

	<b>INSTALLATION, MAINTENANCE AND OPERATING INSTRUCTIONS</b>	
38-52 Review Avenue Long Island City, NY 11101	<b>GATE, GLOBE AND SWING CHECK VALVES</b>	
☎ 1 800 221-1115 ✉ wew@williamsvalve.com	<a href="http://www.williamsvalve.com">www.williamsvalve.com</a>	IMO1 2010 Rev 0

## FOREWORD

The following instructions are offered as a reference aid to the valve user when installing, maintaining or operating Williams' Gate, Globe and Swing Check valves. This document, consisting of basic information, should be of interest to the layman, as well as, the experienced valve user; however, it does not replace the need for an understanding of the particular application, and is not intended to be a complete instruction to the inexperienced valve user.

### 1. RECEIVING & HANDLING

Upon receipt of valves at destination, they should be inspected for shipping damage. The areas to inspect are the pressure retaining shell, valve ends and valve operating mechanisms such as handwheel, actuator, stem, etc.

If valves show no sign of shipping damage, they should be stored in a sheltered area to protect them from weather, dirt and damage. Materials attached to protect valves during shipment should not be removed until time of installation in the line.

Each valve should be handled only with apparatus that will safely support the valve assembly weight. Slings should never be placed around the handwheel, stem or gland adjustment parts. Protect valve ends by leaving end protectors in place until their removal is necessary. Valves are shipped in the open or closed position, depending on the valve type, to protect seating surfaces and should be left in these positions, if possible, until completion of installation.

### 2. PREPARATION FOR INSTALLATION

Prior to installing the valve, clean out all dirt and foreign matter from inside the piping system. Wherever possible, the line should be blown out with clean compressed air or flushed out with water to remove all dirt and grit. The valve should be cleaned out in a similar manner.

Check for adequate clearance around the valve to insure that it may be operated properly and that enough free space is available for maintenance of the valve. Valves installed with the handwheel facing down present a head hazard if not placed at a proper elevation. Care should be taken to provide adequate headroom below the handwheel when it is in full open position.

A clearance of 6 feet, 6 inches above the operating floor is usually sufficient.

Valve with actuators will require additional clearance around them for making service connections and maintenance to the actuator.

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### 3. INSTALLATION

#### A. Precautions:

1. The valve body is a rugged structure, but is not intended to be a means of aligning improperly fitted pipe. Care must be taken to ensure that any stresses caused by improper pipe alignment are relieved elsewhere in the piping system. Piping should be supported by hangers placed on either side of the valve and large heavy valves should be independently supported.

#### B. The following general rules should be followed when installing the valve in the pipe line:

1. Keep pipe ends free of dirt, spatter and grit.
2. Install the valve with flow in proper direction with regard to valve internals. The normal and preferred mounting of Gate valves for performance, operation and maintenance is with stem vertical and handwheel above the body. However, other orientations are possible except where specifically stated otherwise. Globe Valves should be mounted upright with the stem vertical, any deviation from vertical is a compromise. Swing or lift check valves installed in horizontal lines must have the valve cover facing up. Swing Checks in vertical lines must have the flow arrow pointing up.
3. Handle valve only with apparatus that will adequately support it, using a safe and proper technique.
4. Install the valve using good piping practices as governed by the applicable code or specification.
5. Swing Check valves are usually shipped with disc blocked closed-remove blocking.
6. Flanged End Valves
  - a. Do check and align pipe flanges.
  - b. Do use proper type and size gaskets.
  - c. Do not attempt to fit two flanges that are not alike together. Plain face with plain face or raised face with raised face is the proper procedure. Bolting together flanges of two different materials requires special instructions. Refer to Engineering Section of manufacturer's catalog.
  - d. Do NOT TIGHTEN BOLTS IN ROTATION: they must be tightened in a crossover or star pattern to load the bolts evenly.

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7. Butt-Weld End Valves

- a. Valve, pipe and weld rod must all be of materials that are mutually compatible.
- b. Make certain valve is in the open position before applying heat. Check valves may be in the closed position.
- c. Welding should be performed by a qualified welder using the correct welding equipment and following an acceptable procedure.
- d. After completion of the weld, it should be stress relieved if required by the welding procedure and subjected to a pressure test to ensure a sound weld.

4. POST INSTALLATION

After installation of the valve, the line should be flushed or blown out to remove dirt and foreign objects.

Check for tightness of body/bonnet joint and adjustment of packing gland.

Operate valve to make sure that nothing is preventing its proper operation.

Pressure test the joint to prove quality of flange bolting, welding, etc.

Note: Use of caustics or other chemical agents to flush pipe and valve may require the removal of the valve packing and gasket based on compatibility of flushing agent, gasket and packing material.

5. MAINTENANCE & TROUBLE SHOOTING

Valves do not need much attention, but to assure the best operating life and a lower incidence of maintenance, a program for periodic inspection should be established.

Items to check on a periodic basis are:

- A. Glands should be kept tight to prevent leakage. Avoid over-tightening stuffing nuts or stuffing box packing. This unduly compresses the packing, which considerably shortens its life and increases operating torque. The gland should be only as tight as is necessary to seal.

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- B. Observe valve for leakage taking special note of the body/bonnet joint area, the end connections and the pressure retaining shell. If leakage at the body/bonnet joint is evident, check tightness of bolts in a bolted bonnet valve, bonnet or union nut in a threaded or union bonnet valve.

If leakage is at the end connections, check the tightness of the flange bolts in a flanged valve or the weld in a welded valve.

After determination of joint tightness and leakage is still evident, the joint will have to be disassembled and the gasket replaced and/or sealing surfaces repaired.

- C. Lubrication and cleanliness of exposed stems.  
D. Lubrication of the valve yoke nut.

Note: Use of a tacky lubricant on exposed threads can pick up abrasive particles in the atmosphere. Dry film lubricants are preferred.

- E. Open and close valve to check for possible obstruction to travel.  
F. Check tightness of yoke or operator bolting.

## 6. REPAIRS

The following general instructions are offered to make limited repairs to the valve. For major repairs, contact the authorized *WILLIAM E. WILLIAMS VALVE CORPORATION* representative for special instructions. Always give the information shown on the identification plate affixed to the valve.

- A. When holding a valve in a vise to work on it, always put the valve ends against the vise jaws. Never hold the valve with the vise jaws pressing against the valve side since this will cause distortion.
- B. Never use pipe wrenches to remove or replace bonnets on small valves, especially bronze. A pipe wrench will pinch or swage the body neck.
- C. Re-packing – Isolate and de-pressurize valves prior to attempting to add packing or to repack valve. Although valve is designed for re-packing under pressure, there may be foreign material on the backseat so it is good practice to repack only when valve is de-pressurized.

Loosen and remove packing retainer, remove all sets of packing from stuffing box. Clean out stuffing box and inspect stem for signs of damage. Wear or roughness of the stem can make re-packing futile.

Install new packing and re-assemble packing retainer to valve.

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- D. Replacing Bonnet Gasket – Isolate and de-pressurize valve prior to attempting to disassemble valve.

On bolted bonnet valves, mark the body and bonnet flanges so they may be mated in the same position when reassembled.

Valves having large or heavy top works will require the use of a hoist or crane to support and lift the top works away from the valve body.

Loosen bonnet joint and lift bonnet and top works away from body in a direct straight line. On gate valves, the wedge should be marked so that it goes back against the same seat ring when reassembled.

Reassemble in reverse order of above instructions. If valve has not been repacked recently, it should be done prior to placing valve back into service. Tighten Bonnet Bolting using a star pattern.

Prior to re-pressurizing the valve, recheck the tightness of the body/bonnet joint.

7. **TOOLS & EQUIPMENT**

Standard wrenches and tools are generally suitable for servicing Valves. They are:

- A. One set box, open end or socket wrenches.
- B. One set Allen-type hex key wrenches.
- C. Standard packing tool or blunt hook to remove packing rings.
- D. Combination oilstone, coarse and fine grit, to polish wedge and seat ring faces.
- E. Hammer and punches to drive out pins.
- F. Hoist to lift large or heavy items.

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8. OPERATION

The following are general hints on the operation of valves:

- A. One and close valves slowly whenever possible. When the valve has been fully opened, rotate the handwheel one- quarter turn in closed position so as not to leave the valve jammed open.
- B. Never put excessive leverage on handwheel to stop leakage as this may damage the stem and could ruin the valve.
- C. When a cool valve is suddenly opened to let hot material, such as steam pass through, the valve may leak slightly for a short time through the stem packing. Do not tighten the packing gland or nut when this happens, since it will only shorten the life of the packing. Allow the valve components to heat up and expand. The leak will generally stop within ten minutes.
- D. A Gate valve should not be used for throttling purposes.
- E. A Globe valve should not be throttled less than 25% open.
- F. A Swing Check valve should not be used in a vertical pipeline handling liquids at high heads, because severe water hammer may result from reversal of flow, or in applications where flow cycles are short or intermittent.

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## STORAGE, INSTALLATION AND MAINTENANCE PROCEDURES

### **GATE VALVE - O.S. & Y**

#### **1.0 Periodic Inspections**

- 1.1 The valve stem packing should be inspected at least monthly. If the stem packing shows signs of leakage simply tighten the adjusting nuts to compress the packing. Do not over-tighten the adjusting nuts as this will make operation of the valve more difficult. If after tightening the adjusting nuts to their fullest extent, the leakage does not stop, it is then necessary to replace the stem packing. It is not recommended that additional packing rings be added to the stuffing box as this may cause damage to the stem sealing system. Please contact Williams Valve or it's distributor for new stem packing sets. For packing replacement see paragraphs 2.2 and 2.3.
- 1.2 The lubrication of the yoke nut should be inspected at least monthly. A high pressure grease gun should be used for valves supplied with ball type grease fittings. For valves supplied with a Stauffer type grease cup, the cup should be checked to assure that it is full so that the grease can be injected by turning the screw cap. The valve stem threads should also be given a coating of lubricant.
- 1.3 Bonnet bolt tension should be checked periodically when valves are used in high temperature applications where creep may occur. Although leaks through ring joints are rare, erosion or corrosion could cause rings to fail. In these cases, a new ring gasket is required.

#### **2.0 Extraordinary Maintenance or Replacement of Damaged Parts**

- 2.1 Stem. If the stem looks or "freezes", cause can generally be attributed to worn packing, a dry yoke nut or dry stem threads. In either of these cases, the following service is required:
- a) Unscrew gland nuts, remove the gland flange and bushing to expose stem packing and lantern ring. Replace stem packing if it is damaged.
  - b) Check lubrication of yoke nut. If it is dry, remove the yoke nut and determine if there is evidence of seizure marks. If so, replace it with a new yoke nut. Also check the nut and stem threads.
- 2.2 **Disassembly of Stem Packing \***
- a) In those cases where the valve can not be removed from the piping system, it is important that prior to servicing, the valve be opened to its fullest extent. Partially unscrew nuts to reduce the compression load on the stuffing box. Remove the stem packing and then replace with new set(s) of packing. Finally, tighten nuts sufficiently while allowing the stems to operate smoothly.
  - b) To replace the stem when the valve is completely disassembled for general maintenance follow this procedure:

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### **GATE VALVE - O.S. & Y (Continued)**

- Open the valve half way and remove bonnet bolts and nuts.
- Lift up the bonnet to remove the wedge.
- With the bonnet removed, unscrew the gland bolts and lift up the gland flange exposing the stem packing.
- Remove the stem packing.
- Remove the stem through the stuffing box.

#### **2.3 The procedure to re-assembly the valve is as follows:**

Re-insert the stem through the stuffing box taking special care to reassemble parts in sequence. Insert the remaining packing rings into the stuffing box and compress using the gland and flange. Then, reassemble nuts and tighten. Note, the stem must slide freely through the stuffing box without applying excessive force. Finally, install the bonnet gasket making sure it is not damaged. The gasket should be replaced if there are any questions as to its performance.

2.4 Raise the bonnet, making sure the stem is in a half open position, then connect disc to stem. Lower bonnet on to the valve body making sure that the disc fits exactly into body guides and the bonnet gasket is properly seated. Align holes and tighten bonnet nuts taking care that excessive force is not used, possibly damaging the gasket. Hydrostatically test the valve to assure that there is no leakage.

#### **2.5 Disassembly of yoke nut**

When necessary use the following procedure for disassembling and replacing yoke nut:

- a) Direct hand-operated valves (handwheel).
  - Remove set screw.
  - Unscrew handwheel nut.
  - Remove handwheel.
  - Unscrew yoke nut retaining nut, removing spot welds, if necessary.

Reverse the procedure for re-assembly.

- b) Bevel gear operated valves
  - To remove the bevel gear from the valve, unscrew nuts and turn the handwheel in the open direction indicated by the arrow until the drive nuts are disengaged from the stem.
  - To check the condition of the drive nut or bearing, unscrew the retainer ring and remove the drive nut and bearing. If damaged, a new drive nut or bearing is necessary.

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## **GATE VALVE - O.S. & Y (Continued)**

### **2.6 Wedge and Seats**

Leakage through seats and wedges is not always easy to spot when valves are in service. However, when leaks are identified, immediate action is necessary. Any delay can permanently damage seat or wedge seal surfaces.

To repair or replace wedges or seats, the valve must be removed from the line and the following procedure should be applied:

- Make sure the valve is not under pressure before unscrewing bonnet nuts.
- Remove the bonnet, being careful not to damage the gasket.
- Remove the bonnet when the wedge is in the half open position.
- Lift up the bonnet until the wedge is disconnected from the guides.
- Release the wedge from the stem.

If seat surfaces show signs of seizing, pitting, grooves or other defects not deeper than 0.8 mm (1/32") it is possible to repair seating surfaces to its original conditions by relapping the surface with line grain abrasive paste, creating a perfect tightness once again.

Defects having a depth exceeding 0.8 mm (1/32") cannot be repaired by lapping. In this case, parts must be replaced.

It is recommended that the face of the disc be blued to check for contact of seating surface after final lapping. For re-assembly of valves use the procedure outlined under para. 2.4.

## **GLOBE VALVE - O.S. & Y**

### **1.0 Periodic Inspections**

1.1 The valve stem packing should be inspected at least monthly. If the stem packing shows signs of leakage, simply tighten the adjusting nuts to compress the packing. Do not over-tighten the adjusting nuts as this will make operation of the valve more difficult. If, after tightening the adjusting nuts to their fullest extent, the leakage does not stop, it is then necessary to replace the stem packing. It is not recommended that additional packing rings be added to the stuffing box as this may cause damage to the stem sealing system. Please contact Williams Valve or its distributors for new stem packing sets. For packing replacement see paragraphs 2.2 and 2.3.

1.2 The lubrication of the yoke nut should be inspected at least monthly. A high pressure grease gun should be used for valves supplied with ball type grease fittings. For valves supplied with a Stauffer type grease cup, the cup should be checked to assure that it is full so the grease can be injected by turning the screw cap. The valve stem threads should also be given a coating of lubricant.

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## GLOBE VALVE - O.S. & Y (Continued)

1.3 Bonnet bolt tension should be checked periodically when valves are used in high temperature applications where creep may occur. Although leaks through ring joints are rare, erosion or corrosion could cause rings to fail. In these cases, a new ring gasket is required.

### 2.0 Extraordinary Maintenance or Replacement of Damaged Parts

2.1 Stem. If the stem locks or freezes the cause can generally be attributed to worn packing, a dry yoke nut or dry stem threads. In either of these cases, the following service is required:

- a) Unscrew gland nuts, remove gland flange and bushing to expose stem packing and lantern ring. Replace stem packing if it is damaged.
- b) Check lubrication of yoke nut. If it is dry, remove the yoke nut and determine if there is evidence of seizure marks. If so, replace it with a new yoke nut. Also check the nut and stem threads.

### 2.2 Disassembly of Stem Packing\*

- a) In those cases where the valve cannot be removed from the piping system, it is important that prior to servicing, the valve be opened to its fullest extent. Partially unscrew nuts to reduce the compression load on the stuffing box. Remove the stem packing and then replace with new set(s) of packing. Reassemble plug and gland flange. Finally, tighten nuts sufficiently while allowing the stem to operate smoothly.
- b) To replace the stem when the valve is completely disassembled for general maintenance follow this procedure.
  - Open the valve and remove the bonnet bolts and nuts.
  - With the bonnet removed, unscrew the gland bolts and lift up the gland flange exposing the stem packing.
  - Remove the stem packing.
  - Remove handwheel, then turn stem to release it from yoke nut and remove from stuffing box.
  - Check condition of back-seat bushing for seizure marks. If apparent, order replacement parts.

### 2.3 The procedure to re-assembling the valve is as follows

Re-insert the stem through the stuffing box, taking special care to reassemble parts in sequence. Insert the remaining packing rings into the stuffing box and compress using the gland ring and flange. Then, reassemble nuts and tighten. Note, the stem nut must slide freely through the stuffing box without applying excessive force. Finally, install the bonnet gasket making sure it is not damaged. The gasket should be replaced if there is any question as to its performance.

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## GLOBE VALVE - O.S. & Y (Continued)

2.4 Raise the bonnet assembly, making sure the stem is in the fully open position. Lower bonnet on to the valve body making sure that the disc fits exactly into body guides and the bonnet gasket is properly seated. Align holes and tighten bonnet nuts taking care that excessive force is not used, possibly damaging the gasket. Hydrostatically test the valve to assure that there is no leakage.

### 2.5 Disassembly of yoke nut

When necessary use the following procedure for disassembling and replacing yoke nut.

- a) Direct hand-operated valves (handwheel)
  - Remove set screw.
  - Unscrew handwheel nut.
  - Remove handwheel.
  - Unscrew yoke nut retaining nut, removing spot welds if necessary.
  - Reverse the procedure for re-assembly.
  
- b) Bevel gear operated valves.
  - To remove the bevel gear from the valve, unscrew nuts and turn the handwheel in the open direction indicated by the arrow until the drive nuts are disengaged from the stem.
  - To check the condition of the drive nut or bearing, unscrew the retainer ring and remove the drive nut and bearing. If damaged, a new drive nut or bearing is necessary.

### 2.6 Disc and Seats

Leakage through disc and seats is not always easy to spot when valves are in service. However, when leaks are identified, immediate action is necessary. Any delays can permanently damage seat or wedge seal surfaces.

To repair or replace the disc or seats, the valve must be removed from the line, then use the following procedure.

- Make sure that the valve is not under pressure before unscrewing bonnet nuts.
- Remove bonnet, being careful not to damage the gasket.
- Remove bonnet when disc is in full open position.
- Lift up bonnet.

If seat surfaces show signs of seizing, pitting, grooves or other defects not deeper than 1.5 mm (1/16") it is possible to repair seating surfaces to its original conditions by relapping the surface with line grain abrasive paste, creating a perfect tightness once again. Defects having a depth exceeding 1.5 mm (1/16") cannot be repaired by lapping. In this case, parts must be replaced.

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### **GLOBE VALVE - O.S. & Y (Continued)**

It is recommended that the face of the disc be blued to check for contact of seating surface after final lapping. For re-assembly of valves use the procedure outlined under para. 2.4.

### **SWING CHECK VALVES**

No periodic maintenance is necessary. If gasket leaks are detected, correct using the following procedure.

1. Disassemble all cover bolts and nuts.
2. For check valves in sizes 16" and larger, lift up the cover by using a lever inserted into the drilled and tapped cover hole. For valves in sizes 14" and smaller, use one or two bolts and nuts inserted into cover holes and, using adequate force, move the cover upwards.
3. Check that the hinge, nut, and pin are in good condition and firmly connected. Replace damaged parts as necessary.
4. Lift and remove the disc-hinge assembly. Movement should be free and not hindered by any malfunction of the hinge pin. Where disc travel is not sufficiently smooth, remove plugs or blind flanges and then remove hinge pin. Check surface for seizure marks. If marks are deeper than 1.5 mm (1/16"); re-machine hinge pin and re-assemble. If defect depth is greater than 1.5 mm (1/16") a new hinge pin is necessary. When reassembling hinge pin, it is recommended that the disc be removed by loosening nut.
5. When leakage is due to deterioration of seal surfaces caused by corrosion or foreign substances, it must be determined whether the disc or seat seal are the cause.
  - a) Deterioration of disc surfaces.  
Disassemble disc by removing nut and washer. Repair surface by grinding and relapping using fine grain abrasive paste.
  - b) Deterioration of seat seal surfaces.

When seal surfaces are damaged and defects are confined to a small area but are not deeper than 0.8 mm (1/32"), the seal surface can be repaired. The recommended method is to use a cast iron strap with an outside diameter matching the valve's raceway. Then using a fine grain abrasive paste between the strap and raceway, it is rotated on the seat to restore original tightness. When defects are deeper than 0.8 mm (1/32") and found on the entire seal surface, a new seat is required. To replace the new seat, use preferably a pneumatic tool with a shape to match the dimensions of the valve seat. It is recommended that an anti-seizing compound be used when installing the replacement seat to make threading it in to the body easier.

**CAUTION:** Always be sure that the valve is de-pressurized and isolated prior to performing any maintenance work.