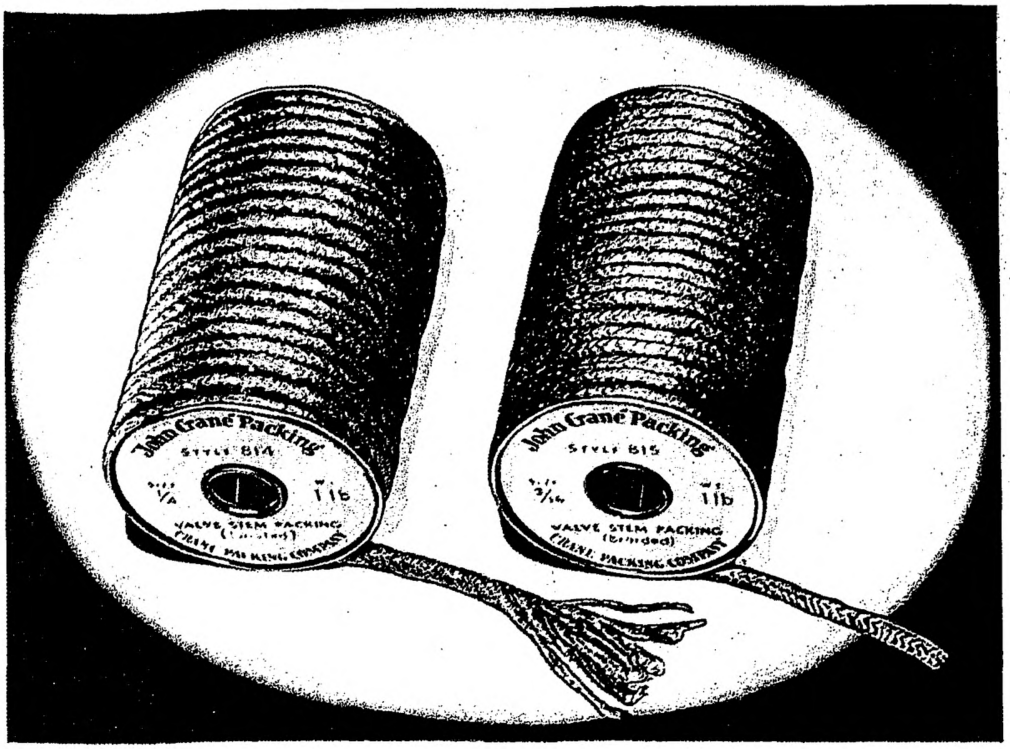
FILE NAME: John Crane (JC)

DATE: 0000

DOC#: JC055

DOCUMENT DESCRIPTION: Crane Sales Literature Part II

VALVE STEM PACKINGS



FOR GENERAL SERVICES

Style 814 for temperatures up to 500° F. Manufactured by twisting long fiber Canadian asbestos yarn. Strands are thoroughly impregnated with a high heat-resistant lubricant and graphited.

Recommended Services: for limited cavity dimensions, such as valve stems on high pressure steam, hot or cold water or oil. Small stuffing boxes can be conveniently packed by simply unraveling the strands to the size required.

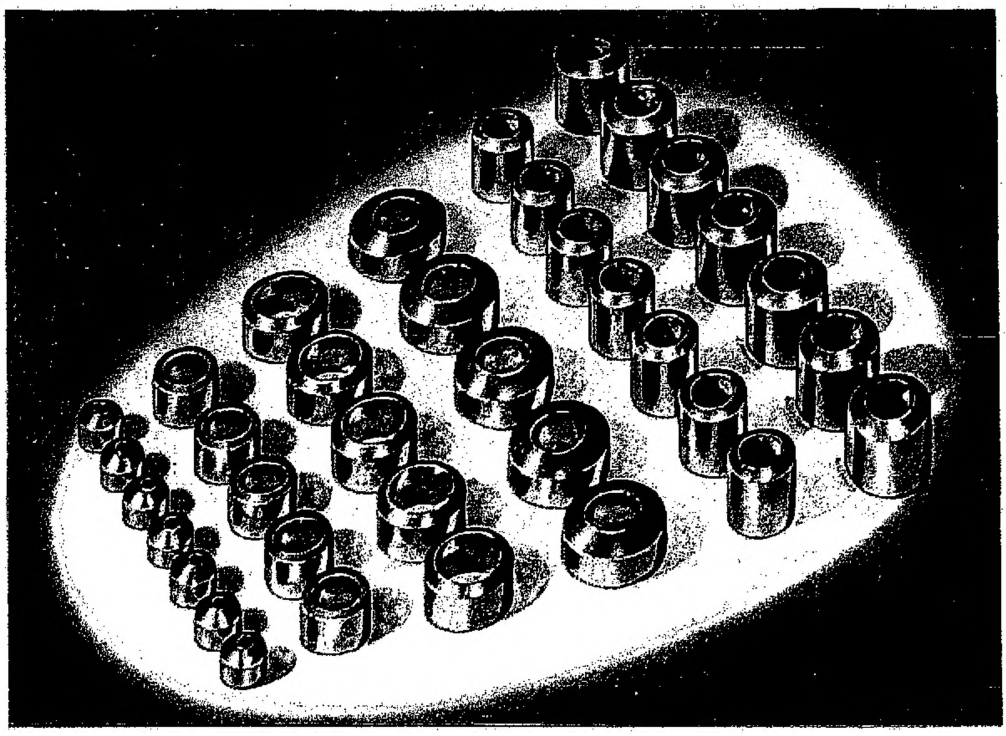
Style 815 for temperatures up to 500° F. Manufactured by braiding long fiber Canadian asbestos yarn impregnated with a high heat-resistant lubricant. Graphited throughout.

Recommended Services: all general services on valves handling high and low pressure steam, oil, water, air and ammonia.

SIZES

Styles 814-815							
Size	Style 814 Feet per Spool	Style 815 Feet per Spool	Approximate Weight per Spool	Size	Style 814 Feet per Spool	Style 815 Feet per Spool	Approximate Weight per Spool
1/16"	260		1 lb.	7/16"	10	13	1 lb.
1/8"	100	87	1 lb.	1/2"	43	46	5 lbs.
3/16"	42	51	1 lb.	9/16"		29	5 lbs.
1/4"	27	38	1 lb.	5/8"		29	5 lbs.
5/16"	17	20	1 lb.	11/16"		21	5 lbs.
3/8"	13	18	1 lb.	3/4"		18	5 lbs.

Endless Plastic Ring Production Line Packings



John Crane Endless Plastic Rings substantially reduce assembly time and costs. Various styles are made from combinations of asbestos, graphite lubricants and synthetic binders.

One-piece rings can be molded to exact blueprint specifications. Beveled or odd shaped rings to fit special fittings are also available. The highly smooth surface finish and low friction qualities allow easy operation of stems. Minimum gland adjustment is required for an effective seal.

Super-Seal No. 4 is a homogeneous mixture of asbestos, mica and an oil-proof synthetic binder. It is recommended for handling edible products where the presence of graphite would be objectionable. (See Bulletin P-390.)

Super-Seal No. 6 consists of asbestos, graphite and a synthetic rubber binder. Soft and resilient, it is available in small endless production rings or in large die-formed rings. Temperature range is to 550° F. (See Bulletin P-390.)

Style 172-D is made of asbestos, graphite and oil-proof binder. It is for use on shutoff valves, stove cocks and low pressure automatic controls handling refrigerants, gas, oils and distillates. Temperature range is to 550° F.

Style 172-DMN is of the same construction as Style 172-D, except that metal particles are added to make a harder ring for use with automatically controlled valves. The packing is suitable for steam, oil, air, gases and petroleum distillates. Temperature range is to 550° F.

Style 172-R consists of asbestos, graphite and a synthetic binder. It is recommended for use on globe and gate valves operating at pressures to 300 psi. Temperature range is to 550° F.

Send us your production line packing requirements. Our Engineering Department will supply you with samples and recommendations.

CRANE PACKING COMPANY

6400 OAKTON STREET, MORTON GROVE, ILLINOIS 60053 *(Chicago Suburb)*

In Canada: Crane Packing Company, Ltd., Box 3248, Station C, Hamilton, Ont.

In Mexico: Industrias John Crane de Mexico, S.A. • Poniente 152 #679 Industrial Vallejo, Mexico, D.F.

In Brazil: John Crane Industria E Comercio, Ltda. • Avenida Jurubatuba 600, Sao Bernardo do Campo, S.P.

In Australia: John Crane Mauri Pty., Ltd., 166 Eldridge Road, Bankstown, New South Wales, Australia

In Europe: Crane Packing Ltd., Slough, Bucks, England

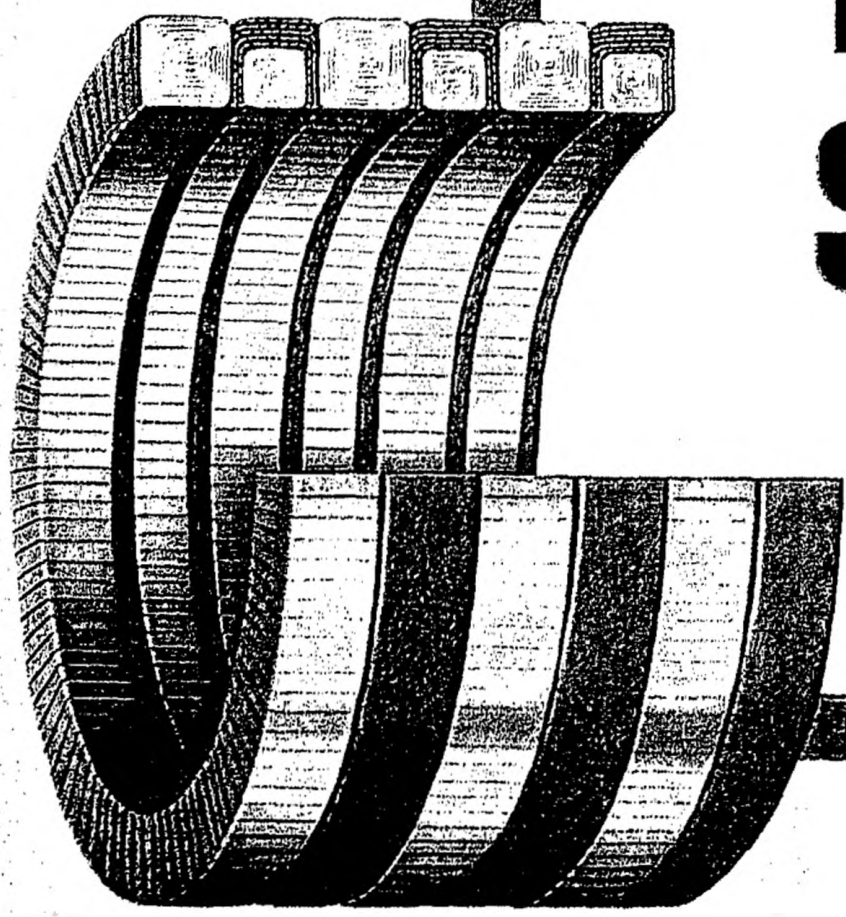
In Japan: John Crane Japan, Inc., No. 5, Tenjinbashi-suji 6-chome, Oyodo-ku, Osaka 531, Japan

OFFICES, WAREHOUSES AND SERVICE THE WORLD OVER

Printed in U.S.A.

BULLETIN NO. P-394-I

John Crane



PACKING RING SETS

FOR SPECIFIC APPLICATIONS

CRANE PACKING COMPANY

6400 OAKTON STREET, MORTON GROVE, ILLINOIS 60053 *(Chicago Suburb)*

In Canada: Crane Packing Company, Ltd., Box 3248, Station C, Hamilton, Ont.

In Mexico: Industrias John Crane de Mexico, S.A. • *Poniente 152 #679 Industrial Vallejo, Mexico, D.F.*

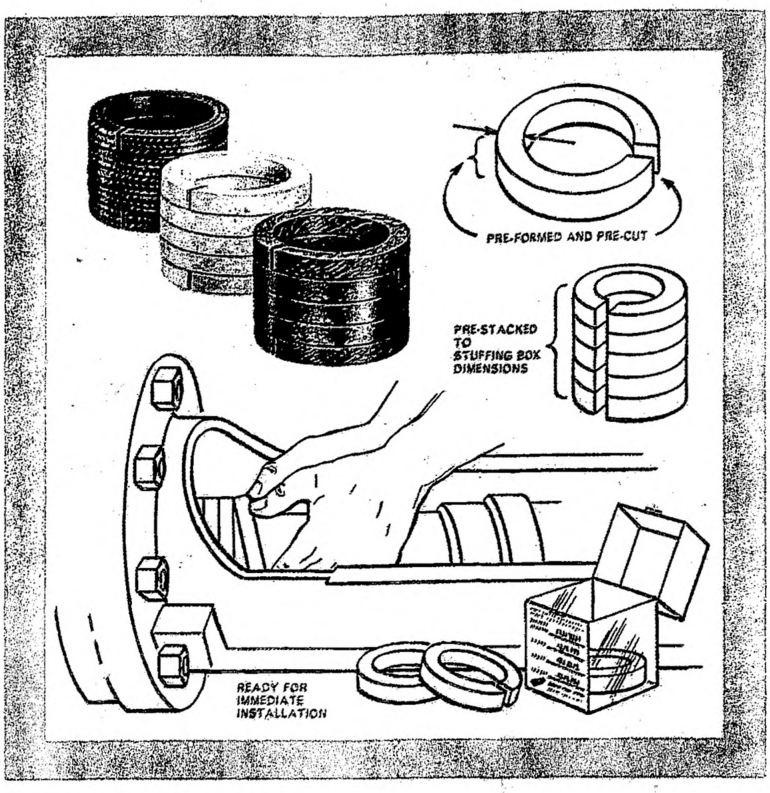
In Brazil: John Crane Industria E Comercio, Ltda. • Avenida Jurubatuba 600, Sao Bernardo do Campo, S.P.

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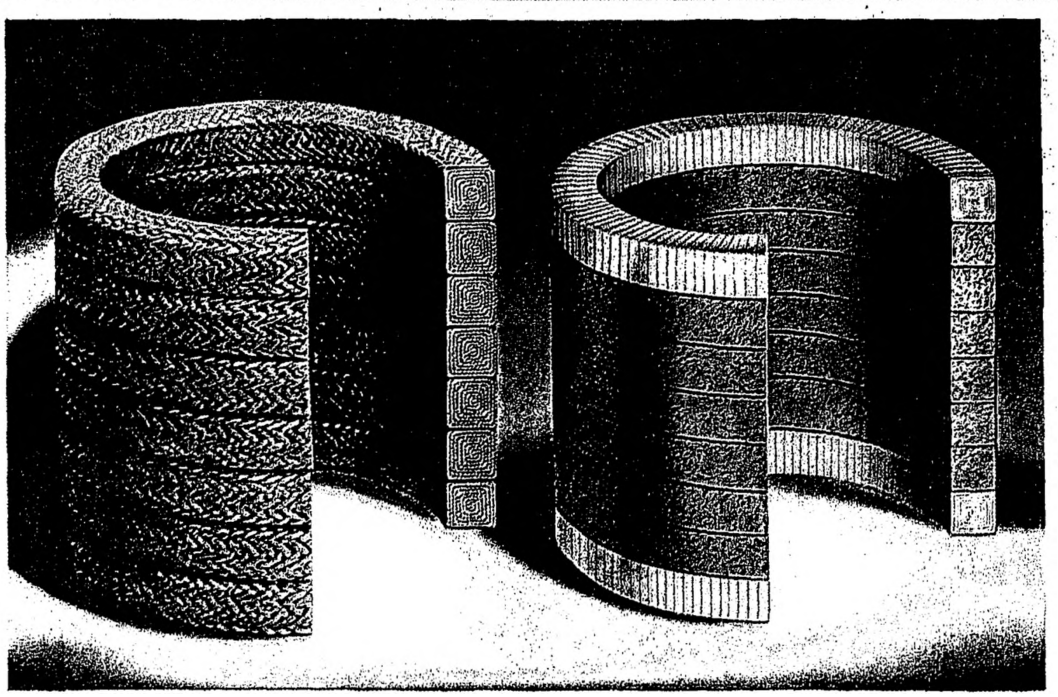
OFFICES, WAREHOUSES AND SERVICE THE WORLD OVER



John Crane Mechanical Packings are available in a wide assortment of ring sets to fit specific services and operating conditions. They offer the best possible means of assuring the proper material or combination of materials to fit the fluid being handled, the temperature and pressure encountered and the mechanical requirements of the equipment.

The sets are furnished pre-formed, pre-cut and pre-assembled to the proper I.D., O.D., and stack height of the stuffing box dimensions. This eliminates the time and labor cost normally involved in forming, cutting and assembling the correct number of rings. It also greatly reduces the chance of error by inexperienced maintenance personnel.

CENTRIFUGAL BOILER FEED PUMP PACKINGS



FOR HARDENED STEEL SLEEVES

Style 805-MBF (illustrated above at left): Made up of accurately die-formed rings. Packing is manufactured from the purest asbestos yarn with a monel wire insert, by the braid-over-braid method. Each strand is lubricated with a special boiler feed lubricant. Recommended for stuffing boxes with or without a lantern. The presence of the monel wire requires that the pump be equipped with shafts or sleeves of 500 Brinell hardness or over.

FOR MEDIUM HARD SLEEVES

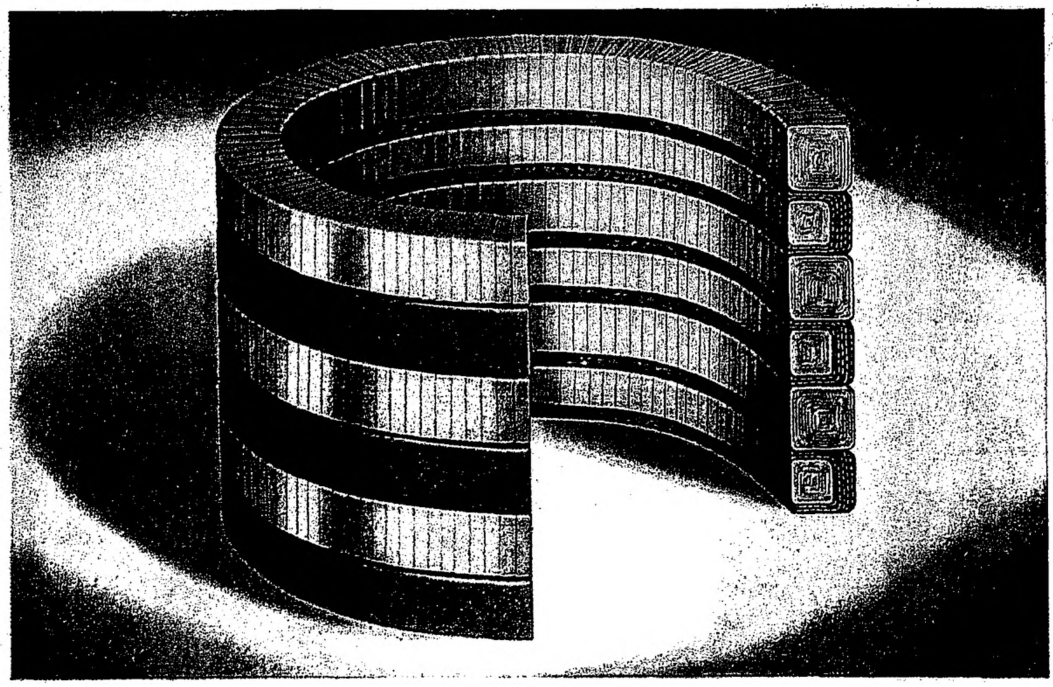
Style 1033 (illustrated above at right): Recommended for use on medium pressure centrifugal boiler feed pumps equipped with medium hard steel sleeves (270 to 500 Brinell). Set is composed of die-formed rings of Styles 101 and Super-Seal No. 1 in a suitable assembly. (See Bulletins Nos. P-389 and P-390.) Style 101 flexible metallic rings form a low frictional metallic surface and act as pressure breakers. The graphited Super-Seal No. 1 plastic rings make the proper seal along the shaft.

FOR BRONZE SLEEVES

Style 1015: Recommended for use on medium or low pressure centrifugal boiler feed pumps equipped with bronze sleeves. Set is composed of die-formed rings of Style 810 and Super-Seal No. 1 in a suitable assembly. (See Bulletins Nos. P-391 and P-390.) Super-Seal No. 1 is a dry-graphited plastic packing.

When ordering sets, specify diameter of shaft, inside diameter and depth of box.

RECIPROCATING BOILER FEED PACKINGS



FOR STEEL PLUNGERS OR RODS

Style 751 (as illustrated): Recommended for use on plunger-type boiler feed pumps where medium pressures are encountered. Reduces friction to a minimum and polishes plungers. Consists of alternate die-formed rings of Styles 101 and 301. (See Bulletin No. P-389.)

Style 751: Recommended for use only on steel or cast-iron plungers or steel rods in good condition and running in line.

FOR BRONZE PLUNGERS OR RODS

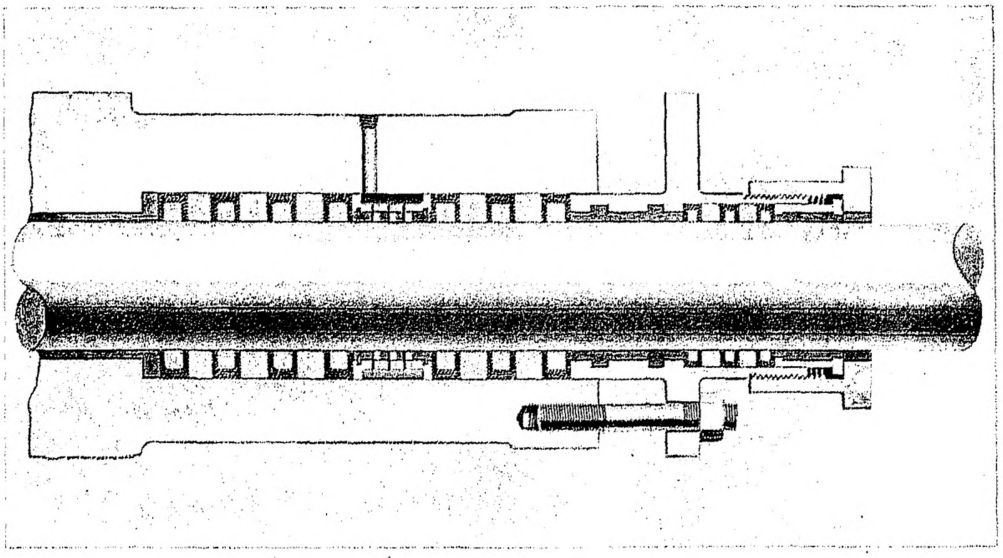
Style 820 or Style 823 Everseal "V" Packings (See Bulletin No. P-391): Recommended for use on reciprocating boiler feed pumps with bronze plungers, dependent on temperatures. Sets are composed of one adapter ring and a sufficient number of self-sealing pressure rings to fill the stuffing box. Pressure rings permit smooth operation of rod or plunger without leakage and reduce friction and wear to a minimum.

Style 820: Made of duck and rubber construction for low temperatures up to 250° F.

Style 823: Made of asbestos and rubber construction for high temperatures up to 350° F.

When ordering sets, specify diameter of shaft, inside diameter and depth of box.

REFRIGERATION PACKINGS

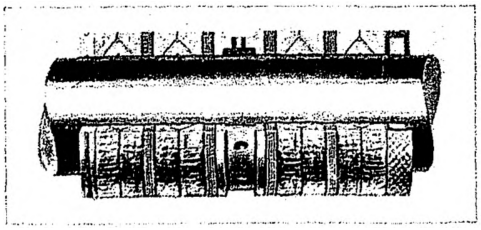


FOR RECIPROCATING AMMONIA COMPRESSORS (Slow Speed)

Style 751 (illustrated above): Made up of die-formed rings of Styles 101 and 301. (See Bulletin No. P-389.) Recommended for use on reciprocating ammonia compressors operating at speeds of less than 450 FPM.

FOR RECIPROCATING AMMONIA COMPRESSORS (High Speed)

Style 761 (illustrated at right): Made up of machined split-babbitt rings held to the rod by coiled steel springs. Each babbitt ring is imbedded between two properly beveled die-formed rings of Style 101. (See Bulletin P-389.) Each unit is separated by a duck and rubber expansion ring. Recommended for reciprocating ammonia and carbon dioxide compressors where piston speeds exceed 450 FPM.



FOR ROTARY AMMONIA COMPRESSORS

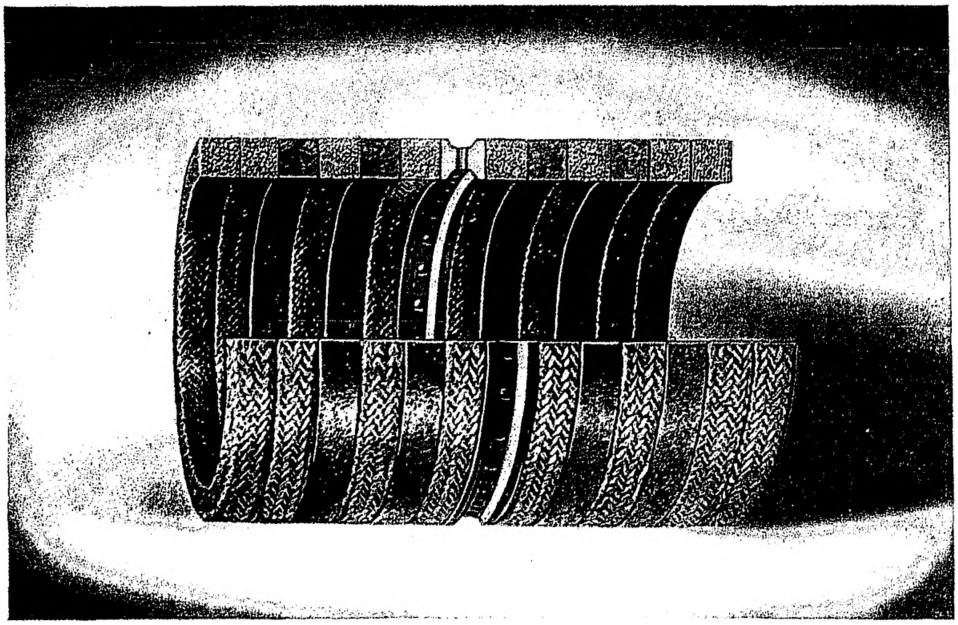
Style 114-D: Die-formed rings of Style 111. (See Bulletin No. P-389.) Each ring is separated by oil-proof gaskets. Recommended on rotary compressors handling ammonia, CO_2 and Freon.

FOR AMMONIA VALVE STEMS

Super-Seal No. 1 valve stem packing in spool form is recommended for refrigerants such as ammonia, Freon, CO_2 and methyl chloride. (See Bulletin No. P-390.)

When ordering sets, specify diameter of rod or shaft, inside diameter and depth of box.

RECIPROCATING AND CENTRIFUGAL HOT OIL PUMP PACKINGS



RECIPROCATING PUMPS

FOR OIL OVER 450° F. — Medium Hard Steel Plungers

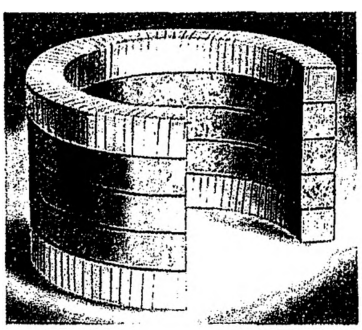
Style 1011 (illustrated above): Consists of alternate die-formed rings of Styles 805-D and Super-Seal No. 2. (See Bulletins Nos. P-391 and P-390.) Recommended for use on stainless steel, medium hard cold-rolled steel rods and plungers operating at high pressures to 1200 psi, in high temperature oil service. Used in refinery cracking pumps operating under severe high temperature, high pressure conditions.

Packings contain only the purest asbestos yarn and asbestos fibers that are specially treated for maximum oil resistance.

CENTRIFUGAL PUMPS

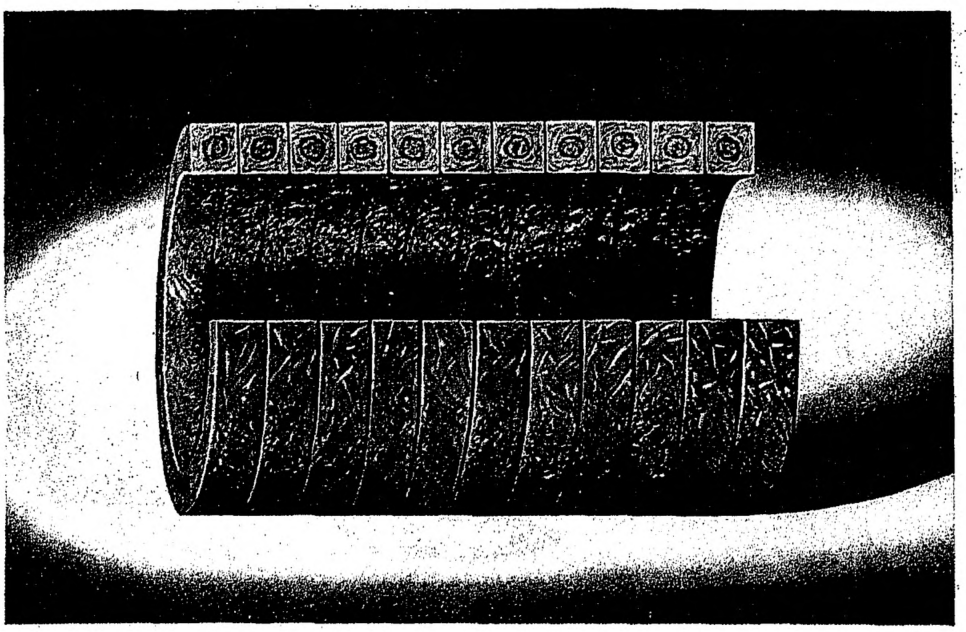
FOR LIGHT OIL, GASOLINE AND NAPHTHA

Style 1035 (illustrated at right): Made up of accurately die-formed rings of Style 101 and Super-Seal No. 3 in suitable assembly. (See Bulletins Nos. P-389 and P-390.) Recommended for centrifugal pumps where leakage must be held to a minimum. Super-Seal No. 3 rings provide the final seal. The exact number of rings of each style furnished is dependent on stuffing box design, fluid handled, pressures and type of lubrication.



When ordering sets, specify sleeve diameter of shaft, inside diameter and depth of box.

CENTRIFUGAL OIL PUMP PACKINGS



CENTRIFUGAL PUMPS

FOR OIL OVER 450° F. — **High Pressures (Hardened Steel Sleeves)**

Style 101-AL (illustration): Consists of accurately die-formed metallic packing rings made by spirally wrapping thin ribbons of soft annealed aluminum foil loosely about a core of pure dry asbestos rovings.

Style 101-CU: Made up of accurately die-formed metallic packing rings formed by spirally wrapping thin ribbons of soft annealed copper foil loosely about a core of pure dry asbestos rovings. If desired, each ring can be separated by a gasket cut from oil-proof asbestos sheet packing.

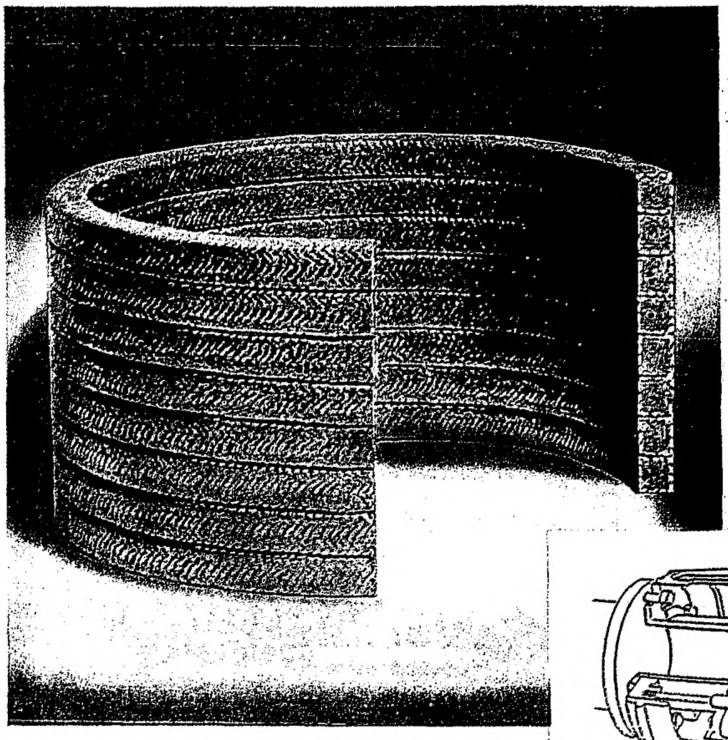
Either set is recommended for use on pumps equipped with hardened steel sleeves (500 Brinell or more). Both will withstand temperatures up to 1000° F., pressures to 1500 psi. and speeds to 4000 RPM. Packing rings are lubricated and graphited.

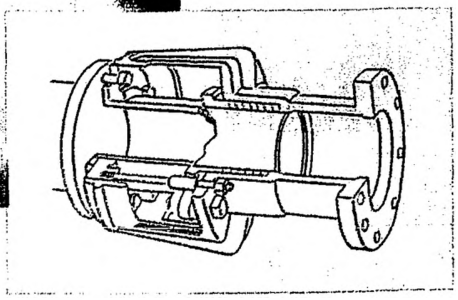
FOR OIL UNDER 450° F. — **Medium Pressures (Hard and Medium Steel Sleeves)**

Style 101-M: Consists of accurately die-formed metallic packing rings made of continuous thin ribbons of soft babbitt foil, spirally and loosely wrapped, crinkled and folded, and squared to required size. If desired, each ring can be separated by gaskets cut from oil-proof asbestos sheet packing.

When ordering sets, specify diameter of rod or plunger, inside diameter and depth of box.

EXPANSION JOINT PACKINGS





FOR TEMPERATURES UP TO 850° F.

Style 6-AM (illustrated above): Especially developed for high temperature, high pressure expansion joints. Rings are made by braiding a jacket of pure asbestos yarn with monel wire insert over a non-metallic core of high temperature plastic. Packing remains resilient and presents a low frictional wearing face, allowing joints to expand and contract freely without strain on the anchors. Recommended for expansion joints handling high pressure super-heated steam and hot gases.

FOR TEMPERATURES UP TO 1200° F.

Style 177-AI: Has a closely braided asbestos yarn top jacket reinforced with Inconel wire. The core consists of long fiber asbestos and flake graphite to reduce friction to a minimum. Available in spools or die-formed rings. Rings are furnished with either square cross section or with special bevels for concave-convex nest sets. Recommended for extreme service conditions in high temperature valves, soot blowers, gauge glass fittings and similar applications. Withstands pressures to 2000 psi. and remains resilient at temperatures to 1200° F.

FOR STEAM AND CORROSIVE SERVICE

Style CO-7: Braided of high quality white asbestos yarn impregnated with TFE (DuPont Teflon). Ideally suited for a wide range of steam, acid, alkali or solvent services, either liquid or gas. Has temperature range of —100° F. to +600° F.

When ordering sets, specify sleeve diameter and inside diameter and depth of box.

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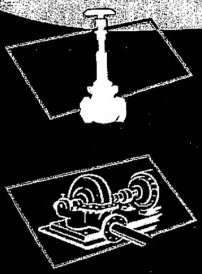
BULLETIN NO. P-325-6

John Crane

CHEMLON®

MECHANICAL PACKINGS

- Braided Styles
- Molded and Machined Styles



For All Services, Including the Most Destructive Acids, Alkalies and Solvents

"JOHN CRANE" CHEMLON—The Best in TFE

CHEMLON BRAIDED PACKINGS



"John Crane" Chemlon Braided Packings are recommended for hot or cold acid, alkali, corrosive, or solvent service—regardless of the concentration—at temperatures from −120°F to +500°F. They are particularly adapted to chemical, refining, paper, food or kindred industries. Completely non-toxic, they are perfectly safe for handling food products and related liquids or gases. Other advantages are a very low coefficient of friction and substantially longer service life over packings fabricated from other materials.

Chemlon Braided Packings are constructed from either braided tape or fiber yarn, depending on service requirements. They assure maximum service life, since the packing remains intact, even though individual strands might wear away. Their construction provides maximum flexibility—so that even small rings can be formed without buckling the I.D. or distorting the O.D.—and also provides uniform density and a smooth wearing surface.

Types and Service Recommendations

1. Solid braided TFE tape — for low shaft speeds or valve stems in highly corrosive service.
2. Braided, bleached TFE fiber yarn — for higher shaft speeds in highly corrosive service.
3. Braided asbestos with either surface lubrication or complete impregnation of TFE suspensoid — for moderate shaft speeds or valve stems in mild chemical or solvent service.

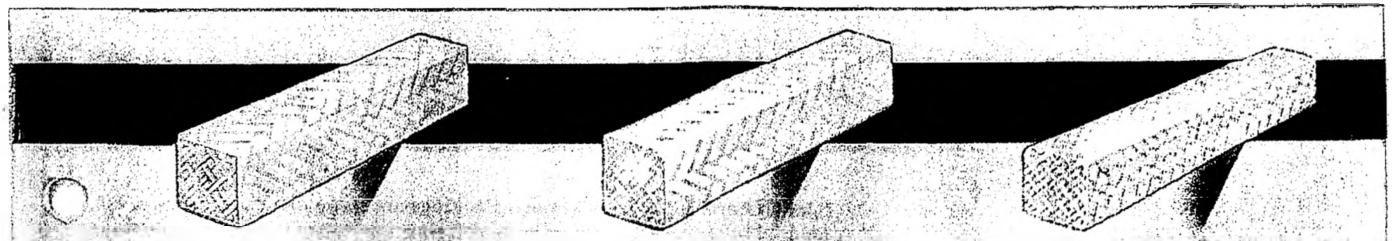
Note: Although this is essentially an asbestos type packing, it provides the exceptional lubricating properties, as well as other advantages of TFE.

"John Crane" Chemlon Braided Packings are available in a full range of sizes in spool, coil or ring form (see facing page).

SERVICE TABLE—CHEMLON BRAIDED PACKINGS

Services	Style Nos.	Temperatures °F
CAUSTIC ALKALI SOLUTIONS	C-1030	−120 to 500
	C-1045	−120 to 500
	704	−100 to 500
	706	0 to 300
	712	−40 to 400
	C-1050	−120 to 500
CHLORINE LIQUID AND BROMINE	C-1030	−120 to 500
	C-1045	−120 to 500
	704	−100 to 500
CHLORINE (Gas)	C-1040	+32 to 350
FOOD	C-06	−100 to 600
	C-12	−100 to 600
	C-1030	−120 to 500
	C-1045	−120 to 500
	C-1050	−120 to 500
	C-60	−100 to 600
GASES (Other than Oxygen and Halogens)	C-1030	−120 to 500
	C-1045	−120 to 500
	706	0 to 300
	C-1050	−120 to 500
INORGANIC ACIDS 1. Nitrating Acids	C-1030	−120 to 500
	C-1040	+32 to 350
	C-1045	−120 to 500
	710	0 to 125
	C-1050	−120 to 500
2. Fluorine-containing Acids	C-1040	+32 to 350
	704	−100 to 500
	706	0 to 300
	712	−40 to 400
3. All inorganic acids other than nitrating and fluorine-containing acids	C-1030	−120 to 500
	C-1040	+32 to 350
	C-1045	−120 to 500
	704	−100 to 500
	706	0 to 300
	710	0 to 125
	712	−40 to 400
	C-1050	−120 to 500
*HYDROGEN PEROXIDE (Strong)	C-1030	−120 to 500
	712	−40 to 400
OLEUM (higher concentrations)	C-1030	−120 to 500
	C-1040	+32 to 350
	C-1045	−120 to 500
	710	0 to 125
*OXYGEN	C-1045	−120 to 500
	C-94	−100 to 600
	704	−100 to 500
STEAM, AQUEOUS Solutions, Solvents	C-1030	−120 to 500
	C-1040	+32 to 350
	C-1045	−120 to 500
	C-06	−100 to 600
	C-12	−100 to 600
	C-60	−100 to 600
	C-1050	−120 to 500

*NOTE: Orders must specify intended service so that special precautions can be taken in handling and packaging to exclude organic matter.



STYLE C-06 — Braided of high quality white asbestos yarn, each strand of which has first been impregnated with TFE suspensoid. This results in a dense packing that prevents permeation of gases or other vapors through the packing. Recommended for services from −100°F. to +600°F.

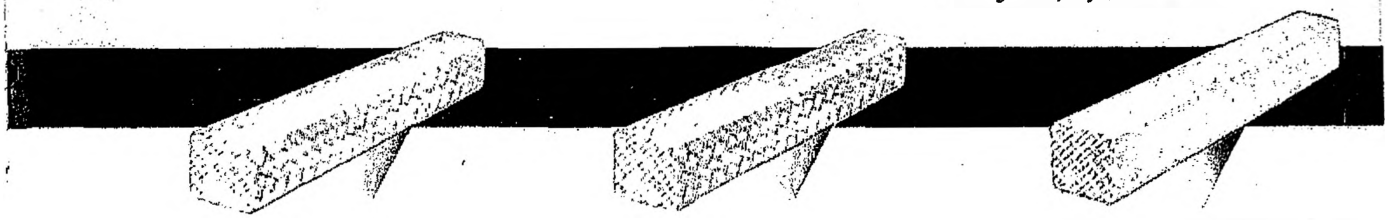
Ring form, Style C-07.

STYLE C-12 — Braided of dry, high quality white asbestos and externally lubricated with TFE suspensoid. A softer, more resilient packing than C-06. Recommended for steam, aqueous solutions, solvents, food services, etc. Temperature range: −100°F. to +600°F.

Ring form, Style C-13.

STYLE C-1030 — Braided of bleached TFE multi-filament yarn, no lubrication of any kind. This packing was developed for pump and valve application in highly corrosive services, where soft resilient packings are required. Recommended for higher peripheral speeds up to 1000 FPM. Temperature range: −120°F. to +500°F.

Ring form, Style C-1031.



STYLE C-1040 — Braided of bleached TFE multi-filament yarn and externally lubricated with Fluorolube. For high speed applications and highly corrosive services. Recommended temperature range: +32°F. to +350°F.

Ring form, Style C-1041.

STYLE C-1045 — Braided of bleached TFE multi-filament yarn and surface lubricated with TFE suspensoid. A dense packing designed for applications where other lubricants are not acceptable. Especially suited for gases and other vapor services. Temperature range: −120°F. to +500°F.

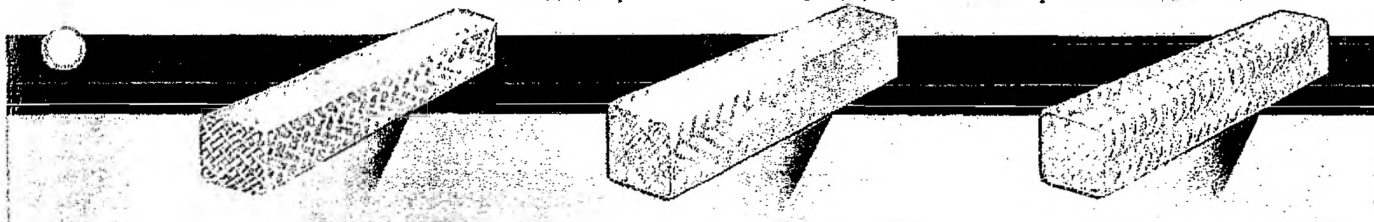
Ring form, Style C-1046.

Meets specification No. MIL-P-24393.

STYLE C-1050 — Braided of bleached TFE multi-filament yarn with each strand coated with a special lubricant (TFE suspensoid). An extremely soft resilient packing designed for high peripheral speeds, corrosive and gas services. Temperature range: −120°F. to +500°F.

Ring form, Style C-1051.

Meets specification No. MIL-P-24393.



STYLE C-60 — Braided of high quality white asbestos and impregnated throughout with TFE suspensoid and a special lubricant. A dense resilient packing designed especially for paper mill applications. Temperature range: −100°F. to +600°F.

Ring form, Style C-61.

Braid-over-braid Style C-58 also available.

Meets specification No. MIL-P-24377.

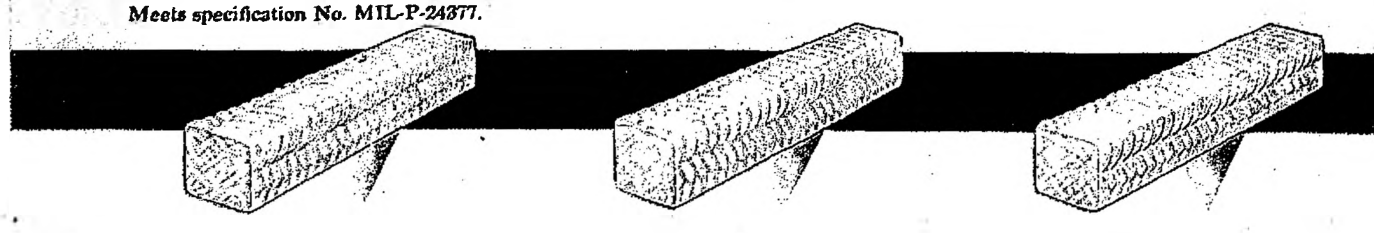
STYLE C-94 — Braided of AAAA asbestos yarn, each strand of which has first been lubricated with TFE suspensoid. Suitable for temperatures up to +600°F., oxygen or other gases.

Ring form, Style C-95.

Styles C-994 and C-995 — low chloride.

STYLE #704 — Braided entirely of pure TFE, no lubricant. For highly corrosive services where any type of lubricant is undesirable. Temperature range: −100°F. to +500°F.

Ring form, Style #705.



STYLE #706 — Braided of pure TFE and impregnated throughout with a special chemical resistant lubricant. Temperature range: 0 to +300°F.

Ring form, Style #707.

STYLE #710 — Braided of pure TFE and impregnated with a lubricant especially suitable for use in nitrating acid services. Temperature range: 0 to +125°F.

Ring form, Style #711.

STYLE #712 — Braided of pure TFE and lubricated with a non-hardening, non-melting lubricant. Temperature range: −40°F. to +400°F.

Ring form, Style #713.

NOTES: All of the above styles are available in spool or coil form from 1/8" up.
On high pressure pump applications, it is advisable to alternate thin TFE separator rings with any of the above packings.

CHEMLON MOLDED PACKINGS...

"John Crane" Chemlon C-V Packing rings have proved to be the closest possible approach to a universal packing. They are as well suited for valves as for reciprocating or rotating pumps and other revolving shaft applications under the most corrosive acid, alkali, or solvent service conditions.

Chemlon C-V rings offer the advantages of a wide operating temperature range from −120°F. to +500°F., plus an extremely low coefficient of friction. "Breakout" friction is only slightly higher than "running" friction. This friction-free characteristic prevents shaft or rod wear, promotes smoother action and increases packing life many times over.

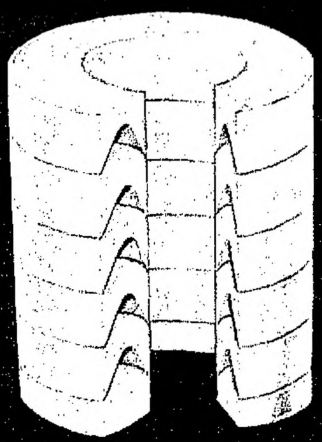
A special cross section design in each pressure ring permits positive sealing at finger tight gland pressure. Also, this design provides a void between each ring to compensate for the relative high coefficient of expansion in TFE.

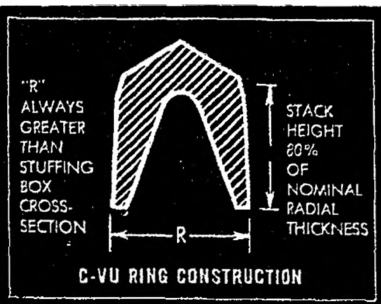
Chemlon C-V rings are used in sets, the number of rings dependent on the stuffing box length and pressures encountered. In all cases, a minimum of two pressure rings, together with male and female adapters, is recommended.

For Low Pressure Service

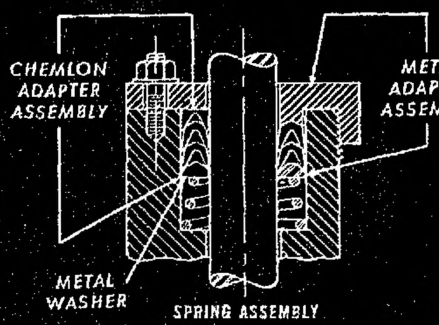
STYLE C-VU RINGS

This design provides a very sensitive and resilient type packing. It is particularly suited for use in control and regulator valves handling gases and fluids.

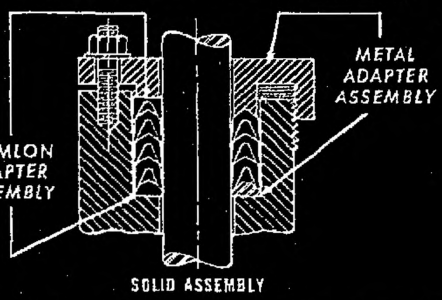




C-VU RING CONSTRUCTION



SPRING ASSEMBLY



SOLID ASSEMBLY

TYPICAL STANDARD SIZES — STYLE C-VU RINGS

Size No.	Nominal I.D.	Nominal O.D.	Stack Hght. ±.010"	Size No.	Nominal I.D.	Nominal O.D.	Stack Hght. ±.010"	Size No.	Nominal I.D.	Nominal O.D.	Stack Hght. ±.010"	Size No.	Nominal I.D.	Nominal O.D.	Stack Hght.* ±.010"
26	1/8	3/8	.100	715	7/16	1 1/16	.200	1420	3/8	1 1/4	.150	2232	1 3/8	2	.250
								1422	3/8	1 3/8	.200				
27	1/4	7/16	.100	812	1/2	3/4	.100	1426	3/8	1 1/2	.300	2333	1 7/8	2 1/4	.250
38	1/4	1/2	.125	813	1/2	1 3/16	.125								
				814	1/2	7/8	.150	1624	1	1 1/2	.200	2432	1 1/2	2	.200
48	1/4	1/2	.100	816	1/2	1	.200	1625	1	1 5/16	.225	2436	1 1/2	2 1/4	.300
412	1/4	3/4	.200					1628	1	1 3/4	.300				
414	1/4	1	.250	913	9/16	1 5/16	.100					2838	1 3/4	2 3/8	.250
				915	9/16	1 5/16	.150	1826	1 1/8	1 1/2	.200	2840	1 3/4	2 1/2	.300
510	5/16	1/2	.125					1828	1 1/8	1 3/4	.250				
511	5/16	11/16	.150	1016	5/8	1	.150					3646	2 1/4	2 7/8	.250
512	5/16	3/4	.175	1018	5/8	1 1/8	.200	1929	1 3/16	1 13/16	.250				
513	5/16	13/16	.200	1117	11/16	1 1/16	.150					4050	2 1/2	3 1/4	.250
				1119	11/16	1 3/16	.200	2030	1 1/4	1 1/2	.250				
69	3/8	9/16	.074					2032	1 1/4	2	.300	4860	3	3 3/4	.300
610	3/8	7/8	.100	1218	3/4	1 1/2	.150								
612	3/8	3/4	.150	1220	3/4	1 1/4	.200								
614	3/8	7/8	.200	1222	3/4	1 3/8	.250	2230	1 3/8	1 3/4	.200	5064	3 1/8	4	.350

* Stock height of all male adapters is .072". Stock height of all female adapters is same as width of cross section of ring.

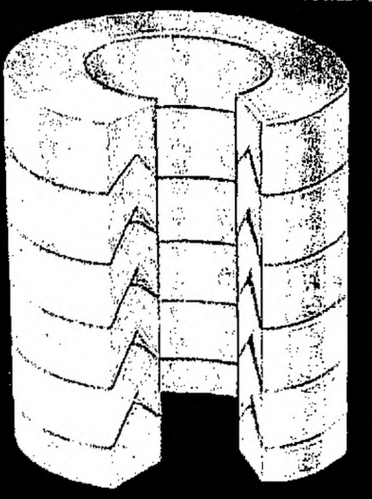
NOTES: (1) In addition to the above standard stock sizes, molds to make many other sizes are available. (2) All rings are endless and can be diagonally cut with pen knife for installation purposes when it is not desirable or practical to disassemble the valve unit.

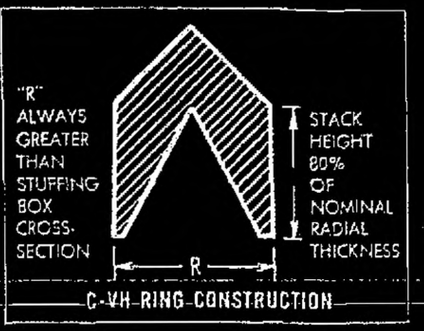
...STYLES C-VU and C-VH

For High Pressure Service

STYLE C-VH RINGS

This design incorporates a heavy wall and heel section necessary to withstand pressures up to 500 PSI and over (on pressures over 1000 PSI, metal adapters are recommended).
This packing is for high pressure application, such as found in hydraulic cylinders and pumps.





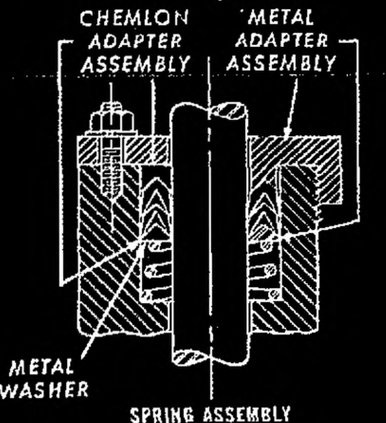
C-VH-RING-CONSTRUCTION

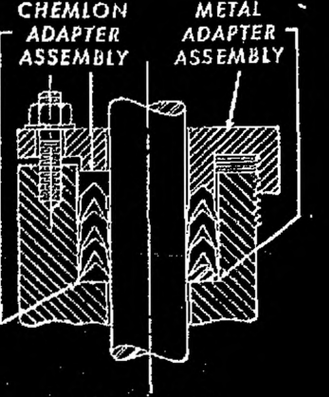
TYPICAL STANDARD SIZES — STYLE C-VH RINGS

Size No.	Nominal I.D.	Nominal O.D.	Stack Height* ±.010"	Size No.	Nominal I.D.	Nominal O.D.	Stack Height* ±.010"
-25	1/4	3/8	.072	1218	3/4	1 1/4	150
-26	1/4	7/16	.100	1220	3/4	1 1/4	200
-27	1/4	1/2	.125	1221	3/4	1 1/4	225
-28	1/4	9/16	.150	1222	3/4	1 1/4	250
-29	1/4	5/8	.175	1224	3/4	1 1/4	300
-30	1/4	11/16	.200	1226	3/4	1 1/4	350
-210	1/4	13/16	.250	1228	3/4	1 1/4	400
-38	3/8	1/2	.100	1321	1	1 1/2	200
-310	3/8	5/8	.150	1323	1	1 1/2	300
-312	3/8	3/4	.200	1325	1	1 1/2	350
-314	3/8	7/8	.250	1327	1	1 1/2	400
-410	1/2	5/8	.100	1521	1 1/4	1 3/4	200
-412	1/2	3/4	.150	1523	1 1/4	1 3/4	250
-414	1/2	7/8	.200	1525	1 1/4	1 3/4	300
-416	1/2	1	.250	1527	1 1/4	1 3/4	350
-418	1/2	1 1/8	.300	1529	1 1/4	1 3/4	400
-510	5/8	7/8	.100	1721	1 1/2	2	200
-512	5/8	1	.150	1723	1 1/2	2	300
-514	5/8	1 1/8	.200	1725	1 1/2	2	350
-516	5/8	1 1/4	.250	1727	1 1/2	2	400
-518	5/8	1 3/8	.300	1729	1 1/2	2	450
-610	3/4	1	.100	1921	1 3/4	2 1/4	200
-612	3/4	1 1/8	.150	1923	1 3/4	2 1/4	300
-614	3/4	1 1/4	.200	1925	1 3/4	2 1/4	350
-616	3/4	1 3/8	.250	1927	1 3/4	2 1/4	400
-618	3/4	1 1/2	.300	1929	1 3/4	2 1/4	450
-710	7/8	1 1/4	.100	2121	2	2 1/2	200
-712	7/8	1 3/8	.150	2123	2	2 1/2	300
-714	7/8	1 1/2	.200	2125	2	2 1/2	350
-716	7/8	1 5/8	.250	2127	2	2 1/2	400
-718	7/8	1 3/4	.300	2129	2	2 1/2	450
-812	1/2	3/4	.100	2032	1 1/4	2	300
-813	1/2	1 5/16	.125	2036	1 1/4	2 1/4	400
-814	1/2	7/8	.150	2232	1 3/4	2	250
-816	1/2	1	.200	2234	1 3/8	2 1/8	300
-818	1/2	1 1/16	.250	2236	1 3/4	2 3/4	325
-913	9/16	1 5/16	.100	2436	1 1/2	2 1/4	300
-915	9/16	1 7/16	.150				
-917	9/16	1 3/16	.200	2638	1 5/8	2 3/8	300
1016	5/8	1	.150	2840	1 3/4	2 1/2	300
1018	5/8	1 1/8	.200				
1019	5/8	1 3/16	.225	3248	2	3	400
1020	5/8	1 1/4	.250				
				4056	2 1/2	3 1/2	400
1117	11/16	1 1/16	.150				
1119	11/16	1 3/16	.200	4151	2 5/8	3 3/4	450

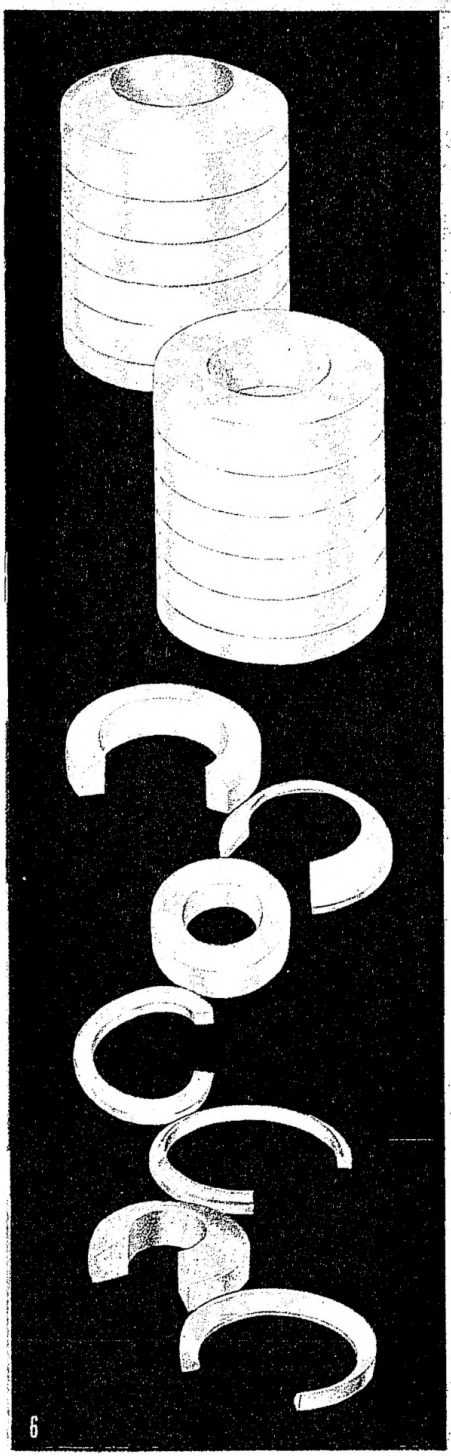
NOTES: (1) In addition to the above standard stock sizes, molds to meet many other requirements can be furnished. (2) All rings are endless and can be diagonally cut with new knife for installation purposes where it is not desirable or practical to disassemble the valve unit.

* Stock height of all male adapters is .072". Stock height of all female adapters is same as width of cross section of ring.





CHEMLON MOLDED and.....



"John Crane" Chemlon Molded and Machined Packings cover a wide range of special application requirements that cannot be handled satisfactorily by our style C-V packing ring designs shown on pages 4 and 5. All of these packings are recommended for safe and effective handling of acids, alkalis, solvents and hydraulic fluids in any concentration at temperatures from −120°F. to +500°F.

They are available in the following general forms:

1. Molded rings of interlocking shreds of TFE — a packing very sensitive to gland adjustment and self-compensating under gland load for minor stuffing box variations.

2. Molded or machined solid rings of TFE — tough, flexible and long lasting.

3. Molded rings of sponge TFE — a resilient packing containing tiny voids which act as reservoirs to carry lubricants.

4. Molded or machined Cup and Cone packing ring sets — a design construction of solid TFE that is easily adjustable and affords a tight seal at low gland pressure. (See page 8.)

5. Combination sets—in which the resilience and easy flow of one type is combined with the toughness of another. (See page 8.)

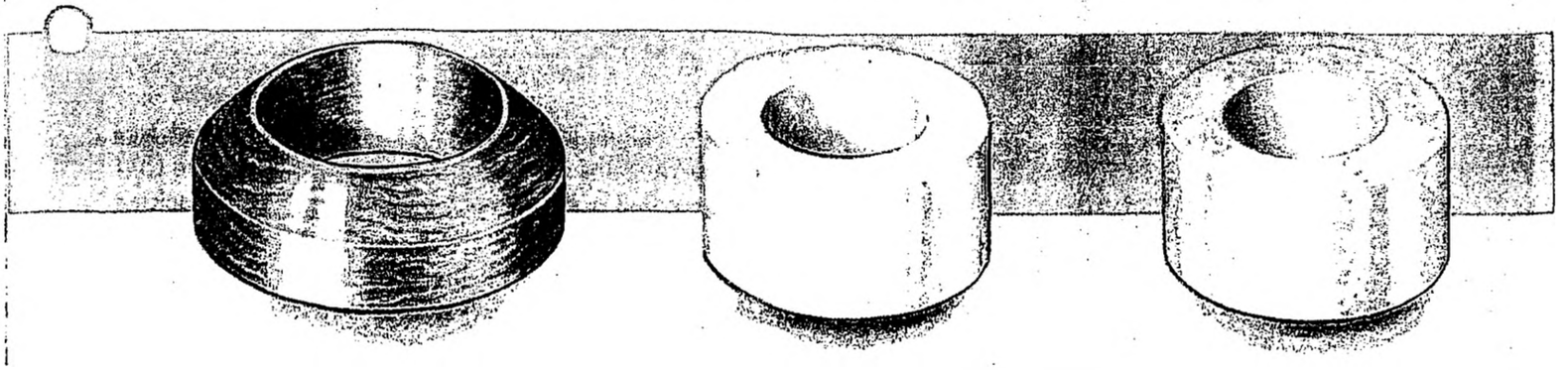
Chemlon Molded and Machined Packings are available with square or beveled ends or in odd shapes for special fittings. They are also suited for valve discs and seats, scraper rings and similar uses.

All of these packings can be impregnated with graphite or other fillers such as carbon, copper particles, calcium fluoride, glass and molybdenum disulfide to suit unique applications. For further particulars on filled TFE, write for our Bulletin T-127.

•

"JOHN CRANE" CHEMLON—
The Best in TFE Packings

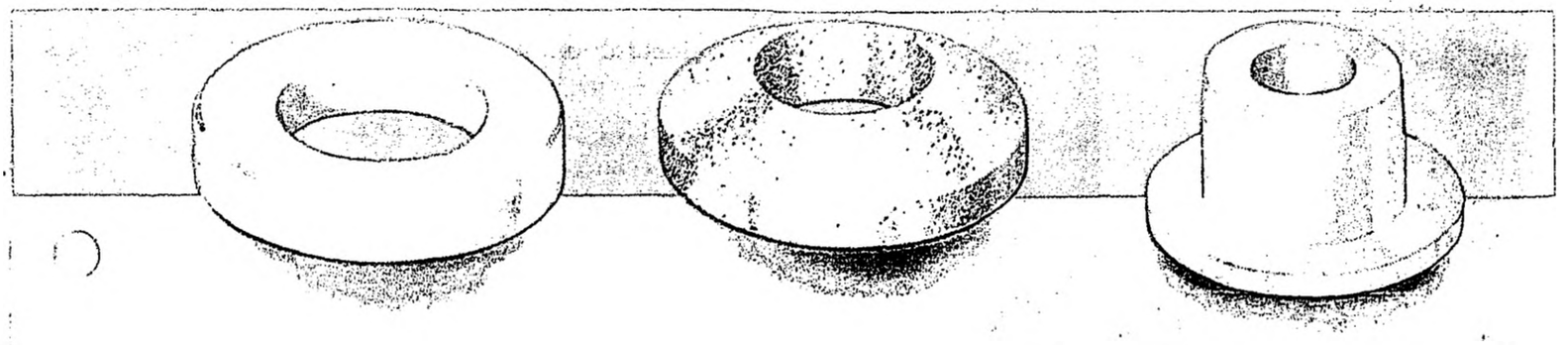
....MACHINED PACKINGS



STYLE C-14—A hard endless packing ring, produced by forming wire-inserted asbestos yarns, lubricated with TFE suspensoid, into a very hard ring. Designed for special applications in high pressure service.

STYLE C-78—An endless ring, formed by winding asbestos tape, lubricated with TFE suspensoid, around a mandrel and molding to size. For special applications, such as push-rod housing seals and for heat exchangers handling corrosive gases and liquids.

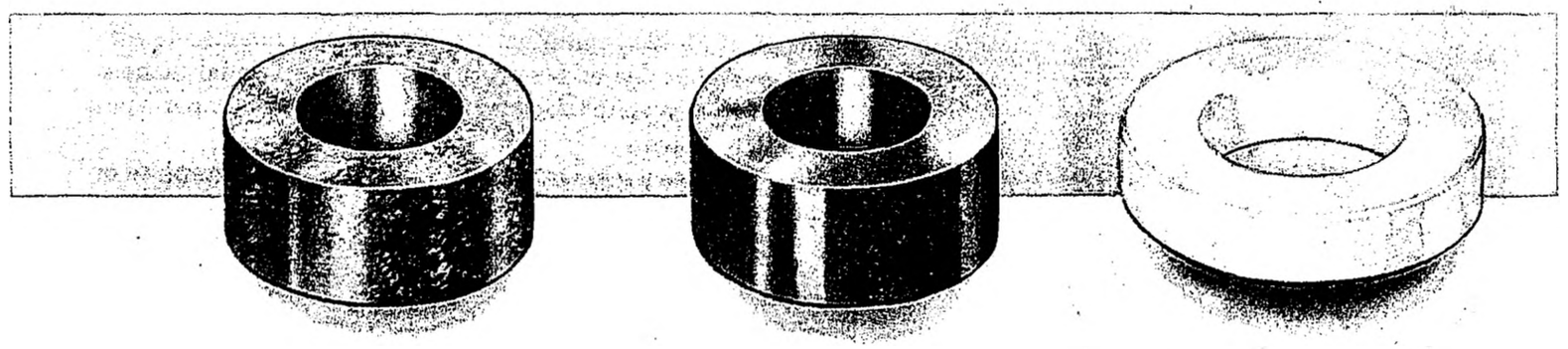
STYLE #772—Die-formed, resilient endless rings of interlocked shreds of pure TFE, containing no binder or lubricant. Recommended for small clearance valve stems, pumps and mixer shafts. Absence of graphite insures against any corrosion on alloys having high chromium content.



STYLE #772-S—Endless or split rings are molded of pure TFE and are as homogeneous as machined TFE. Recommended for same services as Style 772, but where extra-free motion is desired. Contain no special lubricants. Offer unusually long life, toughness and flexibility. Even twisting will not cause breakage.

STYLE #773—Sponge TFE molded to size. Tiny voids in packings carry lubrication and provide resiliency with slight gland pressure. Normally used with intermediate plastic packing for applications where minimum friction is desirable, such as on control and regulator valves.

STYLE #774—Machined from TFE rod or tubing and made to any design or configuration. Recommended for applications where close dimensional tolerances are required. These are precision manufactured products.



STYLE #776—Die-formed endless rings of same construction, and for same services as Style 772, except that graphite impregnation gives extra lubrication. Recommended for stems and rods where throat or gland clearance is small.

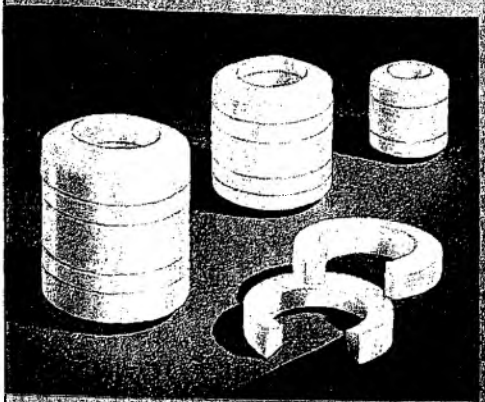
STYLE #776-S—Endless or split molded rings of the same construction as Style 772-S, impregnated throughout with graphite for extra lubrication value. Recommended for the same services as Style 776, but where extra-free motion is desired.

STYLE #793—By an additional coining process, molded Style 772-S rings are made to more precise dimensional tolerances. It should be noted, however, that exposure to a temperature differential will return rings to their original configuration.

Note: Chemlon Molded and Machined Packing styles are sold by the ring. When ordering, accurately specify stuffing box I.D., O.D., depth, and bevels, if any.

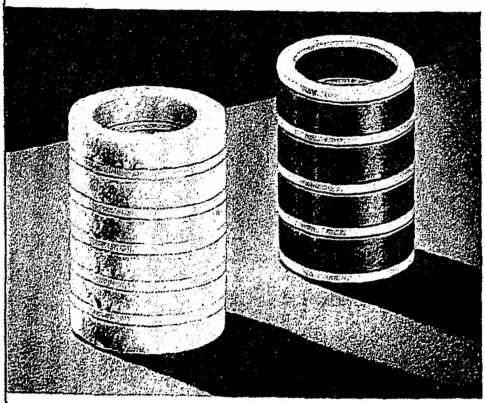
CHEMLON MOLDED and MACHINED PACKINGS

Chemlon Cup and Cone Ring Packings



Cup and Cone ring packings are best suited for use in valves. They can be furnished in sets consisting of two or more cones and matching cups. As pressure is applied, the cones are forced forward, causing the cups to spread outward, thus maintaining a tight seal. In valves, the cups spread outward against the valve body and the cones tighten against the valve spindle. In the [illegible] the same principle is employed, the cups spreading outward against the [illegible] and the cones tightening against the [illegible]. Cup and Cone ring packings are furnished in [illegible] and [illegible] dimensions.

Chemlon Combination Sets



It is frequently desirable to combine the resilience and easy flow of one type ring packing with the toughness of another. Thus, the resiliency, sensitivity to gland adjustment and self-compensating features of Styles 772 or 776 can be combined with the toughness, flexibility and long life of Styles 772-S or 776-S. This is achieved by arranging the above styles in various combinations.

Chemlon Molded and Machined Packings can also be used in combination sets with metallic, fabric or plastic packings to meet particular service conditions or operating requirements.

When ordering combination sets, it is necessary to specify temperatures, pressures, shaft speeds, liquid or gas handled and any special operating conditions or limitations.

John Crane

CRANE PACKING COMPANY

8400 OAKTON STREET, MORTON GROVE, ILLINOIS 60053 (Chicago Num. 1)

In Canada: Crane Packing Company Ltd., Box 3248, Station D, Hamilton, Ont.
In Mexico: Industrias John Crane de Mexico S.A. • Poniente 134-401a, Industrial Vallejo, Mexico, D.F.
In Brazil: John Crane Industria E Comercio, Ltda. • Avenida Vila Bandeira 2001, Sao Bernardo do Campo, S.P.
In Australia: John Crane Mauri Pty. Ltd., 108 Elonora Road, Panania, New South Wales, Australia
In Europe: Crane Packing Ltd., Slough, Bucks, England
In Japan: John Crane Japan, Inc., No. 28 Tsuboya-cho 2-chome, Kita-ku, Osaka 530, Japan

OFFICES, WAREHOUSES AND SERVICE THE WORLD OVER

Printed in U.S.A.

John Crane

Style C-1045

Bleached Multi-Filament Teflon* Yarn Packing

Style C-1045 is an improved Teflon multi-filament yarn packing developed specifically for high speed rotary services handling corrosive chemicals or solvents at temperatures from −120°F. to 500°F. Through a bleaching and shrinking process prior to braiding all carbonaceous material has been removed and greater dimensional stability gained. The results are:

1. Little or no tendency for packing to burn from operational or frictional heat.
2. Rapid response to gland adjustment.
3. Less swelling at elevated operating temperatures to cause additional frictional heat.

Style C-1045 is a firm and dense packing that is tightly woven to eliminate large voids. Each filament or strand is thoroughly impregnated with Teflon dispersion before braiding. This serves as a sealant between the individual fibres to prevent any leaking through the braided structure. Also, friction on the rotating shaft is always at a minimum, even after wear, since the packing is 100% Teflon throughout with no abrasive inorganic fillers to alter the slipperiness of Teflon. This construction provides excellent thermal characteristics.

Sizes are available from ⅛" to ¼" in 1/16" increments. Sizes from ⅛" to ½" available in 1 and 5-lb. spools.

1-LB. SPOOLS

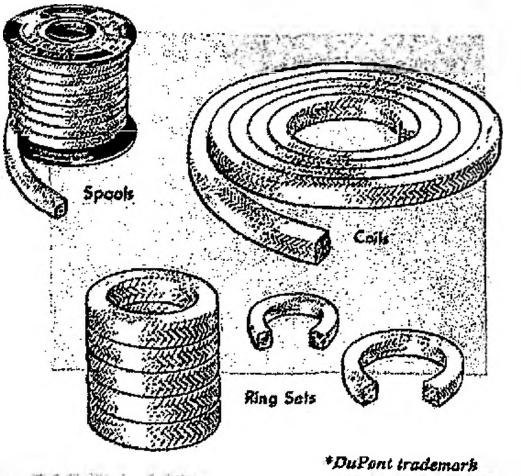
Size	Approx. ft. per spool
⅛"	79
5/32"	35
3/16"	21
7/32"	14
¼"	8
5/16"	6
⅜"	5

5-LB. SPOOLS

Size	Approx. ft. per spool
⅛"	395
5/32"	185
3/16"	105
7/32"	70
¼"	40
5/16"	30
⅜"	25

COILS

Size	Approx. ft. per lb.	Approx. ft. per coil
5/32"	3.7	14
⅜"	2.7	10
13/32"	2.3	10
½"	1.8	10



*DuPont trademark

INTERLACED CONSTRUCTION ADVANTAGES . . .

- **Greater flexibility than other braided packings—because the yarns pass diagonally through the packing. Large cross section packing can be formed into small diameter rings without buckling the I.D. or distorting the O.D.**
- **Longer service-life—because the interlaced construction remains intact even if individual yarns on the I.D. wear away.**
- **Uniform density throughout the packing—greater number of corner and center warps results in even distribution of yarns.**
- **Smoother wearing surface and smaller surface interstices—the result of tighter construction with each yarn locked into the basic structure.**
- **Maximum resilience—provided by the uniform construction of the packing.**
- **Less gland adjustment—the flexibility and density of interlaced construction provides longer service with less attention.**

John Crane

KEEP SHAFTS COOL, SEALS TIGHT, WITH "TEFLON" FIBER

Picking the right packing for almost any kind of service conditions is now an easy task ...if you use new, white fiber packings of "Teflon" TFE-fluorocarbon resins.

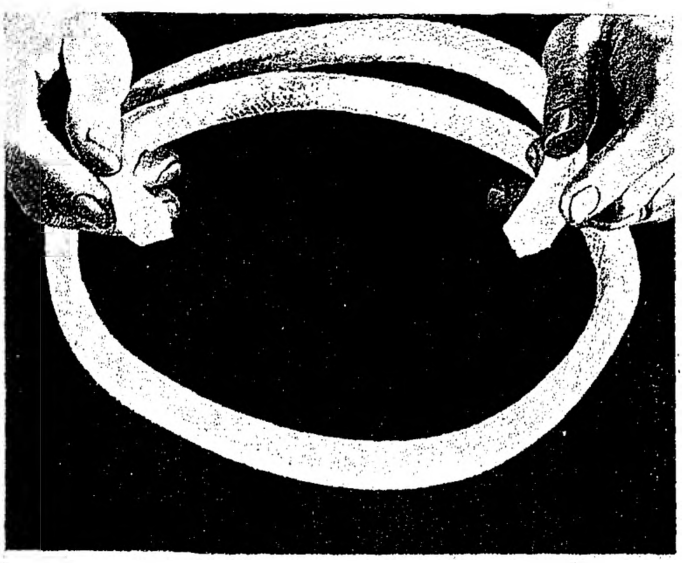
Here's an improved braided packing—made completely from "Teflon"—with a preshrunk yarn of "Teflon" fiber, specially treated to remove temperature-raising contaminants. And it's impregnated with 35 per cent by weight of TFE dispersion to better the seal and simplify break-in, without need for supplemental lubrication.

What's been happening in packings—Long processed into packings, "Teflon" resins are used in solid rings and braided fiber, with or without fillers to vary mechanical properties, and also by themselves as a filler for packing materials like asbestos.

The "Teflon" fiber is different from other TFE resin structures because the molecular orientation of the fibers gives them greater mechanical strength. For instance, the "Teflon" fiber can withstand compressive forces up to 60,000 psi. without significant cold flow or extrusion. In all other respects it has those qualities which make "Teflon" virtually indestructible and so attractive to the design engineer: chemical inertness, thermal resistance, and very low coefficient of friction.

The original braided packing of "Teflon" fiber was brown in color, and worked well enough for valve stem and low speed pump service. But despite precautions taken during installation and run-in, packings burned out with dismaying frequency at higher speeds.

After further development, these restrictions were overcome by revised fiber processing, so that an improved packing material is now available on a commercial basis.



Braided "Teflon" fiber packing, impregnated with dispersion of "Teflon" resin, has that cool, white look. Removal of heat-generating particles means higher speed uses; added resin improves seal, reduces leakage.

Pre-shrinking and bleaching—To allow cooler shaft operation, the fibers are pre-shrunk before braiding. This minimizes swellings of the braid in the packing gland and hence decreases frictional heat because the fiber shrinkage is eliminated in the process.

Similarly, bleaching the yarn removes carbonaceous impurities—another potential source of heat through oxidation.

Impregnation with TFE resin dispersion—Up to 35 per cent of TFE resin has been impregnated in the braid for a tighter seal. The dispersed resin fills in voids between fibers and improves the shaft seal. This added resin also simplifies run-in, since it enhances the sealing qualities of this new packing.

Where to use new braided packing—Install new packing of impregnated, braided "Teflon" just about anywhere you want perfect seals and cooler running shafts, even at high speeds. *Table I* lists numerous pumps and valves profitably packed with braided TFE fiber. Note that besides ordinary high-speed rotary and reciprocal applications, special designs work well too, such as the floating heads in a heat exchanger.

Premium price, premium savings—It's axiomatic that expected performance can be measured in price paid, but don't let this fool you when dealing with fiber packings. Often, maintenance expenses alone will justify all-fiber packings. They've been known to last over ten times as long as many materials formerly used.

Many pumping situations, for example, present challenging problems. On the 9 pieces of equipment shown in *Table I*, for instance, a total savings of $2,000.00 has been realized to date. In all these cases, "Teflon" fiber packings have proven to be a sound investment for the cost-minded engineer.

Some new designs—*"Teflon" fiber yarns are opening up new packaging possibilities. For minimum leakage why not investigate combination packings? Strong sintered "Teflon" rings on both ends of the set and sandwiched between the resilient rings of fiber is an example.*

Combination packings can be used to create a labyrinth seal (See Fig. 1) to permit sealing at much lower gland pressures. The sintered "Teflon" rings can be furnished with many different fillers to prevent cold flow, decrease friction or prevent fiber ring extrusion.

The use of a combination set results in decreased wear, increased packing life and best of all—lower leakage rates.

Review run-in procedure — When properly installed, this new bleached, impregnated, braided packing of "Teflon" fiber will go a long way toward giving smooth, cool, and trouble-free service in many applications. Whichever type of packing design you choose, be sure to follow the proper break-in procedure, such as the one shown below:

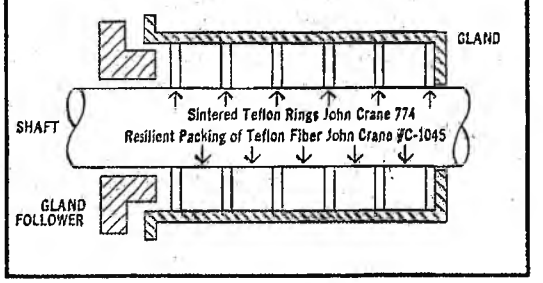
- Before installing, check shaft alignment and surface finish. Avoid shaft runouts over 0.005 in.
- Packing may be butt or diagonal cut. Stagger joints in successive rings at least 90°.

Table I—Typical Case Histories: "Teflon" Fiber Packing

Equipment Item	Service	Operating Conditions	Results
Pump (Milton Roy "Constametric")	Hydrocarbon solvents, metal alkyls, metal halides	5/16-in. piston dia.; 4-12 strokes/min.; 1,000 psi.; 77°F.	Braided packing of "Teflon" TFE fiber impregnated with TFE resin; is still operating satisfactorily after 1½ yrs. Previous packings lasted 2 to 6 mos.
Compressor (Worthington piston type)	Anhydrous ammonia (Moisture content 5% or less)	2½-in. shaft; 7-in. stroke; (610 fpm.); 8 psi.; 6 rings	Braided packing of "Teflon" TFE fiber still in service without leakage after 4 mos.; "V" rings molded from shredded lead foil failed after 1-2 mos.
Heat exchanger (floating head)	High pressure steam	200 psi.; ¾-in. packing; 6 rings	Braided packing of "Teflon" TFE fiber eliminated leaks in heat exchanger used to vaporize nitro bodies, and is still operating after 1 yr. service. Previous packing failed after 2 mos.
Autoclave (agitator shaft)	Formaldehyde, sodium hydroxide, hydrochloric acid, acetic acid	4-in. shaft; 100 rpm. (100 fpm.); 221°F.; ¾-in. packing; 15 rings	Braided packing of "Teflon" TFE fiber impregnated with TFE resin still operating satisfactorily after 11 mos. service despite excessive run-out of shaft. Best life obtained from previous packing was 3 mos.
Centrifugal pump (La Bour DL-20)	Mixed acids: 90% conc. nitric and 35% conc. sulfuric acids	1⅛-in. shaft; 1750 rpm. (515 fpm.); ⅔-in. packing; 6 rings	Packing set consisting of braided rings of "Teflon" TFE fiber alternated with rings of soft "Teflon" resin; was still operating satisfactorily after 6 wks. of no-leakage service. Previous packing lasted only 1 wk.
Centrifugal pump (Duriron H Series; throttle bushing)	Ortho-dichlorobenzene	2⅛-in. shaft; 1750 rpm. (975 fpm.); 150 psi.; 518°F.	Braided packing of "Teflon" TFE fiber used as throttle bushing to maintain positive pressure on mechanical seal; still operating satisfactorily after 7 mos. Carbon bushing lasted 2 mos.
Agitator shaft (in fusion kettle)	Caustic solution	4-in. shaft; 158 rpm. (165 fpm.); 482°F.; 6 rings of ⅝-in. packing; 40 psi.	Previously used packing lasted 1 mo., but braided TFE fiber packing lasted 6 mos. without lubrication.
Agitator shaft (in solvent still)	Organic solvents	4-7/16-in. shaft; 45 rpm. (52 fpm.); 212°F.; ⅝-in. packing; 30 psi.	Previously used packing replaced every 2 mos., yet never completely contained solvent fumes. Packing of braided TFE held 8 mos. without leakage.
Agitator shaft (in sulfonator)	Sulfuric acid and bromine	2-15/16-in. shaft; 60 rpm. (45 fpm.); 194°F.; ⅝-in. packing; 50 psi.	Center bearing shaft froze each time drive shut down; repacked twice weekly. Braided packing of TFE still in service after 2 mos.

- Tamp rings very firmly in place in stuffing box.
- Tighten gland nuts before starting pump to squeeze impregnated dispersion into voids; back off until nuts are just fingertight and shaft turns freely. (Spring-loaded gland followers will help keep uniform pressure on packing.)
- Start pump and let it run for 10 to 15 min.; let pump leak about 50 to 100 drops/min. during run-in. If leakage slows down, loosen gland nuts to keep leak rate constant.
- Gland temperature will level off, and then drop slightly when run-in is complete. Now draw up the gland nuts about 1/6 turn every 5 min. until leakage is minimized.
- If gland heats up too much (viz., will boil water) back off gland nuts and repeat run-in until temperature stays down after gland nuts are re-tightened.

Fig. 1—Combination Packing with Labyrinth Seal



Excerpted with permission of the DuPont Company from their copyrighted article in the "Journal of Teflon."

John Crane



Heat-Resistant Multi-Filament Teflon* Yarn Packing

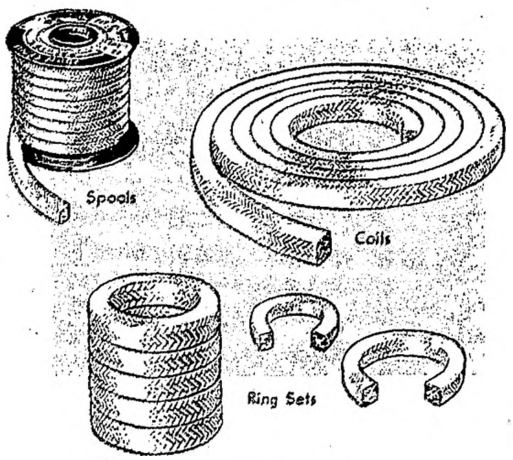
Style C-1050

Style C-1050 is a soft multi-filament yarn braided packing that has exceptional thermal and oxidative stability. It contains 30% Teflon dispersion on the yarns and a special heat resistant lubricant which is applied to the yarns before braiding. This results in a packing that:

1. Does not retain heat, especially during the break-in period.
2. Reacts faster to gland adjustment.
3. Has greater resiliency than has been previously possible with this type of packing.

In addition, the clear and colorless lubricant combines with Teflon's outstanding inertness and non-toxic properties. This makes Style C-1050 ideal for food handling and processing equipment as well as concentrated acid service at temperatures from −120° to +500° F.

Sizes are available from ⅛" to ¾" in 1/16" increments. Sizes from ⅛" to ½" available in 1 and 5-lb. spools.



*DuPont trademark

1-LB. SPOOLS

Size	Approx. ft. per spool
⅛"	78
3/16"	34
¼"	21
5/16"	14
⅜"	8
7/16"	6
½"	5

5-LB SPOOLS

Size	Approx. ft. per spool
⅛"	390
3/16"	170
¼"	105
5/16"	70
⅜"	40
7/16"	30
½"	25

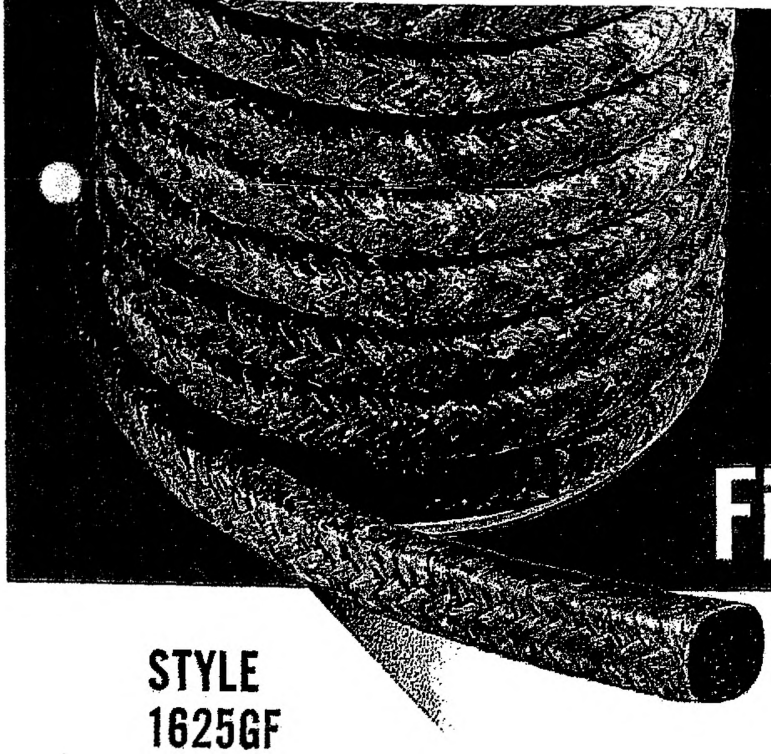
COILS

Size	Approx. ft. per lb.	Approx. ft. per coil
9/16"	3.7	14
⅝"	2.7	10
11/16"	2.3	10
¾"	1.8	10

INTERLACED CONSTRUCTION ADVANTAGES . . .

- Greater flexibility than other braided packings—because the yarns pass diagonally through the packing. Large cross section packing can be formed into small diameter rings without buckling the I.D. or distorting the O.D.
- Longer service-life—because the interlaced construction remains intact even if individual yarns on the I.D. wear away.
- Uniform density throughout the packing—greater number of corner and center warps results in even distribution of yarns.
- Smoother wearing surface and smaller surface interstices—the result of tighter construction with each yarn locked into the basic structure.
- Maximum resilience—provided by the uniform construction of the packing.
- Less gland adjustment—the flexibility and density of interlaced construction provides longer service with less attention.

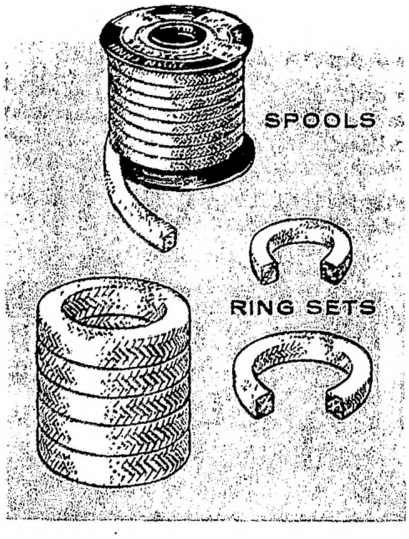
BULLETIN F-1625



John Crane

Graphite Filament Yarn PACKING

STYLE 1625GF



Style 1625GF is a severe service packing that is ideal for the most difficult fluid handling applications in the chemical, petrochemical and related industries. It is impervious to the most destructive acids, corrosives, alkalis and caustic solutions and will withstand extreme temperatures over 1000° F. in the stuffing box.

Made from a special graphite filament yarn, Style 1625GF packing is inherently self-lubricating and has exceptional heat dissipation characteristics. This permits a tight packing adjustment to make leakage almost nonexistent, yet assures maximum protection against shaft scoring. The results are: (1) greatly reduced loss of costly fluids; (2) less maintenance and downtime; and (3) longer equipment life.

Style 1625GF is recommended for use in centrifugal, reciprocating and rotary pumps, boiler feed pumps, mixers, agitators, dryers and blowers, also for valve stems. A complete range of sizes is available from ⅛" to 1" in spools and ⅛" to ⅞" in die-formed rings, both in increments of 1/16".

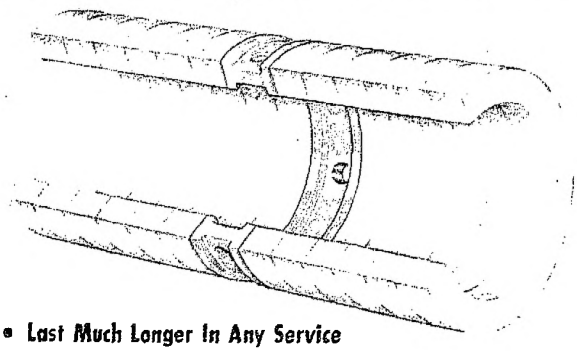
John Crane

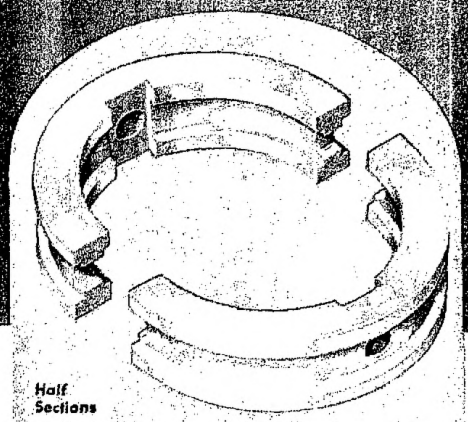
CRANE PACKING COMPANY
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In Australia: John Crane Mouri Pty., Ltd., 169 Elonora Road, Bankstown, New South Wales, Australia
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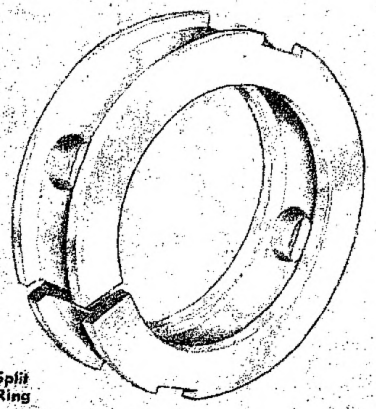
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John Crane Chemloy Lantern Rings

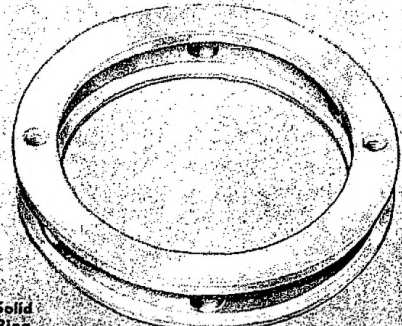




Half Sections



Split Ring



Solid Ring

- Last Much Longer In Any Service
- Corrosion Resistant
- Will Not Score Shaft
- Easily Installed

John Crane Chemloy Lantern Rings will outlast metal rings many times over in all services, particularly the most destructive chemicals, corrosives and alkalis. Made from a special filled TFE material, this combination results in exceptional strength plus wear resistance and will not bend or collapse under extreme gland pressures.

Another advantage of Chemloy Lantern Rings is that they will not score the shaft regardless of high and continuous operating speeds.

Half sections or split rings make installation fast and easy in shop or field without disassembling the pump or equipment. Solid rings are generally used by equipment manufacturers.

Sizes are available for all standard shaft diameters and stuffing box bores. When ordering for pumps or other equipment simply state the shaft or sleeve diameter and stuffing box bore.

CRANE PACKING COMPANY

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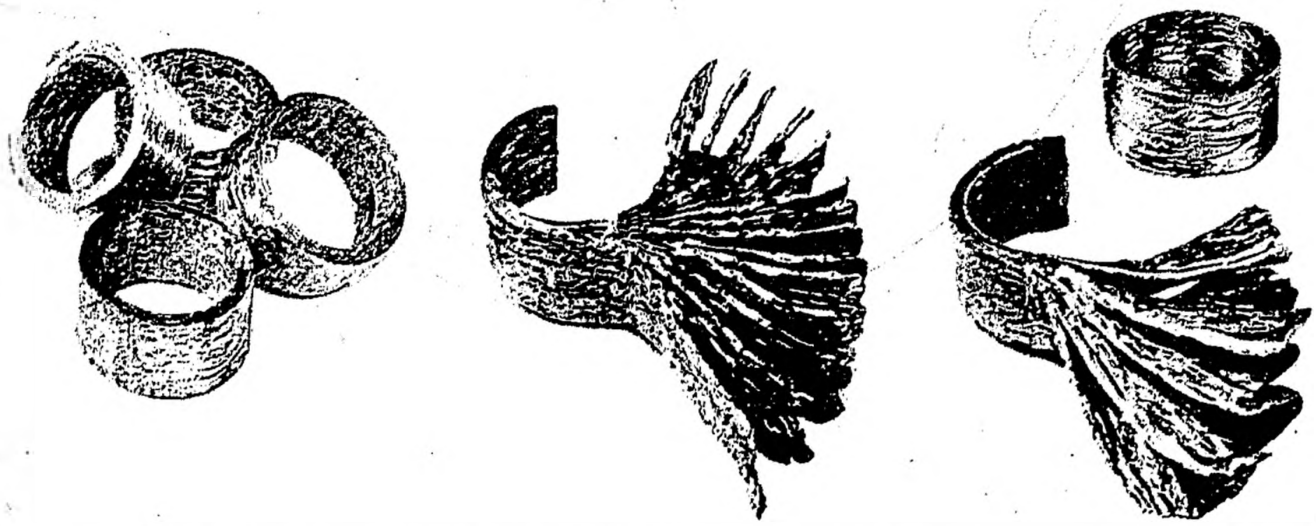
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BULLETIN NO. P-393-1

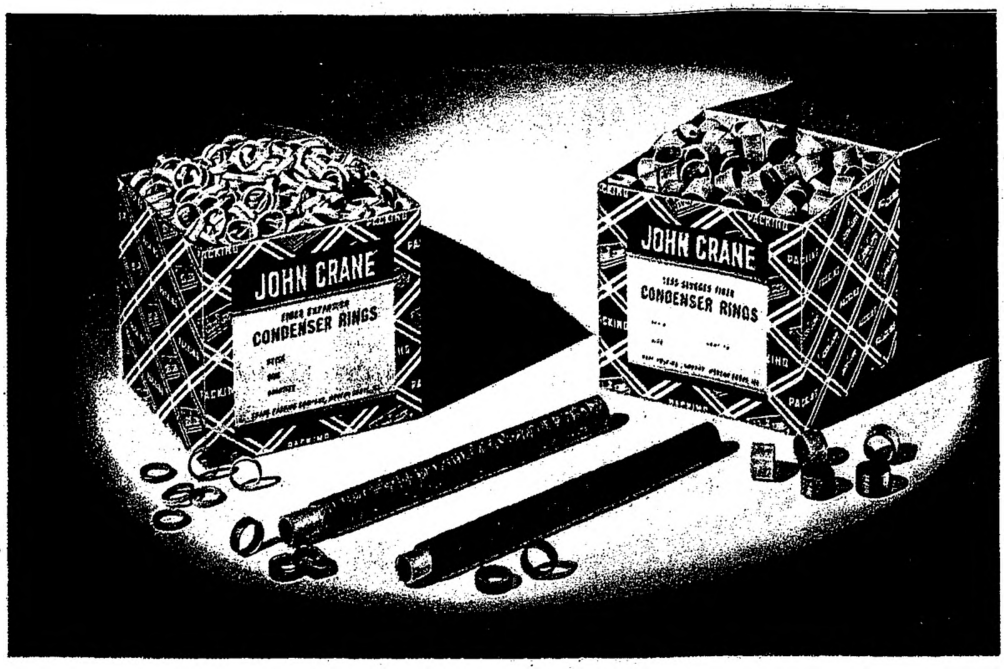
CONDENSER TUBE PACKINGS

AND ACCESSORIES



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OFFICES, WAREHOUSES AND SERVICE THE WORLD OVER

Condenser Tube Packings



Style 602 Style 601-E Style 603

Style 601-E Endless Metallic Rings are manufactured by wrapping narrow ribbons of babbitt foil concentrically around a mandrel of desired size and compressing endwise in a die. Rings of this construction flow easily and compress inwardly around the condenser tube and outwardly into the drilling threads without rupture of the metal. They are not affected by operating temperatures or chemicals used for cleaning and provide a perfect seal and metallic bond between the tube and the tube sheet.

Rings are available for all tube sizes and tube sheet drillings.

Style 602 Fiber Rings are cut from vulcanized fiber tubing and accurately machined. They are finished smooth and are free from burrs. This material is especially adapted to condenser service and is not affected by operating temperatures, polluted circulating waters or normal cleaning solutions.

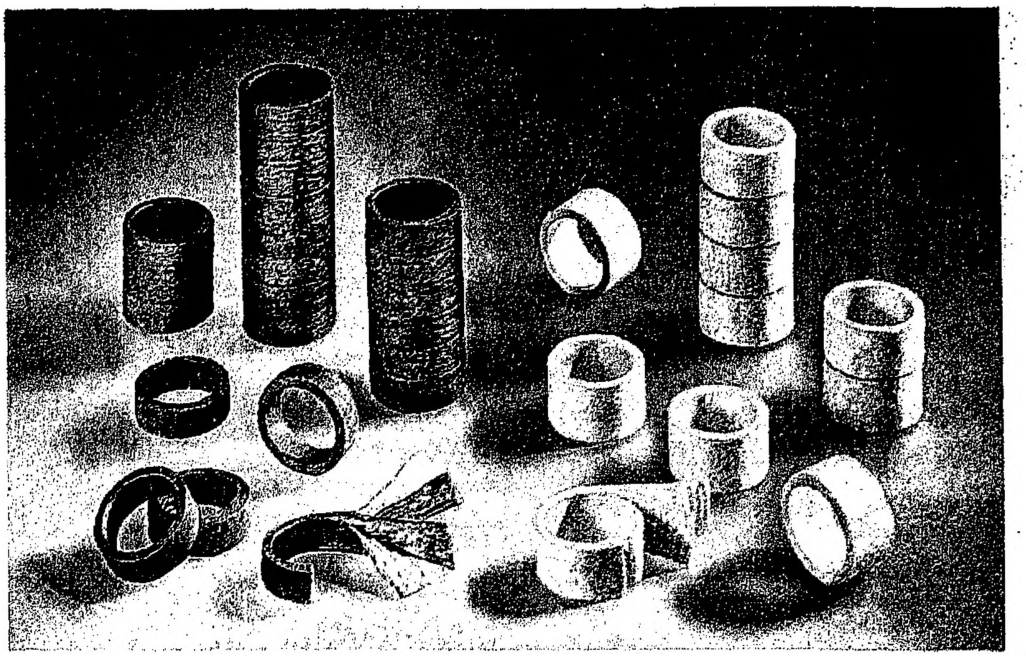
Rings are available for all tube sizes and sheet drillings. Sizes ⅛", 3/16" and ¼" can be furnished from stock.

Style 603 Lead Slugged Fiber Bushings are manufactured from the same tubing stock as Style 602. Each bushing has a lead slug that serves as a metallic bond between the tube and the tube sheet.

The bushings are not affected by operating temperatures or chemical solutions used for tube cleaning. They can be accurately finished to any required size.

HIGH TEMPERATURE

Heater Tube Packings



Syle 601-ECA

Style C-78

Style 601-ECA Endless Copper and Asbestos Rings are manufactured by wrapping narrow ribbons of copper foil and asbestos tape around a mandrel of desired size and compressing endwise in a die. This results in an endless metallic ring with interlocking folds of copper ribbon suitable for further endwise compression with the caulking tool. Each ring is treated and graphited.

Rings of this construction flow easily to compress inwardly around the condenser tube and outwardly into the drilling threads without rupture to the metal. Installed two rings to the stuffing box and used with a check ferrule, they make a tight seal under the most extreme operating conditions.

Style C-78 Endless rings die-formed asbestos and a TFE dispersion for use in condenser and air ejector service where temperature exceeds 250° F. These rings are especially effective where operating conditions, cleaning solutions or chemical additives adversely affect the sealing ability of standard fiber rings.

In high temperature applications, such as heat exchangers and condensers, it is recommended that Style C-78 be used in combination with Style 601-ECA for best sealing results.

Rings are available for all tube sizes and sheet drillings.

Recommended Services: Radial-jet inter-after condensers, vapor condensers, heat exchangers, oil heaters and other heater tube equipment where the packing is exposed to the full temperature of the steam or high temperature gases.

TWO STANDARD METHODS FOR PACKING CONDENSER TUBES WITHOUT FERRULES

METHOD FOR PACKING NEW CONDENSERS

INLET END—Tube rolled into sheet and belled. (See Fig. A.)

OUTLET END—Tube packed with John Crane Endless Metallic Rings. (See Figs. F through J.)

Advantages: (1) no ferrules required; (2) inlet end fixed; (3) outlet end metallic packed; (4) tube free to move; (5) increased packing depth; (6) flush tube sheet; (7) less turbulence; (8) tubes cleaned easier; (9) rapid installation; (10) perfect bonding; and (11) improved condenser performance.

METHOD FOR PACKING OLD CONDENSERS

INLET END—Tube packed with John Crane Lead Slugged Fiber Bushings and belled. (See Figs. B through E.)

OUTLET END—Tube packed with John Crane Metallic Packing. (See Figs. F through J above.)

Advantages: (1) no ferrules required; (2) rapid installation; (3) inlet end fixed; (4) outlet end metallic packed; (5) tube free to move; (6) increased packing depth; (7) flush tube sheet; (8) less turbulence; (9) tubes cleaned easier; (10) perfect bonding; and (11) improved condenser performance.

INLET END

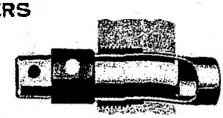
NEW CONDENSERS

FIG. A.
Inlet end rolled into the tube sheet and belled.



OLD CONDENSERS

FIG. B.
Lead slugged fiber bushing on loading pin.



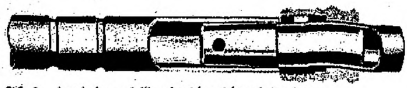


FIG. C. Lead slugged fiber bushing driven into place.



FIG. D. Belling tool entering tube.



FIG. E. Belling tool flaring tube and locking bushing into threads.



Finished inlet end.
Tube flush with tube sheet.

OUTLET END

NEW AND OLD CONDENSERS



FIG. F. First expansion ring on loading pin with caulking tool.



FIG. G. First metallic ring on loading pin.



FIG. H. Second expansion ring ready to be caulked into place.



FIG. J. Second metallic ring ready to be caulked into place.



Finished Outlet completed stuffing box. Packing locked in position.

Condenser Tube Packings

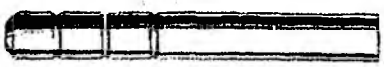
ADVANTAGES OF JOHN CRANE CONDENSER TUBE PACKING

- Eliminate Costly Ferrules
- Permit Expansion And Contraction Of Tubes
- Bond Tubes To Sheets To Reduce Electrolytic Disintegration Of Ends
- Prevent Deformation Of Tube Ends Caused By Extreme Ferrule Pressure
- Not Affected By Contaminated Or Chemically Treated Water
- Last For Life Of Tubes

Condenser Tube Packing Tools



PLAIN TUBE DRIVING TOOL



HAND INSERTION TOOL



UNIVERSAL TUBE DRIVING TOOL
For driving tubes out of tube sheet. Fits ⅝" through 1" tubes.



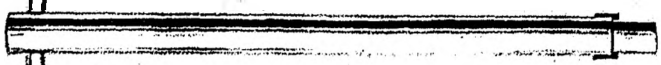
LOADING PIN



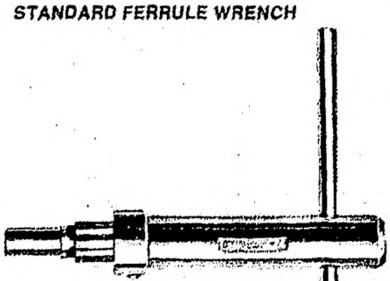
BELLING TOOL



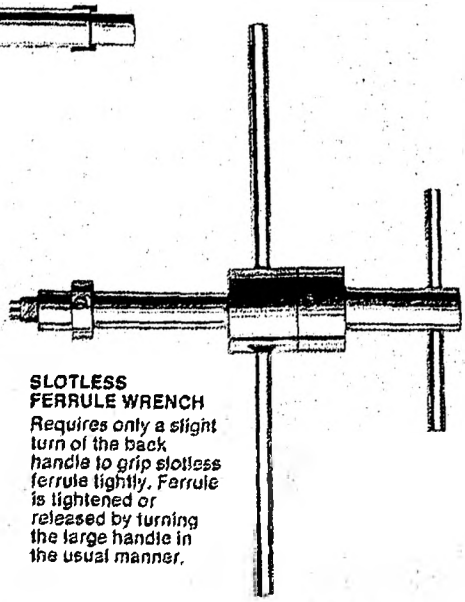
REMOVAL TOOL
Cutters remove metallic or fiber packing without disturbing the tube.



STANDARD FERRULE WRENCH

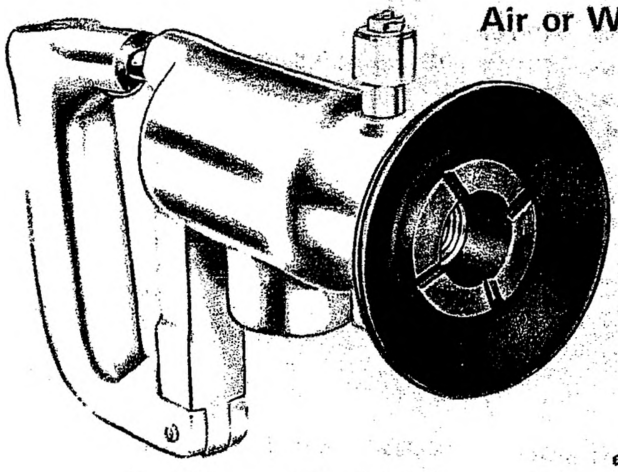


PACKING EXTRACTOR TOOL
For use when the tube has been removed. Drives into the packing for easy extraction simply by turning the tool in a counter-clockwise direction.



SLOTLESS FERRULE WRENCH
Requires only a slight turn of the back handle to grip slotless ferrule tightly. Ferrule is tightened or released by turning the large handle in the usual manner.

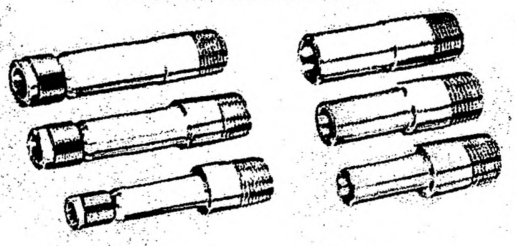
Super-Jet Condenser Tube Cleaner



Air or Water Pressure Operated

SLUG SIZES FOR ALL STANDARD TUBES

INTERCHANGEABLE NOZZLES



For water operation effective pressure 50-200 psi.

For air operation: effective pressure 50-200 psi.

The Super-Jet Condenser Tube Cleaner provides the fastest, simplest and most effective method for maintaining maximum heat transfer efficiency in steam condensers. This handy gun-and-slug method thoroughly removes slime or scale in much less time than other mechanical tools to substantially reduce labor and down time.

Versatile—Interchangeable slugs are designed for positive cleaning under practically all conditions:

1. Spool-type for normal slime removal is designed with a cup at the forward end which expands to wipe the inside of the tube clean.
2. Bullet-shaped slug removes heavier or thick slime deposits.
3. Scraper-type slug cuts away scale or mineral deposits as it is driven through tube.

Latter two slugs have "jet action" holes in side wall that admit water or air to flush away deposits as they are removed.

Fast—One man can quickly load an entire bank of tubes with the cleaning slugs and then shoot them through in rapid succession.

Economical—Slugs can be used over and over again. Gun is ruggedly built for long and heavy-duty service. There is no danger of cutting or gouging inside of tubes. Interchangeable nozzles permit use with either water or air.

Easy—The lightweight gun weighs only 2¾ lbs. An operator can use it for lengthy periods without fatigue.

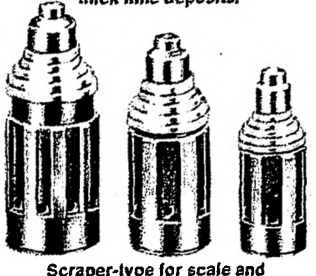
INTERCHANGEABLE SLUGS



Spool-type for normal slime removal.



Bullet-shaped for heavy or thick lime deposits.



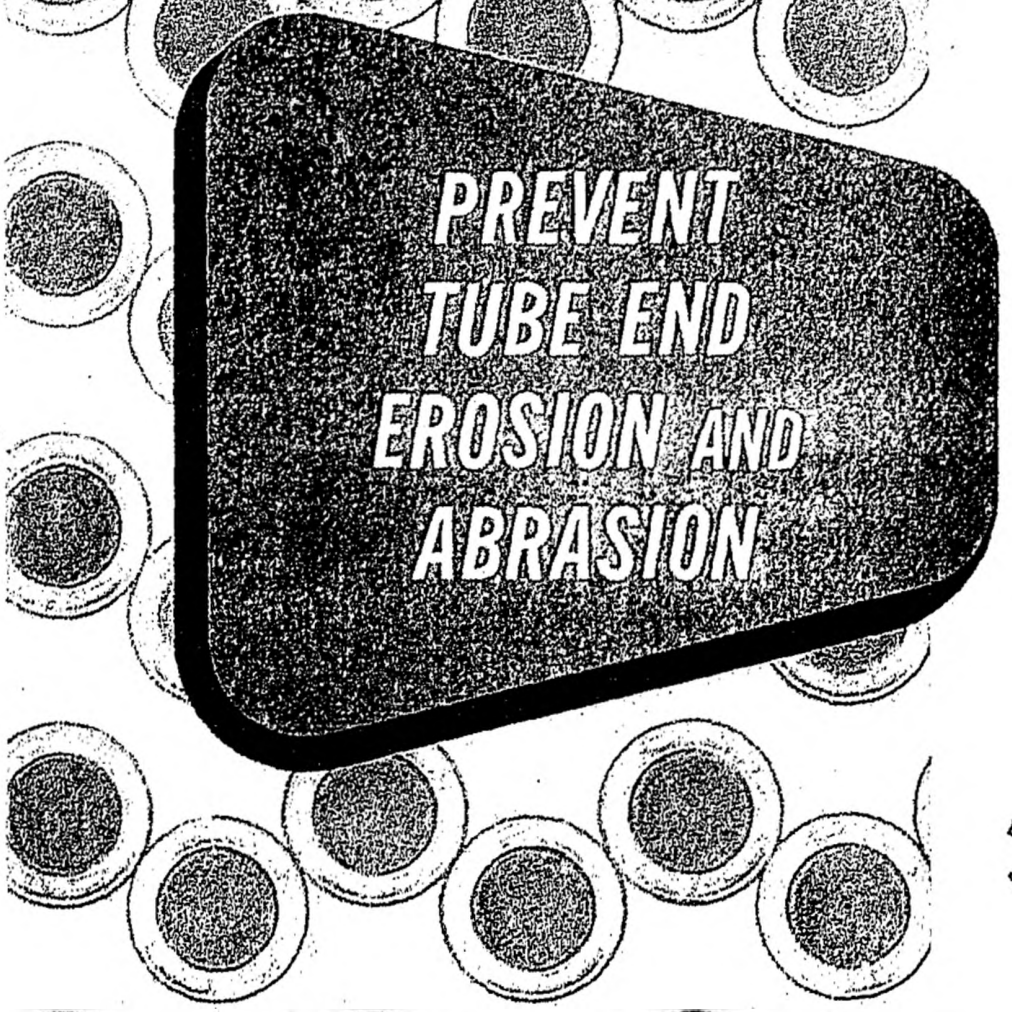
Scraper-type for scale and mineral deposits.

Printed in U.S.A.

Bulletin No. P-335-4

John Crane

Plastic* Condenser and Heat Exchanger Tube Protectors



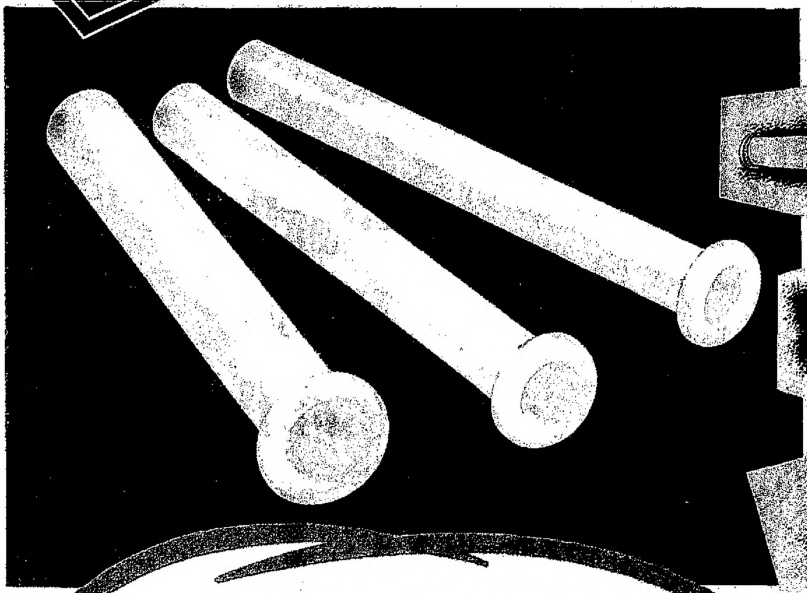
* NYLON
POLYPROPYLENE
TFE

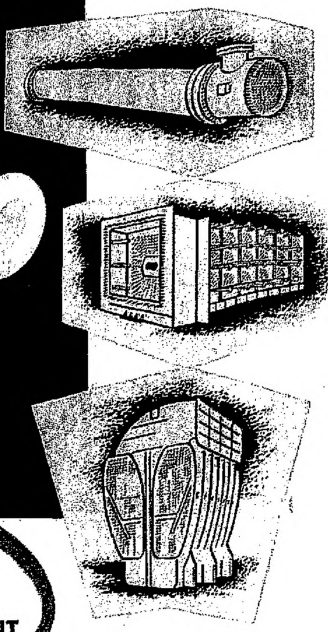
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In Canada: Crane Packing Company, Ltd., Box 3248, Station C, Hamilton, Ont.
In Mexico: Industrias John Crane de Mexico, S.A. • Poniente 152 #679 Industrial Vallejo, Mexico, D.F.
In Brazil: John Crane Industria E Comercio, Ltda. • Avenida Jurubatuba 600, Sao Bernardo do Campo, S.P.
In Australia: John Crane Mauri Pty., Ltd., 166 Eldridge Road, Bankstown, New South Wales, Australia
In Europe: Crane Packing Ltd., Slough, Bucks, England
In Japan: John Crane Japan, Inc., No. 6, Tenjinbashi-suji 6-chome, Oyodo-ku, Osaka 531, Japan
OFFICES, WAREHOUSES AND SERVICE THE WORLD OVER

John Crane

PLASTIC TU



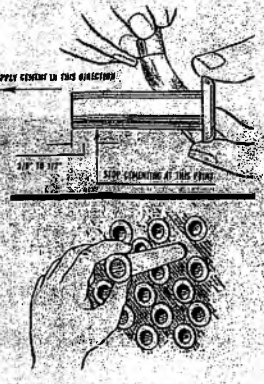


- PROTECT TUBE ENDS FOR LIFE OF TUBE
- POSITIVELY PREVENT EROSION AND ABRASION
- REDUCE COSTLY TUBE MAINTENANCE AND REPLACEMENT
- GREATLY PROLONG TUBE LIFE

EASY TO INSTALL

1. Nylon and Polypropylene Protectors:
   - A. Clean tube and allow to dry. Lightly coat outer surface of tube protector with John Crane Tube Protector Cement (see back page). Stroke in direction of straight end to within 3/8" to 1/2" of edge.
   - B. Push protector into tube with light, steady pressure.
2. TFE Protectors:

   John Crane TFE-Tube Protectors are manufactured so as to press fit in the end of the tube. Just push into tube with light, steady pressure.



EXCLUSIVE JOHN CRANE SMOOTH FLOW DESIGN

Inner wall of protector gradually tapers toward the discharge end to provide the thinnest possible wall at that point. Also, absence of outside flash assures maximum contact with tube I.D. This provides smooth water flow, eliminating turbulence and pressure drop-off.



BE PROTECTORS

SAVE THOUSANDS OF DOLLARS ANNUALLY IN SURFACE CONDENSER AND HEAT EXCHANGER MAINTENANCE AND REPLACEMENT COSTS

WIDELY USED IN MARINE, UTILITY and INDUSTRIAL POWER PLANTS . . . EQUALLY EFFECTIVE IN CHEMICAL PLANTS, REFINERIES AND GAS COMPRESSOR STATIONS

JOHN CRANE PLASTIC TUBE PROTECTORS offer permanent protection for new tubes or extended life for old tubes already pitted or thinned at the entrance section. Their low unit cost is a small price to pay for the major economies they assure through protection of the first few inches of the tube inlet. That area is very vulnerable to a number of erosive elements such as: (1) the abrasive action of sand, silt or other foreign particles entrained in the fluid, (2) air impingement caused by the release of oxygen due to turbulence when fluid enters the tube.

The flared end of the protector is designed to give a smooth venturi entrance for the fluid and the polished inner surface will not foul up or hold scale formation. Once installed they need never be replaced, since they are more resistant to abrasion and erosion than the tube metal itself.

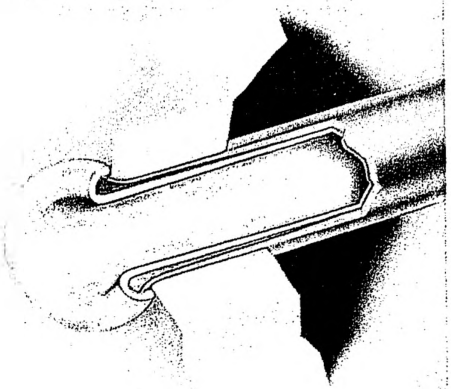
AVAILABLE IN THREE PLASTICS—John Crane Tube Protectors offer a choice of nylon, polypropylene or TFE. Nylon and polypropylene types are resistant to chemical, corrosive and fungus attack and are not affected by oils or greases. They will withstand temperatures to 250°F. TFE protectors are impervious to the most destructive chemicals, corrosives and alkalis at temperatures up to 500°F.

SIZES:

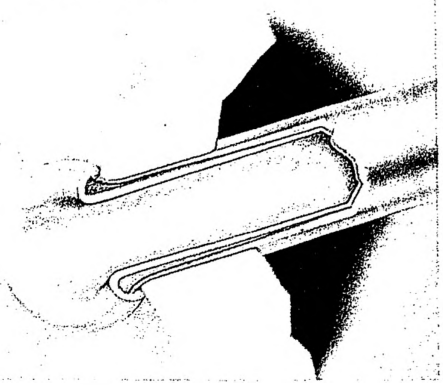
Tube Size	Protector Length		
	Nylon	Polypropylene	TFE
⅝" x 18 BWG	6"	6"	4" & 6"
⅝" x 16 "	6"	6"	6"
¾" x 18 "	4" & 6"	4" & 6"	4" & 6"
¾" x 16 "	6"	6"	4" & 6"
⅞" x 18 "	6"	6"	4" & 6"
1" x 18 "	6"	6"	4" & 6"
1" x 16 "	6"	6"	4" & 6"
1" x 14 "	—	—	6"
1" x 10 "	—	—	4" & 6"
2" x 8 "	4"	4"	—

Note: Other sizes can be made to order.

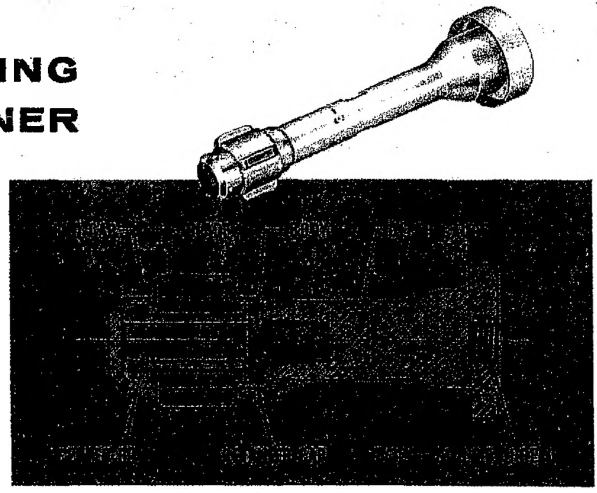
NEW TUBES STAY THAT WAY



OLD TUBES GAIN NEW LIFE



JOHN CRANE ROTARY EXPANDING TUBE END CLEANER



The John Crane Cleaner has been specifically developed for old tube installations. It has a special cutting blade that cleans salt deposits, scale, etc. from the portion of the tube end to be covered by the tube protector. It is designed so it cannot pass beyond this area.

The adapter end of the cleaner is threaded to 7/32"—24 U.S.F. gauge and will fit any small motor used for cleaning boiler tubes either direct or by using a flexible shaft.

JOHN CRANE PROTECTOR TUBE CEMENT

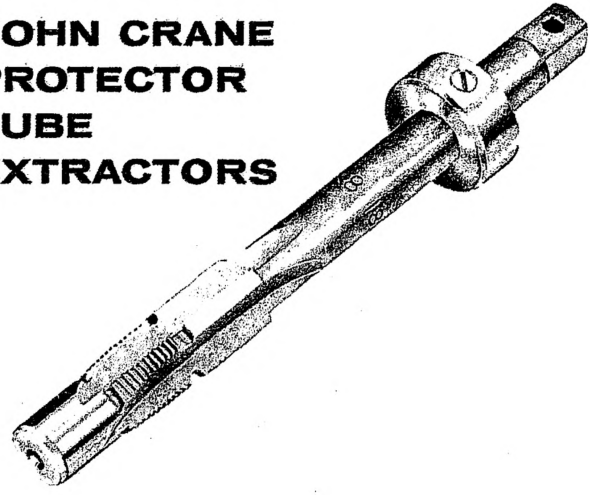


Cementing of nylon and polypropylene tube protectors is recommended to prevent their working out during backwash and cleaning operations.

Cement is easily applied with a small brush (see page 2). It bonds in seconds and dries to full strength in a very short time. Available in ½ pint cans.

Cementing of TFE protectors is not required, as they are made to a press fit.

JOHN CRANE PROTECTOR TUBE EXTRACTORS



If it becomes necessary to remove a protector or protectors, this can be readily accomplished by means of John Crane Protector Tube Extractors. They are especially designed to cut the protector free without damaging the tube metal. Any cement remaining in the tube can be removed with the rotary expanding cleaner above.

Crane Packing Company also manufactures a complete line of Expanding Tools and Super-Jet Condenser Tube Cleaners*

*Crane Packing Company trademark

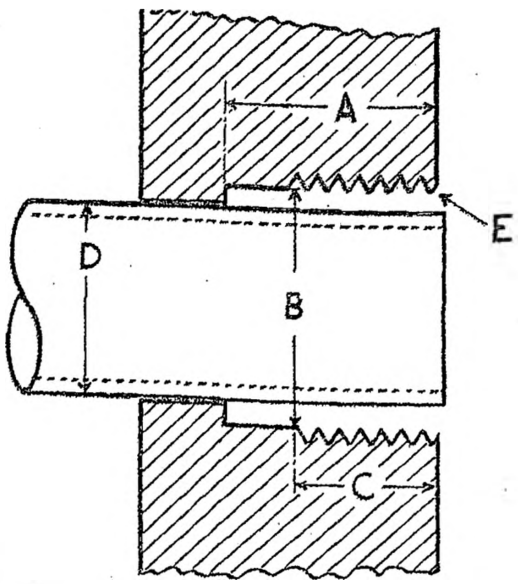
Printed in U.S.A.

Form No. P-313

Specifications for ordering JOHN CRANE *Metallic* CONDENSER TUBE *packing*

PLEASE GIVE FOLLOWING INFORMATION

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★



A. DEPTH OF DRILLING _____

B. DIAMETER OF COUNTERBORE _____

C. DEPTH OF TAPPING _____

D. OUTSIDE DIAMETER AND GAUGE OF TUBE _____

E. NUMBER OF THREADS PER INCH _____

CONDENSER MANUFACTURER AND SERIAL NUMBER _____

_____

NUMBER OF TUBES IN UNIT _____

ARE BOTH TUBE SHEETS DRILLED AND TAPPED _____

ARE TUBES FLUSH WITH FACE OF SHEET OR EXTENDED _____

ARE TUBES NEW, NECKED OR DEFORMED _____

INTEND USING FERRULES _____

WHAT CONDITION ARE FERRULES IN _____

SHALL WE FURNISH TOOLS _____

NAME OF ENGINEER _____

DATE _____

NAME _____

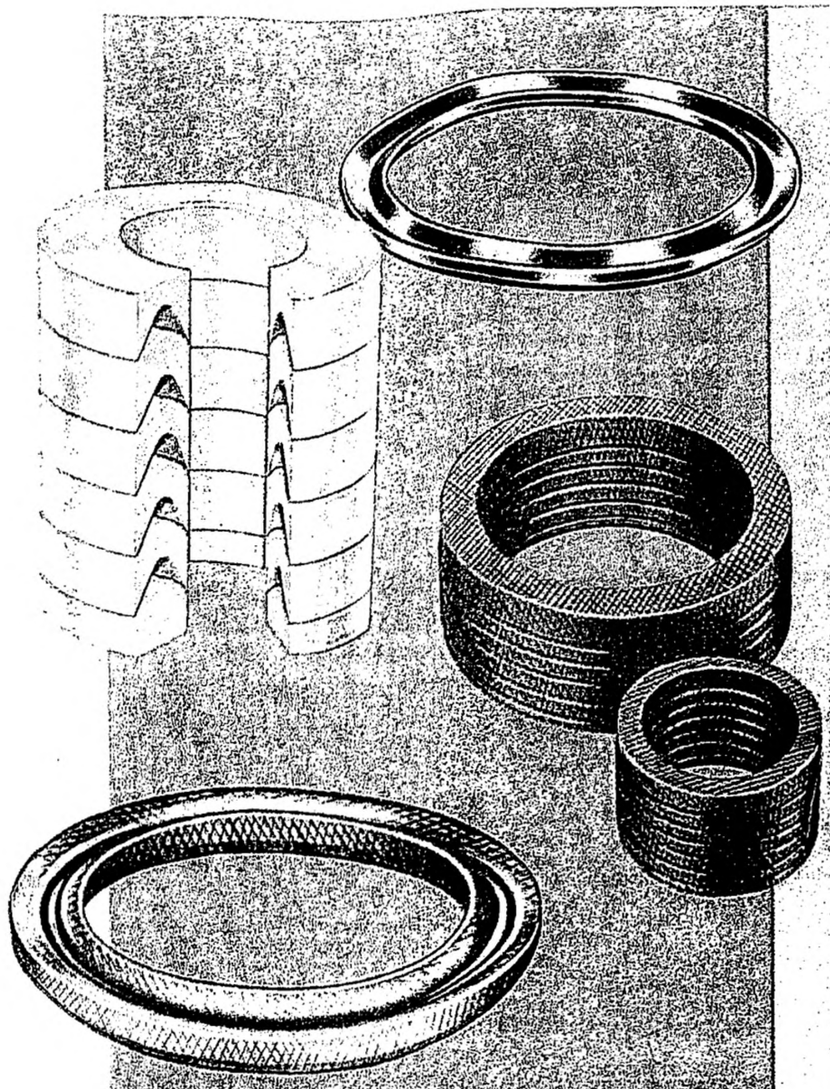
STREET ADDRESS _____

CITY _____ STATE _____

Printed in U.S.A.

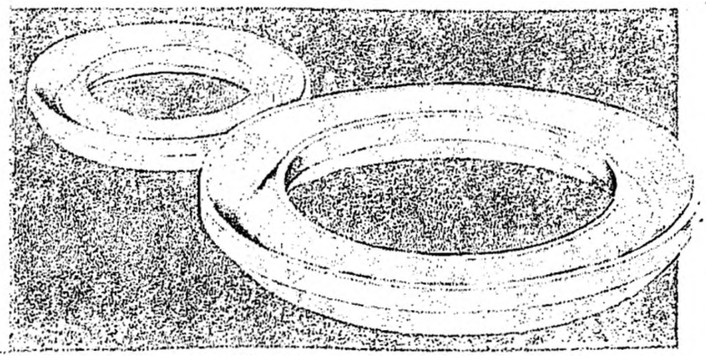
John Crane®
MECHANICAL PACKING DIVISION
CRANE PACKING COMPANY
6400 OAKTON STREET • MORTON GROVE, ILLINOIS

BULLETIN NO. P-420-2



John Crane

V-RING PACKINGS



V-RING PACKINGS

GENERAL INFORMATION

John Crane V-Ring Packings are designed for versatility, reliability, long life and low friction loads in virtually all types of reciprocating motion applications. These include rod and piston seals in hydraulic and pneumatic cylinders, press rams, jacks and seals on plungers and pistons in reciprocating pumps. They are also readily suited to certain slow rotary applications such as valve stems. Available in a large selection of materials and designs. John Crane V-Ring Packings cover all operating conditions encountered in the fluid power industry.

MATERIALS

The wide variety of materials may be generally classified into three categories: homogeneous rubbers, fabrics and Chemlon (TFE).

Each category of material has characteristics that make it especially suited for certain operating conditions. In many instances, V-Rings of different materials can be used in a set combination to gain the best advantages of each.

HOMOGENEOUS RUBBERS

These can be furnished to handle a range of operating conditions from very low pressures to relatively high pressure applications. Materials that will handle temperatures from sub zero to elevated conditions are available. The characteristics of the rubber material, itself, provides a seal that is sensitive to low pressure differentials.

FABRICS

Fabric packings are usually considered as the heavy duty type made to resist higher pressures and tough service conditions such as mobile and mill type hydraulic cylinders and reciprocating pump applications. Materials are available to handle a variety of fluids and temperatures.

In many services, fabric V-Rings are often used in combination with one or more homogeneous rubber V-Rings to obtain the best quality of both. Fabric V-Rings, because of their fibrous make-up, tend to resist extrusion. The addition of homogeneous V-Rings to the set provide for a more sensitive seal.

Chemlon (TFE) V-Ring packings can be manufactured in different ways, each resulting in a product with individual characteristics. Because of the chemical inertness of this material, it provides the solution to difficult and extreme chemical and temperature operating conditions that cannot be handled with other materials.

RECOMMENDED NUMBER OF V-RINGS IN A SET FOR VARIOUS PRESSURES

Homogeneous Rubber and/or Chemlon (TFE) V-Ring Sets:

0 to 500 PSI	500 to 1000 PSI	1000 to 3000 PSI
3 Rings	4 Rings	5 Rings

If *split* homogeneous V-Rings are used, and additional V-Ring should be added to the above.

With Chemlon (TFE) V-Rings, it may be desirable to use metal separator rings and male and female adapters at pressures over 1000 PSI.

Everseal Fabric V-Ring Sets

Fabric V-Rings are furnished *split*, unless otherwise specified. The following chart may be used for split V-Ring Sets:

0 to 1000 PSI	1000 to 3000 PSI	3000 to 5000 PSI	5000 PSI and UP
4 Rings	5 Rings	6 Rings	7 Rings

When endless fabric V-Rings are used, fewer rings are needed:

0 to 1500 PSI	1500 to 3000 PSI	3000 to 5000 PSI	5000 to 7500 PSI	7500 PSI and UP
3 Rings	4 Rings	5 Rings	6 Rings	7 Rings

One or more homogeneous V-Rings may be substituted for endless fabric V-Rings in a set. When used, they should be placed toward the bottom (male) adapter or inboard end of the set. A fabric V-Ring should always back-up a homogeneous V-Ring in a combination set.

Piston packings in a hydraulic cylinder may contain less V-Rings than shown above, since sealing at this point is not as critical as a rod packing and is usually satisfactory if no piston drift is encountered under static conditions.

FINISHES

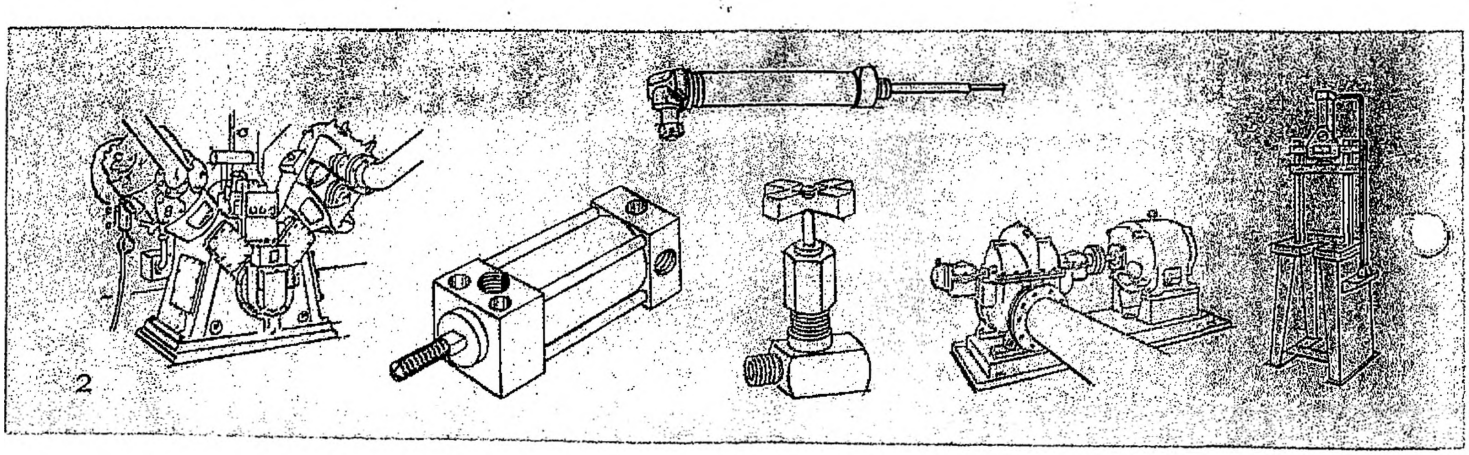
The recommended surface finishes for optimum service life of V-Ring packing sets, regardless of material, is 16 microinches RMS (max.) for dynamic surfaces against which the packing moves and 32 microinches RMS (max.) for static surfaces which the packing contacts. If rougher surface finishes are used, the service life and sealing efficiency of the V-packing sets will be reduced considerably.

GLAND OR STUFFING BOX LENGTH

To calculate the proper confined height of a V-packing set (the length of the space into which the V-packing set will be installed), add the nominal stack height of all of the component parts of the set, including both adapters and V-Rings. Add the plus tolerance specified for each individual part in the set to this total. The resultant figure will represent the length of the stuffing box. This when added to the required plus tolerance necessary for machining the metal parts will give the confined stack height.

PUMPS VS. CYLINDERS

Although the operating conditions may be similar in a recip-



rocating pump and a hydraulic cylinder, the packing performance may not be equal. Pump packings are usually subjected to greater mechanical loads, as evidenced by the wear pattern 180° apart on a used packing set. This wear pattern is in the same plane as the rotation of the crankshaft, and the action of the crankshaft is not entirely eliminated by the crosshead. Generally, it is necessary to add additional V-Rings to a pump packing set to compensate for these mechanical loads.

DESIGN AND INSTALLATION

When it is necessary to install V-Rings over or through threaded surfaces or other sharp projections, be sure to provide adequate clearance between diameter of packing ring and projection. A diametrical clearance of .060" is recommended.

Stuffing box or cylinder bore and the piston rod should have a 30° x 1/16" minimum chamfer at its entrance to facilitate installation and eliminate possibility of damage to sealing lips of packing.

Bevel, burr or undercut all sharp edges and corners in packing area at time of manufacture.

In reciprocating service, avoid any design in which the V-Ring must pass over corners, holes, ports or over a step diameter arrangement.

Do not design an installation so that bottoming or other mechanical loads are transmitted to the packings. Packings are designed to seal fluid pressure only—not to act as bumpers.

When determining rod or piston bearing areas, do not include packings and adapters in calculations, as they are not designed to take bearing loads.

All packing rings should first be lubricated with a material non-injurious to the packing.

Split rings should be installed so that joints on successive rings are 180° apart, then 90° (see page 7). Joints should never be placed over or near each other. Ends of all cut rings should be opened sideways when being placed around rod. Rings are furnished cut to fit and should not be trimmed, since the slight overlap at the joints is necessary for satisfactory sealing.

On installations where pressure is exerted in both directions, such as double-acting cylinders, opposing sets of packings should always be installed so that the sealing lips face away from each other. The female adapters should be located adjacent to a fixed or rigid part of the piston or gland so that no pressure loads will be transmitted to the other set of rings.

When installing endless rings, a means must be provided to eliminate the air cushion which becomes entrapped between the rings when they are inserted into the stuffing box. To do this, collapse a short section of the sealing lip by inserting a thin brass or plastic rod between the packing ring and stuffing box wall. Care must be exercised to avoid injury to ring lip or box wall.

ADAPTERS

Both male and female adapters must be used with V-Ring sets to properly support and back-up the packing. For special applications, metal, laminated phenolic or other hard materials may be used for the male and female adapters. In applications where side loads are present or where mechanical loads of any kind will be applied to the packing, hard adapters should be used. The male adapter must be made of a rigid material if spring loading is to be applied to the set. (See back page for dimensions on machining adapters.)

For high pressures or when surge or shock pressure conditions exist in the system, it is recommended that a close fitting metal or phenolic bushing be used behind the female adapter as a back-up and anti-extrusion device. This will allow the female adapter to flex under the pressure or shock load, but will prevent it from extruding and fracturing.

SPRING LOADING V-PACKING SETS

The use of springs to preload V-packing sets can have definite advantages; however, each application must be considered on its own merits, taking into account the specific operating conditions involved.

Springs are not generally recommended for high speed or quick reverse motion on reciprocating applications. Plunger pumps fall into this category. High speed may cause the packing to shift or "bounce," allowing fluid to by-pass the packing.

As a rule of thumb, spring loading for a fabric or homogeneous V-packing set can be figured on the basis of 5-pounds per linear inch or mean circumference.

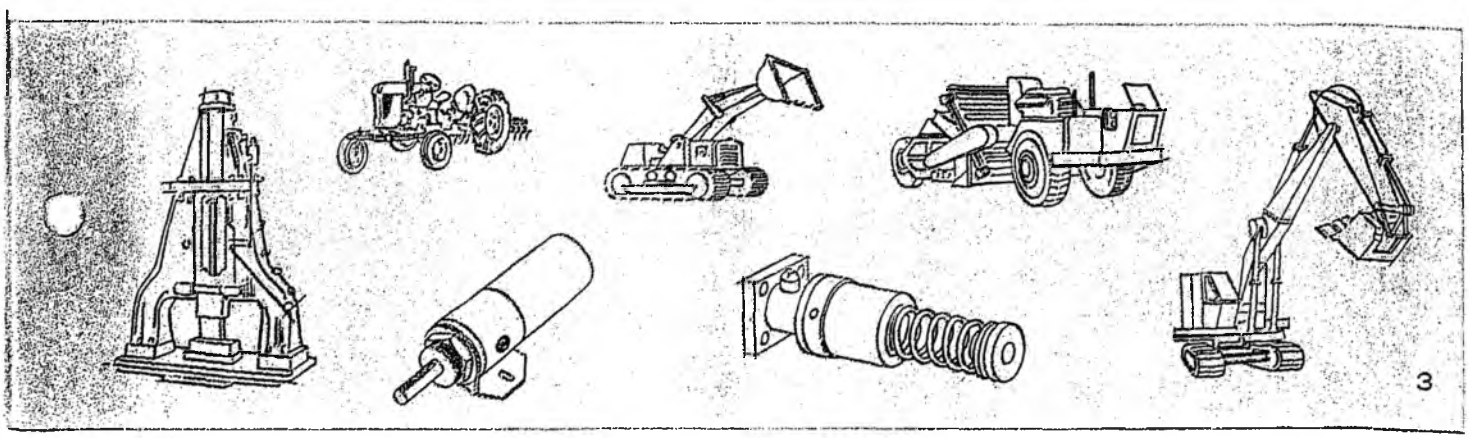
V-Ring sets of TFE, whether C-VU, C-VH or standard AN design, require a heavier spring load. A 10-pound spring load per linear inch of mean circumference should be used with a minimum total load of 15 pounds.

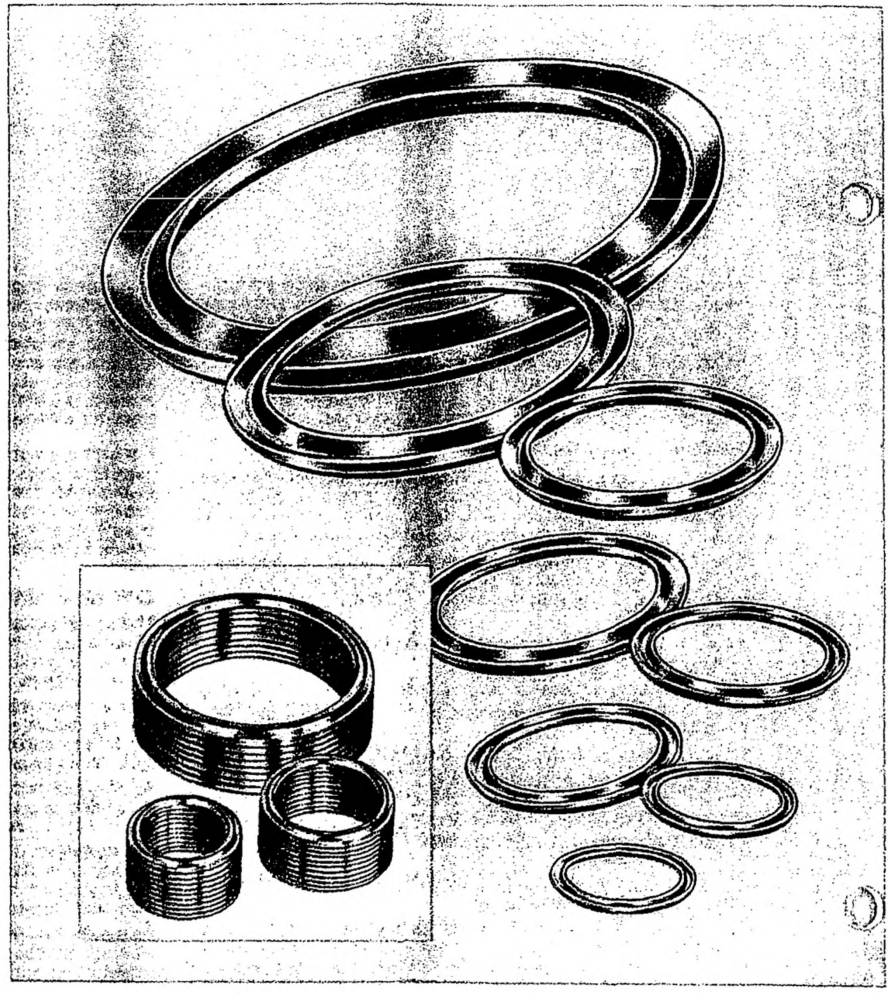
Using the above as a guide, the following must also be considered: Number of V-Rings and the cross-section of the set, speed of operation and the primary reason for the use of the spring loading in this particular unit.

Evidence gathered through field experience and laboratory tests indicates that spring loading is not necessary in most ordinary hydraulic and pneumatic cylinders being manufactured today. If a V-packing set is properly designed to fit a fixed gland dimension and installed properly, extended service life and proper sealing will result without the use of springs.

If the main requirement of a spring is to adjust for differences in stack heights of sets, a wave spring can be used and acts essentially as an "adjustable shim." Split wave springs serve well for this purpose; however, a wave spring's compensation for wear is minimal.

Springs are not a stock item but may be ordered through your local spring manufacturer or supplier. When a recommendation for spring loaded hydraulic packing is required, forward the request to Crane Packing Company, along with all the operating conditions and other information indicated on our Hydraulic Packing Data Sheet No. P-345.





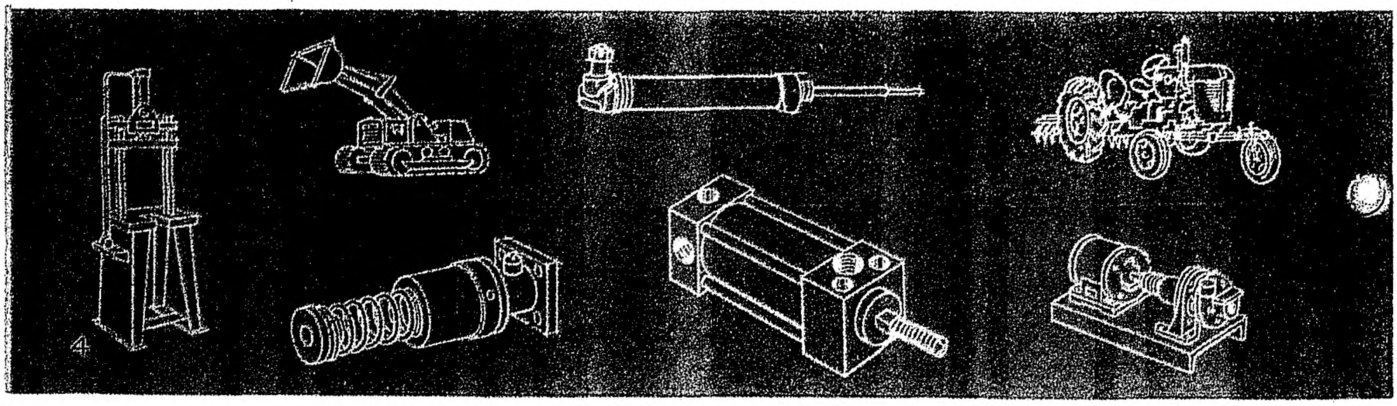
HOMOGENEOUS V-RINGS

John Crane Homogeneous V-Rings are designed for applications such as shock absorbers, cylinders, valves and other hydraulic and pneumatic equipment at low to relatively high pressures. They are designed so that they become pre-loaded when installed. Since the packings are automatic in action and sensitive to pressure changes, no gland pressure is required. Homogeneous V-Rings are always furnished endless.

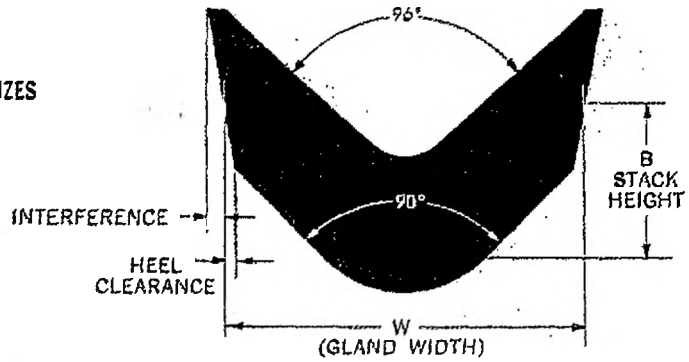
For general services, an all-purpose compound that effectively handles the majority of temperature, fluid and pressure applications has been developed. However, for services beyond the limitations of this compound, a wide variety of special compounds is also available. In such cases, complete information on temperature range, fluid handled, pressure range and rate of motion should be furnished to our engineering department for recommendations.

Homogeneous V-Rings are normally recommended for temperatures from —65° to +400° F., pressures to 3000 psi. For higher pressure applications or where clearances exceed those recommended for homogeneous V-Rings, fabric V-Rings should be used exclusively or in combination with homogeneous rings. (See pages 6 and 7.)

Standard sizes of John Crane Homogeneous V-Rings are shown on page 5.



STANDARD SIZES

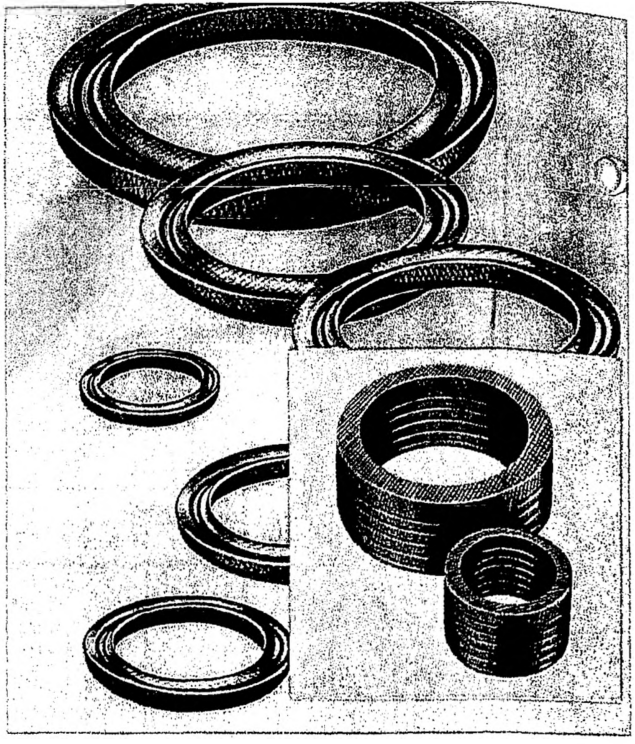


Dash No.	W Ref.	NOMINAL I.D.	NOMINAL O.D.	B ±.010
1	3/16	1/8	1/2	.083
2	3/16	3/16	9/16	.083
3	3/16	1/4	5/8	.083
4	3/16	5/16	11/16	.083
5	3/16	3/8	3/4	.083
6	3/16	7/16	13/16	.083
7	3/16	1/2	7/8	.083
8	1/4	1/4	3/4	.083
9	1/4	5/16	13/16	.083
10	1/4	3/8	7/8	.083
11	1/4	7/16	15/16	.083
12	1/4	1/2	1	.083
13	1/4	9/16	1 1/16	.083
14	1/4	5/8	1 1/8	.083
15	1/4	11/16	1 3/16	.083
16	1/4	3/4	1 1/4	.083
17	1/4	13/16	1 5/16	.083
18	1/4	7/8	1 3/8	.083
19	1/4	15/16	1 7/16	.083
20	1/4	1	1 1/2	.083
21	1/4	1 1/16	1 3/16	.083
22	1/4	1 1/8	1 5/8	.083
23	1/4	1 3/16	1 11/16	.083
24	1/4	1 1/4	1 3/4	.083
25	5/16	1 1/4	1 7/8	.140
26	5/16	1 3/8	2	.140
27	5/16	1 1/2	2 1/8	.140
28	5/16	1 5/8	2 1/4	.140
29	5/16	1 3/4	2 3/8	.140
30	5/16	1 7/8	2 1/2	.140
31	5/16	2	2 5/8	.140
32	5/16	2 1/8	2 3/4	.140
33	5/16	2 1/4	2 7/8	.140
34	5/16	2 3/8	3	.140
35	5/16	2 1/2	3 1/8	.140
36	3/8	2 1/2	3 1/4	.156
37	3/8	2 5/8	3 3/8	.156
38	3/8	2 3/4	3 1/2	.156
39	3/8	2 7/8	3 5/8	.156
40	3/8	3	3 3/4	.156

Dash No.	W Ref.	NOMINAL I.D.	NOMINAL O.D.	B ±.010
41	3/8	3 1/8	3 7/8	.156
42	3/8	3 1/4	4	.156
43	3/8	3 3/8	4 1/8	.156
44	3/8	3 1/2	4 1/4	.156
45	3/8	3 5/8	4 3/8	.156
46	3/8	3 3/4	4 1/2	.156
47	3/8	3 7/8	4 5/8	.156
48	7/16	3 7/8	4 3/4	.197
49	7/16	4	4 7/8	.197
50	7/16	4 1/4	5 1/8	.197
51	7/16	4 1/2	5 3/8	.197
52	7/16	4 3/4	5 5/8	.197
53	7/16	5	5 7/8	.197
54	7/16	5 1/4	6 1/8	.197
55	7/16	5 1/2	6 3/8	.197
56	1/2	5 1/2	6 1/2	.197
57	1/2	5 3/4	6 3/4	.197
58	1/2	6	7	.197
59	1/2	6 1/4	7 1/4	.197
60	1/2	6 1/2	7 1/2	.197
61	1/2	6 3/4	7 3/4	.197
62	1/2	7	8	.197
63	1/2	7 1/4	8 1/4	.197
64	1/2	7 1/2	8 1/2	.197
65	1/2	7 3/4	8 3/4	.197
66	1/2	8	9	.197
67	1/2	8 1/2	9 1/2	.197
68	1/2	9	10	.197
69	1/2	9 1/2	10 1/2	.197
70	1/2	10	11	.197
71	1/2	10 1/2	11 1/2	.197
72	1/2	11	12	.197
73	1/2	11 1/2	12 1/2	.197
74	1/2	12	13	.197
75	1/2	12 1/2	13 1/2	.197
76	1/2	13	14	.197
77	1/2	13 1/2	14 1/2	.197
78	1/2	14	15	.197
79	1/2	14 1/2	15 1/2	.197
80	1/2	15	16	.197

NOTE: Sizes in heavy type conform to J.I.C. Code HV Series for hydraulic packings. All sizes correspond dimensionally to AN-6225 Series.

FABRIC V-RINGS



John Crane Fabric V-Rings are recommended for liquid and gas service on all heavy-duty equipment where operating pressures and clearances exceed those recommended for the homogeneous packings. They are widely used in all types of reciprocating pump and hydraulic cylinder applications and are available in a number of compositions covering an exceptionally wide range of operating conditions.

Fabric V-Rings are usually constructed of cotton duck or asbestos cloth, coated with various elastomers and molded under heat and pressure.

ORDERING

Packings are furnished in sets or as individual rings. If sets are specified, male and female adapters of the same stock are normally supplied. Unless otherwise specified by the customer, all packings are furnished split to facilitate installation. Inquiries or orders should state the exact stuffing box depth and total entrance (if any) of gland ring or nut into the stuffing box.

ADJUSTMENT

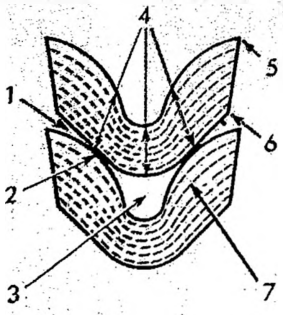
On endless ring installations no gland pressure should be used, since the sole function of the gland is to back up the packings when fluid pressure is applied.

On split packing installations no gland pressure is required to effect a seal in the packings themselves. However, light gland pressure is usually required to seal the joints. If light pressure will not produce the desired sealing, the trouble lies elsewhere. The packings should be removed and inspected and replaced, if necessary.

To avoid excessive gland pressure, the gland should be bolted down metal-to-metal on shims.

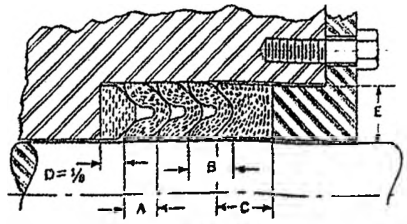
Crane Packing Company can provide complete engineering service and recommendations upon request.

DESIGN FEATURES



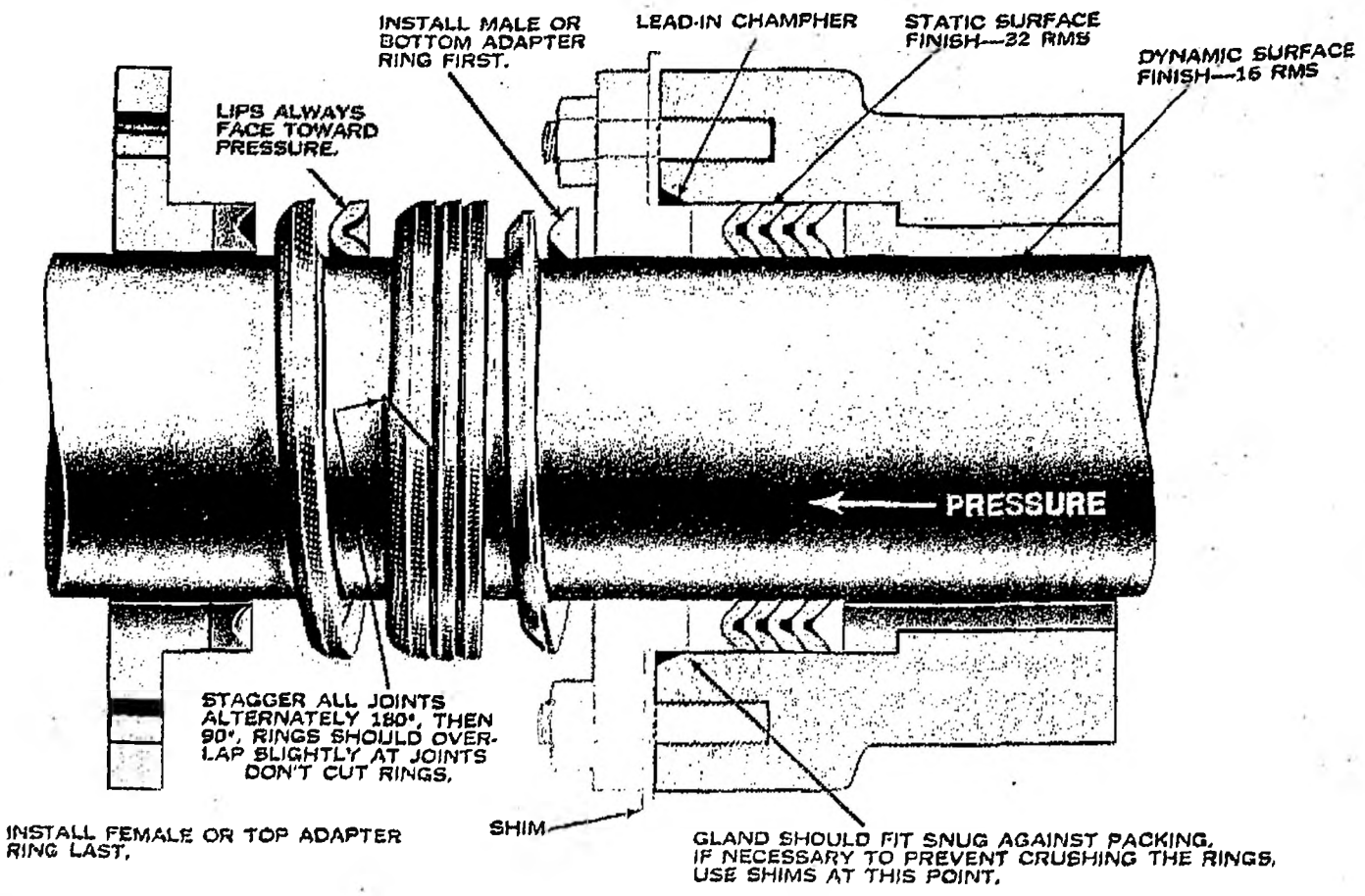
1. Pressure access allows immediate pressure distribution and packing response.
2. "Ball-Joint" nesting surfaces facilitates breathing without pinching, wedging or lip collapse.
3. Adequate lubrication reservoir.
4. Uniform bottom thickness eliminates weak points and insures centerline hinge action.
5. Molded-in lip interference insures light static seal and conformation to bore and rod deflections.
6. Heel clearance prevents "riding" at heel and eliminates lip toe-in.
7. The fabric in the V-Rings is so laid to assure maximum strength — an important consideration for maximum packing life.

DIMENSIONAL DATA



Nominal Packing Space E	Height of Adapters C+D +.040 −.000	Stack Height V-Ring A +.020 −.000	Overall Height V-Ring B +.020 −.000	Stack Height F, Adapter C +.020 −.000
3/16	.312	.093	.142	.187
1/4	.375	.125	.194	.250
5/16	.438	.156	.245	.313
3/8	.500	.187	.280	.375
7/16	.563	.218	.332	.438
1/2	.625	.250	.387	.500
9/16	.687	.281	.431	.562
5/8	.750	.312	.485	.625
11/16	.813	.343	.533	.688
3/4	.875	.375	.571	.750
13/16	.938	.406	.615	.813
7/8	1.000	.437	.669	.875
15/16	1.062	.468	.710	.937
1	1.125	.500	.765	1.000

INSTALLATION DETAILS FOR FABRIC REINFORCED V-RINGS



NOMINAL STACK HEIGHT (See Page 6 For Tolerances)

Nominal Packing Space	Stack Height V-Ring	Height Of Adapters	Total Stack Height (Includes Adapters And V-Rings As Indicated)									
			1 Ring	2 Rings	3 Rings	4 Rings	5 Rings	6 Rings	7 Rings	8 Rings	9 Rings	10 Rings
3/16	.093	.312	.41	.50	.59	.68	.78	.87	.96	1.06	1.15	1.24
7/32	.109	.344	.45	.56	.67	.78	.89	1.00	1.11	1.22	1.33	1.44
1/4	.125	.375	.50	.63	.75	.88	1.00	1.13	1.25	1.38	1.50	1.63
9/32	.140	.406	.55	.67	.83	.97	1.11	1.25	1.39	1.53	1.67	1.81
5/16	.156	.437	.59	.75	.91	1.07	1.22	1.38	1.53	1.69	1.84	2.00
11/32	.171	.469	.64	.81	.98	1.15	1.32	1.50	1.67	1.84	2.00	2.18
3/8	.187	.500	.69	.87	1.06	1.25	1.44	1.62	1.81	2.00	2.18	2.37
13/32	.203	.531	.73	.94	1.14	1.34	1.55	1.75	1.95	2.16	2.36	2.56
7/16	.218	.562	.78	1.00	1.22	1.43	1.65	1.87	2.09	2.31	2.52	2.74
15/32	.234	.594	.83	1.06	1.30	1.53	1.76	2.00	2.23	2.47	2.70	2.93
1/2	.250	.625	.88	1.13	1.38	1.63	1.88	2.13	2.38	2.63	2.88	3.13
17/32	.265	.656	.92	1.19	1.45	1.72	1.98	2.25	2.51	2.78	3.04	3.31
9/16	.281	.687	.97	1.25	1.53	1.81	2.09	2.37	2.65	2.94	3.22	3.50
5/8	.312	.750	1.06	1.37	1.69	2.00	2.31	2.62	2.93	3.25	3.59	3.87
21/32	.328	.781	1.11	1.44	1.77	2.09	2.42	2.75	3.08	3.41	3.73	4.06
11/16	.343	.812	1.56	1.50	1.84	2.18	2.53	2.87	3.21	3.56	3.90	4.24
3/4	.375	.875	1.25	1.63	2.00	2.38	2.75	3.13	3.50	3.88	4.25	4.63
13/16	.406	.937	1.34	1.75	2.16	2.56	2.97	3.37	3.78	4.19	4.59	5.00
7/8	.437	1.000	1.44	1.87	2.31	2.75	3.19	3.62	4.06	4.50	4.93	5.37
15/16	.468	1.062	1.53	2.00	2.47	2.93	3.40	3.87	4.34	4.81	5.27	5.74
1	.500	1.125	1.63	2.13	2.63	3.13	3.63	4.13	4.63	5.13	5.63	6.13

CHEMLON® TFE MOLDED PACKINGS

STYLES C-VU and C-VH

John Crane Chemlon C-V Packing Rings have proved to be the closest possible approach to a universal packing. They are as well suited for valves as for reciprocating pumps and other low speed rotary revolving shaft applications under the most corrosive acid, alkali or solvent service conditions.

Made of TFE, they also offer the advantages of a wide operating temperature range from —120° F. to +500° F., plus an extremely low coefficient of friction. "Breakout" friction is only slightly higher than "running" friction. This friction-free characteristic prevents shaft or rod wear, promotes smoother action and increases packing life many times over.

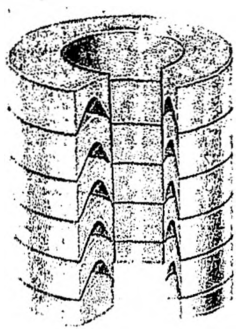
A special cross-section design in each pressure ring permits positive sealing at finger tight gland pressure. Also, this design provides a void between each ring to compensate for the relatively high coefficient of expansion of TFE.

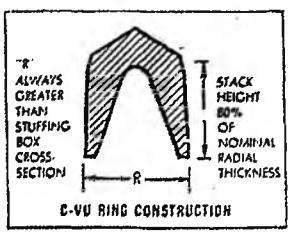
Chemlon C-V Packing Rings are used in sets, the number of rings dependent on the stuffing box length and pressures encountered. In all cases, a minimum of two pressure rings, together with male and female adapters, is recommended.

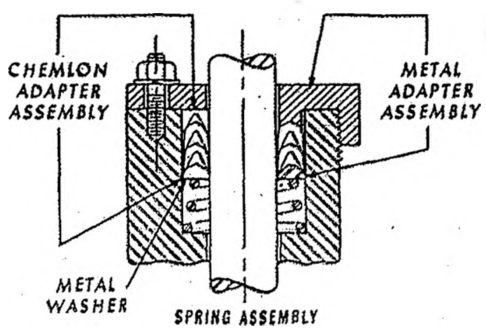
STYLE C-VU RINGS

For Low Pressure Service

A very sensitive and resilient type packing that is particularly suited for use in control or regulator valves handling gases or fluids.





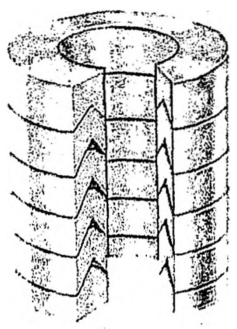


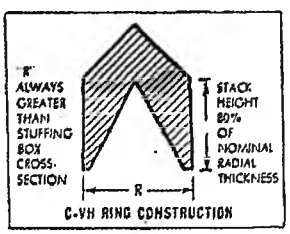
STYLE C-VH RINGS

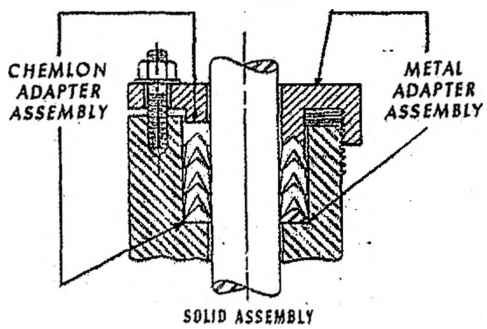
For High Pressure Service

This design incorporates a heavy wall and heel section necessary to withstand pressures up to 500 PSI and over. On pressures over 1000 PSI, metal adapters are recommended. (See back cover.)

C-VH Rings are recommended for high pressure applications such as hydraulic cylinders and pumps.







STACK HEIGHTS and ADAPTER DIMENSIONS

(Styles C-VU and C-VH Rings and Sets)

R Nominal Packing Space	S Stack Height V-Ring ±.010"	Height Of Adapters ±.010"	Total Stack Height (Includes Adapters and V-Rings as Indicated)									
			1 Ring	2 Rings	3 Rings	4 Rings	5 Rings	6 Rings	7 Rings	8 Rings	9 Rings	10 Rings
1/8	.100	.197	.297	.397	.497	.597	.697	.797	.897	.997	1.097	1.197
5/32	.125	.228	.353	.478	.603	.728	.853	.978	1.103	1.228	1.353	1.478
3/16	.150	.260	.410	.560	.710	.860	1.010	1.160	1.310	1.460	1.610	1.760
7/32	.175	.291	.466	.641	.816	.991	1.166	1.341	1.516	1.691	1.866	2.04
1/4	.200	.322	.522	.722	.922	1.122	1.322	1.522	1.722	1.922	2.122	2.322
9/32	.225	.353	.578	.803	1.028	1.253	1.478	1.703	1.928	2.153	2.378	2.603
5/16	.250	.385	.635	.885	1.135	1.385	1.635	1.885	2.135	2.385	2.635	2.885
11/32	.275	.416	.691	.966	1.241	1.516	1.791	2.066	2.341	2.616	2.891	3.166
3/8	.300	.447	.747	1.047	1.347	1.647	1.947	2.247	2.547	2.847	3.147	3.447
13/32	.325	.478	.803	1.128	1.453	1.778	2.103	2.428	2.753	3.078	3.403	3.728
7/16	.350	.510	.860	1.210	1.560	1.910	2.260	2.610	2.960	3.310	3.660	4.010
15/32	.375	.541	.916	1.291	1.666	2.041	2.416	2.791	3.166	3.541	3.916	4.291
1/2	.400	.572	.972	1.372	1.772	2.172	2.572	2.972	3.372	3.772	4.172	4.572
17/32	.425	.603	1.028	1.453	1.878	2.303	2.728	3.153	3.578	4.003	4.428	4.853
9/16	.450	.635	1.085	1.535	1.985	2.435	2.885	3.335	3.785	4.235	4.685	5.135
5/8	.500	.697	1.197	1.697	2.197	2.697	3.197	3.697	4.197	4.697	5.197	5.697
21/32	.525	.728	1.253	1.778	2.303	2.828	3.353	3.878	4.403	4.728	5.453	5.978
11/16	.550	.760	1.310	1.860	2.410	2.960	3.510	4.060	4.610	5.160	5.710	6.260
3/4	.600	.822	1.422	2.022	2.622	3.222	3.822	4.422	5.022	5.622	6.222	6.822
13/16	.650	.885	1.535	2.185	2.835	3.485	4.135	4.785	5.435	6.085	6.735	7.385
7/8	.700	.947	1.647	2.347	3.047	3.747	4.447	5.147	5.847	6.547	7.247	7.947
15/16	.750	1.010	1.760	2.510	3.260	4.010	4.760	5.510	6.260	7.010	7.760	8.510
1	.800	1.072	1.872	2.672	3.472	4.272	5.072	5.872	6.672	7.472	8.272	9.072

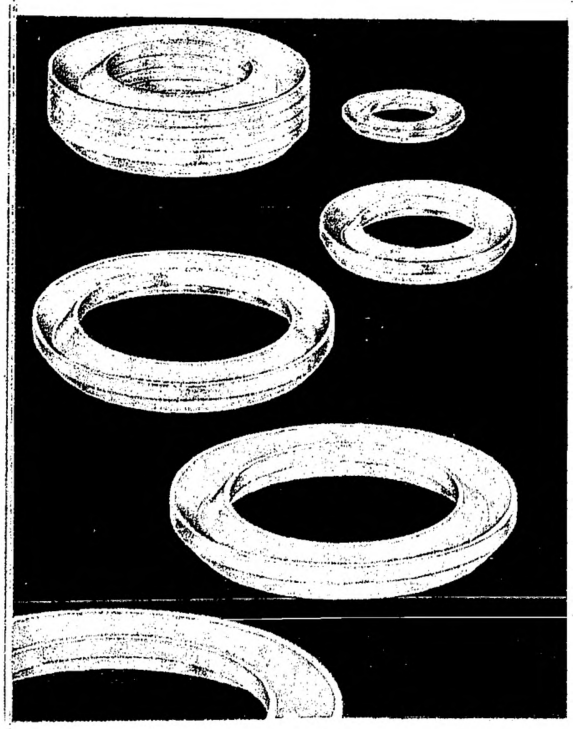
NOTE: 1. Stack height of sets should be measured with a minimum of 10 pound load applied to set in unconfined state.
2. Minimum of three pressure rings per set recommended if space permits.

STANDARD SIZES (C-VU and C-VH Rings and Male and Female Adapters.)

Nominal Box Size ID	OD	Size No.	Stack Ht.	Mold Style "H"	Mold Style "U"
1/8	x 5/16	25	.075	X	—
1/8	x 3/8	26	.100	X	—
1/8	x 7/16	27	.125	X	X
1/8	x 1/2	28	.150	X	X
1/8	x 5/8	210	.200	X	—
1/8	x 11/16	211	.225	X	—
3/16	x 3/8	36	.075	X	X
3/16	x 7/16	37	.100	X	X
3/16	x 1/2	38	.125	X	X
3/16	x 9/16	39	.150	X	—
3/16	x 5/8	310	.175	X	—
3/16	x 11/16	311	.200	X	—
1/4	x 7/16	47	.075	X	X
1/4	x 1/2	48	.100	X	X
1/4	x 9/16	49	.125	X	X
1/4	x 5/8	410	.150	X	X
1/4	x 11/16	411	.175	X	—
1/4	x 3/4	412	.200	X	X
1/4	x 7/8	414	.250	X	X
5/16	x 1/2	58	.075	X	X
5/16	x 9/16	59	.100	X	X
5/16	x 5/8	510	.125	X	X
5/16	x 11/16	511	.150	X	X
5/16	x 3/4	512	.175	X	X
5/16	x 13/16	513	.200	X	X
5/16	x1-1/8	518	.325	X	X
3/8	x 9/16	69	.075	X	X
3/8	x 5/8	610	.100	X	X
3/8	x 11/16	611	.125	X	X
3/8	x 3/4	612	.150	X	X
3/8	x 13/16	613	.175	X	—
3/8	x 7/8	614	.200	X	X
3/8	x1	616	.250	X	X
3/8	x1-1/8	618	.300	X	—
7/16	x 5/8	710	.075	X	X
7/16	x 11/16	711	.100	X	X
7/16	x 3/4	712	.125	X	X
7/16	x 13/16	713	.150	X	X
7/16	x 15/16	715	.200	X	X
7/16	x1	716	.225	X	—
7/16	x1-1/8	718	.275	X	X
1/2	x 3/4	812	.100	X	X
1/2	x 13/16	813	.125	X	X
1/2	x 7/8	814	.150	X	X
1/2	x 15/16	815	.174	X	X
1/2	x1	816	.200	X	X
1/2	x1-1/8	818	.250	X	X
1/2	x1-1/4	820	.300	X	—
9/16	x 13/16	913	.100	X	X
9/16	x 7/8	914	.125	X	X
9/16	x 15/16	915	.150	X	X
9/16	x1	916	.175	X	X
9/16	x1-1/16	917	.200	X	X
5/8	x 13/16	1013	.074	X	X
5/8	x 7/8	1014	.100	X	X
5/8	x 15/16	1015	.124	X	X
5/8	x1	1016	.150	X	X
5/8	x1-1/8	1018	.200	X	X
5/8	x1-3/16	1019	.225	X	—
5/8	x1-1/4	1020	.250	X	—
5/8	x1-3/8	1022	.300	X	—
5/8	x1-1/2	1024	.350	X	—
11/16	x1-1/16	1117	.150	X	X
11/16	x1-1/8	1118	.175	X	X
11/16	x1-3/16	1119	.200	X	X
11/16	x1-1/4	1120	.225	X	—
3/4	x1-1/16	1217	.125	X	X
3/4	x1-1/8	1218	.150	X	X
3/4	x1-3/16	1219	.175	X	X
3/4	x1-1/4	1220	.200	X	X
3/4	x1-5/16	1221	.225	X	—
3/4	x1-3/8	1222	.250	X	X
3/4	x1-1/2	1224	.300	X	X
3/4	x1-5/8	1226	.350	X	X
13/16	x1-5/16	1321	.200	X	X
13/16	x1-3/8	1322	.225	X	X
7/8	x1-1/4	1420	.150	X	X
7/8	x1-3/8	1422	.200	X	X
7/8	x1-1/2	1424	.250	X	—
7/8	x1-5/8	1426	.300	X	X
15/16	x1-7/16	1523	.200	X	—
15/16	x1-1/2	1524	.225	—	X
15/16	x1-9/16	1525	.250	X	—
1	x1-3/16	1619	.075	X	—
1	x1-1/4	1620	.100	X	—
1	x1-3/8	1622	.150	X	—
1	x1-7/16	1623	.175	X	—
1	x1-1/2	1624	.200	X	X
1	x1-9/16	1625	.225	X	X
1	x1-5/8	1626	.250	X	—
1	x1-3/4	1628	.300	X	X
1	x1-7/8	1630	.350	X	—
1-1/16	x1-9/16	1725	.200	X	X
1-1/16	x1-11/16	1727	.250	X	X
1-1/16	x1-13/16	1729	.300	X	X
1-1/8	x1-3/8	1822	.100	X	—
1-1/8	x1-1/2	1824	.150	X	—
1-1/8	x1-5/8	1826	.200	X	X
1-1/8	x1-11/16	1827	.225	X	—
1-1/8	x1-3/4	1828	.250	X	X
1-1/8	x1-7/8	1830	.300	X	X
1-1/8	x2	1832	.350	X	—
1-1/8	x2-1/8	1834	.400	X	X
1-1/8	x2-1/4	1836	.450	X	—
1-1/8	x2-3/8	1838	.500	X	—
1-3/16	x1-1/2	1924	.125	X	—
1-3/16	x1-13/16	1929	.250	—	X
1-3/16	x1-7/8	1930	.275	X	X
1-3/16	x1-15/16	1931	.300	X	—
1-3/16	x2	1932	.325	X	—
1-1/4	x1-1/2	2024	.100	X	—
1-1/4	x1-3/4	2028	.200	X	X
1-1/4	x1-7/8	2030	.250	X	X
1-1/4	x2	2032	.300	X	X
1-1/4	x2-1/8	2034	.350	—	X
1-1/4	x2-1/4	2036	.400	X	—
1-5/16	x2	2132	.275	X	—
1-3/8	x1-3/4	2228	.150	X	—
1-3/8	x1-7/8	2230	.200	X	X
1-3/8	x2	2232	.250	X	X
1-3/8	x2-1/8	2234	.300	X	X
1-3/8	x2-3/16	2235	.325	X	—
1-3/8	x2-1/4	2236	.350	X	—
1-3/8	x2-1/2	2240	.450	X	—
1-7/16	x1-15/16	2331	.200	X	—
1-7/16	x2-1/16	2333	.250	X	X
1-7/16	x2-3/16	2335	.300	X	—
1-1/2	x2	2432	.200	X	X
1-1/2	x2-1/8	2434	.250	X	X
1-1/2	x2-1/4	2436	.300	X	X
1-1/2	x2-1/2	2440	.400	X	—
1-5/8	x2-1/4	2636	.250	X	X
1-5/8	x2-3/8	2638	.300	X	X
1-5/8	x2-9/16	2641	.375	X	—
1-5/8	x2-5/8	2642	.400	X	—
1-11/16	x2-7/16	2739	.300	X	X
1-11/16	x2-1/2	2740	.325	X	—
1-3/4	x2-1/4	2836	.200	X	—
1-3/4	x2-3/8	2838	.250	X	X
1-3/4	x2-1/2	2840	.300	X	X
1-3/4	x2-3/4	2844	.400	X	—
1-7/8	x2-1/2	3040	.250	X	—
1-7/8	x2-5/8	3042	.300	X	—
1-7/8	x2-7/8	3046	.400	X	—
2	x2-1/2	3240	.200	X	X
2	x2-5/8	3242	.250	X	X
2	x2-11/16	3243	.275	X	—
2	x2-3/4	3244	.300	X	X
2	x2-7/8	3246	.350	X	—
2	x3	3248	.400	X	—
2-1/16	x2-13/16	3345	.300	X	—
2-1/8	x2-7/8	3446	.300	X	—
2-1/8	x3	3448	.350	X	—
2-3/16	x2-13/16	3545	.250	X	—
2-3/16	x3	3548	.325	—	X
2-1/4	x2-7/8	3646	.250	X	X
2-1/4	x3	3648	.300	X	X
2-1/4	x3-1/4	3652	.400	X	X
2-3/8	x3-1/8	3850	.300	X	X
2-7/16	x3-7/16	3955	.400	X	—
2-1/2	x3	4048	.200	X	—
2-1/2	x3-1/8	4050	.250	X	X
2-1/2	x3-1/4	4052	.300	X	X
2-1/2	x3-1/2	4056	.400	X	—
2-9/16	x3-3/16	4151	.300	X	—
2-9/16	x3-9/16	4157	.400	X	—
2-5/8	x3-3/8	4254	.300	X	—
2-3/4	x3-1/4	4452	.200	X	—
2-3/4	x3-1/2	4456	.300	—	X
3	x3-3/4	4860	.300	X	X
3	x4	4864	.400	X	—
3-1/8	x4	5064	.350	—	X
3-1/8	x4-3/8	5070	.500	X	—
3-1/4	x4	5264	.300	X	—

NOTES: (1) In addition to the above standard stock sizes, molds to make many other sizes are available. (2) All rings are endless and can be diagonally cut with pen knife for installation purposes when it is not desirable or practical to disassemble the valve unit.

TEMPERIZED STYLE 775-T V-RINGS



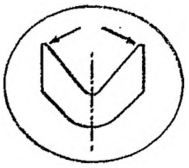
Temperized Style 775-T V-Rings are a new advance in TFE V-Ring packings both in design and in economy. Manufactured by a new John Crane process, these rings are formed in special molds under heat and pressure to offer advantages not found in similar type TFE packings. (See illustrations at right.)

John Crane Temperized Style 775-T V-Rings are manufactured to the same high density and close tolerance standards of fine machine rings. They offer a universal packing for hydraulic cylinders, valves, reciprocating or rotary pumps and other revolving shaft applications. They are non-toxic and impervious to practically all chemicals, corrosives and solvents over a wide temperature range from —120° to +500° F. Another outstanding characteristic is their low coefficient of friction — "breakout" friction is only slightly higher than "running" friction. Consequently, rod wear is reduced to a minimum, smoother operation is promoted and packing life is increased many times over.

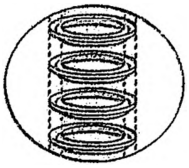
Temperized Style 775-T V-Rings are manufactured in production quantities only. They are designed to AN specifications and are available in a range of sizes as shown in the Dimensional Data Table.



1. An induced elastomeric action at normal operating temperature causes the I.D. and O.D. lips to expand to insure maximum sealing on both the rod and the cylinder wall.



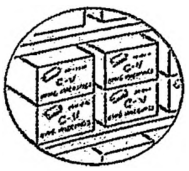
2. Consistently sharp lips provide a positive seal under both static or dynamic conditions.



3. Complete uniformity through precision dies that result in better overall sealing performance.

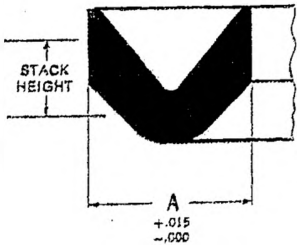


4. More compact installation in that less stack height is required than with other type V-Rings.



5. Practically unlimited storage life without loss of dimensional stability or other properties.

DIMENSIONAL DATA



Nominal C/S	A	Stack Height
1/8	.130	.083
3/16	.192	.083
1/4	.255	.083
5/16	.317	.140
3/8	.380	.156
7/16	.442	.197
1/2	.505	.197

Note: Dimensions are in inches

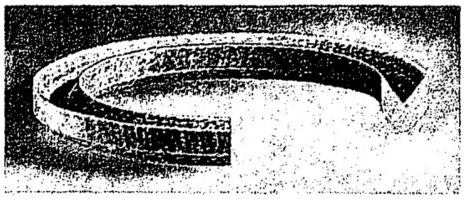
STANDARD SIZES (AN Design)

1/2 x 1 x .083	1 1/2 x 2 x .083	2 1/2 x 3 x .083	3 3/4 x 4 1/2 x .156
9/16 x 1 1/16 x .083	1 1/2 x 2 1/2 x .140	2 3/8 x 3 x .140	3 7/8 x 4 3/4 x .197
5/8 x 1 1/8 x .083	1 3/4 x 2 1/4 x .083	2 1/2 x 3 1/8 x .140	4 x 4 7/8 x .197
3/4 x 1 1/4 x .083	1 3/4 x 2 3/8 x .140	2 1/2 x 3 1/4 x .156	4 1/4 x 5 1/8 x .197
13/16 x 1 5/16 x .083	1 7/8 x 2 1/2 x .140	2 5/8 x 3 1/4 x .140	4 1/2 x 5 x .083
1 x 1 1/2 x .083	2 x 2 1/2 x .083	2 3/4 x 3 1/2 x .156	4 1/2 x 5 3/8 x .197
1 1/16 x 1 9/16 x .083	2 x 2 5/8 x .140	3 x 3 3/4 x .156	4 3/4 x 5 3/8 x .197
1 1/4 x 1 3/4 x .083	2 1/8 x 2 3/4 x .140	3 1/8 x 3 7/8 x .156	5 1/4 x 5 7/8 x .140
1 1/4 x 1 7/8 x .140	2 1/4 x 2 7/8 x .140	3 3/8 x 4 x .140	5 3/4 x 6 3/8 x .140
1 3/8 x 2 x .140	2 1/4 x 3 x .140	3 1/2 x 4 1/4 x .156	6 1/2 x 7 1/8 x .140

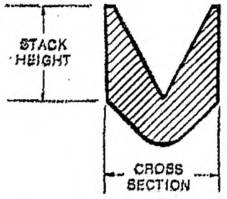
STYLE C-78V ASBESTOS TFE V-RINGS
C-VH and AN Design

Style C-78V V-Rings are recommended for reciprocating motion applications requiring the chemical and temperature resistance of TFE. Typical applications are reciprocating plunger and piston pumps in difficult to handle fluid services, as well as hydraulic cylinders in special applications that cannot be handled with other materials.

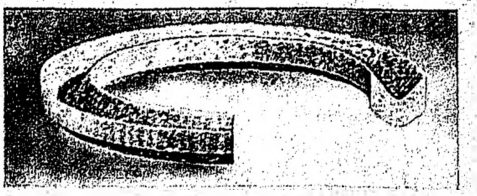
Style C-78V V-Rings are a die-formed V-Ring, either the standard C-VH or AN design, made of asbestos impregnated with TFE suspensoid and fabricated to form a fibrous reinforced self lubricated V-Ring.



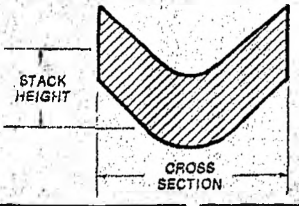
DIMENSIONAL DATA
(C-VH Design)
Nominal Size



I.D.	O.D.	Stack Height
3/16	5/16	.150
1/4	5/8	.150
5/16	11/16	.150
3/8	3/4	.150
7/16	13/16	.150
1/2	7/8	.150
5/8	1	.150
3/4	1 1/8	.150
3/4	1 1/4	.200
7/8	1 3/8	.200
7/8	1 1/2	.250
7/8	1 5/8	.300
1	1 1/2	.200
1	1 3/4	.300
1 1/8	1 3/4	.250
1 1/8	1 7/8	.300
1 3/16	1 3/4	.215
1 1/4	1 3/4	.200
1 1/4	2	.300
1 5/16	1 11/16	.150
1 5/16	2 1/16	.300
1 3/8	1 3/4	.150
1 3/8	1 7/8	.200
1 3/8	2 1/8	.300
1 7/16	2 3/16	.300
1 1/2	2 1/4	.300
1 1/2	2 3/8	.350
1 1/2	2 1/2	.400
1 5/8	2 1/8	.200
1 5/8	2 1/4	.250
1 5/8	2 3/8	.300
1 3/4	2 1/4	.200
1 3/4	2 3/4	.400
1 7/8	2 5/8	.300
1 7/8	2 1/4	.150
2	2 3/4	.300
2	3	.400
2 1/4	2 3/4	.200
2 1/4	2 7/8	.250
2 1/4	3	.300
2 3/8	3	.250
2 3/8	3 1/8	.300
2 1/2	3 1/8	.250
2 1/2	3 1/4	.300
2 1/2	3 3/8	.350
3 1/4	4 1/8	.350
3 3/8	4 1/4	.350
3 1/2	4 1/4	.300
3 1/2	4 1/2	.400
3 13/16	4 11/16	.350
3 15/16	5 3/16	.500
4 3/4	5 1/4	.600



DIMENSIONAL DATA
(AN Design)
Nominal Size



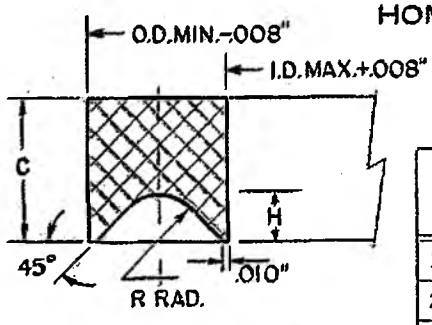
I.D.	O.D.	Stack Height
1/4	5/8	.083
3/8	7/8	.083
1/2	1	.083
9/16	1 5/16	.156
5/8	1 1/8	.083
5/8	1 1/4	.140
11/16	1 1/16	.083
3/4	1 1/4	.083
13/16	1 1/4	.083
13/16	1 7/16	.140
7/8	1 1/2	.140
7/8	1 5/8	.156
1	1 3/8	.083
1	1 1/2	.083
1 1/8	1 5/8	.083
1 3/16	1 11/16	.083
1 1/4	1 5/8	.083
1 5/16	2 1/16	.156
1 7/16	2 5/16	.197
1 1/2	3 3/8	.197
1 3/4	2 3/8	.140
1 3/4	2 3/4	.197
1 3/4	3	.197
1 7/8	2 1/4	.083
1 15/16	2 11/16	.156
2 1/8	2 5/8	.083
2 1/4	3	.156
2 3/8	2 7/8	.083
2 3/8	3 1/8	.156
2 7/16	2 15/16	.197
2 7/16	3 1/8	.156
2 7/16	2 3/8	.197
2 1/2	3	.083
2 1/2	3 1/4	.156
2 3/4	3 1/4	.083
2 3/4	3 3/4	.197
3	4	.197
3 3/4	4 3/4	.197
4	4 7/8	.197
4 1/2	5 1/2	.197
5	5 3/4	.156
5 1/4	6 1/8	.197

MACHINING DATA FOR METAL ADAPTERS

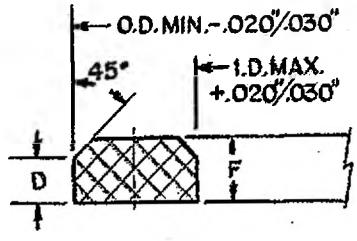
Homogeneous, Fabric, C-VU, C-VH, Temperized 775-T and C-78V V-Rings

(Recommended Material—Bronze or Brass)

HOMOGENEOUS AND FABRIC V-RINGS



FEMALE ADAPTER



MALE ADAPTER

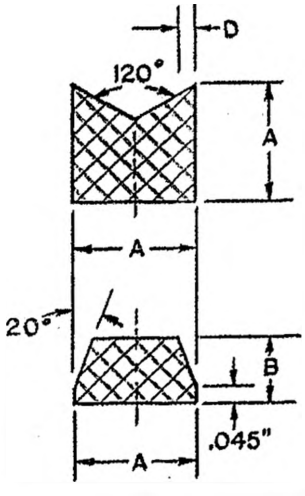
Pressures P.S.I.	Clearances Female Adapter
1500-2000	.005
2000-3000	.004
3000-5000	.003

NOTE:
Clearances for female adapters used with homogeneous V-Rings at pressures over 1500 psi, should be decreased per small table above.

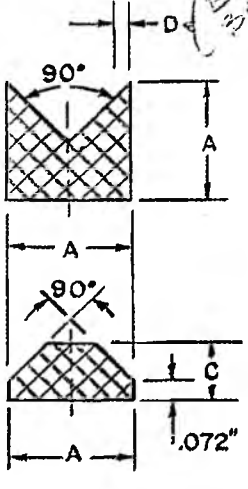
Nominal Packing Space Reference	C -.004	D	F ±.003	H ±.003	R ±.01
3/16	.177	.125	.166	.048	.06
1/4	.240	.125	.188	.080	.06
5/16	.302	.125	.219	.098	.09
3/8	.365	.125	.250	.120	.12
7/16	.427	.125	.281	.144	.14
1/2	.490	.125	.307	.170	.16
5/8	.615	.125	.373	.219	.19
3/4	.740	.125	.438	.269	.22
7/8	.865	.125	.500	.318	.25
1	.990	.125	.563	.364	.28

CHEMLON CV-U, CV-H, TEMPERIZED 775-T AND C-78V V-RINGS

C-VU
FEMALE AND
MALE ADAPTER



C-VH, 775T and C-78V
FEMALE AND
MALE ADAPTER



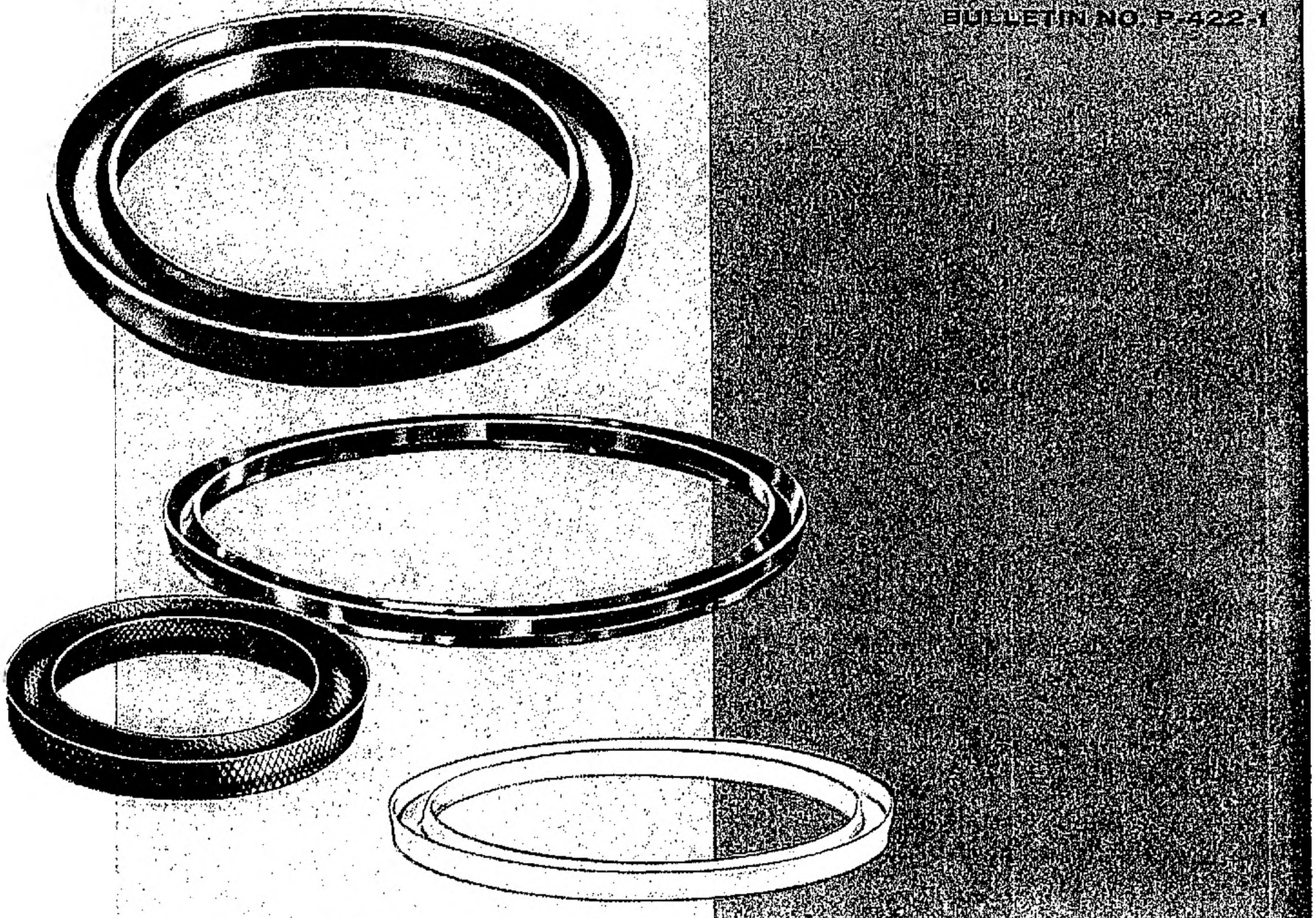
Nominal Packing Space Reference	A	B	C	D MAX.
3/16	.188	.123	.136	.020
1/4	.250	.145	.163	.020
5/16	.312	.176	.190	.020
3/8	.375	.202	.212	.025
7/16	.437	.229	.239	.025
1/2	.500	.255	.267	.025
5/8	.625	.307	.321	.030
3/4	.750	.360	.371	.030

NOTES: (1) Female adapter stem dia. is +.005, box bore is −.005.
Male adapter stem dia. is +.015, box dia. is −.015.
(2) Female adapter tolerances are $\frac{+.002}{-.003}$ I.D., $\frac{+.003}{-.002}$ O.D.
Male adapter tolerances are $\frac{+.005}{-.000}$ I.D., $\frac{+.000}{-.005}$ O.D.

CRANE PACKING COMPANY
6400 OAKTON STREET, MORTON GROVE, ILLINOIS 60053 *(Chicago Suburb)*
In Canada: Crane Packing Company, Ltd., Box 2248, Station C, Hamilton, Ont.
In Mexico: Industrias John Crane de Mexico, S.A. • Poniente 152 #679 Industrial Vallejo, Mexico, D.F.
In Brazil: John Crane Industria E Comercio, Ltda. • Avenida Jurubatuba 600, Sao Bernardo do Campo, S.P.
In Australia: John Crane Mauri Pty., Ltd., 166 Eldridge Road, Bankstown, New South Wales, Australia
In Europe: Crane Packing Ltd., Slough, Bucks, England
In Japan: John Crane Japan, Inc., No. 5, Tenjinbashi-suji 6-chome, Oyodo-ku, Osaka 531, Japan
OFFICES, WAREHOUSES AND SERVICE THE WORLD OVER

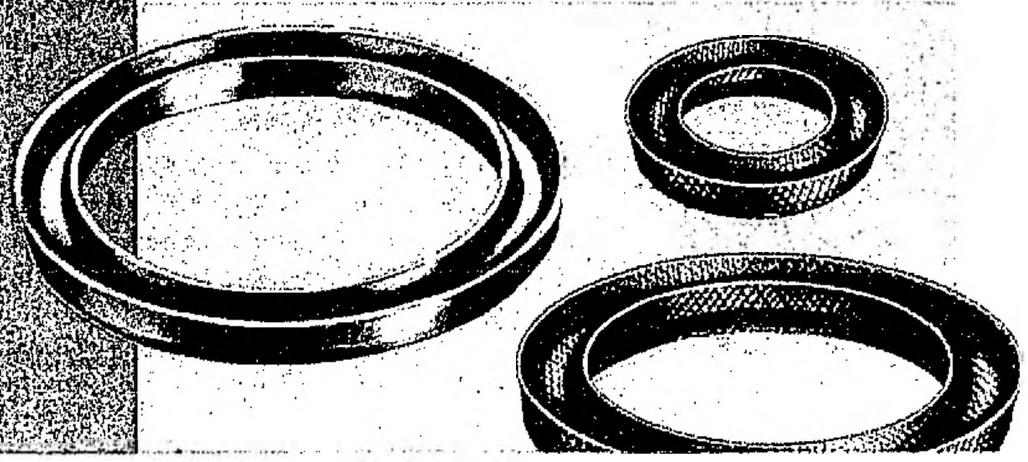
Printed in U.S.A.

BULLETIN NO. P-422-1

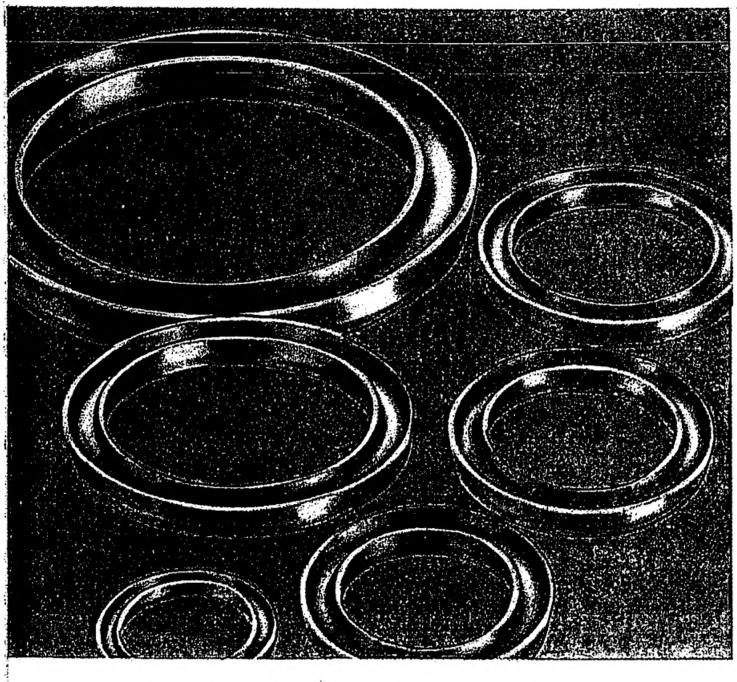


John Crane

U-CUP PACKINGS



Homogeneous U-Cup Packings



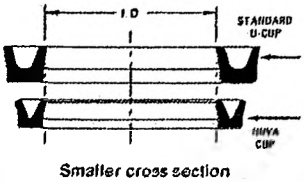
STANDARD "AN" DESIGN

John Crane Homogeneous U-Cup Packings are available in a full line of sizes for hydraulic and pneumatic applications. They are especially adapted to rod and piston assemblies with reciprocating motion or where there is a definite space limitation. Sealing is accomplished by means of the contact made by the U-cup's flexible lips, which are designed to be preloaded when installed. The solid section design at the heel is narrower than the packing groove to eliminate binding in service.

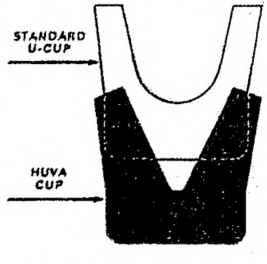
Homogeneous U-cups are available in a variety of compounds to meet specific conditions. They have low frictional qualities and are completely automatic in action.



SPECIAL FEATURES



Smaller cross section saves space.



Increased lip body offers greater resistance to high pressures, sensitivity to low pressures.

HUVA DESIGN

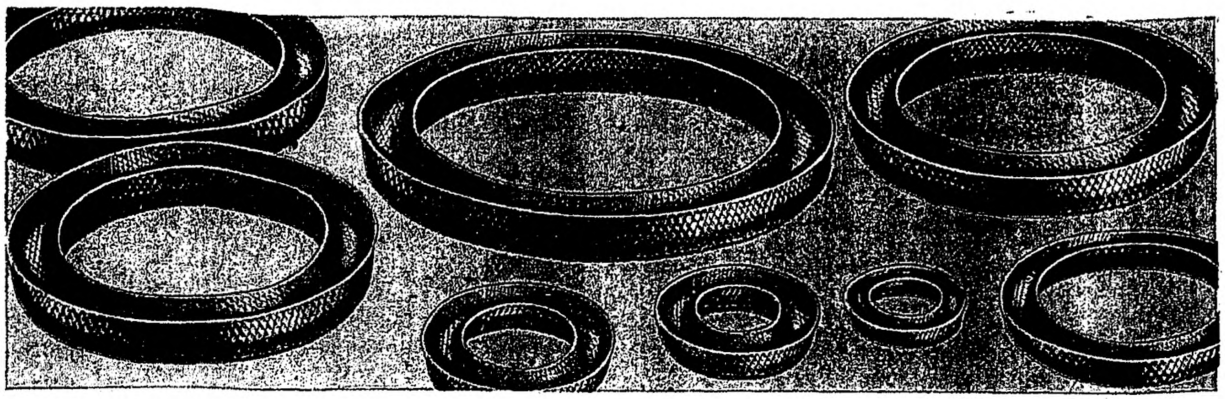
John Crane HUVA-Cups are a proven advancement in homogeneous rubber U-cup packings for both static and dynamic sealing. They offer definite advantages over standard U-cups of the AN design in a wide variety of hydraulic sealing applications.

1. Space savings—smaller cross section facilitates product design.
2. Ability to withstand higher pressures.
3. Greater stability and pressure resistance—made possible by 80-durometer hardness.
4. Greater sensitivity to lower pressures due to the special angle of the lips.

HUVA-cups can be used without additional back-up rings at pressures up to 1500 PSI. They will perform at higher pressures if the clearance behind the cup is bridged with a suitable back-up material.

HUVA-cups are furnished in a Buna-N compound for most hydraulic and pneumatic cylinder applications. Other compounds are available for services such as fire-resistant fluids and high temperatures.

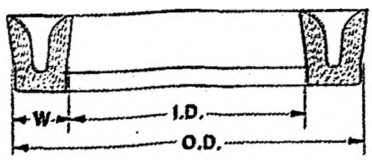
Fabric U-Cup Packings



John Crane Fabric U-Cups are a heavy-duty seal designed primarily for slow moving rams and pistons such as found in hydraulic presses, jacks and cylinders. Space saving and ease of installation features make these unitary seals attractive to designers. They are designed with heel clearance for minimum friction and positive lip interference, which provides the initial seal at low pressures.

Fabric U-cups are generally recommended for hydraulic pressures up to 3000 PSI; however, they can be used successfully at higher pressures when clearances between the metal parts are held to a minimum.

POPULAR SIZES and DIMENSIONS



I.D.	O.D.	W
1½	2	¼
1¾	2½	⅜
1⅞	2⅜	5/16
2	2½	⅜
2	3	⅝
2¼	3	⅜
2⅜	3	⅜
2½	3¼	⅜
2½	3½	½
2¾	3½	⅜
3	3¾	⅜
3¼	4	⅜
3½	4¼	⅜
3¾	4½	½
4	4⅞	7/16
4	5	½
4¼	5⅛	7/16
4½	5½	⅝
4¾	5⅝	7/16
5	5⅞	7/16
5	6	¾
5¼	6	½
5½	6½	½
6	7	⅝
6	7½	1
6¼	7	½
6½	7½	⅝
6¾	8	¾
7	8	⅝
7¼	8¼	¾
7½	8½	⅝
8	9	⅝
8	9½	1
8	10	1¼
8½	9½	⅝
9	10½	1
9½	10½	½
10	11½	1
10	12	1¼
10½	12	1
12	13½	1
12	13¾	1
14	15½	1
14	16	1¼
15	17	1
16	17½	1
18	19½	1
20	21½	1
21	22½	1
22	23½	1
24	25½	1
26	27½	1
30	31½	1
32	33½	1
36	37½	1

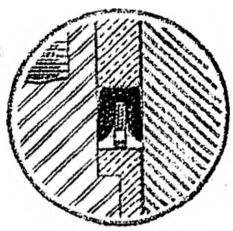
INSTALLATION

The preferred installation for a fabric U-cup is with the use of a pedestal or pedestal and back-up cushion ring.

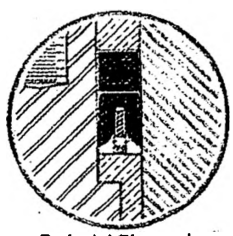
The pedestal keeps the lips of the U-cup away from the bottom of the gland, and it does not exert radial pressure on the lips. This allows the molded-in lip interference to provide the initial seal and the pressure to actuate the lips.

Pedestals are made of one or more laminations of gasket material. The length or height of the pedestal can be varied to fit the specific gland or stuffing box.

The back-up cushion ring acts as an anti-extrusion ring and protects the U-cup at higher pressures. It is usually molded of the same material as the U-cup, and since it does not function as a seal, the back-up ring may be used in split form.



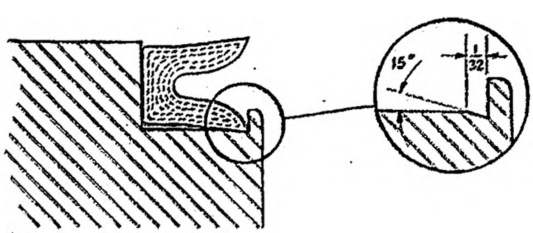
Pedestal Ring



Pedestal Ring and Back-Up Cushion Ring

The use of braided filler rings is a carry-over from leather U-cups. Leather does not have an elastomeric memory, and the braided flax filler rings were used to maintain lip contact at low pressures. Fabric U-cups have a molded-in lip interference and the elastomer binder provides the "memory" to maintain lip contact at all pressures.

Piston Snap-On Installation—Fabric U-cups can be economically installed on one-piece pistons. Below is a sketch of how this can be accomplished.



It is important that a sharp corner be machined where the bottom of the groove meets the shoulder. This is the secret in the success of this type of installation. For this reason it is recommended that a slight chamfer be cut in this corner, which tends to force the lip tightly into the corner assuring that it will be retained on the piston.

U.S.A.

DESIGN and INSTALLATION

Standard AN design U-cups and HUVA-cups are essentially the same kind or type of packing. The differences are in hardness, cross-section and application. Although both can be manufactured in a variety of compounds, U-cups are usually supplied in 70 durometer and HUVA-cups in 80 durometer hardness.

Recommended rod surface finish is 16 RMS. (max.) with internal gland thread offset to avoid damage to the U-cup lips upon installation. Also, all sharp edges and corners in the packing installation areas should be removed. In reciprocating service, avoid any design in which the U-cup must pass over corners, holes, ports or over a step diameter.

U-cups are generally used in pneumatic cylinders for pressures up to 500 PSI. HUVA-cups can be used in both air and hydraulic cylinders for pressures up to 1000 PSI. HUVA-cups will handle pressures up to 5000 PSI if back-up rings are used to bridge the clearance behind the packing and prevent extrusion. Generally, the back-up rings are cut from 1/16" thick gasket sheet material. Recommended finishes for the use of HUVA-cups are 16 RMS on a dynamic surface and 32 RMS on a static surface.

Groove Dimensions

U-cup and HUVA-cup groove dimensions can be calculated with the formulas shown below. If back-up rings are used, the groove length (Dim. A) must be increased by the thickness of the back-up ring.

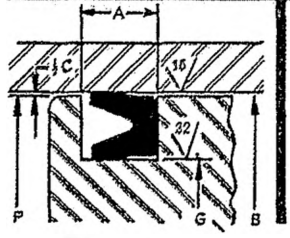
Lip Trim

Sharp clean lips are obtained on both U-cups and HUVA-cups by knife trimming. U-cup lips are cut straight (90° to the axis) and HUVA-cup lips at a 20° angle. The angle trim on the HUVA-cup lips provides a better seal at low pressure and reduces break-away friction.

Pedestals and Spring Loading

These are not generally recommended for U-cups and/or HUVA-cups. Pedestals are not required to support and prevent twisting if the groove or gland is properly dimensioned. Spring loading the lips of a U-cup or HUVA-cup defeats the purpose of the design: low friction and pressure actuated lips.

PISTON INSTALLATIONS

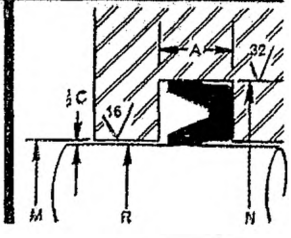


$G_{(Max)} = B_{(Max)} - 2W - C_{(Max)}$

$P_{(Min)} = B_{(Max)} - C_{(Max)}$

$A_{(Min)} = L + 1/32 \pm^{.010}_{.000}$

ROD INSTALLATIONS



$N_{(Min)} = R_{(Min)} + 2W + C_{(Max)}$

$M_{(Max)} = R_{(Min)} + C_{(Max)}$

$A_{(Min)} = L + 1/32 \pm^{.010}_{.000}$

DIMENSIONS

- A = Groove Length
- B = Cylinder Bore
- C = Maximum Diametral Clearance
- G = Piston Groove Diameter
- L = Length of HUVA Cup
- M = Rod Bearing Diameter
- N = Gland Diameter
- P = Piston Diameter
- R = Rod Diameter
- W = Nominal Cross-Section of HUVA Cup

RECOMMENDED MAXIMUM DIAMETRAL CLEARANCES

TYPE OF SERVICE	UP TO 1000 PSI	OVER 1000 PSI
Light Duty	.020	.015
Medium Duty	.015	.010
Heavy Duty	.010	.005

SIZES and DIMENSIONS

HOMOGENEOUS U-CUPS



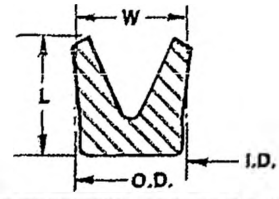
DASH NO.	NOMINAL I.D.	NOMINAL O.D.	W & L
1	1/8	1/2	3/16
2	3/16	9/16	3/16
3	1/4	5/8	3/16
4	5/16	11/16	3/16
5	3/8	3/4	3/16
6	7/16	13/16	3/16
7	1/2	7/8	3/16
8	1/4	3/4	1/4
9	9/16	13/16	1/4
10	5/8	7/8	1/4
11	3/4	15/16	1/4
12	1/2	1	1/4
13	5/8	1 1/16	1/4
14	3/8	1 1/8	1/4
15	11/16	1 3/16	1/4
16	3/4	1 1/4	1/4
17	13/16	1 5/16	1/4
18	7/8	1 3/8	1/4
19	15/16	1 7/16	1/4
20	1	1 1/2	1/4
21	1 1/16	1 9/16	1/4
22	1 1/8	1 5/8	1/4
23	1 3/16	1 11/16	1/4
24	1 1/4	1 3/4	1/4
25	1 1/2	1 7/8	5/16
26	1 3/8	2	5/16
27	1 1/2	2 1/8	5/16

DASH NO.	NOMINAL I.D.	NOMINAL O.D.	W & L
28	1 5/8	2 1/4	5/16
29	1 3/4	2 3/8	5/16
30	1 7/8	2 1/2	5/16
31	2	2 5/8	5/16
32	2 1/4	2 3/4	5/16
33	2 1/4	2 7/8	5/16
34	2 3/8	3	5/16
35	2 1/2	3 1/8	5/16
36	2 1/2	3 1/4	5/16
37	2 5/8	3 3/8	5/16
38	2 3/4	3 1/2	5/16
39	2 7/8	3 5/8	5/16
40	3	3 3/4	5/16
41	1/8	3/8	1/4
42	3/16	3/8	1/4
43	1/4	1/2	1/4
44	5/16	5/8	1/4
45	3/8	5/8	1/4
46	7/16	11/16	1/4
47	1/2	3/4	1/4
48	5/8	1	1/4
49	3/4	1 1/8	1/4
50	7/8	1 1/4	1/4
51	1	1 3/8	1/4
52	1 1/8	1 1/2	1/4
53	1 1/4	1 5/8	1/4

Note: All sizes correspond to Military Specification AN 6226.

HUVA CUPS

Popular Sizes

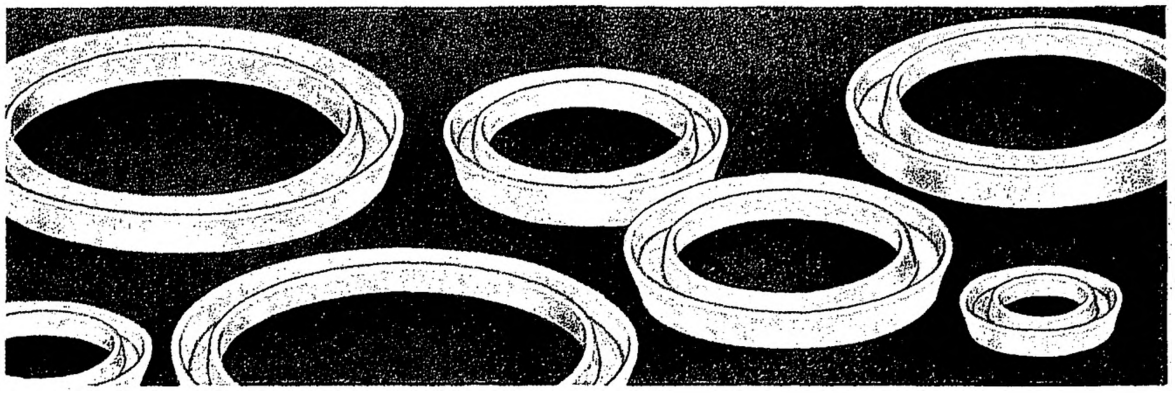


I.D.	O.D.	W & L
1/8	5/16	3/32
3/16	3/8	3/32
1/4	1/2	1/8
5/16	1/2	3/32
3/8	5/8	1/8
7/16	11/16	1/8
1/2	3/4	1/8
9/16	13/16	1/8
5/8	7/8	1/8
11/16	15/16	1/8
3/4	1	1/8
13/16	1 1/16	1/8
7/8	1 1/8	1/8
15/16	1 1/4	5/32
1	1 1/4	1/8
1	1 5/16	5/32
1 1/16	1 3/8	5/32
1 1/8	1 3/8	1/8
1 3/16	1 1/2	5/32
1 1/4	1 7/16	5/32
1 3/8	1 11/16	5/32
1 1/2	1 7/8	5/32
1 5/8	2	3/16
1 3/4	2 1/8	3/16
2	2 3/8	3/16

I.D.	O.D.	W & L
2 1/8	2 1/2	3/16
2 1/4	2 5/8	3/16
2 3/8	2 3/4	3/16
2 1/2	2 7/8	3/16
2 5/8	3	7/32
2 3/4	3 3/16	7/32
2 13/16	3 1/4	7/32
3	3 7/16	7/32
3 1/16	3 1/2	7/32
3 1/4	3 5/8	7/16
3 5/16	3 3/4	7/32
3 1/2	4	1/4
3 3/4	4 1/4	1/4
4	4 1/2	1/4
4 1/4	4 3/4	1/4
4 7/16	5	9/32
4 1/2	5	1/4
4 3/4	5 1/4	1/4
5	5 5/16	7/32
5 3/8	6	5/16
5 1/2	6 1/8	5/16
6 3/8	7	5/16
7 3/8	8	5/16
9 5/16	10	11/32
11 1/4	12	3/8
13	14	1/2
14	15	1/2

Note: Other sizes available.

CHEMLON TFE U-Cup Packings

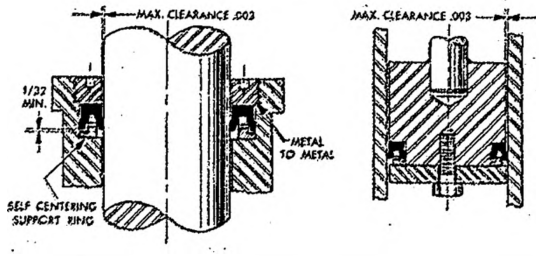


Chemlon TFE U-Cup packings are available in a wide range of sizes. For sealing purposes, the U-cup depends upon contact made by its flexible lips. The solid section at the heel of the cup is generally narrower than the packing groove width and does not come into contact with the groove base and the adjacent part until pressure is applied. Consequently, when installed, the packing is slightly pre-loaded.

U-cup packings have low frictional qualities and are completely automatic in action. Due to their design, they can be assembled satisfactorily in glands which have variations in cross sectional dimensions, thus permitting more liberal manufacturing tolerances. U-cup packings are also very successful in applications where it is desirable to reduce excessive packing friction.

DESIGN and INSTALLATION for TFE U-CUPS

The gland ring supporting the heel of the packing must be close fit to the rod, having a maximum radial clearance of .003". It is recommended that the rod surface finish be 16 RMS (max.). Internal threads should be offset so that no damage will be done to the U-cup lips upon installation.

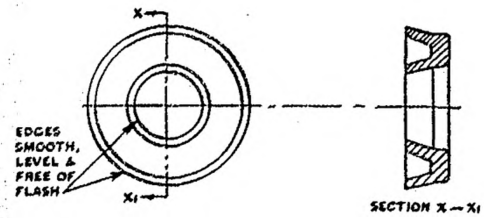


The installations shown in the drawing above are recommended. One illustrates a typical outside packed installation and the other an inside packed installation. The same general design rules apply for both of these types; however, provision should be made for support of the cup at the base of the groove to permit the lips to flex under varying pressure loads. The metal support ring or adapter used for this purpose should not exert axial pressure at the base of the groove, since this would tend to retract the lips of the cup away from the sealed surfaces. It is suggested that the metal support ring be constructed so that it will be properly centered.

U-cup packings can also be adapted for spring loading.

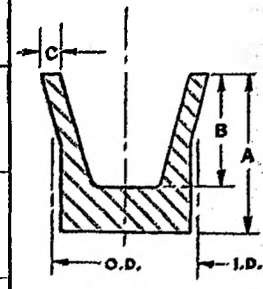
OPERATING PRESSURE

U-cup packings conforming to the drawing below are generally recommended for operating pressures up to 1500 PSI. On installations where operating pressures exceed 300 PSI, diametral clearances at the heel of the cup should be held to .004"-.006".



STANDARD SIZES and DIMENSIONS

NOMINAL I.D.	NOMINAL O.D.	DIAMETERS ±.005 A	B	C
¼	¾	¼	3/16	1/16
⅜	⅞	¼	3/16	1/16
½	1	⅛	3/16	1/16
⅝	1⅛	¼	3/16	1/16
¾	1¼	¼	3/16	1/16
⅞	1⅜	¼	3/16	1/16
1	1½	¼	3/16	1/16
1⅛	1⅝	⅛	3/16	1/16
1¼	1¾	¼	3/16	1/16
1¼	1⅞	5/16	7/32	1/16
1⅜	2	5/16	7/32	1/16
1½	2⅛	5/16	7/32	1/16
1⅝	2¼	5/16	7/32	1/16
1¾	2⅜	5/16	7/32	1/16
1⅞	2½	5/16	7/32	1/16
2	2⅝	5/16	7/32	1/16
2⅛	2¾	5/16	7/32	1/16
2¼	2⅞	5/16	7/32	1/16
2⅜	3	5/16	7/32	1/16
2½	3⅛	5/16	7/32	1/16
2½	3¼	⅜	¼	1/16
2¾	3½	⅜	¼	1/16
3	3¾	⅜	¼	1/16





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In Brazil: John Crane Industria E Comercio, Ltda. • Avenida Jurubatuba 600, Sao Bernardo do Campo, S.P.

In Australia: John Crane Mauri Pty., Ltd., 166 Eldridge Road, Bankstown, New South Wales, Australia

In Europe: Crane Packing Ltd., Slough, Bucks, England

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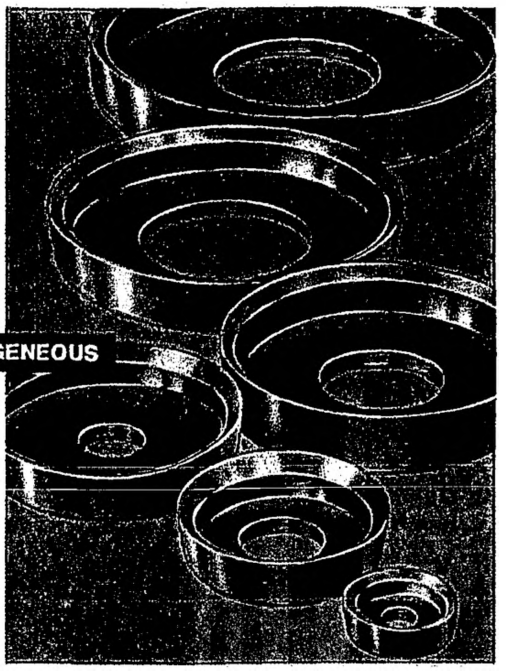
John Crane

PISTON CUP PACKINGS

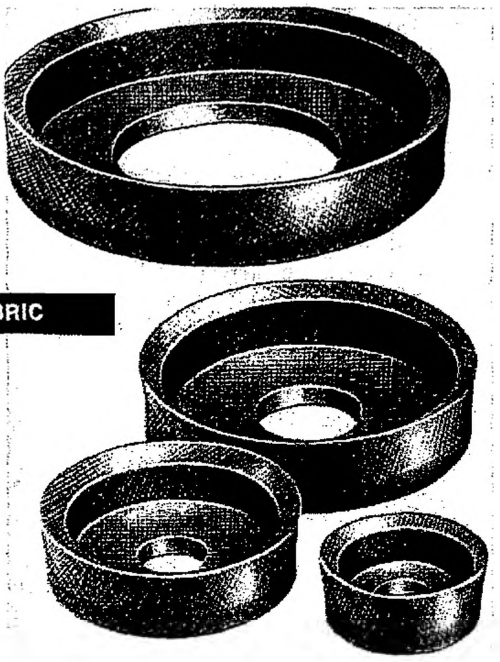


Piston Cup Packings

Homogeneous and Fabric



HOMOGENEOUS



FABRIC

John Crane Piston Cup Packings are designed specifically for pistons in reciprocating pumps and pneumatic and hydraulic cylinders. They offer the best service life for this type application, require a minimum recess space, minimum recess machining and are simply and quickly installed.

Homogeneous piston cups are available in a variety of compounds for specific applications. Fabric piston cups have cotton, asbestos or other suitable fabric frictioned with synthetic elastomers to meet various service conditions.

Homogeneous piston cups are generally recommended for low pressure service applications since their greater flexibility at the sealing lip makes them more responsive to light pressures. Fabric cups with their more rigid construction are recommended for higher pressure services up to 3000 PSI.

DESIGN and INSTALLATION

John Crane Piston Cup Packings incorporate an exclusive square cut heel design that eliminates binding in service and at the same time strengthens the hinge area at the heel. Special lip design provides proper interference (when installed) to hold low pressures.

By designing the back-up plate with a shoulder of proper diameter and height, not only is the centering of the packing automatic, but a controlled squeeze is applied on the packing to prevent it from working loose under pressure.

Where shouldered piston rods are used, it is recommended that an O-ring static seal be installed to prevent leakage along the rod. This eliminates the need for employing the more expensive tapered piston rod ends and piston assembly. When large diameter cups are used (4" O.D. or over), several equally spaced bolts or screws are recommended in order to secure the cup installation firmly in place.

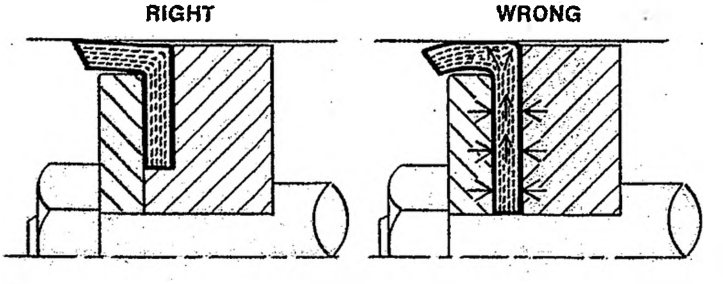
To insure proper operation and long service life of piston cup packings, avoid any design in which the packing must pass over corners, holes, ports or over a step diameter arrangement. For best results cylinder bores should be finished to 16 RMS.

CLEARANCES

It is recommended that the back-up plate be made with close clearances and with square corners to prevent cup extrusion. Excessive clearance between it and the cylinder walls results in early cup failure, because of the extrusion of the heel of the cup into the clearance gap. Clearances resulting from the bore diameter (cup size nominal) and B diameter shown in the table on page 3 are recommended for normal operating pressures.

The inside follower plate should have clearance as indicated by diameter A to prevent pinching of the lip against the cylinder bore.

A controlled squeeze or compression to the bottom of a piston cup is essential. Over-compression is the most common cause of premature failure of piston cups. When the bottom or base of the cup is compressed, the material moves outward radially. If more squeeze than required to seal is used, the cup material is forced into the bore of the cylinder causing high friction, excessive wear and possible toe-in of the lips.



An installation squeeze of .005" to .025" is all that is necessary to seal the bottom of the cup to the piston. This squeeze can be controlled with a metal shoulder on the piston. A metal spacer washer should be used if the piston or follower does not incorporate the shoulder.