

# Installation, Operation, and Maintenance Instructions ASME B16.10 Full Port Flanged Ball Valves AN Series 1, 1/2" thru 6", ANSI 150# & 300# Class



## **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 2-piece, Adjust-O-Seal®, Bi-Directional, AN Series 1 ball valves. Please read the instructions carefully and save them for future reference.

## **2. Installation**

AN valves may be installed in either direction with the valve in the "open" position. For flanged end valves, it is not necessary to disassemble the valves before installation.

## **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.

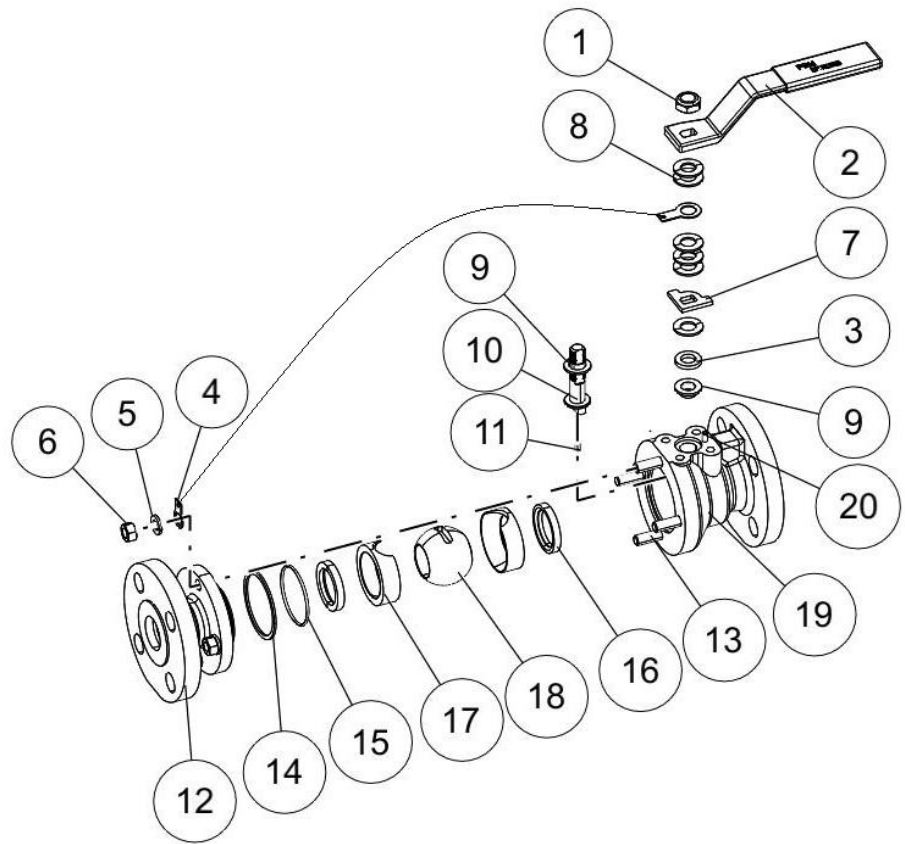
Follow instructions to ensure optimum performance:

## **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® 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 4, until the leakage stops and the valve operates smoothly:
  - a) Initially, there should be a space between end fittings and the body. This space is the key to the Adjust-O-Seal® feature and allows in-line adjustment of the seats and gasket.
  - b) End fitting fasteners should be tightened only until the valve stem breakaway torque is reached (Torque Table on Page 4).
2. If valve shows signs of leakage in stem area due to normal stem packing wear, tighten the jam nut on the stem to fully compress the spring washers, then back off the nut 1/8 turn. For 4" and 6" valves, tighten the nut until there is a 0.1" gap between the 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 Nut
2	Handle
3	Follower
4	Grounding (If Any)
5	Lock-Washers
6	Body Hex Nuts
7	Stop Disc (Manual Only)
8	Spring Washers
9	Stem Packings
10	Stem
11	Grounding Spring (If Any)
12	End Fitting
13	Body Bolts
14	Body Gaskets
15	O-Ring
16	Seats
17	Cavity Filler (If Any)
18	Ball
19	Body
20	Stop Pin (Manual Only)



### 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 upper jam nut from the stem and then remove the handle.
4. Loosen and remove the flange bolting and remove the valve from the piping.
5. Remove the end fitting hex nuts or fasteners, lock washers, and tag, if any.
6. Pull the end fitting free from the body. It may require force to remove.
7. Remove the seat, seat-back o-ring (if applicable), end body gasket, o-ring, and cavity filler, if any.
8. Rotate the stem to orient the ball to the closed position. Slide the ball out, taking care not to nick or scratch the ball.
9. Remove the internal ground spring, if any, from under stem.
10. Remove the jam nut, any spring washers, stop disc (if applicable), and follower. For valves with gear operators, remove the gear operator, bracket, and coupling.
11. Push the stem into the body and out an open end of the body. The bottom packing may come off with the stem. If not, reach into the body counterbore and remove.
12. Remove the top packings from the body, the inner cavity filler, if any, and the seat from the body recess.

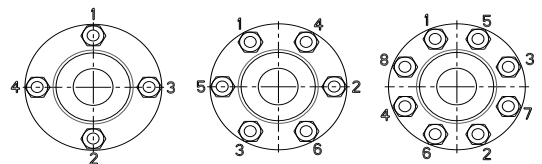
### Reassembly of valve:

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 a new seat, seat-back o-ring (if applicable) and cavity filler, if equipped, into the body recess with the seating surface facing towards the ball cavity.
3. Install a new packing onto the threaded end of the stem and slide it down until it contacts the shoulder.
4. Insert the stem into body bore and through the stem bore in the body. Install the remaining packings onto the stem with the S-TEF® (gray) packing installed last, if used. Push the packings into body counterbore. Install follower onto the stem.

5. Install a spring washer onto the stem with the concave side facing upward. Install the stop disc (if applicable) such that clockwise rotation of the stem closes the valve. Ensure that the stop disc clears the top of the body. Install the external ground wire terminal onto stem, if applicable, such that the ground wire extends towards the end fitting side of the body
6. Install a second spring washer onto the stem with the concave side facing downward. 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
7. Lubricate the stem threads with an anti-galling lubricant.
8. Thread a stem hex nut onto the stem. 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.
9. **For Manual Valves Only:** Install the handle on the stem. Install and tighten the remaining hex nut to secure the handle to the stem. This step does not apply to valves with gear operators
10. 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.
11. 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. Rotate the stem until the ball is in the open position.
12. Install the other cavity filler, if any, onto the ball.
13. Place a new seat and body gasket in their mating cavities in the end fitting. Lubricate the o-ring and the first 1-1/2" of the body bore with a lubricant compatible with the process fluid. Install the O-ring into the groove in the end fitting.
14. Lubricate external threads of body bolting with anti-galling lubricant.
15. With the valve closed, install end fitting against body.
16. Install fasteners, tagging, and lock washers then install and hand-tighten hex nuts. The external ground wire connected to the stem should have its terminal installed underneath one of the closest nuts and lock washers, if applicable.
17. Wrench-tighten the bolting or hex nuts according to the procedure shown at the bottom of Page 4, 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.
18. Reinstall the valve into the piping using appropriate gaskets and fasteners.
19. For valves with gear operators, reinstall the bracket, coupling, and gear operator.
20. **For Automated Valves Only:** Reinstall the automation assembly with the bracket and coupling. Then reconnect air and electrical power.
21. 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 at right until the spring 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.



Replacement Kits and Parts						
Valve Size	Repair Kit (RTFE)	Cavity Filler Kit (VTFE)	Ball (316L S/S)	Stem (316L S/S)	Spring Washers	Follower
1/2"	ANRTC1 -- A -- 1	ANVTC1 -- D -- 3	SPH-C102	SPHLC105	SPK-E110	SPK-C106
3/4"	ANRTD1 -- A -- 1	ANVTD1 -- D -- 3	SPHLD102	SPHLC105	SPK-E110	SPK-C106
1"	ANRTE1 -- A -- 1	ANVTE1 -- D -- 3	SPHLE102	ANHLE105	ANK-E110	ANK-E106
1-1/2"	ANRTG1 -- A -- 1	ANVTG1 -- D -- 3	SPHLG102	SPHLH105	SPK-H110	SPK-H106
2"	ANRTH1 -- A -- 1	ANVTH1 -- D -- 3	SPHLH102	SPHLH105	SPK-H110	SPK-H106
3"	ANRTK1 -- A -- 1	ANVTK1 -- D -- 3	SPHLK402	SPHLK105	SPK-K110	SPK-K106
4"	ANRTL1 -- A -- 1	ANVTL1 -- D -- 3	ANHLL102	ANHLL105	MPK-L110	MPK-L106
6"	ANRTM1 -- A -- 1	ANVTM1 -- D -- 3	ANHLM102	SPHLM105	SPK-M110	SPK-M106

### Notes for Table above:

- Standard repair kits include 2 RTFE seats, 1 RTFE body gasket, 2 RTFE stem packings, and 1 o-ring. Cavity filler kits include 2 VTFE fillers.
- Standard repair kits and replacement parts are RTFE.
- Replacement parts are one each per part number.
- For materials other than RTFE, 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 reinforced polytetrafluoroethylene
TF	V-TEF™	Chemically modified polytetrafluoroethylene
VT	VTFE	Virgin 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 – RTFE Seats	
		in - lbs	N-m
1/2"	C1	48	5.4
3/4"	D1	60	6.8
1"	E1	72	8.1
1-1/2"	G1	168	19.0
2"	H1	192	21.7
3"	K1	420	47.5
4"	L1	780	88.1
6"	M1	1,200	135.6

### 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 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.



1070 Sandy Hill Road, Irwin, PA 15642

Phone: (724) 863-0550 or (800) 967-4PBM Fax: (724) 864-9255  
 E-mail: info.pbmvalve@imi-critical.com Web: www.pbmvalve.com  
 © Copyright 2020 PBM, Inc. IOM-AN1 R1 11/20 Printed in USA

