



VSI AWWA C517 ECCENTRIC PLUG VALVES

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*VSI Waterworks*  
**2" - 72" AWWA C517  
ECCENTRIC PLUG VALVES**

**INSTALLATION, OPERATION AND MAINTENANCE MANUAL**



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**SCOPE:**

This installation, operation, and maintenance manual covers the VSI AWWA C517 resilient seated eccentric plug 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 AWWA C517 Resilient Seated Eccentric Plug 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.

**PARTS:**

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

 **WARNING!**

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



## **SECTION 1: GENERAL**

Plug valves are a significant component of any water distribution system or treatment plant operation. Valve failure due to faulty installation, improper operation, or maintenance in such systems could result in damage, downtime, and costly repairs. In buried or underground installations, problems or malfunctions can result in extensive and costly unearthing operations to correct or eliminate the problem. Many problems with plug 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 6 in. (150 mm), use forklifts or slings under skids. On smaller valves, do not lift valves with slings or chain around actuator or through waterway. Lift these valves with eyebolts or rods through flange holes or chain hooks at the ends of 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 due to condensation resulting from temperature variation. Do not expose resilient 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 valve ends and seats are clean. Check all exposed bolting for loosening in transit and handling and tighten to manufacturer's recommendations. Open and close the valve to make sure it operates properly and that stops or limit switches are correctly set so that the plug seats fully. Close the valve before installing. Check coatings for damage and repair as required.

## **SECTION 5: INSTALLATION**

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

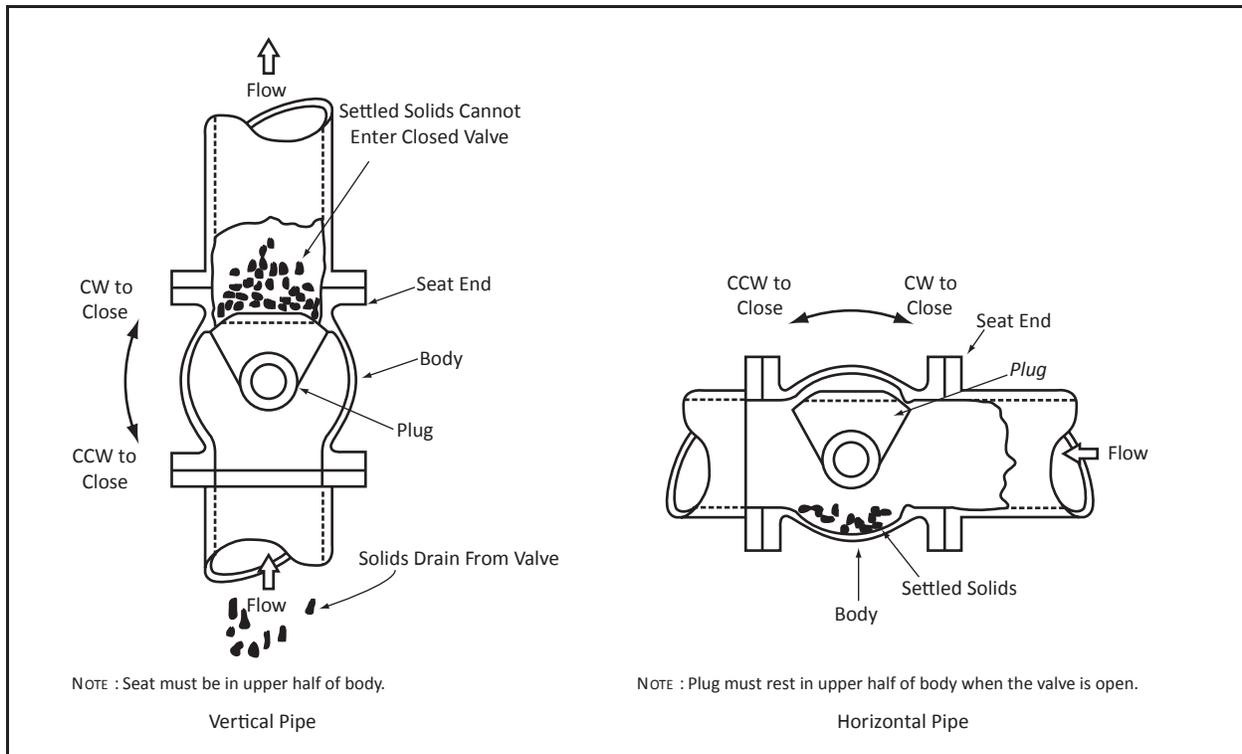
### **Sec. 5.1 Handling**

Handle valves carefully when positioning, avoiding contact or impact with other equipment or structures.

**Sec. 5.2 Service Conditions**

Valves are to be installed in accordance with the manufacturer’s instructions.

**5.2.1 Clean service.** Eccentric plug valves used for fluids free of suspended solids may be installed in any orientation. If practical, the valves shall be installed so the pipe line pressure is exerting force on the plug from opposite the seat end of the valve (direct pressure).



*Image courtesy of Robert O'Neill*

**Figure 1.** Recommended installation position for suspended solids service

**5.2.2 Other service.** Eccentric plug valves used for fluids containing suspended solids should be installed as shown in Figure 1. When installed in horizontal pipes, the axis of the plug is to be horizontal, with flow entering the valve body from the seat end. The plug is to rotate counterclockwise to open, keeping the plug in the upper half of the body. When installed in vertical pipes, the seat end shall be oriented as shown in Figure A-1.

**Sec. 5.3 Buried Installations**

When practical, valves in buried installations should be located in unpaved areas.

**Sec. 5.4 Cleaning**

Be sure valve interiors, ends, and adjacent piping are cleaned of foreign material prior to making 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. In plant piping, the valve shall be installed so as to minimize the bending stresses in the valve end connection with pipe loading.

### **Sec. 5.6 Installation**

For mechanical-joint end valves, lubrication and additional cleaning should be provided by brushing both the gasket and the plain end of the mating pipe with soapy water or pipe lubricant just before slipping the gasket onto the plain end and assembling the joint. When tightening bolts, it is essential that the gland be brought up toward the bell flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. This may be achieved by first partially tightening the bottom bolt, then the top bolt, next the bolts at either side, and finally, the remaining bolts. This process should be repeated until all bolts are fully torqued.

### **Sec. 5.7 Valve Boxes**

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 Valves Installed in Vaults**

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

## **SECTION 6: TESTING**

When resilient-seated cast-iron eccentric plug valves are used to isolate sections of a pipeline for testing, it is important to realize that eccentric plug valves are typically factory adjusted to hold pressure only up to the specified shutoff pressure in the direct pressure direction. Prior to any field pressure test under conditions different from above, it is recommended that the valve manufacturer be contacted for approval. Otherwise, test pressures above the valve design pressure may cause leakage, permanent damage, or structural failure to the valve and injury or death to the operator.

### **Sec. 6.1 Leaks**

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

### **Sec. 6.2 Seat Leakage**

Seat leakage can occur from foreign material in the line. If this occurs, open the valve 5° to

10° to obtain high-velocity flushing action, then close. Repeat several times to clear seats for tight shutoff. Do not force valves for a tighter seal. Plug valves are provided with an externally adjustable closed stop on the actuator to provide a tighter seal. See the instruction manual provided by the manufacturer for the correct adjustment procedure.

## **SECTION 7: RECORDS**

On completion of installation, the valve location, size, make, type, date of installation, number of turns to open, direction of opening, and any other information deemed pertinent should be entered on the owner's permanent records.

## **SECTION 8: OPERATION**

### **Sec. 8.1 Design Pressure**

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

### **Sec. 8.2 Input Torque**

Do not exceed 250 ft-lb (339 N·m) input torque on actuators with wrench nuts and do not exceed 200 lb (890 N) 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 250 ft-lb (339 N·m). 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 the wrench nut, handwheel, or records before applying opening or closing torque.

### **Sec. A.8.3 Sticking**

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 plug open or closed, because excessive torque in this position can severely damage internal parts.

## **SECTION 9: MAINTENANCE**

Maintenance of resilient-seated plug valves by the owner is generally limited to actuators and shaft seals. 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. 9.1 Normal Maintenance**

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. 9.2 Valve Exercising**

Each valve should be operated through a full cycle and returned to its normal position on a time schedule that is designed to prevent a buildup of lubrication or other deposits that could render the valve inoperable or prevent a tight shutoff. The interval of time between operations of valves in critical locations or valves subjected to severe operating conditions should be shorter than for other less important installations, but it can be whatever time period is found to be satisfactory based on local experience. For gear operators, the number of turns required to complete the operation cycle should be recorded and compared with permanent installation records to ensure full plug travel.

**Sec. 9.3 Field Repairs**

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

**Sec. 9.4 Isolation**

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

**Sec. 9.5 Repair Testing**

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

**Sec. 9.6 Valve Removal**

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.



**SECTION 10: TROUBLESHOOTING**

Problem	Cause	Correction
The operator or shaft will not turn	Interference between valve box and shaft key	Reposition valve box if necessary
	Uneven tightening of gland plate bolts	Loosen then retighten bolts and nuts evenly
	Corrosion or debris between the stem and packing	Consult VSI for disassembly procedures and clean stem, stuffing, and stem nut
	Debris blocking movement of plug	Consult VSI for disassembly procedures and clean out debris
	RARE: Seized worm gear	Inspect and replace if necessary
Leakage between the body and cover of valve	Bolts and nuts may be loose or tightened irregularly	Loosen then retighten bolts and nuts evenly
	Bonnet o-ring may be damaged	Consult VSI for disassembly procedures and replace o-ring
	RARE: Crack in body or bonnet	Inspect and replace if necessary
Leakage at the stem	Damaged stuffing	Consult VSI for disassembly procedures and replace damaged parts if needed
	Loose packing	Tighten the packing gland nuts until leakage stops or replace packing
Valve fails pressure test or a leak present in the line	Valve is not completely closed	Close valve completely
	Debris trapped between plug and seat	Throttle valve from fully closed to approximately 25% open several times under line flow to clear debris. If unsuccessful follow instructions for disassembly and remove debris
	Rubber plug or metal seat is damaged	Consult VSI for disassembly procedures to inspect for damage. If present replace damaged parts.