

CHAPTER 1

DESCRIPTION AND OPERATION

1.1 General

This manual contains maintenance instructions together with pertinent illustrations for servicing corrosion resistant steel alloy, manually operated gate, globe and swing check valves. This manual is divided into two chapters; first covering general information pertaining to the types of valves included; second covering maintenance and service instructions for each group of valves in separate sections.

1.2 Descriptions

CAUTION

All gate and globe valves are supplied with PTFE gaskets and packing. All the check valves are supplied with PTFE gaskets. Not to be used on service temperatures exceeding 500 degrees F.

Gate Valves. (See Fig.1) The manually operated gate valves covered by this manual are of the bolted bonnet type, having either a split disc or a flexible or a solid wedge design depending on the size and pressure class. ½" – 2" Class 150 valves are supplied with fully trapped gasket between the body and the bonnet. 3" – 12" Class 150 valves are supplied with flat face gasket between the body and bonnet. All valves Class 300 and 600 are supplied with fully retained gasket between the body and the bonnet.

Globe Valves. (See Fig. 2) The manually operated globe valves covered by this manual are of the bolted type bonnet, having plug type swivel disc and rotating stem with a rising handwheel. The swivel disc is attached by a swivel nut and secured either with a lock weld or pins depending on the size, to prevent disengagement of the disc from the rotating stem during operation. Each globe valve is supplied with a fully trapped gasket between the bonnet and the valve body.

Swing Check Valves (See Fig. 3) The self actuated swing check valves covered by this manual are of the bolted cover type, the clapper arm and the disc being suspended from the cover. Each swing check valve is supplied with fully trapped gasket between the cover and the valve body.

Most check valves are allowed to have some leakage, according to API 598. Therefore, never rely on a swing check valve as positive stop valve.

1.3 Packaging

Gate and Globe Valves. Gate and globe valves are shipped in the closed position to prevent damage to the seating surface during handling and shipping and should be maintained in the closed position until they are installed. No internal blocking is used on the gate and globe valves

Swing Check Valves. These valves are shipped with the clapper arm and the disc blocked during handling and shipping.

CAUTION

The blocking must be removed through the valve waterway prior to installation.

1.4 Installation

Preparation for Installation. It is highly recommended that before you install a valve, you check the valve and determine it is in a satisfactory condition. Some suggested items are:

- 1) Look for special warning tags and the identification plate to assure the valve is correct for the intended service.
- 2) Remove the end caps and ensure that the valve is reasonably clean and free from foreign material.
- 3) Open and close the valve to ensure that no damage has occurred in transporting the valve.

Prior to installing the valve, clean out the dirt and foreign matter from inside the piping system.

Check for adequate clearance around the valve to ensure that it may be operated properly and that enough free space is available for maintenance of the valve.

The valve body is a rugged structure but it is not intended to be a means for aligning improperly fitted pipe. Care must be taken to ensure that any stresses caused by the improper pipe alignment are relieved elsewhere in the piping system. The valves should be supported, as necessary, to prevent unnecessary stresses induced by the connecting piping.

Installation. The following general rules should be followed when installing the valve in the pipeline.

- a. Keep pipe ends free of dirt, spatter and grit. Check for any damage on the raised faces for the flanged end valves, for any thread damage for the threaded end valves, and any damage to the sockets for the socket end valves.
- b. Handle the valve only with apparatus that will adequately support it using a safe and proper technique.
- c. Install the valve using good piping practices (including the ones listed in the Manufacturers Standardization Society of the Valve and Fitting Industry Standard Practice MSS-SP-92 and as governed by applicable Industry Codes and Specifications. Assure that all bolting or welding (including preheat and post-weld heat treatment) associated with the installation of the valve in the piping system is in compliance with applicable codes and standards.

Gate and Globe Valves. The preferred installation for the gate and globe valves is with the valve in a horizontal line with the handwheel positioned vertically above the valve's centerline. When the stem points downward the bonnet acts as a pocket for debris and other foreign material in the line. Such material may interfere with the valve operation. Do not use split disc gate valves for steam service because the velocity will vibrate the disc and cause premature wear.

CAUTION

Split disc gate valves should never be installed with the stem pointed down because the weight of the disc will cause them to spread prematurely. This premature spread may not allow the disc to fully seat (close).

Globe valves are marked with either bridge wall markings, or flow arrows, because it is recommended that the valves be installed with the flow pressure under the disc. However, depending on your application, they may be installed with flow pressure over the disc.

Swing Check Valves. Swing check valves are normally used to prevent flow reversal. Since check valves have an allowable leakage rate per API 598, they are normally used in conjunction with gate valves which provides the positive stoppage of flow. The swing check valves can be installed in either horizontal lines or in vertical lines as required. When the valve is installed in the horizontal line, the valve cover must be up; when the valve is installed in a vertical line or for any angle from horizontal to vertical, they must be installed for upward flow only.

CAUTION

Flow through a swing check valve must open the disc to its full and stable position. Problems involving excessive wear of internal components, noisy operation or premature failure can occur from the use of check valves which are not in their fully open and stable position.

Swing check valves should not be installed immediately after pump discharges, elbows, tees, pulsation dampeners, or throttling valves, because the turbulence may cause disc motion and excessive wear or premature failure.

NOTE

A generally accepted practice is to install check valve a minimum of five times the pipe diameter away from pumps, elbows, tees, pulsation dampeners, or throttling valves.

A swing check valve should not immediately discharge into a tee or elbow.

1.5 Operation

Gate Valves. Opening and closing the gate valve is accomplished by operating the valve handwheel as desired. The gate valve disc moves down against or up and away from the seating surfaces in the valve body as the handwheel is rotated. The gate valve should not be used for the throttling purposes and should be operated only in the fully open or fully closed positions as erosion of the discs and seating surfaces, and stem "T-head" damage would result if the valve were operated in the partially open position.

CAUTION

Wrenches should not be used in the opening and closing of valves. This procedure can be dangerous as well as damaging the valve disc due to overloading of the stem and disc. In some cases, disc and stem separation has resulted or permanent distortion of the disc making the valve inoperable.

Globe Valves. Opening and closing of the globe valve is accomplished by operating the valve handwheel as desired.

The swivel disc and stem move down against or up away from the seating surface in the body. The globe valve can be used for throttling purposes as well as for on-off services. Since closure is accomplished by forcing the disc against the stream rather than across it, problems of chatter, erosion and excessive wear are minimized. In addition the short travel of the disc allows for fast closing time.

Swing Check Valves. Operations of the check valve to the open position is accomplished by self-actuating from line pressure against the disc. As line pressure diminishes, the weight of the disc causes the valve to close. The check valve operates primarily to prevent any reversal of flow in the installation.

1.6 Torque Application

The following procedures should be observed during replacement of the valve bolts (studs) and nuts on the body/bonnet joint, using applicable torque values given in Table 1.

- a. Preparation.** Clean all bolts and nuts with solvent, rinse in demineralized water and dry with clean, lint-free cloths. Visually inspect all threads to ensure removal of all foreign material, corrosion products, burrs and previous lubrication. Lightly lubricate bolt threads, surfaces under the bolt heads and female threads of nuts with an antiseize compound. Install the bolts and nuts on the flanges and hand tighten the nuts against the flange faces. Using solvent and clean, lint-free wiping cloths, wipe off any excess lubricant than might adhere to the adjacent flange areas.

Table 1

Bolt Size (Dia.)	½ Torque (Ft-lbf)	Full Torque (ft-lbf)
5/16"	4-5	8-12
3/8"	6-8	12-18
½"	15-20	30-45
9/16"	25-30	45-68
5/8"	35-40	60-90
¾"	55-75	110-165
1"	140-180	260-390
1 ¼"	210-310	525-790

Torque values are based on bolts(studs) of ASTM A193
Grade B8 Class 2, with Grade 8 or 8F nuts to ASTM
A194

- b. Tightening Procedure.** Hand tighten nuts. Observe the tightening sequence shown in Figure 4 and, using a torque wrench with the required range, tighten each bolt to its value listed in Table 1.

NOTE

Although ½ torque values are listed in Table 1, Alloyco strongly recommends using at least four (4) torque passes to arrive at final torque for bolts (studs) over 5/8" to ensure even pull down.

When all the bolts have been tightened to the 1/2 torque value, each bolt is tightened to the final torque value (Table 1) in the same sequence as previously used for initial torque.

All nuts should be evenly applied on stud and have full engagement.