centerline
(WINDSOR) LIMITED

OHMA® Piercing Cylinder SEAL REPLACEMENT

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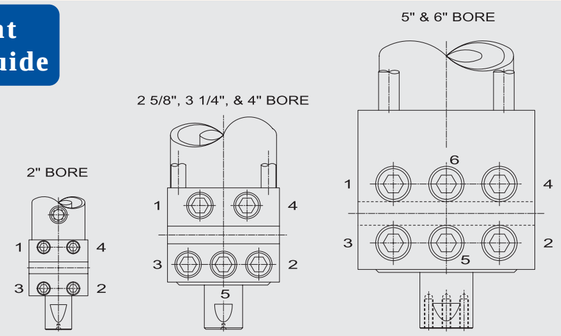
MATERIALS REQUIRED

Seal Kit
Lubricant (included in seal kit)
Allen Wrenches
Soft Hammer
Socket Set & Ratchet
O-Ring Pick
Adjustable Wrench
Torque Wrench
Installation Tool (varies by bore size)
Thread Adhesive

FBL Mount Torque Guide



Use only SAE Grade 8 bolts or stronger for cylinder mounting, socket head bolts are preferred. FF and CFF block mount cylinders should be mounted using shoulder screws matched in size to mounting holes in block. Shoulder screws should be torqued per screw manufacturers specification and checked periodically to ensure proper torque is maintained.

TIE ROD TORQUE GUIDE

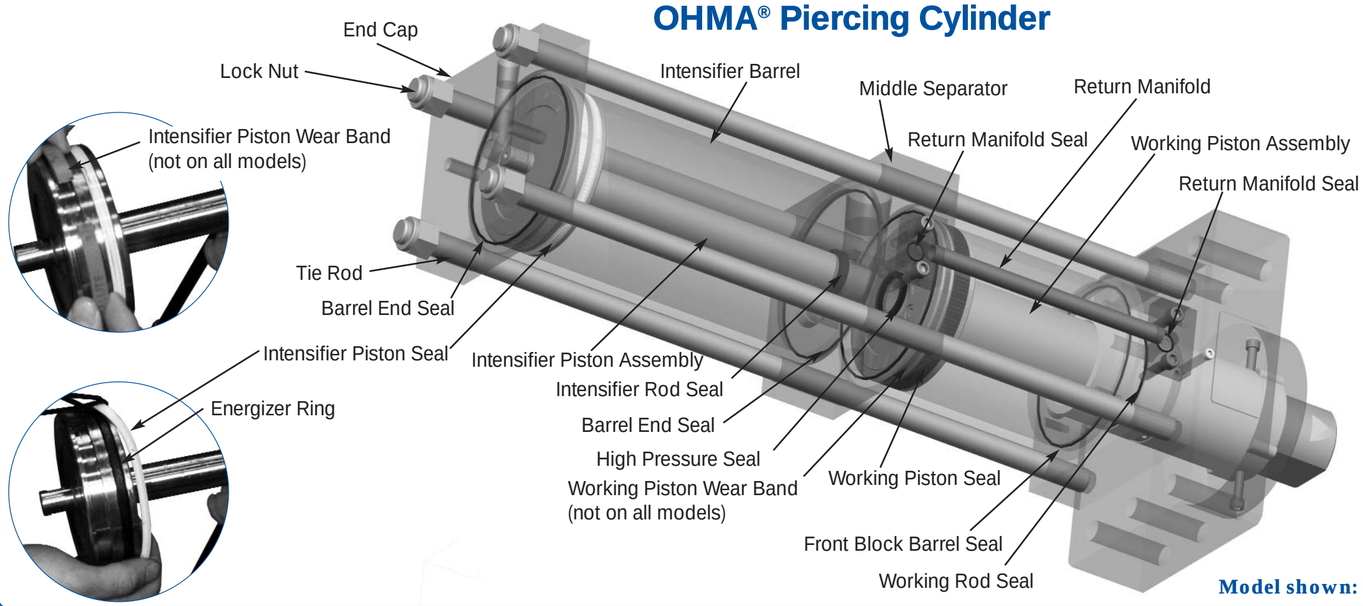
The following figures represent an estimate of torque (torque being the measurement of friction, not tension) required to induce a given preload (clampload) in a bolt for the OHMA® Piercing Cylinders.

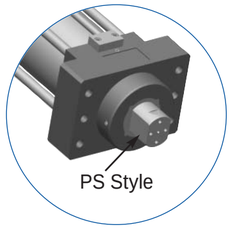
COARSE THREAD*			FINE THREAD*		
Size (in.)	Plain (lb ft)	Plated (lb ft)	Size (in.)	Plain (lb ft)	Plated (lb ft)
3/8-16 (.375)	31	23	3/8-24 (.375)	35	26
7/16-14 (.4375)	50	37	7/16-20 (.4375)	55	41
1/2-13 (.500)	76	57	1/2-20 (.500)	85	64
9/16-12 (.5625)	109	82	9/16-18 (.5625)	122	91
5/8-11 (.625)	150	112	5/8-18 (.625)	170	128
3/4-10 (.750)	266	200	3/4-16 (.750)	297	223
7/8-9 (.875)	430	322	7/8-14 (.875)	474	355
1-8 (1.000)	644	483	1-12 (1.000)	705	529

For lb in, multiply by 12.

*OHMA® cylinder tie rods are always fine thread. Coarse thread chart is provided for your convenience for mounting purposes only.
NOTE: All nuts used on standard OHMA® cylinders are plated. Refer to the plain chart values only when substituting non-plated nuts.

OHMA® Piercing Cylinder





Model shown: PS824-538-CFF-.50-UR-24Z3

Location	2" BORE		2-5/8" BORE		3-1/4" BORE	
	32:1	50:1	79:1	95:1	156:1	224:1
Front Block Barrel Seal	1 3/4" ID x 1/8" (O)		2-3/8" ID x 1/8" (O)		3" ID x 1/8" (O)	
Working Rod Seal	1-1/8" x 1-3/8" x 3/16" (UR)		1-1/2" x 1-3/4" x 1/4" (UR)		1-3/4" x 2" x 1/4" (UR)	
Working Piston Seal	1-5/8" x 2" x .273" (LUR)		2-1/4" x 2-5/8" x .273" (LUR)		2-3/4" x 3-1/4" x 3/8" (LUR)	
Working Piston Wear Band	N/A		N/A		N/A	
High Pressure Seal	5/8" x 7/8" x 1/8" (U)	1/2" x 3/4" x 1/8" (U)	11/16" x 15/16" x 1/8" (U)	5/8" x 7/8" x 1/8" (U)	3/4" x 1" x 1/8" (U)	5/8" x 7/8" x 1/8" (U)
Barrel End Seal	2" ID x 1/16" (O)		2-5/8" ID x 3/32" (O)		3-1/4" ID x 3/32" (O)	
Intensifier Rod Seal	5/8" x 7/8" x 3/16" (UR)	1/2" x 3/4" x 3/16" (UR)	11/16" x 15/16" x 3/16" (UR)	5/8" x 7/8" x 3/16" (UR)	3/4" x 1" x 1/4" (UR)	5/8" x 7/8" x 3/16" (UR)
Barrel End Seal	2" ID x 2" x .283" (SR)		2-5/8" ID x 3/32" (O)		3-1/4" ID x 3/32" (O)	
Intensifier Piston Seal	1.462" x 2" x .283" (SR)		2.087" x 2-5/8" x .283" (SR)		2-23/32" x 3-1/4" x 1/4" (SR)	
Intensifier Piston Wear Band	N/A		N/A		N/A	
Barrel End Seal	2" ID x 1/16" (O)		2-5/8" ID x 3/32" (O)		3-1/4" ID x 3/32" (O)	
Return Manifold Seals (2)	N/A		7/16" ID x 3/32" (O)		7/16" ID x 3/32" (O)	

Location	4" BORE		5" BORE	
	262:1	300:1	387:1	434:1
Front Block Barrel Seal	3-3/4" ID x 1/8" (O)		4-3/4" ID x 1/8" (O)	
Working Rod Seal	2" x 2-3/8" ID x 1/4" (UR)		3" x 3-3/8" x 1/4" (LUR)	
Working Piston Seal	3-1/4" x 4 5/8" (LUR)		4-1/4" x 5" x 5/8" (LUR)	
Working Piston Wear Band	N/A		4.8mm x 5 x 5.6mm (WB)	
High Pressure Seal	7/8" x 1-1/4" x 3/16" (U)	13/16" x 1-1/16" x 1/8" (U)	1-1/8" x 1-1/2" x 3/16" (U)	1-1/16" x 15/16" x 1/8" (U)
Barrel End Seal	4" ID x 3/32" (O)		5" ID x 1/8" (O)	
Intensifier Rod Seal	7/8" x 1-1/8" x 1/4" (UR)	13/16" x 1-1/16" x 1/4" (UR)	1-1/8" x 1-1/2" x 5/16" (UR)	1-1/16" x 1-5/16" x 1/4" (UR)
Barrel End Seal	4" ID x 3/32" (O)		5" ID x 1/8" (O)	
Intensifier Piston Seal	3-7/16" x 4" x 1/4" (SR)		4-7/16" x 5" x 1/4" (SR)	
Intensifier Piston Wear Band	N/A		4-3/4" x 5" x 3/8" (WB)	
Barrel End Seal	4" ID x 3/32" (O)		5" ID x 1/8" (O)	
Return Manifold Seals (2)	9/16" ID x 3/32" (O)		9/16" ID x 3/32" (O)	

Location	6" BORE			8" BORE	
	538:1	652:1	800:1	1430:1	1700:1
Front Block Barrel Seal	5-3/4" ID x 1/8" (O)			7-3/4" x 1/8" (O)	
Working Rod Seal	3" x 3-3/8" x 1/4" (LUR)			4" x 4-3/8" x 1/4" (LUR)	
Working Piston Seal	5-1/4" x 6" x 5/8" (LUR)			7-1/4" ID x 8" OD x 5/8" (LUR)	
Working Piston Wear Band	5.8mm x 6 x 5.6mm			7-3/4" x 3/8" (WB)	
High Pressure Seal	1-3/8" x 1-3/4" x 3/16" (U)	1-1/4" x 1-5/8" x 3/16" (U)	1-1/8" x 1-1/2" x 3/16" (U)	1-1/2" x 1-7/8" x 3/16" (U)	1-3/8" x 1-3/4" x 3/16" (U)
Barrel End Seal	6" ID x 1/8" (O)			7-3/4" x 1/8" (O)	
Intensifier Rod Seal	1-3/8" x 1-3/4" x 5/16" (UR)	1-1/4" x 1-5/8" x 5/16" (UR)	1-1/8" x 1-1/2" x 5/16" (UR)	1-1/2" x 1-7/8" x 5/16" (UR)	1-3/8" x 1-3/4" x 1-5/16" (UR)
Barrel End Seal	6" ID x 1/8"(O)			8" ID x 1/8" (O)	
Intensifier Piston Seal	5-1/4" x 6-3/8" (SR)			7-1/4" x 8" x 3/8" (SR)	
Intensifier Piston Wear Band	5-3/4" x 6" x 3/8" (WB)			7-3/4" x 8" x 3/8" (WB)	
Barrel End Seal	6" ID x 1/8" (O)			8" ID x 1/8" (O)	
Return Manifold Seals (2)	9/16" x 3/32" (O)			N/A	

LEGEND
(O) - O-RING
(WB) - WEAR BAND
(LUR) - LOADED U-RING
(SR) - SQUARE RING
N/A - NOT APPLICABLE
(P) - POLYPAK
(UR) - U-RING
(U) - UNISEAL

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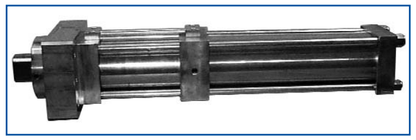
OHMA® Piercing Cylinder Seal Replacement

REFER TO DIAGRAM ON REVERSE FOR PART TERMINOLOGY

DISASSEMBLY

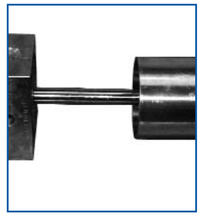
Step 1
Position the cylinder on a flat surface with the manifold facing upwards. Unscrew manifold -- total of 4 screws.
Note: Some custom piercing cylinders do not have manifolds.



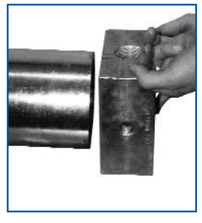
Step 2
Mark the cylinder's port orientation with scribe or marker for use as a reference during reassembly stage.

Step 3
Remove tie rods, then remove the end cap.

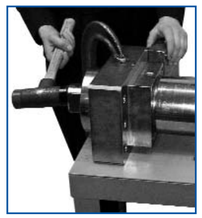
Step 4
Slide out intensifier piston and barrel.



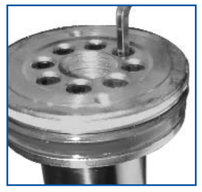
Step 5
Remove middle separator from working piston barrel.



Step 6
Tap the working piston with a soft rubber mallet to remove it from the mounting block. This should cause the working barrel to be removed from the front mounting block as well.



Step 7
Take working piston with flange facing upwards and clamp it into a soft-jawed vice. Remove the 8 allen screws. A pipe may be required for additional leverage since these screws are installed with a thread adhesive.
Note: Some cylinders have a single-piece working piston construction. If this pertains to your cylinder, skip to step 9.



Step 8
Separate working piston from flange by tapping it apart.

Step 9
Remove all visible seals and thoroughly clean all components, especially any thread adhesive that has been used on bolt threads before cylinder reassembly.
NOTE:
a) Keep one used O-ring as an assembly aid for the installation of new seals.
b) Scored components should be repaired or replaced. Contact CenterLine for additional assistance.

RE-ASSEMBLY

(REFER TO DIAGRAM ON REVERSE FOR ADDIITIONAL INFORMATION)

*STEPS 1-4 APPLY ONLY TO MODELS MAKING USE OF A TWO-PIECE WORKING PISTON ASSEMBLY

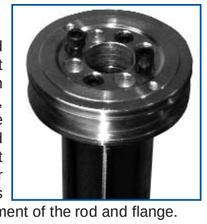
All pieces must be clean and dry; cleaning agents may damage seals.
Prior to installation, all seals must be lubricated using the lubricant provided with the seal kit.

Step 1
Clamp working piston rod vertically in a soft-jawed vice with tapped holes facing upwards.

Step 2
Using the grease provided with the seal kit, lubricate the working rod end seal and insert it into the inside groove of the working piston flange.

Step 3
Gently place the piston flange over the piston rod and engage the end of the rod into the working flange pocket. If necessary, rotate the flange to line up the counter bored holes with the tapped holes in the rod. Make sure that rod and flange are squared up properly before attempting to engage the two pieces.

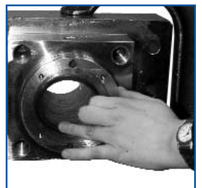
Step 4
Using a removable thread adhesive, install the 8 socket head cap screws. Using an alternating cross pattern, tighten to the torque value specified on the chart found on the reverse. DO NOT start at one screw and work your way around the pattern as this may result in a misalignment of the rod and flange.



Step 5
Slip working piston seal (blue with black energizer inner ring) over the working flange. The lips of the seal must face upwards facing fluid (away from piston rod). Use an old O-ring from the cylinder disassembly to make a loop around the working piston seal and holding the portion of the working piston seal that is in the groove with one hand, slowly ease the seal into place by pulling it into the groove using the looped O-ring as an aid.

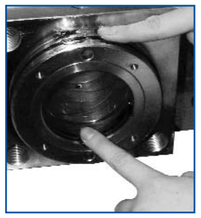
Step 6
Firmly clamp the front block horizontally on a flat surface. Install working rod seal (blue) into the front block with the large lip of the seal facing the working piston.

NOTE: When assembling a rotating round rod (PR) style cylinder, a wiper seal must also be installed in the front block.

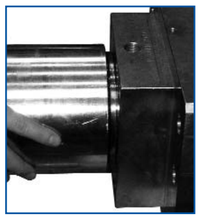


Step 7
Next, install the front block barrel seal (black) on the OD of the front block flange. Lubricate front block barrel seal and working rod seal.

Step 8
Spread a generous amount of lubricant inside the working piston opening of the front block. Ensure that the entire inside surface is evenly coated with lubricant.



Step 9
Install the working barrel by pushing it over the front block barrel seal on the front block. A rubber mallet may be used to help the barrel to engage fully. Be careful to not pinch the O-ring seal.



Step 10
Next, place the working piston rod end through the working barrel and into the front block. Avoid touching the inside of the barrel with the rod end as this may scratch the smooth sealing surface of the barrel. In the case of "nonrotating" rods, the rod may only fit in one orientation in the front block. It may need to be rotated 180° to get it engaged. Check the alignment markings on the working piston rod end and the front block to verify proper port orientation. Before the piston flange covers the end of the working barrel, apply additional lubricant to the ID of the barrel. Make sure the barrel surfaces are fully coated.

Step 11
Use a rubber mallet to tap the working piston assembly into the barrel until the blue working piston seal is partially inserted.
NOTE: The seal will be fully engaged once the cylinder is tightened at the final stage of the assembly.

Step 12
On the side of the middle separator stamped with a "P" or "PZ", lubricate & install the high pressure seal into the groove. With lips towards working piston, squeeze the seal on the sides to form a saddle shape. Insert one end into the groove. Gently work the seal into the groove and run your finger along the seal to ensure proper installation. A small dull instrument may be used to properly seat the seal. Be careful not to damage the seal.

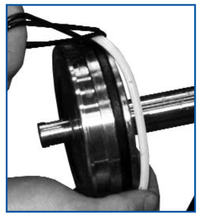
Step 13
Next, invert the middle separator and install the low pressure intensifier rod seal into the groove. The lips of the low pressure seal must face the same direction as the high pressure seal ("P" or "PZ") side of the middle separator. Apply lubricant to both seals.

Step 14
Install the barrel end seals on both sides of the middle separator to the large face grooves. (In case of the 8" bore cylinders, one seal will be a face seal and one will be an OD seal the same size as the one found on the OD of the front block.)

Step 15
Stand the intensifier barrel on end. Grasp the seal installation tool and place it over the top end of the intensifier barrel. Lubricate the O-ring supplied with the seal installation tool.

Step 16
Clamp the intensifier rod assembly by the rod in a soft-jawed vise using only enough pressure to hold the assembly firmly. Do not over-tighten. Lubricate the deeper groove in the intensifier piston flange. Install the black intensifier piston seal energizer ring into the deeper groove of the flange.

Step 17
Next, install the white sealing ring over the top of the energizer ring. Slowly ease the white sealing ring into place by pulling the seal over the energizer ring using an old O-ring as an aid.

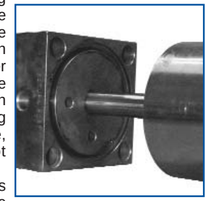


Step 18
Some intensifier pistons incorporate a wear band; if applicable, install the intensifier piston wear band in the shallower groove of the intensifier flange. Lubricate the wear band, seals and the ID of the seal installation tool.

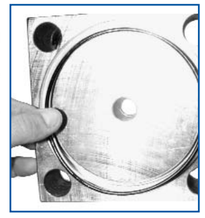
Step 19
Push the flange into the seal installation tool making sure that it is square to the barrel bore.

Step 20
Using a rubber mallet, tap the piston into the barrel until it is fully inserted. Remove the seal installation tool and push the intensifier piston completely inside the intensifier barrel.

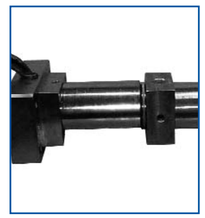
Step 21
Position the middle separator block so the side stamped with a "P or "PZ" is facing the working piston flange (fluid chamber). Once the middle separator is in position, insert the intensifier piston through the opposite side (side not stamped with a "P" or "PZ"). When guiding the barrel into the groove, make sure that you do not pinch or cut the O-ring.
NOTE: The working piston is counterbored to allow the intensifier piston to be fully inserted into the assembly.



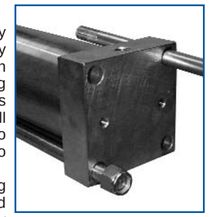
Step 22
Install the barrel end seal into the end cap. Insert end cap into the mating groove of the intensifier barrel. Once again be careful not to pinch or cut the barrel end seal.



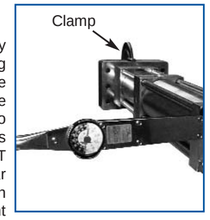
Step 23
Verify proper orientation of the ports (fluid, return and intensifier) to the markings that were made during disassembly.



Step 24
Using two (2) diagonally opposing tie rods, slowly tighten the tie rods in an alternating fashion to bring the cylinder components together. This action will cause the working piston to become fully inserted into the working barrel.
NOTE: Be sure the working piston seal and wear band are not pinched or cut. They should be eased into the barrel, not forced.



Step 25
With the cylinder firmly clamped, install remaining tie rods and tighten to the specified torque (refer to the torque chart) making sure to use the alternating cross pattern as outlined. DO NOT tighten the nuts in a circular pattern as this can result in component misalignment and cylinder damage. Install return manifold and O-rings.



Step 26
Test for leaks by applying air on one port at a time and feel for leaks.

Step 27
Plug all ports until the cylinder is ready for use.

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