

# AF Series 3, 1" thru 6", Firesafe API-607

## Angle Stem Flush Tank Ball Valves

### Installation, Operation, and Maintenance Instructions



#### **WARNING:**

For your safety and protection it is important that the following precautions be taken prior to working on the valve.

1. Depressurize and drain the line.
2. Cycle the valve to relieve any pressure trapped in the valve.
3. Disconnect any air and electrical connections to the valve assembly.
4. Know what the media is in the line and wear appropriate protective clothing and equipment. Obtain appropriate MSDS sheets.
5. To ensure safe product selection and operation, it is the responsibility of the process system designer and end user to determine the appropriate compatible materials of construction and adequate product ratings for the process system. Process system designer, installer, and end user are responsible for proper installation, operation, and maintenance.
6. When disposing of Teflon parts, do not incinerate or subject to open flames.

#### **1. General**

This Installation, Operation, and Maintenance manual is for the safe use of PBM Non-Adjust-O-Seal<sup>®</sup>, AF Series 3 Firesafe API-607 angle stem flush tank ball valves. Please read instructions carefully and save for future reference.

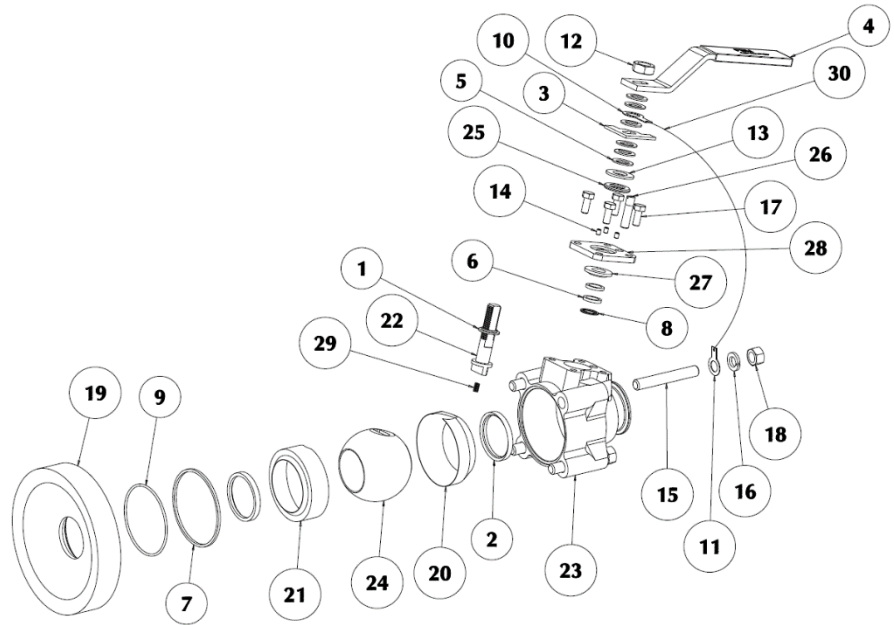
#### **2. Installation**

AF valves may be installed with the valve in the "open" position. For AF valves, disassemble the valve and attach the tank pad to the vessel. Reassemble valve to tank pad. See IOM-WELD for welding of end connections or tank pads.

#### **3. Operation**

For manual valves, operation consists of turning the handle 1/4 turn to close or open the valve. When handle is parallel with the pipeline, the valve is in the open position. These valves may also be automated with actuators and other valve automation equipment. Mechanical handle stops must be removed if manual valves are converted to automated valves. For automated valves, operation is controlled by the actuator placed on top of the valve. Valve stops are an integral part of the actuators. Good operating procedure requires periodic inspection of the valves and replacement of parts as required. Always use PBM factory authorized replacement parts.

PARTS LIST	
ITEM	DESCRIPTION
1	Stem Packing
2	Seat
3	Stop Disk (Manual Only)
4	Handle (Manual Only)
5	Spring Washers
6	Graphite Stem Packings
7	Graphite Body Gasket
8	Stop Ring
9	O-Ring
10, 11	Ground Wire Connector
12	Stem Nut
13	Flat Washer
14	Set Screws
15	Body Bolts
16	Lock Washer
17	Gland Plate Bolting
18	Body Hex Nuts
19	Weld Pad or Bolt On Pad
20	Inner Cavity Filler (If Any)
21	Outer Cavity Filler (If Any)
22	Stem
23	Valve Body
24	Ball
25	Thrust Bearing
26	Stop Pin (Manual Only)
27	Packing Gland
28	Gland Plate
29	Ground Spring
30	Ground Wire



### Disassembly of valve:

1. Isolate and depressurize the associated piping system. Cycle the valve to ensure there is no trapped pressure or fluid in the valve cavity. The valve should be left fully open or fully closed.
2. **For Automated Valves Only:** Remove all air and electrical power from the actuator, solenoid valve, and switchbox, if any. Then remove the automation assembly from the valve. Retain coupling and mounting bracket.
3. **For Manual Valves Only:** Loosen and remove the stem nut from the stem and then remove the handle. For valves with gear operators, remove the gear operator, bracket, and coupling.
4. In order to remove the body subassembly, loosen and remove all body fasteners. Retain the fasteners. 3" thru 6" valves also have loose bolting sleeves. Retain these as well.
5. Slide the body out from the weld pad until the body completely clears the weld pad and downstream piping. Remove the body gasket, outer seat, and o-ring from the tank pad and the outer cavity filler from the valve, if any.
6. Rotate the stem to orient the ball to the closed position. Slide the ball out, taking care not to nick or scratch the ball.
7. Remove the internal ground spring from under stem.
8. Remove any spring washers, flat washer, thrust bearing, and ground cable from the stem.
9. Loosen and remove the gland plate fasteners and the gland plate.
10. Push the stem into the body and out the open end of the body. The bottom packing may come off with the stem. If not, reach into the body counterbore and remove.
11. Remove the packing plate, top packings, and stop ring from the body, the inner cavity filler, if any, and the seat from the body recess.

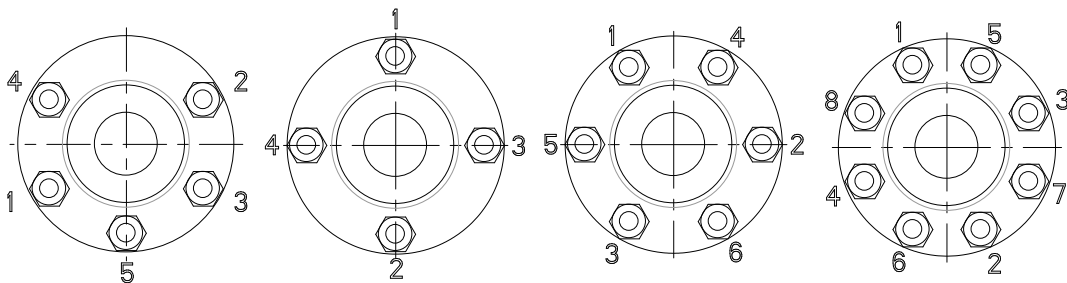
### Reassembly of valve:

1. Before reassembling the valve, examine the parts and repair or replace damaged or worn parts. Clean metal parts, as necessary, using a solvent compatible with the process fluid and a non-abrasive cloth. PBM recommends using new seats, body gaskets, and seals at each assembly.
2. Insert inner seat into the body. Insert inner cavity filler, if any.
3. Install a packing over the stem with the flanged surface seated against the flange on the stem.
4. Insert the stem into the body bore. While supporting the stem, install the stop ring over the stem into the body bore.
5. Slide two new graphite stem packings over the stem and into the body bore. Install the packing gland onto the stem.
6. Install the gland plate over the stem until it rests on the packing gland. Apply anti-galling thread lubricant to the gland plate bolts and bolt the gland plate on top of the body until tight.

7. Install the thrust bearing over the stem followed by the flat washer so it rests on the thrust bearing.
8. Install a spring washer onto the stem with the concave side facing upward.
9. **For Manual Valves Only:** 1" valves have the stop disc integrated with the handle. For 1-1/2" and larger valves, install the stop disc such that clockwise rotation of the stem closes the valve with the ports aligned, and counterclockwise rotation opens the valve. Ensure the stop disk will contact the stop pin. If the ports do not align, rotate the stem 180 degrees to achieve proper alignment.
10. Install a second spring washer onto the stem with the concave side facing downward. Install the external ground wire terminal onto the stem such that the ground wire extends towards the downstream side of the body towards the same body bolt originally attached to.
11. Install the remaining spring washers onto the stem in an alternating or *series* arrangement. No two adjacent spring washers should be facing the same direction or in a *parallel* arrangement. On manual valves, a follower is installed before the handle is assembled to the stem.
12. Lubricate the stem threads with an anti-galling lubricant.
13. **For Automated Valves Only:** Thread a stem hex nut onto the stem. **For Manual Valves Only:** Assemble handle to top of stem and then thread stem hex nut onto stem.
14. For valves 2" and smaller, tighten the nut to completely compress the spring washers, then back off 1/2 turn. For 3" valves, tighten the nut until a gap of about 0.05" (1.3 mm) exists between the adjacent spring washers. For valves 4" and larger, tighten the nut until a gap of about 0.10" (2.5 mm) exists between the adjacent spring washers.
15. Rotate the stem to the closed position of the valve. Insert the internal ground spring into the hole at the bottom of the stem.
16. Orient the ball to the closed position and insert the ball into the body. Slide the stem tang into the ball slot, being careful not to nick or scratch the ball. Engage stem tang in the ball slot. The index on the stem tang must match the index on the ball.
17. Rotate the stem and ball counterclockwise 90 degrees and check that the ports align in the open position. If not, rotate the stem and ball 180 degrees and recheck port alignment.
18. Install the outer cavity filler, if any, into the body.
19. Install outer seat, gasket and o-ring into the flush tank pad. In vertical installations, it may be necessary to apply a lubricant to the back of the seat and gasket to hold these parts in place. Lubricate the first 1-1/2" of the body bore with a lubricant compatible with the process fluid to prevent cutting of the O-ring during installation
20. Lubricate the body fastener threads with an anti-galling lubricant. Then, install the fasteners into the tapped holes in the flush tank pad until they reach the bottom. To assemble the body to the flush tank pad, push the body against the pad, allowing fasteners to enter holes in the body. Make sure the bolting sleeves are also in place.
21. Install hex nuts and lock washers and hand-tighten. Wrench-tighten the hex nuts according to the procedure shown at the bottom of Page 3 until the torque is reached as shown in the torque table on Page 4. Cycle the valve to verify freedom of operation and torque. If practical, check the valve seats and seals for leaks.
22. For valves with gear operators, reinstall the bracket, coupling, and gear operator.
23. **For Automated Valves Only:** Reinstall the automation assembly with the bracket and coupling. Then reconnect air and electrical power.
24. Insulate the valve, if applicable.

### Tightening Procedure for End Fittings:

1. Hand tighten fasteners.
2. Wrench tighten each fastener in increments per the staggered sequence illustrated below until the lock washers begin to compress.
3. Continue tightening bolts or hex nuts 1/8 turn until pad comes in contact with the body. Note that these will go metal to metal – if possible, verify no gap.



1" Size

1-1/2" & 2" Size

3" Size

4" & 6" Size

Replacement Kits and Parts						
Valve Size	AF Repair Kit (RTFE)	AF Cavity Filler Kit (VTFE)	AF Ball (316L S/S)	Follower	Stem (316L S/S)	Spring Washers
1"	AFRTE3 - - A - - 1	AFRTE3 - - B - - 3	ASHLE102	SPK-E106	ASHLE305G	SPK-E110
1-1/2"	AFRTG3 - - A - - 1	AFRTG3 - - B - - 3	ASHLG102	SPK-H106	ASHLH305G	SPK-H110
2"	AFRTH3 - - A - - 1	AFRTH3 - - B - - 3	ASHLH302	SPK-H106	ASHLH305G	SPK-H110
3"	AFRTK3 - - A - - 1	AFRTK3 - - B - - 3	ASHLK302	SPK-K106	ASHLK305G	SPK-K110
4"	AFRTL3 - - A - - 1	AFRTL3 - - B - - 3	ASHLL302	SPK-K106	ASHLK305G	SPK-K110
6"	AFRTM3 - - A - - 1	AFRTM3 - - B - - 3	ASH-M302	SPK-M106	BBHLM305	SPK-M110

**Notes for Table above:**

- For AF Sanitary repair kits, change RT in the repair kits to VT and A- -1 to C- -1 – example AFVTE3- -C - -1.
- For AF Sanitary cavity filler kits, change RT in the repair kits to VT and B- -3 to D- -3 – example AFVTE3- -D - -3.
- Standard repair kits include 2 RTFE or VTFE seats, 1 Graphite body gasket, 1 O-ring, 2 Graphite stem packings, and 1 RTFE or VTFE stem packing. Other materials available.
- Cavity filler kits include 2 VTFE fillers, 1 O-ring, and 1 graphite body gasket.
- Standard repair kits and replacement parts are RTFE or VTFE.
- Replacement parts are one each per part number.
- For materials other than RTFE or VTFE, substitute the correct material ID and code.
- For valves with grounding, add "G" to the end of the stem part number.

**Material Definitions:**

- RT RTFE Glass Filled polytetrafluoroethylene
- VT VTFE Virgin polytetrafluoroethylene
- TF TFM™ Chemically modified polytetrafluoroethylene
- HT S-TEF® Stainless steel reinforced polytetrafluoroethylene

**Notes for Table at right:**

- Stem torques are shown in nominal values and represent ideal conditions. (100 psig / 6.9 bar or less, ambient temperature, with fluid free of suspended solids and comparable in viscosity to water).
- For RTFE, multiply by 1.25. For S-TEF® seats, multiply by 1.56.
- Torque values measured at the stem, NOT at the fasteners.

Valve Size	Size Code	Fastener Torque Body / End Fitting	
		In. – lbs.	N-m
1"	E3	100	11.2
1-1/2"	G3	250	28.2
2"	H3	250	28.2
3"	K3	1,000	112
4"	L3	1,000	112
6"	M3	1,000	112

