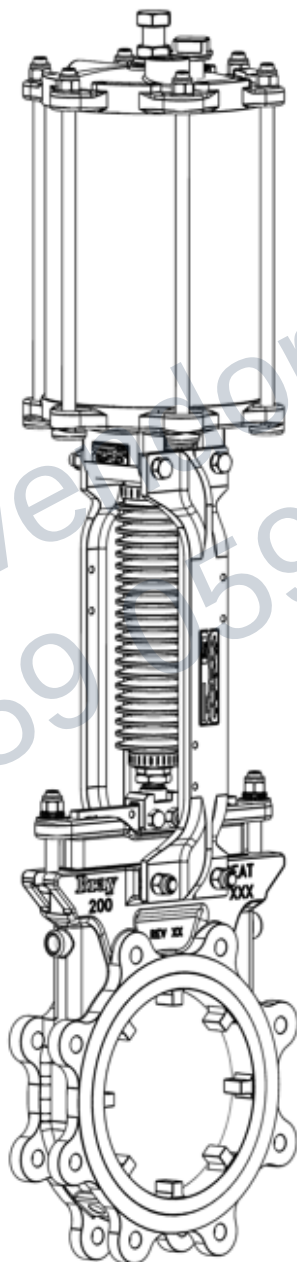

SERIES 942

VORTEX BREAKER KNIFE GATE VALVES FOR RECYCLE/REJECTS

Installation, Operation, and Maintenance Manual



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SERIES 942 VORTEX BREAKER KNIFE GATE VALVES FOR RECYCLE/REJECTS

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**READ AND FOLLOW THESE INSTRUCTIONS CAREFULLY.
FOR THE LATEST IOM VERSION, VISIT BRAY.COM**

1.0 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.

Specific instructions for non-standard materials of construction, temperature range, etc. should be referred to the factory.

1.1 Safety Statements

To prevent unwanted consequences, standard symbols and classifications are used as shown below:



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.

NOTE: Provides important information related to a procedure.

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2.0 INTRODUCTION

The Bray Knife Gate Series 942's one-piece, cast body design offers rugged performance in recycle/reject applications and comes standard with metal seat, vortex breaker, and heavy duty pneumatic actuator.

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**

For a detailed list of product certifications, please contact your local Bray representative.

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3.0 SAFETY INFORMATION



NOTICE

Failure to follow these procedures could affect product warranty.



WARNING

- > The valve must only be installed, commissioned, operated, and repaired by qualified personnel.
- > The device generates a large mechanical force during normal operation.
- > All installation, commissioning, operation, and maintenance must be performed under strict observation of all applicable codes, standards, and safety regulations.
- > Observe all applicable safety regulations for valves installed in potentially explosive (hazardous) locations.



WARNING

This valve will discharge media during cycling. This is normal operation and required to maintain a fully functioning valve. Do not install this valve over walkways, roadways, electrical or other equipment without the use of a discharge containment system.

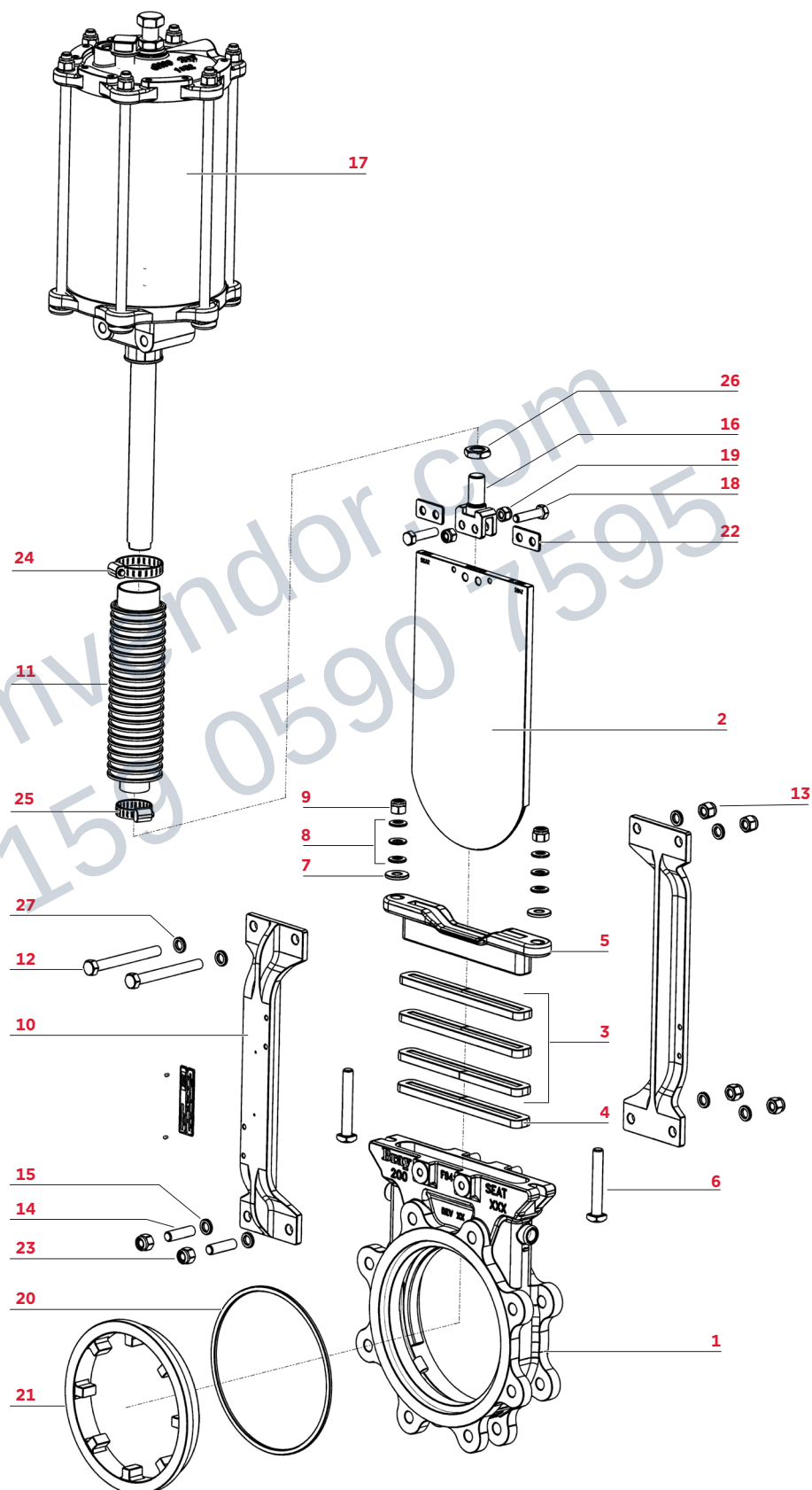
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4.0 PARTS IDENTIFICATION

4.1 Parts Callout



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4.2 Parts List

ITEM	DESCRIPTION
1	Body
2	Gate
3	HP Packing Set
4	Copper Scraper
5	Packing Gland
6	Gland Bolt
7	Gland Washer
8	Belleville Washer Set
9	Gland Nut
10	Yoke
11	Bellows
12	Mounting Bolt (Top)
13	Mounting Nut
14	Mounting Stud (Bottom)
15	Nordlock Washer
16	Clevis
17	Cylinder Actuator
18	Clevis Bolt
19	Clevis Nut
20	Vortex Breaker Gasket
21	Vortex Breaker
22	Dampener
23	Mounting Nut
24	Bellows Clamp (Top)
25	Bellows Clamp (Bottom)
26	Clevis Nut
27	Nordlock Washer

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5.0 VALVE IDENTIFICATION

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. 25% Cr.

6.0 HAZARD-FREE USE



NOTICE

Failure to follow these procedures could affect product warranty.

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.

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.

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.

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.

The valve must not be operated until the following documents have been observed:

- > Declaration on EU Directives
- > IOM Manual (supplied with the product).

7.0 QUALIFIED PERSONNEL



NOTICE

Failure to follow these procedures could affect product warranty.

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.

8.0 HANDLING REQUIREMENTS

8.1 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.

8.2 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.

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9.0 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.

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.

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 4" through 12" valves, a sling can be strapped around the top of the valve body.

9.1 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 2**.

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

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

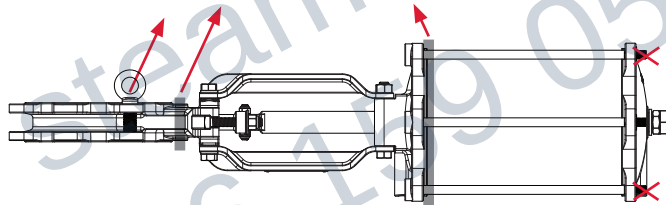


Figure 2: Knife Gate Valve with Pneumatic Cylinder Actuator, Horizontal Lifting

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.

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.

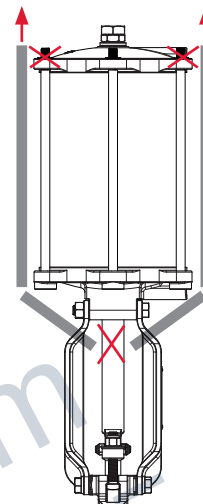
NOTE: DO NOT utilize the cylinder tie-rod ends to lift. See **Figure 3**.



WARNING

The Vortex Breaker is a loose item and will fall out if not secured during moving or lifting the valve.

Figure 3: Knife Gate Valve with Pneumatic Cylinder Actuator, Vertical Lifting



10.0 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.

10.1 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:

The preferred storage location is a clean, dry, protected warehouse. Do not expose the valve to temperature extremes.

End protectors shall remain on the valve ends to prevent the entrance of dirt, debris, or insects/wildlife.

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.

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.

Do not stack the valves on top of each other.

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.

10.2 Long-term Storage

Is defined as storage of valves longer than three months. During long-term storage, the following is required:

The storage location shall be a clean, dry, protected warehouse. Do not expose the valve to temperature extremes.

End protectors shall remain on the valve ends to prevent the entrance of dirt, debris, or insects/wildlife.

Product shall remain in the original shipping container with the original packaging materials.

Do not stack the valves on top of each other.

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.

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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.

Actuators to be stored with all cable/pneumatic entries plugged to prevent entry of foreign material.

Leave protective caps and covers on the product.

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11.0 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.

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.

It is recommended to provide support around areas indicated in **Figures 4, 5 and 6** with an adjustable sling/static support system.

Support from the top as shown or with suitable arrangement from bottom (such as from an access platform) depending on location constraints.

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.

Ensure jerk free movement with the supports in place.

Align the mating pipeline flanges. Select the length of the flange bolts as seen in **Table 1** and **Table 2** below. Install the valve between flanges using fasteners & gaskets.

Tighten flange bolts in a star pattern. See **Figure 11**.

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



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 12**.



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.

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.

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

Figure 4: Installation support for a Valve installed in Horizontal orientation (Stem horizontal and Bore horizontal)

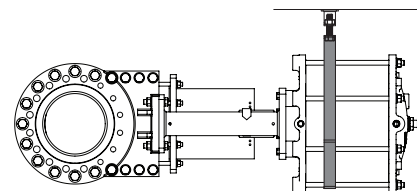


Figure 5: Installation support for a Valve installed in Horizontal orientation (Stem horizontal and Bore vertical)

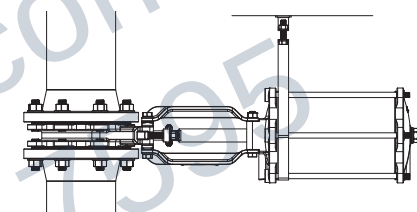
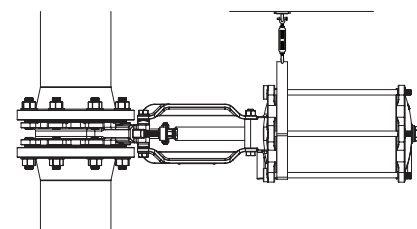


Figure 6: Installation support for a Valve installed in Horizontal orientation with turnbuckle.



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

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.

Figure 7: L5 Lug Bolt

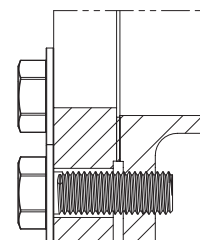


Figure 8: L6 Chest Bolt

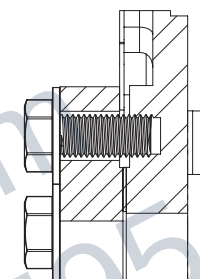


Figure 9: L7 Lug Stud

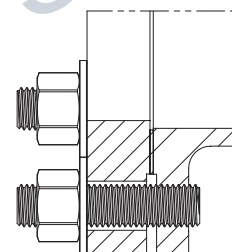


Figure 10: L8 Chest Stud

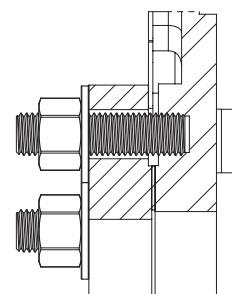


Table 1: RECOMMENDED FASTENERS - ASME B16.5 Class 150 Flanges

		L5 (Figure 7)		L6 (Figure 8)			
Valve Size	Bolt & Nut Size	Lug Bolt Length	Lug Bolt Qty	Chest Bolt Length	Chest Bolt Qty	Washer* Quantity	
NPS	DN	NPS					
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

* Washer Type B Wide

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

		L7 (Figure 9)		L8 (Figure 10)			
Valve Size	Stud & Nut Size	Lug Stud Length	Lug Stud Qty	Chest Stud Length	Chest Stud Qty	Nut Qty	Washer* Qty
NPS	DN	NPS		NPS			
4	100	5/8-11	2.5	12	2.5	4	16
5	125	3/4-10	2.8	12	2.5	4	16
6	150	3/4-10	3.0	12	2.5	4	16
8	200	3/4-10	3.0	12	2.75	4	16
10	250	7/8-9	3.5	16	2.75	8	24
12	300	7/8-9	3.5	16	3.0	8	24

* Washer Type B Wide

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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 11: Bolt Tightening Sequence

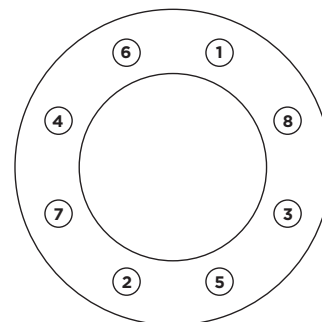
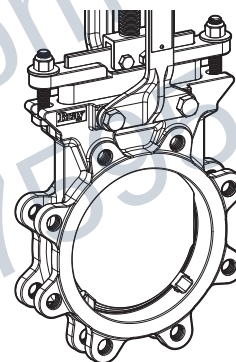


Figure 12: Bolt holes in the chest or upper flange area are blind tapped.



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Select solenoid valve based on the application media.

Use solenoid valve configuration 2/2 way.

Ensure the flushing pressure is 1 bar higher than the process pressure.

Flushing should be done every time the valve is moved from full closed to open position.

Flowmeter to monitor the flushing pressure is optional.

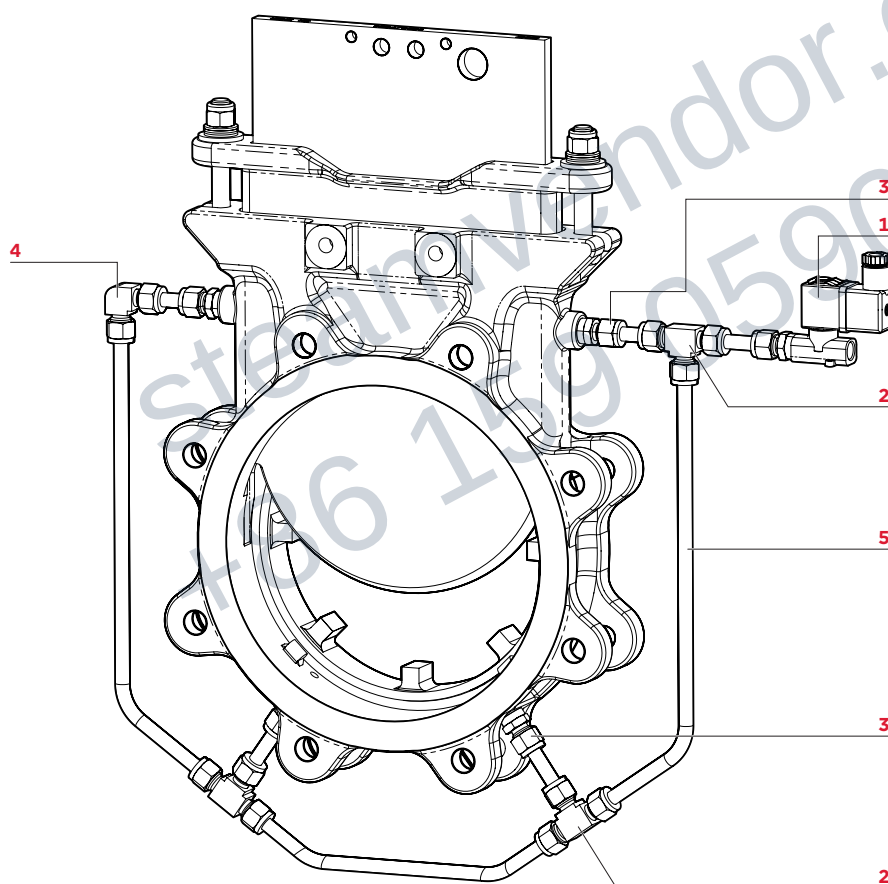
Table 3 : FLUSHING ARRANGEMENT PARTS

ITEM NO.	PART	QTY
1	Solenoid Valve (2/2 Way)	1
2	Tee Connector	3
3	Straight Connector	5
4	Elbow Connector	1
5	Tube	-

Table 4: VALVE TO FLUSH PORT SIZE

VALVE SIZE	FLUSH PORT SIZE
4-5	1/4 NPT
6-8	3/8 NPT
10-12	1/2 NPT

Figure 13: Valve to solenoid flushing arrangement diagram. See **Table 3** for parts identification.



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13.0 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.

13.1 Pneumatic Cylinder Operated Valves

In **Figure 14**, connect instrument quality air, preferably through an air filter/regulator of adequate size.

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**

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

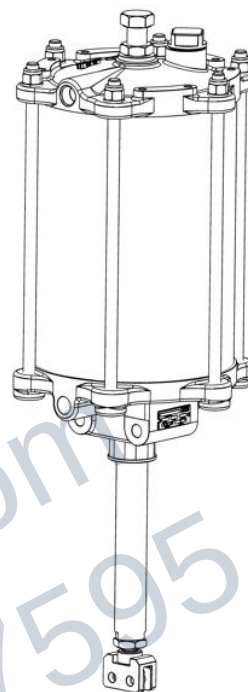
Drain the filter regulator before operating the actuator so that pipe rust and dirt if any in the air line will be removed before actuation.

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.

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

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

Figure 14: Cylinder Actuator



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14.0 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.

Cylinder operated valves do not require routine lubrication.



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.

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.

Table 5: Recommended Lubrication

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

Table 6: Recommended Spare Parts

Part	Qty
Gland Packing	Set of 4 Rows
Gasket	1
Cylinder Repair Kit	1
Gate	1
Vortex Breaker	1

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We recommend that all 942 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.

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14.1 Seal Replacement Procedure

During periodic maintenance of valve, the cylinder seal and packing need to be inspected for leakage.

If leakage is found on the ports, the piston & piston rod seals need to be replaced.

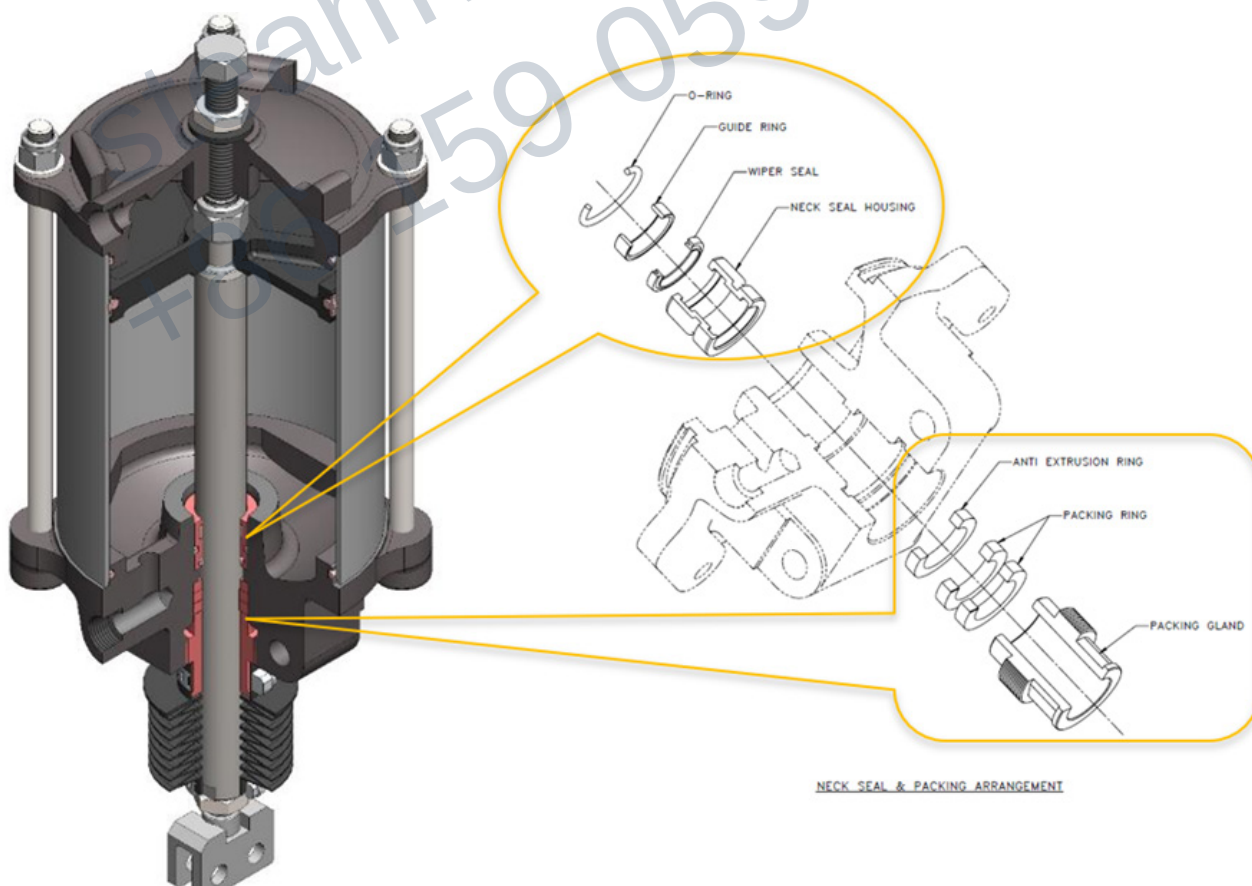
If leakage is found in the head packing, cylinder gland needs to be tightened to avoid leakage.

If the leakage is observed from the rod seals (Actuator head section), tighten the gland to arrest leakage.

If leakage persists after the gland is tightened, disassemble the gland, PTFE packing rings and check for wear on the wiper seal / packing,

If wiper seal is damaged, remove the neck seal housing and replace the neck seal housing components—including the O-ring, wiper, guide ring.

If wiper seal is not damaged, replace the PTFE packing rings with new ones. Reassemble the gland by tightening the gland to the cylinder head.



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15.0 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.

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

In **Figure 16**, remove the cylinder tubing and vent the air inside the CYLINDER (1).

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.

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

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

Remove the GLAND NUTS (7) BELLEVILLE WASHER SET (6) and the PACKING GLAND (5).

Remove the old COPPER SCRAPER (3) and HIGH PERFORMANCE PACKING (4) from the packing chamber, one layer at a time, using a long thin tool to pry it out.

Insert the new packing one at a time ensuring that the GATE (2) is in full contact with the vortex breaker (gate fully closed) and not rubbing the bottom of the packing chamber. Stagger the cut ends of the packing so they do not line up. COPPER SCRAPER (3) to be installed first, followed by the HIGH PERFORMANCE PACKING (4). See **Figure 17**.

Figure 16: Cylinder Operated Valve Cutaway

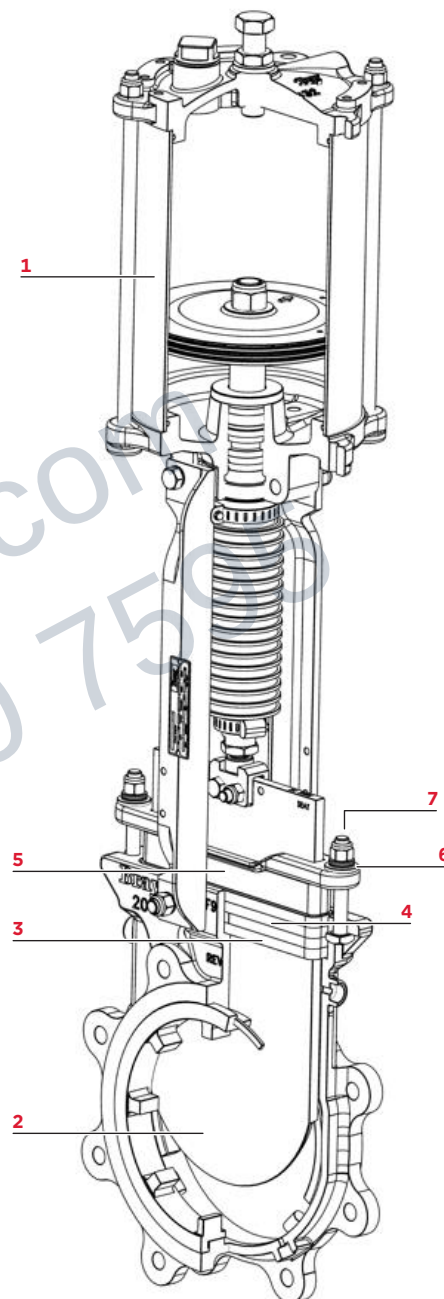
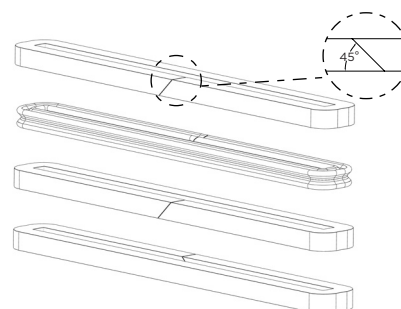


Figure 17: Packing arrangement



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Tap each packing ring firmly and evenly into the chamber before installing the next ring; the ends of each ring should meet but not overlap.

Install the PACKING GLAND (5) BELLEVILLE WASHER SET (6) and GLAND NUTS (7). Ensure that the BELLEVILLE WASHER SET is placed back on the gland bolt as shown in **Figure 18**.

Ensure the gap between the PACKING GLAND (4) and the GATE (2) is uniform all around.

Tighten the GLAND NUTS (5) finger tight plus one half turn.

Mount the actuator assembly to the valve by attaching the fasteners connecting the yokes to the valve body.

Figure 18: Belleville Washer stacking arrangement

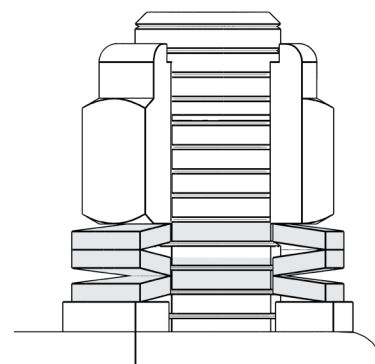


Table 7: PACKING DETAILS

Valve Size		Packing Size	Length	Quantity
NPS	DN	mm	mm	
4	100	Sq. 10	280	4
5	125	Sq. 10	330	4
6	150	Sq. 10	395	4
8	200	Sq. 10	490	4
10	250	Sq. 10	580	4
12	300	Sq. 10	690	4



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.

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16.0 TROUBLESHOOTING

TROUBLE	POSSIBLE CAUSE	SOLUTION
Packing leakage	> Incompatible Media > Packing Deteriorated > Temperature Variations > Normal Packing Wear	Replace packing.
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.	a) Remove valve from service. b) Review gate to seat interface.
Unable to close or open gate	Solidified media between body and gate.	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.

17.0 RETURN MERCHANDISE AUTHORIZATION

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

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.

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