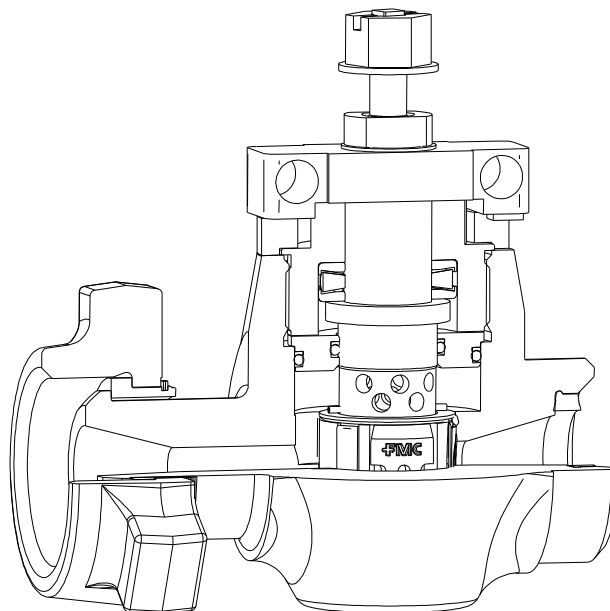


OPERATION AND MAINTENANCE MANUAL, FLOWLINE CHOKE THROTTLE VALVE

Rev	ECN No.	Date	Reviewed By	Approved By	Status
B	5022340	27-APR-2009	Stroebe, Brent	Douglas, Don	RELEASED

Summary:

Operating, maintenance and storage instructions – WECO® Flowline Choke Throttle Valve.

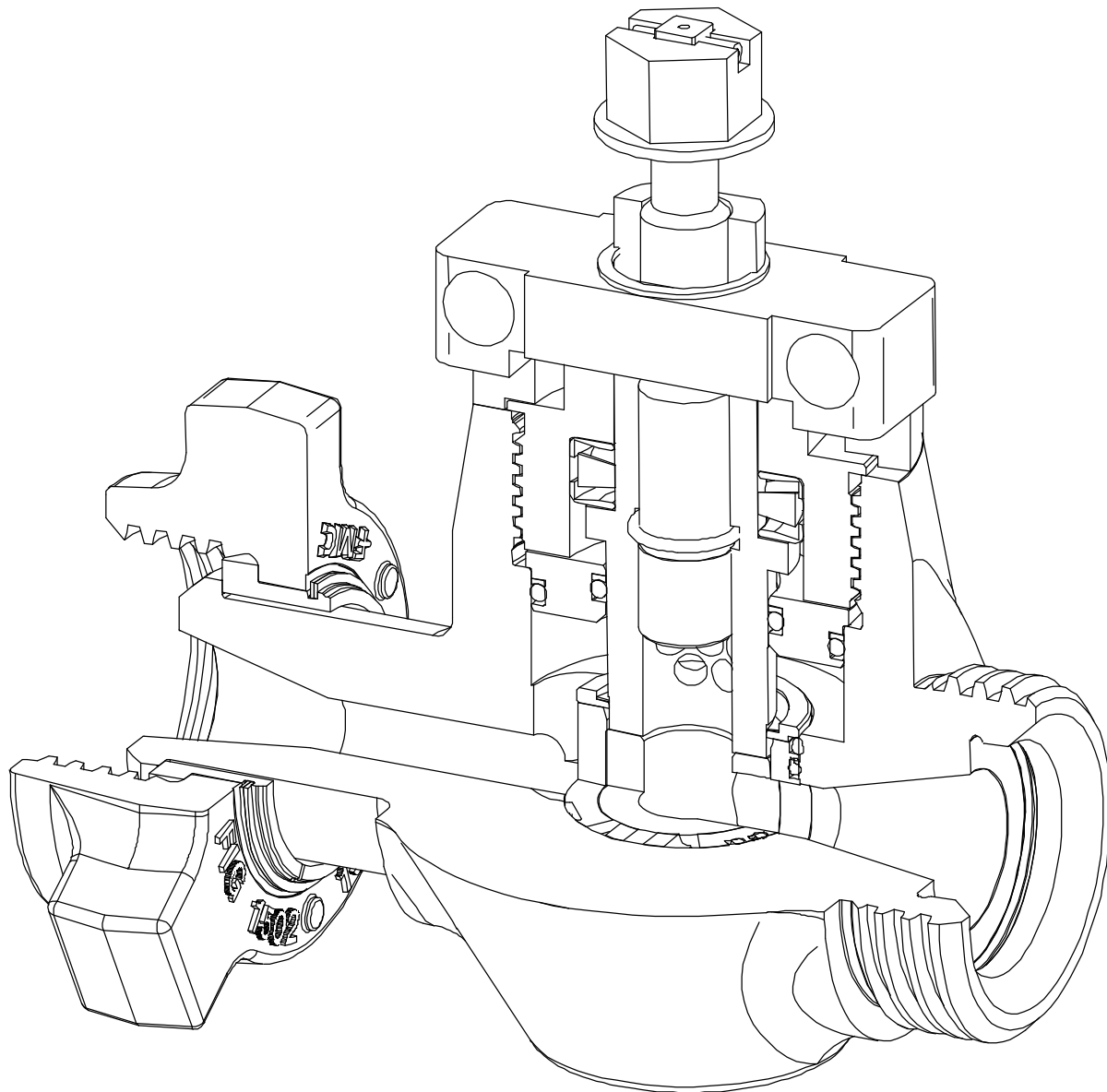


NOTES:

WECO[®] Flowline Choke Throttle Valves

Operating and Maintenance Instructions

2" 15,000 PSI, 0.88" Bore, STANDARD SERVICE



1.0 INTRODUCTION

The Flowline Choke Throttle Valve offers new technology for well service pumping. This valve has been designed for highly erosive applications in which standard plug valves are unable to provide adequate life and safety. By providing a unique combination of a ported choke cage coupled with conventional plug valve sealing technology, the Choke Throttle Valve is capable of handling your high flow throttling needs.

2.0 WARNINGS

FMC cannot anticipate all of the situations a user may encounter while installing and using FMC products. Therefore, the user of FMC products **MUST** know and follow all applicable industry specifications on the safe installation and use of these products. Refer to the FMC product catalogues, product brochures and installation, operating and maintenance manuals for additional product safety information or contact FMC at 800-772-8582.



WARNING: Failure to follow these warnings could result in serious injury or death!

1. Do not mix or assemble components, parts or end connections with different pressure ratings. Mismatched parts may fail under pressure.
2. Do not use or substitute non-FMC components or parts in FMC products and assemblies.
3. Do not strike, tighten or loosen pressurized components or connections.
4. Do not exceed the rated working pressure or temperature rating of the product.
5. Complete and proper make-up of components and connections is required to attain rated working pressure.
6. Do not use severely worn, eroded or corroded products. Contact FMC for more information on how to identify the limits of erosion and corrosion.

7. Follow safe practices when using products in overhead applications. Products not properly secured could fall.
8. Select only appropriate product and materials for the intended service.
9. Do not expose standard service products to sour gas fluids. (Refer to NACE MR0175). Do not interchange sour gas with standard service components.
10. Use appropriate safety precautions when working with ferrous products in below freezing temperatures. Freezing temperatures lower the impact strength of ferrous materials.
11. Follow manufacturers instructions and Material Safety Data Sheet directions when using solvents.
12. Make certain that personnel and facilities are protected from residual hazardous fluids before disassembly of any product.
13. If any leakage is detected from FMC products, remove them from service immediately to prevent potential damage and personal injury.
14. Do not place excessive external loads on the product. These include axial loads, bending and torsional loads. The product's design rating is only valid in the absence of external loading. Improper external loading may severely limit the performance of the product and create an unsafe condition.

3.0 SAFETY INSTRUCTIONS

The applications of FMC products are in working environments where general personnel safety procedures and policies **MUST** be followed. Always use appropriate protective equipment in high pressure, extreme temperature or severe service applications. The proper use of this valve requires a full understanding of the operating instructions contained within this manual.

4.0 CHOKE THROTTLE VALVE PRINCIPLE OF OPERATION

The Flowline Choke Throttle Valve is a new concept in well service pumping valves. The valve combines the best attributes of a ported cage choke and a plug valve into

one valve. The choke portion of the valve is used to control throttling high velocity flows while the plug valve portion of the valve remains full open. When being opened and closed, the plug valve portion is protected from high velocity erosive flow by the choke portion of the valve. Because of the combined use of the two halves of the valve, high velocity erosive flows can be throttled through the valve without degrading the positive shutoff performance of the valve.

Fluid enters the choke through the inlet side of the valve. Fluid is then ported up into an annular area surrounding the outside of the choke cage. The fluid then travels radially inward by way of the multiple ports through the side wall of the cage. The multi-turn stem tip can be adjusted up and down inside the cage to vary the amount of flow allowed through these ports. This is the means of throttle control. Next the fluid travels down through the inside of the quarter-turn shutoff plug and out the plug's single outlet port. This flow will only occur when the plug is rotated such that the outlet port is aligned with the body's outlet. When the plug is rotated one-quarter turn away from this alignment, then the flow is shut off and a metal seal is formed between the outside of the plug and a seal segment located between the plug and the body. See Figure 1 for an illustration of the flow path through the valve when both the throttle and shutoff are in the full-open position.

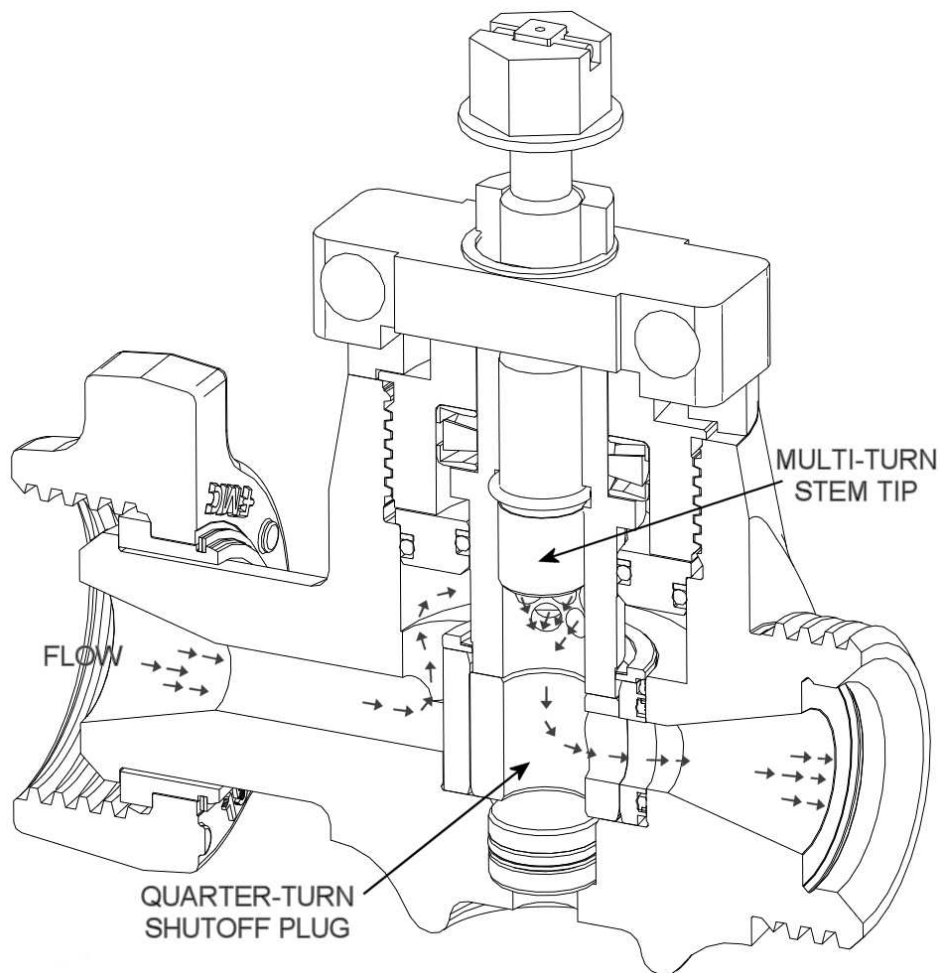


Figure 1: Flow path through fully opened valve

5.0 OPERATING INSTRUCTIONS

Flowline choke throttle valves are used as throttling and bleed valves. Flow must only be allowed through the valve in the designated flow direction. If flow is allowed in the wrong direction, then extreme wear and damage to the valve can occur. A flow direction marking is located on the outside of the valve body.

1. Prior to installation, the choke should be inspected for proper operation and orientation. The valve should be free of contamination and the stem should move freely by turning the throttling nut on top of the valve.
2. It is very important to verify the choke valve's flow direction. The choke valve is unidirectional. To identify flow direction, the valve has an arrow marked into both sides of the outside of the body. If the choke is installed backwards, it will not be possible to fully close the valve.



If the choke valve is installed the wrong way in a flow line, it will not be possible to fully shut off the flow through the valve. Closing the quarter-turn shutoff control will not result in complete flow shutoff. Extreme wear and damage to the valve can also occur and could result in a hazardous condition.

WARNING



Never look into the valve bore while the valve is in a flow line. Pressure and fluids could escape from the valve causing bodily injury.

WARNING

3. Before operating the valve, verify that the stop ring is installed on top of the valve (see Figure 2). It is secured with two cap screws. This ring prevents the body cap from backing out of the body and also provides the quarter turn stops for the bar control. Do not operate the valve without this stop ring properly installed. The absence of this ring can allow the body cap to back out of the body and create an unsafe condition.



Do not operate the valve without the stop ring (see Figure 2) properly secured to the top of the valve. The absence of this ring can create an unsafe condition.

WARNING

4. The choke valve has two manually operated controls:
- a) The multi-turn throttle control nut: This nut requires a 1-1/2" wrench. The throttling control of the valve is operated by turning the throttling control nut at the top of the valve. Turning it clockwise while looking at it from the top, moves the stem down and throttles the valve closed. Turning the nut counter-clockwise moves the stem up and throttles the valve open. It takes approximately 4-1/2 turns to move the throttle stem from full closed to full open.



Opening the multi-turn throttle control will **NOT** allow pressure to be relieved or flow to pass through the valve **UNLESS** the quarter-turn shutoff control is already open.

NOTE

- b) The quarter-turn positive shutoff control: The positive shutoff of the valve is controlled by using a standard plug valve operating rod to engage one of the holes in the rectangular control bar on top of the valve. The control bar can be rotated 90 degrees. When the control bar is aligned with the flow bore of the valve, the valve is open. When it is perpendicular to the flow bore of the valve, the valve is closed. To use the valve properly, always be sure that the throttle control nut is fully closed (down – see 3a above) before opening or closing the shutoff control bar. Always fully open or close the shutoff, never operate the valve with the shutoff control bar partially open. Throttling of the valve is only performed with the stem throttle control.



ONLY the quarter-turn shutoff control can be used to completely close the valve. The multi-turn throttle control can **ONLY** choke the flow to a low rate, it can **NOT** completely stop flow through the valve.

NOTE



Always be sure that the throttle control nut is fully closed (down) before opening or closing the bar control shutoff. Always fully open or close the bar control shutoff, never operate the valve with the bar control shutoff partially open. Failing to use the controls properly will result in improper throttling of the flow through the valve and may result in extreme wear and damage to the valve.

CAUTION

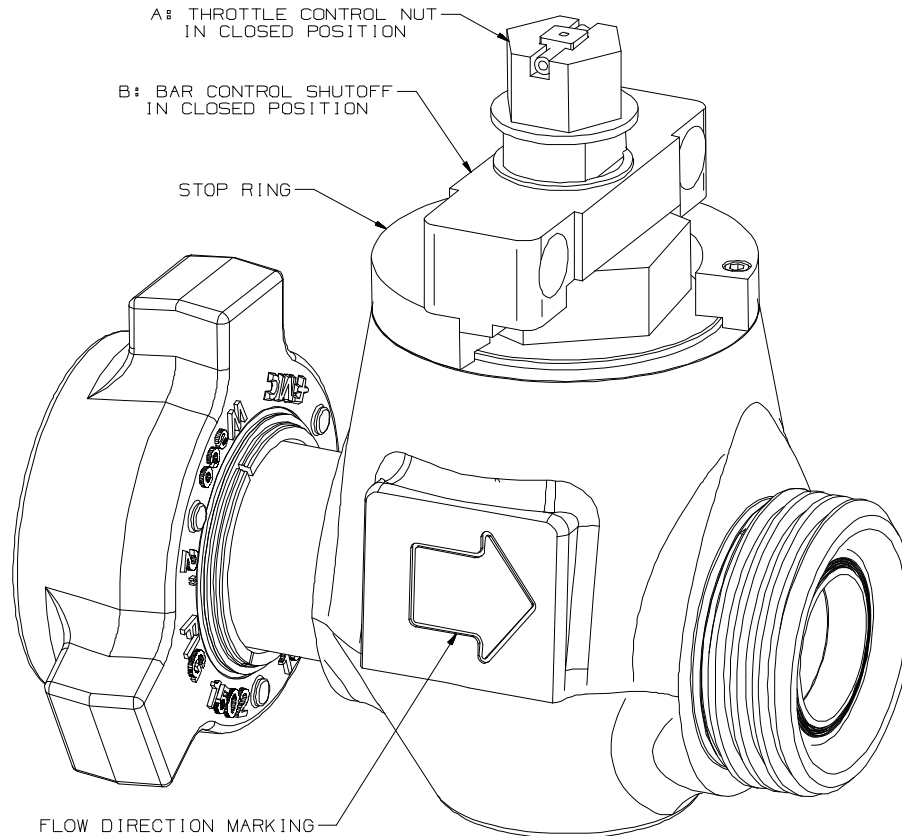


Figure 2: Valve fully closed

5. The following control process should be used for bleeding a pressurized line:
 - a) The valve should initially be in the line in the fully closed position with the bar control shutoff perpendicular to the flow bore and the throttle control nut all of the way down (see Figure 2).
 - a) To initiate a bleed, first fully open the quarter-turn shutoff control by engaging the bar control and rotating it 90 degrees until it is in line with the flow bore. Some small amount of bleeding will begin (see Figure 3).
 - b) To complete the bleed, slowly open the throttling control by rotating the throttle control nut counter-clockwise (while looking at the valve from the top) thereby moving the stem upwards. Fully open the throttle to minimize the amount of wear to the valve (see Figure 4).
 - c) Always be sure to fully close the throttle control nut before opening or closing the quarter-turn shutoff control.

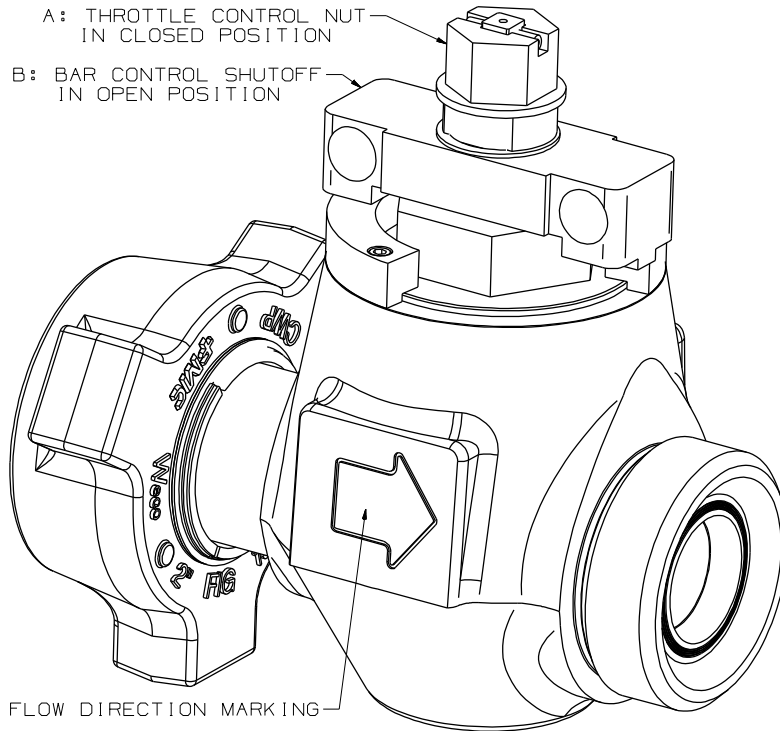


Figure 3: Shutoff is open, throttle is closed

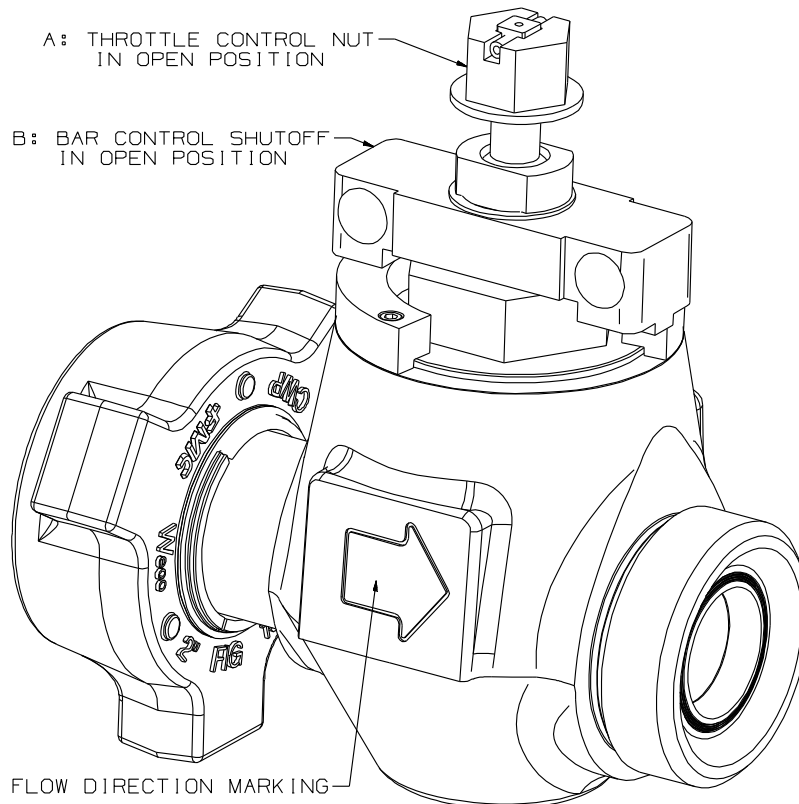


Figure 4: Valve fully open

6.0 MAINTENANCE INSTRUCTIONS

Your FMC Flowline Choke Throttle Valve can be kept working with the best possible performance with the following preventative maintenance practices.

1. Grease the valves after each use with FMC approved plug valve grease. There are two grease fittings located on opposite sides of the lower half of the body. Be sure to pump grease into BOTH fittings using the following technique:
 - Between 32°F and 250°F use Weco® plug valve lubricant and sealant No. 3256666.
 - Between -20°F and 50°F use Weco® plug valve lubricant and sealant No. 3251968.
 - a) Grease valve in the partially open position until grease can be seen through the bore of the valve.
 - a) Cycle valve closed to open and pump a little more grease into the valve while the valve is in the open position.
 - b) If valve is in-line, grease valve a moderate amount until a slight build up of pressure is observed on the grease gun (less than 500 psi). Do not grease this valve with the high pumping pressures that are typical of standard plug valves.
2. Grease valves immediately after pumping solvents through them.
3. Thoroughly flush valves with clean water after each use to wash away any cement or acids that may have been left in the valve (where applicable).
4. Verify that the stop ring (see Figure 2) is properly secured to the top of the valve.
5. Spray rust preventative oil over exposed threads on valve to prevent rusting during storage.
6. Replace grease fittings that become damaged to prevent leaks and to allow proper greasing of the valve.
7. Inspect and service the valve on a regular basis to prevent corrosion and erosion of the valve body. Disassemble and replace worn parts when necessary. There are two levels of service that may periodically be required to restore the valve to optimum performance.
 - a) **PLUG SHUTOFF REPAIR:** Reference OMM50001314

This repair level is required when the valve fails to achieve leak-free shutoff. The components related to the quarter-turn shutoff control are replaced. This includes the plug and the segments and seals surrounding the plug. Obtain OMM50001314 for part number information and detailed repair instructions.

a) CAGE THROTTLE REPAIR: Reference OMM50001314

This repair level is required when the valve fails to properly throttle flow through the choke cage. The components related to the multi-turn throttle control are replaced. This includes the cage and the stem and the parts surrounding the throttle mechanism of the valve. Obtain OMM50001314 for part number information and detailed repair instructions.

7.0 STORAGE INSTRUCTIONS

When not in use, the valve should be stored in an area that protects it from sun, rain, sand, and other debris. Before storing or shipping the valve, ensure that the operating fluids have been removed by flushing with water. After cleaning, fully drain all fluids from the valve and spray the valve with a water displacing lubricant such as a Teflon / oil mix. Spray inside both flow bores as far into the valve as possible. Also spray the threads of the union ends. During long-term storage keep the valve dry and painted to prevent corrosion.