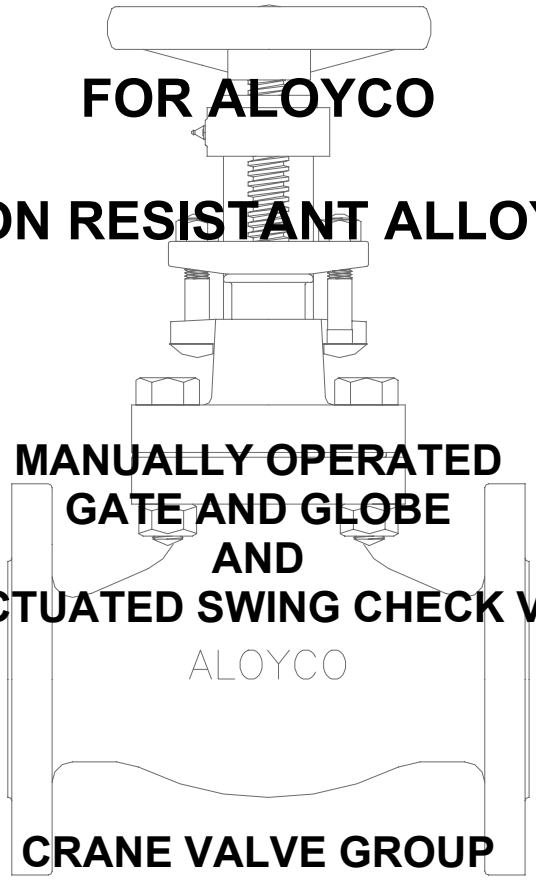
INSTALLATION AND MAINTENANCE MANUAL

FOR ALOYCO

CORROSION RESISTANT ALLOY VALVES



MANUALLY OPERATED GATE AND GLOBE AND SELF ACTUATED SWING CHECK VALVES

CRANE VALVE GROUP

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

INTRODUCTION

Aloyco Stainless Steel valves are built to high standards of Quality. Each valve is inspected and tested prior to it leaving the factory. It is imperative that the valves you purchased be properly installed, maintained and operated to assure satisfactory performance.

The purpose of this manual is to provide you information on installation, maintenance and operation of Aloyco valves. It is not intended to set specific maintenance intervals since these vary from service to service. It is also not to supersede any existing codes, or regulatory and safety requirements.

The illustrations contained in this manual are actual representation of a certain size, they do not necessarily represent all sizes in all details. Crane reserves the right to institute changes in material, design, and specifications without notice, in keeping with its policy of continuous product improvement.

Aloyco valves need very little maintenance, and at some facilities that translates into no maintenance at all. So a small problem, such as a gasket leak, grows into a major leak. Those facilities usually depend on a reactive valve maintenance program, that is correcting valve problems after they have occurred. However, the best approach is a Predictive Maintenance Program designed to determine the current status and condition of the valve and use that information to predict its remaining useful life. This requires you to identify sub-standard valve operation and to either repair or replace the sub-standard valve before failure occurs, thus allowing you to plan your downtime. Unplanned process down time and maintenance are very expensive.

You should use this manual as a guide in setting up your routine and preventive maintenance program specific to your application.

All work procedures should include the required safety equipment (i.e., eye protection, protective clothing, breathing apparatus, etc.) required to safely perform the work.

It is important to understand that the cautions and notices contained in this manual are not exhaustive. Crane could not possibly know, evaluate, and advise of all ways in which a service may be done and the resulting consequences. Crane assumes no responsibility for damage to valves, facilities or personnel, due to faulty installation, improper operation and repair or other conditions beyond our control.

When repair of a valve is necessary, Crane recommends the use of established repair procedures by a competent valve mechanic and the replacement of faulty or worn parts, with Aloyco authorized parts, as soon as possible.

In cases where external leakage is of concern Crane does not recommend or sanction the pressure injection of sealants into valves as an emergency repair procedure.

Should required maintenance exceed in-house capabilities, your local Crane Representative should be contacted for guidance. Valve Service Centers are operated by Crane specifically to assist in Emergency and normal reconditioning of valves. When reconditioned by a Crane Service Center, the valve has the same warranty as a new product.

Crane Service Center locations and phone numbers are listed on the back of this manual.

CHAPTER 1

DESCRIPTION AND OPERATION

1.1 General

This manual contains maintenance instructions together with pertinent illustrations for servicing corrosion resistant steel alloy, manually operated gate, globe and swing check valves. This manual is divided into two chapters; first covering general information pertaining to the types of valves included; second covering maintenance and service instructions for each group of valves in separate sections.

1.2 Descriptions

CAUTION

All gate and globe valves are supplied with PTFE gaskets and packing. All the check valves are supplied with PTFE gaskets. Not to be used on service temperatures exceeding 500 degrees F.

Gate Valves. (See Fig.1) The manually operated gate valves covered by this manual are of the bolted bonnet type, having either a split disc or a flexible or a solid wedge design depending on the size and pressure class. ½" – 2" Class 150 valves are supplied with fully trapped gasket between the body and the bonnet. 3" – 12" Class 150 valves are supplied with flat face gasket between the body and bonnet. All valves Class 300 and 600 are supplied with fully retained gasket between the body and the bonnet.

Globe Valves. (See Fig. 2) The manually operated globe valves covered by this manual are of the bolted type bonnet, having plug type swivel disc and rotating stem with a rising handwheel. The swivel disc is attached by a swivel nut and secured either with a lock weld or pins depending on the size, to prevent disengagement of the disc from the rotating stem during operation. Each globe valve is supplied with a fully trapped gasket between the bonnet and the valve body.

Swing Check Valves (See Fig. 3) The self actuated swing check valves covered by this manual are of the bolted cover type, the clapper arm and the disc being suspended from the cover. Each swing check valve is supplied with fully trapped gasket between the cover and the valve body.

Most check valves are allowed to have some leakage, according to API 598. Therefore, never rely on a swing check valve as positive stop valve.

1.3 Packaging

Gate and Globe Valves. Gate and globe valves are shipped in the closed position to prevent damage to the seating surface during handling and shipping and should be maintained in the closed position until they are installed. No internal blocking is used on the gate and globe valves

Swing Check Valves. These valves are shipped with the clapper arm and the disc blocked during handling and shipping.

CAUTION

The blocking must be removed through the valve waterway prior to installation.

1.4 Installation

Preparation for Installation. It is highly recommended that before you install a valve, you check the valve and determine it is in a satisfactory condition. Some suggested items are:

1) Look for special warning tags and the identification plate to assure the valve is correct for the intended service.
2) Remove the end caps and ensure that the valve is reasonably clean and free from foreign material.
3) Open and close the valve to ensure that no damage has occurred in transporting the valve.

Prior to installing the valve, clean out the dirt and foreign matter from inside the piping system.

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.

The valve body is a rugged structure but it is not intended to be a means for aligning improperly fitted pipe. Care must be taken to ensure that any stresses caused by the improper pipe alignment are relieved elsewhere in the piping system. The valves should be supported, as necessary, to prevent unnecessary stresses induced by the connecting piping.

Installation. The following general rules should be followed when installing the valve in the pipeline.

a. Keep pipe ends free of dirt, spatter and grit. Check for any damage on the raised faces for the flanged end valves, for any thread damage for the threaded end valves, and any damage to the sockets for the socket end valves.

b. Handle the valve only with apparatus that will adequately support it using a safe and proper technique.

c. Install the valve using good piping practices (including the ones listed in the Manufacturers Standardization Society of the Valve and Fitting Industry Standard Practice MSS-SP-92 and as governed by applicable Industry Codes and Specifications. Assure that all bolting or welding (including preheat and post-weld heat treatment) associated with the installation of the valve in the piping system is in compliance with applicable codes and standards.

Gate and Globe Valves. The preferred installation for the gate and globe valves is with the valve in a horizontal line with the handwheel positioned vertically above the valve's centerline. When the stem points downward the bonnet acts as a pocket for debris and other foreign material in the line. Such material may interfere with the valve operation. Do not use split disc gate valves for steam service because the velocity will vibrate the disc and cause premature wear.

CAUTION

Split disc gate valves should never be installed with the stem pointed down because the weight of the disc will cause them to spread prematurely. This premature spread may not allow the disc to fully seat (close).

Globe valves are marked with either bridge wall markings, or flow arrows, because it is recommended that the valves be installed with the flow pressure under the disc. However, depending on your application, they may be installed with flow pressure over the disc.

Swing Check Valves. Swing check valves are normally used to prevent flow reversal. Since check valves have an allowable leakage rate per API 598, they are normally used in conjunction with gate valves which provides the positive stoppage of flow. The swing check valves can be installed in either horizontal lines or in vertical lines as required. When the valve is installed in the horizontal line, the valve cover must be up; when the valve is installed in a vertical line or for any angle from horizontal to vertical, they must be installed for upward flow only.

CAUTION

Flow through a swing check valve must open the disc to its full and stable position. Problems involving excessive wear of internal components, noisy operation or premature failure can occur from the use of check valves which are not in their fully open and stable position.

Swing check valves should not be installed immediately after pump discharges, elbows, tees, pulsation dampeners, or throttling valves, because the turbulence may cause disc motion and excessive wear or premature failure.

NOTE

A generally accepted practice is to install check valve a minimum of five times the pipe diameter away from pumps, elbows, tees, pulsation dampeners, or throttling valves.

A swing check valve should not immediately discharge into a tee or elbow.

1.5 Operation

Gate Valves. Opening and closing the gate valve is accomplished by operating the valve handwheel as desired. The gate valve disc moves down against or up and away from the seating surfaces in the valve body as the handwheel is rotated. The gate valve should not be used for the throttling purposes and should be operated only in the fully open or fully closed positions as erosion of the discs and seating surfaces, and stem "T-head" damage would result if the valve were operated in the partially open position.

CAUTION

Wrenches should not be used in the opening and closing of valves. This procedure can be dangerous as well as damaging the valve disc due to overloading of the stem and disc. In some cases, disc and stem separation has resulted or permanent distortion of the disc making the valve inoperable.

Globe Valves. Opening and closing of the globe valve is accomplished by operating the valve handwheel as desired.

The swivel disc and stem move down against or up away from the seating surface in the body. The globe valve can be used for throttling purposes as well as for on-off services. Since closure is accomplished by forcing the disc against the stream rather than across it, problems of chatter, erosion and excessive wear are minimized. In addition the short travel of the disc allows for fast closing time.

Swing Check Valves. Operations of the check valve to the open position is accomplished by self-actuating from line pressure against the disc. As line pressure diminishes, the weight of the disc causes the valve to close. The check valve operates primarily to prevent any reversal of flow in the installation.

1.6 Torque Application

The following procedures should be observed during replacement of the valve bolts (studs) and nuts on the body/bonnet joint, using applicable torque values given in Table 1.

a. ***Preparation***. Clean all bolts and nuts with solvent, rinse in demineralized water and dry with clean, lint-free cloths. Visually inspect all threads to ensure removal of all foreign material, corrosion products, burrs and previous lubrication. Lightly lubricate bolt threads, surfaces under the bolt heads and female threads of nuts with an antiseize compound. Install the bolts and nuts on the flanges and hand tighten the nuts against the flange faces. Using solvent and clean, lint-free wiping cloths, wipe off any excess lubricant than might adhere to the adjacent flange areas.

Table 1

Bolt Size (Dia.)	½ Torque (Ft-lbf)	Full Torque (ft-lbf)
5/16”	4-5	8-12
3/8”	6-8	12-18
½”	15-20	30-45
9/16”	25-30	45-68
5/8”	35-40	60-90
¾”	55-75	110-165
1”	140-180	260-390
1 ¼”	210-310	525-790

Torque values are based on bolts(studs) of ASTM A193 Grade B8 Class 2, with Grade 8 or 8F nuts to ASTM A194

b. ***Tightening Procedure***. Hand tighten nuts. Observe the tightening sequence shown in Figure 4 and, using a torque wrench with the required range, tighten each bolt to its valve listed in Table 1.

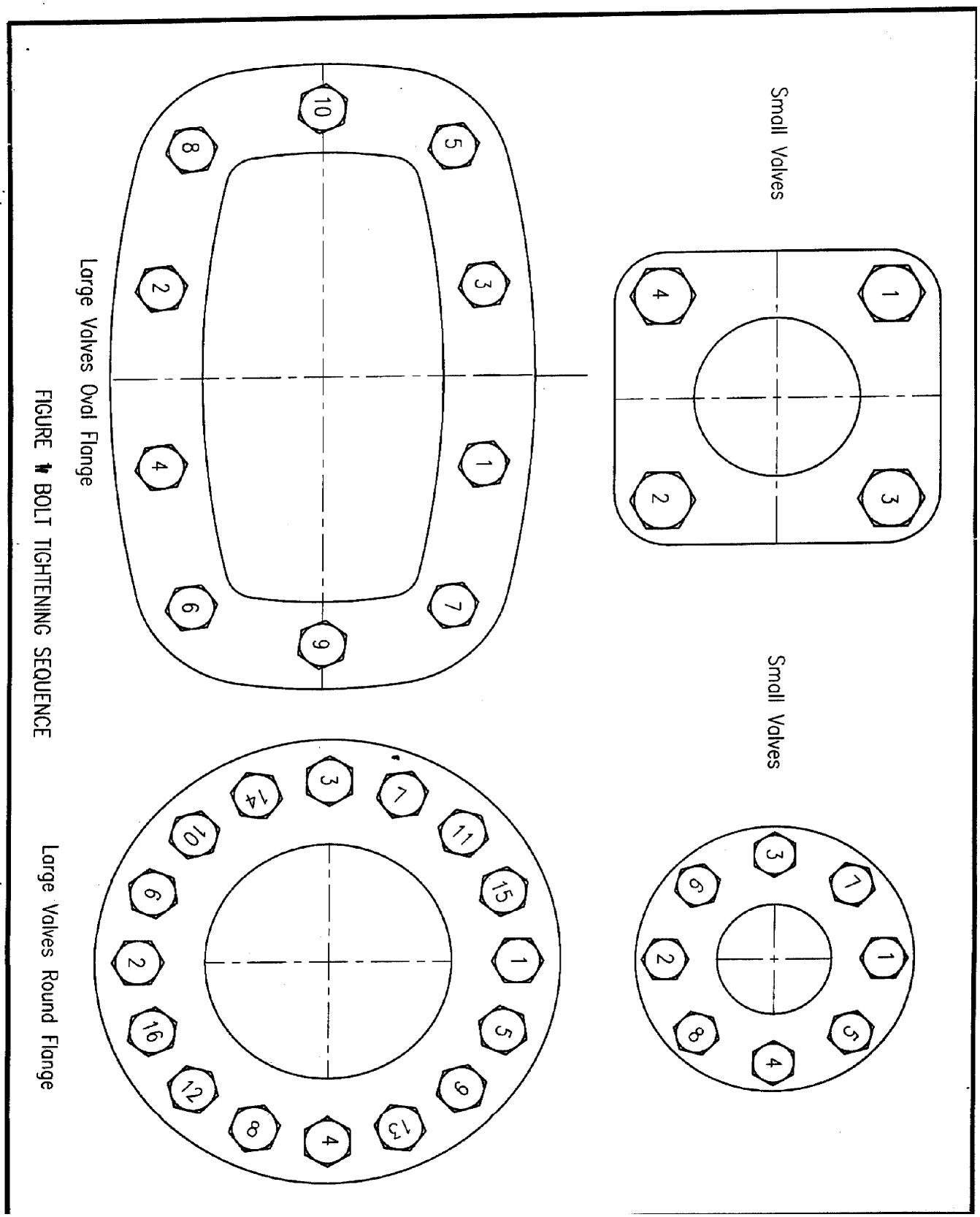
NOTE

Although ½ torque values are listed in Table 1, Aloyco strongly recommends using at least four (4) torque passes to arrive at final torque for bolts (studs) over 5/8” to ensure even pull down.

When all the bolts have been tightened to the 1/2 torque value, each bolt is tightened to the final torque value (Table 1) in the same sequence as previously used for initial torque.

All nuts should be evenly applied on stud and have full engagement.

Figure 4 Bolt Tightening Sequence



CHAPTER 2

MAINTENANCE

Section 1. GATE VALVES

2.1. General

This section covers necessary maintenance instructions for the manually operated gate valves, including routine maintenance, trouble shooting, disassembly, inspection, reassembly and recommended spare parts. Your Maintenance function should develop procedures to ensure that the valve is in maintained in a satisfactory and safe operating condition at all times.

2.2 Routine Maintenance

To ensure satisfactory valve operation, a routine maintenance check should be performed at regular intervals. The following actions should be taken:

1. Operate the valve through a complete cycle several times, checking for smoothness of action and absence of any leakage.
2. Close the valve and check for leakage using Sonic leak detection device.
3. Lubricate the exposed threads of the stems of the manually operated gate valves.
4. Using good grade of cup grease and a grease gun, apply the lubricant to the grease fitting on the yoke of the valves so equipped.
5. Check all the bonnet stud bolt nuts for proper torque values and tighten the nuts as necessary to meet requirements of Table 1.
6. Replace packing ring sets and the gasket if damaged or exposed to temperatures higher than maximum allowed.
7. Check the body and bonnet wall thickness using an Ultrasonic Thickness Tester. If under ASME B16.34 requirements, remove valve from service and either replace or repair, if economical.

2.3 Trouble Shooting

Following are the common troubles of the gate valve operation, together with the probable cause and recommended remedies. Observance of these procedures prior to valve disassembly will prevent unnecessary maintenance time and personnel involvement. Index numbers used in the listing refer to Figure 1.

Trouble:

Leakage at the body/bonnet joint

Probable cause:

1. Loose or improperly tightened bolt nuts (1).
2. Damaged or improperly seated gasket (26).

Remedy:

1. Tighten nuts in accordance with Table 1 and Figure 4, observing the entire sequence of tightening.

NOTE
Tightening should be performed with the valve depressurized.

2. Break the body bonnet joint and replace the gasket. (Refer to Table 1 and Figure 4 for bolt tightening procedure.)

CAUTION
Before attempting any disassembly, the line should be depressurized to prevent possibility of personnel injury or equipment damage. As an added safeguard, the valve should be opened and the body relieved of any residual pressure.

Trouble:

Leakage through valve seats.

Probable cause:

Worn or damaged seating surfaces on discs (4 and 5) or solid wedge (6) and/or body (28).

Remedy:

Disassemble valve and inspect all seating surfaces for wear and mechanical damage. Polish minor damage. Remachine or replace components if damage is heavy.

Trouble:

Leakage at the stuffing box.

Probable Cause:

1. Loose or improperly tightened gland studs nuts (14).
2. Gland follower (17) improperly seated.
3. Corrosion or mechanical damage of stem (7) in the stuffing box area.
4. Worn or damaged packing (25 and 25).

Remedy:

1. Tighten nuts, alternating at 1/4 turns, to torque value of 15 to 30 ft-lbf or just enough to stop any leakage. Do not tighten nuts excessively.
2. Reposition gland follower on the upper packing rings. It may be necessary to replace or to install additional packing rings. If leakage continues, replace the packing.

CAUTION

Crane does not recommend the practice of backseating the valve and repacking the valve under pressure. In the event that the backseat fails to seal properly a leak path to atmosphere is generated which constitutes a potential safety hazard to personnel.

3. Minor corrosion or damage can be polished out. Major damage necessitates stem replacement.

Trouble:

Rough or difficult valve operation.

Probable Cause:

1. Scored or otherwise damaged threads on the stem (7).
2. Damaged yoke bushing (13).
3. Excessively tight gland stud nuts (14).

Remedy:

1. Minor scoring or damage can be polished out. Major damage necessitates stem replacement.
2. Inspect bushing for damaged threads, galling or scoring. Polish out minor damage or replace the bushing for major damage.
3. Loosen nuts and then tighten to a torque value of 15 - 30 ft-lbf. In order to maintain even pulldown you should alternate tightening at 1/4 turn intervals.

2.4 Disassembly

CAUTION

Before attempting any disassembly, the line should be depressurized to prevent possibility of personnel injury or equipment damage. As an added safeguard, the valve should be opened and the body relieved of any residual pressure.

All internal parts of the gate valve are made accessible by removal of the bolted bonnet (3 Figure 1) from the valves body (28). The two discs (4 and 5) of a split disc valve are actuated by the disc arm (8) on the end of the stem(7) and will be lifted out of the body (28) when the bonnet (3) is removed. The solid or flexible wedge (6) of a gate valve is actuated by a stem foot on the end of the stem and will be lifted out of the body when the bonnet is removed.

NOTE

Match -mark the bonnet flange and body flange and disc to body before removing bonnet to ensure assembly of the parts in their original position.

CAUTION

Exercise care to prevent the disc or wedge from being dropped as they emerge from the valve body

Disassemble the gate valve in accordance with the following procedure: (see Figure 1)

1. Operate the valve to approximately one-quarter of open position. Remove the bonnet stud bolt nuts (1) and bonnet stud bolts (2) and lift the bonnet (3) of the body by raising the bonnet straight up. Use suitable hoist to lift the bonnet assembly on 6" valves and larger.

CAUTION

Exercise care to prevent the discs (4) and (5) of a double disc gate valve or the solid wedge (6) from being disengaged from the stem (7) as the discs or wedge emerge from the body. This is best accomplished on the double disc valve by taping the pair of discs together before lifting them clear of the body flange

2. On split disc type valves, after the discs are lifted clear of the body, remove from the disc arm (8) and carefully lay aside disc. Although there is no preferred orientation of the disc assembly in the body, the disc is fitted to the valve, therefore the disc should be replaced in the body in the same position from which they were removed, unless the disc and the body seating surfaces are to be remachined. Remove and discard used gasket (26).

3. On the wedge type valves, keep the solid wedge (6) centered on the stem foot until the wedge is clear of the body flange; then slip the wedge off the stem foot and carefully lay aside. The wedge should be replaced in the body in the same orientation as it was originally placed. Remove and discard used gasket (26).

4. Loosen gland stud nuts (14) and gland studs (15). Holding the stem (7) so it does not rotate, turn the handwheel (11) in the direction to close the valve until the stem threads become disengaged from the threads of the yoke bushing (13). Remove the stem by pulling it down through the stuffing box.

5a. For Class 150, 2" - 12"; Class 300, 2" - 2"; and Class 600, 2" - 1": loosen the yoke nut set screw (9) and remove the yoke bushing nut (13). Remove the handwheel (11), ID Tag, and the handwheel key (12) (sizes 3" and above) and withdraw the yoke bushing (13) through the bottom of the yoke boss. Remove gland stud nuts and gland studs (15) and remove the gland flange (16) and gland follower (17).

5b. For Class 300, 2.5" - 12"; and Class 600, 1.5" - 2": loosen the yoke bushing nut set screw (9) and remove the yoke bushing nut (13). Remove the handwheel (11), and ID Tag. Grind off the lock weld and withdraw the yoke bushing (13) from the bonnet yoke.

6. If the valve has a separate yoke, and the removal of the yoke (20) is necessary, remove the yoke bolt nuts (18) and yoke bolts (19) and remove the yoke from the bonnet (3).

7. Remove the packing rings set (5 rings). If a lantern ring was ordered, remove the upper packing rings (23), the lantern ring (24) and the lower packing rings (25) from the bonnet (3). Do not remove the pipe nipple unless replacement is necessary.

2.5 Inspection

After disassembly of the gate valve, all parts should be inspected for evidence of wear, distortion or mechanical damage. Perform the inspections listed in Table 2 to assure satisfactory operation of the affected parts.

Table 2. Gate Valve Inspection

Step	Part	Inspect For	Remarks
1	Body Seats	Evidence of wear or mechanical damage which could prevent tight sealing.	Minor damage (less than 0.0005") can be corrected by lapping the seats with the body in the line. Major damage or wear will necessitate removal of the body from the line for replacement or remachining.
2	Disc or Wedge	Evidence of wear or mechanical damage to seating surface	Minor damage (less than 0.0005"), such as out-of-flatness, can be corrected by lapping g the seating surfaces. Major damage or wear will require remachining of the seating surfaces and many require replacement of the disc or wedge to ensure fit.
3	Stem Assembly	Evidence of wear or mechanical damage on stem area which passes through packing rings.	Remove minor damage by polishing; major damage will require stem replacement.
		Evidence of wear on stem threads.	Replace stem assembly if wear is excessive
4	Yoke Bushing	Evidence of wear on the stem thread on the I.D., O.D. and shoulder of bushing.	Replace yoke bushing if wear is evident.
5	Yoke Ends	Evidence of wear or roughness in bushing bore and adjacent machined areas.	Remove minor damage by polishing and major damage will require remachining or replacement of yoke.
6	Handwheel	Evidence of wear on underside surface which runs against yoke end.	Remove minor wear by polishing or remachining. Replace handwheel if extensive wear is evident.
7	Lantern Ring (if applicable)	Evidence of wear or roughness on the I.D. of the bore.	Polish out roughness or replace lantern ring.
8	Gland Follower	Evidence of wear or roughness on I.D.	Polish worn or rough areas or replace gland follower.

2.6 Reassembly

Reassembly of the gate valve is performed essentially in the reverse order of disassembly, observing the following special procedures. (See Figure 1)

1. Lubricate both the O.D. and the I.D. of the yoke bushing (13) with good grade of cup grease. Install the yoke bushing in the bushing bore in the yoke (20) from the underside of the bore. Position the handwheel key (12) in the key slot in the yoke bushing sizes (3" and above) and slide the handwheel (11) over the key and the bushing. Position the ID Tag. Secure the handwheel in the position with the yoke bushing nut (10) and tighten the nut with a wrench. Lock the yoke bushing nut in place by tightening the yoke nut set screw (9) with an Allen wrench. Using good grade of cup grease and a grease gun, apply lubrication to the grease fitting (21) on the handwheel end of the yoke.

CAUTION

When installing the top and bottom packing sets make sure that proper cup and cone installation sequence is used. The bottom ring and the top ring in the packing assembly is always a cone shaped ring.

2. Install the stem (7) through the bonnet (3), pushing the stem through the stuffing box far enough so that the bottom packing rings (25), lantern ring (24), top packing rings (23); gland follower (17) and gland flange (16) can be placed onto the stem in this order. Position the lower packing, the lantern ring and the upper packing in the stuffing box. Gently push the stem all the way until the end of the stem meets the bottom of the yoke bushing (13). Turn the handwheel (11) in the direction to open the valve to engage the stem thread in the yoke bushing; continue to turn the handwheel until the stem is approximately in the half open position.

3. Install the yoke bolts (19) through the yoke (20) and the yoke flange of the bonnet (3) and secure with the yoke bolt nuts (18).

4. Slide the gland follower (17) and the gland flange (16) into place on top of the packing rings Assemble the gland studs (15) through the gland flange into the yoke (20) and tighten the gland stud nuts (14) to torque value of 15 to 30 ft-lbf. In order to maintain even pulldown you should alternate tightening at 1/4 turn intervals.

NOTE
Tighten gland stud nuts evenly to avoid forcing the gland follower or gland flange against the stem.

5. Install the new gasket (26). Assemble two discs (4 and 5) to the disc arm (8) or the solid wedge (6) to the stem foot on the stem, making certain to hold the parts in place while carefully lowering the bonnet (3) over the body. As the discs or solid wedge is lowered in the body, guides in the body will guide the discs or wedge to the seat.

NOTE
Be certain that the discs or the wedge are installed in the same position as noted during disassembly.

6. Replace the bonnet stud bolts (2) through the bonnet and body flanges and assemble the bonnet stud bolt nuts (1) to both ends of the bolt studs. Following the procedures contained in Chapter 1, tighten the nuts in the sequence shown in Figure 4 to the torque values specified in Table 1.

2.7 Spare Parts.

The packing rings (25 and 23) and gasket (26) are the only recommended spare parts for a standard valve. If a lantern ring valve was ordered a spare lantern ring is recommended.

Figure 1 Typical Gate Valve Exploded View

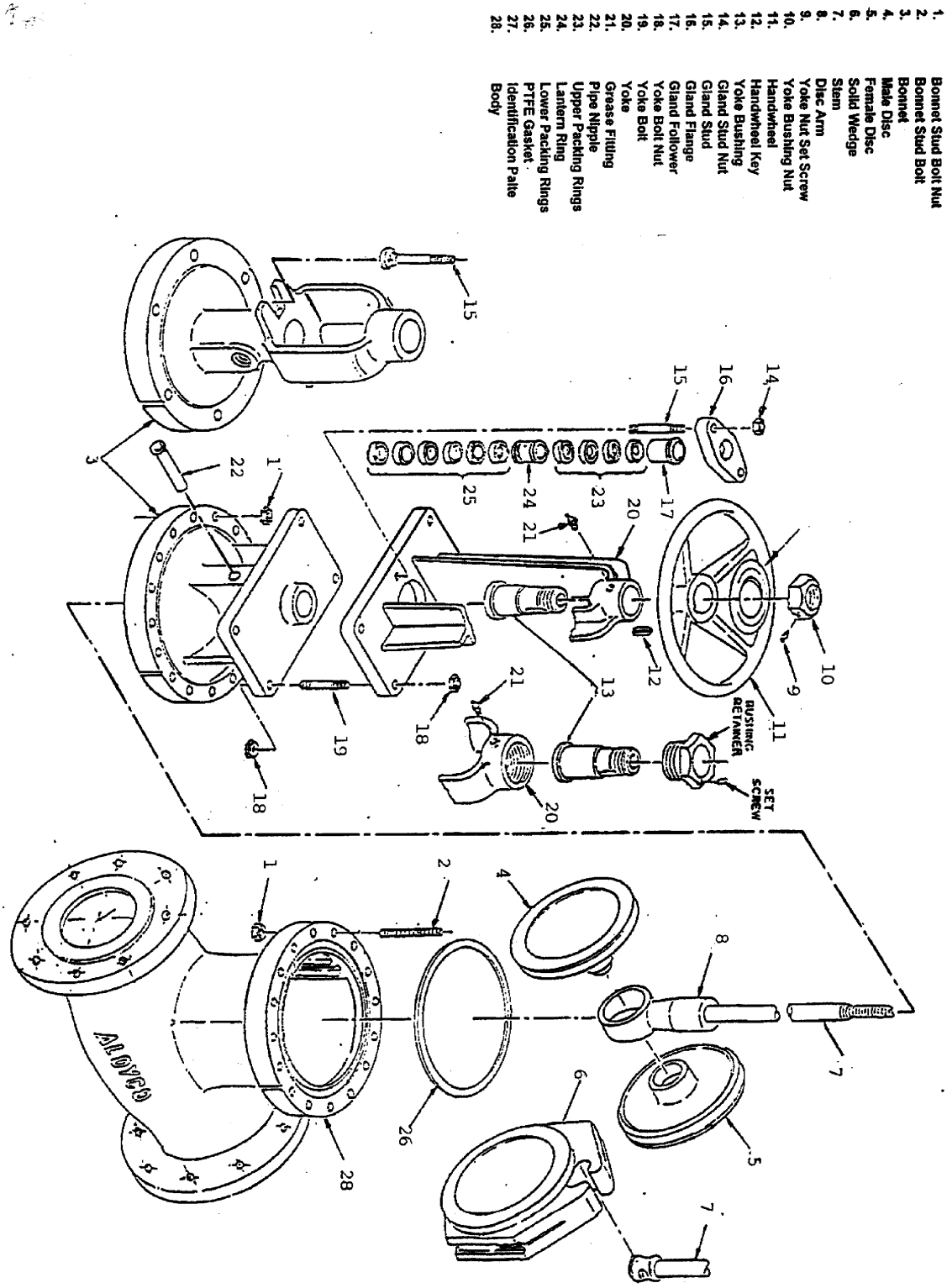


Figure 1. Typical Gate Valve Exploded View

Section 2. GLOBE VALVES

2.8 General

This section covers all necessary maintenance instructions for the manually operated globe valves, including routine maintenance, trouble shooting, disassembly, inspection, reassembly and recommended spare parts. Your Maintenance function should develop procedures to ensure that the valve is in maintained in a satisfactory and safe operating condition at all times.

2.9 Routine Maintenance

To ensure satisfactory valve operation, a routine maintenance check should be performed at regular intervals. The following actions should be taken:

1. Operate the valve through a complete cycle several times, checking for smoothness of action and absence of any leakage.
2. Close the valve and check for leakage using Sonic leak detection device.
3. Lubricate the exposed threads of the stems of the manually operated globe valves.
4. Check all the bonnet stud bolt nuts for proper torque values and tighten the nuts as necessary to meet requirements of Table 1.
5. Replace packing ring sets and the gasket if damaged or exposed to temperatures higher than maximum allowed.
6. Check the body and bonnet wall thickness using an Ultrasonic Thickness Tester. If under ASME B16.34 requirements, remove valve from service and either replace or repair, if economical.

2.10 Trouble Shooting

Following are the more common troubles of globe valve operation, together with the probable cause and recommended remedies. Observance of the remedial procedures prior to valve disassembly may prevent unnecessary maintenance time and personnel involvement. Index numbers used in the listing refer to Figure 2.

Trouble:

Leakage at the body/bonnet joint

Probable Cause:

1. Loose or improperly tightened bonnet stud bolt nuts.
2. Damaged or improperly seated gasket.

Remedy:

1. Tighten nuts in accordance with Table 1 and Figure 4, observing the entire sequence of tightening.

NOTE
Tightening should be performed with valve being depressurized.

2. Break the body/bonnet joint and replace the gasket. (Refer to Table 1 and Figure 4 for bolt tightening procedure.)

CAUTION
Before attempting any disassembly, the line should be depressurized to prevent possibility of personnel injury or equipment damage. As an added safeguard, the valve should be opened and the body relieved of any residual pressure.

Trouble:

Leakage through the valve seat.

Probable Cause:

Worn or damaged seating surface on disc (14) and/or on the body (26).

Remedy:

Disassemble the valve and inspect both seating surfaces for wear and mechanical damage. Polish out minor damage. Remachine the parts if damage is heavy.

Trouble:

Leakage at the stuffing box.

Probable Cause:

1. Loose or improperly tightened gland stud nuts (5).
2. Gland follower (8) improperly seated.
3. Corrosion or mechanical damage of stem (15), in the stuffing box area.

Remedy:

1. Tighten nuts, alternating at 1/4 turns, to a torque of 15 to 30 ft-lbf. Tighten nuts just enough to stop any leakage. Do not tighten excessively.

2. Reposition gland follower on the packing rings. It may be necessary to replace or install additional packing rings. If such is the case

then the valve should be depressurized and in fully open position before any repacking is attempted.

CAUTION

Crane does not recommend the practice of backseating the valve and repacking the valve under pressure. In the event that the backseat fails to seal properly a leak path to atmosphere is generated which constitutes a potential safety hazard to personnel.

3. Minor corrosion or damage can be polished out. Replace the stem if the damage is major.

Trouble:

Rough or difficult operation.

Probable Cause:

1. Scored or otherwise damaged threads on stem (15).
2. Damaged yoke bushing (17).
3. Excessively tight gland stud nuts (5).

Remedy:

1. Minor scoring or damage can be polished out. Replace if stem damage is major.
2. Inspect the bushing for damaged threads or scoring. Polish out minor damage or replace the bushing for major damage.
3. Loosen nuts and then tighten to a torque value of 15-30 ft-lbf. In order to maintain even pulldown you should alternate tightening at 1/4 turn intervals.

2.11 Disassembly

CAUTION

Before attempting any disassembly, the line should be depressurized to prevent possibility of personnel injury or equipment damage. As an added safeguard, the valve should be opened and the body relieved of any residual pressure.

All internal parts of the globe valve are made accessible by removal of the bolted bonnet (22) from the valve body (26). The assembled stem (15) and disc (14) will be lifted out of the body as a unit when the bonnet is removed.

NOTE

Place parts on a clean surface as they are removed from the valve. Exercise care to avoid damage to parts through contact with hard objects.

Disassemble the globe valve in accordance with the following procedure: (see Figure 2)

NOTE

Match -mark the bonnet flange and body flange before removing bonnet to ensure assembly of the parts in their original position.

1. Operate the valve to the fully-open position. Remove the bonnet stud bolt nuts (1) and bonnet stud bolts(2) and lift the bonnet (22) and associated parts off the body (26) by raising the bonnet straight up. Lift the bonnet assembly carefully to avoid striking the disc seating surface against the body chest and damaging the seating surface. Remove and discard the PTFE gasket. If the only purpose of the maintenance procedure is to examine the condition of the disc and body seating surfaces, no further disassembly is necessary. DO NOT use any tool on the stem surface as this will damage the surface.

2. Loosen the gland stud nuts (5) a minimum of two turns; then turn the handwheel (4) in the direction to close the valve until the handwheel is down to the yoke bushing (17).
Remove the handwheel nut (3) and the handwheel. Grasping the portion of the stem (15) extending below the bonnet (22) by hand, turn the stem until the threads are disengaged from the yoke bushing threads. Pull the stem
with disc (14) attached down through the stuffing box and out the underside of the bonnet.

3. Remove the gland stud nuts (5) and the gland studs (6) from the yoke (21) and lift off the gland flange (7) and the gland follower (8). Remove the packing rings (9 and 10) from the bonnet (22). Discard the packing rings.

4. Using the proper size punch drive out the swivel nut pin (12) and remove the swivel nut (13). In case of the welded assembly of the disc and swivel nut , cut the weld. Separate the disc (14) from the stem (15), exercising extreme care not to damage the stem surfaces and the disc seating surface at any time.

5. If replacement of the yoke bushing (17) is necessary, drill out the yoke nut pins (18) to depth sufficient to permit removal of the yoke bushing nut (16). In case of the tack weld, cut the weld. Drive the yoke bushing (17) down through the yoke bushing bore and remove the yoke bushing and the yoke nut pins from the underside of the bore. Discard the yoke bushing, yoke bushing nut and yoke nut pins.

6. In valves design with the separate yoke, if the removal of the yoke (21) is necessary, remove the yoke bolt nuts (19) and yoke bolts (20) and remove the yoke from the bonnet (22). Do not remove the leakoff pipe nipple (24) unless replacement is required.

2.12 Inspection

After disassembly of the globe valve, all parts should be inspected for evidence of wear, distortion or mechanical damage. Perform the inspections listed in Table 3 to assure satisfactory operation of the affected parts.

2.13 Reassembly

1. Reassembly of the globe valve is performed essentially in the reverse order of disassembly observing the following special procedures: (See Figure 2)

Install new yoke bushing (17) into the underside of the bore yoke (21) and seat bushing in the bore. Note location of holes for the yoke nut pins (18) and thread the yoke bushing nut (16) into the yoke bushing. Tighten nut with a wrench and drill holes for the yoke nut pins at the proper location to pick up previously drilled holes in the bushing end of the yoke. Install the yoke nut pins and drive them down until they are flush with the top of the yoke bushing. Using a center punch, stake the pins around their periphery to lock them in place.

Table 3. Globe Valve Inspection

Step	Part	Inspect For	Remarks
1	Body	Evidence of wear or mechanical damage which could prevent tight sealing	Minor damage (less than 0.0005”) can be corrected by lapping the seats with the body in the line. Major damage or wear will necessitate removal of the body from the line for replacement or remachining.
2	Disc	Evidence of wear or mechanical damage to seating surface	Minor damage (less than 0.0005”), such can be corrected by lapping the seating surface. Major damage or wear will require remachining of the seating surface and may require replacement of the disc
		Evidence of galling on the stem side of the disc, particularly where the bottom of the stem bears against the disc.	If galling is evident, remachine or replace the disc.
		Damaged thread on the disc which mate with disc swivel nut threads and may cause assembly difficulties.	Repair threads with thread chaser, or tap or replace the disc.
3	Swivel Nut	Damaged threads which mate with disc threads and may cause assembly difficulties.	Repair threads with thread chaser or tap or replace the swivel nut.
		Evidence of galling or wear in stem bore.	Minor damage can be polished out. Major damage requires replacement of the swivel nut.
4	Stem	Evidence of galling on bottom surface which bears against the disc.	Minor damage can be polished or repaired by machining taking a very light cut. Major damage requires replacement of the stem.
		Evidence of wear on stem area which passes through packing rings, particularly indications of a spiral being worn into the stem by rotation of the stem through the packing rings.	Minor damage can be polished out. Major damage requires replacement of the stem.
5	Yoke Bushing	Evidence of wear or roughness on threads in bushing O.D.	If thread wear or damage is evident replace the yoke bushing, yoke bushing nut, and yoke nut pins.
6	Lantern Ring (if applicable)	Evidence of wear or roughness on the I.D. of bore.	Polish out roughness or replace lantern ring.
7	Gland Follower	Evidence of wear or roughness on I.D.	Polish worn or rough areas or replace gland follower.

2. Assemble the disc (14) on the stem (15) and slide swivel nut (13) over the top of the stem and down to the stem foot. Engage the threads of the swivel nut and the disc and , using a wrench, tighten the swivel nut into the disc. Check to be sure that the disc and swivel nut rotate freely on the stem with minimum of side and end play.

3. Insert the swivel nut pin (12) and drive in to lock the swivel nut (13) in place. Stake each end of the swivel nut pin after installation. Check again that the swivel nut and disc (14) are free to rotate on the stem (15).

NOTE

If new parts are being installed, it will be necessary to drill a hole for the swivel nut pin. The hole must be drilled offset as in the original parts to avoid interference with the free rotation of the disc and swivel nut.

4. Push the stem (15) from the underside of the bonnet (22) through the stuffing box far enough so that the packing (11) lantern ring (if applicable) (10) , gland (8), and gland flange (7) can be placed onto the stem. Install the packing in the stuffing box. Lightly lubricate the stem threads and push the stem through the stuffing box until the stem threads contact the threads of the yoke bushing (17) in the yoke (21). Manually turn the stem in the clockwise direction to engage the stem and the bushing threads. Continue to turn the stem until it is far enough through he yoke bushing so that the handwheel (4) can be installed. Install the handwheel and secure in place with the handwheel nut (3), tightening the nut with the wrench.

5. Install the yoke bolts (20) through the yoke (21) and the yoke flange of the bonnet (22) and secure with the yoke bolt nuts (19).

6. With the packing rings installed, slide the gland follower (8) and gland flange (7) into place on top of the packing rings. Assemble the gland studs (6) through the gland flange into the yoke (21) and tighten the gland stud nuts (5) to torque value of 15 to 30 ft-lbf.

NOTE

Tighten gland stud nuts evenly to avoid forcing the gland follower or gland flange against the stem.

7. Install new PTFE gasket (23) in the recessed groove in the flange of the body (26). Turn the handwheel (4) to move the disc (14) into fully open position. Carefully lower the bonnet (22) and the assembled parts onto the body, making sure not to let the disc seating surface strike against the body chest as the bonnet is lowered into place.

NOTE

Make certain that the bonnet is installed on the body in the same position as was noted during disassembly.

2.14 Spare Parts.

The packing rings (9 and 11) and the gasket (23) are the only recommended spare parts.

Figure 2 Typical Globe Valve Exploded View

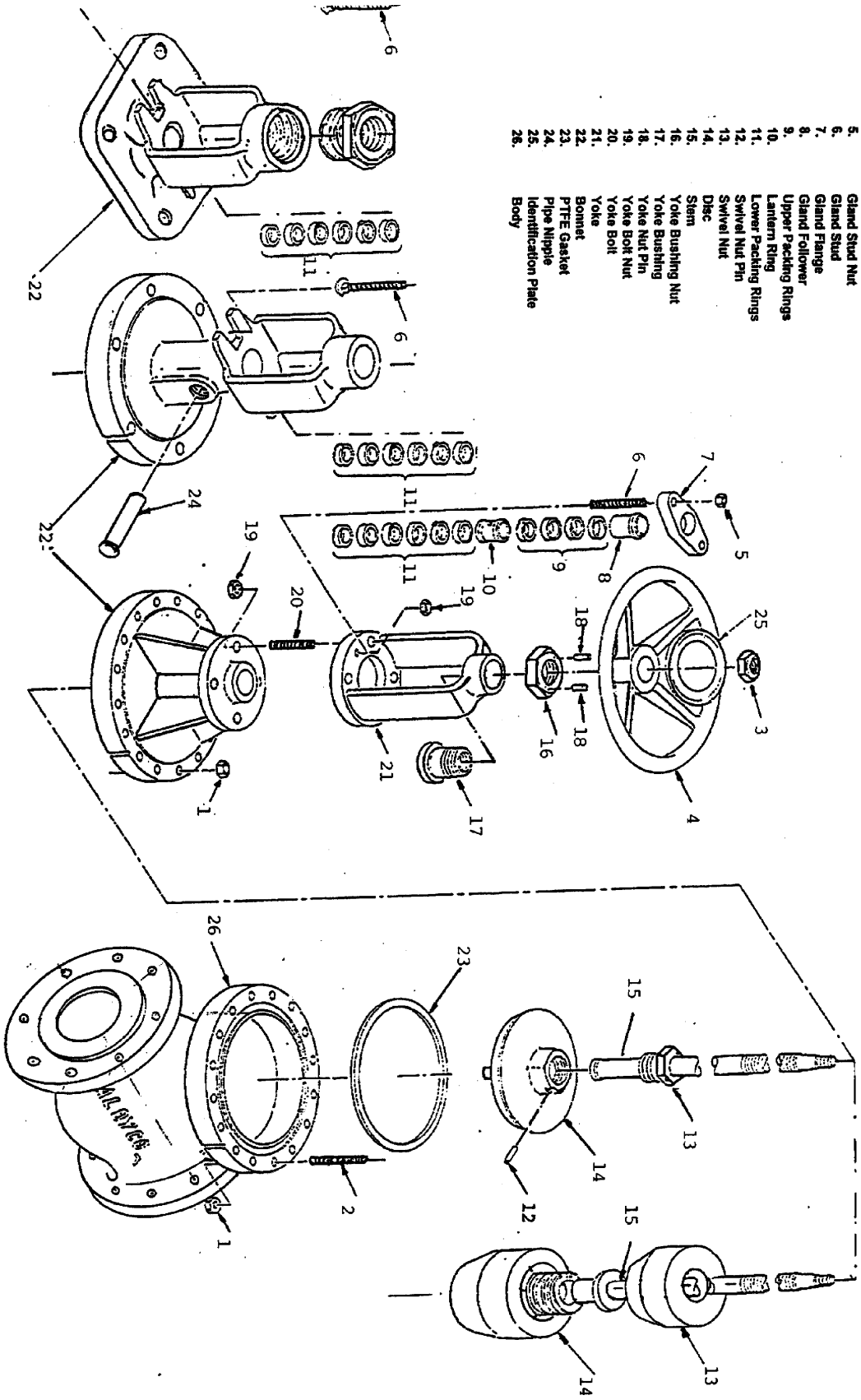


Figure 2. Typical Globe Valve Exploded View

Section 3. SWING CHECK VALVES

2.15 General.

This section covers all necessary maintenance instructions for the self-actuated swing check valves, including disassembly, inspection, lubrication, reassembly and trouble shooting. Your Maintenance function should develop procedures to ensure that the valve is in maintained in a satisfactory and safe operating condition at all times.

2.16 Routine Maintenance

One basic advantage of a swing check is its simplistic design. Other than a joint leak, valve fluttering, noisy operation and an occasional binding between the hinge pin and the disc arm little else can go wrong. To ensure satisfactory valve operation, a routine maintenance check should be performed at regular intervals. The following actions should be taken:

1. Inspect the valve for noisy or erratic operations. If this condition exist correct flow through the pipe.

NOTE
If correcting the flow fails to correct the condition then the valve will need to be disassembled, the most likely cause of the malfunction is process build-up around the hinge pivot point or galling between the moving parts.

2. If the system permits, depressurize the piping until the valve closes. Then pressurize the piping to assure if the valve opens.

NOTE
If the valve fails to open or close the valve needs to be disassembled and inspected to determine the cause of the malfunction.

CAUTION
Before attempting any disassembly, the line should be depressurized to prevent possibility of personnel injury or equipment damage.

3 Check all the cover stud bolt nuts for proper torque values and tighten the nuts as necessary to meet requirements of Table 1.

2.17 Trouble Shooting

Following is the list of more common troubles of swing check valve operation together with the probable cause and recommended remedies. Observance of the remedial procedures prior to valve disassembly may prevent unnecessary maintenance time and personnel involvement. Index numbers used in the listing refer to Figure 3.

NOTE
Place parts on a clean surface as they are removed from the valve. Exercise care to avoid damage to parts through contact with hard objects.

Trouble.
Leakage at cover body joint.

Probable Cause.

1. Loose or improperly tightened cover stud bolt nuts.

Remedy.

1. Tighten nuts in accordance with Table 1 and Figure 4.
2. Break the cover-body joint or replace gasket. (Refer to Table 1 and Figure 4 for bolt tightening procedure).

Trouble.

Leakage through seat.

Probable Cause

1 Worn or damaged seating surfaces on disc (7) and/or body (13).
2. Damaged or binding hinge pin (8) or hinge (9).
3. Disc (7) not free enough in the hinge (9) to align itself against the body seat.

Remedy.

1. Disassemble valve and check the seating surfaces for wear or mechanical damage. Polish out minor damage. Remachine or replace components if damage is heavy.
2. Check hinge pin for wear or out-off-roundness. Check hinge pin holes for roughness or wear. Polish out minor damage or replace parts with major damage.
3. Drive out disc nut pin (4) and loosen disc nut (5). Until disc (7) is sufficiently free. Lock nut in place with replacement disc nut pin.

2.18 Disassembly.

All internal parts are accessible by removal of the bolted cover (10). The hinge (9) and the disc (7) are suspended from the cover and will be lifted out of the valve when the cover is removed.

Disassemble the swing check valve in accordance with the following procedure: (see Figure 3)
1. Remove the cover stud bolt nuts (1) and cover stud bolts (2) and lift cover (10) from the body (13) taking care to prevent any damage to the disc seating surface. Lift cover straight up until cover pin (8) clears its locating hole; then shift cover laterally in the

downstream direction so as to move the disc (7) away from the seat in body (13). Lift cover and attached disc and hinge (9) clear of the valve body.

2. Push out the hinge pin (8) and remove and hinge and disc assembly from cover (10). The hinge pin should slide out easily.

3. If necessary for rework or replacement, remove the disc (7) from the hinge (9). Using hammer and punch, drive out the disc nut pin (4) and unscrew the disc nut (5). Remove the disc nut washer (if applicable) and withdraw the disc from the hinge.

4. Do not remove cover pin (11) unless replacement is necessary.

2.19 Inspection.

After disassembly of the swing check valve, all parts should be inspected for evidence of wear or distortion or mechanical damage. Perform the inspection listed in

Table 4. to assure satisfactory operation of the affected parts.

2.20 Reassembly

Reassembly of the swing check valve is performed essentially in the reverse order of disassembly, observing the following special procedures: (see Figure 3)

1. Assemble the disc (7) to the hinge (9) and install the disc nut washer (if applicable) and disc nut (5).

2. Tighten the disc nut (5) against the disc nuts washer (6) (if applicable) until the pin through holes in the nut and disc are aligned. Install the disc nut pin (4) and peen over the ends of the pin to lock the disc nut in place. Check that the disc is free fitting in the hinge (9) and that adequate movement between the disc and the hinge is present so that the disc can align itself freely against the body seat for closure.

3. Assemble the hinge (9) and the disc (7) to the cover (10) by inserting the hinge pin (8) through the cover hinge holes and the hinge. Check that the movement of the hinge on the hinge pin is free with no binding.

4. Place the PTFE gasket (3) in the gasket recess on the body cover flange.

5. If necessary, install replacement cover pin (11). Approaching the body from the downstream position, place cover (10) with the hinge and disc attached, on the body, in the same manner as removal, taking care to ensure that the cover pin is aligned with its locating hole. Lower cover into place gently to avoid damage to the seating surfaces.

6. Install cover stud bolts (2) and cover stud bolt nuts (1). Follow the procedure specified in Chapter 1 and tighten nuts to the torque values listed in Table 1 in the sequences in Figure 1.

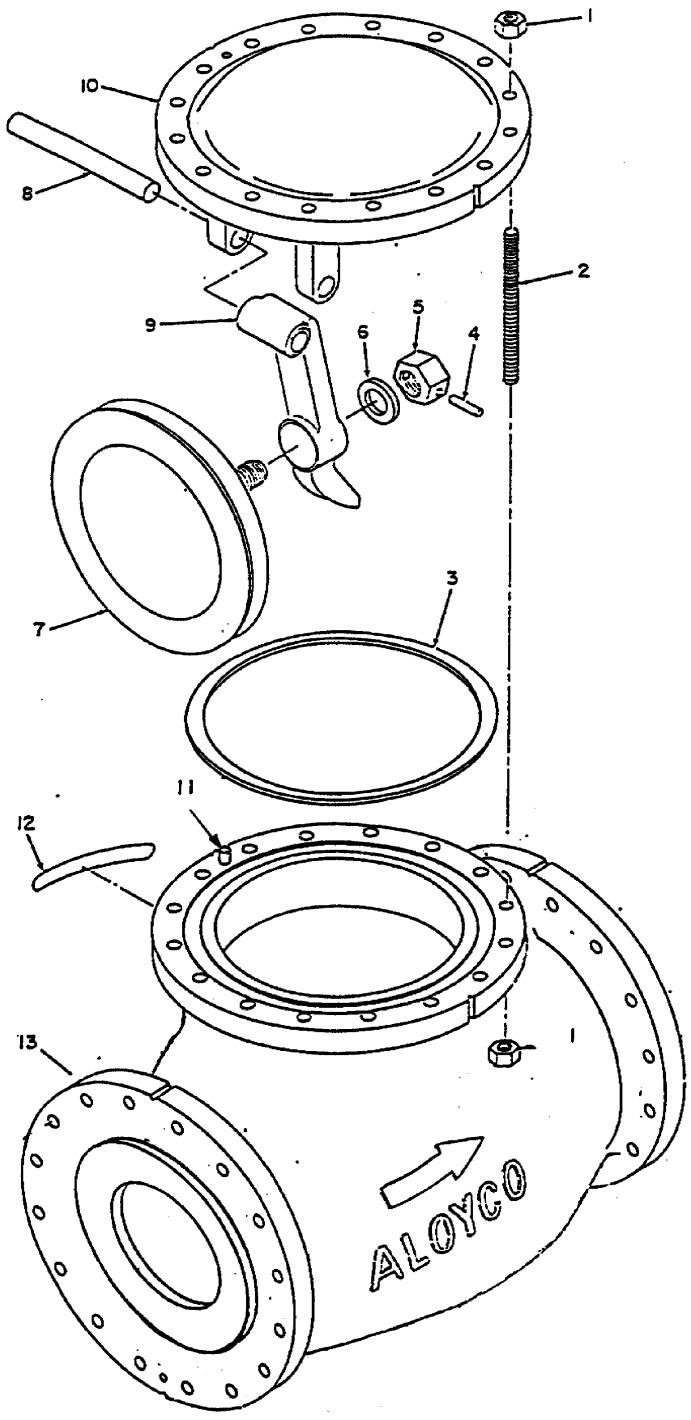
Table 4 Swing Check Valve Inspection

Step	Part	Inspect For	Remarks
1	Hinge Pin	Evidence of wear resulting in out-of-roundness, galling or roughness	Minor wear can be polished out. Major wear will necessitate hinge pin replacement
2	Hinge	Evidence of wear on hinge pin end resulting in out-of-roundness or roughness in hinge pin bore.	Minor wear can be polished out. Major wear will necessitate hinge replacement.
		Evidence of wear resulting from movement of the disc in the hinge	Minor wear can be polished out. Major wear will necessitate replacement.
3	Cover	Evidence of wear resulting in out-of-roundness or roughness in the hinge pin holes on the underside of the cover.	Minor wear can be polished out. Major wear will necessitate cover replacement.
4	Disc	Evidence of wear or damage on seating surface which could prevent tight seating.	Lap, grind or remachine disc seating surface to assure adequate seating or replace disc.
		Evidence of wear on surfaces which mate with hinge	Minor damage can be polished out. Major damage requires replacement of the disc.
5	Body	Evidence of wear or damage on body seat from hammering, sliding, etc. which could prevent tight seating.	Correct minor seating surface damage by lapping seat to obtain a flat surface with the body in line. If damage or wear is extensive, remove the body from the line for remachining of the seat or replacement of the body.

2.21 Spare Parts

The PTFE gasket (3) is the only recommended spare part for the swing check valve.

Figure 3 Typical Swing Check Valve Exploded View



1. Cover Stud Bolt Nut
2. Cover Stud Bolt
3. PTFE Gasket
4. Disc Nut Pin
5. Disc Nut
6. Disc Nut Washer
7. Disc
8. Hinge Pin
9. Hinge
10. Cover
11. Cover Pin
12. Identification Plate
13. Body

Figure 3 Typical Swing Check Valve Exploded View

Crane Service Center

CRANE VALVES
1202 HAHLO STREET
HOUSTON, TX
Ph: (713) 671-4600
Fax: (713) 671-4745