

# ONYX VALVE CO MODEL DAC - ADA

## Installation & Maintenance

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## Storage

Correct storage procedures extend valve life. The rubber sleeve in the valve is perishable. Ideal storage conditions are 50°F and 60% relative humidity.

1. Keep valves and spare sleeves as cool as possible. They can be stored in an unheated area but allow maximum ventilation in storage areas subject to high ambient summer temperatures. Truck trailers and storage sheds become incredibly hot during summer months. Avoid such locations.
2. Avoid sunlight. Ultra-violet light accelerates the deterioration of rubber. Leave the valve in its box. If not feasible to box the valve, cover the sleeve with black plastic.
3. Avoid ozone. DO NOT STORE valve near active electrical equipment. For long-term storage, coat the face and inside the sleeve twice yearly with silicone spray or liquid.

## Design Criteria

The **maximum process temperature** that the valve can tolerate is based on the elastomer used to fabricate the sleeve.

Poly Isoprene	Chloroprene	EPDM Ethylene Propylene	Nitrile	Butyl	Fluorocarbon
PGR Pure Gum Rubber	Neoprene	Nordel	Buna-N	Butyl	Viton
-30°→+180° F -34°→+82° C	-20°→+220° F -29°→+104° C	-40°→+300° F -40°→+150° C	-30°→220° F -34°→104° C	-30°→+225° F -34°→+106° C	-15°→+375° F -26°→+190° C

The **maximum safe process pressure** that the valve sleeve and housing can tolerate is based on valve size and flange rating. For Onyx model DEC valves with 150# flanges maximum process pressure:

Size	2	2½ & 3	4	6	8	10	12	14	16	18	20	24	30
P <sub>max</sub> psi	200	175	150			100		75					

*Notes:*

1. Higher pressure ratings are available on special order.
2. This is the maximum safe pressure that the valve body can safely handle. The actuator is sized to close against the line pressure stipulated on the customer's PO and in most cases is significantly lower than max rated housing pressure shown here. Check name tag on the valve for maximum operating pressure based on actuator available thrust.

**Inspection & Identification**

Inspect the valve before installation. Report any shipping damage before installation. DO NOT INSTALL A VALVE KNOWN TO HAVE BEEN DAMAGED IN SHIPMENT. Check inside the valve to make sure no foreign objects are present.

**1. Identification:**

**Part#.**

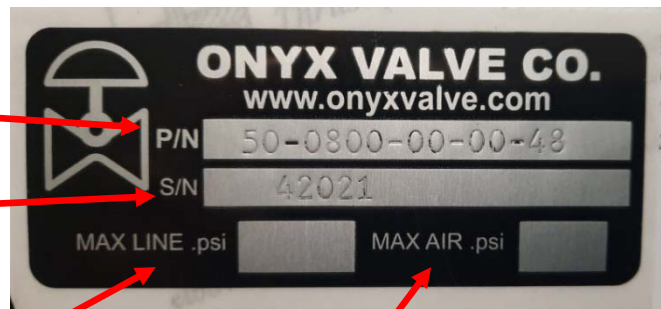
Use this number when ordering spare/replacement parts.

**Sales #:**

Previous sales number for last order

This is the pressure that the valve was tested at the factory prior to shipping.

This is the maximum compressed air pressure feeding the actuator.



**2. Safety:**

- a) Leakage: Consider the possibility of leakage. Pinch valves handle abrasive fluids; it is reasonable to expect the rubber sleeve to eventually wear out and leak. Precautions should be taken where liquids may spray out or drip down onto electrical equipment or plant personnel or combustible fluid may drain into a dangerous area.
- b) After shutting down: Pinch valves can hold pressure in a system for a considerable length of time. Means should be provided to safely relieve pressure and drain lines.

### 3. Flanges:

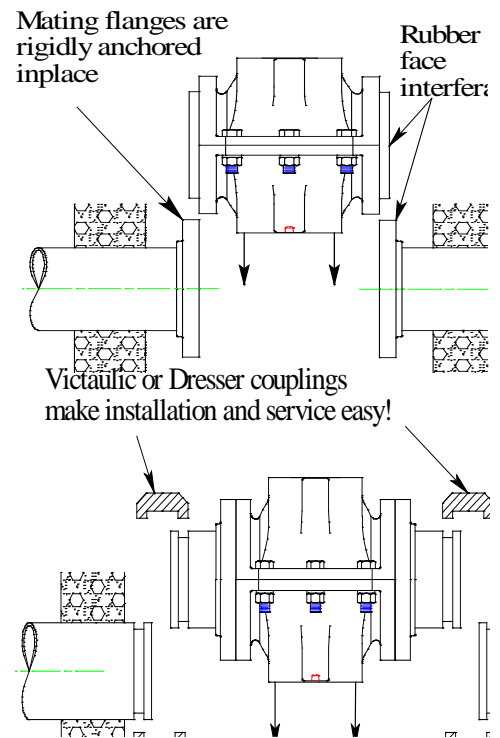
- a. Onyx pinch valves are designed to work with standard ANSI 150# (or 300#) flanges.
- b. No gasket is required; the sleeve face *is* the gasket.
- c. Make sure the inside edges of mating flanges are filed or ground smooth. Any sharp edges on the inside corner of mating flanges will cut the rubber sleeve causing premature failure.
- d. Valve flanges have through holes and are designed to have an ANSI hex (not heavy hex) nut behind the flange. Flange bolts must be inserted from the mating flange side.
- e. Use **flat face flanges**. Do NOT use raised face flanges. Raised face flanges cut into the rubber sleeve damaging it.
- f. Flange bolts must be installed through the mating flanges. Flange bolts **cannot** be inserted from the valve side of the flange assembly.



## **Installation Design & Engineering:**

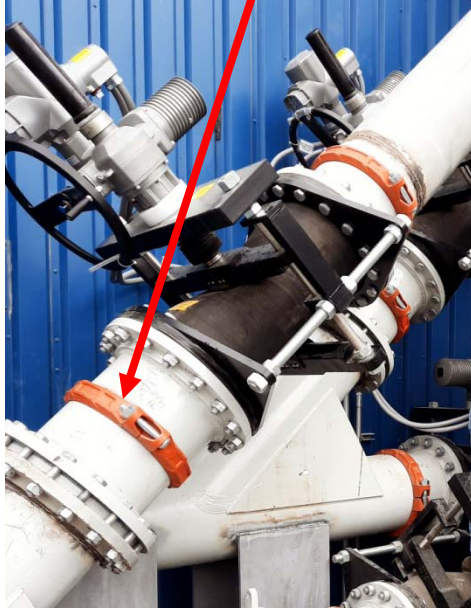
If the valve is at the end of a pipe run, you must install a flange ring on the discharge end of the valve to seal the air properly.

- a. Design the installation so the valve can be removed and reinstalled later. Pinch valve sleeves wear out and have to be replaced. The rubber sleeve is molded longer than the housing to provide enough compression in the rubber to prevent leaks. If mating pipe flanges are rigidly anchored in concrete or welded in place, you might be able to remove the valve from the line but there will be hell to pay when you attempt to reinstall it. The protruding rubber faces of the sleeve will thwart any attempt to get the valve back into place.

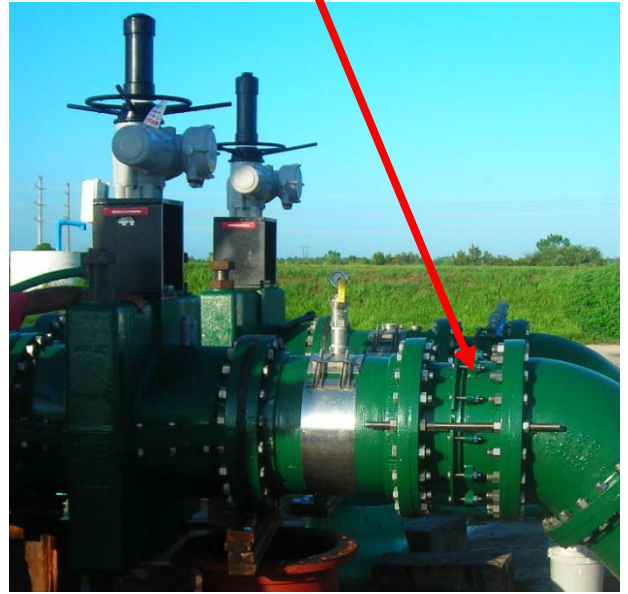


- b. Using a Victaulic or Dresser coupling will facilitate removal and makes it easy to reinstall the valve later. By using split couplings, the mating flanges can be attached to the valve first and tightened prior to installation. Then the entire assembly can be dropped into place and secured with the split couplings.

Victaulic couplings.



Dresser coupling



- c. When installing series-D pinch valve make sure there is ample clearance for guide rods. These are the two rods that slide in and out of the lower housing to raise and lower the pinch bar. Make sure there is sufficient clearance **under the valve** for these rods to extend all the way without hitting anything. Check catalogue literature for required clearance dimension.

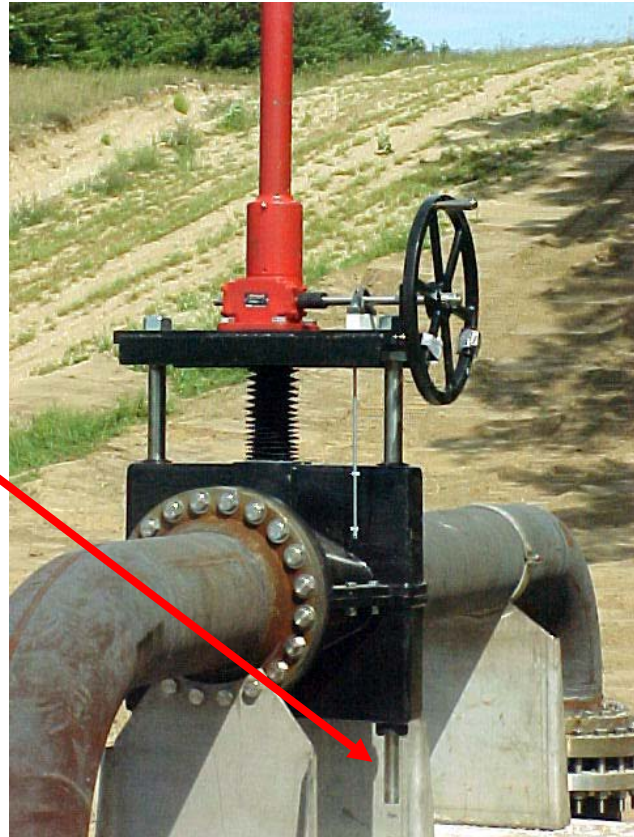
Wrong ➡

Insufficient clearance under the valve. The first time you attempt to open the pinch valve the rods are going to crash into the support beam.





Good design. Note generous clearance under the valve for guide rods.



4. On valves **for modulating service**: Allow at least 2-pipe diameters straight run into throttling valves as a minimum.

Good ↓



Better ↓



7. Valves for **On/Off** service can be connected directly to adjacent pipe fittings without straight run in or out.

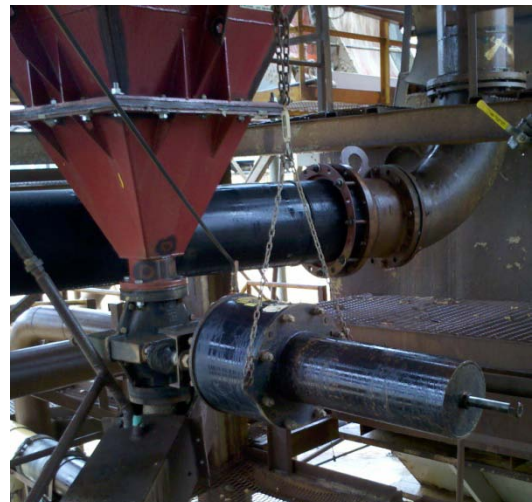




## *Orientation*

There are 4-ways to install a pinch valve. 1 thru 3 are good. #4 is bad.

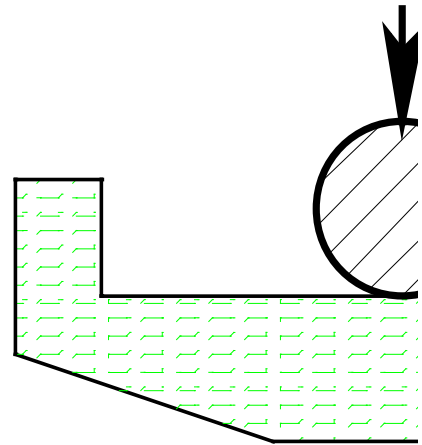
1. Valve upright in horizontal pipe.
  - i. OK for liquid applications.
  - ii. OK for dry bulk applications.
2. Valve 90° from vertical in horizontal pipe.
  - i. OK for liquid.
  - ii. Do **NOT** install this way on **dry bulk** conveying!
3. Valve upright in horizontal pipe.
  - i. OK for liquid.
  - ii. OK for dry bulk applications.



- 4. Valve at intermediate angle.
  - i. Trouble brewing. Don't do this.



- g. Locate the valve where it can be reached for service and sleeve replacement. Allow access by technicians who may have to calibrate automatic valves. Allow access to the auxiliary hand wheel if valve was so equipped.
- h. Be sure pipeline is clean. Foreign material left in the pipeline can damage valves. Clean the mating flanges of adjacent pipe. Remove any old gasket material.
- i. Most pinch valves can be installed with flow in either direction.
  - i. The exception: modulating valves with Trumpet Mouth (Taper-Inlet-Only) design. In this case there will be a Flow Arrow on the valve showing correct flow direction. The correct flow direction is always from the tapered end towards the non-tapered end.
- j. Do not install valve next to a source of extreme heat.



### **Installation Tips**

1. Close valve prior to installation.
2. Make sure adjacent pipe is properly aligned.
3. Adjacent pipe must have sufficient travel to insert valve and draw tight to compress sleeve faces; valve will not stretch.
4. Coat faces of valve sleeve with silicone lubricant to facilitate installation and later removal of the valve and to preserve the resiliency of the rubber.
5. Bolt valve into pipeline. Snug up the bolts gently in a crisscross pattern. It may be necessary to re tighten bolts later after the rubber has taken set.

<b>Bolt Torque in ft-lb</b>			
Flange	# bolts	Pinch & Duckbill Valves	
		1st hit *	2nd hit *
1	4	30	50
1.5			
2			
2.5			
3			
4	8	45	65
5			
6			
8			
10	12	50	80
12			
14			
16	16	60	95
18			
20	20	65	150
24			
30	28	75	175
36			

## **Operation**

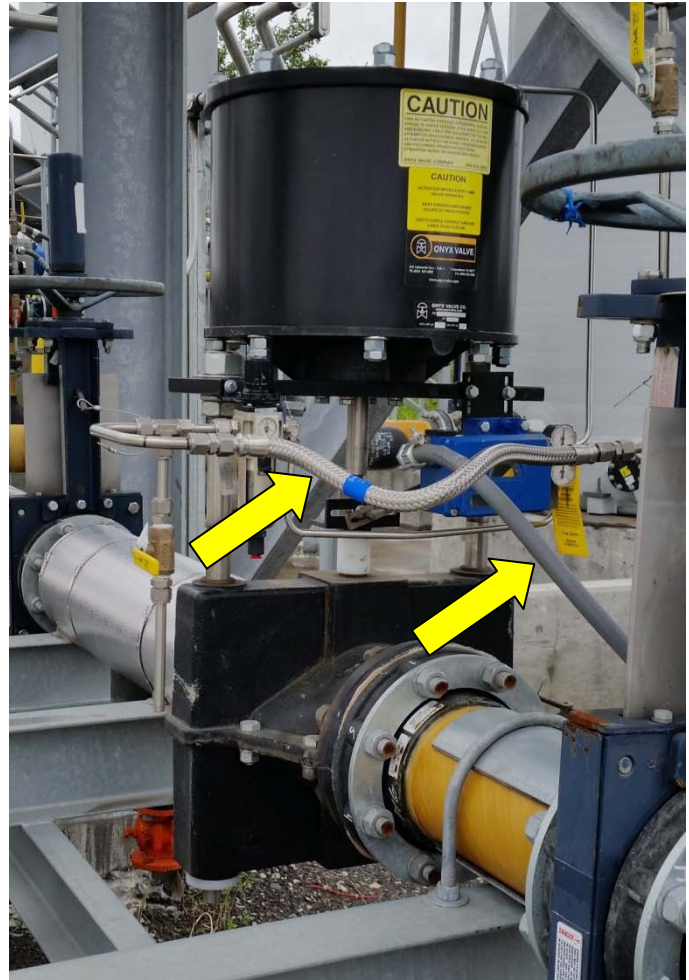
This is a double-acting actuator. The Onyx series DAC-ADA pinch valves fail in last position on loss of air. This piston-driven cylindrical actuator drives a pair of pinch bars to close a rubber sleeve bubble tight. Positive opening tabs molded into the sleeve attached to the pinch bar insure complete opening. When equipped with a positioner, the DAC valves are efficient reliable control valves. These actuators can also come equipped w/ limit switches to prevent over-travel.

All Onyx pinch valves are tested to customer specifications before shipment. Unless otherwise specified, all valves are shipped assembled with all accessories piped, mounted, and calibrated.

## Electrical Connections

All wiring must be performed by a qualified electrician in accordance with local and national electrical codes. If your valve is equipped with a solenoid valve or a positioner or limit switches:

On the model DAC pinch valve, **the actuator moves up and down as the valve operates.** Actuator travel equals half nominal valve size, e.g.: on a 10" valve, the actuator moves up & down 5 inches. **You must use flexible conduit and flexible air line** with sufficient movement to accommodate this vertical translation. Do NOT use rigid conduit.



Refer to instruction manual supplied with your solenoid valve, positioner or limit switches for details on these accessories.



## Maintenance

### *1. Lubrication Schedule*

a. At start up: Construction activities can create a lot of abrasive dust so it's a good idea clean and oil the stem and guide rods at start up.

b. Yearly: Clean and oil the stem and guide rods.

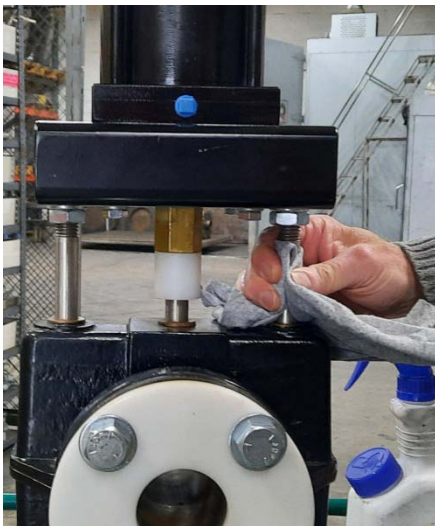
1-Spray stem & rods with WD-40.



2-Spray lower guide rods with WD-40



3-Wipe clean with a soft rag.



4-spray with WD-40 again but this time do not wipe it off. Allow oil to soak into bearings.





## **Start Up**

### ***Duty Cycle and What to Watch For:***

Every Onyx pneumatic actuated valve is tested at final assembly. The valve is flanged and pressurized to max working pressure stated on Order Acknowledgement + 10%. Limit switches (if provided) are set here at the factory. Positioners and position re-transmitters are calibrated here at the factory and should not require any adjustment in the field.

Valve should be Plug & Play. You should only have to connect electric power and/or command signals and valve should be ready to operate. Pneumatic actuators can cycle at high speed, continuously, with no mandatory rest period.

For **on-off** service operation, you want maximum speed. Sleeve wear is caused primarily by turbulence that occurs when the valve is in the near-closed position. Moving the valve as quickly as possible through this transition zone maximizes sleeve life. Actuators for on-off service should cycle open-closed in less than 4 seconds. If your valve can not stroke this fast you might be well advised to change out to a solenoid valve with larger ports or a higher Cv.

The following are a few notes on modulating operation valves:

Valve goes unstable and continuously oscillates back and forth. There are 2 possible reasons for this:

1. **Too much gain:** Inside your SCADDA system is a unique PID module dedicated to controlling every modulating valve in the plant. This PID module has to be “tuned” to match each individual valve’s response characteristic. To do this, the programmer in charge of the SCADDA system adjusts the gain in the PID module. The natural tendency is to crank up the gain (also known as reducing dead band) in the PID module. This improves accuracy. However, **increasing the gain forces the electric actuator to cycle more frequently.**
2. **The valve port is oversized.** The valve seems to control the flow well enough, but even at maximum flow it never goes more than 20% open. When the valve operates close to the seat the high velocity accelerates sleeve wear, requiring more frequent sleeve replacement. The sweet spot is 15% to 90% open. **Operating too close to the seat (< 20% Open) makes flow control unstable, forcing the actuator to cycle more frequently.**

## Sleeve Replacement

**WARNING:** Before attempting to disassemble the valve housing the stem must be in the retracted position. Failure to retract the stem could result in equipment damage and/or serious personal injury.

1. Relieve process pressure and drain process line.
2. Disconnect air and electric lines. Label and record connections so the valve can be reconnected in the same manner.
3. Remove valve from process line.
4. Disconnect any accessories attached to the stem or coupling.
5. Separate upper and lower bonnet halves (#2).
6. Remove positive opening tabs from lower pinch bar (#10) by removing bolts, nuts and washers (#8A, 8B, 8C).
7. Remove the lower pinch bar by removing hex nuts (#23A) from the guide rods (#23).

After the lower pinch bar is removed, **slowly** bleed the air from the actuator. This will push the upper pinch bar down to extract the sleeve.

8. Remove the valve stem (#7) by loosening the coupling jam nut (#13A) and coupling (#13).  
Valve stem threads are left-handed, so you have to turn the coupling and jam nut the 'wrong' way to loosen them.

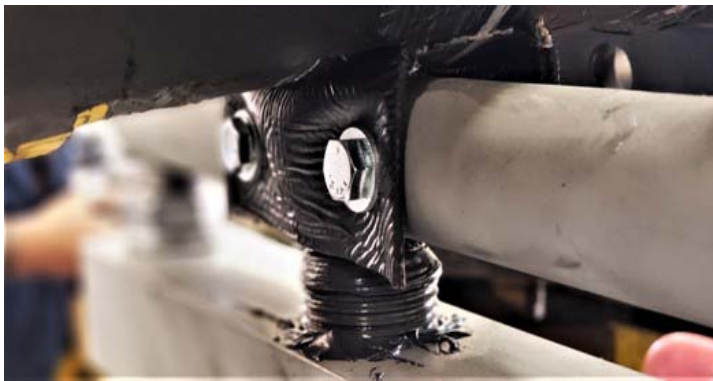
9. If sleeve (#1) is provided with positive opening tabs (integrally molded tabs bolted to the pinch bar), follow steps 'a' through 'e' below. If no positive opening tabs are



provided, proceed directly to step 10.



- a) Remove bolts, nuts and washers that secure the positive opening tabs to the pinch bar (8A, 8B, 8C). The sleeve (#1) is now free from the both pinch bars (#9 & 10). Discard old sleeve. Prepare new sleeve for installation.
- b) Punch holes through the positive opening tabs using a gasket or pliers type punch. The diameter of the holes in tabs should be approximately equal to hole diameter in pinch bar.
- c) Positive opening tab holes must be in proper alignment with respect to the flange face holes, or there will be hell to pay when you reinstall the valve. It is very difficult to twist the rubber sleeve to align these holes later.
- d) Replace tab bolts, nuts and washers (#8A, 8B & 8C). Use flat washers on every hole. If you replace bolts (#8A), cut or grind flush with nut (#8C) so bolts do not puncture sleeve in closed position



- e) Trim the tabs even with the top surface of the pinch bar.
- 10. Apply a coat of silicone valve sealant to the mating flanges of the bonnet halves.
- 11. Coat the stem (#7) where it passes through the bearing with a light application of grease or machine oil.
- 12. Reinsert the valve stem (#7), and replace jam nut and coupling (#13, 13A). Make sure the pinch bar is in the bonnet track.
- 13. Insert new sleeve and reattach the lower pinch bar. (You will have to reapply pressure to the actuator to do this.) Replace the nuts on the guide rods.
- 14. Replace the lower bonnet. Bonnets are matched and must be oriented as they were originally or guide rods will not line up properly. Replace bonnet hardware (#2A, 2B & 2C).
- 15. Replace any accessories that were previously removed. Tighten all fittings and gauges.
- 16. Reinstall valve in process line.
- 17. Reconnect air lines.

### ***Stop Collar Adjustment***

Any time you replace the valve sleeve or perform any other maintenance on the model DEC valve you should check the Stop Collar (#7A) position.

#### **What this Collar Does:**

The Stop Collar insures that the valve closes precisely on Center-Line. If the valve does not close on Center-Line, this will place undue stress on the sleeve leading to premature sleeve failure.

#### **What Goes Wrong?**

- a) The Stop Collar works loose and slides too far up the stem, or...
- b) The Stop Collar disappears for some mysterious reason.
- c) If the Stop Collar is either missing or out of adjustment, when the valve attempts to close, due to the weight of the Actuator the Lower Pinch Bar (#10) just sits on the ribs inside the valve housing and never moves. The Upper Pinch Bar (#9) starts moving in the downward direction but instead of stopping at Center-Line it continues through its target and moves all the way to the bottom of its stroke. Now you have over-stretched the rubber sleeve on the ventral surface line and you rip the flanges out of the sleeve. This generally doesn't happen right away but closing the valve a few hundred cycles beyond where it's designed to close will eventually tear the sleeve apart.

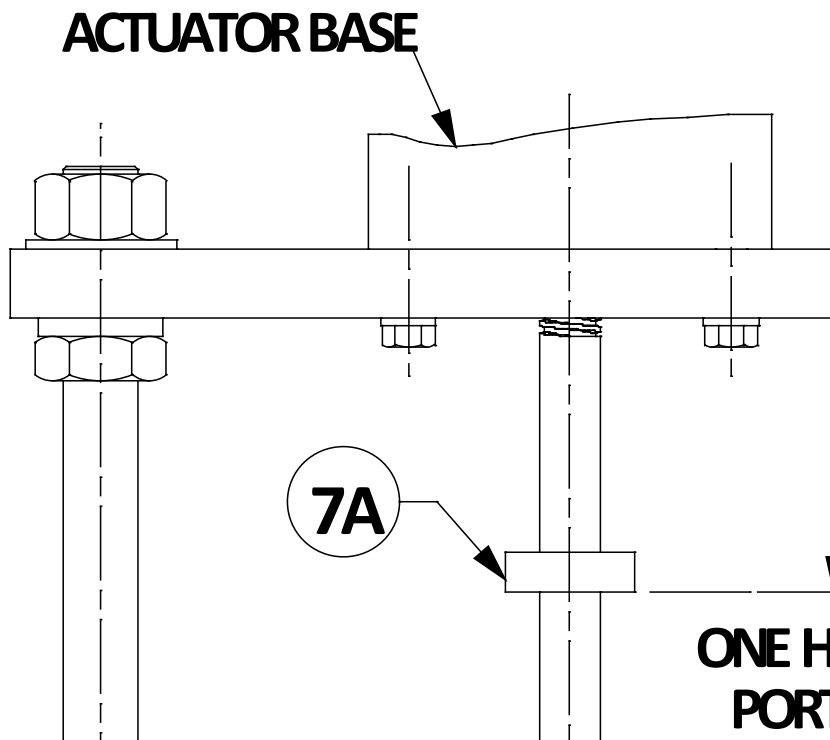


Where Should the Stop Collar be Positioned?

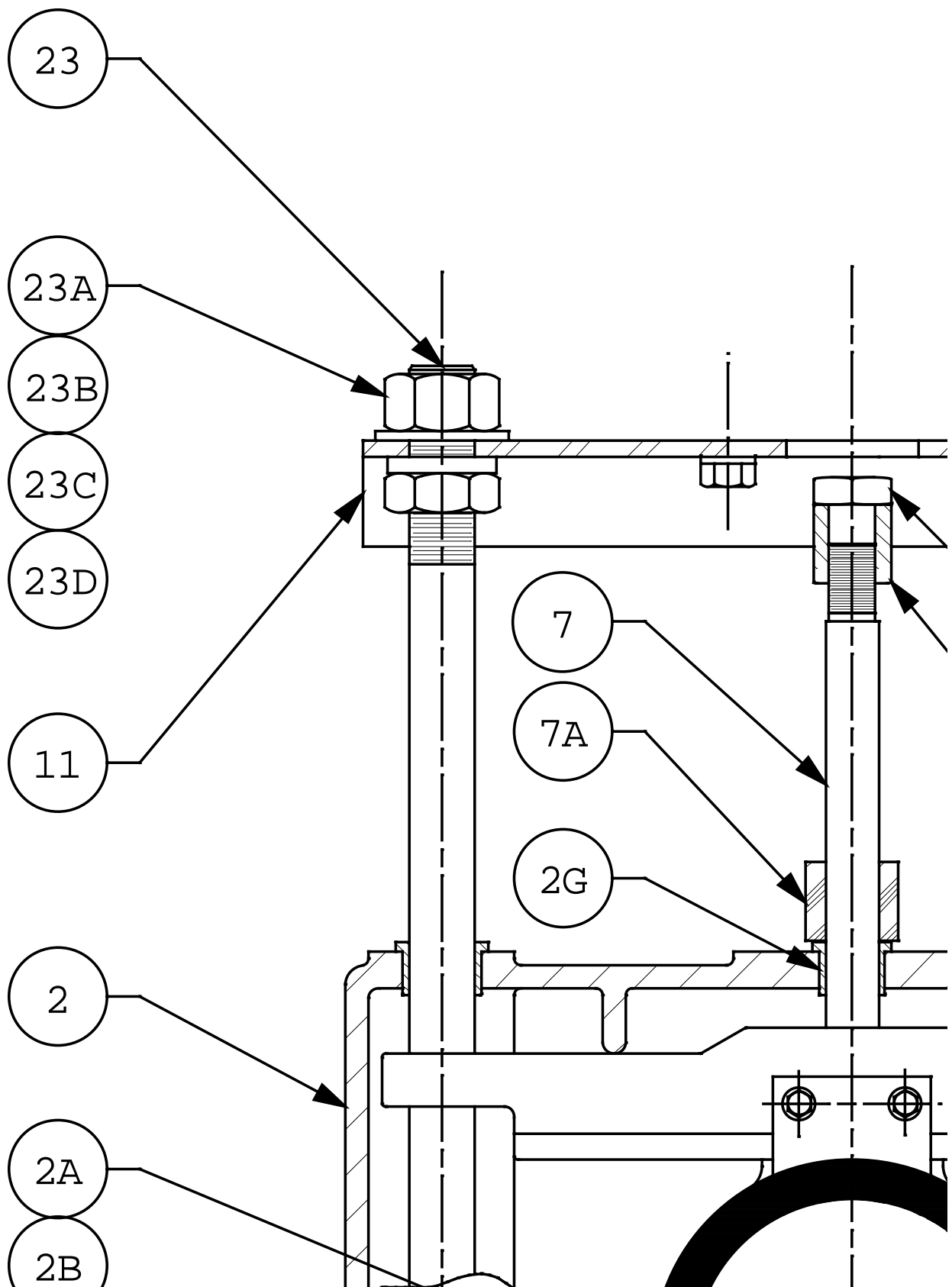
The Stop Collar (#7A) should be firmly clamped to the Valve Stem (#7) so that – when the valve is in the full **OPEN** position – the gap between the bottom surface of the Collar and the top surface of the Stem Bearing is =  $\frac{1}{2}$  valve port size. For example:

If you have a 3” full port valve, there should be a 1½” gap.

If you have a 10 x 6 valve (10” body x 6” Port) there should be a 3” gap.



ITEM	NOMENCLATURE
<b>1</b>	SLEEVE
<b>2</b>	BONNET ASSEMBLY
<b>2A</b>	BOLT, BONNET
<b>2B</b>	LOCK WASHER, BONNET
<b>2C</b>	NUT, BONNET
<b>2E</b>	PLUG, BONNET
<b>2F</b>	SEALANT, BONNET
<b>2G</b>	BEARING, BONNET - STEM
<b>2H</b>	BEARING, BONNET - GUIDE ROD
<b>7</b>	STEM, VALVE
<b>7A</b>	MECHANICAL STOP, VALVE
<b>8A</b>	BOLT, POF
<b>8B</b>	WASHER, POF
<b>8C</b>	NUT, POF
<b>9</b>	UPPER PINCH BAR
<b>10</b>	LOWER PINCH BAR
<b>11</b>	YOKE
<b>11A</b>	BOLT, YOKE - ACTUATOR
<b>11B</b>	LOCK WASHER, YOKE - ACTUATOR
<b>13</b>	COUPLING
<b>13A</b>	JAM NUT, COUPLING - STEM
<b>22</b>	ALIGNMENT BEARING
<b>22A</b>	BOLT, ALIGNMENT BEARING
<b>22B</b>	WASHER, ALIGNMENT BEARING
<b>22C</b>	LOCK WASHER, ALIGNMENT BEARING
<b>23</b>	GUIDE ROD
<b>23A</b>	NUT, GUIDE ROD
<b>23B</b>	WASHER, GUIDE ROD
<b>23C</b>	LOCK WASHER, GUIDE ROD
<b>23D</b>	JAM NUT, GUIDE ROD



## **Actuator Replacement**

### **Actuator Removal**

1. Remove bolts (#11A) and lock washers (#11B).
2. Loosen coupling jam nut (#13A) and remove coupling (#13).

NOTE: Valve stems have left hand threads. Turn jam nut and coupling the 'wrong' way to remove.

### **Actuator Installation**

1. Thread jam nut (#13A) onto valve stem (#7).
2. Lower actuator stem (#20) through yoke (#11) and sandwich the coupling (#13) between the actuator stem and valve stem. Engage both stems simultaneously. Turn coupling clockwise until stems are drawn against each other.
3. Turn jam nut (#13A) clockwise to lock coupling.
4. Replace actuator bolts and lock washers (#11A, 11B).
5. Slowly bleed pressure from lower chamber. Stem will extend and close valve.

### **Trouble-Shooting**

<b>Symptom:</b>	<b>Diagnosis</b>	<b>How to fix:</b>
Process fluid is leaking out from around the stem and guide rods.	Sleeve is ruptured	Replace sleeve.
Process fluid is leaking through valve when it's supposed to be fully closed.	Wire draw failure through sleeve.	Replace sleeve.

# ONYX VALVE CO

## WARRANTY

The following statement of our Warranty and Claims Policy is intended to assist our customers in understanding the terms of our warranty, the circumstances under which we will honor claims, and the procedure for making claims.

### 1 Warranty on Products Manufactured by Us.

We warrant Products manufactured by us to be free from defects in material and workmanship for a period of one year from the date of shipment from our factory or warehouse.

Our liability under this warranty or in connection with any other claim relating to our Products is limited to the repair, or at our option, the replacement or refund of the purchase price of any products or parts or components which are returned to us freight prepaid which are defective in material or workmanship. Products or parts or components that are repaired or replaced by us will be returned to our customer freight collect.

With regards to rubber components, Onyx Valve does not guarantee resistance to erosion, abrasion or other sources of failure, nor does Onyx Valve guarantee a minimum length of service or that the product shall be fit for any particular service.

### 2. Products of Other Manufacturers.

We make no warranty with regard to any products not manufactured by us. The only warranty that attaches to such Products is that warranty, if any, of the manufacturer of such Products. Our Customer Service Department should be consulted if our customers have questions as to whether particular products are covered by our warranty or are separately warranted by their manufacturers.

### 3 Limitation of Liability.

The only warranty that we make to our customers is that summarized above.

WE DO NOT MAKE ANY OTHER EXPRESS WARRANTIES OR ANY IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE OR USE.

In addition, we do not assume and we expressly disclaim any liability for (i) any special, indirect, incidental, or consequential damages which anyone may suffer as the result of the sale, delivery, servicing, use, or loss of use, of any Product, or (ii) any charges or expenses of any nature that are incurred without our express written consent.

Our total liability under our warranty or in connection with any claim involving any Product is expressly limited to the purchase price of the Product in respect of which damages are claimed.

Failure of purchaser to give prompt written notice of any alleged defect under this guarantee forthwith upon its discovery, or use, and possession thereof after an attempt has been made and completed to remedy defects therein, or failure to return product or part for replacement as herein provided, or failure to install and operate said products and parts according to instructions furnished by Onyx Valve, or failure to pay entire contract price when due, shall be a waiver by purchaser of all rights under these representations. All orders accepted shall be deemed accepted subject to this warranty which shall be exclusive of any other or previous warranty, and shall be the only effective guarantee or warranty binding on Onyx Valve.



#### 4. What Is Not Covered By Our Warranty; Types of Damages and Claims For Which We Are Not Responsible.

The following are examples of the kinds of defects which are not covered by our warranty: defects which are caused by improper installation, improper or abnormal use or operation, or improper storage or handling; defects caused by our customer's failure to perform normal preventive maintenance; defects caused by the use of replacement parts not manufactured or supplied by us; defects caused by repairs by persons not authorized by us; defects caused by modifications or alterations made by our customer, and any damage to our Product occurring while it is in our customer's possession. Since these are examples and not a complete list, we suggest that our customers contact our Customer Service Department if they have any questions concerning the scope of our warranty.

Additional costs incurred by our customers because of delays in delivery are consequential damages for which we are not responsible.

Risk of loss or damage to our Products passes to our customer when we tender our Products to the carrier. Although we cannot process transit damage claims with any carrier on a customer's behalf, we will provide reasonable assistance to our customers when such claims arise.

#### 5. Consultations with Customers.

When so requested, our engineers and other personnel may consult with our customers concerning our Products. While our employees offer their best judgment on any question, the ultimate responsibility for selecting that Product which will perform the functions and applications desired by the customer rests with the customer. As noted above, we make no warranty, express or implied, as to the fitness of any Product for any particular purpose or use.

#### 6. How to Make a Claim.

Within the limits of the terms and conditions set forth on our quotation and acknowledgment forms and in this Warranty and Claims Policy, we will honor reasonable and justified claims when adequate evidence is provided to show that our Product was defective.

Whenever a customer has a claim concerning a Product, the customer should contact the Customer Service Department. **CUSTOMERS SHOULD NOT RETURN ANY PRODUCTS OR PARTS OR COMPONENTS TO US WITHOUT FIRST CONTACTING US.**

When contacting us, customers should have the following information available:

1. Customer name, location, purchase order number and date of purchase.
2. Serial number.
3. Product/Model number.
4. Equipment installation date.
5. Equipment failure date.
6. Application or service of unit.
7. Details of claim.

We shall have the option of requiring the return of the defective product to our factory, with transportation charges prepaid, to establish the claim and our liability shall be limited to the repair or replacement of the defective product, F.O.B. our factory. Onyx Valve Co will not assume costs incurred to remove or install defective products nor shall we incur back charges or liquidated damages as a result of warranty work.

We will notify the customer whether it will be necessary to return the Product or part or component to us. If so, we will issue the customer an "AUTHORIZED RETURN GOODS NUMBER" that must be attached to the Product or part or component before returning it. All items returned to us must be returned freight prepaid.

If we determine that the Product or part or component is defective and that the defect is covered by our warranty, we will, as explained above, correct the defect or refund the purchase price.

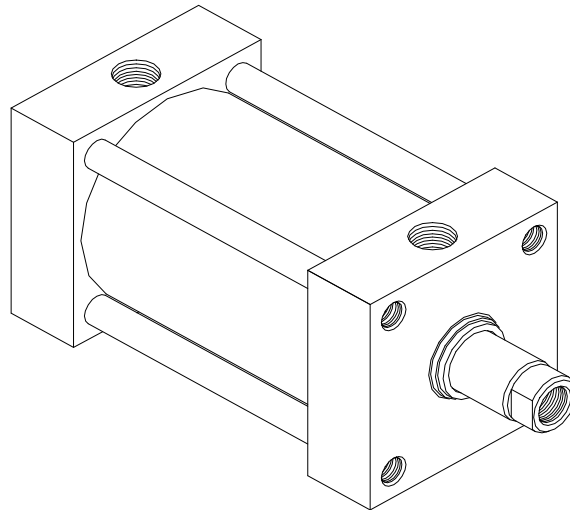
Customers should promptly inspect all Products upon delivery. Customers must make claims for shortages within 20 days after the date of shipment from our factory or warehouse. We suggest that shortages be noted on the bill of lading or packing list, which should then be sent to our Customer Service Department for verification.

All other claims must be submitted within 60 days after the date of shipment from our factory or warehouse, or in the case of an alleged breach of warranty, within 60 days after the date within the warranty period on which the defect is or should have been discovered.

Claims may not be deducted from payments made to us unless we have so agreed in writing in advance.



OPERATION AND MAINTENANCE  
MANUAL FOR PNEUMATIC CYLINDERS



SERIES PA  
VALVE ACTUATORS

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## A-STORAGE

If your RDC Controle pneumatic cylinder is not installed immediately, follow the procedure below for proper storage.

- 1- Store pneumatic cylinders in an indoor area which has a dry, clean and non-corrosive atmosphere. Take care to protect the cylinders from both corrosion and external damage.
- 2- Whenever possible, store cylinders in a vertical position (piston rod up) to prevent corrosion from possible condensation inside the cylinder.
- 3- Do not remove the port protector plugs until time of installation.
- 4- Apply a protective grease coating on all threads and other unpainted surfaces. After several weeks of storage, cylinders should be lubricated and cycled before being installed and submitted to any load.

## B-INSTALLATION

RDC Controle pneumatic cylinders are normally shipped with protective plastic plugs covering the ports. These plugs prevent dirt and other particles from entering the cylinder to avoid damaging the internal seals. We recommend removal of the port plugs just before connecting the air supply.

- 1- Attachment: Fix the cylinder strongly to its working attachments, making sure that the piston rod aligns perfectly with its mating component in both the extended and retracted position. Improper alignment could result in excessive rod gland and/or cylinder bore wear.
- 2- Protection: Special care should be given to the cylinder piston rod. Its surface should be free from any marks that could damage the piston rod wiper. Therefore any cylinders installed near a source of abrasive particles should be equipped with either a rod scraper or protective rod boot.
- 3- Cleanliness: Before connecting any air supply to the cylinder, all piping should be thoroughly cleaned to remove all chips or burrs, which might have resulted from cutting operation.



## C- OPERATION

Each RDC Controle pneumatic cylinder is meticulously assembled assuring perfect adjustment between all components. All sliding surfaces are factory lubricated with Lithium base grease (Molykote 44 Medium or equivalent). For low temperature applications below -40°F, a Phenyl / Methyl / Silicone grease is used (Molykote 33 Medium or equivalent). It is then inspected according to very high specifications to assure our customers of a premium quality product.

However, it is recommended to follow the recommendations below, in order to get the best possible performance from your cylinder.

- 1- Pressure: The maximum operating pressure of Series PA pneumatic cylinders should never exceed 150psig (1000KPa).
- 2- Filtration: The air supplied should always remain dry and free from any particles exceeding 30 microns.
- 3- Lubrication: It is recommended to use pre-lubricated air to maximize the life of the cylinder. A properly sized lubricator should be installed as close as possible to the cylinder.

## D- MAINTENANCE

RDC Controle cylinders are designed to give a very long life expectancy. However, packings and seals might need periodical replacement, to which the frequency will depend on the operating conditions and cycling.

- 1- Verification of piston packings
  - a) Apply air to blind end cap port of cylinder, allowing piston to travel its full stroke.
  - b) Disconnect air line from rod end cap port (head) of cylinder.
  - c) Apply pressure with your thumb to the open port. Maintain a few seconds and try to feel if air pressure is building up under your thumb. The affirmative would mean that the piston packing is leaking and therefore should be replaced.
  - d) Repeat steps a), b) and c) to verify the other piston packing. Pressure should be applied at rod end and piston rod should be retracted.



- 2- Verification of rod packings and seals
  - a) Apply air pressure to rod end port of cylinder
  - b) Spray a leak-detecting soap solution to piston rod and gland.
  - c) The formation of bubbles means that the responsible seal or packing has to be replaced.
  
- 3- Verification of barrel seals
  - a) Apply air pressure to the blind end cap port of the cylinder.
  - b) Spray a leak-detecting soap solution all around the barrel joint of the blind end cap.
  - c) The formation of bubbles means there is a leak... Verify if all four tie rods are torqued adequately, according to the chart included in this manual. If leakage persists, cylinder should be dismantled to correct the problem.(see dismantling and assembling instructions)
  - d) Repeat steps a), b) and c) for the rod end cap.





## E- REPAIR

Repair of pneumatic cylinders should always be done in a clean area, equipped with adequate tooling.

### 1- Dismantling the cylinder

- a) Loosen the tie rod nuts 1/4 turn at a time alternating from corner to corner until tension is completely relieved on the tie rods.

#### **CAUTION: SPRING-RETURN CYLINDERS**

Cylinders loaded with a compressed spring are normally identified with a special nameplate. If you have any doubt, communicate with RDC Controle to have the serial number checked.

The tie rods on a spring-return cylinder are normally longer to allow easier and safer dismantling of the cylinder. It is very important protect these extensions from damage and corrosion.

When removing the tie rod nuts on spring-return cylinders, ensure that the tie rods do not loosen from the cylinder head. Remove the nuts from the tie rods when the spring has totally decompressed.

In cases where the tie rod extensions have been cut or damaged, it is possible to dismantle the cylinder by removing two tie rods from opposite corners and replacing them with threaded rods of the same size and sufficient length. Afterward, remove the other two tie rods and relieve the spring by unscrewing the nuts from the threaded rods.

RDC Controle will not be held responsible for any injuries to persons or property when a customer attempts to repair any spring loaded cylinder. We recommend to send all spring-return cylinders to our facility to have them repaired by our qualified technicians with proper equipment.

- b) Remove the nuts and tie rods from cylinder head.
- c) Remove cylinder head from assembly.
- d) Remove the piston and piston rod assembly from the barrel.
- e) Remove cylinder cap



- f) Inspect the barrel internal surface for any scores that could damage the packings.
- g) Remove the gland bushing from the head using a 1/4" thick flat bar.
- h) Remove packing from both piston and gland bushing, noting orientation of packing lips.
- i) Clean all parts thoroughly.
- j) Check all parts for excessive wear. Damaged parts should be replaced.
- K) In cases where the piston rod has to be removed from the piston, use a strap wrench around the piston and a "D" wrench on the rod flats.  
Caution: the threads have been locked with an anaerobic sealant; you may have to heat the assembly to ease the loosening.

## 2- Re-assembly of cylinder

- a) If the piston rod has been removed from the piston, re-insert the piston rod into the piston on the thread release side. Apply a few drops of an anaerobic sealant (RDC Controle recommends Loctite #262). Secure the rod into the piston using a strap wrench and "D" wrench.
- b) Apply a light coating of grease on the outside diameter of piston (RDC Controle recommends any lithium based precision grease equivalent to Dow Corning's Molykote 44 Medium or equivalent). For low temperature applications below -40°F, a Phenyl / Methyl / Silicone grease is used (Molykote 33 Medium or equivalent).
- c) Leave the piston flat on a table with the piston rod standing up.
- d) Install the first packing in the upper groove making sure to align the packing lips upward.
- e) Cylinders of bore sizes 10" and up have a third groove on their piston to insert a Teflon wear strip. Roll the band around the piston; the two ends of the band should meet with an approximate space of 1/8". Maintain it in place with one hand until the insertion of the piston in the barrel.
- f) Place the barrel vertically on the table and apply a light coat of grease on the internal surface - (RDC Controle recommends any lithium based precision grease equivalent to Dow Corning's Molykote 44 Medium or equivalent). For low temperature applications below -40°F, a Phenyl / Methyl / Silicone grease is used (Molykote 33 Medium or equivalent).



- g) Insert the piston and piston rod assembly into the barrel. The bottom groove should remain empty. If necessary, use a nylon tip to help the insertion of the packing to avoid any damage. Slide the piston all the way to the other end of the barrel and let the empty groove come out of the tube.
- h) Install the second packing with its lips in the opposite direction.
- i) Push the piston back in the tube and re-apply grease on the internal surface at each end. (RDC Controle recommends any lithium based precision grease equivalent to Dow Corning's Molykote 44 Medium or equivalent). For low temperature applications below -40°F, a Phenyl / Methyl / Silicone grease is used (Molykote 33 Medium or equivalent). Put aside.
- j) Apply sealing gaskets into the groove face of the head and cap.
- k) Let the barrel sit in the cap face groove.
- l) Screw the tie rods into the threaded holes on the head.
- m) Insert into the gland bushing, the seals and packings in their respective grooves. Make certain that both seals have their lips facing in opposite directions.
- n) Apply a light coat of grease to the internal surface of the bushing (RDC Controle recommends any lithium based precision grease equivalent to Dow Corning's Molykote 44 Medium or equivalent. For low temperature applications below -40°F, a Phenyl / Methyl / Silicone grease is used - Molykote 33 Medium or equivalent). Put a circle of Loctite thread sealer 565 on the thread (the end with o-ring) and screw this into the head. Torque firmly.
- o) Install the head-tie rods-bushing assembly on the other end of the cylinder barrel being careful not to damage the rod seals.
- p) Screw the tie rod nuts and tighten 1/4 turn at a time proceeding from opposite corner to opposite corner. Consult the recommended torque chart supplied.



## PERFORMANCE – CYCLE EXPECTATIONS

How many cycles can I expect? A cycle being one full extension of the piston rod and one full retraction. The answer depends on many factors that can affect the longevity of the cylinder seals and moving parts. Here some are examples:

- Service factor as in how hard the cylinder is working in proportion to how hard it can work is the most significant.
- Temperature extremes and thermal cycling.
- Speed of operation, stops, and direction changes.
- Mounting alignment – how well aligned is your actuator to your valve?
- Positioning of valve/damper – throttling a valve, each change in direction should be counted
- 
- Media supply quality – Air line contamination can cause internal cylinder corrosion and greatly decrease performance of seals.
- Slamming – Does your cylinder slam at end of stroke?
- Quality valve – Well supported stem important to avoid lateral load.
- External environment – all hazardous conditions that can corrode/jam cylinder
- 
- Dead operation – Cylinder not being stroked for long periods of time.

Note: RDC Controls Ltd PA Series cylinders have high quality seals and have achieved millions of cycles according to some customers in high cycling applications. However, all of the above factors above will influence the number cycles.



## F-TIE ROD TORQUE CHART

PA Series  Bore	Tie Rod		TORQUE		
	Material	Diameter	Steel Barrel	Stainless Steel Barrel	Composite Barrel
3-1/4"	Stressproof Steel	3/8"	10 lbf-ft	10 lbf-ft	10 lbf-ft
4"	Stressproof Steel	3/8"	10 lbf-ft	10 lbf-ft	10 lbf-ft
5"	Stressproof Steel	1/2"	20 lbf-ft	20 lbf-ft	20 lbf-ft
6"	Stressproof Steel	1/2"	25 lbf-ft	25 lbf-ft	20 lbf-ft
7"	Stressproof Steel	5/8"	55 lbf-ft	55 lbf-ft	50 lbf-ft
8"	Stressproof Steel	5/8"	60 lbf-ft	60 lbf-ft	50 lbf-ft
10"	Stressproof Steel	3/4"	90 lbf-ft	90 lbf-ft	100 lbf-ft
12"	Stressproof Steel	3/4"	110 lbf-ft	110 lbf-ft	100 lbf-ft
14"	Stressproof Steel	7/8"	160 lbf-ft	160 lbf-ft	140 lbf-ft
16"	Stressproof Steel	1"	250 lbf-ft	250 lbf-ft	225 lbf-ft
18"	Stressproof Steel	1-1/8"	350 lbf-ft	350 lbf-ft	300 lbf-ft
20"	Stressproof Steel	1-1/4"	450 lbf-ft	450 lbf-ft	400 lbf-ft
22"	Stressproof Steel	1-1/4"	550 lbf-ft	550 lbf-ft	400 lbf-ft
24"	Stressproof Steel	1-3/8"	650 lbf-ft	650 lbf-ft	650 lbf-ft
26"	Stressproof Steel	1-3/8"	825 lbf-ft	825 lbf-ft	825 lbf-ft
28"	Stressproof Steel	1-3/8"	825 lbf-ft	825 lbf-ft	825 lbf-ft
30"	Stressproof Steel	1-3/8"	825 lbf-ft	825 lbf-ft	825 lbf-ft
32"	Stressproof Steel	1-3/8"	825 lbf-ft	825 lbf-ft	825 lbf-ft
36"	Stressproof Steel	1-3/8"	825 lbf-ft	825 lbf-ft	825 lbf-ft