

# The Hydraulic CONNECTION

An Informative Industry Newsletter Published By:

## Meet us at IFPE / ConExpo March 22 – 26, 2011



IFPE (Co-located with CONEXPO-CON/AGG 2011) is the leading international exposition and technical conference dedicated to the integration of fluid power with other technologies for power transmission and motion control applications. Held every three years, the exposition showcases the newest innovations and expertise.

Meet with over 500 exhibitors and thousands of industry professionals from all sectors of the fluid power, transmission and motion control industries. Attend more than 100 cutting-edge education sessions focusing on the newest technologies, best practices, the latest research and developments, including: National Conference on Fluid Power, Innovations Theater and College-level courses in hydraulics and pneumatics.

### Register to Win a FREE I-Pad at Hercules Booth #S-15618.



While attending, be sure to stop by the **Hercules Sealing Products booth #S-15618** to see a live demonstration of the New Hercules On-Line Ordering Website and register a new user account. *All attendees who register a new user account during the show will eligible to win a new iPad (32 MB, wifi)\*.* The Hercules 2.0 On-Line Ordering Website offers many new features including: Product availability and discount (upon login), order tracking and history, freight costs for your specific shipment, monthly web-only specials and a quick order screen (left-

hand menu) for fast and easy ordering by part number. Come by the Hercules

booth and share a breakfast or afternoon treat with your regional or international sales representative in our café area. Staff members from our Canadian and European branches will be available on all show days. We look forward to showing you our new 2011 product lines and discussing your current and future seal needs. See you at IFPE 2011!

\*A winner will be chosen on March 28, 2011 from new on-line users registered during show dates 3/22 – 3/26, 2011 and notified via e-mail.

## Seals On-Demand Program Expanded

Hercules has expanded the Seals On Demand program to include a second machine and larger staff to accommodate your custom seal needs. Now you can order custom seals by Noon EST and receive them the next day-Guaranteed\*! Our staff is now equipped to handle larger size orders (50 to 100 pieces), as well as your single item requests. Visit the "Custom Seals" menu on our website (left menu bar) to receive a same day quote, or view a complete list of styles, materials, and size ranges.

MATERIAL	SIZE RANGE
HPU	(0 - 24.80") (0 - 630mm)
Virgin-TFE	(0 - 10.00") (0 - 254mm)
Glass-TFE	(0 - 12.24") (0 - 311mm)
Bronze-TFE	(0 - 23.97") (0 - 609mm)
POM	(0 - 13.77") (0 - 350mm)
NBR	(0 - 24.60") (0 - 625mm)
FKM	(0 - 14.17") (0 - 360mm)
Nylon	(12.59" - 22.44") (320 - 570mm)

\*Orders placed by Noon EST ship Next Day Air. Standard styles and materials only.

## HERCULES<sup>®</sup> SEALING PRODUCTS

### MARCH WEB SPECIAL Boss & Tube Fitting Assortment Kit 2



- This handy kit contains 8 each of 4 different size fittings (32 total)
- All seals contained in this kit are 90 durometer nitrile (buna-n)

**\$5.00** net

(\$25.52 Retail Value)

Offer Available 3/1/11 - 3/31/11

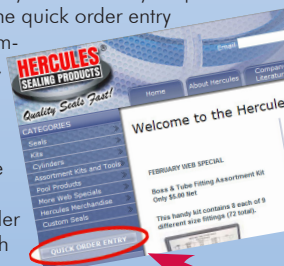
While Supplies Last

When Ordering Online Use

**Part# BOSS & TUBE FITTINGS-2 PR**

### QUICK ORDER ENTRY

Have a large website order that you need to key quickly? Try the **Quick Order Entry** screen. Simply click the **"Quick Order Entry"** button found in the left-hand side menu. A screen will appear that allows you to add 10 line-items by part number. Once complete, hit the "Add to Cart" button at the bottom. This can be re-entered as many times as needed to complete your order quickly. Not sure of your part number? No problem! The quick order entry screen pre-loads part numbers as you begin keying, giving you a complete list of part options. If you have a portion of a part number, try using the **"Search"** box located just below the Quick Order button. This will assist with pulling up all part numbers featuring a portion of the part number keyed. Any questions or concerns regarding the Quick Order, Search capabilities, or any section of the Hercules Website, please call our Help Desk at **(727) 796-1300, ext. 1026.**



# ABOUT BACK-UP RINGS

Recently, customers have been requesting information on back up rings, the different styles, materials and when to use them. The following addresses the questions and also the why of back up rings.

We mostly think of back up rings as being used with o-rings. But they also are used with T-seals (an o-ring substitute) as well as various styles of piston seals and occasionally with u-seals. The primary purpose of the back up ring is to reduce the extrusion gap between metal surfaces of two cylinder components. This will enable the seal to operate at higher pressures without extruding and being damaged.

In cylinders where there are metal parts moving in a linear motion, there must be a suitable space between the metal parts so that metal to metal contact does not cause damage to either or both of the metal parts and damage to the softer seal material. This gap – called extrusion gap - varies depending on metals, temperatures, speed, size and pressure. This gap may be too large to allow for satisfactory performance of elastomeric (soft elastic) seals at the pressure required, so a non-metallic material is used to reduce the gap. In the case of a 70A durometer o-ring, a back up ring should be used at pressures exceeding 1500 PSI depending on extrusion gap, temperature, speed and other factors.

Back up rings used with o-rings are of two different shapes. One style has two flat sides (Hercules style 575-) and the other style has one side concave in shape (to fit the curvature of the o-ring, Hercules style 574-) while

the opposite side is flat to provide support against the metal surface. This

concave style was made popular by Parker Seal Co. and is commonly called a Parback.

The theory behind the concave style is that the curvature of the back up deflects the o-ring

away from the extrusion gap as system pressure deforms the o-ring against the back up ring.

The flat sided back up ring also performs satisfactorily in most applications to keep the softer seal material from “squeezing into” the extrusion gap. There is no clear performance advantage to either style.

Back up rings are available in a variety of materials. The material from which the back up ring is made has the most impact on the performance of the back up ring. The key is to use a material which is hard enough to resist extrusion but with enough elastic “memory” to make installation easy – i.e.: the back up ring will stretch for installation but return to its original size and shape. If a very hard material is used, the back up ring must be “split” to allow for installation. If the seal being used is made of a soft

elastic material (i.e.: a 70A durometer o-ring) the seal may “extrude” into the split of the back up ring at higher pressures, especially under shock loads.

**The two most common back up ring materials are urethane and nitrile.**

Urethane in a 95A durometer hardness (Hercules style 575-) has a good “memory” allowing it to be stretched and readily returning to the original shape. In addition, the physical properties of the urethane material make it slightly more resistant to extrusion than a Nitrile material. These are available in most o-ring sizes.

Nitrile back up rings (Hercules style 574-) in a 90A durometer hardness (commonly found in the contour shaped back ups) is easily installed and is also a highly effective back up ring to reduce extrusion of o-rings under most circumstances. These are available in most o-ring sizes.

High Performance Urethane (Hercules style 590) back up rings in 53D hardness are harder than the standard urethane compound and also has a higher temperature rating making them suitable for use in extreme conditions. These back up rings are mostly used to back up u-seals but may also be used with o-rings.

Hytrell material (Hercules style 573-) may be used in extreme applications – mining equipment, etc. – and is available in many common o-ring sizes. This material is harder (55D) and not quite as easy to install due to its hardness and physical properties as it does not readily return to original shape after being stretched on installation. However, it resists extrusion more than the urethane and Nitrile materials.

PTFE (Hercules style 575- and 595- suffix T) is a filled teflon material. It is commonly used in applications of heat and / or where the fluid is not compatible with elastomeric materials. PTFE back up rings are also used in valve applications due to their lower sliding resistance. Due to installation problems (PTFE has a very poor “memory” and does not readily recover its original shape), these back up rings may be provided “split” for ease of installation. But due to the problems of o-rings extruding into the split, they are also provided in a “spiral” configuration. The 575T product is primarily for o-ring applications while the 595T fits many u-seals.

Nylon (Hercules style 576) back ups are provided in a few o-ring sizes but many are sized to provide back up for rubber u-seals allowing these seals to be used at higher pressures. Due to the hardness of this material, these back up rings are almost universally supplied in a “split” configuration.

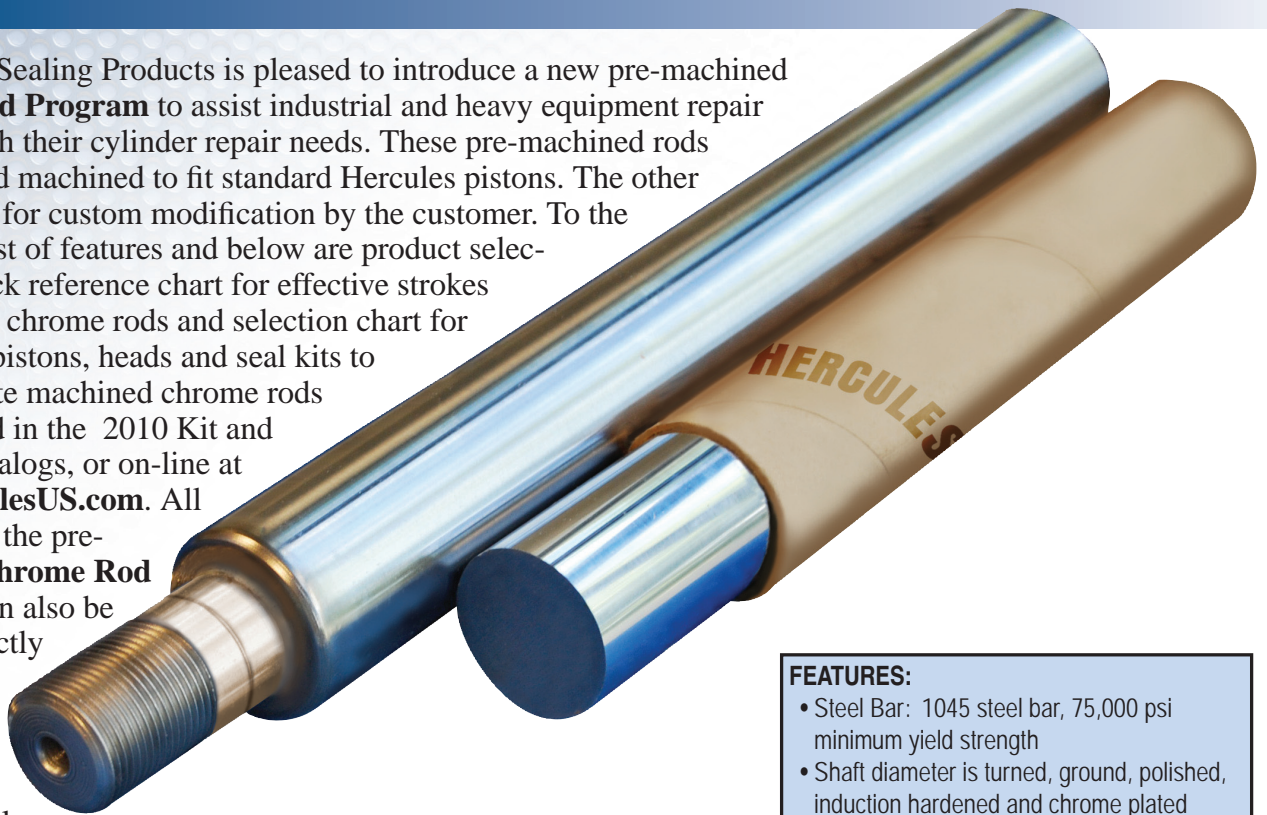
If you should have any seal questions, please do not hesitate to call Sonny or the Hercules Engineering Department for answers. Please send your e-mails to – [sgoldsmith@herculesus.com](mailto:sgoldsmith@herculesus.com).

~ Sonny Goldsmith, Territory Manager

**Toll Free 1-800-777-5617 • Direct 727-796-1300**

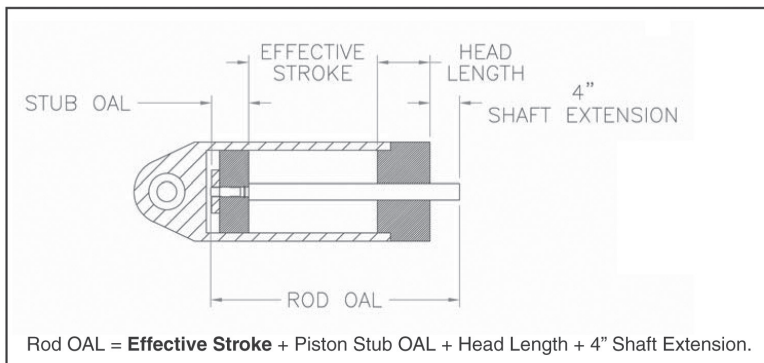
# CHROME ROD PROGRAM

Hercules Sealing Products is pleased to introduce a new pre-machined **Chrome Rod Program** to assist industrial and heavy equipment repair facilities with their cylinder repair needs. These pre-machined rods offer one end machined to fit standard Hercules pistons. The other end is blank for custom modification by the customer. To the right are a list of features and below are product selections. A quick reference chart for effective strokes of machined chrome rods and selection chart for compatible pistons, heads and seal kits to accommodate machined chrome rods can be found in the 2010 Kit and Cylinder catalogs, or on-line at [www.HerculesUS.com](http://www.HerculesUS.com). All products for the pre-machined **Chrome Rod Program** can also be ordered directly through the Hercules website or by calling your regional sales staff at **1-800-777-5617**.



## FEATURES:

- Steel Bar: 1045 steel bar, 75,000 psi minimum yield strength
- Shaft diameter is turned, ground, polished, induction hardened and chrome plated
- Surface Hardness: Induction hardened to Rc 50 minimum Case Depth: 0.050" minimum per SAE J423
- Plate Thickness: 0.001" minimum hard chrome-plated
- Hardness of Chrome Plate: Rc 68-72
- Surface Finish: 12 RMS maximum
- Packaging: Individually cardboard tube wrapped, inside hard plastic tubing
- Salt Spray Test: 48 hours minimum per ASTM B117
- Machined on one end to accommodate standard Hercules pistons Piston styles: IT, ITW, TH, and TM
- One end square cut to be modified, per application, by customer



## EFFECTIVE STROKE CALCULATION

Rod Dia	Stub Dia	Part # 12" Nominal Stroke* (24" OAL)	List \$	Part # 24" Nominal Stroke* (36" OAL)	List \$	Part # 36" Nominal Stroke* (48" OAL)	List \$	Part # 48" Nominal Stroke* (60" OAL)	List \$	Part # 60" Nominal Stroke (72" OAL)	List \$
0.750	0.625	CR75I-0.75X24-0.62	55.20	CR75I-0.75X36-0.62	80.53	CR75I-0.75X48-0.62	105.82	N/A	N/A	N/A	N/A
1.000	0.750	CR75I-1.00X24-0.75	68.18	CR75I-1.00X36-0.75	98.93	CR75I-1.00X48-0.75	129.69	CR75I-1.00X60-0.75	160.49	N/A	N/A
1.125	0.750	CR75I-1.12X24-0.75	74.58	CR75I-1.12X36-0.75	108.67	CR75I-1.12X48-0.75	144.62	CR75I-1.12X60-0.75	178.67	CR75I-1.12X72-0.75	212.76
1.250	0.750	CR75I-1.25X24-0.75	81.96	CR75I-1.25X36-0.75	119.78	CR75I-1.25X48-0.75	157.64	CR75I-1.25X60-0.75	195.56	CR75I-1.25X72-0.75	233.56
1.500	0.750	CR75I-1.50X24-0.75	107.69	CR75I-1.50X36-0.75	157.64	CR75I-1.50X48-0.75	209.11	CR75I-1.50X60-0.75	259.11	CR75I-1.50X72-0.75	309.24
1.500	1.000	CR75I-1.50X24-1.00	107.69	CR75I-1.50X36-1.00	157.64	CR75I-1.50X48-1.00	209.11	CR75I-1.50X60-1.00	259.11	CR75I-1.50X72-1.00	309.24
1.750	1.000	CR75I-1.75X24-1.00	142.76	CR75I-1.75X36-1.00	209.33	CR75I-1.75X48-1.00	277.24	CR75I-1.75X60-1.00	342.31	CR75I-1.75X72-1.00	408.80
2.000	1.000	CR75I-2.00X24-1.00	147.69	CR75I-2.00X36-1.00	218.04	CR75I-2.00X48-1.00	287.16	CR75I-2.00X60-1.00	357.51	CR75I-2.00X72-1.00	426.67
2.000	1.250	CR75I-2.00X24-1.25	147.69	CR75I-2.00X36-1.25	218.04	CR75I-2.00X48-1.25	287.16	CR75I-2.00X60-1.25	357.51	CR75I-2.00X72-1.25	426.67
2.500	1.250	CR75I-2.50X24-1.25	209.20	CR75I-2.50X36-1.25	308.80	CR75I-2.50X48-1.25	408.36	CR75I-2.50X60-1.25	507.82	CR75I-2.50X72-1.25	606.27
3.000	1.250	CR75I-3.00X24-1.25	283.87	CR75I-3.00X36-1.25	419.29	CR75I-3.00X48-1.25	554.71	CR75I-3.00X60-1.25	690.13	CR75I-3.00X72-1.25	825.51