

# Installation, Operation, and Maintenance Instructions Angle Stem Flush Tank Ball Valves AF Series 1, 1" thru 6"



IMI PBM



## **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 Adjust-O-Seal<sup>®</sup>, AF Series 1 angle stem flush tank ball valves. Please read instructions carefully and save for future reference.

## 2. Installation

AF valves may be installed in 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.

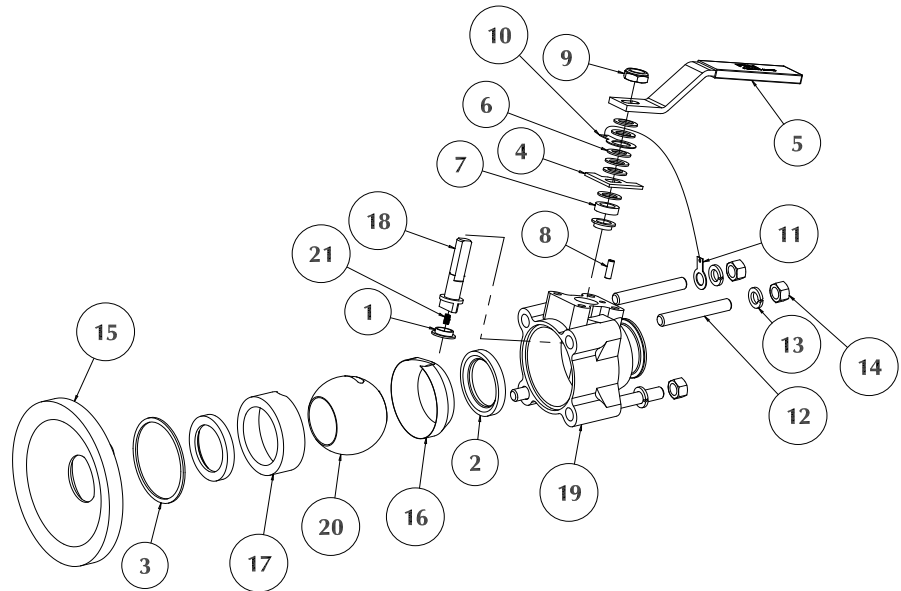
Follow instructions to ensure optimum performance:

### Adjusting for Normal Wear

**Note: Valve to be in fully opened or fully closed position prior to adjustments.**

1. PBM Ball Valves are designed with the Adjust-O-Seal<sup>®</sup> feature. If the valve shows signs of leakage due to normal seat wear, tighten the end fitting fasteners evenly, in the staggered sequence as shown at bottom of Page 3, until the leakage stops and the valve operates smoothly:
  - a) Initially, there should be a space between weld pad or adapter pad and the body. This space is the key to the Adjust-O-Seal<sup>®</sup> feature and allows in-line adjustment of the seats and gasket.
  - b) End fitting fasteners should be tightened only until valve stem breakaway torque is reached (Torque Table - Page 4).
2. If valve shows signs of leakage in stem area due to normal stem packing wear, loosen the upper jam nut on the stem, then tighten the lower jam nut as follows:
  - a) For valves 2" and smaller, tighten nut to completely compress spring washers, then loosen nut 1/2 turn.
  - b) For valves 3", tighten nut until a gap of about 0.05" (1.3 mm) exists between the adjacent spring washers.
  - c) For valves 4" and larger, tighten the nut until a gap of about 0.10" (2.5 mm) exists between the adjacent spring washers. Leakage should stop, and the valve should continue to operate smoothly.
3. After adjustments have been made to seats, or if packing leakage cannot be stopped, a repair kit will be required.

PARTS LIST	
ITEM	DESCRIPTION
1	Stem Packing
2	Seat
3	Body Gasket
4	Stop Disk (Manual Only)
5	Handle (Manual Only)
6	Spring Washers
7	Follower
8	Stop Pin (Manual Only)
9	Stem Hex Nut
10	Ground Wire Connector (If Any)
11	Ground Wire (If Any)
12	Body Bolts
13	Lock Washers
14	Hex Nuts
15	Weld Pad or Adapter Pad
16	Inner Cavity Filler (If Any)
17	Outer Cavity Filler (If Any)
18	Stem
19	Valve Body
20	Ball
21	Ground Spring (If Any)



### 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.
4. In order to remove the body subassembly, loosen and remove all body fasteners. Retain the fasteners.
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 (if any) 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, if any, from under stem.
8. Remove the spring washers and follower(s). For valves with gear operators, remove the gear operator, bracket, and coupling.
9. 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.
10. Remove the top packings from the body, the inner cavity filler, if any, and the seat from the body recess.

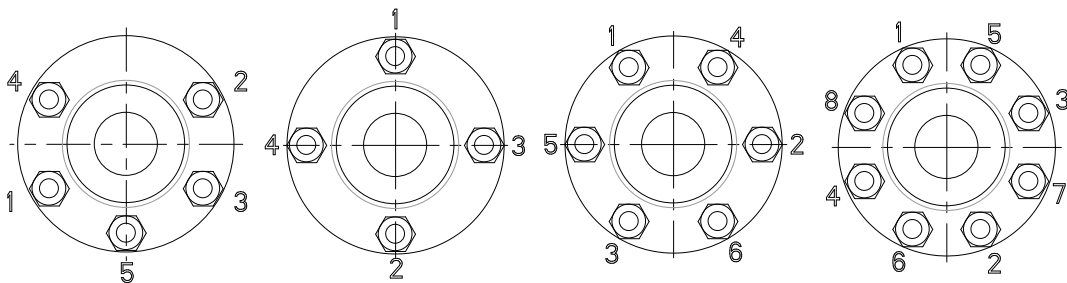
### Reassembly of valve:

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. Install the remaining packings on the stem with the flanged surface facing upward. Push the packing into the body counterbore. Install the follower onto the stem.
5. Install a spring washer onto the stem with the concave side facing upward.

6. **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.
  7. Install a second spring washer onto the stem with the concave side facing downward. Install the external ground wire terminal onto the stem, if applicable, such that the ground wire extends towards the downstream side of the body.
  8. 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 second follower is installed before the handle is assembled to the stem.
  9. Lubricate the stem threads with an anti-galling lubricant.
  10. **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.
  11. 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.
  12. Rotate the stem to the closed position of the valve. Insert the internal ground spring, if any, into the hole at the bottom of the stem.
  13. 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.
  14. 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.
  15. Install the outer cavity filler, if any, into the body.
  16. Install outer seat, gasket and o-ring, if any, 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.
  17. 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. For a 6" valve, 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.
  18. To assemble the body to the flush tank pad, push the body against the pad, allowing fasteners to enter holes in the body.
  19. 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, while maintaining an even gap between the body and end fittings, and until the stem torque, as shown in the torque table on Page 4 is reached. The torque is the measured stem torque as the valve leaves the closed position. Cycle the valve to verify freedom of operation and torque. If practical, check the valve seats and seals for leaks.
  20. For valves with gear operators, reinstall the bracket, coupling, and gear operator.
  21. **For Automated Valves Only:** Reinstall the automation assembly with the bracket and coupling. Then reconnect air and electrical power.
  22. Insulate the valve, if applicable.
- NOTES: 6" valves have one o-ring. Smaller sizes have none.

### 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 the recommended torque value is achieved when measuring at the valve stem.



**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"	AFRTE1 -- A -- 1	AFVTE1 -- D -- 3	ASHLE102	SPK-E106	ASHLE105	SPK-E110
1-1/2"	AFRTG1 -- A -- 1	AFVTG1 -- D -- 3	ASHLG102	SPK-H106	ASHLH105	SPK-H110
2"	AFRTH1 -- A -- 1	AFVTH1 -- D -- 3	ASHLH102	SPK-H106	ASHLH105	SPK-H110
3"	AFRTK1 -- A -- 1	AFVTK1 -- D -- 3	ASHLK102	SPK-K106	ASHLK105	SPK-K110
4"	AFRTL1 -- A -- 1	AFVTL1 -- D -- 3	ASHLL102	SPK-K106	ASHLK105	SPK-K110
6"	AFRTM1 -- A -- 1	AFVTM1 -- D -- 3	ASHLM102	SPK-M106	ASHLM105	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 AFVTE1- -C - -1.
- Standard repair kits include 2 RTFE or VTFE seats, 1 RTFE or VTFE body gasket, and 2 RTFE or VTFE stem packings. 6" repair kit includes 1 O-ring. Other materials available.
- Cavity filler kits include 2 VTFE fillers only.
- 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	V-TEF™	Chemically modified polytetrafluoroethylene
HT	S-TEF®	Stainless steel reinforced polytetrafluoroethylene
PK	PEEK™	Polyetheretherketone
UT	UHMWPE	Ultra High Molecular Weight Polyethylene
KY	KYNAR™	Polyvinylidene Fluoride

Valve Size	Size Code	Valve Stem Nominal Breakaway Torque - VTFE Seats	
		In. – lbs.	N-m
1"	E1	58	6.6
1-1/2"	G1	134	15.2
2"	H1	153	17.3
3"	K1	336	38.0
4"	L1	432	48.9
6"	M1	1,536	173.6

**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 or UHMWPE seats, multiply by 1.25. For S-TEF® or Kynar™ seats, multiply by 1.56. Consult factory for PEEK™ seat torques.
- Torque values measured at the stem, NOT at the fasteners.



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