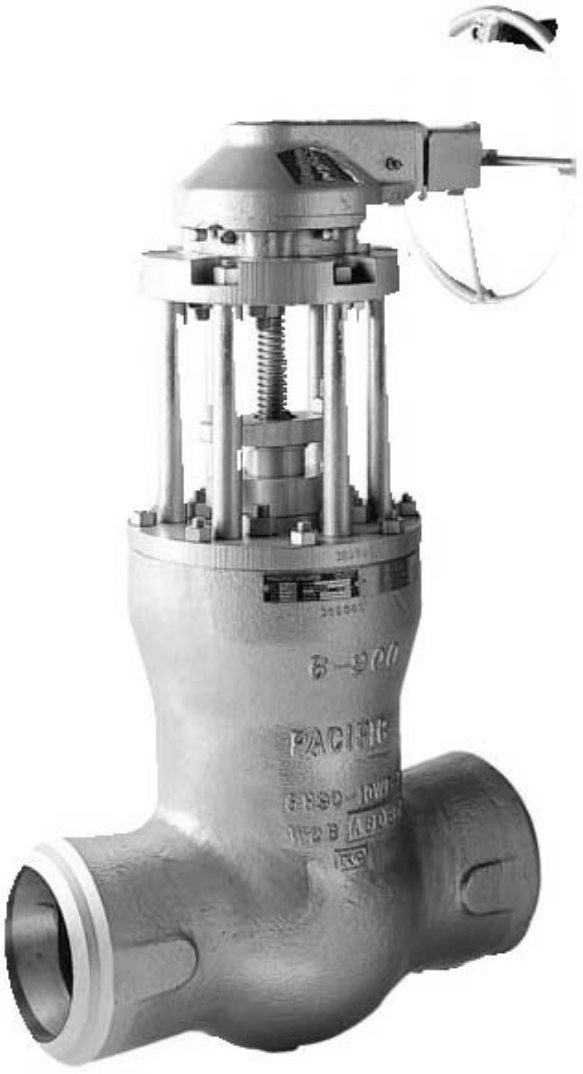
Pacific Valves
Operation and Maintenance Manual
Pressure Seal



Pacific Valves, 3201 Walnut Ave., Signal Hill, CA. 90755
PH. (562) 426-2531
Fax. (562) 595-9717
cranecpe.com

Revisions

REV	ECO	DESCRIPTION	PREPARED BY	DATE	ENGINEERING	OTHER
1	18353 19684	INITIAL RELEASE	Jerry Martin	10-16-2012	S. Sturtevant	
2	19884	CHANGED ALL REASSEMBLY SECTIONS STATEMENT ABOUT DRAW STUD TORQUE TO WRENCH TIGHT	Jerry Martin	11-8-2012	S. Sturtevant	
3	27317	ADDED SWING CHECK VALVE INSTALLATION DETAILS	Hiral Joshi	9-22-2014	S. Kulkarni	
4	37506	REMOVED WEDGE PLUG & BOLTED BONNET DETAILS	Pankaj Nikam	07-12-2017	S. Kulkarni	
5	37937	TILT DISC EXPLODED VIEW ADDED & DISC ASSEMBLY INSTRUCTION ELABORATED	Pankaj Nikam	08-23-2017	S. Kulkarni	

Table of Contents

Section A: Warnings

- All Pacific Valves are designed and manufactured to be installed in applications where no more than 1g of force in excess of gravity is applied to the valve in any direction. This 1g force can be an effect of Traffic, Wind or Earthquake. Pacific Valves should not be used in applications that exceed 1g.
- All piping system components are subject to certain levels of erosion and corrosion. As the valve wall thickness is the governing variable in overall service life, care should be taken to ensure that all valves and related piping components are of a suitable wall thickness for the given application. Periodic inspections should also be made as valves/components may wear over time. As a minimum, annual inspection of valve body and bonnet wall should be performed with calibrated measuring devices such as micrometers and/or ultrasonic thickness gauges. Severe applications may require additional inspection types and/or frequency. Additionally, valves should be inspected for general signs of component wear and/or damage caused by process media, i.e. steam cutting. This may include the removal of insulation and/or other coverings to ensure a proper inspection. All valves should also be cycled completely during these inspections to ensure proper operability. Care should be taken to ensure that this will not affect the operating system.
- With the exception of the Wedgeplug, all Pacific valves are designed for operation in clean media. These media should be free of all debris and particulate matter. Debris in the media may cause damage and/or reduced performance to the valve.
- The style, size, pressure class and material selection of all valves is the responsibility of the piping system designer. Pacific Valves may offer suggestions in this area, however the selection process is solely the responsibility of plant designers. Plant designers should also take into account the specific effects that the process media will have on the valve wall thickness and corresponding service life and ensure that the selected material is compatible with the process media. This material selection should be based on reputable corrosion resistance data and used in conjunction with the valve's corrosion allowance in order to maintain the minimum wall thickness. See Table 1 for wall thickness and corrosion allowance data. It is also the responsibility of the piping designer to ensure that valves are equipped with any necessary venting and/or draining capabilities.
- Do not exceed 100% of the maximum pressure rating of the valve at any time during its operation. Pressure spikes beyond the valve's pressure rating are solely the responsibility of the user.
- When operating any valve stand clear of any moving parts such as the stem and/or disc assembly.
- All manually operated Pacific valves are designed for hand input. Do not apply excessive input torque via pipe wrenches "cheater bars" or other devices.
- Motor operated valves should be left in their factory set condition, unless the system operating parameters dictate a change. If changes are necessary, they should be performed in small increments and then the valve operation inspected. When adjusting these settings, use only the lightest/lowest setting possible to achieve the desired performance. Excess torque and/or thrust in the motor settings, may damage or lockup the valve. Never remove a motor operator, gear operator or manual operating assembly from a valve while it is pressurized. The valve must be completely relieved of all pressure prior to this disassembly.
- Care should be taken to ensure that electrical motors are wired correctly to the power source. Incorrect phasing of 3-phase wiring may cause valve/motor damage.
- Motorized Parallel disc gate valves are position seated and should never be torque seated. Do not use the motor torque settings to seat the valve.
- The operator of any valve should have an understanding of the effects of opening/closing the valve with regards to its role in the overall piping system. Operators of valves under pressure should take caution to ensure that the valve is in good operating condition prior to operating it under pressure.
- Certain valve applications take place at elevated temperatures. Care should be taken in these instances to ensure that an operator does not touch any portion of the valve other than the

handwheel. In severe temperature applications (300 degrees F and above), insulation may be required on the valves to protect operators from the heat.

- Certain processes utilize flammable, caustic and/or otherwise unstable media. Care should be taken in these circumstances to ensure the operator is aware of the specific health and safety risks associated with that medium.
- All Pacific valves should be operated within the pressure and temperature ranges listed in Table 2 of ANSI B16.34. Under no circumstances should the valves be operated at conditions outside these tables.
- All piping systems should contain independent support mechanisms and should not utilize the valve as a sole means of support.
- The estimated total lifespan of a Pacific valve when installed within ideal boundary conditions is 20 years.
- All valve actuators shall be sized by referring to the specific relevant valve torque and thrust data published by Pacific Valves. Generic or standard valve information shall not be used.
- It is the ultimate responsibility of the piping designer to ensure that each valve is sized appropriately for the given system parameters of pressure, temperature, flow rate, velocity, pressure drop, etc. Additionally it is the responsibility of the piping designer to ensure that the corresponding actuator sizing data is correct for the given application.
- Valves other than globes should not be used for throttling applications. Severe damage may occur to other valve styles. When using globe valves for throttling, do not operate the valve continuously at less than 10% open.
- All valves shall only be used within their defined boundary conditions. All standard materials of construction, including bolting are suitable for operation within the boundary conditions listed in section 8.0 of this document. Care should be taken to ensure that all valves are not operated at conditions that exceed or deviate from the defined boundary conditions. The boundary conditions must be adhered to regardless of the piping system status, including but not limited to: Start-up, hydro-testing, chemical cleaning, system flushing, etc.
- Valves are not suitable to serve as block valves during system hydrostatic pressure tests that exceed 1.1 times the cold working pressure.
- Care should be taken around all valves as injury or damage may occur from the leakage of hot, high pressure and/or caustic materials from a gasket and/or packing joint. Additionally, packing and/or gasket leaks may cause external corrosion damage to the valve.
- When possible, gate valves should be relieved of maximum seating force when left in the closed position. By relieving this force, it may help prevent damage caused by excessive thermal stem expansion. Care should be taken however to ensure that the valve is not opened, only that the torque/thrust has been removed from the stem.
- It is the responsibility of the user/owner of a plant to ensure that all valve operators are ordered to meet all applicable requirements and specifications.
- Only valves that have been certified as fire safe shall be used in piping systems that may be exposed to fire.
- Standard graphitic packing is suitable for 500ppm VOC emissions. Consult the factory if lower emissions are required. Crane Pacific meets API-622 / Method 21 emissions standards.
- When operating manual valves, gloves should be worn to minimize the risk of injury to the hands.
- In situations where manual valves are difficult to operate due to substantial torque requirements, it is recommended that the valve be supplied with a gear or motor operator.
- All valves should be mounted with the stem vertical and the pipeline horizontal. Check valves may be installed in vertical pipelines only when the normal flow is in the upward direction. For any other orientation, please contact the factory.
- Depending upon the specific application, normal lubricants may not be sufficient for higher temperature applications. In this case, higher temperature lubricants should be used in place of the standard type.

- All valve packing glands should be tightened in an even manner. Care should be taken to ensure that the packing gland and/or gland flange do not contact the valve stem or stuffing box during tightening.

Table 1

MINIMUM WALL THICKNESS FOR ALL PRODUCTS BY PRESSURE CLASS							
Size	Class 150	Class 300	Class 600	Class 800	Class 900	Class 1500	Class 2500
0.5	0.11	0.11	0.13	0.14	0.16	0.19	0.25
0.75	0.12	0.12	0.13	0.14	0.18	0.23	0.29
1	0.16	0.17	0.18	0.21	0.22	0.26	0.35
1.25	0.19	0.19	0.19	0.24	0.25	0.31	0.44
1.5	0.19	0.19	0.21	0.27	0.29	0.38	0.50
2	0.22	0.25	0.25	0.29	0.31	0.44	0.62
2.5	0.22	0.25	0.28		0.34	0.50	0.75
3	0.22	0.28	0.31		0.41	0.62	0.88
4	0.25	0.31	0.38		0.50	0.75	1.09
6	0.28	0.38	0.50		0.72	1.09	1.59
8	0.31	0.44	0.63		0.88	1.41	2.06
10	0.34	0.50	0.75		1.06	1.72	2.59
12	0.38	0.56	0.90		1.25	2.00	3.03
14	0.41	0.62	0.97		1.38	2.19	3.34
16	0.44	0.69	1.09		1.56	2.50	3.81
18	0.47	0.75	1.22		1.75	2.81	4.27
20	0.50	0.81	1.34		1.91	3.04	4.69
24	0.57	0.94	1.59		2.28	3.72	5.63
30	0.66	1.14	1.96				
36	0.75	1.31	2.33				

CORROSION-EROSION ALLOWANCE FOR ALL PRESSURE CLASSES BY PRODUCT				
Size	Bolted Bonnet	Wedgeplug	Pressure Seal	Compact Pattern
0.5		0.12		0.12
0.75		0.12		0.12
1		0.12		0.14
1.25		0.12		0.15
1.5	0.06	0.12		0.17
2	0.12	0.12	0.11	0.21
2.5	0.16	0.19	0.12	
3	0.19	0.19	0.13	
4	0.19	0.19	0.14	
6	0.19	0.19	0.14	
8	0.19	0.19	0.14	
10	0.22	0.22	0.16	
12	0.25	0.25	0.17	
14	0.25	0.25	0.19	
16	0.25	0.25	0.21	
18	0.25	0.25	0.24	
20	0.25	0.25	0.27	
24	0.24	0.24	0.34	
30	0.13	0.13		
36	0.02			

All valves will have a wall thickness in the new condition at least equal to the minimum wall thickness plus the corrosion-erosion allowance.
If the wall thickness is reduced to less than the minimum value in the table after usage, the valve must be repaired or replaced.

1. THEORY OF OPERATION

Gate Valves: Gate valves are designed to close off or open up the flow in a pipeline. The wedge is designed to completely stop flow and form a tight seal against pressure in either direction. In the open position, the wedge is completely out of the flow stream. Gate valves are **not** recommended for throttling use.

Globe Valves: Globe valves are designed to close off, open up or throttle the flow in a pipeline. The disc is designed to completely stop flow and form a tight seal with pressure under the disc. In the 10% open position to full open position, globe valves are effective in throttling line pressure.
NOTE: Continuous throttling at less than 10% open may cause excessive vibration, noise, wear and damage to discs and seats.

Y-Globe Valves: Y-Globe valves are designed to close off, open up or throttle the flow in a pipeline. The disc is designed to completely stop flow and form a tight seal with pressure under the disc. In the 10% open position to full open position, globe valves are effective in throttling line pressure. These valves typically offer better flow characteristics than standard globe valves.
NOTE: Continuous throttling at less than 10% open may cause excessive vibration, noise, wear and damage to discs and seats.

The Y-Globe is also available in a stop-check configuration. Stop check valves (sometimes called non-return valves) are designed to be opened by the flow of system pressure in one direction and close automatically when the system flows in the opposite direction. In addition, stop check valves can throttle the flow in the open direction or close the flow off completely.

Swing Check & Tilt Disc Valves: Check valves are designed to open by the system pressure in a line. The desired direction of flow in the line will open the valve, and any attempt by the flow to reverse will close the valve completely. The check valve typically does not require any outside force or signal to operate properly. Check valves allow flow in one direction only

Stop and Lift Check Valves: Lift check valves and stop check valves are designed to be opened by the flow of system pressure in one direction and close automatically when the system flows in the opposite direction. Stop check valves (sometimes called non-return valves) have the additional feature of throttling the flow in the open direction or closing the flow off completely.
NOTE: Continuous throttling at less than 10% open may cause excessive vibration, noise, wear and damage to disc and seat ring.

Pressure Seal Valves: Pressure seal valves use internal line pressure to seal the bonnet joint. These valves are available in Gate, Globe, Check and Y-Globe configurations.

Parallel Disc Gate Valves: Parallel disc valves utilize a special free-floating disc arrangement to provide positive shutoff. Unlike standard wedge gates, the parallel disc valve is seated by position and not input torque. This system uses upstream pressure to affect a positive seal on the downstream seat; these valves are not for double block and bleed type service.

2. DESCRIPTION

This manual covers all Pacific pressure seal valves. These valves are designed within the limits of ANSI B16.34. For the operator and mounting top works of these valves, the user is referred to the applicable appendix in this manual. See Appendix 7 for operation of valves. This manual is for reference purposes only. Disassembly and maintenance of valves should only be performed by qualified personnel. Consult Pacific Valves for specific technical support.

For Specific information regarding a particular style of valve, please refer to the corresponding detailed section.

3. INSTALLATION

When unpacking, care should be exercised in lifting and handling to avoid damage to valves or injury to personnel. Do not lift any valve by the handwheel or stem. Use lifting lugs or straps around the valve body. For specific installation information, please refer to Appendix 3 of this manual.

When installing, ensure that all foreign material is removed from the interior of the valve, including desiccants. ***Note:*** Do not remove protective end coverings until immediately prior to valve installation.

Note: Do not disassemble or modify a Pacific Valve in any way prior to installation. This will void the factory warranty if it occurs.

When installing weld-end, flex wedge gate or globe valves into the line, it is advisable to have the valve slightly open to prevent the wedge from becoming "stuck" due to thermal expansion and to discourage damage to the seating surfaces.

A protective paint has been applied to the weld ends on some valves and it should be removed before welding.

For soft-seated valves, the temperature of the valve body should not exceed 200°F during welding to avoid damaging the soft seals. Check the temperature of surrounding areas to avoid heating valve body excessively, especially with small sizes, where a heat sink may be necessary.

Use the smallest electrodes and the minimum amperage possible consistent with approved welding procedures. This will help to minimize warpage in the seat areas. Tack welds should be ground out before completing the root pass in that area.

Valves of carbon steel should be allowed to cool slowly. The valve may be covered with a heat-insulating blanket to promote slow cooling and limit the heat-affected zone. Appropriate industry standards should be followed for all PWHT.

Certain valve types are designed to function in a single direction (check valves, etc.) All markings should be noted on the valves. Arrows on the valves indicating flow direction should correspond with the system flow direction.

Note: Ensure that all foreign material (dirt, weld slag, etc.) has been removed from the valve prior to and after installation. Foreign material is the primary cause of premature seat failures.

4. WARRANTY

All Pacific Valves are backed by a full manufacturer's warranty against defects in materials or workmanship. It should be noted that any work or modification performed on a Pacific Valve must be authorized by Pacific Valves in order to retain the original factory warranty.

5. OPERATING INSTRUCTIONS

Pacific valves are designed for simplicity and ease of operation. To open a gate, globe & stop check valve. Turn the handwheel in a counterclockwise direction; continue turning until interference is felt; at this point, the valve will be fully open. To close the valve, turn the handwheel in a clockwise direction; continue turning until interference is felt; at this point, the valve will be fully closed. Note that Parallel disc valves are not seated by torque. The disc is position seated and will stop when it contacts the factory set travel limits. Further tightening will not improve the seal and could lead to valve damage if excessive torque is applied.

Swing, Lift and tilting disc check valves are designed to be operated by line pressure only. When the upstream line is pressurized, flow will open the disc. When the pressure is reduced upstream, or if there is backpressure, the disc will close.

With some larger valves under conditions of high pressure, a rim pull of more than 250 lbs. may be required to achieve proper seating.

CAUTION! - These valves were designed to operate within the pressure and temperature limits of ANSI B16.34. Do not exceed these limits.

6. MAINTENANCE

6.1. Preventative Maintenance and Periodic Inspection Pacific Valves recommends that periodic inspections be made of all valves. The frequency of these inspections will vary, depending upon the severity of service and frequency of operation of the valve. As a minimum, all valves should be checked quarterly to ensure proper operation and discourage the damage compounding effects of leakage. The following list details the specific valve types and areas requiring inspection and maintenance.

Item to inspect		GATE	GLOBE	CHECK		Y-GLOBE	STOP CHECK	PARALLEL DISC GATE
Check Stem threads for wear		XXX	XXX			XXX	XXX	XXX
Check for Packing leaks		XXX	XXX			XXX	XXX	XXX
Check body/bonnet joint for leaks, retighten all bolting (a)		XXX	XXX	XXX		XXX	XXX	XXX
If conditions permit, operate valve.		XXX	XXX			XXX	XXX	XXX
Inspect all external connections		XXX	XXX	XXX		XXX	XXX	XXX
Ensure Stem and seal areas are free from debris		XXX	XXX			XXX	XXX	XXX
Check all lubrication points		XXX	XXX			XXX	XXX	XXX
Inspect condition of motor and/or gear operators (when used)		XXX	XXX			XXX	XXX	XXX
Inspect valve for obvious damage		XXX	XXX	XXX		XXX	XXX	XXX

Warning! Do not remove or loosen the packing gland or bonnet bolts while the valve is pressurized.

(a) The pressure seal draw bolting must be periodically tightened during service to prevent gasket loosening.

6.2 Maintenance of valve under pressure

If the above listed inspections reveal any indications, the following procedures are recommended:

Note: Extreme care should be taken when working on any pressurized system!

6.2.1 If the stem packing is leaking, the gland nuts on the gland flange should be tightened uniformly until the leakage stops. If the leakage continues or there is no adjustment remaining, additional packing must be installed or the packing must be replaced. (See disassembly procedure for appropriate valve or Packing and Gasket maintenance Appendix 4 It should also be noted that the valve should be able to operate freely at all times. If the valve cannot operate due to excessive packing force, the packing has become worn and must be replaced during a system shutdown.

6.2.2 The stem threads that are exposed to atmosphere should be periodically lubricated to reduce wear, operating torque, and to deter corrosion. Care should be taken to ensure that only the threaded portion of the stem is lubricated. Pacific Valves does not recommend the practice of

lubricating the sealing area of the stem. This practice tends to attract debris and foreign material, which can lead to stem or stuffing box damage.

6.2.3 The yoke sleeve should be lubricated periodically through the grease fitting to ensure smooth operation. Lubrication should be inspected and revised at each application. Each installation may have specific requirements/ specifications regarding lubrication.

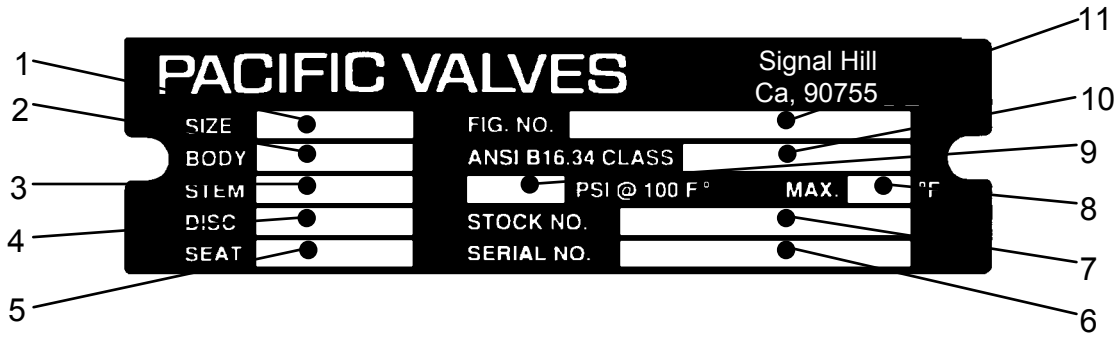
<u>CAUTION!</u> Do not overstress the bolting. If leakage continues, the gasket should be replaced. (See the bolting torque Appendix 1 **or the appropriate valve disassembly procedure)**

6.2.4 If normal inspection reveals a binding or galling action of valve operating parts, it is advisable to dismantle and inspect the valve parts during a system shutdown. Contact Pacific Valves prior to disassembling any valve.

7. <u>IDENTIFICATION</u>

All Pacific Valves are identified with a metal Tag that is riveted to the valve. This tag is usually found on the body/bonnet joint area, or on the top plate area near the handwheel.

When performing any work, ordering spare parts, or requesting technical support, please refer to this tag. The Serial number (6), Figure number (11) and Stock number (7) are the keys to proper valve identification.



EXPLANATION OF TAG MARKINGS		
1	**SIZE**	Nominal pipe size (NPS) of the valve
2	**BODY**	Body ASTM material grade designation
3	**STEM**	Stem material
4	**DISC**	Disc or Wedge trim material
5	**SEAT**	Seat trim material
6	**SERIAL NO.**	Unique number identifying a single valve
7	**STOCK NO**	Number identifying a group of like valves
8	**MAX °F**	Maximum temperature at which the valve may be operated within the limits of pressure allowed by ASME B16.34, Table 2.
9	**PSI @ 100 °F**	Pressure in psig at which the valve is rated to operate when the temperature does not exceed 100 °F
10	**ANSI B16.34 CLASS**	Pressure class rating of the valve as defined in ASME B16.34 Section 2.
11	**FIG. NO.**	Number identifying the valve's main features including material, class, trim, end connections, and operator type. See the following sections for classification of Figure Numbers.

The following is the newer figure number system for the pressure seals.

Pressure Seal Valves

Enhanced Pressure Seal Figure Number System

1 2 - 4 5 6 7 8 - 10 11 12 13 - 15 - 17 - 19 20 21 - 23 24 25 26 27 28 29 30

1 - 2 = Size of Connection
- 2H = 2 ½" Valve
- 03 = 3" Valve

4 - 6 = Valve Type
- 554 = Parallel Disc
- 555 = Flex Wedge
- 560 = T-Globe Stop
- 565 = T-Globe Stop Check (non return)
- 580 = Swing Check
- 586 = Lift Check - Globe
- 588 = Tilting Disc Check
- 590 = Y Globe Stop Valve
- 595 = Y Globe Stop Check
- 596 = Y Globe Life Check

7 - 8 = Pressure Class
- 06 = 600
- 6C = 600 Intermediate Class (see sales order notes)
- 09 = 900
- 9C = 900 Intermediate Class (see sales order notes)
- 15 = 1500
- 1C = 1500 Intermediate Class (see sales order notes)
- 25 = 2500
- 2C = 2500 Intermediate Class (see sales order notes)
- 45 = 4500

10 = Valve Port Size
- *S = Standard port
- R = Reduced port
- E = Expanded port

11 - 12 = By Pass, Drain & Bleed Arrangements
- * NN = N.A.
- EA = Equalizing Line from body neck to A
- EB = Equalizing Line from body neck to B
- KW = Bonnet Vent in upstream side of wedge
- J1 = Single valve bypass from A to B
- J2 = Double valve bypass from A to B
- J3 = Triple valve bypass from A to B and body neck
- JA = Single valve equalizing line from body neck to A
- JB = Single valve equalizing line from body neck to B
- VV = 6" socket weld nipples with globe style drain valves at locations C&D
- PP = 6" socket weld nipples capped at locations C&D
- V? = 6" socket weld nipple with globe style drain valve at location? (A-G)
- P? = 6" socket weld nipple capped at location? (A-G)

13 = Custom Feature
- *N = N.A.
- X = See sales order notes

15 = Special Processing
- *S = No special processing
- Z = See sales order notes

17 = Body Material
- 1 = WCB
- 2 = WCC
- 4 = C12A
- 5 = C5
- 6 = WC6
- 9 = WC9

19 = Customer Pipe Schedule
- A = 10
- B = 20
- C = 30
- D = 40
- E = STD
- F = 60
- G = 80
- H = XS
- J = 100
- K = 120
- L = 140
- M = 160
- N = XXS
- X = Custom (see sales order notes)

20 - 21 = Valve Weld End Prep Figure (per ASME B16.25)

Pipe wall thickness .1875" to .88"
- *2B = For use with no backing ring or split rectangular backing ring
- 2C = For use w/continuous rectangular backing ring
- 2D = For use w/continuous tapered backing ring

Pipe wall thickness greater than .88"
- *3B = For use with no backing ring or split rectangular backing ring
- 3C = For use with continuous rectangular backing ring
- 3D = For use with continuous tapered backing ring

For use w/GTAW root pass or consumable insert ring
- 5B = Pipe wall thickness from .38" to 1.0"
- 6B = Pipe wall thickness over 1.0"

XX= Custom weld ends (see sales order notes)

RF= Raised face flanged end connections

23 = Manual Operation
- N = N.A.
- H = Handwheel
- L = Handwheel with locking device (closed)
- R = Handwheel with locking device (open)
- J = Handwheel with chain
- G = Manual Bevel Gear Operator
- C = Manual Bevel Gear Operator with Chainwheel
- A = Manual Bevel Gear with Air Wrench
- P = Manual Bevel Gear with position indicator
- M = Manual Bevel Gear Operator with locking device (closed)
- R = Manual Bevel Gear Operator with locking device (open)
- B = Hammerblow Handwheel

24 = Valve Actuator
- N = N.A.
- E = Direct mount Electric Motor Operator
- T = Direct mount Electric Motor Operator w/thermal compensating device
- F = Electric Motor Operator with Bevel Gear
- P = Pneumatic Operator
- H = Hydraulic Operator
- M = Operator mounted by customer

25 = Gear & Actuator Mounting Dimensions (per MSS SP-102)

N = N.A.	5 = FA25
1 = FA7	6 = FA30
2 = FA10	7 = FA35
3 = FA14	8 = FA40
4 = FA16	9 = Other

**Denotes Standard Offering*

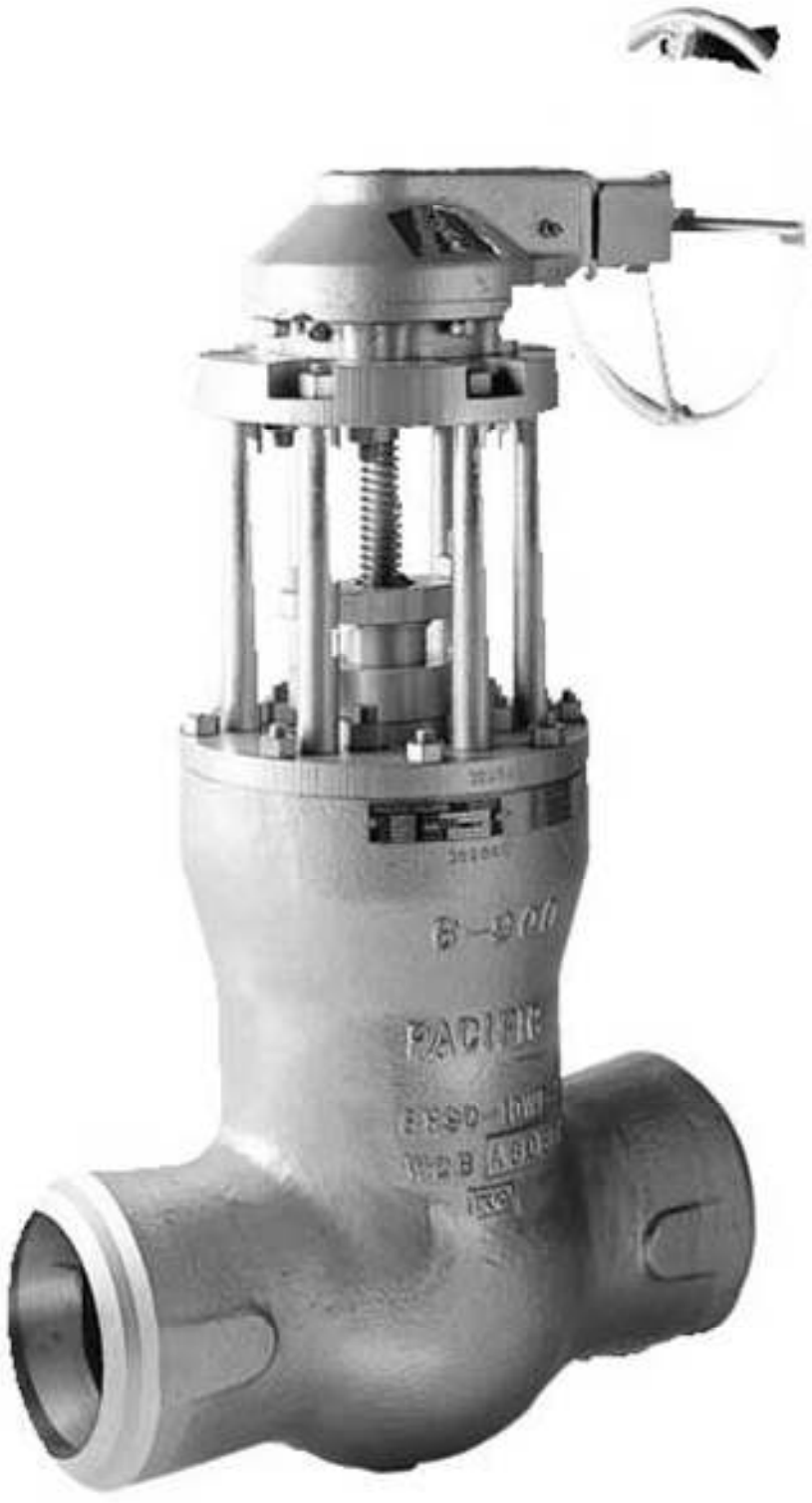
8. Boundary Conditions

The following charts denote the defined boundary conditions for all Pacific Valve products.

Boundary conditions for Pressure Seal products

Scope of product:	2 ½" through 36" Class 600 through 3500
Service fluid:	• Water, steam, gas, or hydrocarbon compounds. • No suspended solid material greater than 100 microns
Service Life:	20 years or when corrosion allowance is depleted whichever is less. This excludes normal maintenance parts such as packing, seals, gaskets and parts that move relative to each other e.g. seats, stems and bushings.
Allowable pressure and temperature:	As Per Table 2 ASME B16.34
Materials for pressurized parts:	Only materials approved under PMA by Accredited Notified Body may be used. See approved CE materials list. Appropriate material for service conditions to be based upon the following criteria: 1. The design pressure and temperature 2. An acceptable service life consistent with the corrosion rate of the material at design conditions. 3. Expected operating conditions within the defined pressure cycles, thermal cycles and flow velocity limits.
Packing and gasket materials	To be compatible with expected operating conditions
Corrosion/erosion allowance:	Varies by valve size and pressure class. See valve wall thickness calculation in Table 1 of this section.
Method of operation:	• Gate and Globe: Handwheel, Manual Gear, Motor Actuator, Air or Hydraulic cylinder Actuator • Check: self-actuation
Frequency of operation:	• Gate and Globe valves: not to exceed once per week or 50 per year • Check: N/A
Installation orientation:	• Gate and Globe: Stem vertical up in a horizontal pipe run. • Check: Flow horizontal in a horizontal pipe run or Vertical up in a vertical pipe run.
Flow velocity. • To keep noise and erosion at or below reasonable levels, valves are not to be used for throttling service, and velocity is not to exceed the values shown in table to right. • Check valves should operate at or above the velocity indicated to stabilize the disc and avoid premature wear.	Maximum flow velocity for gate, globe and check valves Gate $300\sqrt{\overline{V}}$ T-globe $180\sqrt{\overline{V}}$ Y-globe $200\sqrt{\overline{V}}$ Check $200\sqrt{\overline{V}}$ Minimum flow velocity for check valves is $55\sqrt{\overline{V}}$ Where $\overline{V}$ =Specific volume of flowing medium
Hydrostatic test:	1.5 times the 100 °F rating pressure in ASME B16.34 for the body material
Pressure cycles:	Unlimited cycles < Design Pressure/3
Thermal cycles:	Unlimited cycles < 30 °F
Heat up/cool down rate:	Not to exceed 100 °F per hour for 2000 cycles
Pipe & support reactions:	All reaction loads transmitted through valve ends. Cross section and Moment of Inertia of valve ends to be greater than that of the connecting pipe.
External fire capability:	Valve seats of standard product contain no plastic or low-temperature materials. Not suitable for sustained external heat source greater than 1500 °F.
Wind and Earthquake rating:	1 g load in any direction.
Vent or drain method:	None

Section B: Pressure Seal Gate Valves



PRESSURE SEAL GATE VALVES

1. General Information

   For general operation & maintenance information regarding this or any other Pacific valve please refer to section “A” of this manual.

   For specific information pertaining to Parallel Disc Gate Valves, please refer to section “C” of this manual.

   For specific information pertaining to the Fabricated Yoke Assembly, please refer to Appendix 6 of this manual.

2. Complete Disassembly

   CAUTION! Before disassembling any valve, ensure that all pressure has been removed from the line and from any cavities within the valve. Contact Pacific Valves prior to disassembling any valve.

   2.1 Handwheel operated valves
   Upon completion of the disassembly procedure listed below, the handwheel 50 may be separated from the yoke sleeve 31, by removing the handwheel nut 54.

   2.2 Gear and motor operated valves
   Refer to Appendix 7 of this manual for specific gear and motor information.

   2.3 The following page contains a general disassembly and reassembly procedure. These procedures cover the bulk of the disassembly and reassembly process; however special attention should be paid to the following:

   2.3.1 Extreme care should be taken to ensure that the sealing surfaces of the gasket area do not become damaged during disassembly or reassembly. This includes scratches caused by misalignment and/or by debris in the seal area.

   2.3.2 Crane requires that the pressure seal bonnet gasket 55 be replaced when servicing any valve.

   2.3.3 Caution should be exercised in handling the new bonnet gasket 55 to avoid scratching its surfaces.

   2.3.4 When reassembling the valve it should be noted that in certain cases it may be necessary to e-tighten the bonnet draw bolts 16C after the system pressure is built up. This process will ensure a positive seal for the pressure seal gasket.

   For all other bolting, excluding gland studs, torque bolts per Appendix 1.

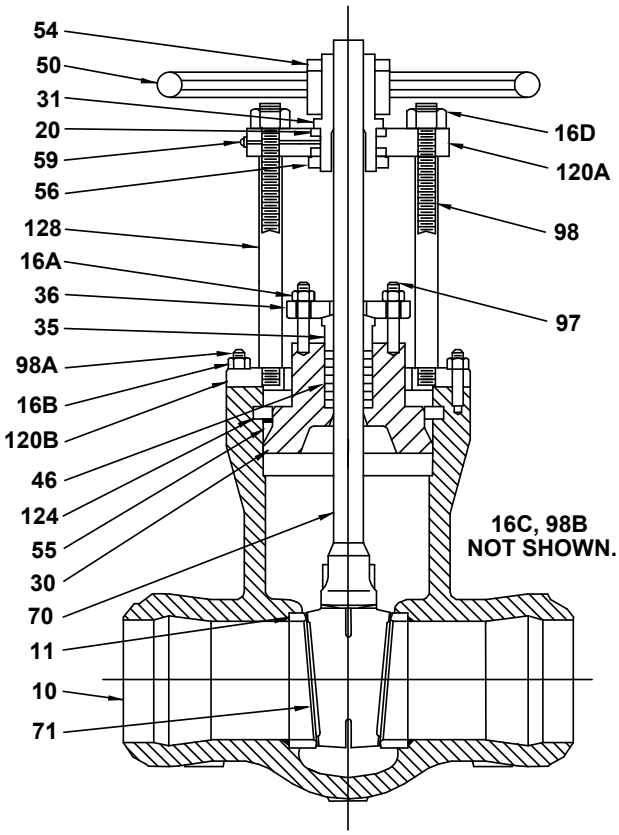
PRESSURE-SEAL GATE VALVES
CLASS 600, 900, 1500, & 2500

DISASSEMBLY

- Read the warning notice listed in section 2.0 of these instructions.
- Loosen gland stud nuts 16A. Loosen and remove bonnet nuts 16C and yoke nuts 16B.
- Install rigging to support weight of the yoke assembly and the handwheel or actuator if present.
- Turn the handwheel to closed position. The yoke and handwheel will back off of the stem 70. Temporarily remove yoke assembly.
- Remove the gland flange 36, gland 35, and all packing material 46.
- Using a block of wood or similar soft material, drive the bonnet 30 down until there is sufficient clearance above the bonnet to remove the segment rings 124. Care should be taken to ensure that bonnet does not become cocked during this process.
- Using a brass bar, tap the top of each segment ring to loosen, using lubricants as necessary. Remove the segments by prying, with a screwdriver or similar tool, out away from the body until the segments are free to be lifted out. ***Clean all surfaces of foreign matter prior to next step.***
- Replace the yoke and turn the handwheel to open valve. After back seating, continue to raise the bonnet until the pressure seal gasket 55 is free. Pull the yoke assembly, bonnet 30 stem 70, and the wedge 71 from the body 10.
- Use extreme caution to not scratch or damage the seating surfaces of the body, gasket, bonnet, or wedge. Match mark the wedge to the body for re-assembly.
- Remove the gasket 55 from the bonnet. Remove the stem from the bonnet.
- Clean the stuffing box and stem.

REASSEMBLY

- Clean all parts thoroughly. Polish gasket seating surface in the body 10 and the bonnet 30 with fine emery cloth. Lubricate the gasket seating surfaces with a light oil to prevent galling during assembly. Replace gasket 55 with a new factory supplied part.
- Insert the wedge 71 and the stem 70 into the body 10 following the match marks previously made.
- Install the gasket 55 onto the bonnet. Insert the bonnet into the body 10. Install the segment rings 124 into the body groove and backseat the bonnet to seat the gasket and install the bonnet bolting. Tighten wrench tight only, do not torque.
- Install the yoke assembly. Install new packing, and reinstall the gland, gland flange and tighten the eyebolt nuts.



PART IDENTIFICATION			
10	BODY	54	WHEEL NUT
11	SEAT RING	55	GASKET
16A	NUT	56	JAM NUT
16B	NUT	59	GREASE FITTING
16C	NUT	70	STEM
16D	NUT	71	WEDGE
20	BEARINGS	97	STUD
30	BONNET	98	STUD
31	YOKESLEEVE	98A	STUD
35	GLAND	98B	STUD
36	GLAND FLANGE	120A	TOP PLATE
46	PACKING	120B	BASE PLATE
50	HANDWHEEL	124	SEGMENT RING
		128	YOKE COLUMN

NOTE: After system pressure has been reestablished, retighten all bolting in accordance with this manual.

3. Maintenance of disassembled valves

3.1 Following the above listed disassembly procedures, examine the body cavity 10 for deposits of foreign material.

3.2 Examine seating surfaces of seat rings 11 and wedge 71 for wear.

3.3 Examine stem 70, seal area and threads for excessive wear.

3.4 If excessive wear is evident, worn parts, or if necessary, the entire valve should be reconditioned or replaced.

3.5 Crane offers complete replacement seal kits and spare parts for reconditioning. When ordering, always state the figure number (or stock number) of the valve and the body material.

3.6 Crane also offers complete re-manufacturing services to rework your valve. If you find this necessary, the Crane Valve Service Center will re-manufacture your valve to factory specifications.

4. Lubrication

4.1 Parts requiring lubrication are stem and yoke sleeve threads 70, 31, entire gasket 55, and under all nuts 16 before torqueing. Bonnet draw studs should be lubricated with an anti-seize lubricant to promote ease of future disassembly.

5. Special tools and instructions

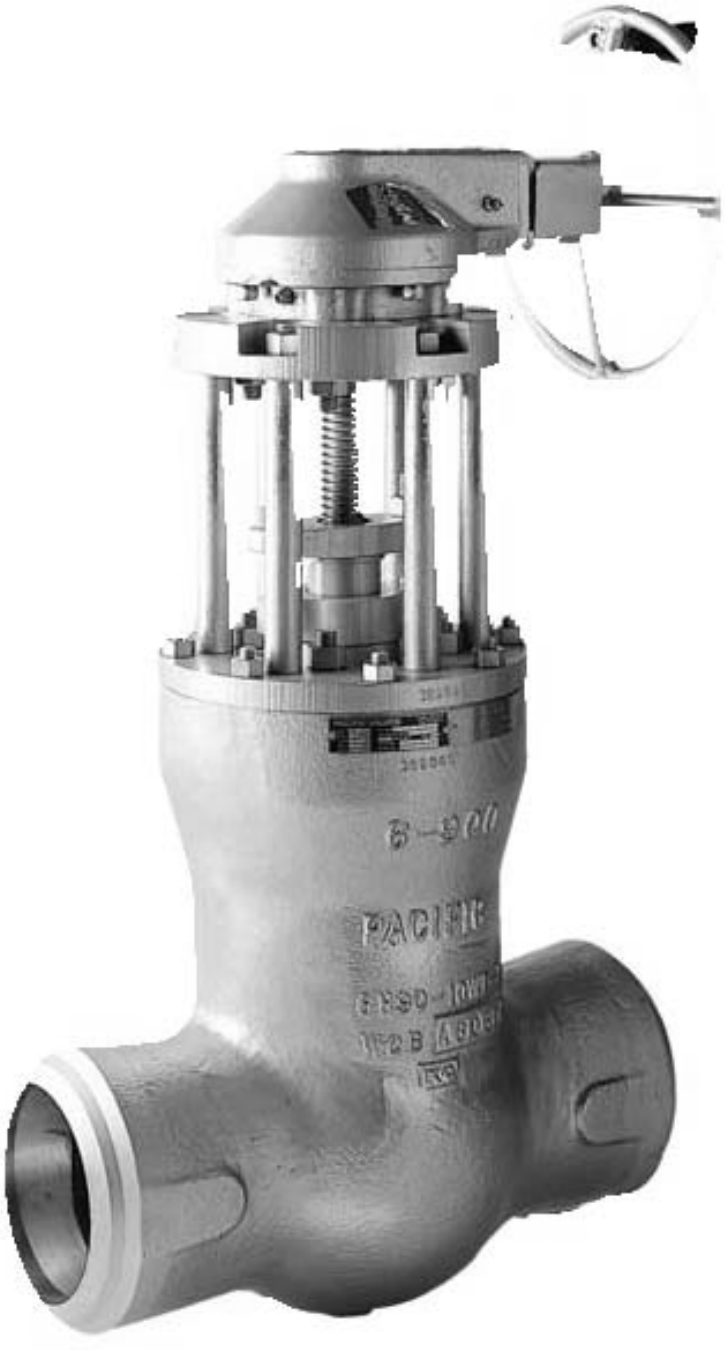
5.1 Recommended bolting torques are shown in Appendix 1 of this manual

5.2 No special tools are required for general valve maintenance. However, in certain large valve styles, the use of a hydraulic torque device may be necessary to achieve optimum bolt torque.

6. Preventative maintenance

6.1 Refer to section “A” of this manual for general valve maintenance information.

Section C: Pressure Seal Parallel Disc Gate Valves



PRESSURE SEAL PARALLEL DISC GATE VALVES

1.0 General Information

For general operation & maintenance information regarding this or any other Pacific valve please refer to section “A” of this manual.

For specific information pertaining to the Fabricated Yoke Assembly, please refer to Appendix 6 of this manual.

2.0 Complete Disassembly

CAUTION! Before disassembling any valve, ensure that all pressure has been removed from the line and from any cavities within the valve. Contact Pacific Valves before disassembling any valve.

2.1 Handwheel operated valves
Upon completion of the disassembly procedure listed below, the handwheel 50 may be separated from the yoke sleeve 31, by removing the handwheel nut 54.

2.2 Gear and motor operated valves
Refer to Appendix 7 of this manual for specific gear and motor information. **Note that this valve is position seated. Do not use motor torque switch settings to close this valve.**

2.3 The following page contains a general disassembly and reassembly procedure. These procedures cover the bulk of the disassembly and reassembly process, however special attention should be paid to the following:

2.3.1 Extreme care should be taken to ensure that the sealing surfaces of the gasket area do not become damaged during disassembly or reassembly. This includes scratches caused by misalignment and/or by debris in the seal area.

2.3.2 *Crane* requires that the pressure seal bonnet gasket 55 be replaced when servicing any valve.

2.3.3 Caution should be exercised in handling the new bonnet gasket 55 to avoid scratching its surfaces.

2.3.4 When reassembling the valve it should be noted that it is necessary to re- tighten the bonnet draw bolts 16C after the system pressure is built up. This process will ensure a positive seal for the pressure seal gasket.

For all other bolting, excluding gland studs, torque per Appendix 1.

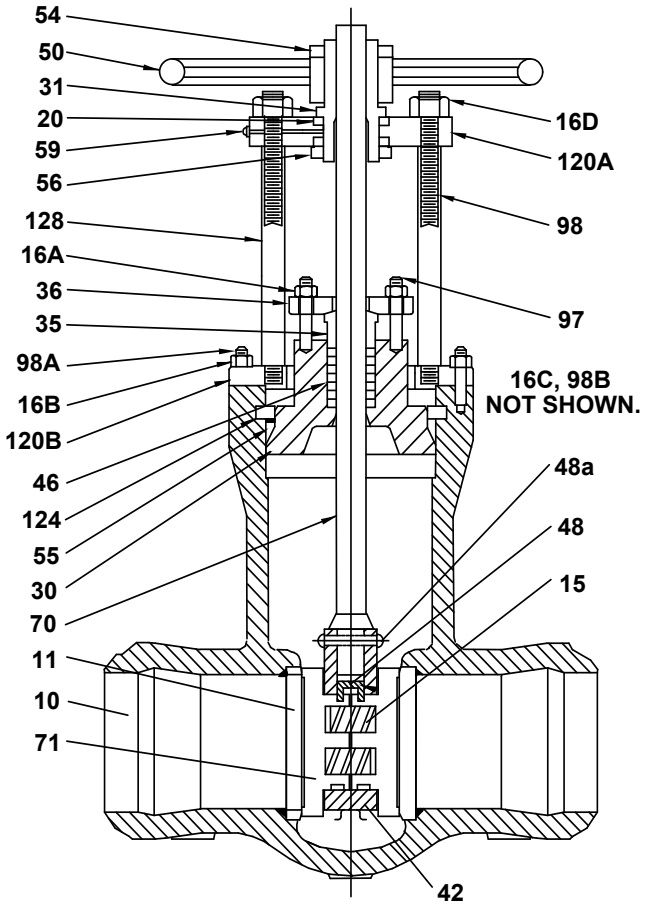
PRESSURE-SEAL PARALLEL DISC GATE VALVES
CLASS 600, 900, 1500, & 2500
ALL SIZES

DISASSEMBLY

- Read the warning notice listed in section 2.0 of these instructions
- Loosen gland stud nuts 16A. Loosen and remove bonnet nuts 16C and yoke nuts 16B.
- Install rigging to support weight of the yoke assembly and the handwheel or actuator if present.
- Turn the handwheel to closed position. The yoke and handwheel will back off of the stem 70.
- Remove the gland flange 36, gland 35, and all packing material 46.
- Using a block of wood or similar soft material, drive the bonnet 30 down until there is sufficient clearance above the bonnet to remove the segment rings 124. Care should be taken to ensure that bonnet does not become cocked during this process.
- Using a brass bar, tap the top of each segment ring to loosen, using lubricants as necessary. Remove the segments by prying, with a screwdriver or similar tool, out away from the body until the segments are free to be lifted out. ***Clean all surfaces of foreign matter prior to next step.***
- Replace the yoke and turn the handwheel to open valve. After back seating, continue to raise the bonnet until the pressure seal gasket 55 is free. Pull the yoke assembly, bonnet 30 stem 70, and the discs 71 from the body 10. Use caution while lifting the stem/disc assembly off the seats as the disc will "pop" open at the bottom when free of the seat rings.
- Use extreme caution to not scratch or damage the sealing surfaces of the body, gasket, bonnet, discs or seat rings.
- Remove the gasket 55 from the bonnet. Remove the bonnet over the end of the stem.
- Clean the stuffing box and stem.

REASSEMBLY

- Clean all parts thoroughly. Polish gasket-seating surface in the body 10, and on the bonnet 30. Replace gasket 55 with a factory supplied part. Lubricate the gasket seating surfaces with light oil or other suitable material to prevent galling during reassembly.
- Insert the disc 71 / stem 70 assembly into the body 10 noting that it is necessary to clamp the bottom of the discs together so they will fit between the seat rings. Once between the rings the clamp can be removed and assembly completed.
- Install the new gasket 55 and packing to the bonnet. Insert the bonnet into the body 10. Install the segment rings 124 into the body groove and backseat the bonnet to seat the gasket and install the bonnet bolting. Tighten wrench tight only, do not torque.
- Install the yoke and bolting. Install new packing and replace the gland, and gland flange and tighten the eyebolt nuts.



PART IDENTIFICATION

10	BODY	48A	PIN
11	SEAT RING	50	HANDWHEEL
15	SPRINGS	54	WHEEL NUT
16A	NUT	55	GASKET
16B	NUT	56	JAM NUT
16C	NUT	59	GREASE FITTING
16D	NUT	70	STEM
20	BEARINGS	71	DISCS
30	BONNET	97	STUD
31	YOKESLEEVE	98A	STUD
35	GLAND	98B	STUD
36	GLAND FLANGE	120A	TOP PLATE
42	CARRIER	120B	BASE PLATE
46	PACKING	124	SEGMENT RING
48	CLIP	128	YOKE COLUMN

NOTE: After system pressure has been reestablished, re-tighten all bolting to the TORQUE values given in Appendix 1 of this manual.

3.0 Maintenance of disassembled valves

3.1 Following the above listed disassembly procedures, examine the body cavity 10 for deposits of foreign material.

3.2 Examine seating surfaces of seat rings 11 and discs 71 for wear.

3.3 Inspect disc 71 spring holes for wear.

3.4 Examine carrier 42 guide surfaces for wear.

3.5 Examine stem 70, seal area and threads for excessive wear.

3.6 Inspect springs 15 , pin 48A and clip 48 for signs of wear

3.7 If excessive wear is evident, worn parts, or if necessary, the entire valve should be reconditioned or replaced.

3.8 Crane offers complete replacement seal kits and spare parts for reconditioning. When ordering, always state the figure number (or stock number) of the valve and the body material.

3.9 Crane also offers complete remanufacturing services to rework your valve. If you find this necessary the Crane Valve Service Center will re-manufacture your valve to factory specifications.

4.0 Lubrication

4.1 Parts requiring lubrication are stem and yoke sleeve threads 70, 31, entire gasket 5, and under all nuts 16 before torqueing. Bonnet draw studs should be lubricated with an anti-seize lubricant to promote ease of future disassembly.

5.0 Special tools and instructions

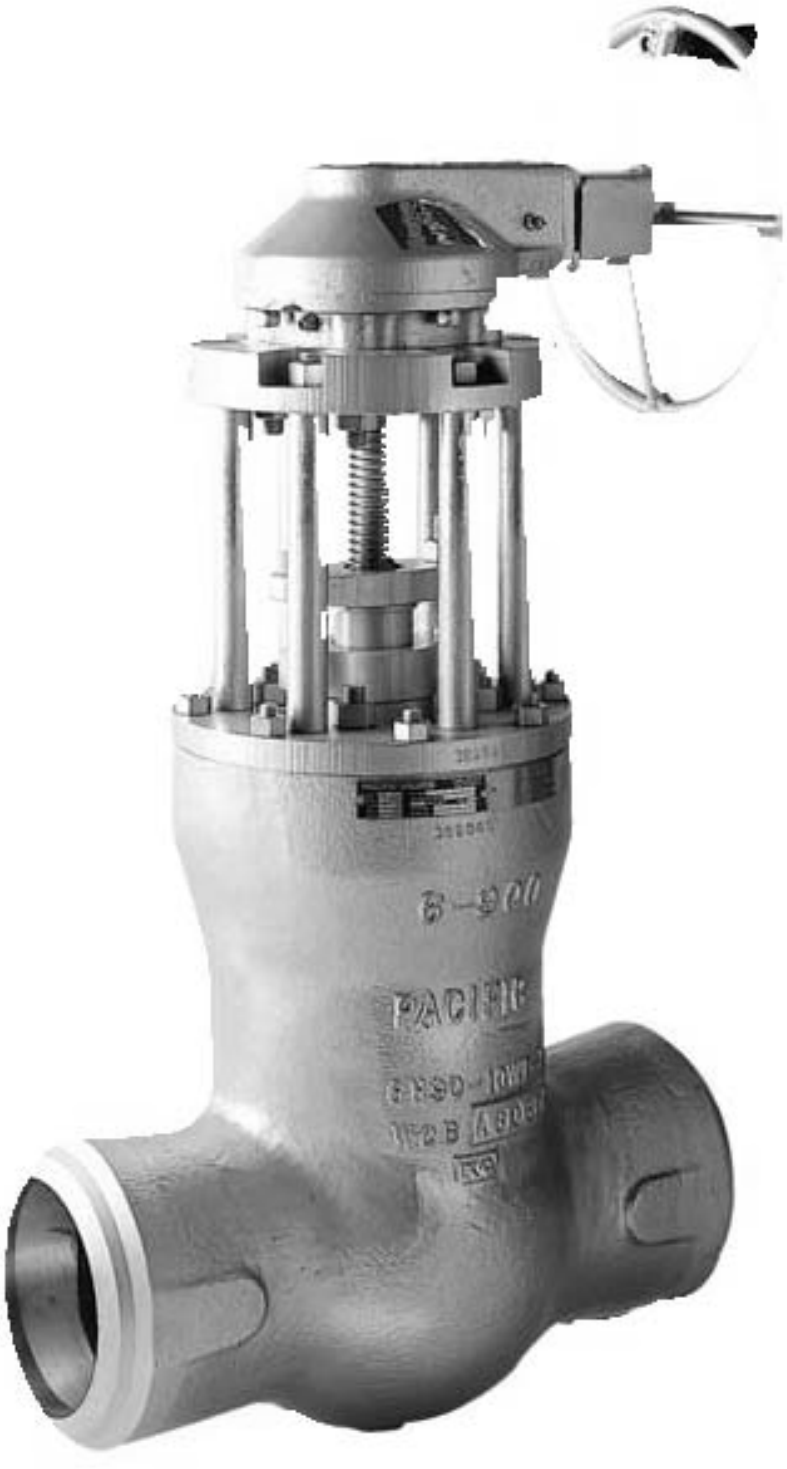
5.1 Recommended bolting torques are shown in Appendix 1of this manual

5.2 A clamping device is recommended to prevent the disc halves from springing open during installation/removal. This clamp can be a commercially available unit, or contact Pacific Valves for more information. Certain large valve styles may require the use of a hydraulic torque device to achieve optimum bolt torque. When final stroking set up is done note that correct disc position in the closed position is @ .25 in. off the body stops. This is achieved by closing the valve until the carrier hits the stops, then backing the disc off by opening the valve @ .25 in. or 1 stem turn.

6.0 Preventative maintenance

6.1 Refer to section “A” of this manual for general valve maintenance information.

Section C1: Pressure Seal Parallel Disc Belt Eye Gate Valves



PRESSURE SEAL PARALLEL DISC (BELT EYE) GATE VALVES

1.0 General Information

For general operation & maintenance information regarding this or any other Pacific valve please refer to section “A” of this manual.

2.0 Complete Disassembly

CAUTION! Before disassembling any valve, ensure that all pressure has been removed from the line and from any cavities within the valve. Contact Pacific Valves before disassembling any valve.

2.1 Gear and motor operated valves

Refer to Appendix 7 of this manual for specific gear and motor information. **Note that this valve is position seated. Do not use motor torque switch settings to close this valve.**

2.2 The following page contains a general disassembly and reassembly procedure. These procedures cover the bulk of the disassembly and reassembly process, however special attention should be paid to the following:

2.2.1 Extreme care should be taken to ensure that the sealing surfaces of the gasket area do not become damaged during disassembly or reassembly. This includes scratches caused by misalignment and/or by debris in the seal area.

2.2.2 *Crane* requires that the pressure seal bonnet gasket 55 be replaced when servicing any valve.

2.2.3 Caution should be exercised in handling the new bonnet gasket 55 to avoid scratching its surfaces.

2.2.4 When reassembling the valve it should be noted that it is necessary to re- tighten the bonnet draw bolts 16C after the system pressure is built up. This process will ensure a positive seal for the pressure seal gasket.

For all other bolting, excluding gland studs, torque per Appendix 1.

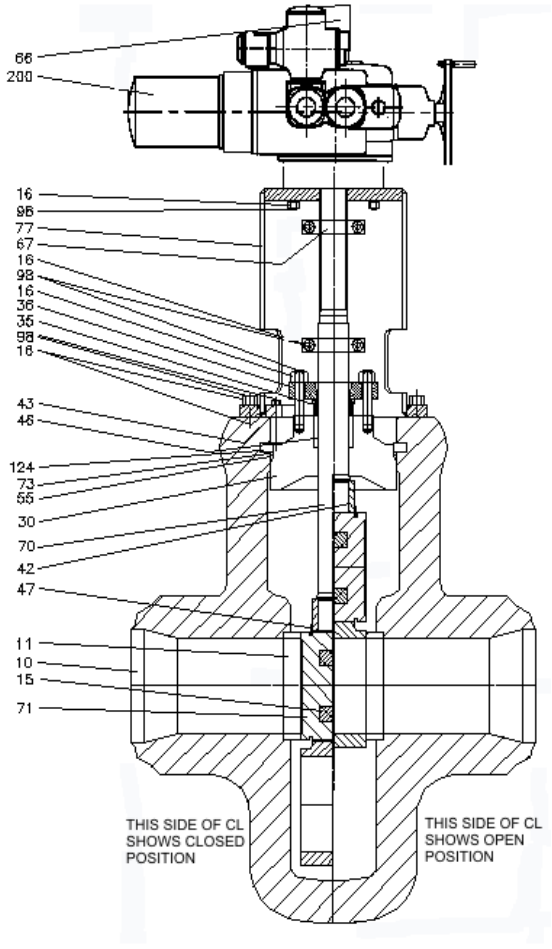
PRESSURE-SEAL PARALLEL DISC GATE VALVES
CLASS 2500

DISASSEMBLY

- Read the warning notice listed in section 2.0 of these instructions
- Loosen gland stud nuts 16A. Loosen and remove bonnet nuts 16C and yoke nuts 16B.
- Install rigging to support weight of the yoke assembly and the handwheel or actuator if present.
- Turn the handwheel to closed position. The yoke and handwheel will back off of the stem 70.
- Remove the gland flange 36, gland 35, and all packing material 46.
- Using a block of wood or similar soft material, drive the bonnet 30 down until there is sufficient clearance above the bonnet to remove the segment rings 124. Care should be taken to ensure that bonnet does not become cocked during this process.
- Using a brass bar, tap the top of each segment ring to loosen, using lubricants as necessary. Remove the segments by prying, with a screwdriver or similar tool, out away from the body until the segments are free to be lifted out. ***Clean all surfaces of foreign matter prior to next step.***
- Replace the yoke and turn the handwheel to open valve. After backseating, continue to raise the bonnet until the pressure seal gasket 55 is free. Pull the yoke assembly, bonnet 30 stem 70, and the discs 71 from the body 10. Use caution while lifting the stem/disc assembly off the seats as the disc will "pop" open at the bottom when free of the seatrings.
- Use extreme caution to not scratch or damage the sealing surfaces of the body, gasket, bonnet, discs or seat rings.
- Remove the gasket 55 from the bonnet. Remove the bonnet over the end of the stem.
- Clean the stuffing box and stem.

REASSEMBLY

- Clean all parts thoroughly. Polish gasket-seating surface in the body 10, and on the bonnet 30. Replace gasket 55 with a factory supplied part. Lubricate the gasket seating surfaces with a light oil or other suitable material to prevent galling during reassembly.
- Insert the disc 71 / stem 70 assembly into the body 10 noting that it is necessary to clamp the bottom of the discs together so they will fit between the seatrings. Once between the rings the clamp can be removed and assembly completed.
- Install the new gasket 55 and packing to the bonnet. Insert the bonnet into the body 10. Install the segment rings 124 into the body groove and backseat the bonnet to seat the gasket and install the bonnet bolting. Tighten wrench tight only, do not torque.
- Install the yoke and bolting. Install new packing and replace the gland, and gland flange and tighten the eyebolt nuts.



PART IDENTIFICATION

10	BODY	200	ACTUATOR
11	SEAT RING	55	GASKET
15	SPRINGS	70	STEM
16	NUTS	71	DISCS
98	STUDS	124	SEGMENT RINGS
77	YOKE		
67	STEM GUIDE	(PARTS NOT SHOWN)	
43	CARRIER	NS	DISC RETAINER STUDS & NUTS
30	BONNET	NS	LOCKING PINS
47	DISC RETAINER		
35	GLAND		
36	GLAND FLANGE		
42	DISC CARRIER		
46	PACKING		
66	STEM COVER		

NOTE: After system pressure has been reestablished, re-tighten all bolting to the TORQUE values given in Appendix 1 of this manual.

3.0 Maintenance of disassembled valves

3.1 Following the above listed disassembly procedures, examine the body cavity 10 for deposits of foreign material.

3.2 Examine seating surfaces of seat rings 11 and discs 71 for wear.

3.3 Inspect disc 71 spring holes for wear.

3.4 Examine carrier 42 guide surfaces for wear.

3.5 Examine stem 70, seal area and threads for excessive wear.

3.6 Inspect springs 15 & retainers 47 for signs of wear

3.7 If excessive wear is evident, worn parts, or if necessary, the entire valve should be reconditioned or replaced.

3.8 Crane offers complete replacement seal kits and spare parts for reconditioning. When ordering, always state the figure number (or stock number) of the valve and the body material.

3.9 Crane also offers complete remanufacturing services to rework your valve. If you find this necessary the Crane Valve Service Center will re-manufacture your valve to factory specifications.

4.0 Lubrication

4.1 Parts requiring lubrication are stem and yoke sleeve threads 70, 31, entire gasket 5, and under all nuts 16 before torqueing. Bonnet draw studs should be lubricated with an anti-seize lubricant to promote ease of future disassembly.

5.0 Special tools and instructions

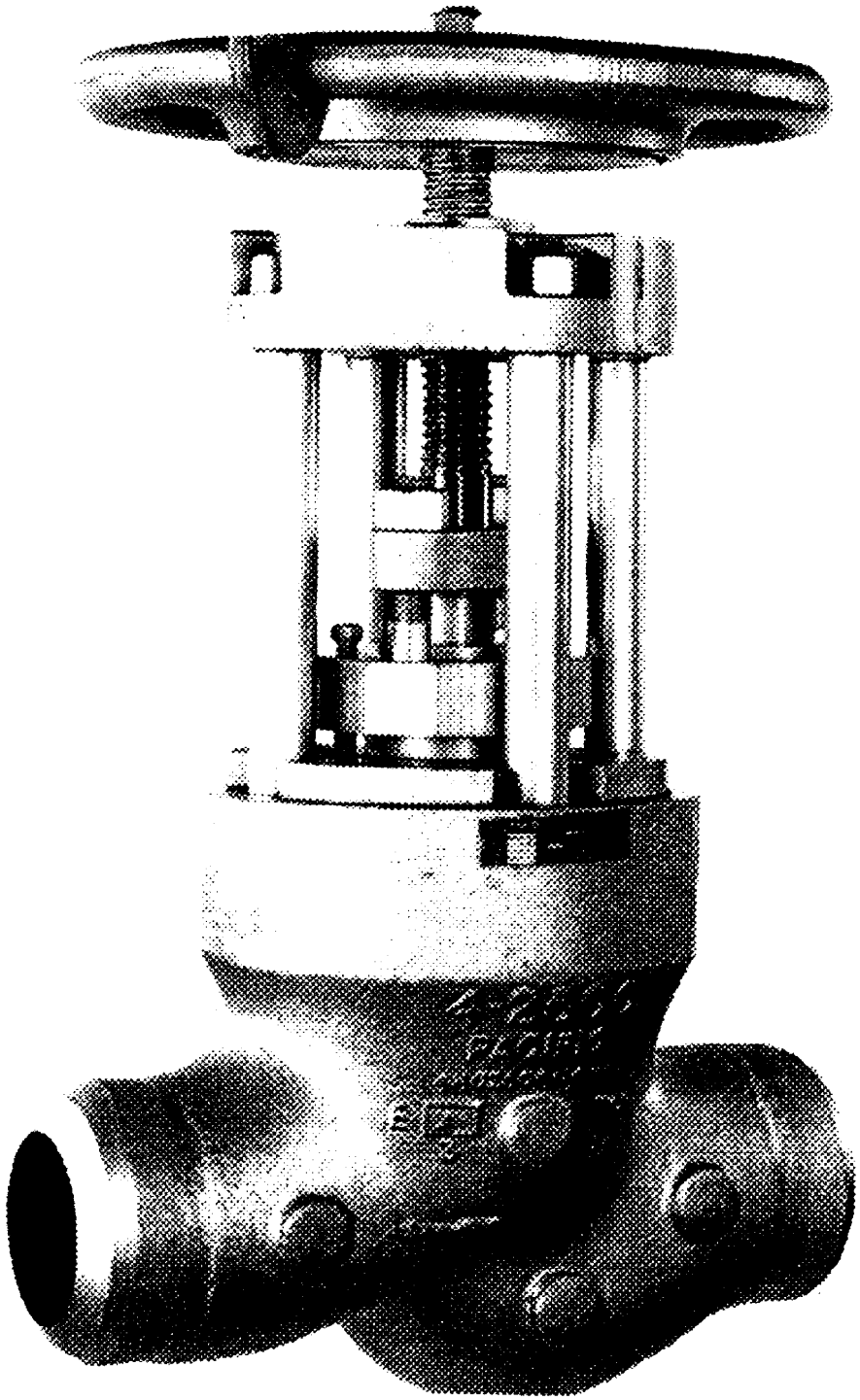
5.1 Recommended bolting torques are shown in Appendix 1 of this manual

5.2 A clamping device is recommended to prevent the disc halves from springing open during installation/removal. This clamp can be a commercially available unit, or contact Pacific Valves for more information. Certain large valve styles may require the use of a hydraulic torque device to achieve optimum bolt torque. When final stroking set up is done note that correct disc position in the closed position is @ .25 in. off the body stops. This is achieved by setting the actuator limit switches at the open and close position indication marks located on the yoke near the stem guide slot.

6.0 Preventative maintenance

6.1 Refer to section “A” of this manual for general valve maintenance information.

Section D: Pressure Seal Globe Valves



PRESSURE SEAL GLOBE VALVES

1.0 General Information

For general operation and maintenance information regarding this or any other valve please refer to section “A” of this manual. Note, the lift check and stop check versions of the globe valves have pipe orientation limitations. Refer to the warnings section “A” of this manual.

For specific information pertaining to the Fabricated Yoke Assembly, please refer to Appendix 6 of this manual.

2.0 Complete Disassembly

CAUTION! Before disassembling any valve, ensure that all pressure has been removed from the line and from any cavities within the valve. Contact Pacific Valves before disassembling any valve.

2.1 Handwheel operated valves

Upon completion of the disassembly procedure listed below, the handwheel 50 may be separated from the yokesleeve 31, by removing the handwheel nut 54.

2.2 Gear and motor operated valves

Refer to Appendix 7 of this manual for specific gear and motor information.

2.3 The following page contains a general disassembly and reassembly procedure. These procedures cover the bulk of the disassembly and reassembly process, however special attention should be paid to the following:

2.3.1 Extreme care should be taken to ensure that the sealing surfaces of the gasket area do not become damaged during disassembly or reassembly. This includes scratches caused by misalignment and/or by debris in the seal area.

2.3.2 *Crane* recommends replacing the pressure seal bonnet gasket 55 when servicing any valve.

2.3.3 Caution should be exercised in handling the new bonnet gasket 55 to avoid scratching its surfaces.

2.3.4 When reassembling the valve it should be noted that in certain cases it may be necessary to tighten the bonnet draw bolts as the system pressure is built up. This process will ensure a positive seal for the pressure seal gasket.

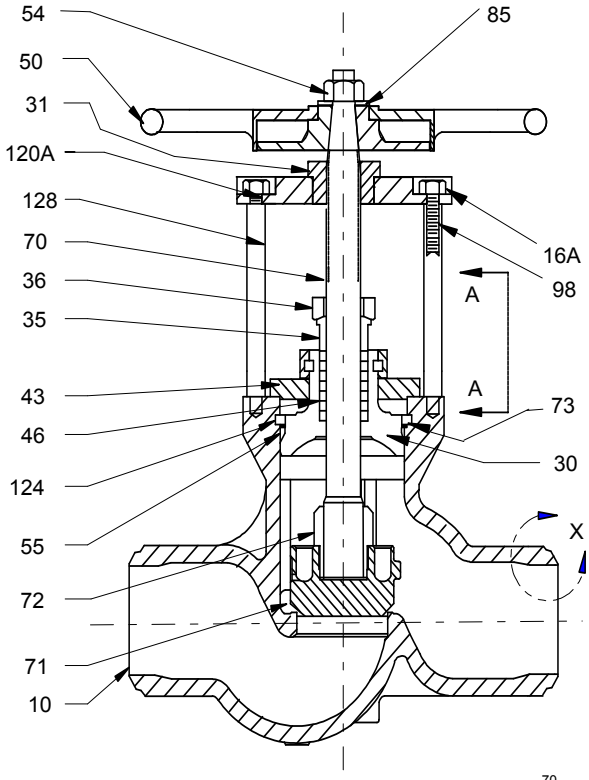
PRESSURE-SEAL GLOBE VALVES
CLASS 600, 900, 1500, & 2500, ALL SIZES

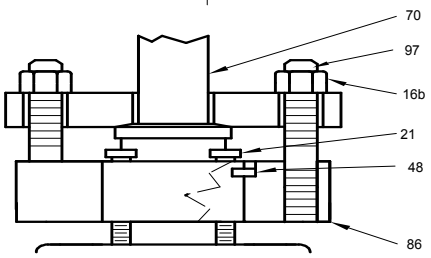
DISASSEMBLY

- Read the warning notice in section 2.0 of these instructions.
- Remove operator 200 (if used) and upper plate 120.
- Remove the yoke columns 128 but do not remove the yoke studs.
- Remove the gland flange 36, gland 35, and all packing material 46.
- Screw in the jack bolts 21 sufficiently to loosen the collar plate 86.
- Remove the retainer clips 48.
- Remove the collar plate 86 and lower plate 43.
- Replace the upper plate 120 on the exposed yoke studs and push plate down until it contacts the bonnet 30.
- Reinstall the yoke nuts 16B and run the nuts down until they contact the upper plate. Tighten the nuts until they lower the bonnet 30 sufficiently enough to remove the segment rings 124 .
- Remove upper plate 120 and yoke nuts 16B
- Using a brass bar, tap the top of each segment ring to loosen, using lubricants as necessary. Remove the segments by prying out with a screwdriver or similar tool.
- Clean off all debris prior to next step.
- Remove gland studs 97 and reinstall them upside down. These studs may be tack welded.
- Reinstall collar plate 86 & retainer clips 48.
- Screw in the gland studs 97 to raise the entire bonnet assembly.
- Use extreme caution to not scratch or damage the seating surfaces of the body, gasket, bonnet, or disc.
- Remove disc retention system. (May be tack weld or retainer pin)
- Remove the gasket 55 (and thrust ring 73 if used) from the bonnet.
- Remove the bonnet over the end of the stem.
- Clean the stuffing box and stem.

REASSEMBLY

- Clean all parts thoroughly. Polish gasket seating surface in the body 10 and bonnet 30 with fine emery cloth. Lubricate the gasket seating surfaces with a light oil to prevent galling during assembly. Replace gasket 55 with a new factory supplied part.
- Reassemble the bonnet in reverse order.
- Insert the disc 71 and the stem 70 into the body. Replace the disc retention system.
- Install the gasket 55 onto the bonnet. Insert the bonnet into the body 10. Install the segment rings 124 into the body groove.
- Install the yoke and bolting. Replace the packing, gland, gland flange and tighten the jacking bolts.
- Backseat the bonnet to seat the gasket and adjust jacking bolts 21. Tighten wrench tight only, do not torque.





VIEW A-A

PART IDENTIFICATION			
10	BODY	55	GASKET
11	SEAT RING	70	STEM
16A	NUT	71	DISC
16B	NUT	72	DISC NUT
21	JACKING BOLT	73	THRUST RING
30	BONNET	85	IMPACTOR
31	YOKESLEEVE	86	COLLAR PLATE
35	GLAND	97	GLAND STUD
36	GLAND FLANGE	98	YOKE ROD
43	LOWER PLATE	120A	UPPER PLATE
46	PACKING	124	SEGMENT RING
48	RETAINER CLIP	128	YOKE COLUMN
50	HANDWHEEL		
54	HANDWHEEL NUT		

SPECIAL NOTE: After system pressure has been reestablished, retighten all bolting to the Torque values given in Appendix 1 of this manual.

3.0 Maintenance of disassembled valves

3.1 Following disassembly procedures in Section 2.0, examine body cavity 10 for deposits of foreign material.

3.2 Examine seating surfaces of seat ring 11 and disc 71 for wear. If soft seats are provided, the insert may need replacement, if it shows any signs of damage.

3.3 Examine stem 70, seal area and threads for excessive wear.

3.4 If excessive wear is evident, worn parts, or if necessary, entire valve should be reconditioned or replaced.

3.5 Crane requires replacing the pressure seal bonnet gasket when servicing any valve.

3.6 It should be noted that the Pacific pressure seal globe valve is available in a standard globe and stop check (non-return) configuration. Each configuration utilizes a specific disc retention system.

3.7 Crane offers complete replacement seal kits and spare parts for reconditioning. When ordering, always state the figure number (or stock number) of the valve, the body material, as well as the quantity desired.

3.8 Crane also offers complete remanufacturing services to rework your valve. If you find this necessary, the Crane Valve Service Center will re-manufacture your valve to factory specifications.

4.0 Lubrication

4.1 Parts requiring lubrication are stem and yoke sleeve 70, 31, entire gasket 55, and under all nuts 16 before torqueing. Bonnet draws studs should be lubricated with an anti-seize lubricant to promote ease of future disassembly.

5.0 Special tools and instructions

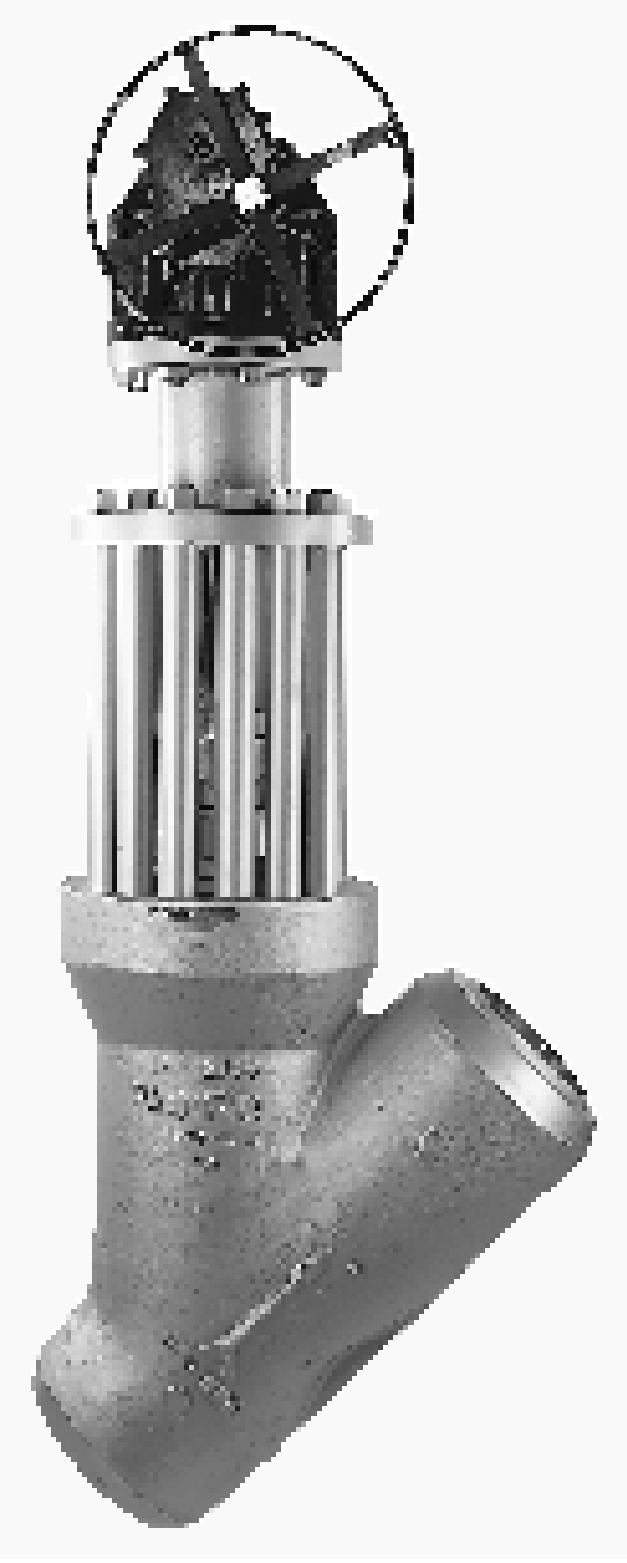
5.1 Recommended bolting torques are shown in Appendix 1 of this manual

5.2 No special tools are required for general valve maintenance. However, in certain large valve styles, the use of a hydraulic torque device may be necessary to achieve optimum bolt torque.

6.0 Preventative maintenance

6.1 Refer to section “A” for general maintenance data

Section E: Pressure Seal Y-Globe Valves



PRESSURE SEAL Y-GLOBE VALVES

1.0 General Information

For general operation & maintenance information regarding this or any other valve please refer to section “A” of this manual. Note, the lift check and stop check versions of the globe valves have pipe orientation limitations. Refer to the warnings section “A” of this manual.
For specific information pertaining to the Fabricated Yoke Assembly, please refer to Appendix 6 of this manual.

2.0 Complete Disassembly

CAUTION! Before disassembling any valve, ensure that all pressure has been removed from the line and from any cavities within the valve. Contact Pacific Valves before disassembling any valve.

Note: Certain Pacific pressure seal Y-globe valves utilize a gate style bonnet configuration. If the Y-globe valve does not have the bonnet shown in figure A-A below, then the bonnet disassembly procedures from section “B” of this manual should be used.

2.1 Handwheel operated valves
Upon completion of the disassembly procedure listed below, the handwheel 50 may be separated from the yoke sleeve 31, by removing the handwheel nut 54.

2.2 Gear and motor operated valves
Refer to Appendix 7 of this manual for specific gear and motor information.

2.3 The following page contains a general disassembly and reassembly procedure. These procedures cover the bulk of the disassembly and reassembly process, however special attention should be paid to the following:

2.3.1 Extreme care should be taken to ensure that the sealing surfaces of the gasket area do not become damaged during disassembly or reassembly. This includes scratches caused by misalignment and/or by debris in the seal area.

Note: Due to the special orientation of Y-Globe bonnets, it is especially important to ensure that the bonnet does not become misaligned during disassembly or reassembly. Whenever possible, to further facilitate disassembly, the Y-Globe valve should be removed from the pipeline and place in an angled fixture. This will orient the bonnet vertically and discourage misalignment.

2.3.2 *Crane* requires replacing the pressure seal bonnet gasket 55 when servicing any valve.
2.3.3 Caution should be exercised in handling the new bonnet gasket 55 to avoid scratching its surfaces.
2.3.4 When reassembling the valve it should be noted that in certain cases it is necessary to re-tighten the bonnet draw bolts 16C after the system pressure is built up. This process will ensure a positive seal for the pressure seal gasket.

For all other bolting, excluding gland studs, torque bolts per Appendix 1.

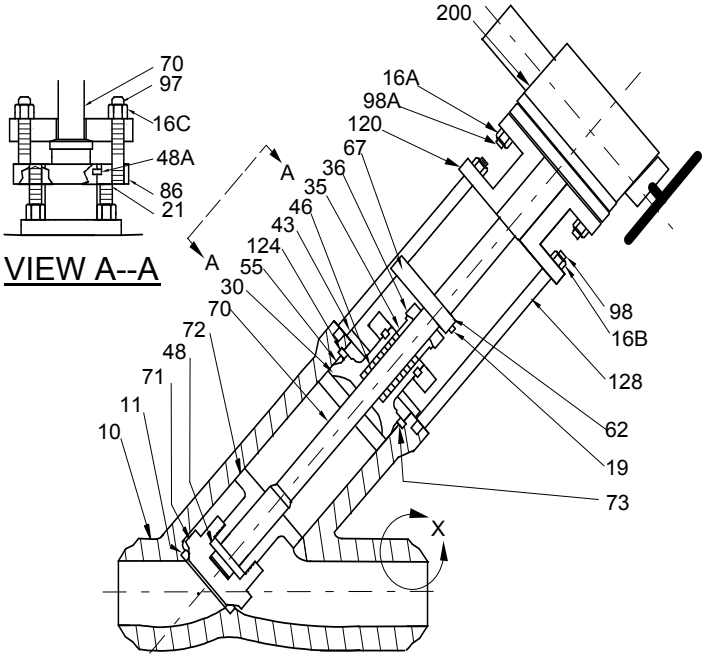
PRESSURE-SEAL Y-GLOBE VALVES
CLASS 600, 900, 1500, & 2500

DISASSEMBLY

- Read the warning notice in section 2.0 of these instructions.
- Remove the gland flange 36, gland 35, and all packing material 46.
- Remove operator 200 and upper plate 120.
- Remove the yoke columns 128 but do not remove the yoke studs.
- Screw in the jack bolts 21 sufficiently to loosen the collar plate 86.
- Remove the retainer clips 48.
- Remove the collar plate 86 and lower plate 43.
- Replace the upper plate 120 on the exposed yoke studs and push plate down until it contacts the bonnet 30.
- Reinstall the yoke nuts 16B and run the nuts down until they contact the upper plate. Tighten the nuts until they lower the bonnet 30 sufficiently enough to remove the segment rings 124.
- Remove upper plate 120 and yoke nuts 16B
- Using a brass bar, tap the top of each segment ring to loosen, using lubricants as necessary. Remove the segments by prying out with a screwdriver or similar tool.
- Clean off all debris prior to next step.
- Remove gland studs 97 and reinstall them upside down. These studs may be tack welded.
- Replace collar plate 86 & retainer clips 48.
- Screw in the gland studs 97 to raise the entire bonnet assembly.
- Use extreme caution to not scratch or damage the seating surfaces of the body, gasket, bonnet, or disc.
- Remove disc retention system. (May be tack weld or retainer pin)
- Remove the gasket 55 (and thrust ring 73 if used) from the bonnet.
- Remove the bonnet over the end of the stem.

REASSEMBLY

- Clean all parts thoroughly. Polish gasket seating surface in the body 10 and bonnet 30 with fine emery cloth. Lubricate the gasket seating surfaces with a light oil to prevent galling during assembly. Replace gasket 55 with a new factory supplied part.
- Reassemble the bonnet in reverse order.
- Insert the disc 71 and the stem 70 into the body. Orient anti rotation arm between yoke columns. Replace the disc retention system.
- Install the gasket 55 onto the bonnet. Insert the bonnet into the body 10. Install the segment rings 124 (and thrust ring) into the body groove.
- Install the yoke and bolting. Replace the packing, gland, gland flange and tighten the jacking bolts.
- Backseat the bonnet to seat the gasket and adjust jacking bolts 21. Tighten wrench tight only, do not torque.



PART IDENTIFICATION			
10	BODY	55	GASKET
11	SEAT RING	67	ANTI ROTATION
16A	NUT	70	STEM
16B	NUT	71	DISC
21	JACK BOLT	72	DISC NUT
30	BONNET	73	THRUST RING
31	YOKESLEEVE	85	IMPACTOR
35	GLAND	86	COLLAR PLATE
36	GLAND FLANGE	97	GLAND STUD
43	LOWER PLATE	98	YOKE ROD
46	PACKING	120	UPPER PLATE
48	RETAINER CLIP	124	SEGMENT RING
50	HANDWHEEL	128	YOKE COLUMN
54	HANDWHEEL NUT	200	OPERATOR

SPECIAL NOTE: After system pressure has been re-established, re-tighten all bolting in accordance with this manual.

3.0 Maintenance of disassembled valves

3.1 Following disassembly procedures in Section 2.0, examine body cavity 10 for deposits of foreign material.

3.2 Examine seating surfaces of seat ring 11 and disc 71 for wear. If soft seats are provided, the insert may need replacement, if it shows any signs of damage.

3.3 Examine stem 70, seal area and threads for excessive wear.

3.4 If excessive wear is evident, worn parts, or if necessary, entire valve should be reconditioned or replaced.

3.5 Crane requires replacing the pressure seal bonnet gasket when servicing any valve.

3.6 It should be noted that the Pacific pressure seal globe valve is available in a standard globe and stop check (non-return) configuration. Each configuration utilizes a specific disc retention system

3.7 Crane offers complete replacement seal kits and spare parts for reconditioning. When ordering, always state the figure number (or stock number) of the valve, the body material, as well as the quantity desired.

3.8 Crane also offers complete remanufacturing services to rework your valve. If you find this necessary, the Crane Valve Service Center will re-manufacture your valve to factory specifications.

4.0 Lubrication

4.1 Parts requiring lubrication are stem and yoke sleeve 70, 31, entire gasket 55, and under all nuts 16 before torqueing. Bonnet draws studs should be lubricated with an anti-seize lubricant to promote ease of future disassembly.

5.0 Special tools and instructions

5.1 Recommended bolting torques are shown in Appendix 1 of this manual

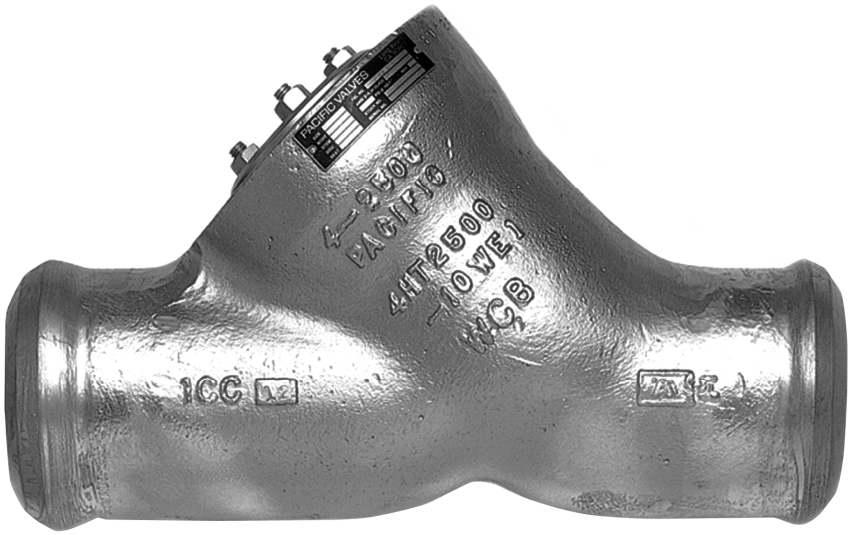
5.2 No special tools are required for general valve maintenance. However, in certain large valve styles, the use of a hydraulic torque device may be necessary to achieve optimum bolt torque.

6.0 Preventative maintenance

6.1 Refer to section “A” for general maintenance data

Section F: Pressure Seal Check Valves

Pressure Seal Tilt Disc Check Valves



Pressure Seal Swing Check Valves

PRESSURE SEAL CHECK VALVES

1.0 General Information

For general operations & maintenance information regarding this or any other Pacific valve please refer to section “A” of this manual.

2.0 Complete Disassembly

CAUTION! Before disassembling any valve, ensure that all pressure has been removed from the line and from any cavities within the valve. Contact Pacific Valves before disassembling any valve.

2.1 The following page contains a general disassembly and reassembly procedure. These procedures cover the bulk of the disassembly and reassembly process, however special attention should be paid to the following:

2.1.1 Extreme care should be taken to ensure that the sealing surfaces of the gasket area do not become damaged during disassembly or reassembly. This includes scratches caused by misalignment and/or by debris in the seal area.

Note: Due to the special orientation of Check Valve bonnets, it is especially important to ensure that the bonnet does not become misaligned during disassembly or reassembly. Whenever possible, to further facilitate disassembly, the Check valve should be removed from the pipeline and place in an angled fixture. This will orient the bonnet vertically and discourage misalignment.

2.1.2 *Crane* requires the replacement of the pressure seal bonnet gasket 55 when servicing any valve.

2.1.3 Caution should be exercised in handling the new bonnet gasket 55 to avoid scratching its surfaces.

2.1.4 When reassembling the valve it should be noted that in certain cases it may be necessary to tighten the bonnet draw bolts 16C as the system pressure is built up. This process will ensure a positive seal for the pressure seal gasket.

PRESSURE-SEAL TILT DISC CHECK VALVES

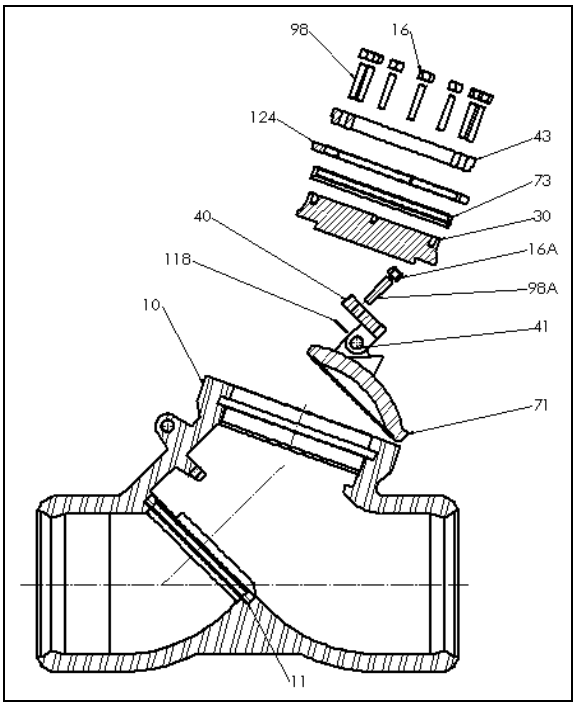
CLASS 600, 900, 1500, & 2500, ALL SIZES

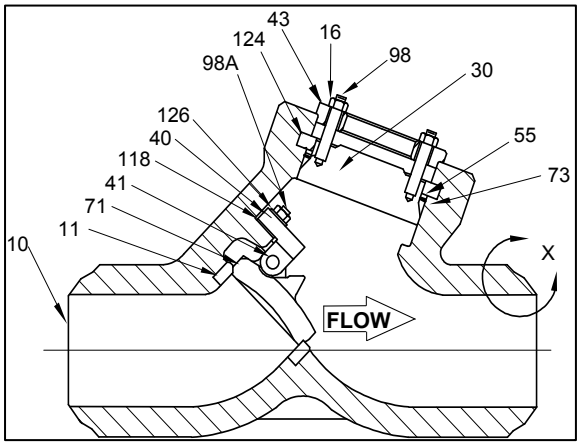
DISASSEMBLY:

- Read the warning notice in section 2.0 of these instructions.
- Loosen and remove the draw nuts 16 and studs 98.
- When a tapped hole is provided, Install an eyebolt or similar lifting device in center of bonnet 30.
- Using a block of wood or similar soft material, drive the bonnet 30 down until there is sufficient clearance above the bonnet to remove the segment rings 124.
- Using a brass bar, tap the top of each segment ring to loosen using lubricants as necessary. Remove the segments by prying, with a screwdriver or similar tool, out away from the body until the segments are free to be lifted out. Clean all surfaces of foreign matter prior to next step.
- Using the lifting device in the center of the bonnet, lift the bonnet and gasket from the valve body.
- Use extreme caution to not scratch or damage the seating surfaces of the body, gasket, and bonnet.
- Remove the hinge mounting nut 98A.
- Remove the hinge and disc assembly from the valve. Note the position, quantity and thickness of all shims 118.
- Remove hinge pin 41 from disc assembly to separate disc 71 and hinge 40.

ASSEMBLY

- Clean all parts thoroughly. Polish gasket seating surface in the body 10, and on the bonnet 30 with fine emery cloth. Lubricate the gasket seating surfaces with a light oil to prevent galling during assembly
- Disc 71 is assembled with hinge 40 by using hinge pin 41. This Disc assembly is installed into body 10.
- Before installing disc assembly into body 10, shims 118 are to be placed below hinge 40. Then Disc assembly is installed. Place lock 126 below nut and fastened with Stud and Nuts 98A. There shall be no difference in position, quantity and thickness of shims118 as noted earlier during disassembly. In case of variation in shims 118 it causes incorrect seating of disc 71 and cause damage to seat ring11.
- Install the gasket 55 onto the bonnet. Insert the bonnet into the body 10. Install the segment rings 124 into the body groove. Tighten wrench tight only, do not torque.





PART IDENTIFICATION

10	BODY	55	THRUST RING (#2500 ONLY)
11	SEAT RING	71	DISC
16	NUT	73	GASKET
16A	NUT	98A	STUD
30	BONNET	98	STUD
40	HINGE	118	SHIM
41	HINGE PIN	124	SEGMENT RINGS
43	BONNET CARRIER CAP	126	LOCK

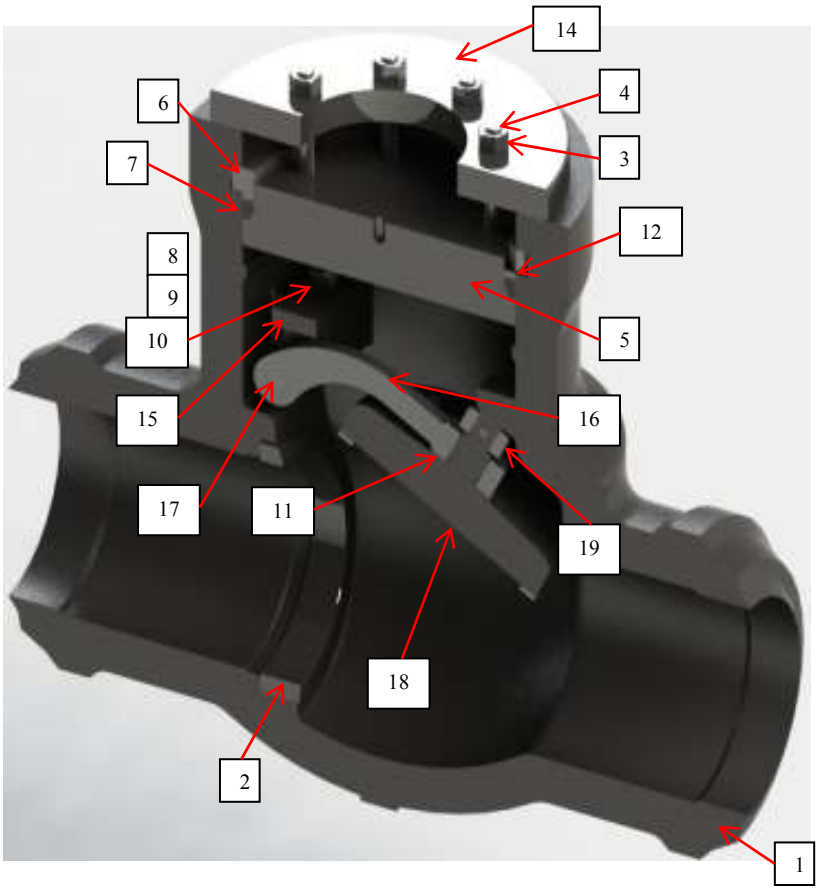
NOTE: After system pressure has been reestablished, re-tighten all bolting to the TORQUE values given in Appendix 1 of this manual.

PRESSURE-SEAL SWING CHECK VALVES

CLASS 600, 900, 1500, & 2500, ALL SIZES

DISASSEMBLY:

- Read the warning notice in section 2.0 of these instructions.
- Loosen and remove the draw nuts 3 and studs 4. Remove the bonnet cap carrier plate 14.
- When a tapped hole is provided, Install an eyebolt or similar lifting device in center of bonnet 5.
- Using a block of wood or similar soft material, drive the bonnet 5 down until there is sufficient clearance above the bonnet to remove the segment rings 6.
- Using a brass bar, tap the top of each segment ring to loosen using lubricants as necessary. Remove the segments by prying, with a screwdriver or similar tool, out away from the body until the segments are free to be lifted out. Clean all surfaces of foreign matter prior to next step.
- Using the lifting device in the center of the bonnet, lift the bonnet 5 and gasket 7 from the valve body.
- Use extreme caution to not scratch or damage the seating surfaces of the body, gasket, and bonnet.
- Remove the hinge mounting nuts, washers & bolts 8, 9 & 10.
- Remove the hinge and disc assembly 11 along with the bracket 15 from the valve.



REASSEMBLY

- Clean all parts thoroughly. Polish gasket seating surface in the body 1, and on the bonnet 5 with fine emery cloth. Lubricate the gasket seating surfaces with a light oil to prevent galling during assembly.

- Install the gasket 7 onto the bonnet 5. Install the Thrust Ring 12 if it is part of original assembly. (Please note that thrust ring is provided on higher pressure classes only as required) Insert the bonnet into the body 1. Install the segment rings 6 into the body groove. Tighten wrench tight only, do not torque.

NOTE: After system pressure has been reestablished, re-tighten all bolting to the TORQUE values given in Appendix 1 of this manual.

PART IDENTIFICATION

1	BODY	9	WASHER
2	SEAT RING	10	STUD (BRACKET)
3	NUT	11	DISC ASSEMBLY
4	STUD	12	THRUST RING (IF APPLICABLE)
5	BONNET	14	BONNET CARRIER CAP
6	SEGMENT RING	15	BRACKET
7	GASKET	16	HINGE
8	NUT (BRACKET)	17	HINGE PIN
		18	DISC
		19	DISC NUT

3.0 Maintenance of disassembled valves

3.1 Following disassembly procedures listed above, examine body cavity 10 for deposits of foreign material.

3.2 Examine seating surfaces of seat ring 11 and disc 71 for wear. If soft seats are provided, the insert may need replacement, if it shows any signs of damage.

3.3 Inspect hinge assembly 40 and hinge pin 41 for wear.

3.4 If excessive wear is evident, worn parts, or if necessary, entire valve should be reconditioned or replaced.

3.5 Crane requires the replacement of the pressure seal bonnet gasket when servicing any valve.

3.6 Crane offers complete replacement seal kits and spare parts for reconditioning. When ordering, always state the figure number (or stock number) of the valve, the body material, as well as the quantity desired.

3.7 Crane also offers complete remanufacturing services to rework your valve. If you find this necessary, the Crane Valve Service Center will remanufacture your valve to factory specifications.

4.0 Lubrication

4.1 Parts requiring lubrication are; entire gasket 55, and under all nuts 16 before torqueing. Bonnet draw studs should be lubricated with an anti-seize lubricant to promote ease of future disassembly.

5.0 Special tools and instructions

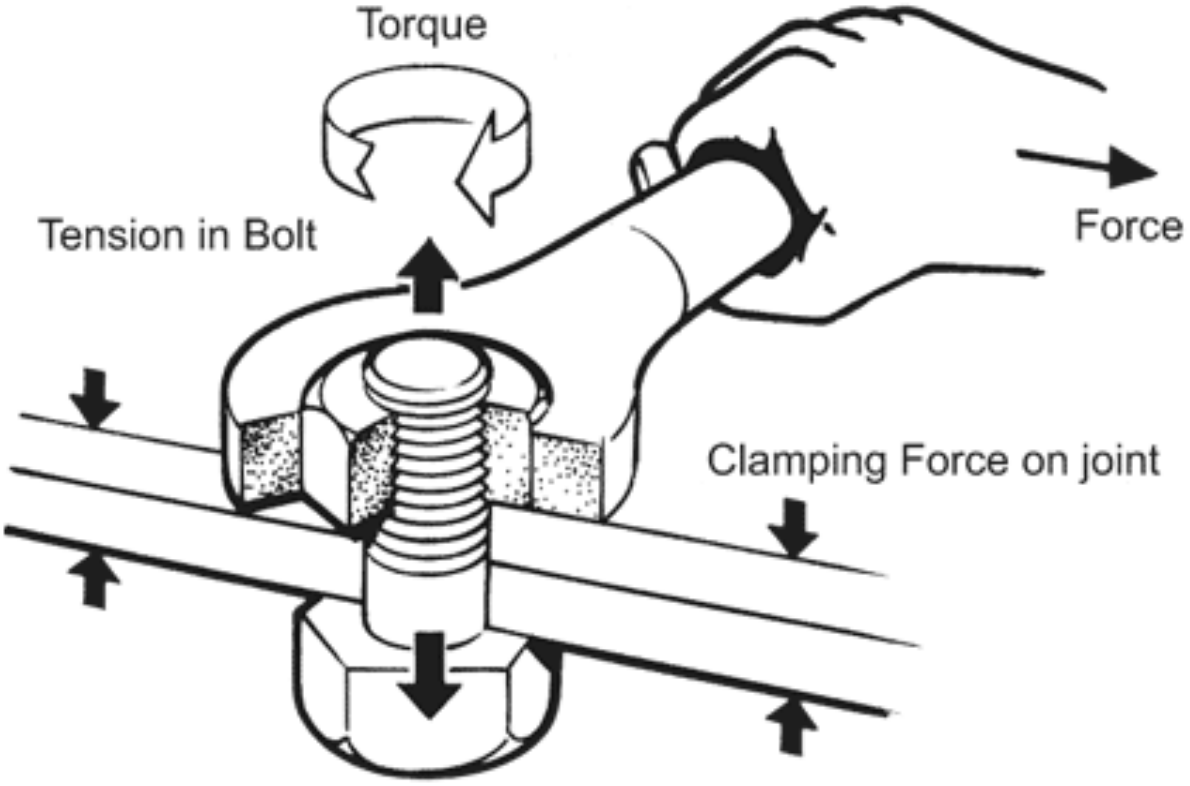
5.1 Recommended bolting torques are shown in Appendix 1 of this manual

5.2 No special tools are required for general valve maintenance.

6.0 Preventative maintenance

6.1 Refer to section “A” for general maintenance data

Appendix 1
Bolting Torque Values



BOLTING TORQUE VALUES

1.0 General Information

For general valve operation & maintenance information please refer to section “A” of this manual.

This section details the specific torque values recommended by Pacific Valves for bolting used in all Pacific products.

2.0 Standard Procedures

2.1 Always use new bolting materials.

2.2 Verify that the materials are compatible with the process system as well as any temperature or pressure requirements. Note that bolting materials can have minor identification changes which may have a substantial impact on performance, i.e. B7M vs. B7.

2.3 Whenever allowed by system and process parameters, use appropriate lubrication to ensure even tightening of the bolting materials. For higher temperature applications, the use of an “Anti-seize” compound may be necessary to promote future disassembly.

3.0 Torque Values

(Applicable to valve components only, not for pipe flange connections)

All values are listed in foot/pounds (ft/lbs.)

Bolt Dia.	**TPI**	***ASTM A193 GR B7,B16, & K-500 monel*** with a bolt stress of 60,000 psi	***ASTM A193 GR B8 class 2, & B8M*** with a bolt stress of 45,000 psi
1/4	20	20	16
5/16	18	30	22
3/8	16	45	34
7/16	14	60	47
½	13	90	65
9/16	12	120	90
5/8	11	160	120
¾	10	270	200
7/8	9	500	300
1	8	700	450
1 1/8	8	875	650
1 ¼	8	1200	900
1 3/8	8	1625	1200
1 ½	8	2100	1590
1 5/8	8	2750	2000
1 ¾	8	3400	2570
1 7/8	8	4250	3200
2	8	5200	3880
2 ¼	8	7400	5575
2 ½	8	10000	7685
2 5/8	8	11800	8900
2 ¾	8	13700	10200
3	8	17750	13350

3.1 Fabricated Yoke Torque Values

FABRICATED YOKE POST BOLT TORQUES, FT/LBS

PRESSURE SEAL GATE VALVES

VALVE SIZE	900#	1500#	2500#
2.5”	*PV*	60	*PV*
3”	62	53	123
4”	138	53	214
6”	128	208	602
8”	217	202	534
10”	208	428	440
12”	155	540	360
14”	427	492	606
16”	352	622	2,889
18”	727	1,282	1,356
20”	628	588	1,200
24”	642	1,155	1,271

PRESSURE SEAL “T” GLOBE VALVES

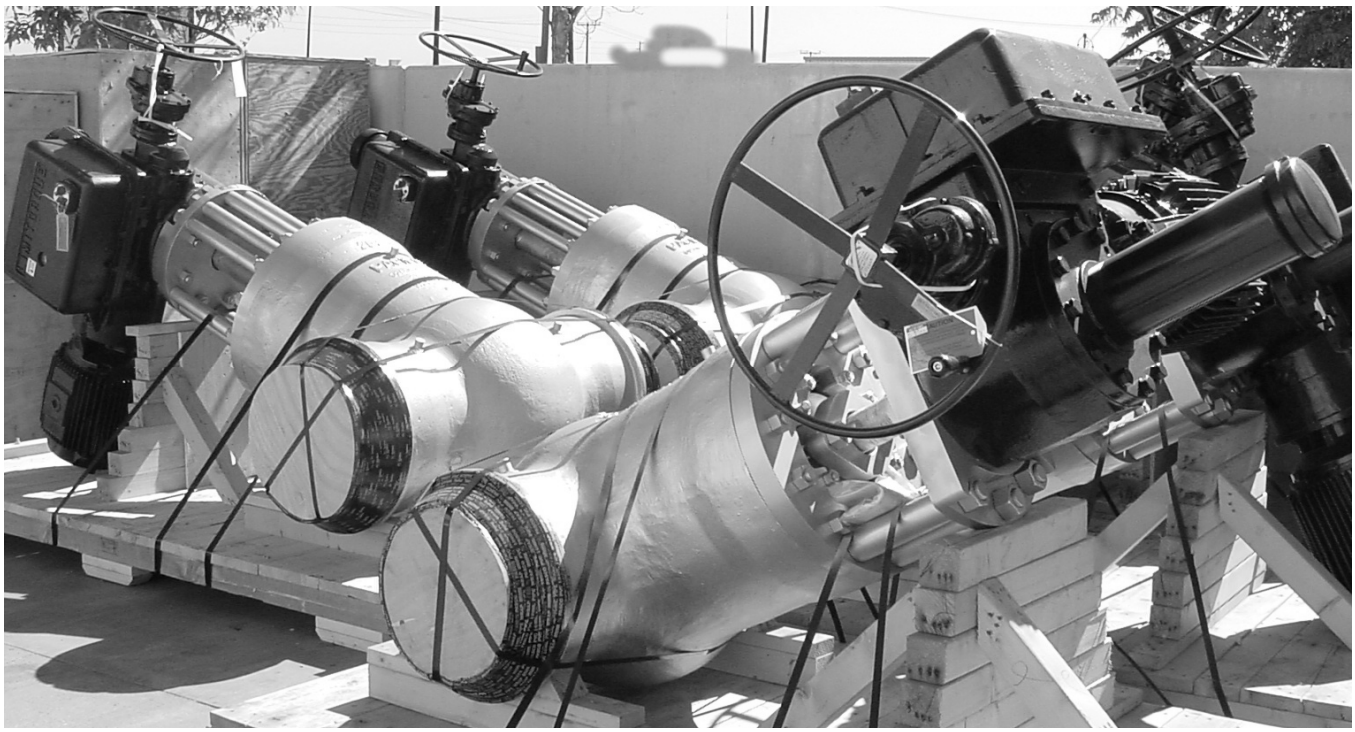
VALVE SIZE	900#	1500#	2500#
2.5”	*PV*	*PV*	*131*
3”	115	218	168
4”	184	141	111
6”	364	352	594
8”	*PV*	*PV*	*PV*
10”	1,627	*PV*	*PV*
12”	1,292	*PV*	*PV*
14”	*PV*		

PRESSURE SEAL “Y” GLOBE VALVES

VALVE SIZE	600#	900#	1500#	2500#
2.5”	*PV*	*PV*	*PV*	*PV*
3”	*PV*	*PV*	*PV*	*PV*
4”	*PV*	*PV*	*PV*	*PV*
6”	*PV*	*PV*	*PV*	*PV*
8”	*PV*	543	543	*PV*
10”	*PV*	1,025	1,025	2,782
12”	*PV*	2,772	2,772	2,508
14”	*PV*	2,772	2,772	2,401
16”	1,209	2,772	2,772	2,401
18”	1,209	2,503	2,503	*PV*
20”	*PV*	1,869	1,869	*PV*
24”	*PV*	2,515	2,515	*PV*

- When *PV* is entered for a value, please contact Pacific Valves for Specific information regarding this valve.

Appendix 2
Long Term Storage of Valves



LONG TERM STORAGE OF VALVES

1.0 General Information

For general operation & maintenance information regarding for valves, please refer to section “A” of this manual.

2.0 Storage

The following recommendations are for preparing valves and their accessories for Long Term Storage. They are necessary to maintain the valves in proper condition prior to installation into the pipeline. By following these procedures, abrasive and corrosive substances can be prevented from affecting valve performance. It is the purchaser’s responsibility to take the necessary precautions for the protection of valves in storage.

2.1 As shipped condition

Valves are packaged with a moisture resistant closure on the valve ends. Where size permits, plastic plugs or caps are used. On larger size valves, wood covers are sealed with tape and securely attached with metal bands. On valves with pipe flanges the wooden covers are secured with bolts. All other openings are covered with plastic caps or plugs. Parts packaged separately are secured in packaging from the factory to prevent damage during handling and storage. These parts are to be stored off the ground in an area protected from the weather. If it is anticipated that the valve will be in storage for more than 4 months the packing should be removed and shipped dry.

2.2 Recommended storage facilities

The following are a list of storage types in order of most preferred to least preferred:

- Enclosed weather tight building with a concrete floor.
- Enclosed building with a dirt floor. Valves must be on pallets.
- Open air, valves on pallets on a concrete floor covered with a tarpaulin (this is not recommended for more than six months)
- Open air, valves on pallets on a dirt floor and covered with a tarpaulin (this is not recommended for more than six months)

2.3 Inspection

Periodic inspections should be performed on all stored valves and parts. The frequency of these inspections should be determined by the type of storage facilities and weather conditions. At a minimum, all parts and valves should be inspected every 4-6 months. Inspect for dirt, moisture or any other type of contamination. If any is found the valve is to be thoroughly cleaned and dried. Repeat the above listed packaging procedure to ensure the valve is weather tight. Slight external rusting may occur on valves stored outside. This will have little or no effect on their performance. Heavy internal rust however, may be harmful and must be corrected. If stored longer than 4 months the packing must be replaced.

2.4 Preparation for installation into the pipeline

Inspect valves as per the above instructions and remove any contamination, assuring that the valve is clean and dry. Re-torque all bolting to factory specifications to compensate for possible bolt relaxation, which may occur during long storage. Ensure that all foreign material has been removed from the valve and that it is dry. If stored longer than 4 months the packing must be replaced.

Appendix 3
Valve Installation

VALVE INSTALLATION

1.0 General Information

For general valve information, please refer to section “A” of this manual.

2.0 Introduction

By exercising proper care in the installation of Pacific valves, the probability of trouble-free service will be enhanced. It is important to recognize that in the transport, handling and storage of a valve between the time of manufacture and the time of installation, there are numerous possibilities for accident or error, which may affect valve performance.

All valves should be handled / installed in such a manner as to comply with all applicable state, local and federal safety regulations including, but not limited to OSHA regulations. Personal Protective Equipment (PPE) should also be used in compliance with all regulations.

3.0 Inspection and handling

Before installation of the valve, it is important to determine that the valve is in satisfactory condition. It may be helpful to observe the following points, in order to avoid subsequent valve

Problems:

- Carefully unpack valve and note any special warning tags or identification plates attached to the valve; take appropriate action.
- Check valve for any markings indicating flow direction. If flow direction is indicated, appropriate care should be exercised to install the valve in the proper flow orientation. Check valves and non-return valve are uni-directional and must be installed in the proper orientation.
- Inspect the valve interior through the end ports to determine that it is clean and free from foreign matter and/or harmful corrosion. Remove any special packing materials (blocks to prevent disc movement) or packages of desiccant. The wedge/discs of weld end gate/globe valves should be slightly open during welding of the valves into the pipeline.
- Check the pipeline to ensure that it is properly aligned and supported. Expansion joints or bends should be installed in the pipeline to compensate for expansion and contraction.
- Only qualified riggers should handle the valves. The pickup point for all Pacific valves is by the use of a strap or chain around the neck area of the valve body. Do not pick up Pacific valves by use of straps or chains on or around the handwheels, yoke, bevel gear, motor or cylinder operator, or any override attachment. Do not pick up a valve by the packing bolting or other interior connections. After the weight of the valve is supported by a strap or chain around the neck of the valve body, other lines may be attached for steadying the valve in place during installation.
- Immediately prior to valve installation the interior of the piping (to which the valve is to be attached) should be checked for cleanliness and freedom from foreign materials.

4.0 Installation

All valves should be installed in such a manner as to prevent exposure to excessive vibration and process flow turbulence. Check valves specifically are subject to increased turbulence and wear due to their position in a piping system. Pressure seal check valves shall have a minimum of 5 pipe diameters of straight pipe upstream.

When Pacific valves with bevel gear, motor or air cylinder operators are mounted in a position other than with the valve stem in a vertical position, contact Pacific Valves for specific instructions.

4.1 Weld End Valves

Welded joints when properly made provide a structural and metallurgical continuity between the pipe and the valve body. For socket weld joints it is usually required that the weld fillet have more cross sectional area that the pipe. Butt welds usually require full penetration and thickness at least equal to that of the pipe. If a pipe of a high strength alloy is welded to a valve with body material of lower mechanical strength, the weld usually must taper to a compensating greater thickness at the valve end, or the valve must have a matching high strength welded-on extension or "pup".

CAUTION! All welding should be in accordance with any Code or jurisdictional regulations applicable to the piping system construction and with complete and approved welding procedures, and inspected as required by applicable specification.

4.1.1 The following items are a general overview of sound welding practice: Check material markings on pipe and valve to confirm they are as specified.

4.1.2 Inspect welding end surfaces, dimensions, and cleanliness. Correct any condition that might interfere with assembly and satisfactory welding.

4.1.3 If backing rings are to be used, check to confirm that ring material is compatible with pipe and valve materials, check individual rings for fit and cleanliness.

4.1.4 Determine that the prescribed welding parameters including preheating and post weld heat treating if required are in accordance with the approved welding procedure.

4.1.5 Inspect valve-pipe end alignment; adjust if and as required.

4.1.6 Securely tack weld.

4.1.7 Complete weld, using approved welding procedure.

4.2 Flanged Valves

Pipe flanged joints depend on tight sealing and compressive deformation of gasket material between facing flange surfaces. The bolting must provide the mechanical force necessary to maintain the necessary compressive stresses on the gasket, as well as resist the normal pressure forces tending to separate the joint. It should be recognized that bolting force used for "brute force" alignment of misaligned flanges will not be available to sustain gasket loading and pressure force loading, and the result may be a joint leakage problem.

4.2.1 Check mating flange facings if a condition is found which might cause leakage, (e.g. a deep radial groove or cut), do not attempt to assemble until the condition is corrected.

4.2.2 Check bolting for proper size, length and material.

4.2.3 For flange bolting for steel flanges ANSI Class 400 or higher, high strength material (usually B - 7) is required. The proper matching of flanges, bolting and gaskets is important.

4.2.4 Check gaskets for obvious defects or damage.

4.2.5 Use care to provide good alignment of flanges being assembled. Use suitable lubricants on bolt threads. When assembling, sequence the bolt tightening (in a star pattern) to make initial contact of flanges and gaskets as flat and parallel as possible. Tighten gradually and uniformly to avoid tendency to twist one flange relative to the other. Use of torque wrench is important to assure correct and uniform final tightening of flange bolting.

4.2.6 Parallel alignment of flanges is especially important in the case of assembly of a valve into an existing system. It should be recognized that if the flanges are not parallel, in such instances, it would be necessary to bend something to make the flange joint tight. Simply forcing the flanges together with the bolting may bend the pipe, or it may bend the valve. In large diameter piping particularly, such conditions should always be brought to the attention of someone capable of evaluating the bending conditions, and corrective measures taken as needed.

CAUTION! As indicated above, torque wrenches should be used for flange bolting. If, in the tightening process, the torque on a given bolt has been increasing with each part turn, and then is observed to remain unchanged or increase a much lesser amount with an additional part turn, that bolt is yielding. Such bolt should be replaced and scrapped.

4.3 Threaded Valves

For tight sealing, threaded pipe joints depend on a good fit between the male and female pipe threads, and, usually, the presence of a special soft or viscous material between the assembled threads. For best assurance of a leak-free system the following points should be observed:

4.3.1 Check the threads on both the valve and the mating pipe for form and cleanliness. Inspect for obvious dents, deformation of the thread or out-of-round areas. Ensure that no chips or grit are present.

4.3.2 Note internal length of threads in valve ends, and proximity of valve internal seat or wall. Observe any need for care regarding how far pipe is threaded into valve. If there appears to be a possibility of a problem, carefully check the pipe end thread, to make sure there is no extended straight portion beyond the standard tapered sections.

4.3.3 Use care to align threads at point of assembly. Tapered pipe threads are inherently loose fit at entry; substantial wrenching force should not be applied until it is apparent that threads are properly engaged.

4.3.4 Apply appropriate tape or thread compound to the external pipe threads (except when dry seal threading is specified).

4.3.5 Assemble joint wrench-tight. Wrench on valve should be on the valve end into which the pipe is being threaded.

CAUTION! Because there is no clear limit on the torque that may be developed in a tapered thread joint, it is possible to damage valves by applying excessive twisting forces through the body.

4.3.6 Repeat the process at second valve end. Again apply wrench at end of valve to which pipe is being assembled.

5.0 TESTING AND ADJUSTMENT

5.1 When a valve has been properly inspected and installed, it is reasonable to assume it will be in good condition and ready to operate. Nevertheless, it is at this time that the valve is at the end point of its more vulnerable phase. Operability can be proven only by test.

5.2 At this point valves having adjustable stem seals should be checked to determine that packing has been properly installed and gland bolting has its initial adjustment. Additional adjustment should be determined according to need as valve operability is checked and as system pressure is introduced.

5.3 A first observation can be made by actuating the valve through an open-close, or close-open cycle. If no obvious problems are observed, an actual test at pressure may be applied while tightness and operability are checked.

5.4 It is a fairly common practice after the installation of piping systems to clean the systems by blowing with gas or steam or flushing with a liquid to remove debris and/or internal protective films and coatings. It should be recognized that valve cavities may form a natural trap in a piping system and material not dissolved in or carried out by the flushing fluid may settle in such cavities and adversely affect valve operation. Also, abrasive material carried by a high velocity fluid stream may cause serious damage to seating surfaces. Again, great care should be taken to ensure that the valve is free of all debris prior to operation.

5.5 Upon installation, new valve lubrication should be applied to all lubrication points.

Appendix 4
Packing, Gasket &Valve Lubrication

PACKING & GASKET MAINTENANCE AND VALVE LUBRICATION

1.0 General Information

1.1 For general valve operation & maintenance information please refer to section “A” of this manual.

2.0 Packing Maintenance

2.1 Inspection of the valve stem/bonnet seal should be an essential part of routine monthly valve maintenance inspections.

2.2 If inspection indicates the seal is leaking, the bolts holding the gland flange should be tightened uniformly (one-quarter of a turn at a time) until leakage stops. **CAUTION!!** Extreme care should be taken when working on or around any pressurized equipment. Bolt Tightening beyond this point results in over-compression of the packing against the stem, thereby producing excessive wear and loss of packing material. If difficulty is experienced in achieving satisfactory sealing without producing excessive stem friction, it may be desirable to increase or to replace the packing material.

2.3 If gland travel is fully taken up and leakage does not stop, a careful examination of the stem should be undertaken. Operation of a valve on a regular basis will minimize corrosion between the stem and packing material. Any deterioration of the stem surface which is in contact with the stem seal or packing (such as dents, scratches, pitting or general corrosion) must be recognized as a probable cause of leakage problems. The valve stem should be examined to determine if it has become bent or misaligned. If any of the above conditions exist, the stem must be refinished or replaced. If the stem is undamaged and the valve continues to leak, addition to or replacement of the packing is necessary.

2.4 Replacement packing should be dry and free of all types of contamination prior to installation in the stuffing box. The new packing should also be compatible with both the valve stem material and the material in the piping system, at operating temperatures and pressures.

CAUTION! It is extremely dangerous to remove the bolting, gland flange and gland to replace the packing with pressure in the pipeline. Always depressurize the valve/pipeline before dismantling the stuffing box. Although specific procedures may vary with specific valve and packing designs, the following rules always must be considered.

3.0 Packing Installation and Instructions

3.1 Remove/drain system pressure from the valve.
3.2 Loosen and remove nuts holding gland flange in place. At this time, the gland flange and the gland will be free to move up the stem and the stem packing is exposed (refer to appropriate valve section for identification of parts).
3.3 Remove old packing. Use caution to ensure that tools used to remove packing do not scratch either the stem shaft or the inside of the stuffing box. Clean shaft and box thoroughly.
3.4 Replace original packing with packing indicated on the applicable spare parts listing. (In most cases, the packing will be die-formed graphite/ braided carbon set). Use all new packing. Never install used rings.

3.4.1 To open split ring joints, twist the open ends in opposite directions (the packing ring should resemble an “S”. Install each new packing ring separately, tamping each one before installing the next. Ensure that rings are not cocked and that air is not entrapped between adjacent rings.
3.4.2 The joints of split packing rings should be staggered 90 degrees to 120 degrees from the joints of adjacent rings.
3.4.3 If the valve has a lantern ring, make sure it is replaced in its original position.
3.4.4 The gland may be used to set the packing in the bottom of the stuffing box.

3.5 Replace the gland and gland flange and hand tighten the gland nuts. Then tighten the gland nuts to approximately 40 ft. lbs.
3.6 Manually open and close valve several times to ensure all parts are working smoothly under pressure and to help “set” the packing.
3.7 After several days, inspect valve for leakage. Slight adjustment may be required.
3.8 The following suggestions apply if Chevron type Teflon Packing is used:
3.8.1 Ensure that sections of the lips of the rings (see Figure 3) are <u>not</u> turned over.
3.8.2 Ensure that the packing rings are facing in the direction of the medium being sealed - whether it is liquid or gas.

4.0 Gasket Maintenance

Note: The following information refers primarily to valves that have been repaired / reconditioned previously. It is always a sound practice to inspect and maintain all sealing areas.
Flanged valves should have the flange ends inspected at the same time. In addition to improper gasket installation procedure, thermal changes, pressure changes, vibrations etc. also may cause leakage. If re-torqueing of the bolting does not stop the leakage, the flanged joint should be unbolted and the gasket carefully examined.

Observation	Possible Remedies
Gasket corroded	Select replacement material with improved corrosion resistance.
Gasket extruded Excessively.	Select replacement material with better cold flow properties, select Replace material with better load carrying capacity i.e. more dense.
Gasket grossly Crushed	Select replacement material with better load carrying capacity, provide means To prevent crushing of the gasket by use of a stop ring or redesign of flanges.
Gasket mechanically damaged due to Overhang of raised face or flange bore.	Review gasket dimensions to insure gaskets are proper size. Make certain gaskets are properly centered in joint.
No apparent gasket compression visible	Select softer gasket material. Select thicker gasket material. Reduce gasket area to allow higher unit sealing load. Inspect flange dimensions.
Gasket substantially thinner on O.D. than I.D.	Indicative of excessive "flange rotation" or bending. Alter gasket dimensions to move gasket reaction closer to bolts to minimize bending movement. Provide stiffness to flange by means of back-up rings. Select softer gasket material to lower required seating stresses. Reduce gasket area to lower seating stresses.
Gasket unevenly compressed around	improper bolt-up procedure followed. Make certain proper sequential bolt up procedures are followed.

circumference.

Gasket thickness varies periodically	Indicative of "flange bridging" between bolts or warped flanges. Provide reinforcing rings for flanges to better distribute bolt load. Select gasket material with lower seating stress. Provide additional bolts if possible to obtain better load distribution. If flanges are warped, re-machine or use softer gasket material.

5.0 Gasket Installation Procedures

Regardless of the type of gasket being used or the materials of construction, certain basic procedures must be followed during assembly to ensure proper operation.

While these comments may seem elementary, they are extremely important in achieving a satisfactory seal and minimizing the time required to successfully make up joints. The procedures should be followed whether bolt stresses will be achieved with ordinary stud wrenches, preheating studs, using tensioning devices, using torque wrenches, or using hydraulic wrenches.

5.1 Inspect the gasket seating surfaces. Look for tool marks, cracks, scratches or pitting by corrosion and make sure that the gasket seating surface is proper for the type of gasket being used. Radial tool marks on a gasket seating surface are virtually impossible to seal regardless of the type gasket being used, therefore every attempt must be made to minimize them.

5.2 Inspect the gasket. Make sure the material is as specified, look for any possible defects or damage in the gasket.

5.3 Inspect and clean each stud or bolt, each nut, each washer, and the facing on the flanges against which the nuts will rotate. Look for severe galling, pitting, etc. If any of the above mentioned items are damaged beyond repair, replace the damaged item.

5.4 *5.4* Lubricate all thread contact areas and nut facings. The importance of proper lubrication cannot be over-stressed. No joint should be made up without the proper lubricant being applied to the threaded surfaces and to the nut facings. When flanges will be subjected to high temperatures, the use of an anti-seize compound should be considered to facilitate subsequent disassembly.

5.5 With raised face and flat face installation, loosely install the stud bolts on the lower half of the flange. Insert the gasket between the flanges facing to allow the bolts to center the gasket on the assembly. Install the balance of the bolts and nuts and bring all to a hand-tight or snug condition.

5.6 If the gasket is being installed in a recess or a groove, center the gasket midway into the recess or the groove. If the joint is vertical it may be necessary to use some cup grease or a few dabs of gasket cement or some other adhesive compatible with the process fluids, to keep the gasket in position until the flanges are tightened.

5.7 Torque the bolts up to a maximum of thirty percent of the final torque value required following the sequence recommended. (See charts for bolting sequence). Number bolts so that torqueing requirements can be followed. With any gasket material, it is extremely important to follow a proper bolting sequence. If this sequence is not followed, the flanges can be cocked. Then, regardless of the amount of subsequent torqueing, they cannot be brought back parallel. This problem, of course, is maximized on metallic gaskets more so than on non-metallic.

5.8 Repeat step 5.7, increasing the torque to approximately 50 to 60 percent of the final torque required.

5.9 Continue with a star pattern of re-torqueing all studs or bolts to the desired amount until no further rotation of the nuts can be achieved. This may require several re-torqueing since as

one stud is torqued it will relieve the stress on the adjacent stud until such time as equilibrium is achieved.

5.10 On high-pressure, high-temperature applications, it is recommended that the flanges be re-torqued to the required stress after 24 hours at operating pressures and temperatures to compensate for any relaxation or creep that may have occurred.

6.0 Please note the following Pacific Valves Pressure Seal Graphite Bonnet Gasket Characteristics

6.1 Gaskets are designed and manufactured with 30 Deg Angle.
- 6.1.1 Please note that the gasket will form to the existing bonnet angle during installation.

6.2 Gaskets have tape holding the caps or wires in place for shipping and installation purposes.
- *6.2.1 Please note: Tape **should not** be removed.*

6.3 Like all graphite seals, Pacific Valve gaskets are compressible, and thus are taller than standard metal pressure seals prior to installation.
- 6.3.1 Please note Pacific Valves graphite gaskets will compress during installation and initial system pressurization.

6.4 In some rare cases the pre-installed graphite gasket height may prevent the segment rings from being installed. If this occurs **one or both** of the following steps may be used:
- 6.4.1 With the backing ring on the gasket apply pressure using a plastic or brass pin and hammer
- 6.4.2 (And / Or) You may leave the backing ring out and pull the gasket up against the segment rings until the required amount of compression has taken place for the backing ring to be installed.

7.0 Follow all safety related protocols for valve repair before performing the steps listed below

7.1 Before bonnet disassembly:
- 7.1.1 Measure and record the stud length from the bottom of the nut to the top of the stud.

7.2 Disassemble per the valve manufacturer's instructions or facility guidelines.

7.3 *7.3* Measure the metal gasket height. Subtract the metal gasket height from the graphite gasket height to ensure that there is sufficient stud length for assembly.
- 7.3.1 Inspect the sealing area per facility guidelines.

7.4 Assemble the valve components per the Pacific Valves IOM instructions. Should damage occur to the graphite gasket during assembly, please contact Pacific Valves Engineering for engineering approval?

7.5 Bonnet alignment during pull-up is very critical. Please locate an area on the valve where measurements can be taken to check for any tilting or misalignment.

7.6 Torque requirements for bonnet fasteners are listed in Appendix 1 of the IOM. Calculate 30% of the assembled torque and start tightening the fasteners using a cross pattern technique.

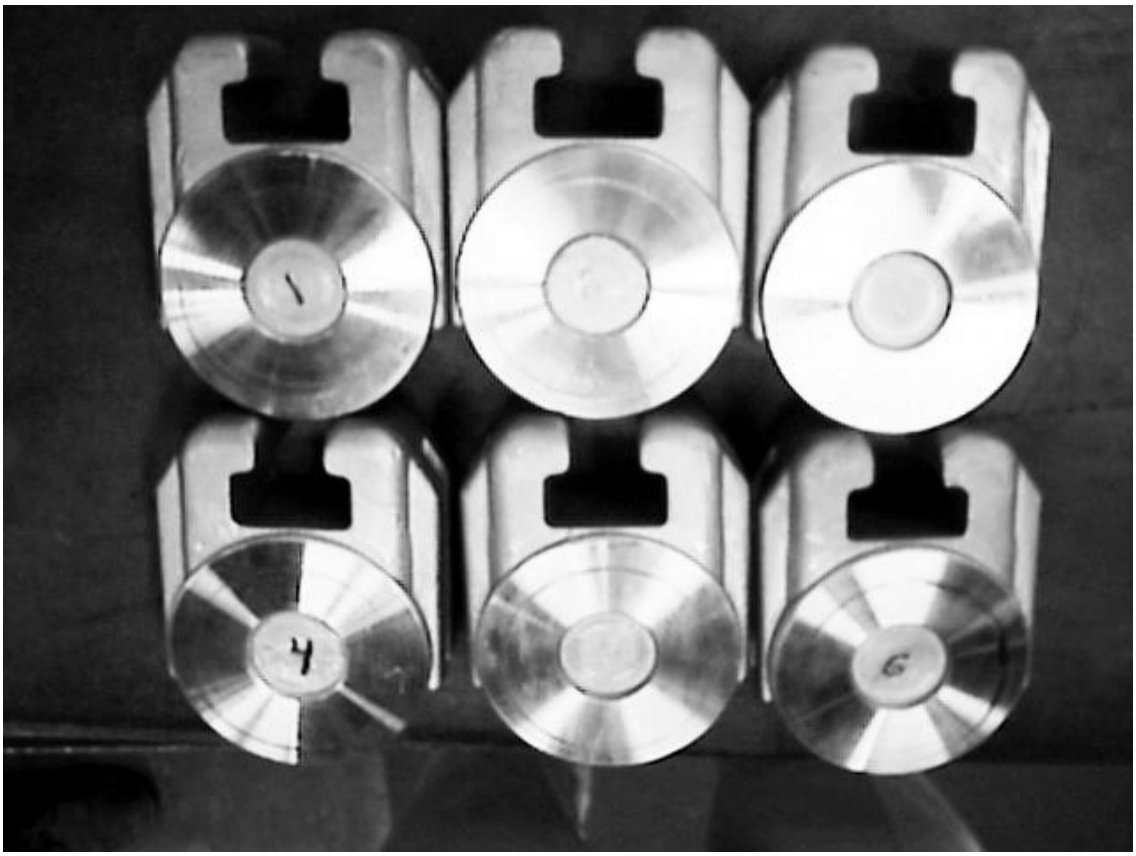
7.7 Check for alignment and continue torqueing the fasteners to 60% using the same technique.

7.8 Check for alignment and continue torqueing the fasteners to 100% using the same technique.

7.9 Once the initial 100% is reached check for alignment and continue torqueing the fasteners in a clockwise pattern until all fasteners are at a constant 100% torque value.

7.10 Re-torque each fastener to 100% once the valve is at normal system operation pressure.

Appendix 5
Fitting of Wedge Gate Valves



FITTING OF WEDGE GATE VALVES

1.0 GENERAL INFORMATION

For general information regarding this or any other valve please refer to section “A” of this manual.

2.0 INTRODUCTION

Fitting of gate valve wedges has a direct effect on the overall performance and longevity of the valve. Occasionally, wear or damage may facilitate the need to refit a gate valve. It is recommended that this operation be entrusted only to an experienced valve mechanic. Although it is recommended that this operation be performed in the shop, with correct equipment and proper care, it can be done with the valve in place. The following are suggested procedures and inspection points:

3.0 PROCEDURE

3.1 New gate valve wedges are furnished with material left on each side to allow for custom fitting. The amount varies with valve sizes from .025" to .050" per side. Insert the wedge into the body after body seats have been finished and check the following points.

3.1.1 Adequate finish for fitting. Wedge rides high in body seats. If this is not convenient for use then use inside Calipers to check minimum distance between seats in the body & outside calipers to measure minimum distance across seats of wedge at the toe (bottom). Wedges should be polished/lapped to a minimum of 32 rms. Preferred finish is approx. 12 rms.

3.1.2 Adequate guide clearance to permit seat face contact. Some valves are designed to allow the wedge to be inserted one way only (wide and narrow guides). Otherwise, select the most advantageous orientation of the wedge in the body. Match mark the body and wedge to ensure proper orientation.

3.1.3 Check that the centerline of the wedge and body seats oriented such that the stem T-head has proper clearance to align itself at assembly.

3.1.4 Mount the wedge in a machine (grinder, boring mill or lathe), on a 10º angle face plate (Adjustable or not) Centerline of the seat face must be parallel to the guides.

3.1.5 By trial and error, plus minute adjustments of the wedge angle and the orientation of its centerline, fit the wedge to the body seats, by removing small amounts of surface material from the wedge.

3.1.6 To check the fit, hang the wedge on a dummy stem (or appropriate fixture), insert it into the body, noting any lean of the wedge relative to the body guides and the guide clearance. Hit the end of the dummy stem with a hammer to seat the wedge and mark the body seat on the wedge. A sharp blow on the bottom of the body will free the wedge from the body seats. To emphasize the position of the seal, a thin film of Prussian Blue can be put on the wedge seat face prior to inserting into the body.

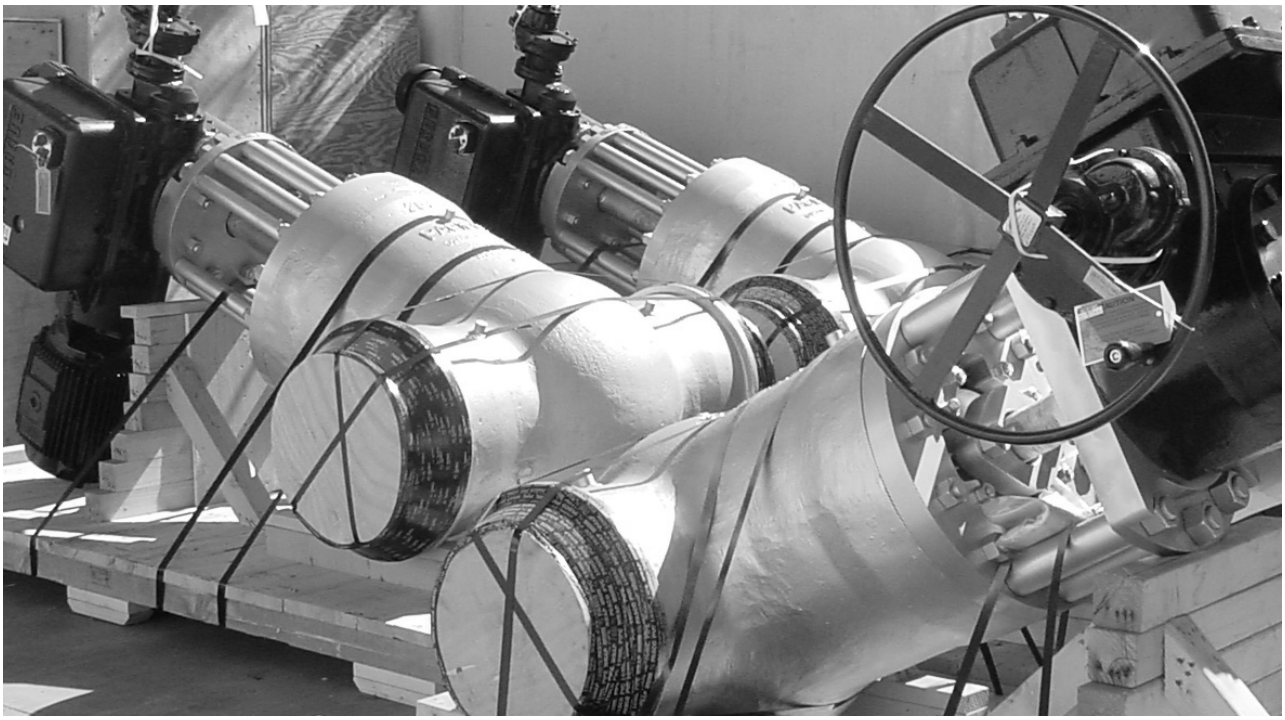
3.2 When the wedge is finally fitted to the body and is resting between the seats (not hammered into place), there should be a small clearance at the toe (bottom), depending on the size and pressure class of the valve (body flexibility).

	Valve Size		
Suggested Toe Clearance	150	300 and 400	600 and up
.0005 - .001	Up to 4"	Up to 6"	1 1/2 - 2
.0015 - .003	5 - 12	8 - 16	All
.003 - .005	14"- 16”	18" up	--
.005 - .007	18” up		

3.2.1 The ideal fit is with the wedge seal uniform and narrow (approx. 1/8") all around. The seal on the wedge should be below the center of the wedge face (wedge riding high). See Figure 1 below. There should be sufficient guide clearance so that the wedge can seat on both sides. Also, there should be adequate T-head clearance to permit the wedge and stem to be self-aligning.

3.2.2 Note on Parallel disc valves. Parallel disc halves must be polished or lapped as listed in 2.1.1 above. Due to their constructions however, it is critical that these disc halves be as flat as possible. When lapping or polishing the parallel disc halves, ensure that there are no low spots in the seating areas.

Appendix 6
Fabricated Yoke Assemblies



FABRICATED YOKE ASSEMBLY

1.0 General Information

For general valve operations & maintenance information please refers to section “A” of this manual.

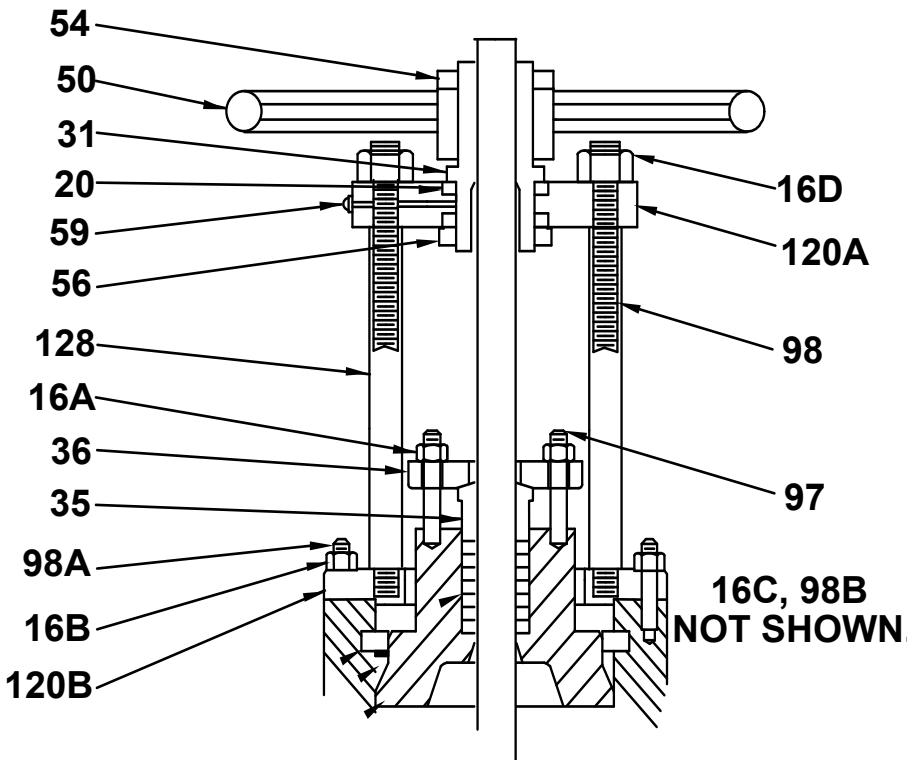
This section covers the design, disassembly and use of the Pacific Fabricated Yoke assembly. This yoke configuration is typically used on pressure seal valves, but may also be applied to bolted bonnet valves.

2.0 Disassembly

2.1 In addition to the disassembly procedures listed in the appropriate valve sections of this manual, the fabricated yoke assembly may also be used to assist in pressure seal valve disassembly. Specifically the fabricated yoke assembly can be used to aid in the “dropping” of the bonnet.

DISASSEMBLY

- Refer to the corresponding valve section for valve specific information.
- Remove the handwheel nut 54 and handwheel 50.
- Remove the Yoke sleeve jam nut 56.
- Remove the yoke sleeve 31.
- Remove the rod column nuts 16D.
- Remove the top adapter plate 120A.
- Remove all of the rod columns 128.
- Replace the top adapter plate 120A over the exposed rod studs 98.
  Note: It may be necessary to remove the packing gland bolts 97 and nuts 16A to provide clearance for the adapter plate.
- Thread the rod column nuts 16D onto the rod studs and run the nuts all the way down until they contact the adapter plate
- Tighten the column nuts 16D until the bonnet has dropped sufficiently to remove the segment rings.
- Reassemble the Fabricated yoke assembly and draw out the bonnet and gasket by opening the valve handwheel.

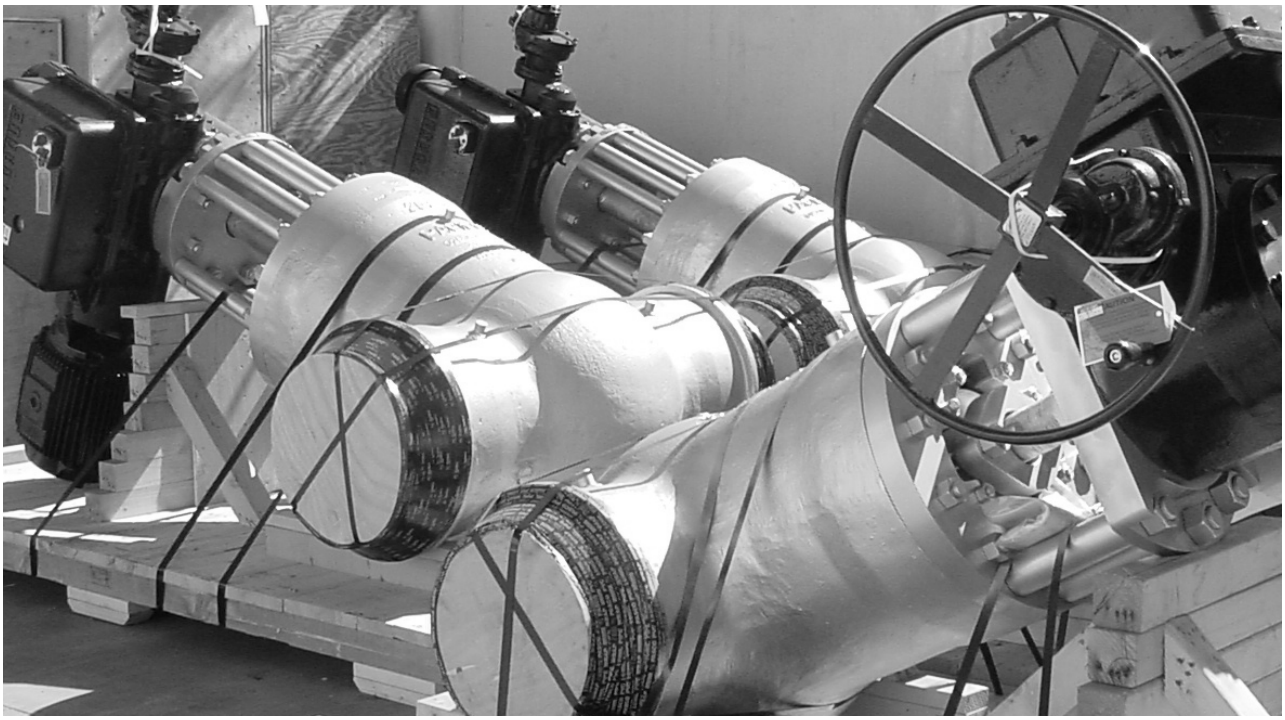


Gate valve shown above

REASSEMBLY

- Tighten the column nuts 16D in accordance with Appendix 1.

Appendix 7
Gear & Motor Actuated Valves



GEAR AND MOTOR OPERATORS

1.0 THEORY OF OPERATION

Most valves, which are located in an accessible environment, are operated by a manual Hand-wheel mounted directly on top of the valve. When the valve size or differential pressure is very high that the handwheel size cannot keep the operating handwheel pull within customer reasonable limits, then a bevel gear should be mounted on the top-works. In addition, many customers require remote operation or operating times that are not possible with manual handwheels, in this case Electric Motor Operators (EMO's) can be used.

Note! Operator limit and torque settings are factory set during valve testing for ANSI cold working pressure tests. Additional adjustment may be required in the field. Contact Pacific Valves with any questions.

WARNING! Do not use excessive air wrench torque or snipes on handwheels as the gearing or valve stem could be damaged!

2.0 INSTALLATION

Warning! Ensure that the electric motor operator is wired correctly and phased properly prior to operation. Do not allow the valve to travel in the wrong direction (when phased is reversed). This can result in damage to the valve and void all valve warranties.

3.0 MAINTENANCE

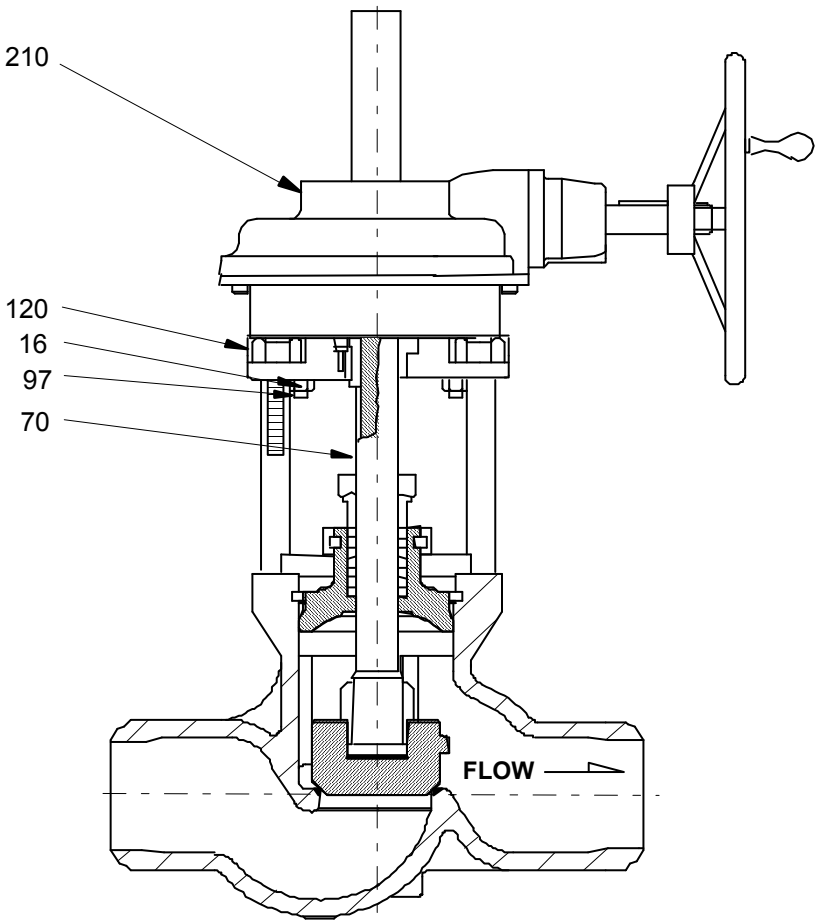
The gear or electric operator itself should never require disassembly and it is recommended that this be done only by the operator manufacturer. If it becomes necessary to disassemble the valve, the operator assembly must be removed first.

3.1 Preventive Maintenance

The preferred orientation for Pacific gear and motor operated valves is in horizontal pipelines with the stem in a vertical position. When installed in any other position, motor operated valves should be supported by means of a support clamp around the motor mounting plate. Please contact Pacific Valves when specifying an operated valve with an orientation different than that listed above.

3.1.1 With the operator removed from the valve, and operator drive nut for thread wear, galling or binding.

3.1.2 If excessive wear is evident, worn parts should be replaced.



PRESSURE SEAL GLOBE EXAMPLE

4.0 DISASSEMBLY

4.1 Remove operator mounting bolts 97 from mounting plate 119 or mounting adapter 120.

4.2 Attach a support sling around operator 210 and prevent rotation.

4.3 Turn handwheel closed to turn operator off from stem and then lift gear operator off. In the case of an Electric Motor operator it may be necessary to disengage or “de-clutch” the motor before using the manual handwheel. The Electric Motor Operator manufacturer’s manual should detail this procedure.

4.4 Proceed with disassembly instructions given in the appropriate valve maintenance instructions.

Note: Prior to the disassembly of any valve equipped with an Electric Motor Operator, ensure that all electrical sources have been disconnected and the appropriate lockout/tag out procedures has been used.

5.0 ASSEMBLY

5.1 Install spacer 64, if used, and coupling 45.

5.2 Lift gear operator carefully over valve stem and while preventing operator from rotating, turn handwheel open until operator aligns over mounting holes.

5.3 Loosely install mounting bolts 97 on mounting plate 119 or mounting adapter 120 and then check that stem 70 operation does not bind.

5.4 Torque mounting bolts 97 while valve is in open position.

5.5 Set torque and limit switches in accordance with the instruction manual for the applicable operator.

5.6 For all gate and globe style valves (excluding the Parallel Disc Gate Valve) upon valve closing; the torque switch should be set to trip first.

5.7 For Parallel Disc gate valves upon valve closing, only the limit switch should be utilized. The torque switch should not be utilized. Care should be taken to ensure that the torque switch is not engaged as this may apply excessive operator thrust/torque to the Parallel Disc gate valve.

5.8 Upon valve opening, the limit switch should be the only switch set to trip. The torque switch should not be utilized. The valve can be back seated only by turning the operator handwheel further passed this limit position. Do not allow the motor operator to drive the stem into the backseat position. This operation should be done manual.

This page is blank