687 Technology Way
Napa, CA 94558
Phone: (707) 259-0102
FAX: (707) 259-0117
www.aptech-online.com

Operation Manual

Manual Bellows Valves

(Models BZ91TM, BZ91UM)

A. General information

AP Tech manual bellows valves are used as shut off devices in high capacity gas delivery systems.

Refer to the appropriate catalog data sheet for specific product information.

B. System Design/Product Selection

1. When selecting the valve model and configuration, verify the following information.
   a. Verify the materials of construction are compatible with the intended process gas.
   b. Verify the pressure and temperature ratings are acceptable for the intended application.
   c. Verify that the flow capacity (C_v) of the valve is appropriate for the application.
2. Valves can be used under a large variety of operating conditions. The system designer(s) shall select appropriate product based on their own analysis and testing to verify acceptable operation and compatibility with specific equipment.

C. Installation

1. Inspect the valve to determine the flow path through the valve and how the valve will be installed in the system.
   a. An inlet (upstream) port is defined as a port connected to the region below the valve seat and is labeled with an "IN" marked on the body near the port.
   b. An outlet (downstream) port is defined as a port connected to the region above the seat common with the bellows.
   c. The traditional flow direction is inlet to outlet.
2. For valves with inlet/outlet flanges attached:
   a. Install valve per section **C**.5 or **C**.6, as applicable.
3. <u>To attach inlet/outlet adapters and flanges to valve (refer to **Figure 1**):</u>
   a. Apply lubrication to each flange screw.
      i) Lubricate the bottom half of each screw with appropriate grease (e.g. *Krytox® GPL-206)*.
   b. Place a new flange gasket over the raised section of adapter.

   Caution: Take care to avoid damaging either gasket or adapter sealing surfaces.
   c. Hold the adapter and flange gasket in place over inlet/outlet port in the valve body.
   d. Place the flange over the adapter.
   e. Orient the adapter as needed, and align the holes in the flange with the threaded holes in the valve body.
   f. Follow the pattern in **Figure 2** and tighten the flange screws through the flange and into the valve body **hand tight**.

g. Secure the valve body and flanges as needed before applying torque to the flange screws
h. Using a torque wrench and 5/16 inch hex drive, incrementally tighten the flange screws using the pattering in figure 2 as follows:

Caution: Do not rotate the valve body or adapters while tightening flange screws.

i) Tighten to **100 in-lbf**.

ii) Tighten to **200 in-lbf**.

iii) Tighten a second time to **200 in-lbf**.

i. Repeat steps **C**.4.a through **C**.4.h for additional flanges and adapters.

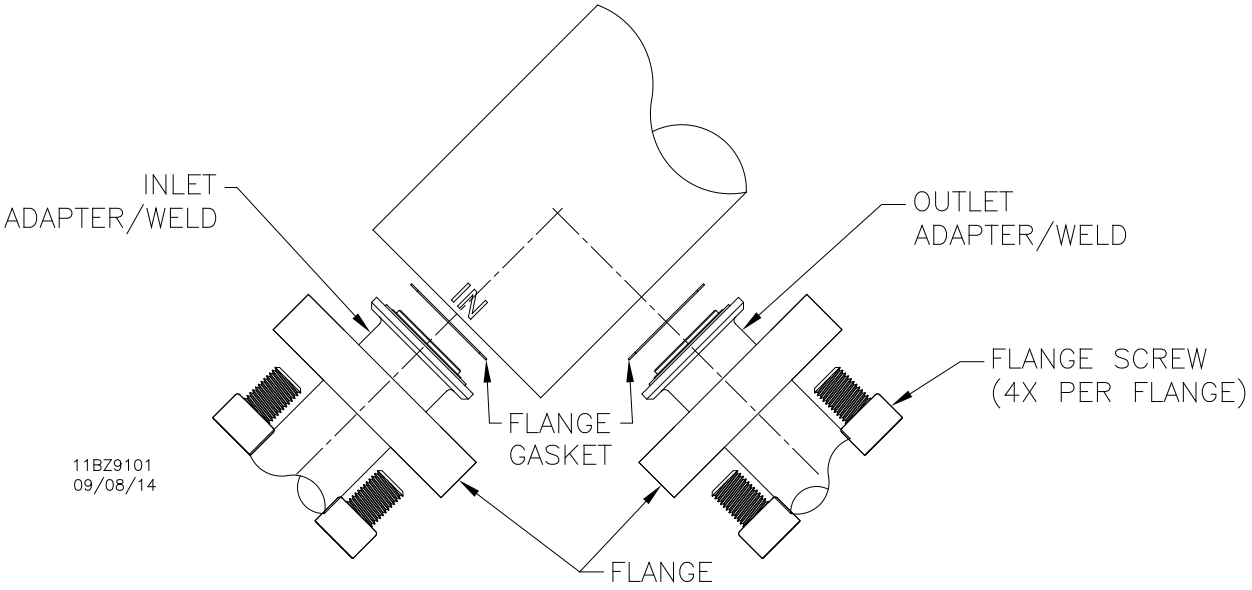

Figure 1 – Exploded view of flanges, flange gaskets, adapters, and screws.

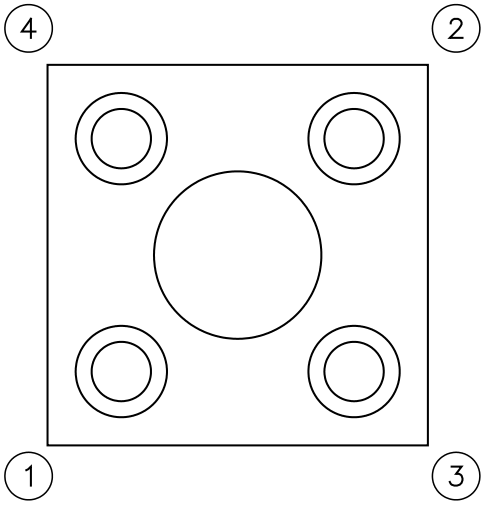

Figure 2 - Tightening pattern for flange screws.

4. For tube stub connections, weld connectors or other components to the tube stubs per standard industry practice (reference SEMI standard F78).
5. For metal face seal connectors, assemble connections per standard practice described by fitting supplier (typically 1/8 turn past finger tight).
6. Support/secure valve as appropriate for safe installation and operation.
7. After installation, perform a leak test of all connections and welds per standard industry practice (reference SEMI standard F1).

D. Operation

1. Perform the following to close the valve.
   a. Rotate the valve handle clockwise as viewed from the top until a sudden, large increase in torque indicates that the internal hard stop is reached.

Caution: Torque to operate a valve may noticeably increase due to load from the internal pressure. Higher internal pressure will require higher operation torque. Do not mistake an actuation torque increase due to the internal pressure with contacting the internal stop. This could result in a partially open valve instead of the intended closure.

2. Perform the following to open the valve.
   a. Rotate the valve handle counter clockwise as viewed from the top.
   b. A sudden, large increase in torque indicates that the valve is fully open reaching the internal hard stop.

Caution: The valve will open before the hard stop in the actuator has been reached.

Caution: Do not use a tool to apply excessive opening or closing torque to the valve handle: damage may result.

3. When a valve is in the closed position, the inlet ports are isolated from the outlet ports. When a valve is in the open position, all ports are common.

Please contact the factory or your local representative to answer questions or for further information.