maintenance &
operation manual

E5000 GENERAL PURPOSE KNIFE GATE VALVE

(SIZES 2” TO 60”)

ELITE VALVE

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Guarantee

Elite Valve Canada warranties it products against manufacturing defects or failure as a result of a manufacturing defects for a period of one year from the date of purchase.

This warranty is limited to the performance of the valve and valve components where assembled by Elite Valve Canada. Elite Valve Canada will repair, replace or refund the purchaser for those components at its discretion provided that no modifications or alternations have been made to these components. Furthermore, this warranty is limited to the components in questions and will not cover any damages either directly or indirectly.

Elite Valve Canada's warranty is void, where any modifications have been made to the product or products components, and thereby releases Elite Valve, it agents, and employees from obligations.

Disclaimer

Elite Valve Canada reserves the right to incorporate the latest design and material changes without notice or obligation. Design features and materials of construction as described in this manual are for informational purposes only. Certified engineering drawings are available upon request.

Description

The Elite E5000 series knife gate valve brings both performance and value to the table. This valve comes standard in either 304 SS or 316 SS with metal or Viton seats. This model is available in sizes 2" to 60".

Figure 1: E5400 Seat Configurations

Instructions

These instructions are intended for personnel who are responsible for the installation, operation and maintenance of your Elite E5000 knife gate valve. Personnel involved in the installation or maintenance of valves should always be aware of the potential emission of process material and should take any necessary safety precautions. Always wear the required personal protective equipment when dealing with any hazardous materials. Always handle valves that are removed from service with the assumption that process material remains within the valve.

Inspection

The Elite E5000 knife gate valve has been packaged to provide protection during shipment. Carefully inspect the unit for damage upon arrival and file a claim with the carrier if damage is apparent.

Parts

Order parts from your local sales representative. Recommended spare parts are listed on the assembly drawing. These parts should be stocked to minimize your downtime. When ordering parts, please provide serial numbers for any valves you wish to replace components for. The serial number will be situated on an Elite Valve stainless steel label affix to the body of the valve.

Component Identification

This figure outlines the components of the knife gate valve.

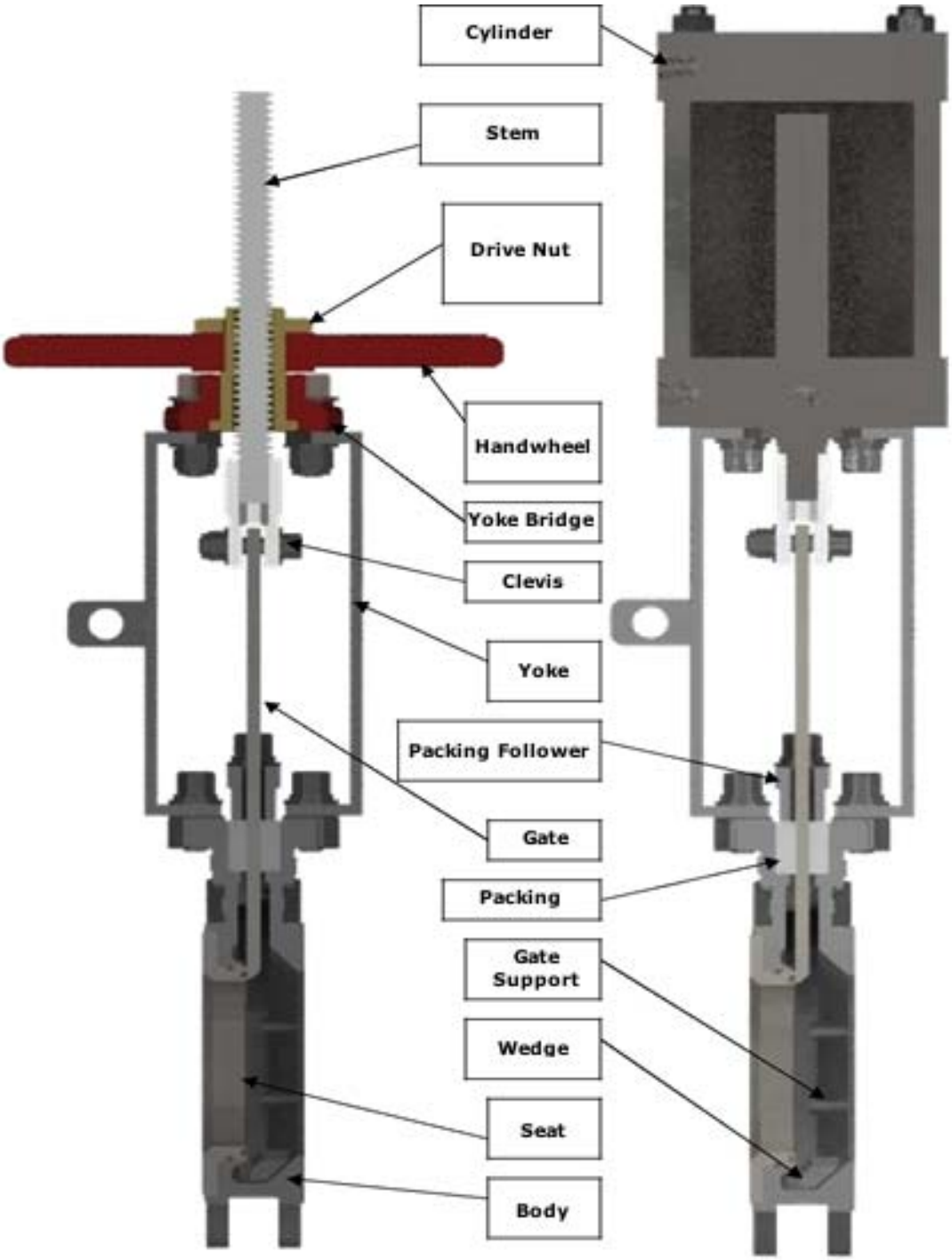

Figure 2: Component Identification

General Installation

Install the valve between ANSI Class 125 or Class 150 pipeline flanges with gaskets. Before installation, remove foreign material such as weld spatter, oil, grease, and dirt from the valve and pipeline.

Use the values for bolt torque found in Table A below. Observe the following points to prevent distortion of the valve body and gate when the flange bolts are tightened:

- Maintain alignment of the mating pipeline flanges
- Select the length of the flange bolts for the blind holes near in chest area of the valve so they do not bottom out when tightened
- Tighten the flange bolts evenly in a crisscross pattern
- When bolting the valve in line, use standard flange bolt torque less 25%. Adjust after start-up as required for gasket leaks etc. Over torqueing will result in seizing of the gate against the seat ring.

Valve Size (in)	Thread	Length (in)	Number of Bolts	Torque (ft.lbs)
2	5/8-11	1.38	4	80
3	5/8-11	1.5	4	110
4	5/8-11	1.5	8	100
5	3/4-10	1.63	8	120
6	3/4-10	1.75	8	130
8	3/4-10	1.88	8	130
10	7/8-9	2.0	12	215
12	7/8-9	1.19	12	220
14	1-8	2.38	12	320
16	1-8	2.5	16	320
18	1 1/8-7	2.63	16	450
20	1 1/8-7	2.75	20	450
24	1 1/8-7	3.0	20	650
30	1 1/4-7	3.25	28	650
36	1 1/2-6	3.75	32	1100
42	1 1/2-6	4.0	36	1150

Table A: Recommended Flange Bolt/Stud Torque Range in ft-lbs.

If the valve is equipped with yoke mounted bolt style limit switches and a clevis mounted target, travel adjustments can be made by positioning the bolts and target in their slotted mounting holes.

Installation – Liquid Application

Standard knife gate valves that are used for liquid flow use line pressure to assist with sealing by pressing the gate against the seat. For this reason, we recommend installing the valve with the seat side on the low pressure side for liquid applications; Install the valve with the flow in the same direction as the arrow marked liquid located on the side of the valve body (pressure-assisted seating). Refer to figure 4 below.

Installation – Solids Application

For Solid flow applications, we recommend installing the valve with pressure pushing the gate away from the seat; install the valve with the seat on the high pressure side. This flow is in the direction of the arrow marked solid located on the side of the valve body. This type of flow eliminates flow into cavities where solid product could buildup and lead to valve failure by preventing the gate to fully close. Refer to figure 4 below.

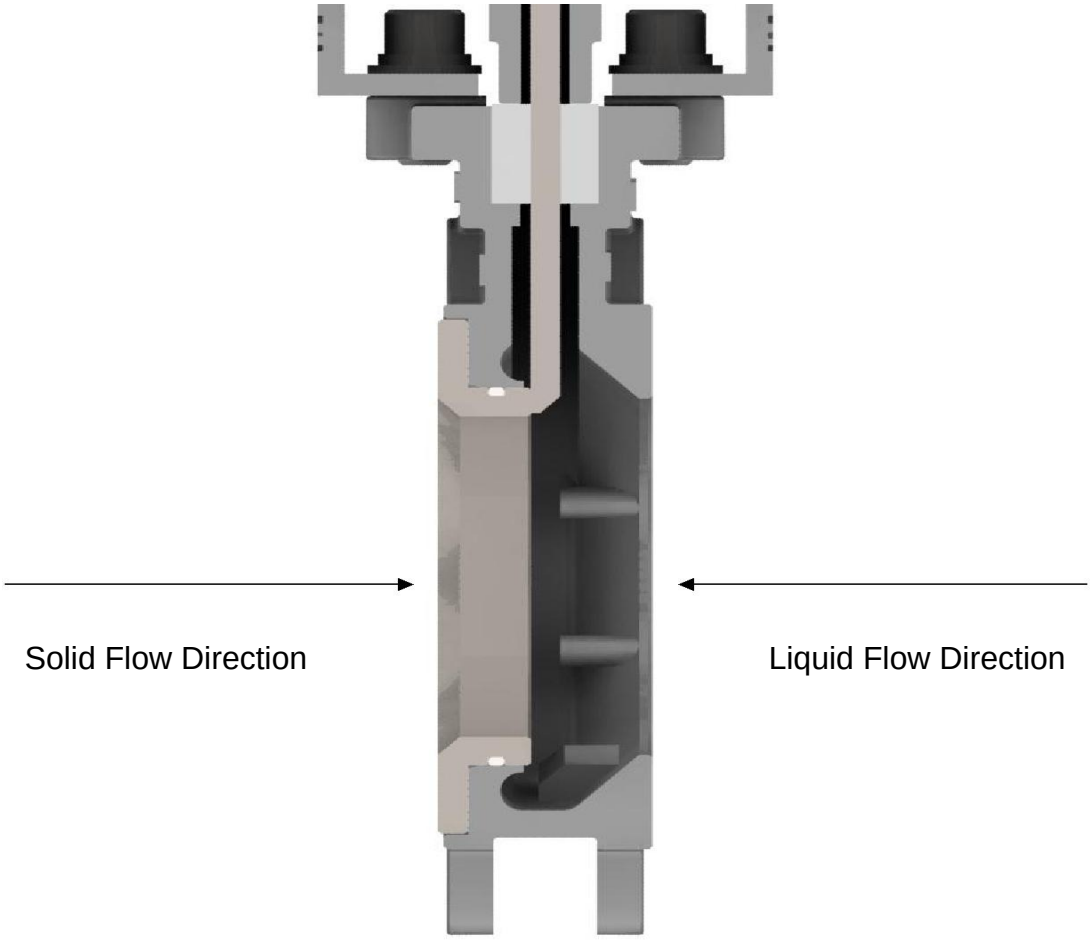

Figure 3: Solid and Liquid Flow Directions

The ideal installation for a solid flow application is to mount the valve horizontally, which allows the valve seat to keep it self-clean of product build up. The following figures illustrate correct and incorrect installations for actuated horizontally mounted knife gate valves. Due to the cylinder's weight, it must be supported externally to prevent valve gate and cylinder rod misalignment.

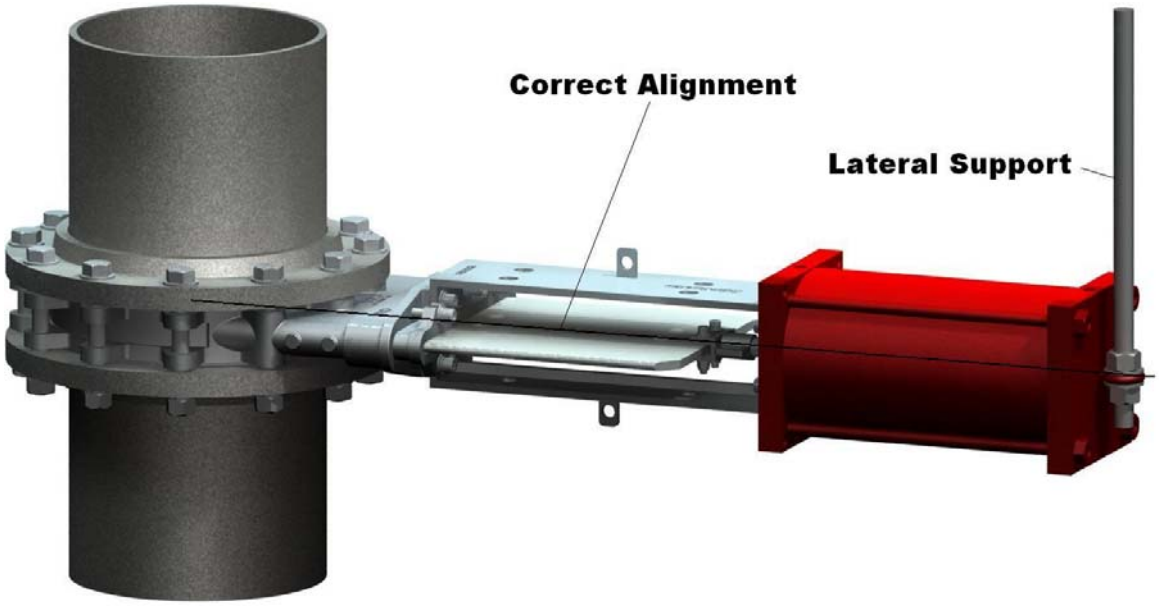

Figure 4: Correct Horizontal Alignment

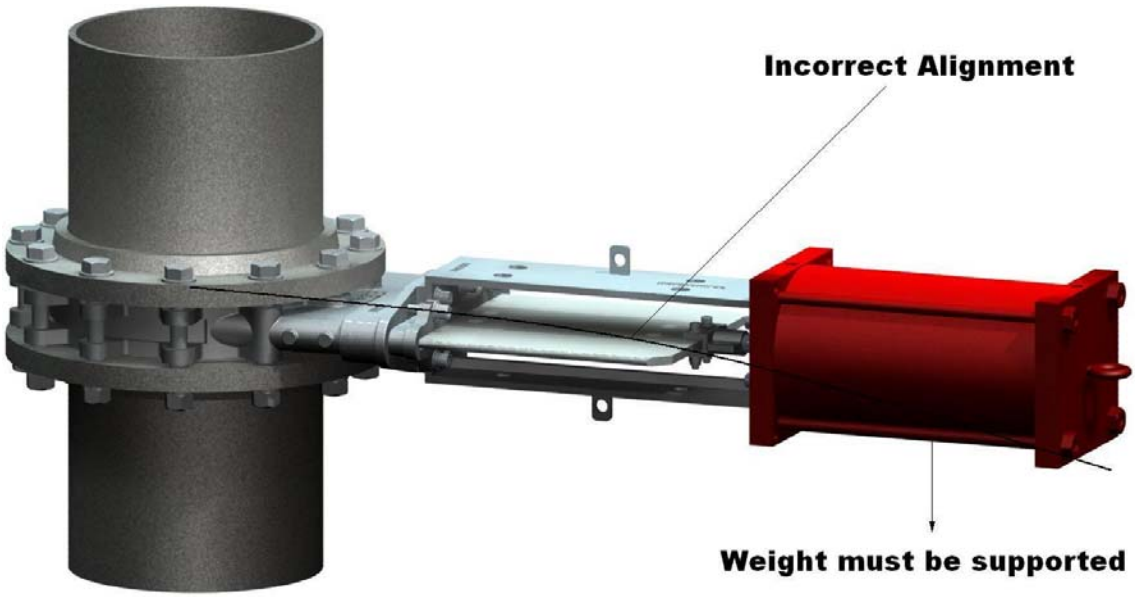

Figure 5: Incorrect Horizontal Alignment

Operation

The gate is positioned by the valves actuator or hand wheel. When the gate from the seat into the open position. Note that if over travel occurs when opening the gate (gate loses contact with seat), the bottom of the gate could get caught on top of the seat and cause considerable damage e.g. bending the gate, crushing the seat ring, etc. For this reason, there should be no adjustments made to the gate travel.

Lubrication

Knife gate valves that are equipped with hand wheel operators and gear operators will normally have a grease fitting for the threaded drive bushing. This fitting requires periodical lubrication depending on the frequency of valve operation. Refer to the “Actuator Instructions” for lubrication requirements for actuators.

Packing

The gate packing is contained and compressed by the packing gland follower. The packing gland follower is slightly loosened prior to shipping. This is done to increase the life of the packing during extended storage.

Packing Adjustment

If the valve packing leaks, tighten the adjustment nuts on top of the packing gland. Always tighten the nuts evenly and gently — just enough to stop the leak. Over-tightening will cause excessive operating forces and decrease the life of the packing. Do not compress the packing more than is needed to stop leaks.

Top Works - Disassembly

When the packing gland follower is at the bottom of its travel, tightening it will no longer cause the packing to compress and seal. When this occurs, the valve requires the addition or replacement of one or more rows of packing. The following is a guide to disassembling the top works in order to conduct further maintenance operations:

- Set the valve to the open position
- Ensure that energized actuator power sources are removed or locked and that pipe process pressure is relieved before removing the top works assembly
- Remove clevis bolts
- Remove bolts that connect the yoke plates to valve body
- Remove top works

Valve Repair

Valve repair typically consists of replacing seat rings, gates, and packing rows. Gate and seat ring replacement are typically carried out simultaneously because they wear evenly when made of the same material. When replacing packing, note that there are some instances where only one row may need to be replaced. Also see the troubleshooting section near the end of this manual to determine the required action for certain conditions.

Gate Inspection

Gate repair or replacement may be necessary in the event that the packing leaks after adequately tightening the packing follower. To remove the gate, follow the instruction for top works disassembly and remove the gate from the valve body by lifting it up slowly straight upwards – The packing should remain intact for easier installation of the gate

Inspect the gate for wear by looking for deep scratches or galling. If the gate appears to have deep scratches caused by product embedded in the packing, attempt to carefully remove the embedded product from the packing without disrupting the packing rows. If there is a large amount of embedded product, it may be necessary to replace the packing or even the gate if it is damaged enough. Also, see the upcoming section on seat inspection.

If fine aggregate (e.g. sand, loose gravel, etc.) material is expected to continuously embed itself in the packing, the use of a lantern gasket below the bottom packing row to act as a gate wiper will benefit this application. For more information on lantern gaskets, contact Elite Valve Canada.

Gate Repair / Replacement

Repairing a gate with some light scratches is achievable by light polishing. Lightly polish back and forth across the scratch (not in the direction of the scratch) along the entire scratch.

Repairing gates with deep scratches can be achieved by a grinding process capable of small flatness tolerances e.g. Blanchard grinder or surface grinder. Remove no more than .035”. Also see Valve Repair.

If the valve continues to leak after a repair attempt, it is evident that the gate should be replaced. Please contact Elite Valve Canada for assistance in gate replacement.

Insert the repaired or replaced gate back into the valve body into the existing packing rows without disrupting them. The 45º beveled edge on the bottom of the gate should be on the opposite side of the seat so that it makes contact with the wedge blocks. Proceed with the instructions for reassembling the valve.

Seat Inspection

In order to carry out a seat inspection, the valve must be removed from the process pipeline.

- Place the valve in the fully open position
- Ensure there is the process pipeline is free of product
- Disconnect all components and energy sources connected to the valve i.e. pressurized air or hydraulic hoses, electrical wires, etc.
- Remove flange bolts and remove the valve from the pipeline
- Inspect the valve body and the gate surface visually for signs of abrasion such as deep scratches or galling

The following is a guideline for repairing a seat ring before a replacement seat ring and gate are needed:

1. Remove the seat ring using a hammer or mallet driving a blunt, soft (wood, brass) rod or bar lightly against the seat surface moving around the circumference evenly to avoid binding (now is a good time to inspect the O-ring that creates a seal between the valve body and seat ring)
2. Position the gate in the valve body near the closed position with the gate close (but not touching) to the deflection blocks
3. Measure the seat depth at the top and bottom of the seat ring pocket while pressing the gate in the opposite direction of the seat towards the

deflection blocks – the measurement at the bottom should be greater than the top (see figure 8)

4. Slowly stroke the valve in very small increments towards the closed position while pressing the gate into the deflection blocks until the seat depth at the top and bottom are equal (both measurements will decrease as the gate deflects from the wedge block with the bottom measurement decreasing more rapidly)
5. Mount the seat ring on a lathe using a three jaw chuck with the seat surface facing outwards and the valve body mating surface protruding from the chuck. Using a dial indicator to achieve minimal run out of the valve body mating surface prior to making a cut
6. Slowly machine a light cut from the worn seat surface (typically .005” to .010”) or until all wear marks have been removed to achieve a smooth surface finish
7. Machine the valve body mating surface so that the seat depth of the seat ring (figure 7) equals the seat depth measured in step four (figure 8) + .020”

Packing Installation

For valve sizes 2” to 24”, the packing sizes and lengths per row required are shown in Table B below. For sizes 30” and up, contact Elite Valve Canada.

VALVE SIZE	PACKING SQ. SIZE	LENGTH PER ROW (In.)
2"	3/8"	5 13/16
3"	3/8"	8 1/2
4"	3/8"	9 15/16
6"	3/8"	14 7/16
8"	3/8"	18 1/8
10"	7/16"	21 13/16
12"	1/2"	26 11/16
14"	9/16"	31 3/8
16"	5/8"	35 3/4
18"	5/8"	38 7/8
20"	7/8"	42 15/16
24"	7/8"	50 11/16

Table B: Packing Row and Packing Cord Length & Quantity

Figure 9 on page 13 illustrates how to cut packing rows to length with 45º ends. Observe the following points for installing additional rows of packing:

- Ensure the gate is fully closed and centered in the body before installing packing

- Assemble and pack the rows one at a time, laying each down from left to right as it appears in figure 2 - the 45º ends should overlap at the seam
- The 45º seam angle should travel from the top of the row to bottom, not from the gate to the body packing gland - refer to figure 10 on page 13
- Use a blunt, square-ended wood or plastic tool driven by a hammer or mallet - Do not use any sharp tools to pack the valve. These will potentially score the gate causing leakage through the packing
- Stagger and alternate the joints from side to side on the long sides of the packing chamber to seal off any leak paths – never place a joint around the gate ends where the packing is curved around the gate

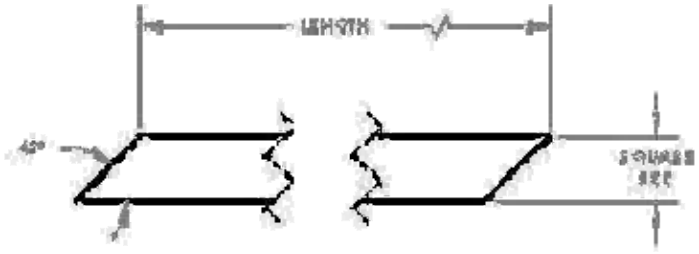

Figure 9: Measuring Packing Length & End Treatment

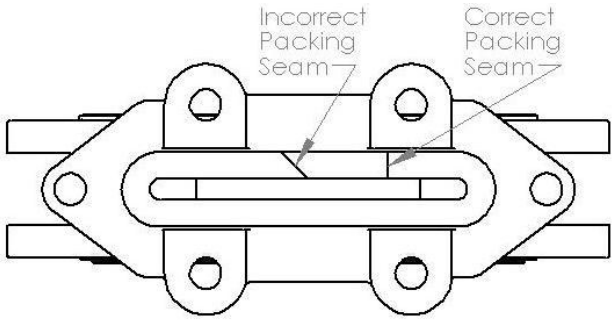

Figure 10: Packing Orientation

Reassembling the Valve

1. Reinsert the packing gland follower's washers and bolts, hand-tightening evenly, plus a half turn
2. Place the top works assembly onto the valve body
3. Fasten the yoke plate bolts into the body hand tight plus half a turn only

4. Secure the gate to the stem using the clevis bolts
5. Stroke the valve open and closed several times to allow the stem and gate to ‘self-align’ *
6. Secure the top works assembly to the valve by tightening the yoke plate bolts
7. Reconnect the stem to the gate with the two screws and nuts.
8. If the actuator is a powered actuator, reconnect power to the actuator.
9. Pressurize the pipeline and inspect packing for leakage.
10. If packing leaks, tighten the adjustment nuts on top of the packing gland. Tighten the nuts evenly and gently — just enough to stop the leak **

* To promote longevity of the valve, it is best to ensure proper alignment of the gate and stem to avoid uneven wear of gate packing, cylinder bushings and lip seals, etc.

** Over tightening the packing gland follower bolts will result in increased friction and excessive operating forces which will decrease the life of the packing.

Troubleshooting

Condition	Possible Cause	Corrective Action
Packing leaks , with no evidence of galling on gate	Packing is loose.	Adjust packing gland.
	Packing is worn or torn.	Replace packing.
Packing leaks , and gate is galled.	Packing is worn or torn.	Replace packing and gate, check seat for damage.
Valve leaks when fully closed, with no evidence of galling on gate.	Seats are worn or torn.	Replace seats.
Valve leaks when fully closed, and gate is galled.	Seats are worn or torn.	Replace seats and gate.

Table C: Troubleshooting

Sales and Service

For information about our worldwide locations, approvals and certifications, please visit our website or feel free to contact Elite Valve Canada directly.

Web site: www.elitevalve.com

Phone: 519-756-3100

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