MPI
MCWANE
PLANT & INDUSTRIAL

HIGH PERFORMANCE BUTTERFLY VALVE

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL - SERIES HP

MPI
1201 Vanderbilt Road | Birmingham, AL 35234
866.924.8674 • mcwanepi.com
sales@mcwanepi.com

SAFETY INSTRUCTIONS - DEFINITION OF TERMS

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

This manual contains crucial information that you must follow to ensure the safe and effective use of your McWane Plant & Industrial (MPI) valve. It provides detailed instructions on how to operate and maintain your valve correctly, so you can extend its lifespan and avoid accidents or damage to your valve.

Below are examples of safety notices used throughout this manual:

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.

WARNING: Read all applicable directions and instructions before performing any maintenance, troubleshooting, disassembly, installation, etc.

WARNING: It is crucial for individuals involved in valve installation and maintenance to stay vigilant and alert for any potential emissions of pipeline material. This is essential to ensure the safety of the personnel and the environment. It is highly recommended that appropriate safety measures are taken, including the use of suitable protective gear, when handling hazardous pipeline materials. These measures will help prevent any harm or damage and ensure the safety of all personnel involved in the installation and maintenance process.

STORAGE

The high performance butterfly valve requires some specific handling and storage instructions.

- The valve should be stored with the disc positioned at a 10° open angle.
- It's important to store the valves indoors, with a preferred temperature range of 40°F to 85°F.
- Every 3 months, while in storage, the valves should be cycled opened, and closed once.
- The polymer and elastomer parts should not be stored in the presence of sunlight or artificial light with high ultraviolet content or any source of radiation, as these are the primary causes of aging.
- Protect the valves from water, dirt, rocks, and debris.

FUNCTION

The butterfly valve is designed to rotate 1/4 turn to provide a tight shut-off in industrial applications, such as, pulp & paper, power generation, water treatment, petrochemical, air separation, vacuum, and CDA. This type of valve can be used to regulate the flow rate by positioning the disc between 10 and 90 degrees open.

Unlike many valve types, the butterfly valve's disc extends beyond the face of the valve body at opening angles above approximately 30° or more when installed between flanges. Special consideration must be taken during installation if the valve has a fail-open actuator installed.

VALVE CYCLE

Butterfly valves can be fully closed with a 90-degree clockwise rotation and fully opened with a 90-degree counter-clockwise rotation of the valve stem via a hand lever, gear operator, or actuator.

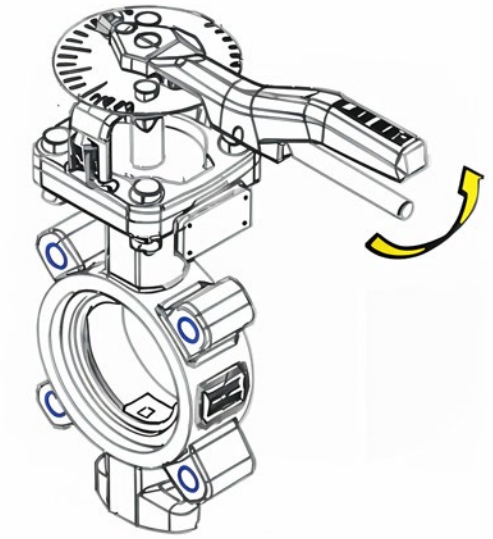
OPERATION

High performance butterfly valves can be operated with levers, manual gear actuators, pneumatic actuators, electric actuators, and other specialty control devices.

LEVER OPERATION

Valve can be opened or closed using the lever and can be locked in position at increments of 10 degrees.

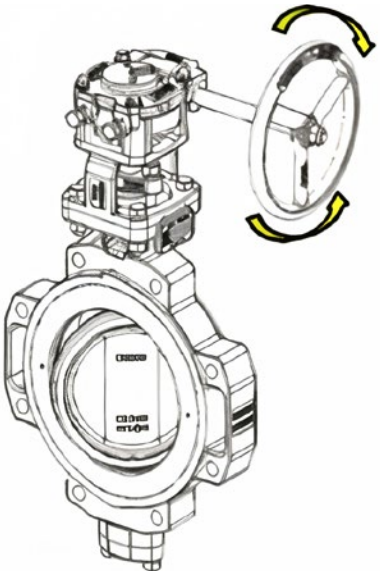
WARNING: Valve must be operated slowly to prevent potential damage from water hammer.



GEARBOX OPERATION

Valve can be opened or closed using a gearbox equipped with a handwheel, chainwheel, or nut.

- Rotate the handwheel, chainwheel, or nut to open or close the valve.
- Counter-clockwise rotation opens the valve.
- Clockwise rotation closes the valve.



VALVE LOCATION

It is recommended to install butterfly valves at a distance of at least 6 pipe diameters from other line elements such as elbows, pumps, valves, etc. However, this may not always be possible due to space constraints. In such cases, it is important to achieve as much distance as possible.

When installing a butterfly valve next to other equipment such as a check valve or pump, an expansion joint, or a spacer piece at least one pipe diameter should be used between them to ensure that the opening disc does not interfere with the adjacent equipment.

VALVE ORIENTATION

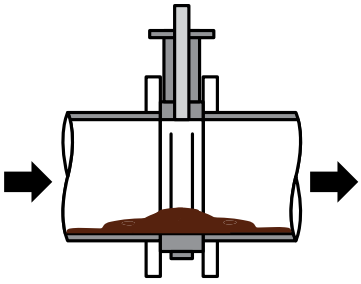
MPI generally recommends installing the high performance valve in a vertical position with the actuator mounted directly above the valve. However, there are some specific applications where the valve stem should be installed horizontally instead.

NOTICE: MPI does not recommend valves be installed in an upside-down position.

MPI recommends installing the high performance valve with the stem in a horizontal position for slurries, sludge, mine tailing, pulp stock, dry cement, and any media that contains sediment or particles. The lower disc edge should open in the downstream direction, as illustrated in the diagram on the right.

INCORRECT

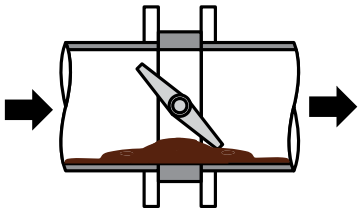
Sediment is prone to building up in the lower disc, shaft and bearing area.



Valve Stem
(vertical)

CORRECT

Sediment is allowed to pass under the disc, valve prone to flushing itself out.

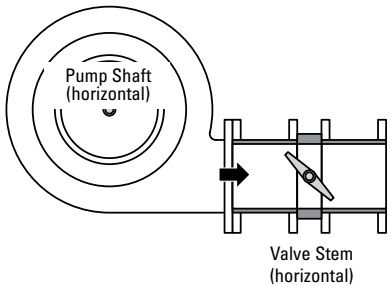


Valve Stem
(horizontal)

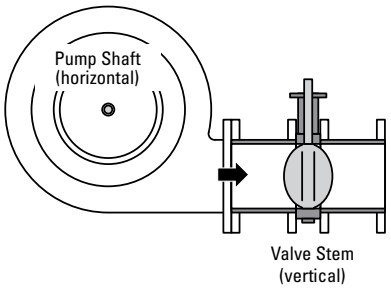
Butterfly valves located at the discharge of a pump should be oriented as follows:

Centrifugal pump (with pump shaft horizontal)

INCORRECT
Valve stem horizontal



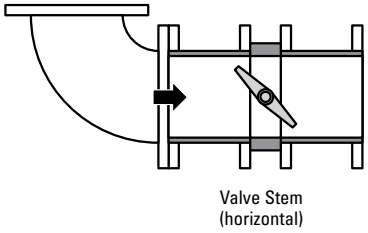
CORRECT
Valve stem vertical



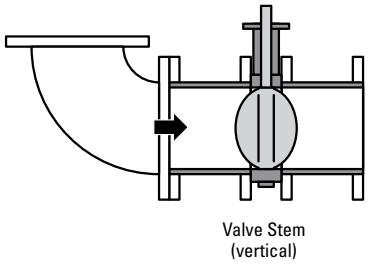
Butterfly valves located downstream of a bend or pipe reducer should be oriented as follows:

Bend

INCORRECT
Valve stem horizontal

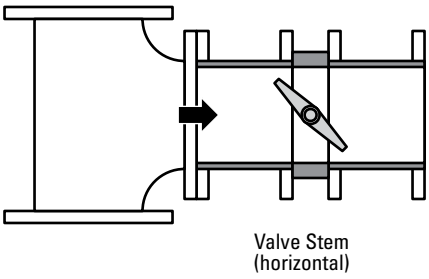


CORRECT
Valve stem vertical

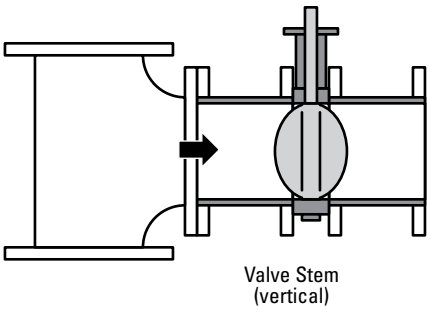


Tee

INCORRECT
Valve stem horizontal

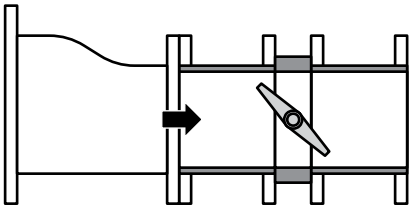


CORRECT
Valve stem vertical



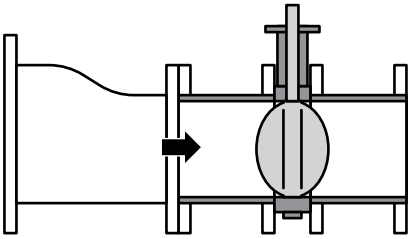
Reducer

INCORRECT
Valve stem horizontal



Valve Stem
(horizontal)

CORRECT
Valve stem vertical



Valve Stem
(vertical)

INSTALLATION

NOTICE: Ensure the pipeline and pipe flange faces are free of debris, such as pipe scale, metal chips, welding slag, and welding rods, to prevent any obstruction of disc movement or damage to the disc or seat.

NOTICE: Align the piping and spread the pipe flanges apart to permit the valve body to be easily dropped between the flanges without contacting the pipe flanges. Check to see that the valve disc has been positioned to a partially open position, with the disc approximately 10° open.

NOTICE: Insert the valve between the flanges taking care not to damage the seat faces. Always pick the valve up by locating holes or by using a nylon sling on the neck of the body.

WARNING: Never pick up the valve by the actuator or operator mounted on top of the valve.

CAUTION: Installing the valve with the disc fully closed may cause seat damage or high torques.

CAUTION: When installing the valve, it is important to proceed with caution to avoid damaging the disc edge.

To properly install the valve, follow these steps:

1. Rotate the disc sealing edge until it is 10° open. Ensure that the disc is not fully closed or protruding past the body's face into the pipeline.
2. Spread the flanges by approximately 0.2" more than the valve's face-to-face (or lay length) dimension. This will make installation of the valve easier, and prevent damage or distortion to the seating face.
3. Center the valve body between the flanges and span all flange bolts possible. Turn the disc to the fully open position to confirm it does not hit the surrounding piping or equipment.

4. While gradually removing the flange spreaders, center the valve to the flanges and tighten the bolts half-tight. Slowly close the valve to check for adequate disc clearance between surrounding piping or equipment.
5. Return the disc to the fully open position and cross-tighten all bolting.

By following these steps, you can ensure the proper installation of the valve.

WARNING: The butterfly valve with its actuator removed can cause injury or damage if the disc opens or closes unintentionally during installation. If a clamp is used to secure the disc during installation, it must be removed before the valve is put into service.

WARNING: If the actuator is removed from the valve during installation, make sure to:

1. Mark the valve and actuator to ensure that the re-installed actuator is in the same quadrant as it was originally configured.
2. Install the valve according to the instructions detailed in this document.
3. Re-install the actuator, ensuring that it is in the proper quadrant.

TESTING

When using high performance valves to isolate sections of the line for testing, it's important to note that these valves are designed to hold rated pressure only. Exceeding the rated pressure during testing may cause leakage past the seat or damage to the valve.

WARNING: Valves must not be operated above their rated pressure.

To avoid wasting time looking for leaks, it is advisable to delay the backfilling of buried valves until after hydrostatic pressure tests have been carried out.

If seat leakage occurs due to foreign material in the line, you can open the valve 5-10 degrees to promote a flushing action. Close and repeat the process several times to clear seats and confirm a tight shut-off is achieved.

WARNING: Fluids freezing inside the valve can cause the valve to fail, which can result in injury to individuals or damage to valves and other property. It is not recommended to use valves in applications that are exposed to freezing temperatures unless there is sufficient flow maintained through the valve to prevent freezing or if other protection is provided.

WARNING: Anyone who installs, operates, or adjusts this equipment must read the instructions and drawings carefully. Improper use of the equipment can cause injury or damage to property. It is assumed that those who install this equipment have the necessary knowledge and skills in mechanical or electrical equipment. The manufacturer cannot be held responsible for any misuse of the equipment or information provided, nor can it assume any liability for any resulting damage.

MAINTENANCE

The maintenance of valves by their owners is typically limited to actuators and shaft seals. Sometimes, the valve design allows for the adjustment of the seat in the field when there is leakage. However, if the owner lacks skilled personnel and proper equipment, any significant rework will require the removal of the valve from the line. Depending on its condition, the valve may need to be returned to the manufacturer.

ANNUAL MAINTENANCE

Before maintenance work please confirm the following:

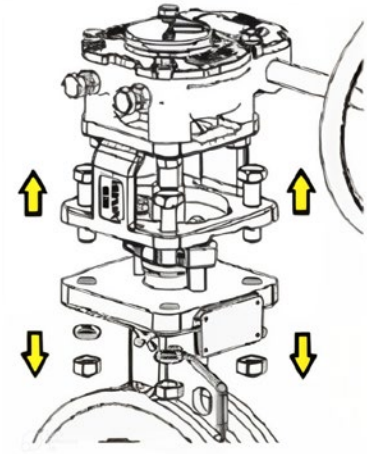
1. Personnel should wear proper eye, head, and body protection.
2. Always partially open the valve to safely release pressure.
3. Flush the butterfly valves and the pipelines attached and make sure that no (dangerous) residues are left.

It is not possible to accurately predict the required maintenance interval for the valve. This interval depends on various factors, such as the type of media used, the frequency of valve usage, and the extent of preventative maintenance. It is advisable for the end user to visually inspect the valve regularly to anticipate any potential maintenance requirements.

Please perform the following steps to verify the operation of the valve:

1. Cycle the valve and ensure it operates smoothly without any obstructions in the line.
2. Close the valve and check for any leakage. If leakage is detected, verify that the disc is fully closed by checking the actuator stops. If leakage persists, remove the valve to inspect the seat.
3. Check the flange connections for any leaks and tighten bolts if necessary.
4. Check the packing area for any leakage. If leakage is detected, replace the packing.
5. If possible, remove any scale that may interfere with disc travel in the line. Inspect the seat for wear and ensure that all screws are tightened.

PACKING REPLACEMENT



Step 1: For valves with actuators, loosen yolk screws and remove the actuator and yolk as one unit. Note orientation of disc and actuator before removing.

Step 2: Remove nuts and spring washers from packing gland, then remove packing gland.

Step 3: Remove anti-blowout pin and gland bushing.

Step 4: Remove packing.

Step 5: Thoroughly clean packing chamber, removing any burrs or corrosion.

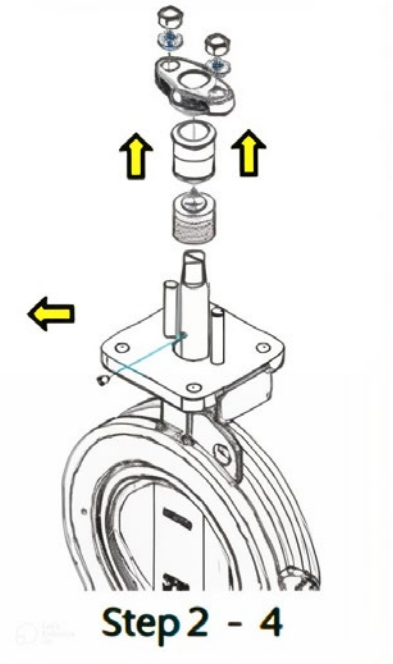
Step 6: Install new packing in proper orientation (see example).

Step 7: Re-install gland bushing and anti-blowout pin.

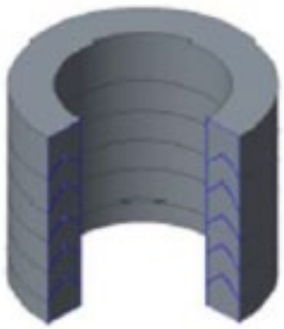
Step 8: Re-install packing gland, gland nuts, and spring washers. Tighten nuts equally by alternating sides. Tighten nuts according to the recommended torque indicated for the valve size in the "Gland Bolt Tightening Torque" table below.

Step 9: Re-install actuator and yolk. Reference actuator location noted prior to disassembly.

Step 10: Cycle valve several times to ensure smooth operation.



Gland Bolt Tightening Torque			
Valve Size		Graphite Packing (ft-lb)	PTFE Packing (ft-lb)
Class 150	Class 300		
2"-4"	2"-4"	7	5
5"-6"	5"	12	8
8"	6"	15	11
10"	8"	17	13
12"	10"	35	25
14"	12"	41	29
16-18"	14"	59	42
20"	16"	89	63
24"	18"	96	68
26-28"	20"	130	93
30"	-	145	103
32"	24"	153	109
36"	-	168	119
40"- 44"	-	239	170
48"	-	258	184



SEAT REPLACEMENT

Step 1: With the valve laying flat, remove the retainer ring by rotating it counter-clockwise using the pin holes at 3 and 9-o'clock.

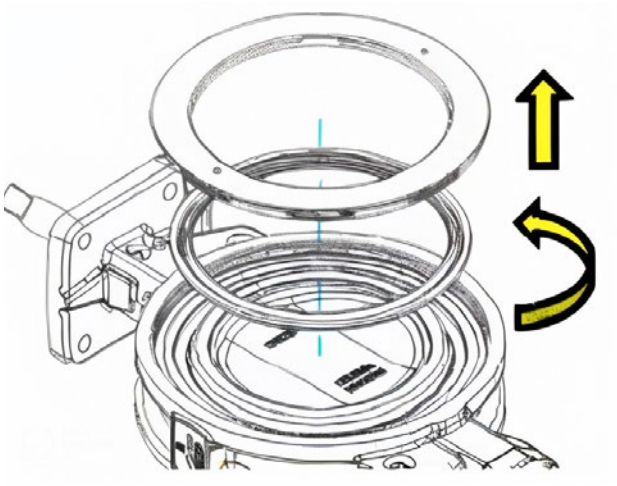
Step 2: Remove the valve seat components and thoroughly clean the valve body and disc, inspecting both for scratches or damage.

Step 3: Verify the disc is centered on the body using a vernier caliper to measure the distance from the disc to the body at the top and bottom of the disc. The measurements must be within 0.004" of each other (0.1mm).

Step 4: Carefully install new seat components per valve style:

1) Standard valve: seat only
2) Metal Seated valve: metal seat & graphite gaskets
3) Fire-safe valve: metal seat, soft seat, & graphite gasket

Step 5: Install new spring and positioning pin into retaining ring and torque retainer ring to the locked position.



Diameter (inch)	PTFE Locking Torque (ft-lb)	Graphite Locking Torque (ft-lb)
2-4"	8	11
5-6"	13	18
8"	17	24
10"	18	26
12"	38	53
14"	44	62
16-18"	64	89
20"	97	134
24"	104	144
28"	142	195
30"	159	221

DISC AND STEM REPLACEMENT

Step 1: For valves with actuators, loosen yolk screws and remove actuator and yolk as one unit. Note orientation of disc and actuator before removing.

Step 2: Remove nuts and spring washers from packing gland, then remove packing gland.

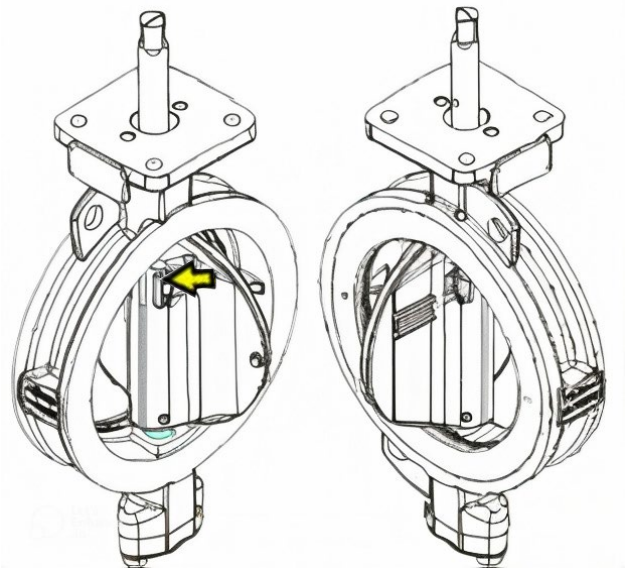
Step 3: Remove anti-blowout pin and gland bushing.

Step 4: Remove packing.

Step 5: With the valve laying flat, remove the retainer ring by rotating it counter-clockwise using the pin holes at 3 and 9-o'clock.

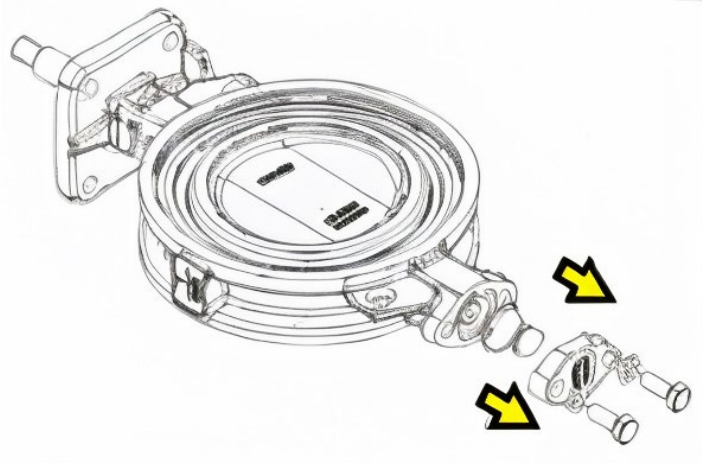
DISC AND STEM REPLACEMENT (continued)

Step 6: Tap out the tapered pins from the disc.



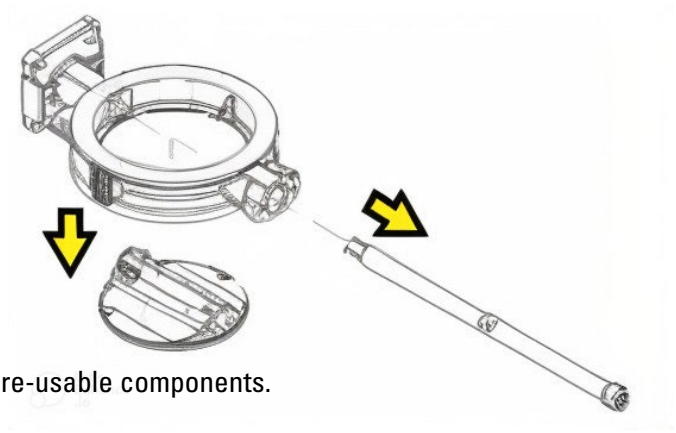
Step 7: Loosen the bottom cover screws and remove the bottom cover.

Step 8: Remove the bottom cover gasket and the thrust bearing.



DISC AND STEM REPLACEMENT (continued)

Step 9: Pull the stem out of the disc from the bottom of the valve.



Step 10: Thoroughly clean all re-usable components.

RE-ASSEMBLY

Step 11: Place the disc in the center of the body and insert the stem into the disc from the bottom of the body.

Step 12: Tap the taper pins partially into the disc - just enough to lock the disc in position on the stem.

Step 13: Install thrust bearing, bottom cover gasket, and bottom cover. Tighten bottom cover screws equally according to the recommended torque indicated for the valve size in the "Bottom Bolt Tightening Torque" table below.

Step 14: Verify the disc is centered on the body using a vernier caliper to measure the distance from the disc to the body at the top and bottom of the disc. The measurements must be within 0.004" of each other (0.1mm).

Step 15: Carefully install new seat components per valve style:

1) Standard valve: seat only

2) Metal Seated valve: metal seat & graphite gaskets

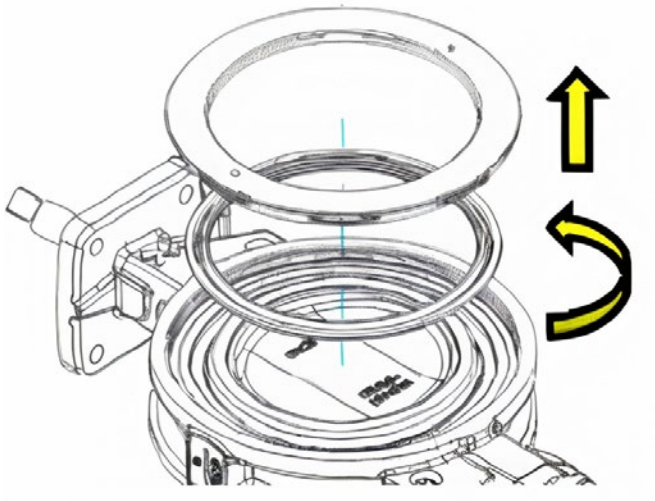
3) Fire-safe valve: metal seat, soft seat, & graphite gasket

Bottom Bolt Tightening Torque

Valve Size		Recommended Torque (ft-lb)	Maximum Torque (ft-lb)
Class 150	Class 300		
2"-4"	2"-4"	11	45
5"-6"	5"	11	45
8"	6"	20	78
10"	8"	20	78
12"	10"	49	195
14"	12"	49	195
16-18"	14"	95	380
20"	16"	95	380
24"	18"	95	380
26-28"	20"	164	656
30"	-	164	656
32"	24"	164	656
36"	-	164	656
40"- 44"	-	326	1303
48”	-	326	1303

DISC AND STEM REPLACEMENT (continued)

Step 16: Install new spring and positioning pin into retaining ring and torque retainer ring to the locked position.



Diameter (inch)	PTFE Locking Torque (ft-lb)	Graphite Locking Torque (ft-lb)
2-4"	8	11
5-6"	13	18
8"	17	24
10"	18	26
12"	38	53
14"	44	62
16-18"	64	89
20"	97	134
24"	104	144
28"	142	195
30"	159	221

Step 17: Open the disc to the halfway point and tap the taper pins into the disc completely.

Step 18: Re-install actuator and yolk. Reference actuator location noted prior to disassembly.

Step 19: Install new packing in proper orientation (see example in packing replacement procedure).

Step 20: Re-install gland bushing and anti-blowout pin.

Step 21: Re-install packing gland, gland nuts, and spring washers. Tighten nuts equally by alternating sides. Tighten nuts according to the recommended torque indicated for the valve size in the "Gland Bolt Tightening Torque" table on page 10.

Step 22: Re-install actuator and yolk. Reference actuator location noted prior to disassembly.

Step 23: Cycle valve several times to ensure smooth operation.

TROUBLESHOOTING GUIDE

Problem	Cause	Suggested Remedies
Shaft leakage	Packing worn, screws loose on packing gland.	Tighten the screws on the packing gland. Replace worn packing.
High torque	Pinched seats, flange bolts are not evenly torqued, or over-torqued bolts.	Loosen the flange bolts. Manually cycle the disc through the valve a few times to reshape the seat. Tighten the flange bolts in the correct sequence.
	Valve installed to close to the piping, reducer, strainer, elbow, equipment, or obstruction	Change the piping or location of the valve. Confirm the valve is not interfering with adjacent piping or equipment. If you wish to increase the actuator size to overcome higher torque requirements, please consult the factory.
	Obstruction in the pipeline	Remove the valve from the pipeline and remove the obstruction.
	Valve stem or disc bent	Return the valve to the factory for replacement.
	Scale buildup on stem or seat	To remove the scale buildup, try opening and closing the valve multiple times. It's recommended to operate the valve at least once a month to prevent scale buildup. Check the valve seat for any signs of deterioration. Additionally, flush the system periodically. Be cautious while adding chemicals as excessive addition at one time may coat the surface of the valve seat and disc.
	Incorrect actuator installation	Check the alignment of the actuator and adjust if side loading is evident.
Leakage when the valve is in the closed position	The actuator is not properly adjusted	Reset actuator stops
	Line pressure is higher than the valve's rated close-off pressure.	Reduce line pressure to valves rated close-off pressure.
	High torque	See "high torque" section above
Leakage past the flange face	Flange bolts are not evenly torqued	Loosen the flange bolts. Tighten the flange bolts in the correct sequence.
Valve opens only a few degrees and stops	Improper installation. The valve is not aligned properly.	Loosen the flange bolts, realign the valve with flanges, and re-tighten the flange bolts to the correct torque.

PARTS & SERVICE:

Parts and service are available from your local representative or the factory. For availability and pricing of spare parts please contact the MPI sales team:

McWane Plant & Industrial
www.mcwanepi.com
Phone: 866.924.8674
Email: sales@mcwanepi.com

Scan QR code below for detailed drawings.