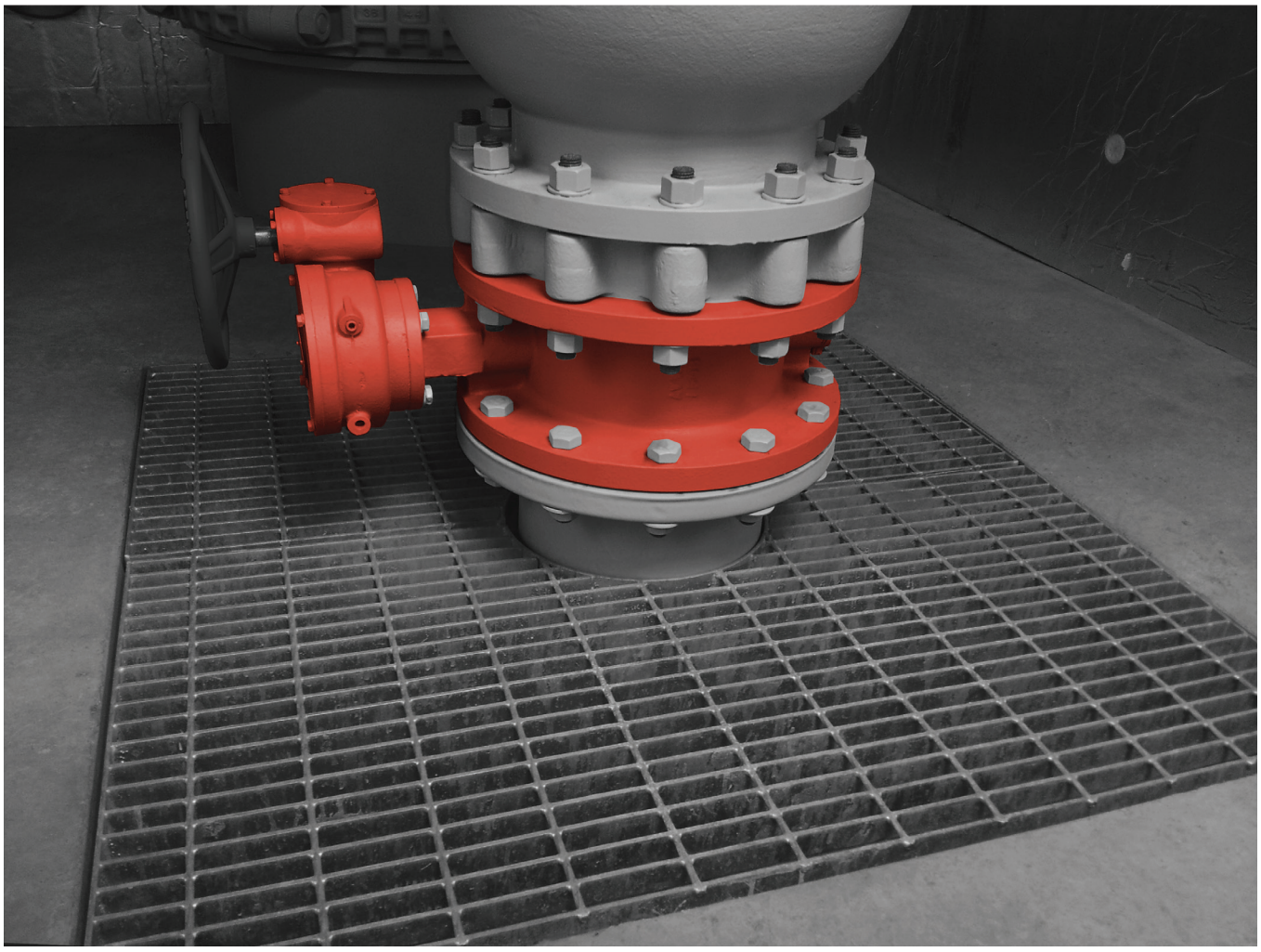
VSI Waterworks

24″ - 120″ AWWA C504 REPLACEABLE SEAT BUTTERFLY VALVES

INSTALLATION, OPERATION AND MAINTENANCE MANUAL



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SCOPE:

This installation, operation, and maintenance manual covers the AWWA C504 replaceable seat 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 replaceable seat 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.

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

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

When valves have adjustable seating, install the seat-adjustment side of the valve for access and adjustment in service.

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 Wafer Valves

In the case of wafer-type butterfly valves, concentrically center the valve disc between the mating flanges.

Sec. 5.7 Installation Location and Orientation

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. When valves have adjustable seating, install the valve with flow into the back of the disc. Meaning the flat disc face where the seat retaining rings are located will be pointed downstream. This orientation will provide the best orientation for debrise clearing.

Sec. 5.8 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. 5.9 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 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 ft-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

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 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 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 8.6 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 - PACKING REPAIR

Sec. 9.1 Packing Adjustment

If leakage occurs at stem seal packing tighten each gland bolt one quarter turn and observe leakage. If leakage is still observed continue tightening gland bolts in one quarter turn increments until leakage stops. If leakage does not stop replace packing.

Sec. 9.2 Packing Replacement

If adjustment of packing does not stop leakage replacement of packing is necessary. Remove valve from service and isolate from pressure. Below are the two methods of replacing packing.

Replacement Technique 1: Removal of gearbox

If equipped with an operator remove the bolts holding the operator to the valve or valve stem. Before removal of the operator note the orientation for reinstallation later. Remove the valve operator to access the packing gland. Remove gland retaining bolts, lift and remove packing gland. Using packing tools and picks remove packing rings making sure not to scratch the valve shaft or body. Lightly grease new packing rings with a food safe silicone grease. Press the packing into packing recess starting with the bottom packing ring (flat bottom, convex top), filling the middle with the intermediate packing (concave and convex sides), and finishing with the upper packing ring (concave bottom, flat top). Reinstall the packing gland and tighten gland bolts snug. If the gland provides no compression add more intermediate rings. If it is impossible to tighten the packing gland down remove an intermediate ring. Return valve to service. If leakage is observed at packing tighten gland bolts as outlined in Section 9.1.

Replacement Technique 2: Split Packing Rings

Remove gland retaining bolts, lift and hold packing gland out of the way. Using packing tools and picks lift packing rings making sure not to scratch the valve shaft or body. To remove the rings cut them off of the shaft. Using a sharp razor, split each ring in one spot. Lightly grease new packing rings with a food safe silicone grease. Wrap the packing around the shaft and press the packing into packing recess. Staggering where the cut is located, start with the bottom packing ring (flat bottom, convex top), filling the middle with the intermediate packing rings (concave and convex sides), and finishing with the upper packing ring (concave bottom, flat top). Reinstall the packing gland and tighten gland bolts snug. If the gland provides no compression add more intermediate rings. If it is impossible to tighten the packing gland down remove an intermediate ring. Return valve to service. If leakage is observed at packing tighten gland bolts as outlined in Section 9.1.

SECTION 10 - SEAT REPLACEMENT AND ADJUSTMENT

The VSI AWWA C504 Replaceable Seat 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, new ring segments, studs, and an NSF 61 approved lubricant (such as Dow Corning 111 or Phoenix 505). For making adjustments to the seat you will need the appropriate torque wrench, and socket to fit the lock nuts.

Sec. 10.1 - Seat Replacement

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

Sec. 10.2 - New Seat Adjustment

1. Replace seat per Sec. 10 Seat Replacement
2. Open the valve disc. Clean and lubricate the seat and seat surface 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 locknuts to 65-70 in/lbs in a crisscross pattern, and then again to 95 in/lb. This will cause the compression of the seat to be uniform across the entire seating surface. Do not exceed 110 in/lb.
5. Apply water up to test pressure rating, note the location of any leakage.
6. Select one locknut where leakage is occurring and tighten the locknut 1/4 to 1/3 of a turn. Bypass locknuts where there is no leakage. Continue this process clockwise around the seat until the last leak has been stopped.

Sec. 10.3 Existing Seat Adjustment

1. Note the location of seat leakage.
2. Select one locknut where leakage is occurring and tighten the locknut 1/4 to 1/3 of a turn. Bypass locknuts 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 seats life.

SECTION 11 - TROUBLESHOOTING

Condition	Possible Cause	Corrective Action
Packing leakage	Packing is loose	Adjust packing
	Packing is worn	Replace packing
Flange leakage	Flange bolts not tightened	Tighten flange bolts
	Gasket is worn	Replace gasket
Valve leaks when in closed position	Valve is not fully closed	Increase force on handwheel to fully close valve
	Seat is damaged	Replace seat
	Seat mating surface on body is damaged	Consult manufacturer
	Debris in seat	Cycle valve several times
Valve does not fully close	Object is stuck between the body and disc	Fully open valve to remove object. If obstruction remains open pipe and remove the foreign object.
Opening and/or closing torque is excessive	The valve bearings have become worn beyond service	Inspect and replace bearings if necessary
	The shaft/s, body, or disc have become bent or warped	Inspect and replace component if necessary
	Packing gland screws are over-tightened	Loosen screws and replace packing if needed