

MILWAUKEE VALVE

HIGH PERFORMANCE BUTTERFLY VALVE

Installation, Operation, and Maintenance Manual

Rev. 0422

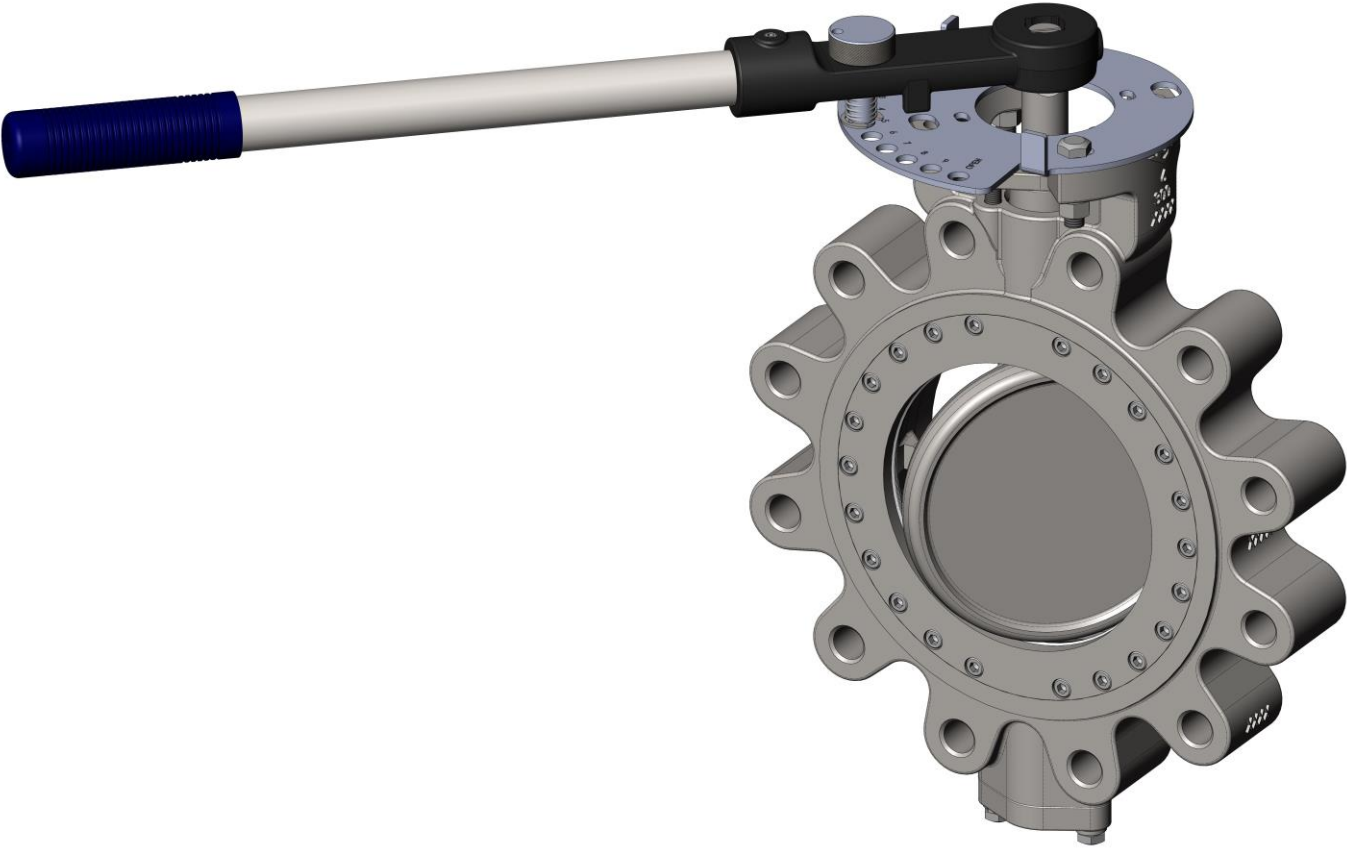




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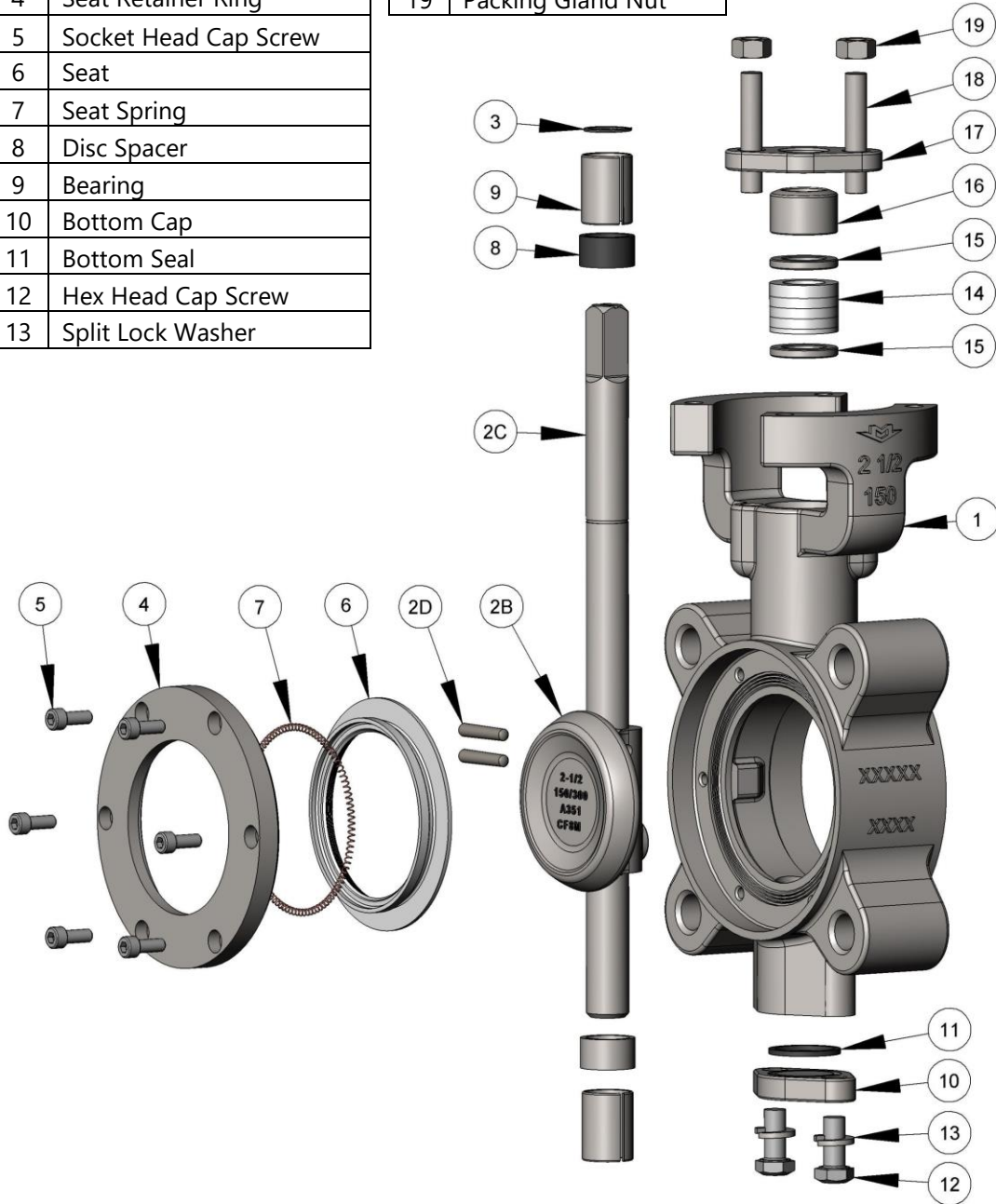
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1.0 Part Identification

#	Part Description
1	Body (Lug style shown)
2B	Disc
2C	Stem
2D	Taper Pin
3	Stem Retainer
4	Seat Retainer Ring
5	Socket Head Cap Screw
6	Seat
7	Seat Spring
8	Disc Spacer
9	Bearing
10	Bottom Cap
11	Bottom Seal
12	Hex Head Cap Screw
13	Split Lock Washer

#	Part Description
14	Packing V-Ring Set
15	Packing Washer
16	Gland Follower
17	Gland Retainer
18	Studs
19	Packing Gland Nut





2.0 Pre-Installation

2.1 General

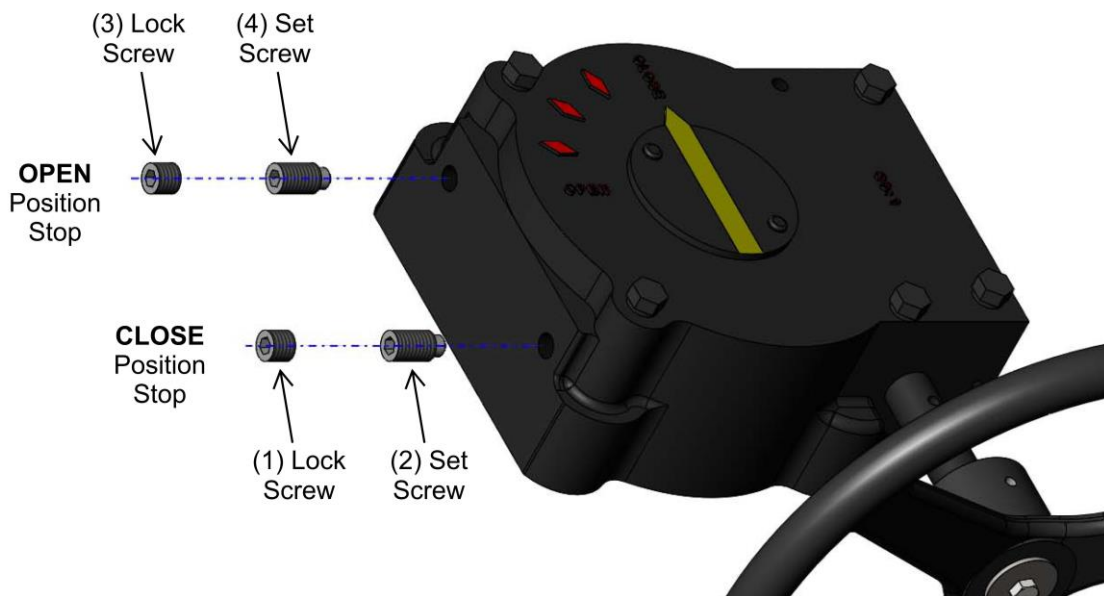
Milwaukee Valve's High Performance Butterfly Valve (HPBV) is designed for higher pressure and temperature requirements found in rigorous commercial and industrial applications. It is important to read carefully and follow the proper installation and maintenance procedures to maximize the valve's life and performance.

1. Inspect the valve to be certain the disc, seat, and waterway are free from foreign matter such as dirt, dust, pipe scale, welding slag, etc. Do not install a valve that shows signs of damage to the seating surfaces or pressure containing components.
2. Check the valve identification tag for valve class, materials, and operating pressure to be sure they are correct for the application. Also check the flange bolts or studs for proper size, threading, and length.
3. Mount the operator on the valve prior to installation in the pipeline to facilitate proper alignment of the disc in the valve seat.
4. On handle operated valves, note the valve handle's path of travel between the open and closed positions to ensure that necessary clearance is available when installed.
5. Always operate the valve to verify that the intended open and closed disc positions are properly set.

⚠ CAUTION: Personal injury or property damage may result if the valve is installed where service conditions could exceed the valve ratings.


2.2 Gear Operator Stop Adjustment

THE STOPS MUST BE PROPERLY SET BEFORE THE VALVE IS INSTALLED. While the HPBVs are shipped from the factory with the gear operator stops set, it is recommended that the valve be operated from the fully open position to fully closed position to verify the stops are set correctly. If adding a gear operator or the stops require adjustment, use the part identification below and follow the procedure on the next page.





1. With the adjustment screws facing you and the hand wheel shaft extending to the right, the right-hand stop will adjust the **CLOSE** position. Remove the outer lock screw (1) from the right-hand adjustment hole.
2. Open the valve slightly to release any pressure the gear operator may be applying to the close position set screw.
3. Loosen the internal **CLOSE** position set screw (2) by turning approximately 3-4 turns.
NOTE: The wrench size required is 6 mm for all gear operators except CL 150 sizes 14", 20", 24" and CL 300 size 12", which require 9 mm.
4. Close the valve until the disc is fully seated and engaged with the internal disc stop. DO NOT torque the valve tightly into the internal stop.
5. Adjust the **CLOSE** position internal set screw (2) until it contacts the gear. DO NOT over-torque the set screw into the gear, as this may result in improper positioning.
6. With the **CLOSE** position set screw adjusted (2), install the outer lock screw (1) and tighten until it contacts the internal set screw.
7. The left-hand stop will adjust the **OPEN** position. Remove the outer lock screw (3) from the left-hand adjustment hole.
8. If the valve is in the fully open position, close the valve slightly to release any pressure the gear operator may be applying to the open position set screw.
9. Loosen the internal **OPEN** position set screw (4) by turning approximately 3-4 turns.
10. Open the valve until the disc is in the desired open position. NOTE: It is not recommended to set the open position greater than 90 degrees from the fully closed position.
11. Adjust the **OPEN** position internal set screw (4) until it contacts the gear. DO NOT over-torque the set screw into the gear as this may result in improper positioning.
12. With the **OPEN** position set screw adjusted (4), install the outer lock screw (3), and tighten until it contacts the internal set screw.
13. Remember to cycle the valve to verify the open and close stops have been adjusted correctly.

 View a video demonstration of how to install a gear operator and adjust the stops:
https://www.youtube.com/watch?v=jMbwlznh_s

2.3 Lever Operator Installation

When a lever operator handle kit needs to be installed, follow the instructions below.

- 2 1/2" – 4" (assembly requires 7/16" wrench and 1/8" hex wrench)
 - 5" – 6" (assembly requires 9/16" wrench and 1/8" hex wrench)
 - 8" (assembly requires 3/4" wrench and 1/8" hex wrench)
1. Position the valve in the orientation as shown on the right. Verify that the valve disc is in the fully closed position (rotated fully clockwise), up against the internal disc stop. **THIS IS CRITICAL.**



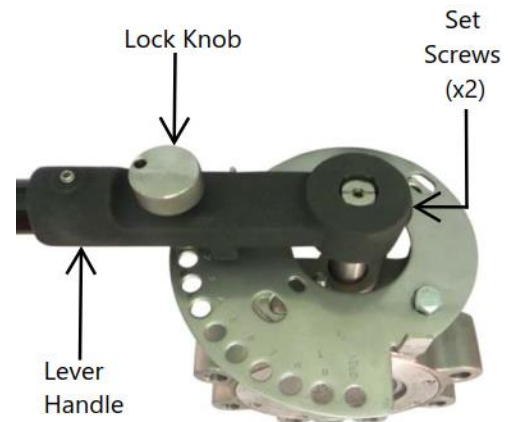
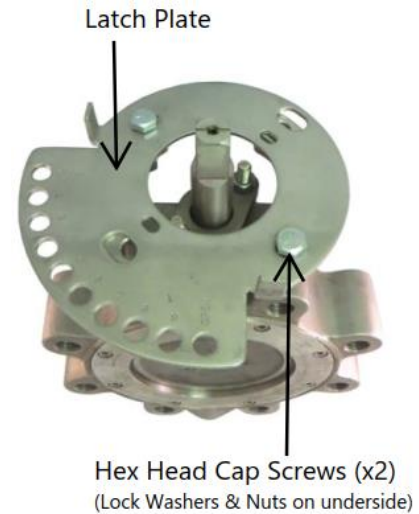


NOTE: For 6" and smaller valves, the linear groove on top of the valve stem is in alignment with the valve disc, indicating whether the valve is **OPEN** or **CLOSED** (closed in this case). Similarly, the 8" valve has a keyway on the valve stem and a matching set of keyways in the lever handle.

- Note that the valve can be rotated 180° so the handle comes out the opposite side, if necessary. Align, center, and assemble the Latch Plate to the valve so that the **OPEN** hole is at the six o'clock position, in alignment with the centerline of the valve and pipeline. Note that the **CLOSE** hole is at the nine o'clock position. The Lock Washer and Nut go to the underside. Finger-tighten only, as further position adjustment will be needed.
- Slip the Lever Handle over the valve stem so the axis of the handle aligns with the groove on top of the valve stem. On the 8" valve the keyway ensures alignment.

NOTE: Locate the spring-loaded Lock Knob. When the hole in the Lock Knob is aligned with the roll pin, the Lock Knob moves down into the latch-capable position. When the Lock Knob is pulled up and rotated out of engagement with the roll pin, it is in the non-latched position.

- Align the Latch Plate so the Lock Knob pin on the Handle engages in the **CLOSE** hole on the Latch Plate.
- Adjust the engagement of the Lever Handle onto the stem so that the locking pin, when in the up position, just clears the Latch Plate yet still engages into the **CLOSE** hole in the Latch Plate when down in the latch position.
- Tighten the Set Screws (1/8" hex) to secure the Lever Handle to the valve stem.
- Both the **CLOSE** and **OPEN** position alignment must be satisfied. Adjust the Latch Plate positioning so that when the valve disc is fully closed (against the internal stop of the valve), the Lock Knob pin falls into the **CLOSE** hole.
- Move the Lever Handle to the **OPEN** position and note if adjustment is necessary but do not adjust yet as all adjustment will be made with the Lock Knob pin back in the **CLOSE** hole. With the Lock Knob pin in the **CLOSE** hole, then make the estimated adjustment to the **OPEN** hole. Check and adjust again until they are aligned.
- Tighten down the Latch Plate. Re-check the alignment at **CLOSE** and **OPEN**. Re-adjust if necessary, until full alignment is achieved.





3.0 Installation

3.1 General

The HPBV can be installed in the pipeline with the stem in the vertical, horizontal, or other intermediate diagonal position, based on the application. However, in mediums with concentrations of solid or abrasive particles or media subject to solidification buildup, valve performance and service life will be improved by mounting the valve with the stem in the horizontal position.

NOTE: As with most valves, stem seals may require periodic adjustment; an installation that does not allow access to the valve stem should be avoided.

Although lug style HPBVs are capable of dead-end service, Milwaukee Valve recommends using a downstream flange for safety in these installations.

During initial valve cycling, perform a system flush before closing the valve to prevent debris, weld slag, or other piping installation debris from getting trapped and impinging upon the seat when the valve is closed.

🔊 View a video demonstration of a High Performance Butterfly Valve installation here:
<https://www.youtube.com/watch?v=qblPV1Qtm88>

3.2 Gaskets

Use 1/8" or thinner sheet gaskets that meet the dimensional requirements of ASME B16.21. The gaskets selected should be made of appropriate material suitable for the line media and the application the valves will be used in. Do not use thick elastomeric gaskets.

A full face or ring gasket is required for valve sizes 2-1/2" through 5", and spiral wound (3/16") or ring gaskets can be used for 6" and larger. Spiral wound gaskets are NOT to be used on 5" and smaller valves.

3.3 Flange Bolting

The HPBV is designed to fit between standard ASME B16.5 Class 150 and Class 300 flanges. When installing flange bolts, initially tighten bolts in a star pattern. Apply final target torque to bolts in a sequential pattern. The final required torque is dependent on the type of gasket, bolting material, lubrication, pressure conditions, and application fluid. Milwaukee Valve recommends consulting ASME standards and the gasket manufacturer to determine the appropriate bolting torque based on the specific application.

Recommended bolt and stud lengths for installation in ASME B16.5 and B16.47 Series A flanges are listed on the following pages. Lengths are based on gasket thickness of 1/8" (2-1/2" – 5") and 3/16" (6" and larger).

⚠ CAUTION: Flange bolting lengths are intended only as a guide to installation. Bolt lengths may vary depending on manufacturing tolerances of the valve, flange, gaskets, and bolting.



Recommended Flange Bolting Lengths

HP Class 150 | Lug

Valve Size	Flange Data		Lug Style		
	No. of Holes	Thread Size	Cap Screw	Blind Hole Cap Screw	Stud / Nut
2 1/2	4	5/8-11	(8) 1.75		(8) 2.50
3	4	5/8-11	(8) 2.00		(8) 2.50
4	8	5/8-11	(16) 2.00		(16) 2.75
5	8	3/4-10	(16) 2.00		(16) 2.75
6	8	3/4-10	(16) 2.00		(16) 2.75
8	8	3/4-10	(16) 2.50		(16) 3.25
10	12	7/8-9	(24) 2.50		(24) 3.25
12	12	7/8-9	(24) 3.00		(24) 3.75
14	12	1-8	(24) 3.25		(24) 4.25
16	16	1-8	(32) 3.25		(32) 4.50
18	16	1 1/8-8	(32) 3.75		(32) 5.00
20	20	1 1/8-8	(32) 4.25	(8) 3.00	(40) 5.50
24	20	1 1/4-8	(32) 5.00	(8) 4.00	(40) 6.25
30	28	1 1/4-8	(24) 6.50* (24) 6.00	(4) 5.00* (4) 4.50	
36	32	1 1/2-8	(56) 7.00	(8) 5.50	
42	36	1 1/2-8	(64) 7.00	(8) 6.00	
48	44	1 1/2-8	(36) 8.50* (36) 7.50	(8) 7.50* (8) 6.00	

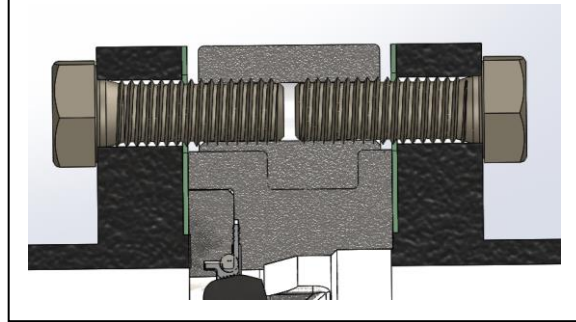
*Retainer side

HP Class 300 | Lug

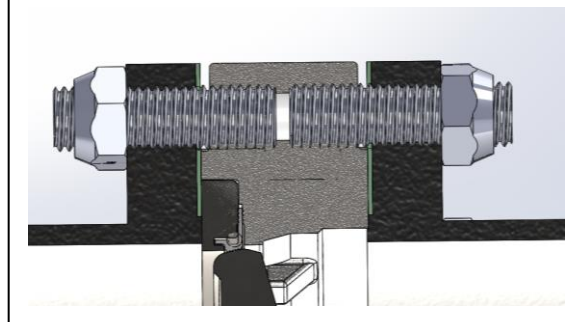
Valve Size	Flange Data		Lug Style		
	No. of Holes	Thread Size	Cap Screw	Blind Hole Cap Screw	Stud / Nut
2 1/2	8	3/4-10	(16) 2.00		(16) 2.75
3	8	3/4-10	(16) 2.00		(16) 3.00
4	8	3/4-10	(16) 2.25		(16) 3.25
5	8	3/4-10	(16) 2.50		(16) 3.25
6	12	3/4-10	(24) 2.50		(24) 3.25
8	12	7/8-9	(24) 3.00		(24) 4.00
10	16	1-8	(32) 3.50		(32) 4.50
12	16	1 1/8-8	(32) 3.75		(32) 5.00
14	20	1 1/8-8	(32) 4.50	(8) 3.50	(40) 5.50
16	20	1 1/4-8	(32) 4.75	(8) 3.75	(40) 6.00
18	24	1 1/4-8	(40) 4.75	(4) 4.00* (4) 3.75	
20	24	1 1/4-8	(40) 5.00	(4) 4.50* (4) 4.25	
24	24	1 1/2-8	(40) 5.75	(8) 4.75	

*Retainer side

Lug Valve & Cap Screws



Lug Valve & Studs/Nuts



CAUTION: Flange bolting lengths are intended only as a guide to installation. Bolt lengths may vary depending on manufacturing tolerances of the valve, flange, gaskets, and bolting.

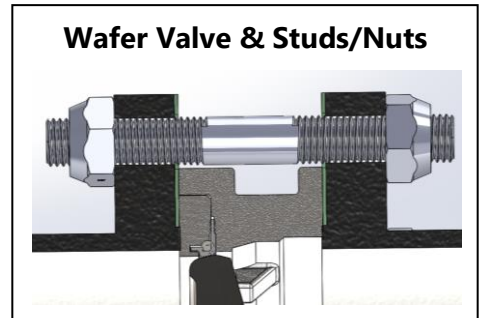
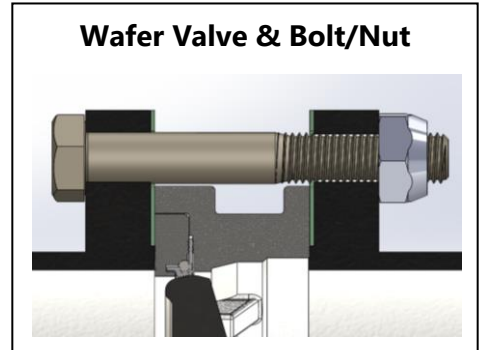
NOTES: Valve sizes 20" CL 150 & larger and 14" CL 300 & larger have tapped blind holes at the neck locations that do not permit thru holes, thus requiring either shorter cap screws or shorter studs.

Cap screw lengths for 30" CL 150 & larger and 18" CL 300 & larger have been calculated using 1/8"-1/4" washer thickness. If washers are not being used, this thickness may need to be subtracted from the recommended lengths.



HP Class 150 | Wafer

Valve Size	Flange Data		Wafer Style			
	No. of Holes	Thread Size	Bolt / Nut	Blind Hole Cap Screw	Stud / Nut	Blind Hole Stud/Nut
3	4	5/8-11	(4) 4.75		(4) 5.25	
4	8	5/8-11	(8) 5.00		(8) 5.50	
6	8	3/4-10	(8) 5.25		(8) 6.00	
8	8	3/4-10	(8) 6.00		(8) 6.75	
10	12	7/8-9	(12) 6.25		(12) 7.25	
12	12	7/8-9	(12) 6.75		(12) 7.75	
14	12	1-8	(12) 7.75		(12) 8.75	
16	16	1-8	(16) 8.25		(16) 9.25	
18	16	1 1/8-8	(16) 9.00		(16) 10.25	
20	20	1 1/8-8	(16) 9.75	(8) 3.00	(16) 11.00	(8) 5.50
24	20	1 1/4-8	(16) 11.25	Contact Factory	(16) 12.75	(8) 6.25



HP Class 300 | Wafer

Valve Size	Flange Data		Wafer Style			
	No. of Holes	Thread Size	Bolt / Nut	Blind Hole Cap Screw	Stud / Nut	Blind Hole Stud / Nut
3	8	3/4-10	(8) 5.25		(8) 6.00	
4	8	3/4-10	(8) 5.75		(8) 6.50	
5	8	3/4-10	(8) 6.00		(8) 6.75	
6	12	3/4-10	(12) 6.25		(12) 7.00	
8	12	7/8-9	(12) 7.50		(12) 8.75	
10	16	1-8	(16) 8.50		(16) 9.50	
12	16	1 1/8-8	(16) 9.25		(16) 10.25	
14	20	1 1/8-8	(16) 10.50	(8) 3.50	(16) 11.50	(8) 5.50
16	20	1 1/4-8	(16) 11.50	(8) 3.75	(16) 13.00	(8) 6.00

CAUTION: Flange bolting lengths are intended only as a guide to installation. Bolt lengths may vary depending on manufacturing tolerances of the valve, flange, gaskets, and bolting.

NOTE: Valve sizes 20" CL 150 & larger and 14" CL 300 & larger have tapped blind holes at the neck locations that do not permit thru holes, thus requiring either shorter cap screws or shorter studs.



4.0 Operation

All HPBVs have quarter-turn operation. Turning the valve handle 90° clockwise will fully close the valve. The valve handle also serves as a disc position indicator. When the valve handle is parallel to the pipe, the valve is open. When perpendicular to the pipe, the valve is closed.

All soft seated valves provide bubble-tight shut-off. Under certain conditions, throttling flow in the near-closed position can destroy the valve seats. The range for throttling service should be limited from 30° to 70°.

⚠ CAUTION: On steam applications, the valve must be operating under 50 psig for modulating service.

Actuators must be selected for maximum breakaway torque for line pressure and media. Some highly viscous or abrasive services could cause an increase in torque requirements. Contact the factory for assistance sizing and selecting an appropriate actuator.

5.0 Maintenance

5.1 General

HPBVs are low maintenance valves during normal service. Periodic stem packing adjustment may be required if necessary. Slightly tighten packing nuts equally until leakage stops. Avoid over-tightening which may result in excessive valve torque or premature packing wear.

Stem leaks should not go unattended. Lack of maintenance of stem leakage could cause premature seal degradation. If the operating temperatures of a system are substantially higher or lower than 80°F, initial stem seal adjustment may be required.

Refer to Section 1.0 for part identification.

5.2 Valve Removal

⚠ WARNING: Before beginning any work, ensure that all Lock-Out/Tag-Out guidelines and safety procedures are followed.

1. Verify the piping has been depressurized and drained. It can be possible for fluid to be trapped in the valve cavity when the valve is in the closed position.

If the valve has been used to control a hazardous media, place valve in its half-open position and flush the line to remove the hazardous material from the valve cavities prior to removal from the line. Proper protective clothing and eye protection should always be utilized.

2. Attach lifting straps as necessary to secure the weight of the valve.
3. With the valve disc in the fully closed position, loosen and remove all bolting from the mating flanges.
4. Remove the valve from between the flanges.
5. Discard used gaskets and clean the seal surfaces to remove any gasket residue.



5.3 Seat Replacement

1. Remove valve from the piping per procedure in 5.2.
2. Open valve slightly to disengage disc from the seat and remove all seat retainer socket head cap screws.
3. Remove the seat retainer by lifting it from the valve body. Seat and spring should be attached to the seat retainer.
4. Remove the seat and spring assembly from the retainer.
5. Carefully clean the retainer groove and valve body face of any debris. Inspect the disc seating area for scratches or damage.
6. Place spring around the seat groove and snap into the retainer, ensuring the flat back of the seat is flush with the top edge of the retainer.
7. With the valve in the closed position and lying flat on a safe working surface, place the seat retainer assembly into the valve body so the seat sits on the disc sealing edge and is not pinched or damaged by the disc/seat retainer. Ensure bolt holes are aligned.
8. Install seat retainer cap screws using a star pattern until snug. Torque respective cap screws as follows:

Table 3: Seat Retainer Screw Torque Values

Valve Size	CL 150 Torque (in-lb)		CL 300 Torque (in-lb)	
	Lug	Wafer	Lug	Wafer
2 1/2"	14	N/A	14	N/A
3"	29	14	29	14
4"	29	14	29	14
5"	29	N/A	29	N/A
6"	29	29	29	29
8"	29	29	60	29
10"	29	29	60	29
12"	92	29	189	29
14"	92	29	189	29
16"	92	29	189	29
18"	92	29		
20"	92			
24"	92			

9. Operate the valve and inspect the seat for any damage. Disc must be closed completely before reinstalling the valve in the line.



5.4 Stem Packing Replacement

1. Remove valve from the piping per procedure in 5.2.
2. Remove packing gland nuts, gland retainer, gland follower, stem retainer ring, and top packing washer.
3. Use packing removal tool to puncture and remove packing rings, being careful not to damage seal surfaces or the base ring.
4. Clean packing cavity and gland. Inspect for any possible damage.
5. Insert new packing V-ring set over stem and drive to bottom of packing bore. Place top metal packing washer over the V-ring packing.
6. Install stem retainer ring, gland follower and gland retainer. Secure finger tight with self-locking retainer nuts. Tighten as required when installed into service.

5.5 Bottom Seal Replacement

NOTE: This procedure can be performed by one person, however it may be preferable to have two people available, so when the bottom cover is removed one person can hold a rag up into the opening while the second person removes and replaces the seal in the cover.

If the service is performed by one person, or in a wet (but otherwise depressurized) system where too much water could escape the bottom of the valve while the cover is removed, simply hang a bucket under the valve to catch the drainage.

⚠ WARNING: Do not replace under pressure. If the service was at an elevated temperature, allow piping to cool sufficiently to handle safely before proceeding.

1. Remove all hex head cap screws holding the bottom cover on the valve (two on 2 1/2" to 6" valves, four on all larger sizes). Set aside cap screws and remove bottom cover.
2. Remove existing graphite ring from cover using the tip of a knife, a dental tool or other similar sharp implement—take care not to scratch the metal sealing surfaces on the gland, cover, or valve body.
3. Inspect mating surfaces on the bottom cover and valve body. Remove any debris that could impede a full metal-to-metal contact on reassembly, taking care not to damage these surfaces which could create a leak path.
4. Install new graphite ring into the groove of the bottom cover.
5. Bring bottom cover up into position at the bottom of the valve. Re-install all hex head cap screws, finger-tightening evenly so the cover is metal to metal all around.
6. Torque the bottom cover cap screws using a star pattern to medium tight, or to the appropriate torque for stainless steel by size.



5.6 Spare Parts

HPBV Repair Kit includes RTFE Seat, Seat Spring, PTFE Packing Set, and Graphite Bottom Cap Seal. Other replacement parts or accessories can be available upon request.

Valve Size	Pressure Class	Repair Kit Part #
2 1/2"	CL 150/300	H8852130000
3"	CL 150/300	H8803130000
4"	CL 150/300	H8804130000
6"	CL 150/300	H8806130000
8"	CL 150/300	H8808130000
10"	CL 150	H8810150000
	CL 300	H8810300000
12"	CL 150	H8812150000
	CL 300	H8812300000
14"	CL 150	H8814150000
	CL 300	H8814300000
16"	CL 150	H8816150000
	CL 300	H8816300000
18"	CL 150	H8818150000
20"	CL 150	H8820150000
24"	CL 150	H8820150000

5.7 General Troubleshooting

Contact the factory with other issues requiring assistance.

Issue	Recommended Solution	Section
Leaking at the valve stem	Slightly tighten gland retainer nuts until leakage stops.	5.1
	If leakage does not stop, packing may be damaged or worn. Replace stem packing.	5.4
Leaking between flange and valve	Tighten flange bolts.	3.3
	Inspect retainer face for scratches or major damage. Replace flange gasket.	3.2
Leaking past the valve seat	Confirm the closed travel stop is fully engaged with the internal valve stop.	2.2 / 2.3
	Confirm there is no dirt or debris preventing the seat from sealing. Clean seat and retainer groove.	5.3
	Debris during installation may have damaged the seat, and it may need to be replaced.	5.3
	Inspect the disc sealing surfaces. If required, replace disc and stem assembly. Contact factory for further assistance.	-

The information contained within this document is believed to be accurate at the time of publication. Milwaukee Valve reserves the right to change design and/or materials without notice. For additional information, visit our website at www.milwaukeevalve.com.

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