WILLIAMS VALVE

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

PRESSURE SEAL CAST STEEL GATE, GLOBE AND SWING CHECK VALVES

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Revision	Effective Date	Description	Prepared by	Approved by
01	2025-09	Initial Release	Eric Chen	Foster Voelker

SAFETY GUIDELINES

Prior to commencing any valve maintenance or service work, it is essential to ensure that Operations has locked out, isolated, and fully depressurized all relevant piping and equipment to establish a safe working environment.

Maintenance must not proceed until Operations has formally confirmed that it is safe to do so.

All jobsite safety protocols, lockout/tagout procedures, and work permit requirements must be followed without exception. Special attention should be given to double-seated valves, such as ball valves and wedge gate valves, as the body cavity may remain pressurized even after the process lines have been depressurized. Therefore, personnel must exercise caution and verify that all valve cavities are completely depressurized before commencing any service or disassembly work.

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1 FOREWORD

The improper installation, operation, or maintenance of a valve can pose significant risk to personnel and the environment. The following instructions are offered as a reference to aid the valve user when installing, maintaining or operating Williams Pressure Seal valves. This document consists 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 for the inexperienced valve user.

2 VALVE COMPONENTS

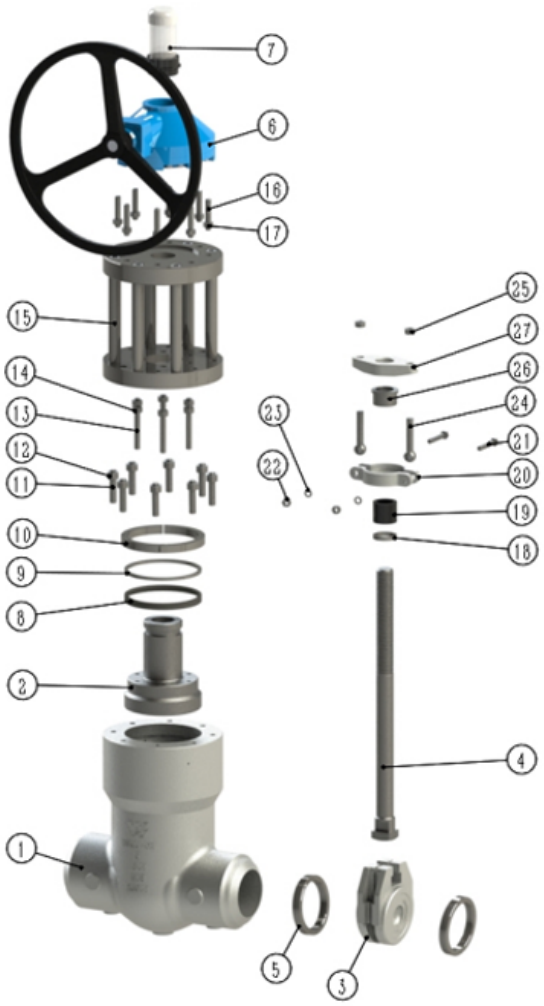
Pressure seal gate and globe valves are multi-turn valves featuring a rising stem design. They require multiple rotations of the handwheel to fully open or fully close the valve. These valves are intended for use only in the fully open or fully closed position and must not be used for throttling or flow regulation unless specifically designed for that purpose.

Self-acting check valves, in contrast, operate automatically based on flow and pressure differentials. They do not require manual actuation and are designed to prevent backflow without external control input.

2.1 Gate Valves

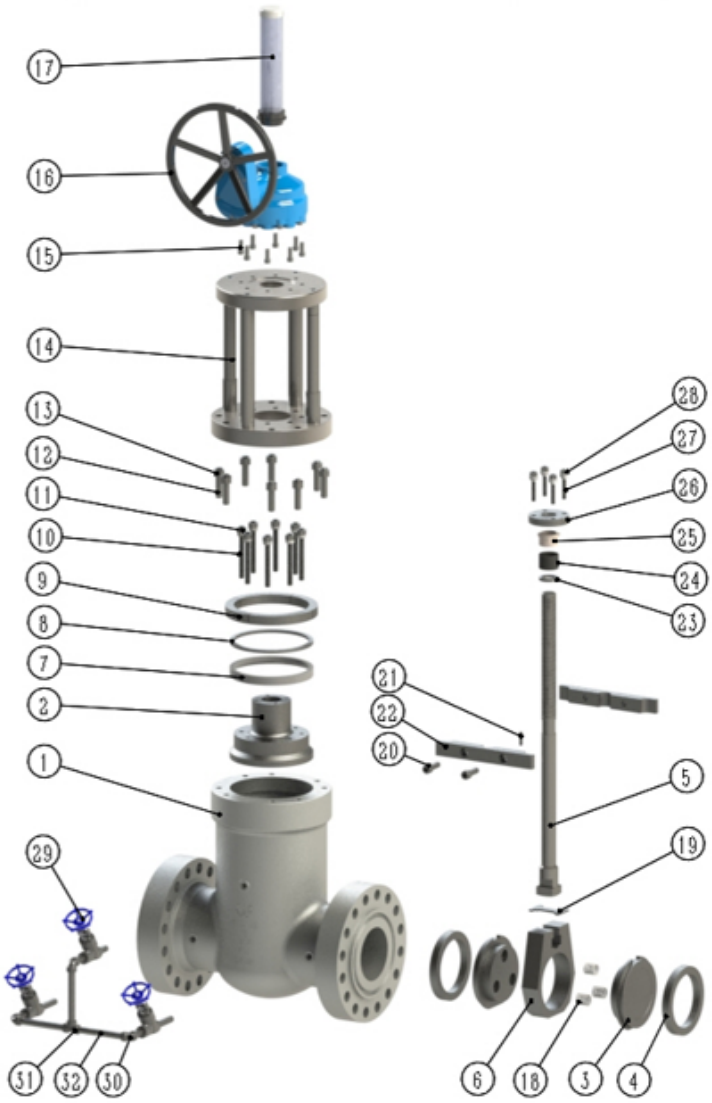
Based on obturator design, gate valves are classified into two types.

1. Pressure seal flexible wedge gate valve.
2. Pressure seal parallel slide gate valve.



PSB Gate Valve

No.	Part Name
1	Body
2	Bonnet
3	Gate
4	Stem
5	Seat Ring
6	Gearbox
7	Stem Cover
8	Gasket
9	Thrust Ring
10	Segmented Ring
11	Stud
12	Nut
13	Stud
14	Nut
15	Yoke Assembly
16	Stud
17	Nut
18	Spacer Ring
19	Packing
20	Clipping Ring
21	Bolt
22	Nut
23	Spring Washer
24	Eye bolt
25	Nut
26	Gland
27	Gland Flange



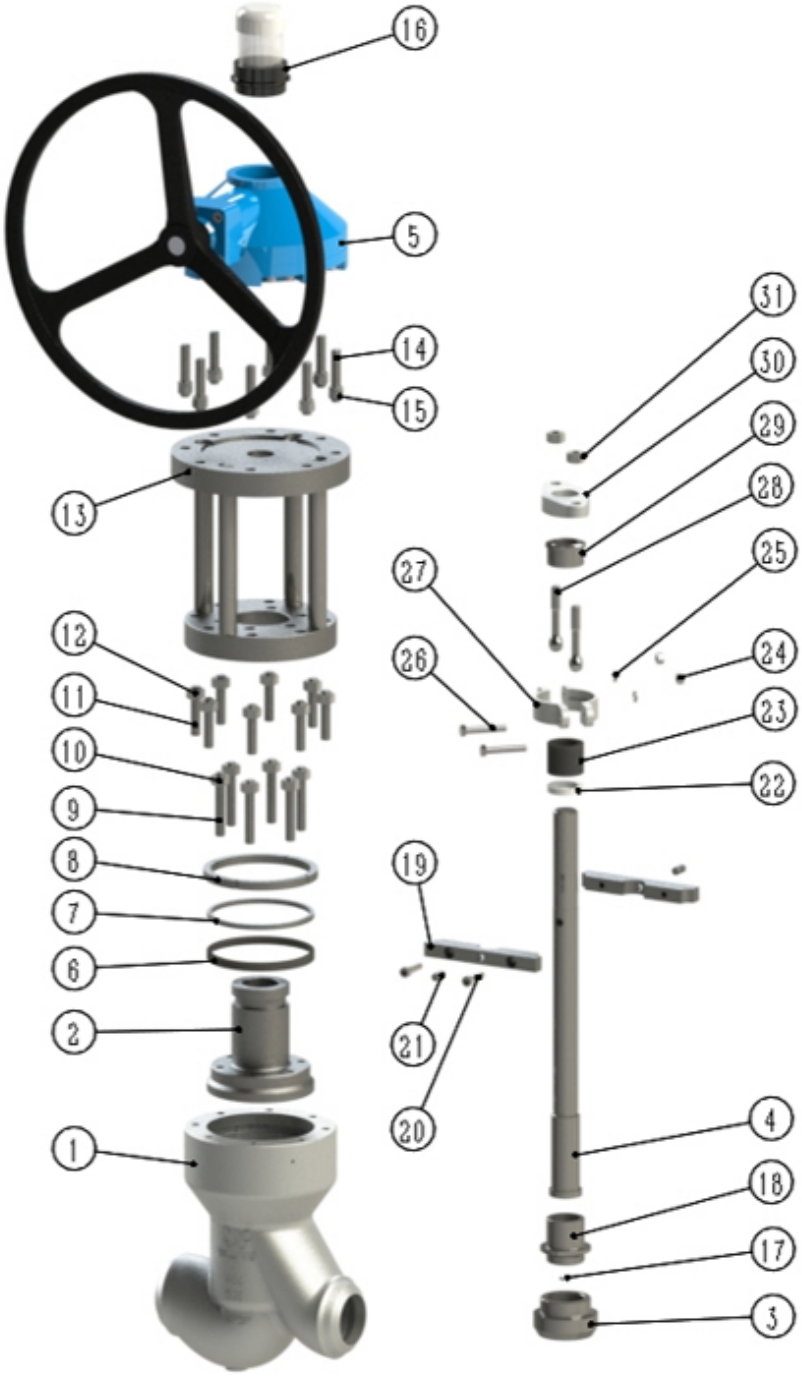
No.	Part Name
1	Body
2	Bonnet
3	Disc
4	Seat Ring
5	Stem
6	Carrier
7	Gasket
8	Thrust Ring
9	Segmented Ring
10	Stud
11	Nut
12	Stud
13	Nut
14	Yoke Assembly
15	Cap Screw
16	Gearbox
17	Stem Cover
18	Spring
19	Holding Plate
20	Cap Screw
21	Key
22	Guide Arm
23	Spacer Ring
24	Packing
25	Gland
26	Gland Flange
27	Stud
28	Nut
29	Y Type Globe valve
30	Tee
31	Pipe

PSB Parallel Slide Gate Valve

2.2 Globe Valves

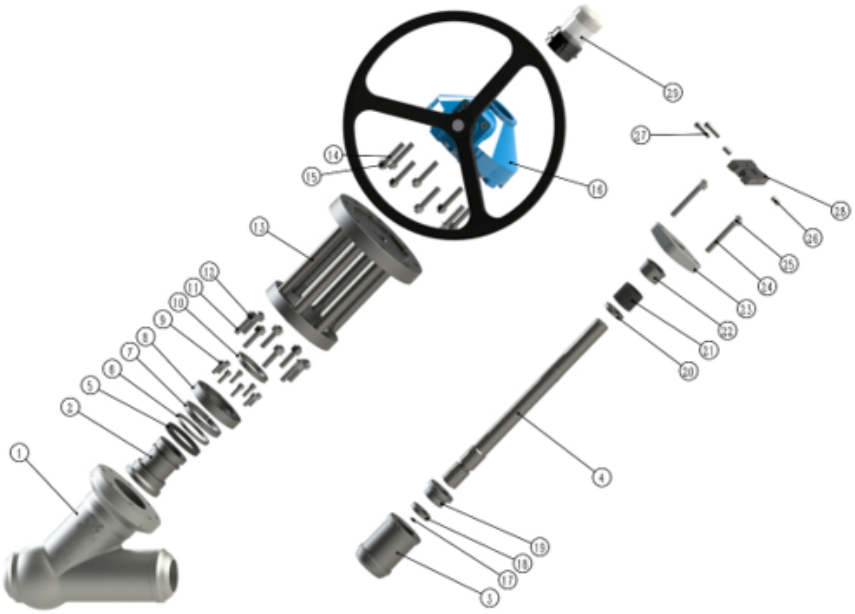
Based on body design, globe valves are classified into two types.

1. Pressure seal T-pattern globe valve.
2. Pressure seal Y-pattern globe valve.



No.	Part Name
1	Body
2	Bonnet
3	Disc
4	Stem
5	Gearbox
6	Gasket
7	Thrust Ring
8	Segmented Ring
9	Stud
10	Nut
11	Stud
12	Nut
13	Yoke Assembly
14	Stud
15	Nut
16	Stem Cover
17	Stem Washer
18	Disc Cover
19	Guide Arm
20	Cap Screw
21	Pin
22	Spacer Ring
23	Packing
24	Nut
25	Spring Washer
26	Bolt
27	Clipping Ring
28	Eye bolt
29	Gland
30	Gland Flange
31	Nut

PSB T-pattern Globe Valve



No.	Part Name
1	Body
2	Bonnet
3	Disc
4	Stem
5	Gasket
6	Thrust Ring
7	Segmented Ring
8	Supported Plate
9	Cap Screw
10	Split Collar
11	Stud
12	Nut
13	Yoke Assembly
14	Stud
15	Nut
16	Gearbox
17	Stem Washer
18	Split Collar
19	Disc Cover
20	Spacer Ring
21	Packing
22	Gland
23	Gland Flange
24	Stud
25	Nut
26	Pin
27	Cap Screw
28	Guide Arm
28	Stem Cover

PSB Y-pattern Globe Valve

2.3 Check Valves

No.	Part Name
1	Body
2	Bonnet
3	Disc
4	Seat Ring
5	Hinge
6	Hinge Pin
7	Washer
8	Nut
9	Cotter Pin
10	Pin
11	Hinge Seat
12	Retainer Ring
13	Screw
14	Gasket
15	Thrust Ring
16	Segmented Ring
17	Cover Retainer
18	Stud
19	Nut
20	Lifting Bolt

PSB Swing Check Valve

3 GENERAL INSTRUCTIONS

3.1 RECEIVING & HANDLING

A. Upon receipt, valves 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. Any damage observed during the inspection should be documented in an inspection report. Significant damage should be reported to William E. Williams to determine if repair or replacement of the equipment is necessary.

B. Valves should be stored in a sheltered environment providing adequate protection from weather, dirt, and damage. Materials attached to protect valves during shipment should not be removed until time of installation in the line.

C. Valves should only be handled with equipment that will safely support the valve assembly weight. Slings should never be placed around the handwheel, stem or gland adjustment parts. Protect the valve ends by leaving end protectors in place until 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.

D. Once the valve is installed, it is expected that the system will be operational within a reasonable time limit. No extraordinary care is required to maintain the equipment during idle time. However, prior to returning the valve to service, it is recommended that it be checked for smooth operation and proper tightness of packing. Stem threads should be checked to ensure that they are still properly lubricated and free of debris.

E. For installed equipment that is expected to be idle for more than six months it is recommended that the valve be cycled from fully closed to fully open and returned to the idle position of the valve. This valve cycling should be performed once every six months for the duration of the idle period.

3.2 VALVE TRANSPORTATION / STORAGE

A. Valves should be adequately packaged to ensure protection from atmospheric conditions prior to transportation or storage. If the packaging is damaged, repair it so that the valve can be safely stored and transported. Avoid rotating the handwheel before installation if possible.

B. Actuator and valve may be packaged separately.

C. The paint, the nameplate and the sealing faces of the end flanges shall be protected during transportation. No part of the valve can be dragged on the ground and the valve must be adequately protected from abrasion and impact during transport.

D. The valve shall be stored at a safe location to protect against rain and dust if it will not be installed immediately. Valves shall be stored in a ventilated and dry warehouse for protection. It is not permitted to store the valve outdoors.

E. Ensure the valve is fully closed. If the valve is opened, the sealing face of the seat and wedge shall be cleaned, the valve closed, and the end protection installed.

F. Take care not to scratch the stem when moving the valve. The packing box and gland flange cannot come into contact with the shelf if the valve is stored on a shelf.

G. Inspect and clean the valve if it has been stored over six months. Pressure test prior to use if the valve has been stored over twelve months.

3.3 PREPARATION FOR INSTALLATION

A. 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.

B. Check for adequate clearance around the valve to ensure 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 a fully open position. A clearance of 6 feet, 6 inches above the operating floor is usually sufficient.

C. Valves equipped with actuators require additional clearance to allow for service connections and routine maintenance of the actuator.

3.4 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 pipeline:

1. Keep pipe ends free of dirt, spatter, and grit.

2. Install the valve with flow in the proper direction with regards to valve internals. The normal and preferred mounting of PSB Gate and PSB Globe valves for performance, operation and maintenance is with the stem vertical and handwheel above the body. However, other orientations are possible except where specifically stated otherwise. PSB Swing check valves installed in horizontal lines must have the valve cover facing up. PSB Swing Check valves in vertical lines must have the flow arrow pointing up.

3. Handle the valve only with properly rated equipment that can adequately support its weight, using safe and approved lifting techniques.

4. Install the valve using good piping practices as governed by the applicable code or specification.

5. Swing Check valves are shipped with a wood block to protect the disc from contacting the seat during transport; remove the wood block prior to installation. Williams recommends that all check valves be installed at a minimum distance of five pipe diameters from any upstream pumps, elbows, fittings, or equipment, and at least three pipe diameters from any downstream components.

6. Flanged End Valves

    a. Check and align pipe flanges before valve installation.
    b. Use proper gasket type and size.
    c. Clean debris, dirt, and any other foreign particles off the surface of the flanges.
    d. Do NOT ATTEMPT TO FIT TWO FLANGES THAT ARE NOT ALIKE TOGETHER. For example, flat face with flat face or raised face with raised face is the proper procedure.
    e. Do NOT TIGHTEN BOLTS IN A CIRCULAR PATTERN: bolts must be tightened in a crossover or star pattern to load the gasket evenly.

7. Butt-Weld End Valves

    a. Valve, pipe, and weld rod must all be of materials that are mutually compatible.
    b. Welding should be performed by a qualified welder using the correct welding equipment and following all applicable site and industry procedures.
    c. 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.
    d. For additional information, refer to WEW-RP-001 Guidelines for Installation of Weld End Valves.

3.5 POST INSTALLATION

A. Pressure seal valves require the bonnet draw bolts to be torqued to the specified values when the valve is at operating pressure and temperature. This ensures proper compression of the pressure seal ring, which seals against the valve body and bonnet as the bonnet is forced upward under pressure. To verify seal integrity between the valve body and bonnet, open the valve and bring the line pressure and temperature as close as possible to normal operating conditions. Then verify draw bolt torque and, if necessary, re-tighten the body-to-bonnet bolts to the torque values specified in Table 1.

Table 1 - Body-Bonnet Draw Bolts Torque Values

VALVE TYPE	STUD SIZE	B7 BOLTING	
		Ft.lb	N.m
	3/8”-16UNC	20	27
	1/2”-13UNC	50	68
	5/8”-11UNC	95	129
	3/4”-10UNC	170	231
	7/8”-9UNC	270	366
	1”-8UN	410	556
	1 1/8”-8UN	600	814
	1 1/4”-8UN	845	1146
	1 3/8”-8UN	1150	1560
	1 1/2”-8UN	1520	2062
	VALVE SIZE	Threaded Bonnet design	
		Ft.lb	N.m
	2”- 2 1/2”	750	1012
	3”- 4”	1150	1560

B. Verify the tightness of body/bonnet joint and packing gland.

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

D. Pressure test the system 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 the compatibility of the flushing agent, gasket and packing material utilized.

3.6 MAINTENANCE & TROUBLE SHOOTING

3.6.1 While valves typically require minimal attention during normal operation, establishing a program for periodic inspection can help ensure optimal service life and reduce the likelihood of unplanned maintenance.

The recommended maintenance schedule is tabulated below in Table 2.

Table 2 - Recommended Maintenance Procedure and Frequency

Area	Purpose	Procedure	Frequency
Stem	Prevention of leakage and improper function.	Visual check for scoring and seizing, especially along sliding surfaces of stem and packing.	When leak is detected or every 2 years.
Bolts &Nuts	Ensure proper tightness of joints.	Check bolt torque.	When leak is detected or annually.
Packing	Prevention of leakage.	Check Gland bolting and retighten or adjust as necessary.	When leak is detected or annually.
Pressure Seal Ring	Prevention of leakage	Check nuts and bolt torque and retighten if necessary.	When leak is detected or annually.

Items to check on a periodic basis are:

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

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 weld integrity in a welded valve.

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

C. 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 from 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.

3.6.2 Over time, factors such as valve age, service conditions, or wear may lead to issues such as packing leakage, body-to-bonnet (or cover) joint leakage, seat leakage, or reduced operational smoothness. The troubleshooting chart in Table 3 outlines typical problems along with recommended corrective actions. While the chart does not address every possible issue or solution, and should not be considered a substitute for regular preventive maintenance, it does identify the most commonly

encountered problems and the repair procedures most likely to restore the valve to proper working condition.

Table 3 - Troubleshooting Procedures

Observation	Possible Cause	Procedure
Packing Leakage	•Packing Compression •Worn Packing •Stem Damage	•Tighten Packing •Replace Packing •Repair or Replace Stem
Body-Bonnet/ Cover Joint Leakage	•Insufficient Bolting Tightness •Seal ring or Damaged	•Check Bolting Torque •Replace Seal ring
Seat Leakage	•Damaged Seating Surfaces	•Lap Disc and Seat Ring
Stem Binding	•Insufficient Lubrication •Packing Too Tight •Damaged Stem Threads •Damaged Stem Sleeve	•Lubricate Stem •Adjust or Replace Packing •Repair or Replace Stem

3.7 COMMON REPAIRS

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

A. Never use pipe wrenches to remove or replace bonnets on small valves. A pipe wrench will pinch or swage the body neck.

B. Re-packing – Isolate and de-pressurize valves prior to attempting to add packing or to repack valve. Although some valves are designed with a backseat to isolate the cavity from the stuffing box, there may be foreign material or damage on the backseat. The backseat is intended to prevent catastrophic leaks and it is highly recommended to repack only when the valve is de-pressurized to ensure personnel safety.

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

Use caution when removing the packing from the stuffing box. Avoid using steel hooks that could scratch or gouge the fine finish of the stuffing box. Wood or brass dowels are acceptable alternatives. (See Figure 1 and Figure 2).

Figure 1

Figure 2

Install new packing and re-assemble gland and gland flange to valve.

Note: Stagger joints of successive packing rings at 90° to 120°, as shown in Figure 3, and insert them into the stuffing box.

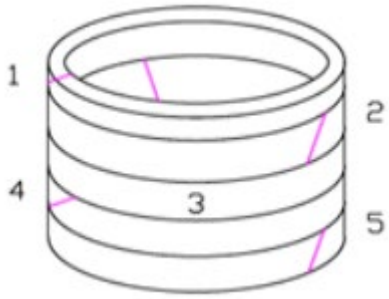


Figure 3

C. Replacing Bonnet Gasket – Isolate and de-pressurize valve prior to attempting to disassemble valve. (Please refer to the valve disassembly procedures section.)

If a leak persists after bolt re-tightening, it must be assumed that the pressure seal is compromised. In such cases, the valve must be opened for internal inspection. **Note:** Regardless of the cause of failure, any disassembled pressure-seal bonnet must be reassembled with a new gasket. Follow the prescribed maintenance procedure for proper replacement of the body-to-bonnet gasket.

Valves having a 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 body/bonnet joint and lift bonnet away from body in a vertical line. On gate valves, the wedge should be marked so that the same wedge and seat sealing surfaces contact when reassembled. (Please refer to the valve disassembly procedures section)

Prior to re-pressurizing the valve, recheck the tightness of the body/bonnet joint. Tighten bonnet bolting using a star pattern.

Paint Repair - During coating repair, the intact area surrounding the damage must first be lightly abraded and then ground to form a smooth transition layer, ensuring uniform blending between the existing and repaired surfaces. Throughout the repair process, climatic conditions must be controlled in accordance with the parameters established in the original coating procedure. The repaired area shall achieve the specified dry film thickness as defined by the relevant standard, with air spraying or localized brushing recommended depending on the size and nature of the repair. Drying time for the repaired coating must align with the requirements for standard paint application, and no installation or packaging shall proceed until the coating is fully cured. All additional painting requirements must conform to the project-specific painting specifications or, where applicable, the Williams Valve Painting Specification.

3.8 TOOLS & EQUIPMENT

Standard wrenches and tools are generally suitable for servicing valves. Common tools are:

A. Hoist to lift large or heavy items.

B. One set of box-end, open-end, or socket wrenches.

C. One set Allen-type hex key wrenches.

D. Standard packing tool or blunt hook to remove packing rings.

E. Combination oilstone, coarse and fine grit, to polish wedge and seat ring sealing surfaces.

F. Hammer and punches to drive out pins.

3.9 OPERATION

The following is general information on the operation of valves:

A. Open 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 media, 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 liquid at high heads, because severe water hammer may result from reversal of flow, or in applications where flow cycles are short or intermittent.

G. Williams recommends that all check valves be installed at a minimum distance of five pipe diameters from any upstream pumps, elbows, fittings, or equipment, and at least three pipe diameters from any downstream components.

4 VALVE SPECIFIC STORAGE, INSTALLATION AND MAINTENANCE PROCEDURES

4.1 PRESSURE SEAL GATE VALVE

A. Periodic Inspections

1. The valve stem packing should be inspected quarterly. 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 distributor for new stem packing sets.
   Table 1 in appendix for tightening torque of eye bolts for PSB Gate valves.

2. The lubrication of the yoke nut should be inspected quarterly. A high-pressure grease gun should be used for valves supplied with ball type grease fittings. Injection method for handwheel operated valve: rotate handwheel CCW (the same as opening direction) at least 4 turns and then use grease gun to inject through grease fitting until grease is spilled between bushing and upper section of stem nut; close valve with handwheel in CW direction. The grease will cover the thread surfaces as the stem nut rotates, providing sufficient lubrication. The valve stem threads should be consistently coated in lubricant.

   Refer to Figure 4 and Figure 5.

Figure 4

Figure 5

* Figure 4 - Valve stem threads coating of lubricant.
* Figure 5 - Grease the stem nut through the grease fitting.

3. Bonnet bolt tension should be checked periodically when valves are used in high temperature applications where creep may occur.

   CAUTION: Any maintenance that includes any disassembly of the valve must be carried out with the valve depressurized and isolated.

B. Disassembly of yoke nut

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

1. Direct hand-operated valves (handwheel).
   Please refer to Figure 6.
   - Unscrew handwheel nut (pos.23).
   - Remove handwheel (pos.21).
   - Unscrew yoke nut retaining nut (pos.25), removing the lock screw.
   - Remove stem nut (pos.22)
   - Remove bearing (pos.24)

   Reverse the procedure for re-assembly.

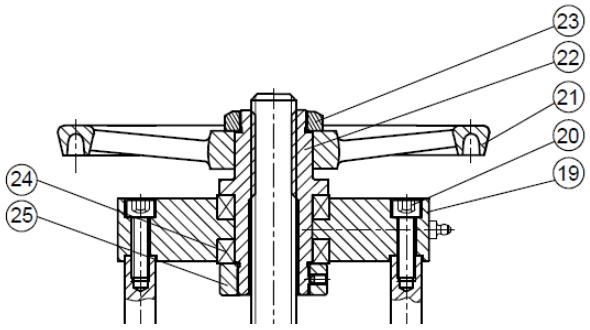


Figure 6

2. Bevel gear operated valves
   Refer to Figure 7 thru Figure 12.
   - 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.

Figure 7

Figure 8

Figure 9

Figure 10

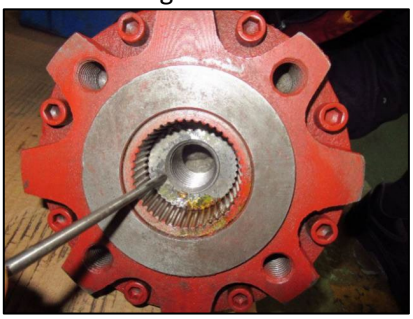


Figure 11

Figure 12

C. Disassembly of Yoke assembly

After removing the operator, check for any stem guides present between the yoke and the stem. They are to be disassembled before removing the yoke.

Stem guides are not available in flexible wedge gate valves. They are present in some globe valves and in all parallel slide gate valves.

Please refer to Figure 13 thru Figure 20

1. Loosen and remove screw (pos.18)
2. Remove the yoke plate (pos.17)
3. Loosen and remove the pillar (pos.12)
4. Disassembly of stem packing, please refer to **Section E**
5. Unscrew and remove the bolts (pos.10, pos.25), nuts (pos.11,pos.26)
6. Remove the support plate (pos.9)

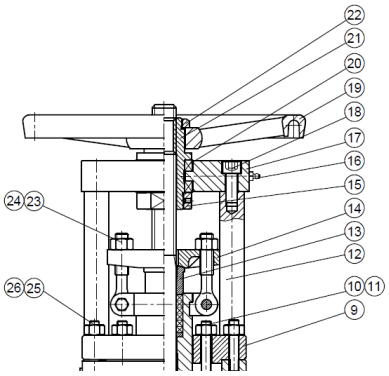


Figure 13

Fig.14 remove the handwheel

Fig. 15 Loosen and remove screw

Fig. 16 remove the yoke plate

Fig.17 remove the pillar

Fig.18 disassembly the stem packing

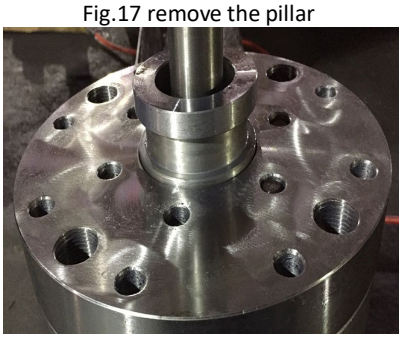


Fig.19 remove the bolts, nuts

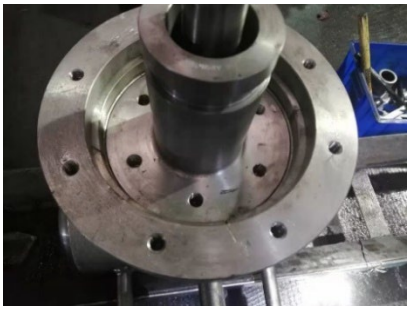


Fig.20 remove the support plate

D. Disassembly of Bonnet Gasket

Refer to Section F for detailed disassembly procedures.

Note:

1. Take care not to damage the packing during disassembly. It is recommended to replace the packing whenever the body gasket is changed.

2. Carefully clean all the gasket housing and seating surfaces.
3. Reassemble all components by reversing the steps outlined in the disassembly procedure.

E. Disassembly of Stem Packing

Unscrew the eyebolt 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 stem to operate smoothly.

For the Disassembly of Stem Packing procedure, please refer to Figure 21 thru Figure 26.

To replace the packing proceed as follows:

1. Open completely the valve up to the backseat position.
2. Remove the nuts of the gland bolts.
3. Lift the gland flange.
4. Unscrew stud, Remove the nut and spring washer, eye bolts.
5. Remove the clamping ring.
6. Remove the gland.
7. Remove the packing.
8. For a better tightness. Proceed to an accurate cleaning of the stem and stuffing box and make sure there no scratches or signs of seizing.
9. When the stuffing box is filled, replace the gland and gland flange in their original position.
10. Tighten gland nuts in accordance with Table 1 in appendix
11. Cycle the valve.
12. Pressurize the line.
13. If a leakage is detected, tighten the gland nuts slowly and evenly until the leakage stops.

Fig. 21 Remove the nuts

Fig.22 Remove the gland flange

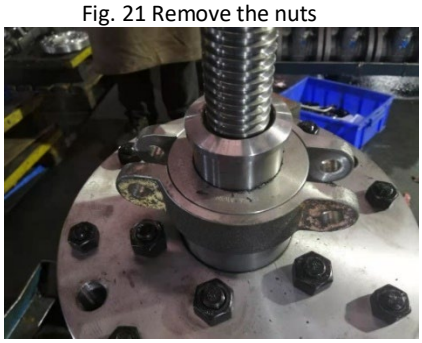


Fig.23 Remove eye bolts, stud& nut washer

Fig.24 Remove the clipping ring

Fig.25 Remove the gland

Fig.26 Remove the packing

Reverse the procedure above for re-assembly.

F. Disassembly of stem

To replace the stem when the valve is completely disassembled for general maintenance follow this procedure.
Refer to Figure 27 thru Figure 43.

1. Disassembly of yoke nut, please refer to section B.
2. Disassembly of yoke assembly, please refer to section C.
3. Remove the segmented ring (pos.8)
4. Remove the thrust ring (pos.7)
5. Remove the body gasket (pos.6)
6. Lift up and remove the bonnet (pos.5)
7. Lift up the stem (pos.4) & wedge (pos.3) and disassembly them.

Reverse the procedure for re-assembly.

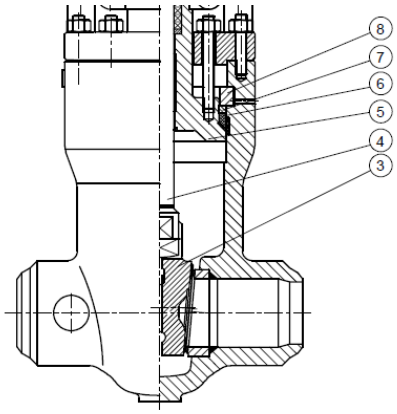


Fig.27

Figure 28

Fig.29 Loosen and remove screw

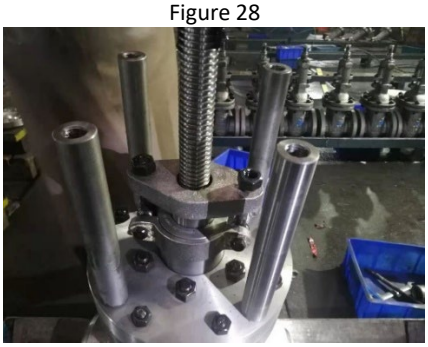


Fig.30 Remove the yoke plate

Fig.31 Remove pillar

Fig. 32 remove nut

Fig.33 remove eye bolt

Fig.34 remove clipping ring

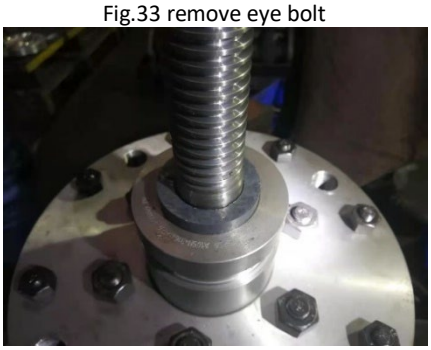


Fig.35 remove gland

Fig.36 remove spacer ring

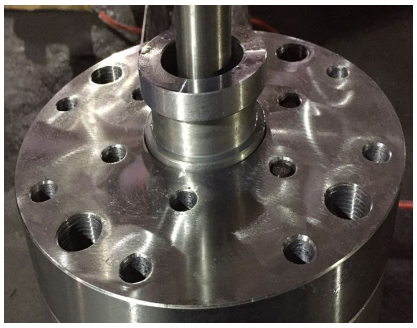


Fig.37 remove bolts, nuts

Fig.38 remove support plate

Fig.39 remove segmented ring

Fig.40 remove thrust ring

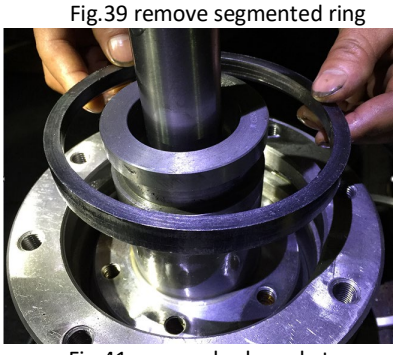


Fig.41 remove body gasket

Fig.42 remove bonnet

Fig.43 Lift up the wedge and disassembly stem & wedge

G. 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.
For disassembly & re-assembly of valves use the procedure outlined under Section F.

It is recommended that the face of the disc be blued to check for contact of seating surface after final lapping. Refer to Figure 44 thru Figure 45.

Fig.44 Grinding wedge


Fig.45 Grinding seat

4.2 PSB GLOBE VALVE

A. Periodic Inspections

1. The valve stem packing should be inspected quarterly. 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 parts B and C.
   Table 2 in appendix for tighten torque of eye bolt for PSB Globe valve.

2. The lubrication of the yoke nut should be inspected quarterly. A high-pressure grease gun should be used for valves supplied with ball type grease fittings. The valve stem threads should also be given a coating of lubricant.

3. Bonnet bolt tension should be checked periodically when valves are used in high temperature applications where creep may occur.

B. Disassembly of yoke nut

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

Direct hand-operated valves (handwheel).
Please refer to Figure 46.
- Unscrew handwheel nut (pos.26).
- Remove handwheel (pos.22).
- Unscrew yoke nut retaining nut (pos.20) and screw (pos.21), removing spot welds, if necessary.

- Remove stem nut (pos.30)

Reverse the procedure for re-assembly.

Please refer to Gate valve section B clause 2 for gearbox disassembly procedure.
Reverse the procedure for re-assembly

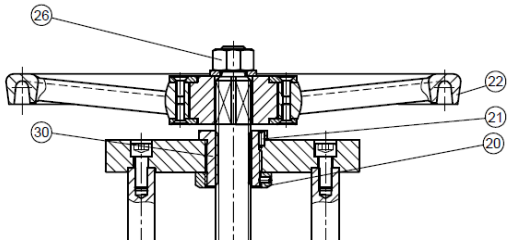


Fig.46

C. Disassembly of yoke assembly

After removing the operator, check for any stem guides present between the yoke and the stem. They are to be disassembled before removing the yoke.

Please refer to Figure 47.

1. Loosen and remove screw (pos.28).
2. Remove the yoke plate (pos.29).
3. Loosen and remove the pillar (pos.19).
4. Disassembly of stem packing, please refer to **Section E.**
5. Unscrew and remove the bolts (pos.10,12), nuts (pos.11,13).
6. Remove the support plate (pos.9).

Please refer to Gate valve section C for disassembly procedure picture.
Reverse the procedure for re-assembly

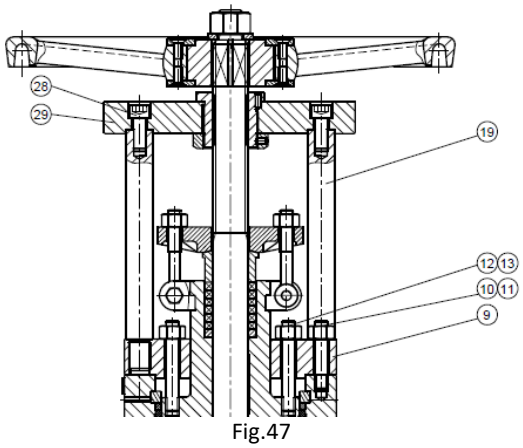


Fig.47

D. Extraordinary Maintenance or Replacement of Damaged Parts

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:

1. Check the stem packing and replace stem packing if it is damaged.
   Disassembly of the stem packing procedure, please refer to **section E.**

2. 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.
   Disassembly of yoke nut procedure, please refer to section E of Section 4.1.

   Reverse the procedure for re-assembly.

E. Disassembly of Stem Packing

1. Loosen the eye bolts, remove the nut, lift the packing gland, and use a pry bar or packing tool to remove the packing.
2. Replace the stem packing with new set(s) of packing. Reassemble nuts and gland flange. Finally, tighten nuts sufficiently while allowing the stem to operate smoothly.
   Please refer to steps 5 thru 10 of section F for disassembly procedures.
   Reverse the procedure for re-assembly.

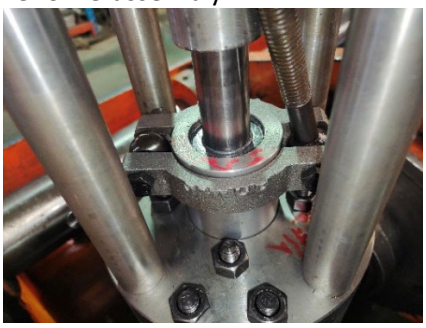


Fig.48 Disassembly of stem packing

3. To replace the stem when the valve is completely disassembled for general maintenance follow this procedure.
   Please refer to steps 1 thru 17 of section F for disassembly procedures.
   Reverse the procedure for re-assembly.

F. The procedure to disassemble the valve is as follows:
Refer to Figure 49 to Figure 65, reverse their order for re-assembly.

To disassemble the valve proceed as follows:
1. Remove the operator. Please refer to Gate valve section B.
2. Disassemble to yoke assembly. Please refer to Gate valve section C.
3. Loosen and remove screw (pos.28).
4. Remove the yoke plate (pos.29).
5. Loosen the eye bolts (pos.17).
6. Remove the nuts (pos.18).
7. Remove the gland flange (pos.16).
8. Remove the gland (pos.15).

9. Remove the pillar (pos.19).
10. Use the bar to lift the stem packing(pos.36).
11. Unscrew and remove the bolts (pos.10, pos.12), nuts (pos.11,pos.13).
12. Remove the support plate (pos.9).
13. Remove the segmented ring (pos.8).
14. Remove the thrust ring (pos.7).
15. Remove the body gasket (pos.6).
16. Lift up and remove the bonnet (pos.31).
17. Lift up the stem (pos.5)& disc (pos.2) and disassembly them.

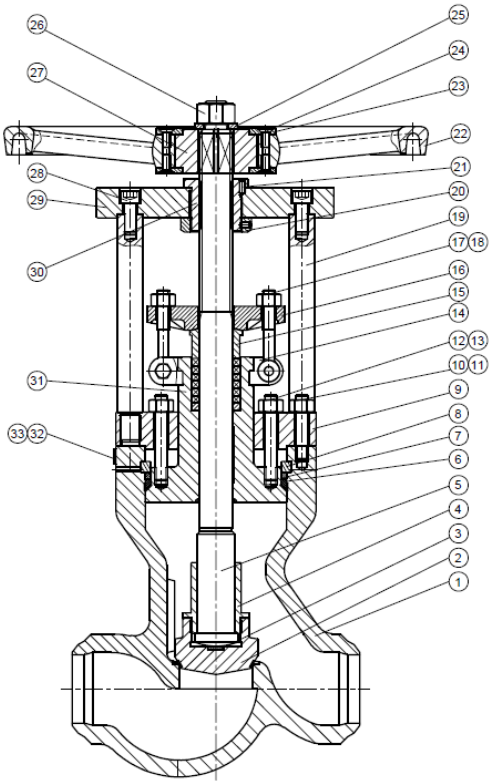


Fig.49

Fig.50 Remove the operator

Fig.51 Remove the yoke plate, stem nut

Fig.52 Remove the pillar

Fig.53 Remove gland flange

Fig.54 Remove eye bolts

Fig.55 Remove the clamping ring

Fig.56 Remove the gland

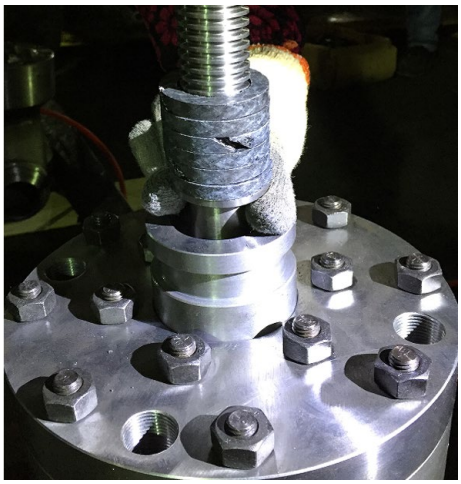


Fig.57 Remove the packing

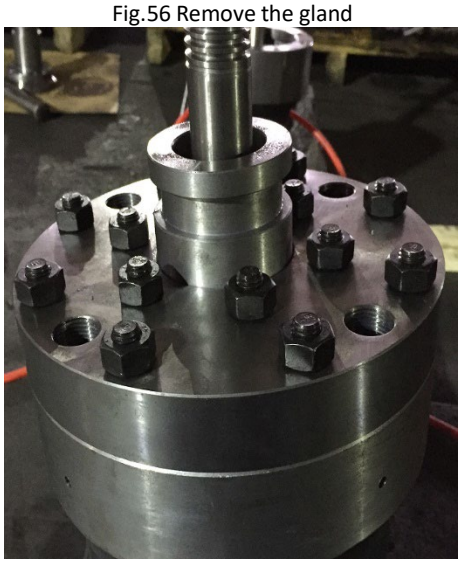


Fig.58 Unscrew and remove the bolt& nuts

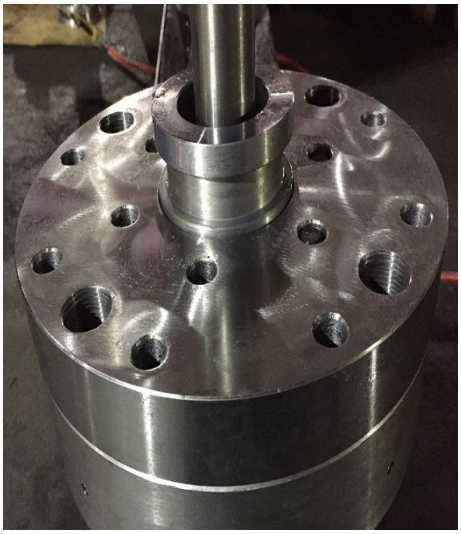


Fig.59 Remove the support plate

Fig.60 Remove the segmented ring

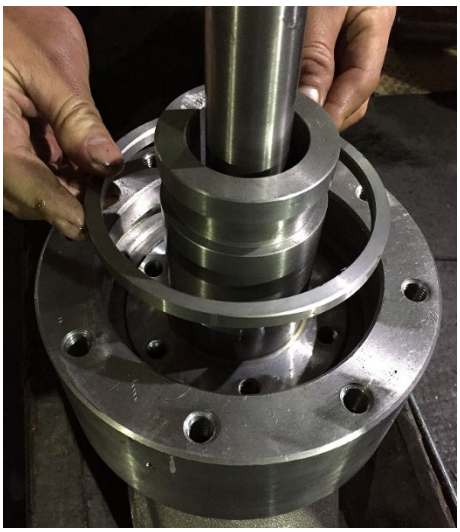


Fig.61 Remove the thrust ring

Fig.62 Remove the body gasket

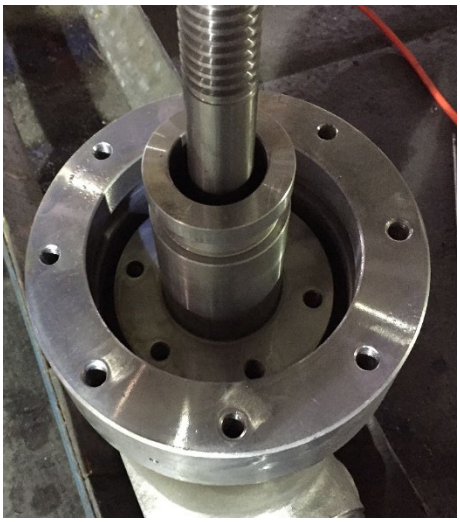


Fig.63 Lift up and remove the bonnet

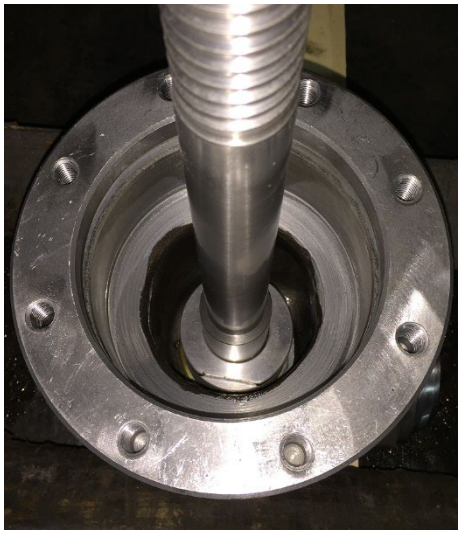


Fig.64 Lift up the stem& disc

Fig.65 disassembly the stem & disc

Re-insert the stem through the stuffing box, taking special care to reassemble the 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 must slide freely through the stuffing box without applying excessive force. Finally, install the bonnet gasket making sure it is not damaged. Williams recommends the use of new gaskets during re-assembly.

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 bonnet gasket is properly seated. Align holes and tighten bonnet nuts utilizing proper torque control procedures. Hydrostatically test the valve to assure that there is no leakage.

G. Bonnet Gasket

Please refer to **Section F**

Note:

1. Take care not to damage the packing during disassembly. It is recommended to replace the packing whenever the body gasket is changed.
2. Carefully clean all the gasket housing and seating surfaces.
3. Reassemble all components by reversing the steps outlined in the disassembly procedure.

H. 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 disc 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.

Please refer to steps 1 thru 17 of **Section F** for disassembly procedures.
Reverse the procedure for re-assembly.

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

4.3 PSB SWING CHECK VALVES

4.3.1 Disassembly Procedure for PSB Check valve:

Please refer to Figure 66 thru Figure 80.

1. Unscrew the bolt (pos.14) and nuts (pos.15).
2. Remove the cover retainer (pos.13).
3. Remove the segmented rings（pos.17）, push them out from the body groove by using the body holes placed radially on the top of the body.
4. Remove the thrust ring (pos.18).
5. Lift up the bonnet(pos.10) and pressure seal body gasket (pos.19).
6. Loosen the screw (pos.20) and remove the retainer ring (pos.9).
7. Remove the hinge-disc assembly from the top, includes pos.22.
8. Disassembly of hinge disc assembly in PSB Swing check valve.
   Remove the hinge pin (pos.8) and hinge seat (pos.2) can be disassembled from the hinge-disc assembly.
   In case of hinge-disc assembly connection with disc nut (pos.5) and split pin (pos.23), remove the split pin & the spot weld of disc nut. Remove nut and washer (pos.4). Disc can be disassembled from the hinge.

9. Reassemble all parts following backwards the above mentioned steps.

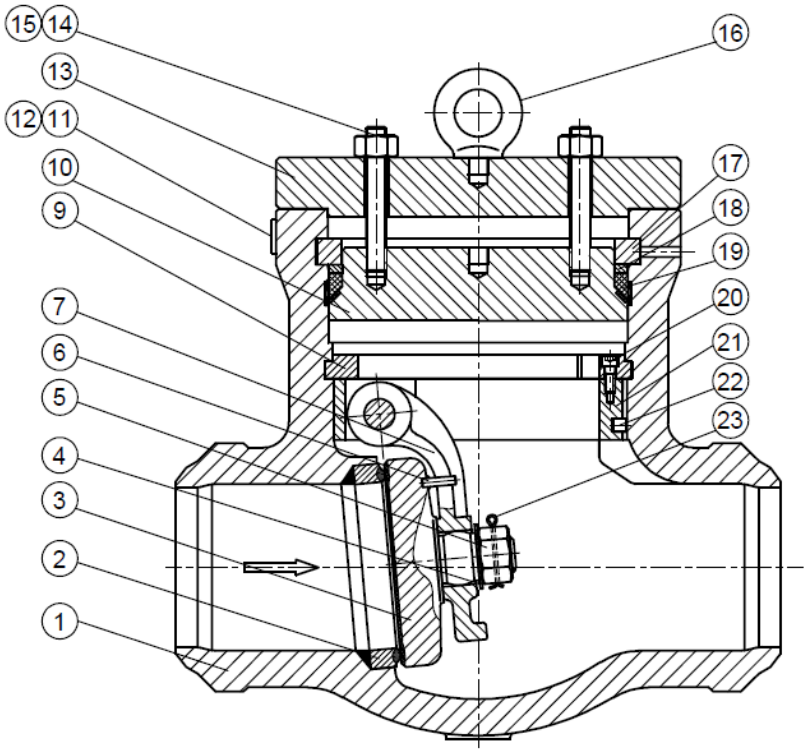


Fig.66

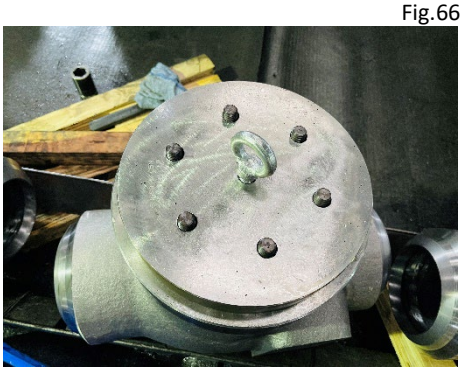


Fig.67 Unscrew the nuts

Fig.68 Remove the cover retainer

Fig.69 Remove the segmented rings

Fig.70 Remove thrust ring

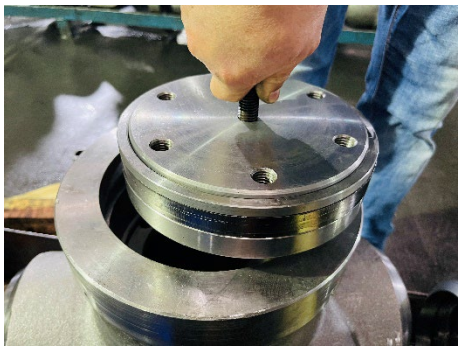


Fig.71 Lift up the bonnet

Fig.72 Remove pressure seal body gasket

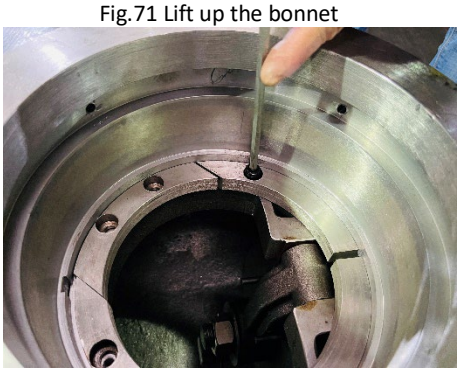


Fig.73 Loosen the screw

Fig.74 Remove retainer ring

Fig.75 anti-rotation pin

Fig.76 Remove anti-rotation pin

Fig.77 Disassemble hinge-disc assembly

Fig.78 Remove hinge pin & hinge seat

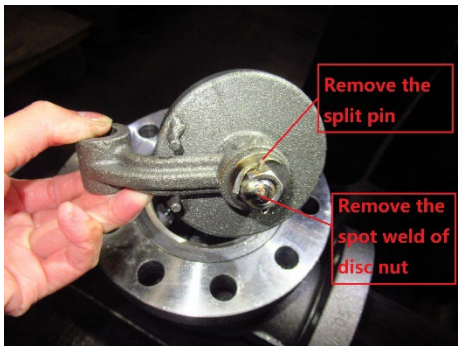


Fig.79 Remove the split pin


Fig.80 Remove nut & washer

4.3.2 Repair & Maintenance

PSB Check valves have been designed to require minimum maintenance.
This manual describes on site repairs as.
- Body/Bonnet Gasket Replacement.

All the other repairs should be performed by Williams Valve Company.

If gasket leaks are detected, correct using the following procedure.

Please refer to steps 1 thru 5 for **Disassembly Procedures for PSB Check valve** as above.
Reverse the procedure for re-assemble.

Carefully clean all the gasket housing.
Replace the body gasket.
Reassemble all parts following backwards the above mentioned steps.

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.

Disassembly Procedure is same as the PSB Check valve above mentioned steps for it.

1. Deterioration of disc surfaces.
   Disassemble disc by removing nut and washer. Repair surface by grinding and lapping using fine grain abrasive paste or abrasive paper.

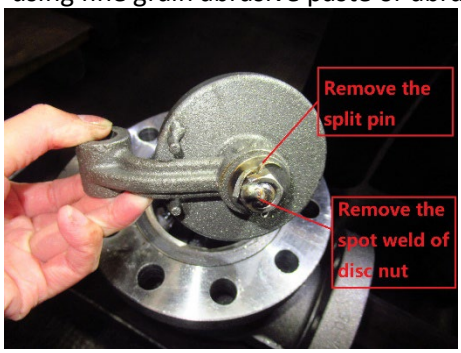


Figure 48 Remove spit pin, nut, washer


Figure 49 Grinding and Lapping

2. Deterioration of seat seal surfaces.
   The seat ring is a welded seat, need a special tool to grinding, if need support, please contact an authorized *WILLIAM E. WILLIAMS VALVE CORPORATION* representative for special instructions.

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

5 APPENDIX BOLTING TORQUE REQUIEMENT

5.1 Eye Bolting Torque (N.m):

5.1.1 Annex Table 1 Gate Valve Eye Bolting Torque Data

Valve Size	Torque			
	600LB/900LB		1500LB	
	Ft.lb	N.m	Ft.lb	N.m
2”	21	28	21	28
2 1/2”	21	28	21	28
3”	23	31	23	31
4”	32	43	32	43
6”	51	69	51	69
8”	102	138	102	138
10”	125	170	125	170
12”	125	170	125	170
14”	125	170	125	170
16”	141	191	197	267
18”	147	199	197	267

Table 1

5.1.2 Annex Table 2 Globe Valve Eye Bolting Torque Data

Valve Size	Torque			
	600LB/900LB		1500LB	
	Ft.lb	N.m	Ft.lb	N.m
2”	21	28	21	28
2 1/2”	21	28	21	28
3”	23	31	25	34
4”	32	43	32	43
6”	81	110	81	110
8”	112	152	112	152
10”	132	179	141	191
12”	132	179	190	258
14”	132	179	190	258
16”	151	205		

Table2