



VSI AWWA C504 HP
HIGH PERFORMANCE BUTTERFLY VALVES

Valve Solutions Inc.

6" - 72" AWWA C504 HP

HIGH PERFORMANCE BUTTERFLY VALVES

INSTALLATION, OPERATION AND MAINTENANCE MANUAL



Publication: **VHPBV-4**
MAR 2022



TABLE OF CONTENTS

SCOPE	3
WARNINGS	3
GENERAL	4
UNLOADING	4
INSPECTION PRIOR TO INSTALLATION	4
STORAGE	4
INSTALLATION	4
TESTING	5
OPERATION	6
MAINTENANCE	6
SEAT REPLACEMENT	7
SEAT ADJUSTMENT	8

SCOPE:

This installation, operation, and maintenance manual covers the VSI high performance AWWA C504 Butterfly valve and should be read and understood thoroughly by all parties responsible for installation and continued use/maintenance.

WARNINGS:

The critical safety messages within this manual are labeled with an exclamation symbol within a red triangle flag. Care should be taken to thoroughly read and understand these warnings before proceeding to ensure no damage to equipment occurs. Failure to follow all warnings could result in injury or death.



WARNING!

All parties that take part in any installation or continued use/maintenance are cautioned to be vigilant in the possible exposure to media that is contained within the valve and its pipeline. Because of the vast range of media that could be within the valve, protection from pipeline media is not within the scope of this manual. All personnel should be aware of the media within the valve and take appropriate precautions when exposure is possible while installing or servicing the valve.

RECEIVING:

The VSI high performance AWWA C504 Butterfly valve is rugged and will be packaged to provide protection during most shipping incidents, however care should be taken to inspect the valve on receipt for any possible shipping damage. Inspection should be performed as soon as practical. Failure to promptly notify VSI of any shipping damage may invalidate any claim for shipping damage. Most shipments from VSI will be made FOB Origin, unless noted on the sales documents, the purchaser will own the freight while in transit, assumes all risk while in transit, and will be responsible for reporting shipping damage promptly to the carrier.



WARNING!

Read all applicable instructions and directions prior to any maintenance, installation or troubleshooting.



INSTALLATION, OPERATION AND MAINTENANCE VSI AWWA C504 HP HIGH PERFORMANCE BUTTERFLY VALVES

SECTION 1 - GENERAL

Butterfly valves are a significant component of any water distribution system or treatment plant operation. Valve failure caused by faulty installation, improper operation, or maintenance in these systems could result in damage, downtime, and costly repairs. In buried or underground installations, problems or malfunctions can result in extensive and costly excavation to correct or eliminate the problem. Many problems with butterfly valves can be traced to improper installation, operation, or maintenance procedures.

SECTION 2 - UNLOADING

Inspect valves on receipt for damage in shipment and conformance with quantity and description on the shipping notice and order. Unload valves carefully to the ground without dropping. On valves larger than 36 in. (900 mm), use forklifts or slings under the skids. On smaller valves, do not lift valves with slings or chain around the operating shaft, actuator, or through the waterway. Lift these valves with eye bolts or rods through the flange holes or chain hooks at ends of the valve parts.

SECTION 3 - STORAGE

If it is not practical to store the valve indoors, protect the valve and actuators from weather and the accumulation of dirt, rocks, and debris. When valves fitted with power actuators and controls are stored, energize electric actuators or otherwise protect electrical-control equipment to prevent corrosion of electrical contacts caused by condensation resulting from temperature variation. Do not expose rubber seats to sunlight or ozone for any extended period. Also, see the manufacturer's specific storage instructions.

SECTION 4 - INSPECTION PRIOR TO INSTALLATION

Make sure flange faces, joint-sealing surfaces, body seats, and disc seats are clean. Check the bolting attaching the actuator to the valve for loosening in transit and handling. If loose, tighten firmly. Open and close the valve to make sure it operates properly and that stops or limit switches are correctly set so that the valve seats fully. Close the valve before installing.

SECTION 5 - INSTALLATION

It is strongly recommended that instruction manuals supplied by the valve manufacturer be reviewed in detail before installing butterfly valves. Be sure that inspection, as described in Sec. 4, is carried out at the jobsite prior to installation.

Sec. 5.1 Handling

Handle valves carefully when positioning, avoiding contact or impact with other equipment, vault walls, or trench walls.

Sec. 5.2 Integrity

Valves are to be installed in accordance with the manufacturer's instructions. To maintain the integrity of valves greater than 48 in., it is important to avoid subjecting the valve to pipe loads that could drive the valve out of round, such as the use of valve foundations or supports without proper pipe supports. The valve should be supported independently of the adjacent piping, and the adjacent piping should be supported independently of the valve. Piping to and from the valve should be adequately supported and controlled. Valve inlet and outlet piping should be supported as near to the valve as practical. This removes most of the



INSTALLATION, OPERATION AND MAINTENANCE

VSI AWWA C504 HP HIGH PERFORMANCE BUTTERFLY VALVES

static load and allows identification of piping fit problems during installation and easier removal of the valve for maintenance. Piping considerations should include allowable flange loadings, thermal expansion and contraction, and differential settlement.

Sec. 5.3 Adjustable Seats

The VSI AWWA C504 HP Butterfly Valves are bi-directional, but when deciding upon the valves installation, you should consider placing the valve for optimal access and flow in regards to the seat. The preferred installation method is having the seat end facing into the flow direction.

Sec. 5.4 Foreign Material

Foreign material in a butterfly valve can damage the rubber seat when valves are operated. Be sure valve interiors and adjacent piping are cleaned of foreign material prior to mating up valve-to-pipe-joint connection.

Sec. 5.5 Pipe Ends

Prepare pipe ends and install valves in accordance with the pipe manufacturer's instructions for the joint used. Do not deflect the pipe-valve joint. Do not use a valve as a jack to pull pipe into alignment. The installation procedure should minimize the bending of the valve/pipe connection with pipe loading.

Sec. 5.6 Pipe Diameters

Make sure the valve disc, when opened, will not contact the pipe port. This is especially necessary on pipe with linings and when wafer valves are used. Check manufacturer's recommendations for minimum pipe inside diameter required for clearance.

Sec. 5.7 Valve Boxes and Buried Service

Buried valves installed with valve boxes shall be installed so that the valve box does not transmit shock or stress to the valve actuator as a result of shifting soil or traffic load.

Sec. 5.8 Vaults

When valves are installed in vaults, the vault design shall provide space for removal of the valve-actuator assembly for purposes of repair. The possibility of groundwater or surface water entering the valve and the disposal of the water should be considered. The valve operating nut should be accessible from the top opening of the vault with a tee wrench.

SECTION 6 - TESTING

When rubber-seated butterfly valves are used to isolate sections of a line for testing, it is important to realize that these valves are designed or factory adjusted to hold rated pressure only. Test pressures above valve rated pressure may cause leakage past the rubber seat and damage to the valve.

Sec. 6.1 Testing of Buried Valves

All buried valves should be fully tested before backfilling. Once valves are buried adjusting the seat or seating angle may be difficult or impossible. In no instance will VSI be held responsible for the excavation costs of valves that were not line-tested before backfilling.

Sec. 6.1 Hydrostatic testing

In order to prevent time lost searching for leaks, where feasible, it is recommended that excavations for buried valves not be backfilled until after pressure tests have been made.

Sec. 6.2 Valve flushing

Seat leakage can occur from foreign material in the line. If this occurs, open the valve 5°–10° to obtain high-velocity flushing action, then close. Repeat several times to clear the seats for tight shutoff.

Sec. 6.3 Seat leakage

Seat leakage can result from a rotational shift in position of the disc with relation to the body seat. Readjust closing the stop in accordance with the manufacturer's instructions.



SECTION 7 - OPERATION

Sec. 7.1 Pressure ratings

Do not permit the use or operation of any valve at pressures above the rated pressure of the valve.

Sec. 7.2 Torque limits

Do not exceed 300 ft-lb (406 Nm) input torque on actuators with wrench nuts and do not exceed 200-lb (890 Nm) rim pull for handwheels or chainwheels. If portable auxiliary actuators are used, size the actuator or use a torque limiting device to prevent application of torque exceeding 300 ft-lb (406 Nm). If an oversize actuator with no means of limiting torque is used, stop the actuator before the valve is fully opened or closed against stops and complete the operation manually. Be sure to check the actuator directional switch against the direction indicated on wrench nut, handwheel, or records before applying opening or closing torque.

Sec. 7.3 Stuck valves

If a valve is stuck in some intermediate position between open and closed, check first for jamming in the actuator. If nothing is found, the interference is inside the valve. In this case, do not attempt to force the disc open or closed, because excessive torque in this position can severely damage internal parts.

SECTION 8 - MAINTENANCE

The VSI AWWA C504 HP High Performance Butterfly valves require no regularly scheduled lubrication or maintenance other than being exercised. Exercising is considered being fully opened and closed to verify the valve is smoothly operating. If the initial operation of the valve is difficult, it may be necessary to flush any sediment from the valve by operating the valve several times under flowing conditions. The recommended interval for exercising is every six months, or annually if the valve is under regular operation.

Maintenance of rubber-seated butterfly valves by the owner is generally limited to actuators and shaft seals. In some instances, valve design permits field adjustment or replacement of rubber seats when leakage occurs past the disc. Unless the owner has skilled personnel and proper equipment, any major internal problem will probably require removal of the valve from the line and return to the manufacturer for repair.

Sec. 8.1 Prompt repairs

Normal maintenance is in the area of shaft seals and actuators. Seal leakage, broken parts, hard operation, and, in some cases, seat leakage should be corrected by a repair crew as soon as possible after a defect is reported.

Sec. 8.2 Field repairs

If repairs are to be made in the field, repair crews should take a full complement of spare parts to the jobsite. Be sure to review the valve manufacturer's maintenance instructions prior to any repair work.

Sec. 8.3 Line flow

Provision should be made to stop line flow and isolate the valve from line pressure prior to performing any corrective maintenance.

Sec. 8.4 Valve cycling

After completing repairs, cycle the valve through one complete operating cycle and, after line pressure has been restored, inspect for leakage.

Sec 8.5 Packing Adjustment

Visually inspect the packing area for leaks yearly and tighten packing gland bolts if leakage is observed. If



INSTALLATION, OPERATION AND MAINTENANCE

VSI AWWA C504 HP HIGH PERFORMANCE BUTTERFLY VALVES

leaking packing cannot be corrected by tightening gland bolts replacement of packing is necessary.

1. Remove line from service and isolate valve as necessary
2. Remove actuator following appropriate actuator manual.
3. Loosen and remove gland bolts(7). Inspect for damage and replace if necessary.
4. Remove the gland(6). Inspect for damage and replace if necessary.
5. Using a packing removal tool or pick remove the packing rings(8) taking care not to scratch or damage the packing housing of the valve body or the valve shaft.
6. Carefully clean the packing housing with compressed air and brass brushes
7. Insert the new packing set, only using compatible grease if necessary.
8. Reinstall the gland(6) and gland bolts(6).
9. Tighten gland bolts(7) snug.
10. Return valve to service and inspect packing for leakage. If leakage is observed tighten each packing bolt/nut 1/2 turn at a time until leakage ceases.

Sec. 8.6 Notifications

If major repairs require the removal of the valve for repair, be sure to notify interested parties in the water department and fire department that the valve and line are out of service. On completion of repair and reinstallation, notify the same personnel of the return of the valve and line to service.

Sec 8.7 Parts

Order parts from your Valve Solutions Inc. sales representative. Please include the serial number, located on the valve tag, when ordering parts.

SECTION 9 - SEAT REPLACEMENT AND ADJUSTMENT

The VSI AWWA C504 HP High Performance Butterfly Valves have a field replaceable seat that can be replaced while the valve is in the open or closed position, and still installed in the pipeline. To replace the seat, you will need the following: a new seat and an NSF 61 approved lubricant (such as Dow Corning 111 or Phoenix 505).

1. Relieve pipeline pressure and drain the section near the valve
2. Warning - Accidental operation of a powered actuator can cause personal injury or equipment damage. Disconnect and lockout power to any connected actuator before service.
3. If there is a powered actuator installed, disconnect and lock-out the powering source (pneumatic, electric or hydraulic) to prevent accidental operation of the actuator.
4. If the valve is to be repaired in line, remove the piping from the seat side of the valve. If the valve is to be serviced outside the pipeline, remove the valve from the pipeline.
5. Remove the cap screws(13), and the seat retaining ring(12) from around the disc(2).
6. Remove the seat(11) from the disc(2) area.
7. Carefully clean the area that the seat is retained in. Make sure to remove and debris or other foreign material from the seat groove.
8. Place the replacement seat(11) back into seat grove on the disc, aligning the seat so that it matches the alignment holes on the disc (if applicable).
9. Starting at the top of the disc, place the seat(11) retaining ring on the seat, then add each cap screw(13) one at a time, lightly tightening until finger tight.



INSTALLATION, OPERATION AND MAINTENANCE VSI AWWA C504 HP HIGH PERFORMANCE BUTTERFLY VALVES

10. After all the cap screws(13) are in place, apply a thin layer of lubricant on the exposed rubber surface of the seat(11).
11. Tighten the seat bolts(13) in a crossover pattern in two steps. Cycle the valve open and closed and verify that the disc closes with $\pm\frac{1}{4}$ of center. Conduct a pressure test, and if necessary, tighten any seat bolts(13) in the observed leakage location no more than $\frac{1}{2}$ turn at a time to stop any leakage.

SECTION 10 - SEAT ADJUSTMENT

Sec. 10.1 - New Seat Adjustment

1. Replace seat per Sec. 9.1 Seat Replacement
2. Open the valve disc(2). Clean and lubricate the seat(11) and seat surface(10) on the disc edge with your NSF 61 certified lubricant (such as Dow Corning 111 or Phoenix 505)
3. Close valve disc completely
4. Torque all cap screws(13) to 75 in/lbs in a crisscross pattern, and then again to 150 in/lb. This will cause the compression of the seat(11) to be uniform across the entire seating surface.
5. Apply water up to test pressure rating, note the location of any leakage.
6. Select one cap screw(13) where leakage is occurring and tighten the locknut $\frac{1}{4}$ to $\frac{1}{3}$ of a turn. Bypass cap screws where there is no leakage. Continue this process clockwise around the seat until the last leak has been stopped.

Sec. 10.2 Existing Seat Adjustment

1. Note the location of seat leakage.
2. Select one cap screw(13) where leakage is occurring and tighten the locknut $\frac{1}{4}$ to $\frac{1}{3}$ of a turn. Bypass cap screw where there is no leakage.
3. Continue this process until the last leak has been stopped.

NOTE: The minimum amount of torque should be used to achieve a seal at the seat. This will lower the valve operating torque, and extend the seat's life.

