes rings easy to install
Wide range of materials and sizes	» Packing can be used in virtually any kind of fluid » Offers flexibility in design
Special end rings	» Prevent packing extrusion at elevated pressures
Split sets	» Quick installation » Can be cut from solid rings or coil stock

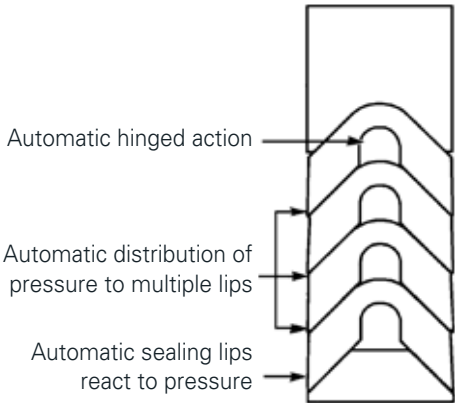
BENEFITS

- Elimination of costly seal failure or blowouts
- Reduced installation costs
- Reduced equipment downtime with exact seal specifications
- Extended packing and seal life reduces maintenance and operating costs
- Reduced inventory costs

APPLICATIONS

Since CHEVRON® products have been the industry standard for many years, they can be found as the sealing device in many different types of equipment. Although normally associated with reciprocating applications, CHEVRON® has been used successfully on slow rotating equipment as well.
The most common applications are:

- Accumulators
- Bailing Presses
- Extrusion Presses
- Fluid Transfer Pumps
- Forging Presses
- Homogenizers
- Hydraulic Cylinders
- Injection Molding Presses
- Intensifiers
- Jacks
- Lifts
- Pneumatic Cylinders
- Rubber Molding Presses
- Steam Hammers
- Valve Stem Packing
- Water Flood Pumps



WARNING:
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Application Data Sheet

The first step in recommending CHEVRON® products is to determine as much as possible about the operating of the equipment, the stuffing box dimensions, environmental conditions, what product(s) have been used before and any related problems.

The data sheet below is provided to help simplify this process.

EQUIPMENT TYPE

Cylinder _____ Press _____ Pump* _____

Other (explain)_____

Manufacturer_____ Model No. _____

EXISTING SEALS

Seal Type _____ Manufacturer _____ Part Number _____

How does the seal perform? _____

What constitutes a seal failure? _____

Expectations for new seal? _____

What constitutes a successful seal replacement? _____

STUFFING BOX DATA

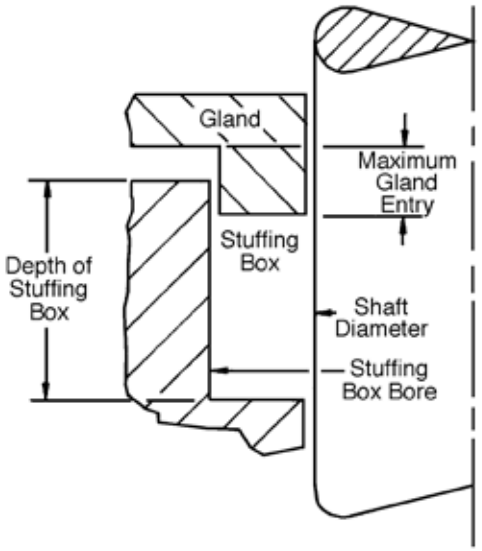
Shaft, Rod, Ram or Plunger Dia. _____

Stuffing Box Bore_____

Depth of Box_____

Gland, ☐ Adjustable ☐ Nonadjustable

Maximum Gland Entry_____



OPERATING CONDITIONS

Fluid Type_____

Manufacturer's No. _____

Pressure: _____ Min. _____ Max.

Temperature: _____ Min. _____ Max.

Motion: Reciprocating _____

Length of Stroke _____

Cycles/min._____

To aid in selecting the proper CHEVRON® packing, please refer to the following pages where information on product compatibility, stack height, pressure ranges and clearances is available.

If factory assistance is required, copy the data sheet section above, fill in the blanks and fax or mail it directly to Garlock Hydraulic Components, fax 866.636.4275.

For other than reciprocating equipment (i.e. rotary, oscillating), contact Garlock for recommendations.

*See page 13 for more detailed information on reciprocating equipment.

Recommended Styles for General Service

FABRIC REINFORCED MATERIALS

Style/Materials of Construction		260RH/261RH Cotton, Fabric, Natural, Rubber, Rockhard	432/435 Cotton, Fabric, Nitrile, Elastomer	433 Cotton, Fabric, Butyl, Elastomer	532 PolyCotton, Fabric, Nitrile, Elastomer	7960 PloyCotton, Fabric, Fluoro-elastomer	7532 Hi-Temp, Fabric, Nitrile, Elastomer	7857RH Cotton, Fabric, SBR, Elastomer, Rockhard
Available Forms	Vee-Rings		•	•	•	•	•	•
	Adapters	•	•	•	•	•	•	•
	Air	•	•		•			•
Recommended for use against	Acids	•				•		
	Aliphatic Solutions	•	•		•	•	•	
	Alkalies	•		•		•		•
	Aromatic Solutions					•		
	Hydrocarbons	•	•		•	•	•	•
	Ketones							
	Phosphate Esters	•		•		•		•
	Steam				•		•	
	Water Glycol	•	•	•	•	•	•	•
	Water in Oil	•	•		•	•	•	•
Temperature	Minimum	-40°F (-40°C)	-40°F (-40°C)	-40°F (-40°C)	-40°F (-40°C)	-20°F (-29°C)	-30°F (-34°C)	-40°F (-40°C)
	Maximum	275°F (135°C)	250°F (121°C)	250°F (121°C)	300°F (149°C)	300°F (149°C)	325°F (162°C)	250°F (121°C)
Heat Resistance		Good	Good	Good	Very Good	Very Good	Very Good	Good
Pressure Rating[1]		Med. to Hi	Low to Hi	Low to Hi	Low to Hi	Low to Hi	Low to Hi	Med. to Hi
Abrasion Resistance		Excellent	Good	Fair	Good	Good	Good	Very Good
Relative Hard-ness/Flexibility		Very Hard/ Rigid	Firm but Flexible	Firm but Flexible	Firm but Flexible	Firm/Very Flexible	Firm but Rigid	Very Hard/ Rigid
Generally Recommended for		Worn or misaligned equipment where extrusion resistant adapters are needed.	General hydraulic oils, water emulsions. Multi-purpose.	Straight phosphate-ester fluids having no oil or hydrocarbon additives.	Moderate to high temperature, oil or steam.	Chemical service, most fire-resistant fluids.	High temperature oil or steam.	Excellent for water and high pressure service.

1. Pressure ratings are affected by actual condition of equipment, clearances and tolerances, leakage acceptability and other factors. Complete application data could result in slightly different recommendations. Contact the factory with specific questions and/or problems. Other styles available.

HOMOGENEOUS MATERIALS

7910 PTFE w/ Hi-Temp Aramid/ Fiber Fabric	8452 Homogeneous, Nitrile, Elastomer	8455 Homogeneous, Silicone, Elastomer	9188 Homogeneous, Butyl, Elastomer	9511 Homogeneous, Nitrile, Elastomer	9600 Homogeneous, Flouro-elastomer	7500 PTFE	7600 PTFE & Graphite	9003/9005 Glass Filled Nylon MARBLOCK®
•	•	•	•	•	•	•	•	
						•	•	•
•	•	•	•	•	•	•	•	•
•		•	•		•	•	•	
•	•			•	•	•	•	•
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•					•	•	•	
•	•	•		•	•	•	•	•
•						•	•	
•		•	•		•	•	•	•
•						•	•	
•	•	•	•	•	•	•	•	•
•	•	•		•	•	•	•	•
Cryogenic	0°F (-17°C)	-70°F (-57°C)	-40°F (-40°C)	-20°F (-29°C)	-20°F (-29°C)	Cryogenic	Cryogenic	-65°F (-54°C)
450°F (232°C)	225°F (107°C)	500°F (260°C)	250°F (121°C)	250°F (121°C)	400°F (204°C)	500°F (260°C)	500°F (260°C)	300°F (149°C)
Very Good	Good	Excellent	Good	Good	Very Good	Excellent	Excellent	Good
Med. to Hi	Vacuum to Low	Vacuum to Low	Vacuum to Low	Vacuum to Low	Vacuum to Low	Low to Med	Low to Med	High
Good	Good	Fair	Good	Good	Good	Very Good	Very Good	Excellent
Hard	90 Duro Flexible	80 Duro Flexible	90 Duro Flexible	70 Duro Flexible	80 Duro Flexible	Firm/Rigid	Hard/Rigid	Very Hard/ Rigid
All except very low pH fluids. A problem solver.	MIL-R-3065. General purpose oil, air and water service.	Most fluids except strong acids and alkalies or steam.	Same as style 433. For low pressure service.	General purpose - air, oil and water service.	Low pressure seals in high temperature and chemical service.	Excellent for all fluids. non-lubricated service or food processing.	Especially suitable for soot blowers.	Excellent bearing material for hydraulic cylinders. Low break-away friction. High strength.

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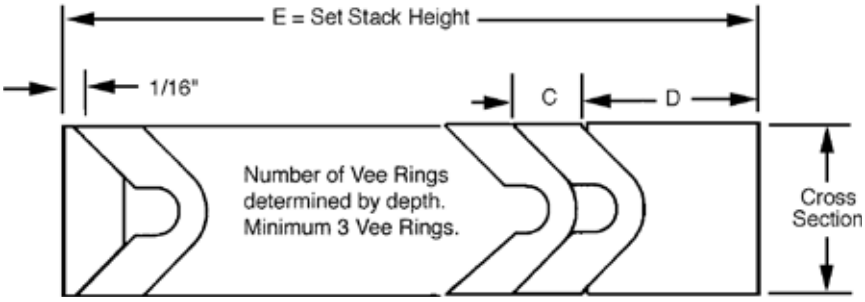
CHEVRON® Stack Height Table

Cross-section	CHEVRON "C"	Adapter Set "D" + 1/16"	TOTAL DEPTH "E" (includes the adapter set plus the number of CHEVRON x "C")									
			1	2	3	4	5	6	7	8	9	10
3/16"	7/64"	5/16"	27/64"	17/32"	41/64"	3/4"	55/64"	31/32"	1-5/64"	1-3/16"	1-19/64"	1-13/32"
0.188"	0.109"	0.313"	0.422"	0.531"	0.641"	0.750"	0.859"	0.969"	1.078"	1.188"	1.297"	1.406"
7/32"	7/64"	5/16"	27/64"	17/32"	41/64"	3/4"	55/64"	31/32"	1-5/64"	1-3/16"	1-19/64"	1-13/32"
0.219"	0.109"	0.313"	0.422"	0.531"	0.641"	0.750"	0.859"	0.969"	1.078"	1.188"	1.297"	1.406"
1/4"	7/64"	5/16"	27/64"	17/32"	41/64"	3/4"	55/64"	31/32"	1-5/64"	1-3/16"	1-19/64"	1-13/32"
0.250"	0.109"	0.313"	0.422"	0.531"	0.641"	0.750"	0.859"	0.969"	1.078"	1.188"	1.297"	1.406"
9/32"	5/32"	11/32"	1/2"	21/32"	13/16"	31/32"	1-1/8"	1-9/32"	1-7/16"	1-19/32"	1-3/4"	1-29/32"
0.281"	0.156"	0.344"	0.500"	0.656"	0.813"	0.969"	1.125"	1.281"	1.438"	1.594"	1.750"	1.906"
5/16"	11/64"	3/8"	35/64"	23/32"	57/64"	1-1/16"	1-15/64"	1-13/32"	1-37/64"	1-3/4"	1-59/64"	2-3/32"
0.313"	0.172"	0.375"	0.547"	0.719"	0.891"	1.063"	1.234"	1.406"	1.578"	1.750"	1.922"	2.094"
11/32"	3/16"	13/32"	19/32"	25/32"	31/32"	1-5/32"	1-11/32"	1-17/32"	1-23/32"	1-29/32"	2-3/32"	2-9/32"
0.344"	0.188"	0.406"	0.594"	0.781"	0.969"	1.156"	1.344"	1.531"	1.719"	1.906"	2.094"	2281"
3/8"	3/16"	7/16"	5/8"	13/16"	1"	1-3/16"	1-3/8"	1-9/16"	1-3/4"	1-15/16"	2-1/8"	2-5/16"
0.375"	0.188"	0.438"	0.625"	0.813"	1.000"	1.188"	1.375"	1.563"	1.750"	1.938"	2.125"	2.313"
10.0 mm	5.5 mm	13.0 mm	18.5 mm	24.0 mm	29.5 mm	35.0 mm	40.5 mm	46.0 mm	51.5 mm	57.0 mm	62.5 mm	68.0 mm
0.394"	0.217"	0.512"	0.728"	0.945"	1.161"	1.378"	1.594"	1.811"	2.028"	2.244"	2.461"	2.677"
13/32"	3/16"	15/32"	21/32"	27/32"	1-1/32"	1-7/32"	1-13/32"	1-19/32"	1-25/32"	1-31/32"	2-5/32"	2-11/32"
0.406"	0.188"	0.469"	0.656"	0.844"	1.031"	1.219"	1.406"	1.594"	1.781"	1.969"	2.156"	2.344"
7/16"	15/64"	1/2"	47/64"	31/32"	1-13/64"	1-7/16"	1-43/64"	1-29/32"	2-9/64"	2-3/8"	2-39/64"	2-27/32"
0.438"	0.234"	0.500"	0.734"	0.969"	1.203"	1.438"	1.672"	1.906"	2.141"	2.375"	2.609"	2.844"
15/32"	15/64"	9/16"	51/64"	1-1/32"	1-17/64"	1-1/2"	1-47/64"	1-31/32"	2-13/64"	2-7/16"	2-43/64"	2-29/32"
0.469"	0.234"	0.563"	0.797"	1.031"	1.266"	1.500"	1.734"	1.969"	2.203"	2.438"	2.672"	2.906"
12.5 mm	6.0 mm	14.0 mm	20.0 mm	26.0 mm	32.0 mm	38.0 mm	44.0 mm	50.0 mm	56.0 mm	62.0 mm	68.0 mm	74.0 mm
0.492"	0.236"	0.551"	0.787"	1.024"	1.26"	1.496"	1.732"	1.969"	2.205"	2.441"	2.677"	2.913"
1/2"	15/64"	19/32"	53/64"	1-1/16"	1-19/64"	1-17/32"	1-49/64"	2"	2-15/64"	2-15/32"	2-45/64"	2-15/16"
0.500"	0.234"	0.594"	0.828"	1.063"	1.297"	1.531"	1.766"	2.000"	2.234"	2.469"	2.703"	2.938"
17/32"	15/64"	5/8"	55/64"	1-3/32"	1-21/64"	1-9/16"	1-51/64"	2-1/32"	2-17/64"	2-1/2"	2-47/64"	2-31/32"
0.219"	0.234"	0.625"	0.859"	1.094"	1.328"	1.563"	1.797"	2.031"	2.266"	2.500"	2.734"	2.969"
9/16"	15/64"	21/32"	57/64"	1-1/8"	1-23/64"	1-19/32"	1-53/64"	2-1/16"	2-19/64"	2-17/32"	2-49/64"	3"
0.563"	0.234"	0.656"	0.891"	1.125"	1.359"	1.594"	1.828"	2.063"	2.297"	2.531"	2.766"	3.000"
15.0 mm	7.5 mm	18.0 mm	25.5 mm	33.0 mm	40.5 mm	48.0 mm	55.5 mm	63.0 mm	70.5 mm	78.0 mm	85.5 mm	93.0 mm
0.591"	0.295"	0.709"	1.004"	1.299"	1.594"	1.89"	2.185"	2.48"	2.776"	3.071"	3.366"	3.661"
5/8"	9/32"	23/32"	1"	1-9/32"	1-9/16"	1-27/32"	2-1/8"	2-13/32"	2-11/16"	2-31/32"	3-1/4"	3-17/32"
0.625"	0.281"	0.719"	1.000"	1.281"	1.563"	1.844"	2.125"	2.406"	2.688"	2.969"	3.250"	3.531"
11/16"	9/32"	25/32"	1-1/16"	1-11/32"	1-5/8"	1-29/32"	2-3/16"	2-15/32"	2-3/4"	3-1/32"	3-5/16"	3-19/32"
0.688"	0.281"	0.781"	1.063"	1.344"	1.625"	1.906"	2.188"	2.469"	2.750"	3.031"	3.313"	3.594"
3/4"	21/64"	27/32"	1-11/64"	1-1/2"	1-53/64"	2-5/32"	2-31/64"	2-13/16"	3-9/64"	3-15/32"	3-51/64"	4-1/8"
0.750"	0.328"	0.844"	1.172"	1.500"	1.828"	2.156"	2.484"	2.813"	3.141"	3.469"	3.797"	4.125"

Cross-section	CHEVRON "C"	Adapter Set "D" + 1/16"	TOTAL DEPTH "E" (includes the adapter set plus the number of CHEVRON x "C")									
			1	2	3	4	5	6	7	8	9	10
20.0 mm	10.0 mm	23.0 mm	33.0 mm	43.0 mm	53.0 mm	63.0 mm	73.0 mm	83.0 mm	93.0 mm	103.0 mm	113.0 mm	123.0 mm
0.787"	0.394"	0.906"	1.299"	1.693"	2.087"	2.48"	2.874"	3.268"	3.661"	4.055"	4.449"	4.843"
13/16"	21/64"	29/32"	1-15/64"	1-9/16"	1-57/64"	2-7/32"	2-35/64"	2-7/8"	3-13/64"	3-17/32"	3-55/64"	4-3/16"
0.813"	0.328"	0.906"	1.234"	1.563"	1.891"	2.219"	2.547"	2.875"	3.203"	3.531"	3.859"	4.188"
22.0 mm	9.5 mm	25.0 mm	34.5 mm	44.0 mm	53.5 mm	63.0 mm	72.5 mm	82.0 mm	91.5 mm	101.0 mm	110.5 mm	120.0 mm
0.866"	0.374"	0.984"	1.358"	1.732"	2.106"	2.48"	2.854"	3.228"	3.602"	3.976"	4.35"	4.724"
7/8"	3/8"	1"	1-3/8"	1-3/4"	2-1/8"	2-1/2"	2-7/8"	3-1/4"	3-5/8"	4"	4-3/8"	4-3/4"
0.875"	0.375"	1.000"	1.375"	1.750"	2.125"	2.500"	2.875"	3.250"	3.625"	4.000"	4.375"	4.750"
15/16"	3/8"	1-1/16"	1-7/16"	1-13/16"	2-3/16"	2-9/16"	2-15/16"	3-5/16"	3-11/16"	4-1/16"	4-7/16"	4-13/16"
0.938"	0.375"	1.063"	1.438"	1.813"	2.188"	2.563"	2.938"	3.313"	3.688"	4.063"	4.438"	4.813"
25.0 mm	10.0 mm	28.0 mm	38.0 mm	48.0 mm	58.0 mm	68.0 mm	78.0 mm	88.0 mm	98.0 mm	108.0 mm	118.0 mm	128.0 mm
0.984"	0.394"	1.102"	1.496"	1.89"	2.283"	2.677"	3.071"	3.465"	3.858"	4.252"	4.646"	5.039"
1"	13/32"	1-1/8"	1-17/32"	1-15/16"	2-11/32"	2-3/4"	3-5/32"	3-9/16"	3-31/32"	4-3/8"	4-25/32"	5-3/16"
1.000"	0.406"	1.125"	1.531"	1.938"	2.344"	2.750"	3.156"	3.563"	3.969"	4.375"	4.781"	5.188"
1-1/16"	13/32"	1-3/16"	1-19/32"	2"	2-13/32"	2-13/16"	3-7/32"	3-5/8"	4-1/32"	4-7/16"	4-27/32"	5-1/4"
1.063"	0.406"	1.188"	1.594"	2.000"	2.406"	2.813"	3.219"	3.625"	4.031"	4.438"	4.844"	5.250"
1-1/8"	29/64"	1-1/4"	1-45/64"	2-5/32"	2-39/64"	3-1/16"	3-33/64"	3-31/32"	4-27/64"	4-7/8"	5-21/64"	5-25/32"
1.125"	0.453"	1.250"	1.703"	2.156"	2.609"	3.063"	3.516"	3.969"	4.422"	4.875"	5.328"	5.781"
1-3/16"	1/2"	1-5/16"	1-13/16"	2-5/16"	2-13/16"	3-5/16"	3-13/16"	4-5/16"	4-13/16"	5-5/16"	5-13/16"	6-5/16"
1.188"	0.500"	1.313"	1.813"	2.313"	2.813"	3.313"	3.813"	4.313"	4.813"	5.313"	5.813"	6.313"
1-1/4"	1 /2"	1-3/8"	1-7/8"	2-3/8"	2-7/8"	3-3/8"	3-7/8"	4-3/8"	4-7/8"	5-3/8"	5-7/8"	6-3/8"
1.250"	0.500"	1.375"	1.875"	2.375"	2.875"	3.375"	3.875"	4.375"	4.875"	5.375"	5.875"	6.375"

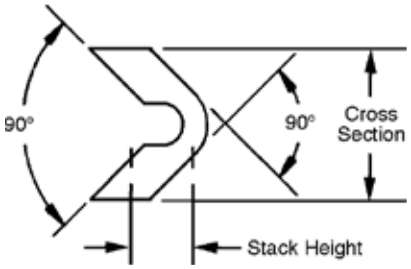


NOTE:

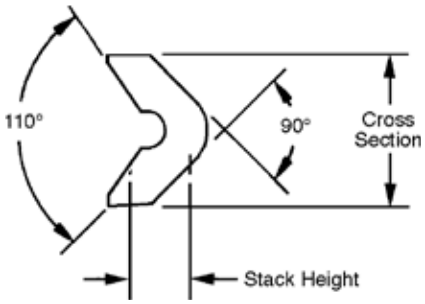
1. Heights are approximate to aid in calculating set heights
2. Table applies to fabric-reinforced CHEVRON® sets only
3. For engineered sets or non adjustable stuffing boxes contact Garlock
4. Due to space restrictions we cannot list all of our size capabilities such as large cross sections, optional stack heights and a multitude of size variations cut from coil.

Vee Ring and Adapter Design

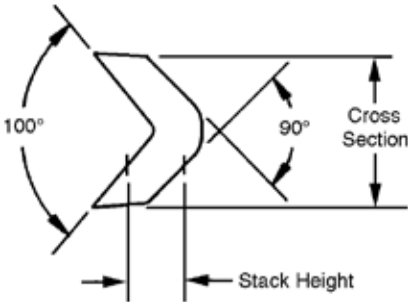
A. FABRIC - HINGE - TYPE XE



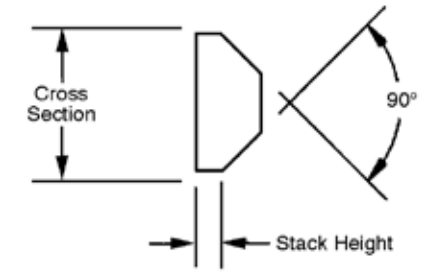
B. FABRIC - MODIFIED HINGE - TYPE GX

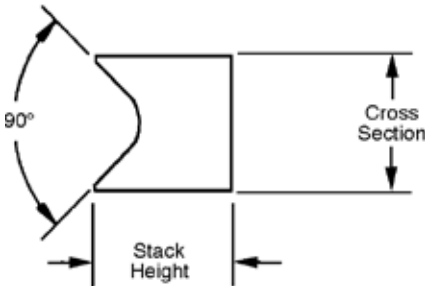


C. HOMOGENEOUS RUBBER - NO HINGE - TYPE NH

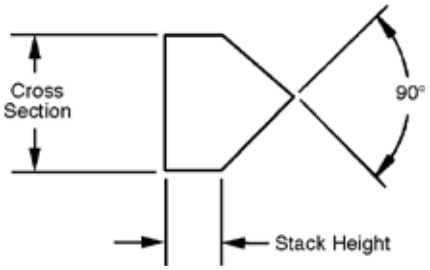


D. FABRIC AND METAL ADAPTERS

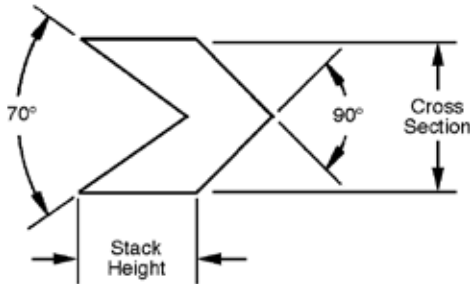




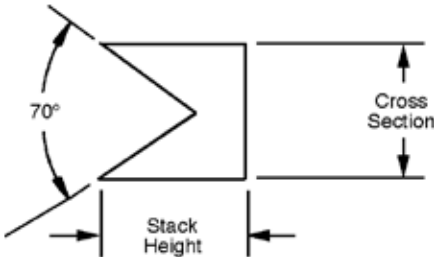
E. PTFE MALE ADAPTER



F. PTFE VEE RING



G. PTFE FEMALE ADAPTER



CROSS SECTION	MALE (E) STD./J.I.C	VEE RING (F) STD./J.I.C.	FEMALE (G) STD. OR J.I.C
0.188	0.075/0.063	0.150/0.083	0.188
0.219	0.088/0.063	0.175/0.083	0.219
0.250	0.100/0.063	0.200/0.083	0.250
0.313	0.125/0.063	0.250/0.140	0.313
0.375	0.150/0.063	0.300/0.156	0.375
0.438	0.175/0.063	0.350/0.197	0.438
0.500	0.200/0.063	0.400/0.197	0.500
0.563	0.225/0.063	0.450/0.197	0.563
0.625	0.250/0.063	0.500/0.250	0.625
0.750	0.300/0.063	0.600/0.297	0.750

PTFE Stack Heights (inches)

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Leaders in Sealing Integrity

Design Parameters

Number of Vee Rings by Application

PISTON APPLICATIONS

Diameter of Cylinder	Zero to 1,000 psi		1,000 - 2,500 psi		2,500 - 4,000 psi		4,000 psi and up	
	Cross Section	Vee Rings per Set	Cross Section	Vee Rings per Set	Cross Section	Vee Rings per Set	Cross Section	Vee Rings per Set
1" to 2"	1/4"	3	1/4"	4	5/16"	4	3/8"	5
2" to 3"	5/16"	3	5/16"	4	5/16"	4	3/8"	5
3" to 6"	3/8"	3	3/8"	4	3/8"	4	3/8"	5
6" to 8"	1/2"	3	1/2"	4	1/2"	4	1/2"	5
8" to 14"	5/8"	3	5/8"	4	5/8"	4	5/8"	5

ROD, PLUNGER OR RAM APPLICATIONS

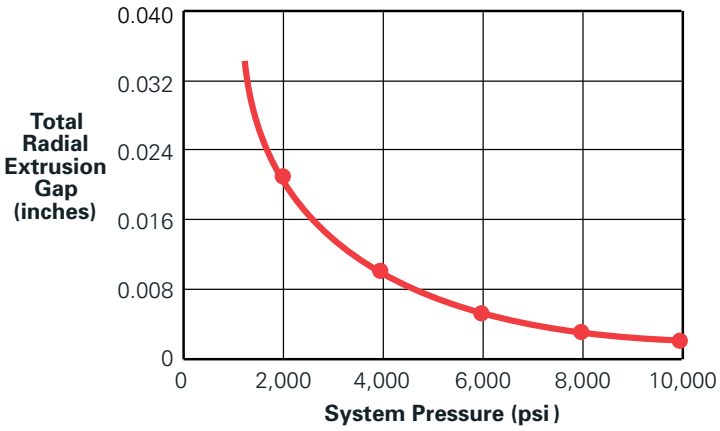
Diameter of Rod Plunger or Ram	Zero to 1,000 psi		1,000 - 2,500 psi		2,500 - 4,000 psi		4,000 psi and up	
	Cross Section	Vee Rings per Set	Cross Section	Vee Rings per Set	Cross Section	Vee Rings per Set	Cross Section	Vee Rings per Set
1" to 3"	1/4"	4	1/4"	5	5/16"	5	5/16"	6
3" to 6"	1/4"	4	5/16"	5	3/8"	5	3/8"	6
6" to 8"	5/16"	4	3/8"	5	1/2"	5	1/2"	6
8" to 14"	3/8"	4	1/2"	5	1/2"	5	5/8"	6
14" - 24"	1/2"	4	5/8"	5	5/8"	5	3/4"	6
24" - 36"	5/8"	4	3/4"	5	3/4"	5	1"	6
36" and up	3/4"	4	1"	5	1"	5	1"	6

RECOMMENDED ADAPTERS FOR PRESSURE RANGES

Adapter Type	1,000 psi	2,000 psi	3,000 psi	5,000 psi
Standard Fabric	•	•		
Rockhard Fabric		•	•	
Bronze			•	•
MARBLOCK®	•	•	•	

CLEARANCES

If excessive clearance exists between the cylinder wall or the shaft and the component supporting the female adapter, operating pressure will extrude the adapter into the clearance. The greater the pressure and clearance, the more quickly extrusion will occur. In a clean system, where concentricity requirements are met, and where minimum clearances are held, optimum seal life can be expected.



NOTE:

See Stack Height Table on pages 8 & 9 for the height of the Vee rings plus male and female adapter rings per set. This table is for general guidance. Many satisfactory Garlock CHEVRON® packing installations can be made with variations in the recommended equipment or packing guidelines.

Deep Vee CHEVRON® Packing

FOR LARGE DIAMETER, DEEP STUFFING BOX APPLICATIONS

- Easier installation—fewer rings required
- Quicker turnaround—rings won't "roll-over" during installation
- Wide variety of styles—choose from the many popular fabric and rubber styles available from Garlock to suit your application
- Few size restrictions—made in our continuous process, so large Diameters are no problem
- Most popular cross sections are: 5/8", 3/4", 7/8", 1"

CHEVRON® PACKINGS FOR HIGH PRESSURE SERVICE

In unusually high pressure applications, CHEVRON® packing might need to be reinforced to prevent undue distortion from this extreme pressure. The following are examples of some design considerations that can be used to overcome problems experienced with standard components (such as 432, 433, etc.).

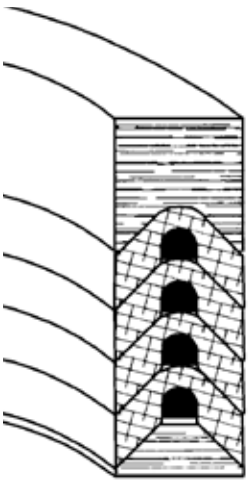
"D" filler rings can be installed in the groove of the hinge-type CHEVRON® Vee Rings to prevent distortion of the packing without interfering with the automatic hinge action of the rings.

"D" fillers can be used only with 3/8" cross sections and up with hinge type "XE" CHEVRON® rings per illustration A, page 10.

When pressure ranges exceed those normally satisfied with standard Style 432, 433 or 532 adapters, the stronger rockhard adapters such as 260RH, 261RH and 7857RH should be considered.

When a problem relates to excessive clearances, as discussed on page 11, a close tolerance phenolic (Style 155) or bronze bushing installed behind the female adapter will act as additional support and reduce the extrusion gap. A phenolic or bronze female adapter will serve the same purpose.

These configurations have been used successfully to extend the life of CHEVRON® packing sets. However, specific applications should be considered on an individual basis, taking into account the type of equipment, size, temperature, media being sealed, pressure, surface speed, condition of equipment and any other contributing factors.



CHEVRON® packing
with "D" shaped filler rings.

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Seals for Reciprocating Plunger Pump Applications

Garlock has long been a leader in the development of seals and packings for reciprocating equipment. The CHEVRON® trade name for vee packing was registered over 75 years ago; and although it is very popular for use in such applications as hydraulic cylinders and hydraulic presses, it also is capable of providing excellent performance for the demanding service conditions found in plunger pumps.

However, it is important to be able to offer alternative packing recommendations. With hundreds of tooled sizes available in numerous materials, Garlock CHEVRON® provides the options necessary to meet the changing needs of Simplex and Multiplex pumps.

Over the years Garlock has developed styles specifically for plunger pump applications. Although other materials are available, one of the following packing styles will most likely provide satisfactory service:

- **8024**: SBR rubber/cotton fabric, rockhard cure
- **8064**: SBR rubber/cotton fabric, standard cure
- **8140**: SBR rubber/polyester-cotton fabric, rockhard cure
- **8150**: NBR/PTFE/polyester-cotton fabric, standard cure
- **8872**: Nitrile/polyester-cotton fabric

In addition to selecting the proper material for an application, the packing arrangement and design of the other packing set components are equally important. Bronze is the material of choice for male and female adapters or lantern rings to provide plunger alignment through the sealing CHEVRON®, as well as prevent its extrusion. Figures 1 through 4 illustrate some common packing assemblies.

Since stuffing box spaces vary with pump models, it may be necessary to have Garlock design the packing set. The minimum information necessary to do so should include the operating conditions and details of the packing area, which may be best covered by a drawing.

Garlock has the products, experience and quality to satisfy your plunger pump packing needs.

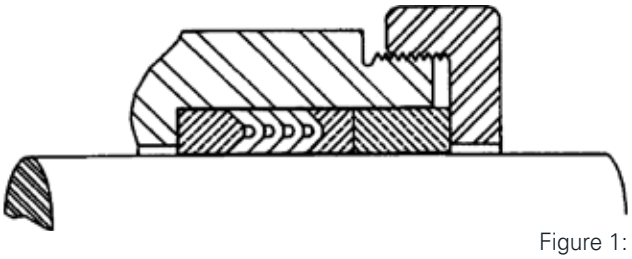

Figure 1:
Non-lubricated box
Adjustable CHEVRON® set

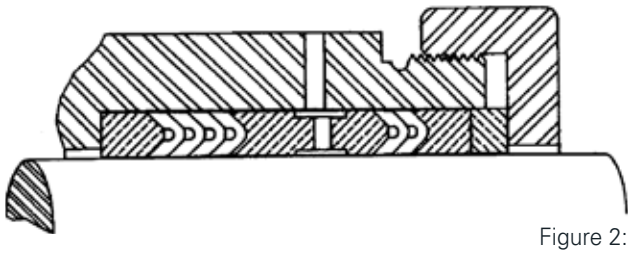

Figure 2:
Lubricated box
Adjustable primary and secondary CHEVRON® sets

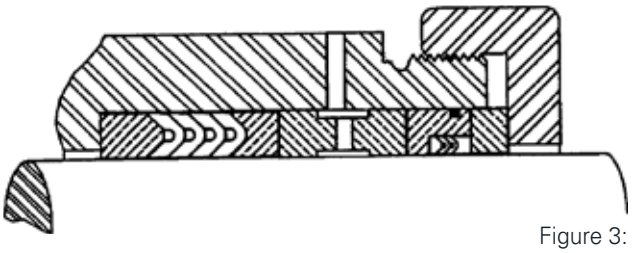

Figure 3:
Lubricated box
Adjustable primary CHEVRON® set
Non-adjustable secondary CHEVRON® set

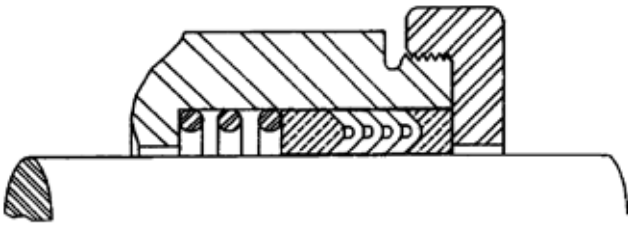

Figure 4:
Non-lubricated box
Spring-loaded self-adjusting CHEVRON® set

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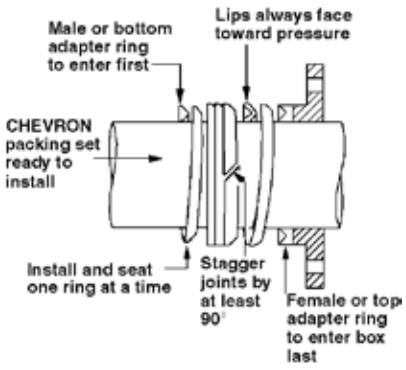
CHEVRON® Installation and Adjustment

Protect your investment. Do not hang Garlock CHEVRON® packing on nails or under any excessive stack pressure that might deform the concentricity of the product. Do not stock in extreme weather conditions. Avoid constant sunlight. The elastomer compounds used in CHEVRON® packing are highly technical and, while reliable, they are subject to handling stress.

1. Packing on a moving ram should be endless rings, if possible, for best service life.
2. If rams are grooved, worn, rusted or corroded, they should be reconditioned or replaced. No packing stands up to these conditions. Use boots to protect rams if abrasive dust is a problem.



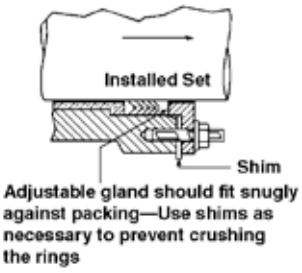
3. On high pressure jobs, make clearance between rod and gland as close as possible to prevent extrusion.
4. If lubrication is not getting into a Garlock CHEVRON® packing set, the gland may be drawn up too tightly and should be loosened appropriately. To avoid over-tightening and/or cocking of the gland, place a shim under the gland.
5. If a stuffing box is very deep, spacer(s) can be used to take up the space of additional CHEVRON® rings that are not needed. This saves replacement time and cost.
6. Use the correct style. For example, don't use butyl against a petroleum base oil, or a nitrile against a phosphate ester.
7. Use the right size. In emergencies, "off-size" parts can be distorted and made to work for a short period of time, but do not expect them to last or work as efficiently as the correct size.
8. Make sure all rings are seated with no voids in the set.
9. Use lubrication when installing the rings, as it makes installation much easier and helps during the break-in period.
10. Make sure sections of the lips of the rings are not turned over or twisted. This is easy to do, especially in blind installation, and will result in premature leakage and failure.
11. Make sure the packings are facing in the direction of the medium being sealed—whether liquid, air, dust, etc.
12. Consider metal structure. Many times a packing is blamed for leakage when the real culprit is porous metal—either the rod or the housing.
13. Let Garlock help you. Tell us about the application. If a forging press is under shock load, then packing must be a more rugged type, for example. Or, if low pressures are involved, the packing selection must be more flexible than for high pressure.
14. Don't use sharp metal tools like screwdrivers when installing packings. Hardwood tools are best and will not score rod or stuffing box.

    For installation of endless CHEVRON® packing, gland pressure should be only sufficient to snug rings within the confining cavity.

    On split ring installations, adjustment practice will vary depending on service conditions.

    For horizontal packing installations, nominally light gland pressure is necessary to seal the ring joints. Adjustment is made by turns of 1/4 flat on gland bolts.

    On vertical applications of split rings, it is desirable to provide increased gland pressure for the effective seal of ring joints.



9220 GARTHANE® U-Seals

STRENGTH/DURABILITY

» Four times the tensile strength / tear resistance of conventional seals
» High modulus counteracts extrusion and shear forces
» Withstands shocks over a wide range of temperatures and pressures
» Exceptional abrasion resistance
» Outstanding endurance under difficult operating conditions

FLEXIBILITY

» Excellent elasticity
» Excellent resilience
» Withstands high degree of deformation

TEMPERATURE AND CHEMICAL RESISTANCE

» Excellent for use against petroleum-based fluids to 225°F (107°C), air, warm water and water glycol to 180°F (82°C)
» Withstands dilute acetic and alkaline solutions, aliphatic alcohols and hydrocarbons, salts and solutions of aromatics and solids in concentrations under 80%
» Not recommended for use with very strong oxidizers, highly concentrated acids or bases, pure aromatic compounds, esters, ketones, automotive brake fluid or steam

PRESSURE RESISTANCE

» Compounded to withstand a wide range of pressure conditions
  › Normally used as hydraulic cylinder or large ram press seals to 3,500 psi (242 bar)
  › Successfully used for slow-moving equipment to 8,000 psi (552 bar), and static applications to 30,000 psi (2,070 bar) on specially adapted equipment

BENEFITS

» Increased seal life and performances
» Less equipment downtime
» Fewer sizes save inventory expense
» Eliminates chance of costly premature equipment failure

FEATURES	ADVANTAGES
90 Durometer Urethane	» High tensile strength » High tear resistance
Reverse bevel lip design	» Less friction » Responds immediately to pressure
Balanced design	» Can function as a rod or piston seal
Clear Urethane	» No hidden defects in seal
Extensive tooling list	» Greater size availability - both inch and metric

RECOMMENDED TOLERANCES AND FINISHES

» Shaft hardness: 30 Rockwell C (minimum)
» Groove length (axial): Height of U-seal plus 10% of cross section (0.032 minimum)
» Dynamic surface finish: 10 to 20 RMS
Tolerance: ±0.003 (maximum)
» Static surface finish: 60 RMS (maximum)
Tolerance: ±0.005 (maximum)

Standard Design Cross Section

Metric Design Cross Section

Polytop Sets

These unique set configurations have found widespread popularity due to their high sealing efficiency.

A Garlock Polytop CHEVRON® set utilizes both squeeze and multiple lip type seals. Used in a set configuration, these two proven designs combine to provide maximum sealing performance.

Squeeze seals, such as the Garlock 9220 polyurethane U-Seal, provide excellent low pressure sealing performance. Lip seals, such as Garlock 432 CHEVRON®, provide low friction rates while maintaining responsiveness to pressure fluctuations.

Compounded from the highest quality urethane, the Garlock 9220 U-Seal is strong and abrasion-resistant. In the Polytop configuration, it replaces the traditional top adapter used with vee sets and provides an additional sealing lip.

The fabric and rubber composition of Garlock 432 CHEVRON® provides a strong, yet flexible, sealing system that dampens any pressure surges.

Unlike typical vee sets, Garlock Polytop sets need no axial preload or adjustment after startup, virtually eliminating the fear of catastrophic failure.

POLYTOP SETS AND SLUDGE-PAK® PACKING

Polytop sets and SLUDGE-PAK® are similar in design because they combine different styles of packing. In performance, where it counts, these unique sets offer some significant features and benefits.

SLUDGE-PAK® Packing

FOR VERTICAL SLUDGE PUMPS

These unique, combination sets from Garlock for use in Carter, Marlow, Komline Sanderson and Passavant vertical sludge pumps have gained wide acceptance in the waste treatment industry.

SLUDGE-PAK® hydraulic packing sets are designed to reduce the friction and abrasion so often associated with vertical sludge pumps. This unique packing arrangement decreases the chance of scoring plungers as might occur with the use of a packing set consisting only of braided packing.

The set's function is based upon the qualities of three types of packing. In the bottom of the stuffing box is Style 8921-K. Next is Style 432 CHEVRON® sealing rings. Topping off the set is a Style 9220 GARTHANE® (urethane) U-seal.

Garlock SLUDGE-PAK® packing is the best of three worlds; braided packing, CHEVRON® rings and urethane U-seals. The performance is unbeatable and necessary in today's waste treatment industry.

FEATURES	ADVANTAGES
The best properties of each component improve sealability	» Longer life, fewer repacks
Combined styles react better to varying pressure conditions	» Less chance of costly premature failure
Individual components do not cause equipment damage	» Reduces expensive downtime and wear on spare parts

Well Service Packing

MAXIMUM SEALABILITY & LONGEVITY FOR HIGH PRESSURE WELL SERVICE PUMPS

Blue DURATUFF® was designed to provide maximum sealability for high pressure well service pumps. The propriety material was developed to eliminate extrusion and provide excellent abrasion resistance for fracturing, acidizing and cementing pumps.

VALUE AND BENEFITS

Longer Life

» Extensively field tested to ensure extended service life
» Eliminates extrusion
» Abrasion resistance – with our proprietary Header Ring material in combination with our superior Chevron® pressure rings

Advantages

» High pressure application
» Low coefficient of friction
» Superior strength

Cost Saving

» Longer life means less down time
» Longer life means less maintenance cost
» Increased profitability

Availability

» Inventory is available for most pump sizes
» Fabric wrapped & HNBR sets available

EQUIPMENT

» Well Service Pumps
» Fracturing Pumps
» Cementing Pumps
» Acidizing Pumps

LUBRIKUP®

LUBRIKUP® continues to supply high quality sealing products to the oil production industry as it has for over 90 years. LUBRIKUP® products allow pump jacks to operate safely and efficiently while increasing uptime which translates to increased production.

DOWNHOLE COMPONENTS

» Valve Cups: API, Lip and Wood types
» Seating Cups: API compatible
» Pressure Actuated Rings (PA Rings)
» Composition Rings

STUFFING BOX PACKING

Cone Packing:

» Graphited
» DURAGOLD™
» DURATUFF™
» TEFLON-FLAKE
» DURAGOLD™/TEFLON-FLAKE

Stuffing Box Packing:

» FLUID-SEAL™ Rod & Cone Packing
» LONG-LIFE™
» LUBRIPAK™

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