
SERIES 943/953

UNIDIRECTIONAL KNIFE GATE VALVES

Installation, Operation, and Maintenance Manual

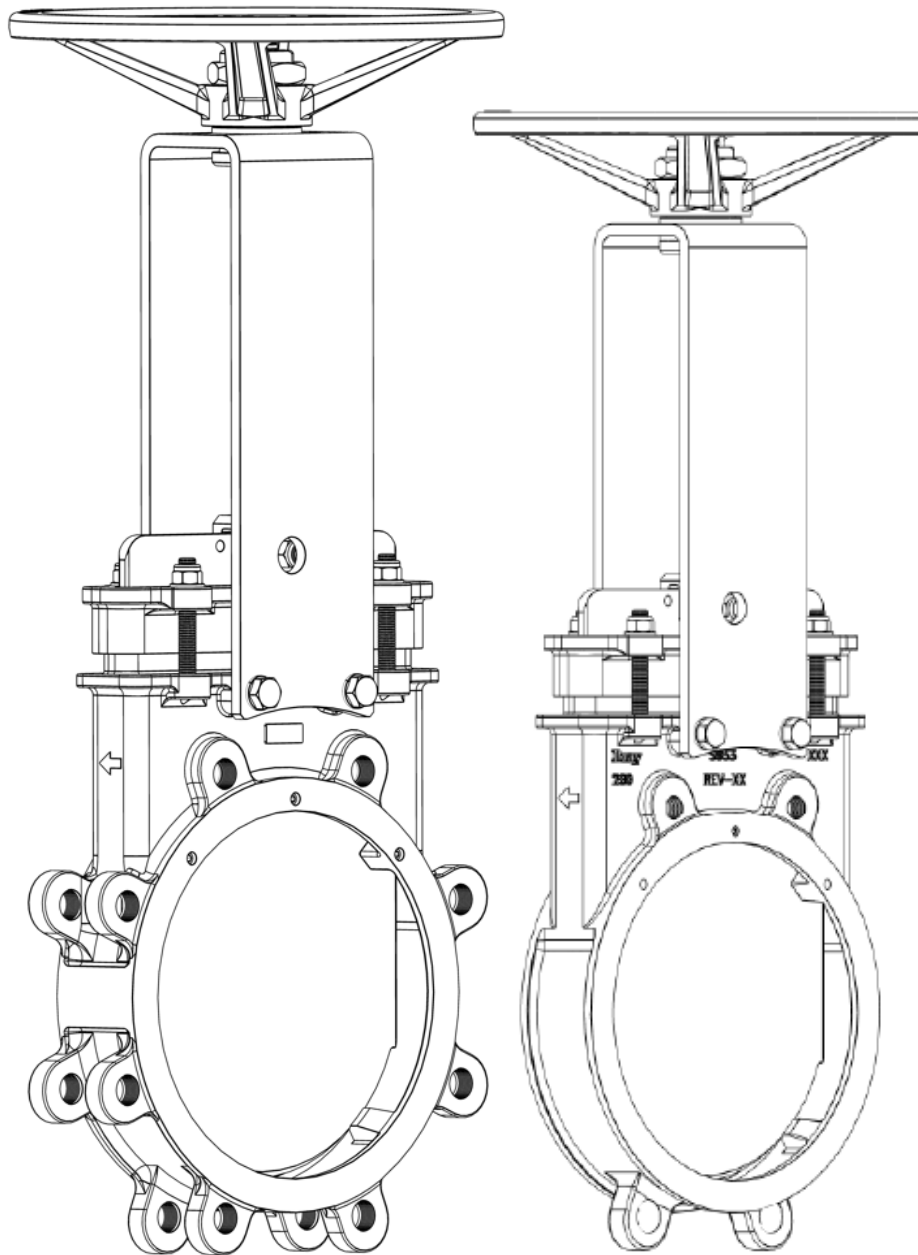


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**READ AND FOLLOW THESE INSTRUCTIONS CAREFULLY.
SAVE THIS MANUAL FOR FUTURE USE.**

0.0 DEFINITION OF TERMS

All information within this manual is relevant to the safe operation and proper care of your Bray valve. Please understand the following examples of information used throughout this manual.

0.0 IDENTIFIES CHAPTER HEADING

0.00 Identifies and explains sequential procedure to be performed.

NOTE: Provides important information related to a procedure.

SAFETY STATEMENTS: To prevent unwanted consequences. Standard symbols and classifications are:



DANGER

Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.



NOTICE

Used without the safety alert symbol, indicates a potential situation which, if not avoided, may result in an undesirable result or state, including property damage.

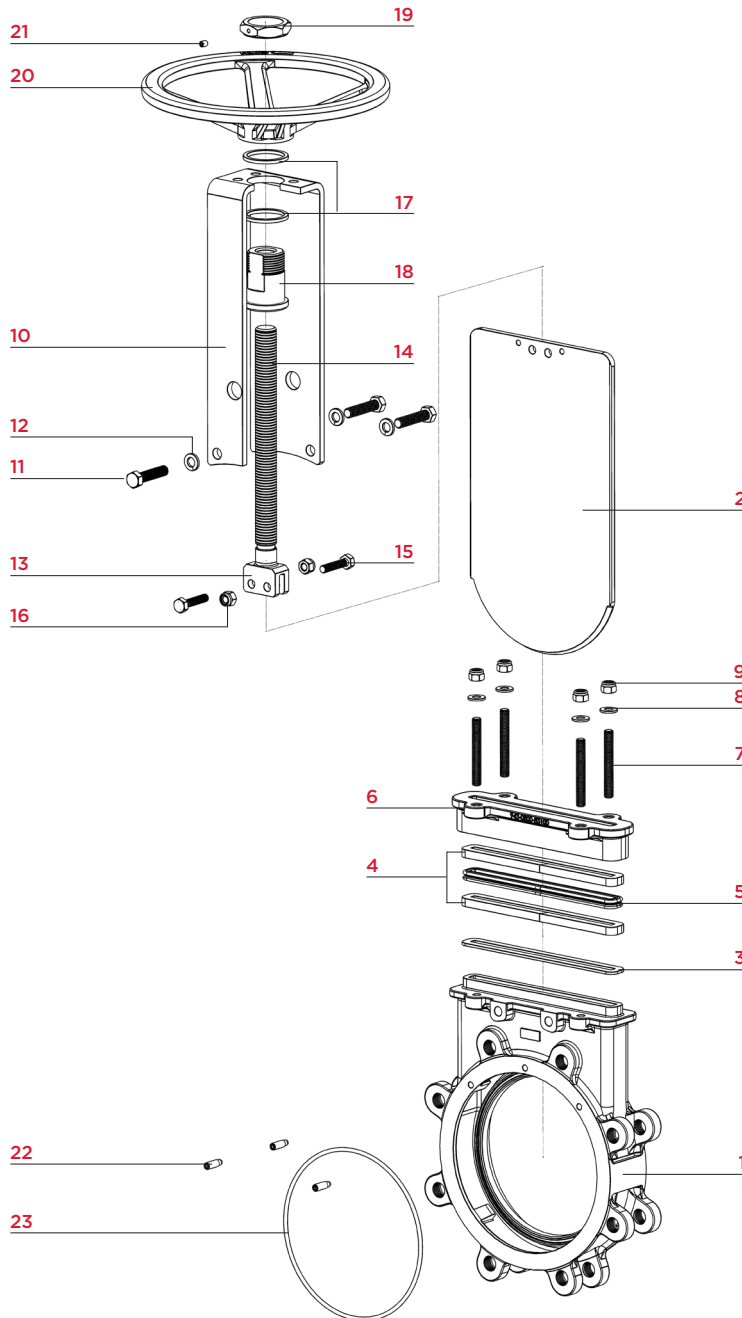
1.0 INTRODUCTION

- 1.1** The Series 943 features a full lug and the Series 953 features a semi-lug, single piece cast body for demanding applications. The standard metal-to-metal seating is engineered for general purpose on/off service and isolation of clean, dirty, corrosive, abrasive, viscous, and high temperature media. Optional zero leakage resilient seats are available.
- 1.2** Additional **product information** (such as application data, engineering specifications, actuator selection, etc.) is available from your local Bray distributor or sales representative, or online at **BRAY.COM**
- 1.3** For complete details on the latest product **certifications**, visit **BRAY.COM/Certifications**.

2.0 PARTS IDENTIFICATION

Figure 1: Series 943 Parts

Item	Description
1	Body
2	Gate
3	Anti-Extrusion Ring
4	Packing Set
5	Quad Seal
6	Gland
7	Gland Stud </td
8	Gland Washer
9	Gland Nut
10	Yoke
11	Mounting Bolt
12	Spring Washer
13	Clevis
14	Stem
15	Clevis Bolt
16	Clevis Nut
17	Thrust Washer
18	Yoke Sleeve
19	Lock Nut
20	Hand Wheel
21	Grub Screw
22	Gate Guides
23	Seat ¹



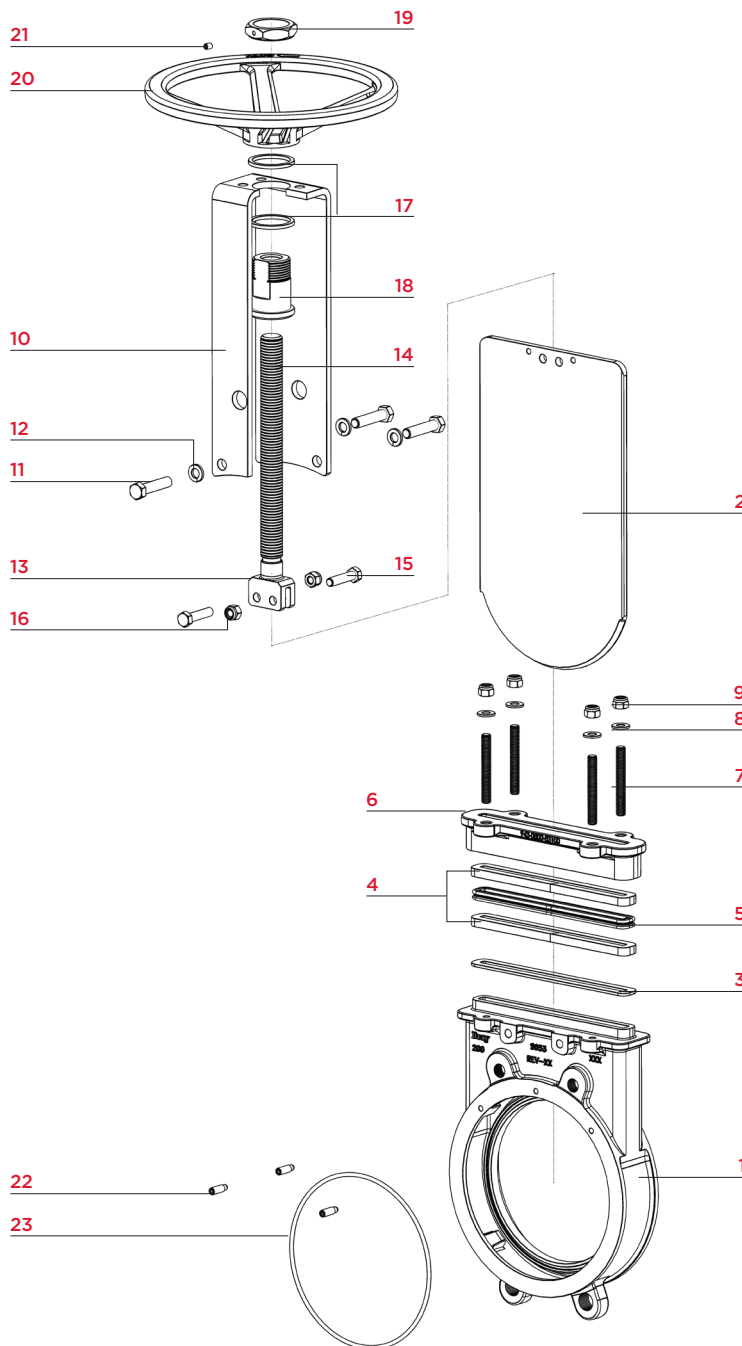
NOTE

1 Optional replaceable resilient seat.

2.1 PARTS IDENTIFICATION

Figure 2: Series 953 Parts

Item	Description
1	Body
2	Gate
3	Anti-Extrusion Ring
4	Packing Set
5	Quad Seal
6	Gland
7	Gland Stud
8	Gland Washer
9	Gland Nut
10	Yoke
11	Mounting Bolt
12	Spring Washer
13	Clevis
14	Stem
15	Clevis Bolt
16	Clevis Nut
17	Thrust Washer
18	Yoke Sleeve
19	Lock Nut
20	Hand Wheel
21	Grub Screw
22	Gate Guides
23	Seat ¹



NOTE

1 Optional replaceable resilient seat.

3.0 VALVE IDENTIFICATION

3.1 All valves, actuators, or control products are provided with an identification tag that is unique to each device. The following table is a representation of information that may be included.

Data	Label	Description
Serial Number	SERIAL NUMBER	Unique serial number of valve.
Valve Size	SIZE	Valve size e.g. 6 in/150 mm.
Model	MODEL	Series number of the Valve
Flange Drill	FLG. DRILL	Flange Drill e.g. ASME B16.5 CL150.
Temperature Limits	MAX TEMP	Maximum temperature in °F/°C
Maximum Permissible Pressure	CWP	Maximum permissible pressure in psi/bar(g)
Body Material	BODY	Material grade of body e.g. CF8 (304) etc.
Gate Material	GATE	Material grade of gate e.g. 304 Stainless Steel.
Packing Material	PACKING	Material of packing e.g. PTFE w/EPDM Quad Seal.
Seat Material	SEAT	Material of seat e.g. Buna-N.

4.0 HAZARD-FREE USE



NOTICE

Failure to follow these procedures could affect product warranty.

- 4.1** This device left the factory in proper condition to be safely installed and operated in a hazard-free manner. The notes and warnings in this document must be observed by the user if this safe condition is to be maintained and hazard-free operation of the device assured.
- 4.2** Take all necessary precautions to prevent damage to the valve due to rough handling, impact, or improper storage. Do not use abrasive compounds to clean the valve, or scrape metal surfaces with any objects.
- 4.3** The control systems in which the valve is installed must have proper safeguards — to prevent injury to personnel, or damage to equipment — should failure of system components occur.
- 4.4** The upper limits of permitted pressure and temperature (depending on the housing and liner materials) must be observed. These limits are shown on the valve identification tag.
- 4.5** The valve must not be operated until the following documents have been observed:
- > Declaration on EU Directives
 - > IOM Manual (supplied with the product).

5.0 QUALIFIED PERSONNEL



NOTICE

Failure to follow these procedures could affect product warranty.

5.1 A **qualified person** (in terms of this document) is one who is familiar with the installation, commissioning, and operation of the device, and who has appropriate qualifications, such as:

- > Is trained in the operation and maintenance of electrical equipment and systems in accordance with established safety practices.
- > Is trained or authorized to energize, de-energize, ground, tag, and lock electrical circuits and equipment in accordance with established safety practices.
- > Is trained in the proper use and care of personal protective equipment (PPE) in accordance with established safety practices.
- > Is trained in the commissioning, operation, and maintenance of equipment in hazardous locations — in cases where the device is installed in a potentially explosive (hazardous) location.

6.0 HANDLING REQUIREMENTS

6.1 Packed Valves

Crates: Lifting and handling of the packed valves in crates will be carried out by a fork lift truck, by means of the appropriate fork hitches.

Cases: The lifting of packed valves in cases will be carried out in the lifting points and in the center of gravity position which has been marked. The transportation of all packed material must be carried out safely and following the local safety regulations.

6.2 Unpacked Valves

Lifting and handling of valves should be carried out by using appropriate means and observing the carrying limits. Handling must be carried out on pallets, protecting all machined surfaces to avoid any damage.

With large bore valves, rigging the load must be carried out by using the appropriate tools to prevent the valve from falling or moving during the lifting and handling.



CAUTION

For handling and/or lifting, the lifting equipment (fasteners, hooks, etc.) must be sized and selected while taking into account the product weight indicated in our packing list and/or delivery note. Lifting and handling must be performed only by qualified personnel.

Fasteners must be protected by plastic covers in sharp corner areas.

Caution must be taken during handling to avoid this equipment passing over workers, or over any other place where a possible fall could cause injury or damage. In all cases, local safety regulations must be respected.

7.0 LIFTING THE VALVE



WARNING

A potential hazard exists with handling valves. Failure to handle valves properly may cause a valve to shift, slip or fall causing serious injury or death and/or equipment damage.

7.1 The points below are for reference purposes only, use safe and proper lifting and support techniques. **DO NOT** lift valves with any adjoining pipe or other equipment attached. Lift with properly rated lifting equipment. Follow jurisdictional safety requirements.

7.2 Suggested lifting points are as shown below to lift valve assemblies that are in a horizontal orientation. Eye bolts in flange through holes can be used to lift the valve body or, for 2" through 12" valves, a sling can be strapped around the top of the valve body.

7.3 KNIFE GATE VALVE WITH BEVEL GEAR ACTUATOR:

For valves with bevel gear actuators, a sling or chain can be wrapped around the bevel gear actuator body, between the mounting plate and the input shaft housing. This would be in conjunction with lifting from the valve body as well. See **Figure 3**.

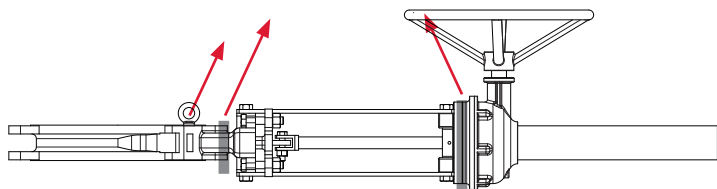


Figure 3: Knife Gate Valve with Bevel Gear Actuator, Horizontal Lifting

7.4 KNIFE GATE VALVE WITH PNEUMATIC CYLINDER ACTUATOR:

For valves with pneumatic cylinder actuators, a sling can be wrapped around the cylinder, near the cylinder head (piston rod end). This would be in conjunction with lifting from the valve body. See **Figure 4**.

7.5 Utilize caution to not bump, dent or damage the cylinder tube.

7.6 **DO NOT** utilize the cylinder tie-rod ends to lift.

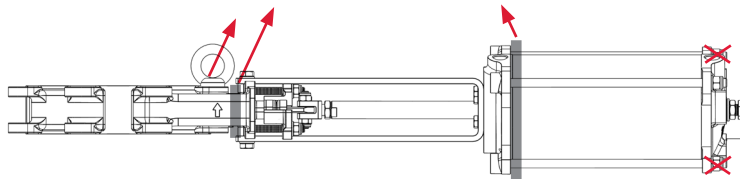


Figure 4: Knife Gate Valve with Pneumatic Cylinder Actuator, Horizontal Lifting

(continued)

7.7 KNIFE GATE VALVE WITH HANDWHEEL ACTUATOR:

For valves with handwheel actuators, a sling or chain can be wrapped through the rim of the handwheel. For chain wheel actuators, a sling can be wrapped in the area between the yoke/legs and the chain-wheel/guide assembly. This would be in conjunction with lifting from the valve body as well. See **Figure 5**.

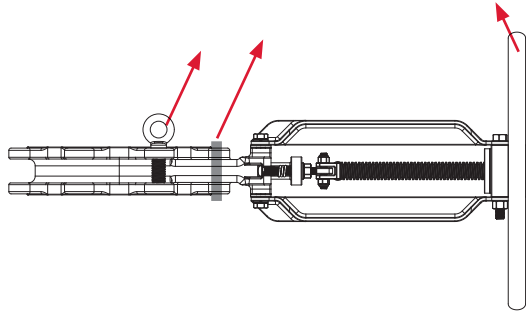


Figure 5: Knife Gate Valve with Handwheel, Horizontal Lifting

7.8 Suggested lifting options are as shown below to lift valve assemblies that are in a vertical orientation. For valves with bevel gear actuators, wrap slings or chains around the top of each leg.

NOTE: Use caution not to put any side load on the bevel gear input shaft or on the valves threaded stem. See **Figure 6**.

7.9 For valves with pneumatic cylinder actuators, wrap slings around the top of each leg. Use caution to not bump, dent or damage the cylinder tube and avoid any side load on the cylinder piston rod.

NOTE: DO NOT utilize the cylinder tie-rod ends to lift. See **Figure 7**.

7.10 For valves with handwheel or chain-wheel actuators, wrap slings or chains around the top of the each leg or yoke side.

NOTE: Use caution to not put any side load on the valves threaded stem. See **Figure 8**.

Figure 6: Knife Gate Valve w/Bevel Gear Actuator, Vertical Lifting

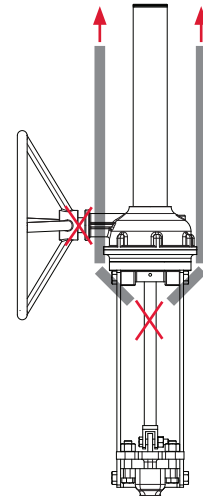


Figure 7: Knife Gate Valve with Pneumatic Cylinder Actuator, Vertical Lifting

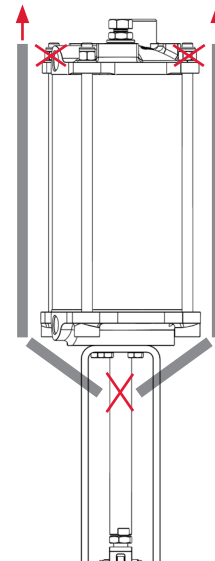
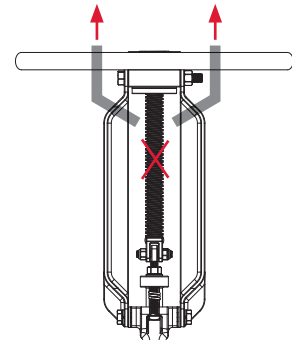


Figure 8: Knife Gate Valve with Handwheel, Vertical Lifting



8.0 STORAGE



NOTICE

The packaging is designed to protect the valve only during shipping. If you are not installing the valve immediately after delivery, then you must store it according to these requirements.

Failure to follow these procedures could affect product warranty.

- 8.1** **Short-term storage** is defined as storage of valves to allow for project construction and will be installed within a relatively short amount of time (typically one to three months). During short-term storage, the following is required:
- 8.2** The preferred storage location is a clean, dry, protected warehouse. Do not expose the valve to temperature extremes.
- 8.3** End protectors shall remain on the valve ends to prevent the entrance of dirt, debris, or insects/wildlife.
- 8.4** Remain in the original shipping container with the original packaging materials. This packaging method will not protect valves that will be stored outside, uncovered, and unprotected.
- 8.5** Storage of valves in an open, uncovered area is permissible, but requires provisions for inclement weather. The product must be elevated from the ground on a pallet, a shelf, or other suitable surface, and must be covered with a secure, waterproof tarp.
- 8.6** **Do not** stack the valves on top of each other.
- 8.7** Manually actuated valves may be stored in the vertical or horizontal position. For air or hydraulic actuated valves, the preferred orientation is with the valve and cylinder in the vertical position. Access ports should be secured to prevent unauthorized entry and prevent contamination.

(continued)

- 8.8** **Long-term storage** is defined as storage of valves longer than three months. During long-term storage, the following is required:
- 8.9** The storage location shall be a clean, dry, protected warehouse. Do not expose the valve to temperature extremes.
- 8.10** End protectors shall remain on the valve ends to prevent the entrance of dirt, debris, or insects/wildlife.
- 8.11** Product shall remain in the original shipping container with the original packaging materials.
- 8.12** **Do not** stack the valves on top of each other.
- 8.13** Manually actuated valves may be stored in the vertical or horizontal position. For air or hydraulic actuated valves, the preferred orientation is with the valve and cylinder in the vertical position. Access ports should be secured to prevent unauthorized entry and prevent contamination.

Valves and equipment containing elastomers, including O-rings, must be stored in a climate-controlled warehouse according to SAE-ARP5316D requiring:

- > The ambient relative humidity to be less than 75%.
- > No exposure from direct ultraviolet or sunlight.
- > Protection from ozone generating equipment or combustible gases and vapors.
- > Storage at temperatures below 100°F (38°C), away from direct sources of heat.
- > No exposure to ionizing radiation.

Storage inspection — visual inspection shall be performed on a semi-annual basis and results recorded. Inspection, as a minimum, shall include reviewing the following:

- > Packaging.
- > Flange covers.
- > Dryness.
- > Cleanliness.

- 8.14** Actuators to be stored with all cable/pneumatic entries plugged to prevent entry of foreign material.
- 8.15** Leave protective caps and covers on the product.

9.0 INSTALLATION AND COMMISSIONING



WARNING

Verify line is depressurized before installing, removing, or repairing a valve or operator.

Do not pressurize the line without an operator on the valve.

The device generates a large mechanical force during normal operation.

Observe all applicable safety regulations for valves installed in potentially explosive (hazardous) locations.

Valve should not be used to pull pipe into alignment.



CAUTION

Gate guides (**Item 22, Figure 1 & 2**) are factory set and not for customer tightening.

If required, adjustment shall be no more than 1 ½ to 2 turns after gate guide tip comes into contact with the gate. Otherwise damage could occur to the screw tip, the gate, and the seat.

- 9.1 The valve is unidirectional. It should be installed with pressure exerted against the seat. To enable correct orientation the word "SEAT" is marked on the valve body to indicate the position of the valve seat.
- 9.2 It is good practice to provide additional support for all pneumatically, hydraulic and electric actuated valves installed in the horizontal stem position. This includes ALL valve sizes due to the fact that many of these installations are located in high vibration areas. Failure to provide additional support will result in premature valve failure.
- 9.3 It is recommended to provide support around areas indicated in **Figures 9** and **10** with an adjustable sling.
- 9.4 Support from the top as shown or with suitable arrangement from bottom (such as from an access platform) depending on location constraints.
- 9.5 After the support is given, please operate the valve a few times to check free movement and adjust the level (using the sling adjuster or similar device) if required.
- 9.6 Ensure jerk free movement with the supports in place.

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Figure 9: Installation support for a Valve installed in Horizontal orientation (Stem horizontal and Bore horizontal)

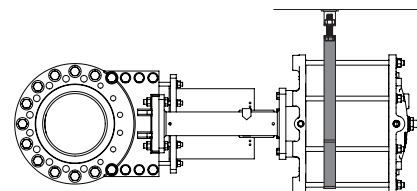
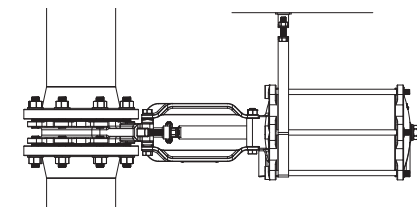


Figure 10: Installation support for a Valve installed in Horizontal orientation (Stem horizontal and Bore vertical)



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9.7 Align the mating pipeline flanges. Select the length of the flange bolts as seen in **Table 1** and **Table 2** for **Series 943** below and **Table 3** and **Table 4** for **Series 953** on the next page. Install the valve between flanges using fasteners & gaskets.

9.8 Tighten flange bolts in a star pattern. See **Figure 19**.

9.9 Refer to GA Drawing/ Technical Bulletin for quantity and size of blind tapped holes on valve chest area.

Figure 11: L5 Lug Bolt

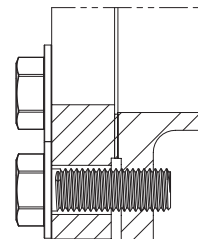


Figure 12: L6 Chest Bolt

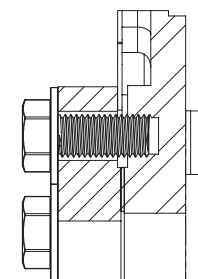


Figure 13: L7 Lug Stud

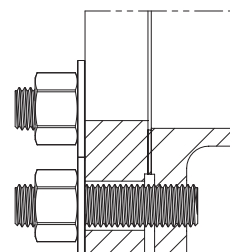


Figure 14: L8 Chest Stud

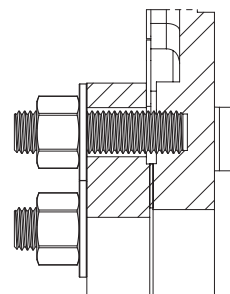


Table 1: SERIES 943 RECOMMENDED FASTENERS - ASME B16.5 Class 150 Flanges

Valve Size		Bolt & Nut Size	L5 (Figure 11)		L6 (Figure 12)		Washer* Quantity
NPS	DN		Lug Bolt Length	Lug Bolt Qty	Chest Bolt Length	Chest Bolt Qty	
2	50	5/8-11	1.5	4	1.25	4	8
3	80	5/8-11	1.8	4	1.5	4	8
4	100	5/8-11	1.8	12	1.5	4	16
5	125	3/4-10	2.0	12	1.5	4	16
6	150	3/4-10	2.0	12	1.5	4	16
8	200	3/4-10	2.3	12	1.75	4	16
10	250	7/8-9	2.5	16	1.75	8	24
12	300	7/8-9	2.5	16	1.75	8	24
14	350	1-8	2.8	16	2.0	8	24
16	400	1-8	2.8	20	2.25	12	32
18	450	1 1/8-7	3.0	20	2.5	12	32
20	500	1 1/8-7	3.3	28	2.75	12	40
24	600	1 1/7-7	3.5	28	3.0	12	40

* Washer Type B Wide

Table 2: SERIES 943 RECOMMENDED FASTENERS - ASME B16.5 Class 150 Flanges

Valve Size		Stud & Nut Size	L7 (Figure 13)		L8 (Figure 14)		Nut Qty	Washer* Qty
NPS	DN		Lug Stud Length	Lug Stud Qty	Chest Stud Length	Chest Stud Qty		
2	50	5/8-11	2.5	4	2.25	4	8	8
3	80	5/8-11	2.5	4	2.5	4	8	8
4	100	5/8-11	2.5	12	2.5	4	16	16
5	125	3/4-10	2.8	12	2.5	4	16	16
6	150	3/4-10	3.0	12	2.5	4	16	16
8	200	3/4-10	3.0	12	2.75	4	16	16
10	250	7/8-9	3.5	16	2.75	8	24	24
12	300	7/8-9	3.5	16	3.0	8	24	24
14	350	1-8	4.0	16	3.5	8	24	24
16	400	1-8	4.0	20	3.5	12	32	32
18	450	1 1/8-7	4.5	20	4.0	12	32	32
20	500	1 1/8-7	4.5	28	4.5	12	40	40
24	600	1 1/4-7	5.0	28	4.5	12	40	40

* Washer Type B Wide

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Table 3: SERIES 953 RECOMMENDED FASTENERS - ASME B16.5 Class 150 Flanges

Valve Size		Bolt & Nut Size	L1 (Figure 15)		L2 (Figure 16)		Washer* Quantity
NPS	DN		Lug Bolt Length	Lug Bolt Qty	Chest Bolt Length	Chest Bolt Qty	
2	50	5/8-11	4.5	2	1.25	4	8
3	80	5/8-11	5.0	2	1.5	4	8
4	100	5/8-11	5.0	6	1.5	4	16
5	125	3/4-10	5.5	6	1.5	4	16
6	150	3/4-10	5.5	6	1.5	4	16
8	200	3/4-10	6.5	6	1.75	4	16
10	250	7/8-9	6.5	8	1.75	8	24
12	300	7/8-9	7.0	8	1.75	8	24
14	350	1-8	7.5	8	2.0	8	24
16	400	1-8	8.0	10	2.25	12	32
18	450	1 1/8-7	8.5	10	2.5	12	32
20	500	1 1/8-7	9.5	12	2.75	16	40
24	600	1 1/4-7	10.0	12	3.0	16	40

* Washer Type B Wide

Table 4: SERIES 953 RECOMMENDED FASTENERS - ASME B16.5 Class 150 Flanges

Valve Size		Stud & Nut Size	L3 (Figure 17)		L4 (Figure 18)		Nut Qty	Washer* Qty
NPS	DN		Lug Stud Length	Lug Stud Qty	Chest Stud Length	Chest Stud Qty		
2	50	5/8-11	5.5	2	2.25	4	8	8
3	80	5/8-11	6.0	2	2.5	4	8	8
4	100	5/8-11	6.0	6	2.5	4	16	16
5	125	3/4-10	6.5	6	2.5	4	16	16
6	150	3/4-10	6.5	6	2.5	4	16	16
8	200	3/4-10	7.5	6	2.75	4	16	16
10	250	7/8-9	7.5	8	2.75	8	24	24
12	300	7/8-9	8.0	8	3.0	8	24	24
14	350	1-8	8.5	8	3.5	8	24	24
16	400	1-8	9.0	10	3.5	12	32	32
18	450	1 1/8-7	9.5	10	4.0	12	32	32
20	500	1 1/8-7	11.0	12	4.5	16	40	40
24	600	1 1/4-7	11.0	12	4.5	16	40	40

* Washer Type B Wide

Figure 15: L1 Lug Bolt

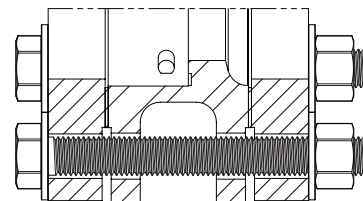


Figure 16: L2 Chest Bolt

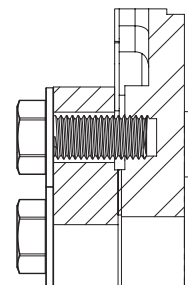


Figure 17: L3 Lug Stud

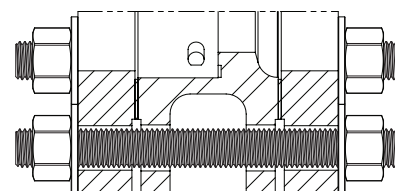
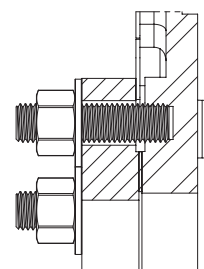


Figure 18: L4 Chest Stud





CAUTION

Care must be taken when installing the studs or bolts in the tapped holes of the flange in the chest area to prevent damage, see **Figure 20**.



CAUTION

Support should be used for all valve sizes when installed in vertical pipe. Failure to do so can result in improper valve orientation and/or valve failure. Please consult factory for details.

9.10 Gland packing is tightened to hold the specified pressure and tested for no leakage in the factory. Gland packing is then loosened before dispatch to prevent compression during transit and storage.

9.11 Tighten packing gland in a crisscross pattern until the packing ring at the top is slightly compressed.

9.12 Pressurize the valve gradually and stop when packing leak is visible or design pressure is reached.

9.13 Re-tighten packing gland bolts just enough to stop the leakage.



CAUTION

If the gland nuts are pulled too hard, the force needed to operate the valve will increase, the valve function will be affected and the box packing lifetime will be shortened.



CAUTION

Incorrect electrical supply to accessories will damage the equipment.



CAUTION

Do not over tighten the gland nuts as this may cause excessive friction and premature damage to packing.

If maximum design pressure is not reached, continue to pressurize the valve and repeat steps 9.11 and 9.12.

Figure 19: Bolt Tightening Sequence

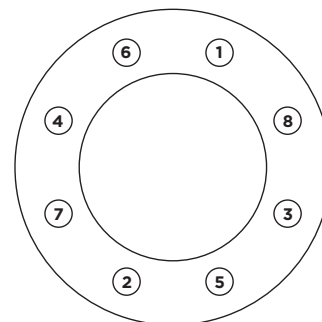


Figure 20: Bolt holes in the chest or upper flange area are blind tapped

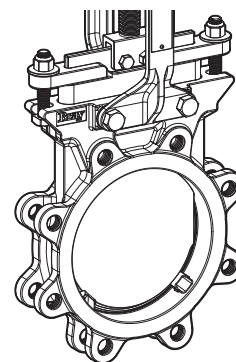
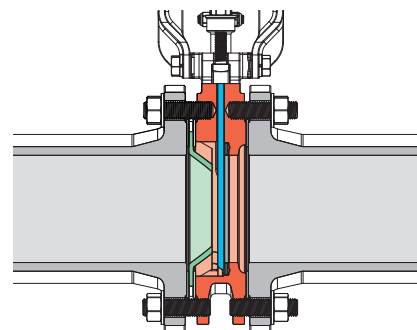


Figure 21: Flange Bolting



NOTE: To determine bolt length for the blind holes in the upper chest area of the valve, add thread depth+ gasket + flange thickness + any washers (plus deflection cone and gasket when used)

10.0 ACTUATION AND TRAVEL STOPS



WARNING

Verify line is depressurized before installing, removing, or repairing a valve or operator.

Do not pressurize the line without an operator on the valve.

10.1 PNEUMATIC CYLINDER OPERATED VALVES

10.2 In **Figure 22**, connect instrument quality air, preferably through an air filter/regulator of adequate size.

10.3 The recommended air pressure is 50-100 psi (3.5-7 bar). Refer to the appropriate bulletin/drawing for port and cylinder size details.



WARNING

Maximum Air Supply Pressure - **DO NOT EXCEED 100 psi**

10.4 Make sure the supply air is free from moisture, dirt, and other foreign particles.

10.5 Drain the filter regulator before operating the actuator so that pipe rust and dirt if any in the air line will be removed before actuation.

10.6 If valves are supplied with electrical accessories like limit switch and solenoid valve, ensure wiring is done as per local electrical safety codes and regulations.

10.7 Ensure correct electrical supply is given to electrical accessories for proper functioning and safety of the equipment.

10.8 Open the valve by energizing the solenoid valve/giving air supply to cylinder and operate the valve 2-3 times.

10.9 MANUAL VALVES

10.10 For **Figure 23**, Stroke the valve through the full open and closed position to make sure it is functioning properly.

Figure 22: Cylinder Actuator

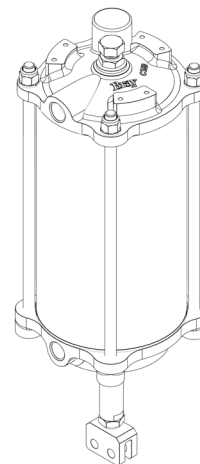
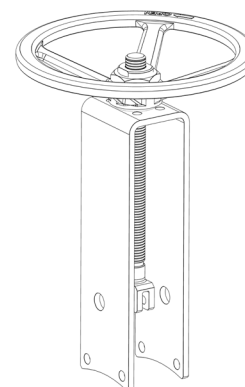


Figure 23: Manual Valve Stem



11.0 LOCKOUT

11.1 Lockouts, **Figure 24 and 25**, are designed to prevent unauthorized operation of the valve. The instructions below are intended for personnel who are responsible for the installation, operation and maintenance of the lockout device for Bray knife gate valves.

11.2 Any actuated valve (Pneumatic or Hydraulic or Electric) must be placed in a “De-energized state” by isolating all potential energy sources including electricity, operator supply air or hydraulic fluids.

11.3 Valves supplied with spring to close or open contain mechanical springs in the cylinder and hence cannot be placed in a de-energized state. Take extreme care when inserting and removing the lockout pin to avoid any injury to operating personnel.

11.4 For mechanical lockout or full force lockout, where the lockouts are meant to hold the full actuator force, please contact factory for assistance and more information.



CAUTION

Once the lockout pins are in place in the lockout brackets, any Bray actuated valve **MUST** be placed in a “De-energized state” by isolating the supply air / hydraulic fluid / electricity.



CAUTION

The lockout device could get damaged when actuator thrust is applied with the Lockout pin engaging the Gate.

Figure 24: Lockout pin through yoke and open gate.

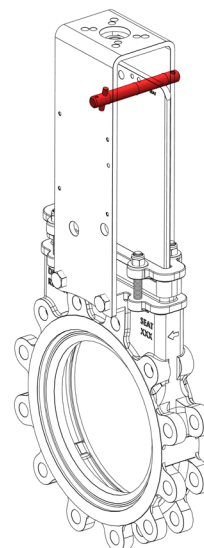
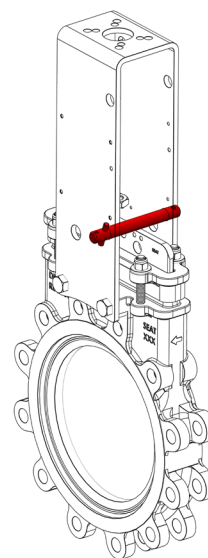


Figure 25: Lockout pin through yoke, closed gate.



12.0 STANDARD MAINTENANCE



WARNING

Verify line is depressurized before installing, removing, or repairing a valve or operator.

Do not pressurize the line without an operator on the valve.



WARNING

After completing any alterations or maintenance procedures, the product must be tested to confirm performance requirements.



WARNING

When the process fluid is hazardous, thermal (hot or cold), or corrosive, take extra precautions.



WARNING

Always wear protective clothing and equipment to safeguard the eyes, face, hands, skin, and lungs from the particular fluid in the line.



NOTICE

Any modification or use of unauthorized parts voids any and all warranty considerations.



NOTICE

Note assembly positions before removal.



CAUTION

Disconnect electrical, pneumatic, and hydraulic power before servicing actuator or automation components.

12.1 The stem and nut of the knife gate valve are lubricated at the factory before shipment.

12.2 The manual valve stem should be lubricated at regular intervals for smooth operation of the valve. A lubrication nipple is provided on the collar. See Lubrication requirements in **Table 5**.

12.3 Cylinder operated valves do not require routine lubrication.

Table 5: Recommended Lubrication

Lubricant Type
Industrial Grease - Medium
C5 - A Compound
XL 47 - F2 - 75
Molytex Grease #2

(continued)



NOTICE

If the cylinder actuator is disassembled for repair, the cylinder wall and seals need to be lubricated with a lithium-based grease prior to reassembly.

12.4 Parts recommended as spares as shown in **Table 6**, may be stocked. Provide the valve serial number and work order number from the nameplate for proper parts.

12.5 We recommend that all 943/953 knife gate valves be inspected at least every 60 days. The following points should be examined and corrected as required:

1. Exterior overview: As piping system components are subject to varying levels of erosion and corrosion, periodic inspections should be made as valves/components may wear over time. Regular inspection of the valve body and gate should be performed, check for general signs of corrosion, component wear and/or damage caused by process media and atmospheric conditions.
2. Packing gland: Check for leaks or worn packing. If leakage is occurring around the packing gland, tighten the packing gland bolts, being careful not to over stress the bolting.
3. If possible stroke the valve through the full open and closed position to make sure it is functioning properly.

Table 6: Recommended Spare Parts

Part	Qty
Gland Packing	Set of 3 Rows
Spare Seat	1
Cylinder Repair Kit	1
Gate	1

13.0 PACKING REPLACEMENT - Manual Valves

13.1 Ensure the valve is fully closed.



WARNING

Relieve line pressure before loosening gland nuts to avoid injury and/or equipment damage. Fully close the valve. Ensure the line is empty, and flush if necessary. Remove the valve from the pipeline.

13.2 In **Figure 26**, Disconnect the stem from the GATE (2) by removing the clevis BOLTS & NUTS (6).

13.3 Rotate the HANDWHEEL (1) counterclockwise by holding the stem from rotation, so that the stem retracts fully from the gate.

13.4 For mechanical lockout or full force lockout, where the lockouts are meant to hold the full actuator force, please contact factory for assistance and more information.



NOTICE

If valves are supplied with bellows, ensure stem is not rotating, as rotation will damage the bellows.

13.5 Remove all U-plate bolting and remove U-plate subassembly (U-plate, Handwheel, Stem, Yoke sleeve, Handwheel, Lock nut) from the body.

13.6 Remove the GLAND NUTS (5).

13.7 Unscrew all adjustable gate guides 2 turns each counterclockwise.

13.8 Take away the gland and gate subassembly to outside.

13.9 Remove the old PACKING (3) from the Gland chamber, one layer at a time, using a long thin tool to pry it out.

13.10 Clean the gland & gate face. Ensuring the surface is free of any damage, sharp edges and burrs. Replace the gate if rework is not possible.

13.11 Hold the gate bevel edge side up and clamp the gate to soft jaw.

13.12 Insert the gland into the gate and maintain 25mm from straight face. As shown **Figure 27**.

13.13 Press the 1st layer of packing into the gland chamber, followed by the quad seal as the 2nd layer, and last layer of packing. Make sure the joining ends of each of the three layers are opposing each other in the gland chamber. After that put the Anti Extrusion ring at last layer.

13.14 Install the gate and gland sub assembly into the valve body in the proper orientation.

13.15 Check the clearance between the seat and gate face using a Feeler Gauge (A feeler gauge is a tool used to measure gap widths) and ensure the clearance is between 0.002" to 0.004".

Figure 26: Manual Valve Cutaway

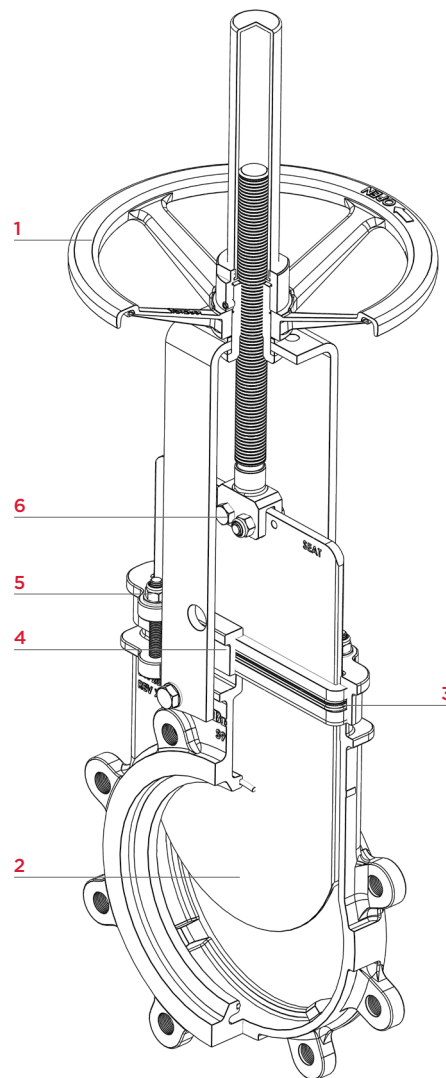
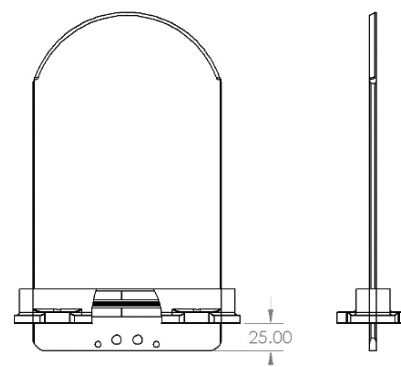


Figure 27: Gate with Packing Gland



- 13.16** If the gap is less than 0.002", push the Gate away from the seat face and tighten the Gland.
- 13.17** If the clearance is more than 0.004", push the Gate towards seat face and maintain the gap and tighten the Gland.
- 13.18** Screw the adjustable gate guides until they touch the gate. Do not over tighten.
- 13.19** Ensure the gate & gland will be approximately centered with valve body viewed from front & side.
- 13.20** Tighten the GLAND NUTS (5) finger tight plus one-half turn.
- 13.21** Attached U-plate assembly to the body with screws. Lower the stem by rotating the handwheel clockwise while holding the stem and fasten the stem to the gate with nuts and bolts.

14.0 PACKING REPLACEMENT - Cylinder Operated Valves



WARNING

De-energize before loosening gland nuts to avoid injury and/or equipment damage. Fully close the valve. Ensure the line is empty, and flush if necessary. Remove the valve from the pipeline.

14.1 Switch off the electrical supply to the solenoid and limit switches.

14.2 In **Figure 28**, remove the cylinder tubing and vent the air inside the CYLINDER (1).

14.3 For mechanical lockout or full force lockout, where the lockouts are meant to hold the full actuator force, please contact factory for assistance and more information.



NOTICE

If valves are supplied with bellows, ensure stem is not rotating, as rotation will damage the bellows.

14.4 Apply air slightly to the bottom port of the actuator so that the piston rod is retracted from the gate.

14.5 Remove the actuator assembly from the valve by removing the fasteners connecting the yokes to the valve body.

14.6 Remove the GLAND NUTS (5) and the GLAND (4).

14.7 Unscrew all adjustable gate guides 2 turns each counterclockwise.

14.8 Remove the old PACKING (3) from the gland chamber, one layer at a time, using a long thin tool to pry it out.

14.9 Clean the gland & gate face. If gate seating face has more abrasion replace the gate.

14.10 Hold the gate bevel edge side up and clamp the gate to soft jaw.

14.11 Press the gland onto the gate and slide down while maintaining 25mm gap from top straight face. As shown **Figure 27**.

14.12 Press the 1st layer of packing into the gland chamber, followed by the quad seal as the 2nd layer, and last layer of packing. Make sure the joining ends of each of the three layers are opposing each other in the gland chamber as shown **Figure 27**. Place the Anti Extrusion ring at last layer.

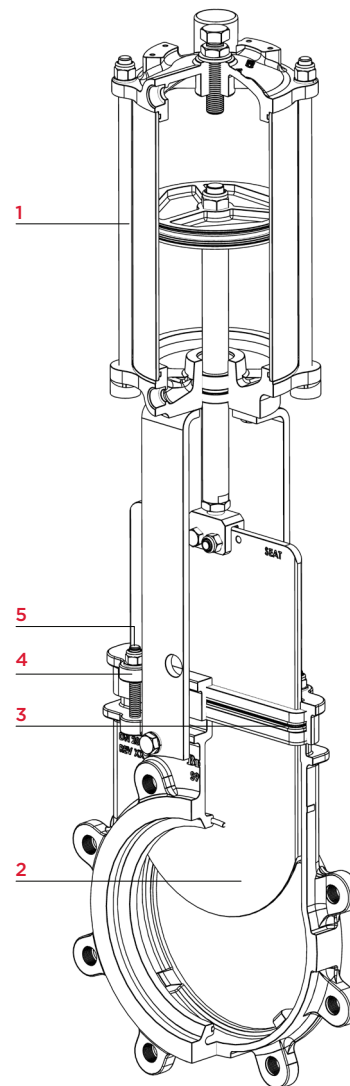
14.13 Move the gate & gland sub assembly, flip upside down then insert into the body.

14.14 Check the clearance between the seat and gate face using a Feeler Gauge (A feeler gauge is a tool used to measure gap widths) and ensure the clearance is between 0.002" to 0.004".

14.15 If the gap is less than 0.002", push the Gate away from the seat face and tighten the Gland.

14.16 If the clearance is more than 0.004", push the Gate towards seat face and maintain the gap and tighten the Gland.

Figure 28: Cylinder Operated Valve Cutaway



- 14.17** Screw the adjustable gate guides until they touch the gate. Do not over tighten.
- 14.18** Ensure the gate & gland will be approximately centered with valve body viewed from front & side.
- 14.19** Tighten the GLAND NUTS (5) finger tight plus one-half turn.
- 14.20** Mount the actuator assembly to the valve by attaching the fasteners connecting the yokes to the valve body.
- 14.21** Apply air slightly to the Top port of the actuator so that the piston rod with clevis move downwards and fasten the clevis to the gate with nuts and bolts.

Table 7: PACKING DETAILS

Valve Size		Packing Size	Length	Quantity ¹
NPS	DN	mm	mm	
2	50	Sq. 10	230	3
3	80	Sq. 10	278	3
4	100	Sq. 10	328	3
5	125	Sq. 10	384	3
6	150	Sq. 10	436	3
8	200	Sq. 10	550	3
10	250	Sq. 10	634	3
12	300	Sq. 10	740	3
14	350	Sq. 12.7	842	3
16	400	Sq. 12.7	958	3
18	450	Sq. 16	1084	3
20	500	Sq. 16	1182	3
24	600	Sq. 16	1398	3

NOTE ¹ Two rows of packing + one row Quad Seal



NOTICE

If leakage is observed from the packing area after installing the valve in the pipeline and the valve is pressurized or charged with media, tighten the gland nuts evenly side to side just enough to stop leakage. Do not over-tighten the gland nuts.

15.0 SEAT REPLACEMENT



CAUTION

Relieve line pressure before attempting to remove the valve from the line to avoid personnel injury and/or equipment damage. If the valve has a pneumatic actuator, solenoid valve, limit switches, or other accessories, disconnect electrical and pneumatic supply.

- 15.1 Relieve the line pressure and close the valve. Flushing the line may be necessary.
- 15.2 Remove the valve from the line by loosening the flange mounting bolts, studs, and nuts.
- 15.3 Clamp the valve in the vertical position to a fixture. Do not block the valve port when clamping the valve. An overhead hoist may be needed for larger size valves.
- 15.4 Disconnect the stem from the gate by removing the clevis, bolts, and nuts. See **Figure 29**.
- 15.5 Remove one set of U-plate bolting and tilt the U-plate to one side as shown in **Figure 30**.
- 15.6 After gland packing loosened, Lift the gate up until it fully clears the seat area and remove the old seat by cutting and remove from valve body by Narrow blade or Screwdriver. See **Figure 31**.
- 15.7 Clean & remove sharp edges and burrs from seat groove.
- 15.8 Apply Loctite and Insert the new seat to the dovetail groove.
- 15.9 Bolt the U-plate to the body again and then fasten the stem to gate bolts & After this Gland shall be retightened to the specified torque.

Figure 29: Lift clevis after removing nuts & bolts.

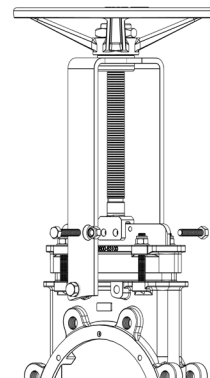


Figure 30: Tilt super structure.

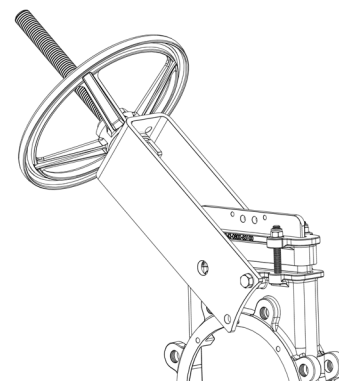
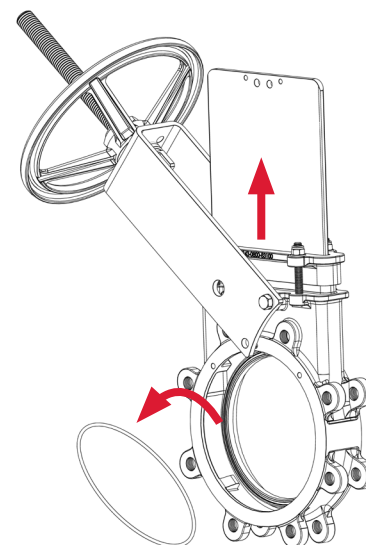


Figure 31: Fully lift out gate and remove seat.



16.0 RETRO FITTING CYLINDER ACTUATOR

- 16.1 Clamp the valve in the vertical position to a fixture. Do not block the valve port when clamping the valve. An overhead hoist may be needed for larger size valves.
- 16.2 Disconnect the stem from the gate by removing the clevis, bolts, and nuts. See **Figure 32**.
- 16.3 Remove set of U-plate bolting as shown in **Figure 33**.
- 16.4 Remove the Stem, yoke sleeve, Handwheel, thrust washer from the U-plate as shown in **Figure 34**.
- 16.5 Keep the Double Acting Actuator in fully retracted position—with minimal piston rod projection.
- 16.6 Mount the Actuator on to the U-plate and tighten by hand as shown in **Figure 35**.
- 16.7 Move the piston rod slowly towards close position to align clevis holes by applying air pressure (to close) through the cylinder port.
- 16.8 Use screwed clevis to connect with gate moving the piston rod downward direction in **Figure 36**.
- 16.9 Fasten the Clevis and Gate. by using same bolts and nuts used for manual assembly as shown in **Figure 32**.
- 16.10 Check the clearance between the seat and gate face using a **Feeler Gauge** (A feeler gauge is a tool used to measure gap widths) and ensure the clearance is between 0.002" to 0.004".
- 16.11 If the gap is less than 0.002", push the Gate away from the seat face and tighten the Gland.
- 16.12 If the clearance is more than 0.004", push the Gate towards seat face and maintain the gap and tighten the Gland
- 16.13 Apply air pressure and cycle the actuator for 3 open-close cycles and observe for any scratches/scoring on the Gate surface.
- 16.14 If the gate surface is not scratched/scored after 3 cycles, tighten all the fasteners (actuator mounting-side plate bolts and nuts and clevis to gate bolts and nuts) to the prescribed torque.
- 16.15 Stroke the valve once to check for smooth operation of the valve.
- 16.16 Carry out seat leakage testing with the relevant testing procedure.

Figure 32: Disconnect Stem from Gate

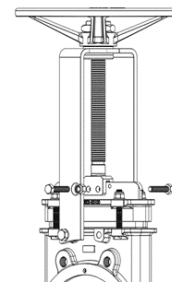


Figure 33: Remove U-Plate bolting.

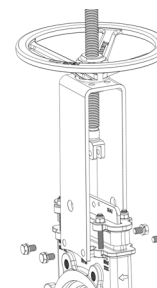


Figure 34: Remove Stem, Yoke, Handwheel, & Thrust Washer



Figure 35: Mount actuator on to U-Plate.

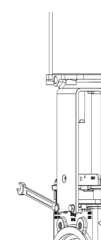
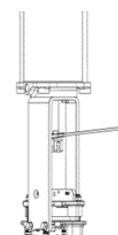


Figure 36: Connect Clevis to gate



17.0 TROUBLESHOOTING

TROUBLE	POSSIBLE CAUSE	SOLUTION
Packing leakage	<ul style="list-style-type: none"> > Incompatible Media > Packing Deteriorated > Temperature Variations > Normal Packing Wear 	Replace packing.
Soft Seated Valve: In fully closed position, seat leakage	Seat is worn or damaged.	<ul style="list-style-type: none"> a) Remove worn or damaged seat. b) Inspect and clean seat chamber, install new seat.
	Gate is damaged.	Gate replacement.
High torque during valve seating and unseating	Entrapped foreign media in pipeline prohibiting valve from seating	Please consult factory for proper solutions.
	Packing not tightened to recommended torque.	<ul style="list-style-type: none"> a) Remove valve from service. b) Review gate to seat interface.
Unable to close or open gate	Solidified media between body and gate.	<ul style="list-style-type: none"> a) Check for valve orientation, flow direction and flow indication. b) Re-orient valve. c) Replace gate. d) Clean chest area of valve
Valve jerks during open and close	Superstructure fasteners loosened.	Tighten the superstructure fasteners.
	Insufficient air supply.	Pneumatic operated valves: Increase supply pressure.
	Solenoid valve dust accumulation.	Remove and clean solenoid valve.
	Piston rod seal damaged.	Replace seal.
	Packing is too tight.	Loosen packing.

NOTES:

- > Bray does not accept any responsibility for the product if wear parts not tested and approved by Bray are used.
- > Bray does not accept any responsibility for the product if maintenance instructions are not followed during maintenance.

18.0 RETURN MERCHANDISE AUTHORIZATION

18.1 All products that are returned require a Return Merchandise Authorization (RMA). Contact a Bray representative to obtain authorization and shipping instructions.

18.2 The following information must be provided when submitting RMA.

- > Serial number
- > Part number
- > Month and year of manufacture
- > Actuator specifics
- > Application
- > Media
- > Operating temperature
- > Operating pressure
- > Total estimated cycles (since last installation or repair)

NOTE: Product information is provided on identification tag attached to device.



NOTICE

Materials must be cleaned and sanitized prior to return. MSDS sheets and Declaration of Decontamination are required.

SINCE 1986, BRAY HAS PROVIDED FLOW CONTROL SOLUTIONS FOR A VARIETY OF INDUSTRIES AROUND THE WORLD.

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