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The Hydraulic CONNECTION

An Informative Industry Newsletter Published By:

HERCULES® SEALING PRODUCTS

HERCULES WEBSITE UPDATES

At your request, we have made the following improvements to our website.

- **Firefox, Safari, Chrome and other browsers are available**
- **Branch specific "ship to" addresses on your profile**
- **Orders shipped freight collect**
- **Choose blind shipments to your customers for drop shipments**
- **Add a P.O. # to charge card orders**
- **Quick Order auto populates as you key part numbers**
- **Back order shipment options**

If you should need assistance with your order, please contact Ron Hancock at **1-800-777-5617 ext. 1026**, Gina Decaire at **ext. 1070** or via e-mail: **rhancock@HerculesUs.com** or **gdecaire@HerculesUs.com**. We appreciate your comments and suggestion concerning our online ordering process and are pleased to make these improvements.

SEAL FAILURE Compression Set

Frequently, compression set is misdiagnosed as excessive wear in the case of dynamic seals and overlooked as a possible cause of leakage in static seals. With modern urethane compounds, there is actually very little wear that occurs on a dynamic urethane seal as long as the metal surface finish is acceptably smooth. Even in cases of a "rough" surface, urethane compounds will "out wear" other elastomeric (elastic) seal compounds.

Nitrile materials are not as resistant to wear as urethanes. That is the reason dynamic seals (especially rod seals) used in almost all hydraulic cylinders and many pneumatic cylinders are designed and manufactured in urethane compounds. Carboxilated nitrile is a compound which has a wear resistance similar to urethane but is generally more costly and not as readily available. Therefore, carboxilated nitrile is not used as much as urethane in dynamic sealing applications. Urethane is generally the most cost effective wear resistant compound available.

However, urethane generally "suffers" from compression set failure more rapidly than nitrile compounds. Nitrile also suffers from compression set, but generally it takes longer for the physical symptoms of compression set to become evident than with urethane (assuming comparable quality in the two compounds and physical operating conditions).

A seal suffering from compression set will become "flat" or loose its original radial shape on both the ID and OD of the seal where it contacts the cylinder surfaces. In the case of an o-ring, it will retain its round shape on the axial portion of the seal cross section but be flat on the radial portion of the seal.

The degree of "flatness" or loss of original shape will vary with the age of the seal and the application in which the seal is being used.

This failure is sometimes misdiagnosed as wear when the dynamic lip of the seal is inspected and noted that it is flat. So it is assumed the failure is due to wear.

continued on back

OCTOBER SPECIAL
O-ring Gauge

Slide gauge for measuring standard cross-section o-rings with an inside diameter up to 13".

$16.50 Net

Offer Available 10/1/10 - 10/31/10
While Supplies Last
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Part# OR-GAUGE PROMO

NOVEMBER SPECIAL
Split Flange Seal Kit

This kit contains 35 Split Flange Seals in 7 popular sizes.

$24.50 Net

Offer Available 11/1/10 - 11/30/10
While Supplies Last
When Ordering Online Use
Part# SFS KIT PROMO

FALL HOLIDAY HOURS

November 25-26, 2010
Closed for Thanksgiving

November 29, 2010
Re-open for business

HERCULES SINGLE ACTING SNOW PLOW CYLINDERS

PART NUMBER	DESCRIPTION	A	B	C & D	E	H	WT LBS.	LIST PRICE	RESELLER PRICE
HSPM-1506-0625	MYER 1.5" X 6"	11-7/8	12.00	11/16	2.00	5/8	12	$ 74.94	$ 43.22
HSPM-1510-0625	MYER 1.5" X 10"	15-7/8	16-1/4	11/16	2.00	5/8	14	85.30	49.19
HSPM-1512-0625	MYER 1.5" X 12"	17-7/8	18.00	11/16	2.00	5/8	15	90.21	52.03
HSPW-1506-0750	WESTERN 1.5" X 6"	12-5/8	13.00	11/16	2-3/4	3/4	12	74.94	43.22
HSPW-1508-0750	WESTERN 1.5" X 8"	14-5/8	15-1/4	11/16	2-3/4	3/4	13	80.48	46.42
HSPW-1510-0750	WESTERN 1.5" X 10" X 3/4"	16-5/8	17-1/4	11/16	2-3/4	3/4	14	85.30	49.19
HSPW-1510-1000	WESTERN 1.5" X 10" X 1"	16-5/8	17-1/2	11/16	2-3//4	1.00	14	85.30	49.19
HSPA-1510-0750	ARTIC 1.5" X 10"	16-5/8	17.00	3/4	2-3/4	3/4	14	85.30	49.19
HSPA-1512-0750	ARTIC 1.5" X 12"	16-5/8	19.00	3/4	2-3/4	3/4	15	90.21	52.03
HSPF-1512-1000	FISHER 1.5" X 12"	18-7/16	19-3/8	3/4	2-5/8	1.00	15	90.21	52.03
HSPF-1510-1000	FISHER & DIAMOND 1.5" X 10"	16-3/8	17-1/4	3/4	2-11/16	1.00	14	90.21	52.03

SEAL KIT NUMBER	DESCRIPTION	LIST PRICE
HC181-SK-SP150	1-1/2" ROD CYLINDER	$ 7.23
HC181-SK-SP200	2" ROD CYLINDER	8.71

PART NUMBER	DESCRIPTION	A	B	C & D	E	H	WT LBS.	LIST PRICE	RESELLER PRICE
HSPM-2012-0625	MYER 2.0" X 12"	17-1/4	18.00	3/4	2-3/16	5/8	18	$ 115.03	$ 66.34
HSPW-2016-1000	WESTERN & DIAMOND 2.0" X 16"	22-5/8	23-5/8	11//16	2-3/4	1.00	21	133.27	76.86
HSPW-2006-0750	WESTERN 2.0" X 6"	12-5/8	13-3/16	3/4	2-3/4	3/4	13	97.88	56.45
HSPW-2010-1000	WESTERN 2.0" X 10"	16-5/8	17-1/4	11/16	2-3/4	1.00	16	111.73	64.43
HSPF-2016-125	FISHER 2.0" X16"	22-1/2	23-1/4	7/8	2-3/4	1-1/4	20	133.28	76.86

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NEW METRIC SEALS

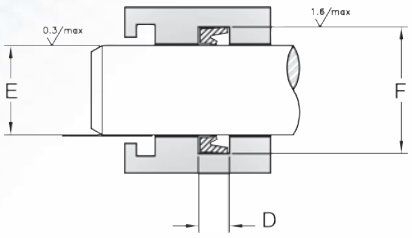
ROD SEAL

MUKRN is an asymmetrical single-acting pneumatic rod seal. Molded in Nitrile, this seal is resistant to water and most oils while maintaining good low-pressure sealing.

HERCULES PART NUMBERS

MUKRN - 6 X 12 X 4

Type of Seal	Rod Diameter	Groove Diameter	Height



SEAL INFORMATION	
MATERIAL	80 A NBR
TEMPERATURE RANGE	-22° TO +212° F
PRESSURE RANGE	0 TO 1,500 PSI
PART NUMBER	(Prefix) - (ID) X (OD) X (H)

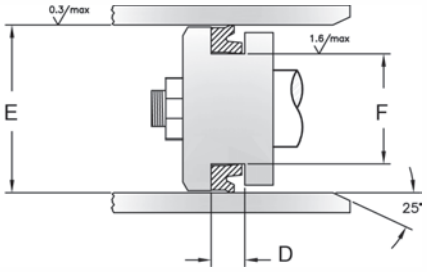
PISTON SEALS

MUKPN is an asymmetrical single-acting pneumatic piston seal. Molded in Nitrile, this seal is resistant to water and most oils while maintaining good low-pressure sealing.

HERCULES PART NUMBERS

MUKPN - 8 X 5 X 4

Type of Seal	Rod Diameter	Groove Diameter	Height



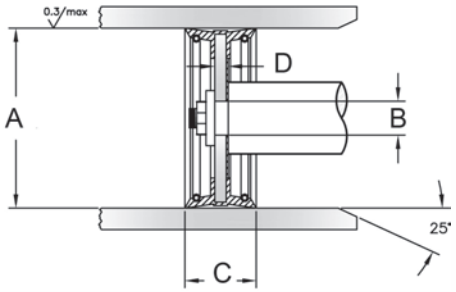
SEAL INFORMATION	
MATERIAL	80 A NBR
TEMPERATURE RANGE	-22° TO +212° F
PRESSURE RANGE	0 TO 1,500
PART NUMBER	(Prefix) - (ID) X (OD) X (H)

MDPC is a double-acting complete piston seal constructed of a steel plate vulcanized with Nitrile rubber sealing lips. Pneumatic applications to 230 psi pressure.

HERCULES PART NUMBERS

MDPC - 020

Type of Seal	Bore Diameter



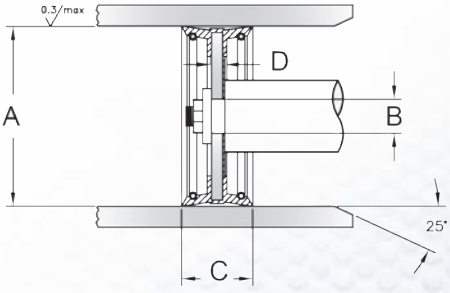
SEAL INFORMATION	
MATERIAL	75A NBR
TEMPERATURE RANGE	-22° F TO +212° F
PRESSURE RANGE	0 TO 230 PSI
PART NUMBER	(Prefix) - (OD)

MDPCS is a double-acting complete piston seal constructed of a steel plate vulcanized with Nitrile rubber sealing lips and spring energized for low-pressure sealing. Pneumatic applications to 230 psi pressure. Hydraulic pressure limits range from 175 to 870 psi, depending on size.

HERCULES PART NUMBERS

MDPCS - 030

Type of Seal	Bore Diameter



SEAL INFORMATION	
MATERIAL	90A NBR
TEMPERATURE RANGE	- 22° TO +221° F
PRESSURE RANGE	175 TO 870 PSI
PART NUMBER	(Prefix) - (OD)

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SEAL FAILURE Compression Set

continued from front page

However, if the static portion of the seal is carefully inspected many times the same "flatness" will be observed there.

Generally, leakage or failure with compression set will only be experienced when the seal is at "low" pressures or is "at rest" when the machine is idle overnight. Since the seal has lost its "radial" flare there is not as much radial seal force exerted against the sealing surfaces at low/no pressure and thus the hydraulic fluid will leak past the point of seal lip / cylinder surface interface. So, when the operator inspects the machine in the morning before operation, he may find a puddle of oil on the machine under the cylinder if the rod is positioned in a "down" position.

When the cylinder is operated at "high" pressure, the seal suffering from compression set will "deform" in the gland due to the force transmitted through they hydraulic fluid and exert increased radial force against the sealing surface and perform satisfactorily.

Typical causes of compression set include, but are not limited to:

- Time – this is probably the most prevalent cause of compression set. Any elastomeric compound will eventually suffer from compression set over a period of time.
- Excessive temperatures – the longer the seal is exposed to higher temperatures (temperatures at the upper level of or exceeding the temperature range of the seal) the more rapid the onset of compression set.
- Squeeze – if a seal groove is machined incorrectly so there is excessive squeeze on the seal, it will create excessive heat and will hasten compression set.
- Poor quality compounds – higher quality compounds (which tend to be more expensive) resist compression set longer than compounds that use more "fillers" and hence are less expensive. Price is not the sole determiner of quality. Make sure the seals you purchase come from high quality, well known manufactures.

Following are pictures of seals exhibiting compression set characteristics:

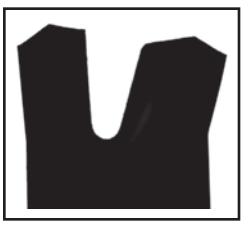


IMAGE 1

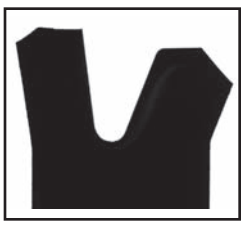
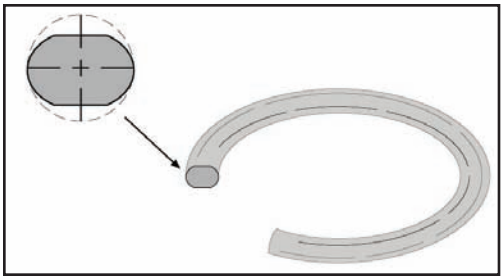


IMAGE 2

Image 1 shows a rod u-seal with an acceptable amount of compression set. A loss of lip flare is visible as the ID (short) and OD (tall) lips have angled in toward the u-cavity. With this slight compression set, the u-seal has still retained enough lip interference to provide low-pressure sealing. **Image 2** is a new rod u-seal with the original amount of lip interference. Further, had the rod u-seal failed from excessive wear, the ID lip would have worn flat and lost the sharp corner.



The o-ring graphic shows flattened surfaces on both sides of an o-ring when used in an axial application.

- Sonny Goldsmith, Hercules Sealing Products