

## INSTALLATION – MAINTENANCE MANUAL

# 1/2"-8" F15/F30 SERIES UNI-DIRECTIONAL METAL SEAT

## ASME CL150/CL300 FLANGED FULL PORT BALL VALVES

### 1.0 DESIGN:

The Flow-Tek metal seat design is unique in the industry. Chrome Carbide Coated Metal Seats support and seal against the ball, while a graphite ring seals against the valve body. A controlled preload is provided by a wave spring to ensure sealing at low differentials while minimizing the operational torque of the valve. The durable Chrome Carbide coating provides a long service life even in harsh, abrasive conditions and a moderate scraping action on its hardened edge. Add to these features the ability to convert a standard polymer seated valve to metal seats by simply replacing a few parts and you have an extremely versatile and reliable design.



The F15/F30 valve is a two piece, split body construction, allowing ease of maintenance without special tools. These valves feature a "free floating" ball. The ball is not fixed, but is free to move with the line pressure. The spring absorbs this variation while allowing the valve to be installed in any orientation.

***WARNING: Before installing this equipment, confirm that it is suitable for the intended service. The installed identification tags describe the maximum allowable service conditions for this product. Be sure that the installation is protected by appropriate pressure control and safety devices to insure that acceptable limits are not exceeded.***

**CAUTION: Read all instruction and identify all of the components before beginning any installation or service work.**

### 2.0 OPERATION:

Operation of the valve is done by turning the handle a 1/4 turn or 90 degrees. Rotation in the Clockwise direction is used to Close the valve, and Counter-Clockwise to Open the valve.

As a uni-directional valve, this valve will only seal against pressure from one direction. This flow direction is indicated by the flow arrow on the valve. If this arrow is missing or worn, the Body of the valve should be considered downstream.

The valve should be periodically inspected and maintained as part of a preventative maintenance program and in accordance with Flow-Tek's recommended pressure, temperature and corrosion limits to insure a long service life. Although the converted valve is suitable for high temperature applications, do not exceed ASME B16.34 pressure vs temperature ratings. During shipment and storage, the valve should be fully open with flange end protection in place. In operation, for round port valves, the valve should be fully open or closed. If modulating service is required, a V-Port ball valve is recommended. Do not use the valve in throttling service without confirming the suitability for the flow and pressure conditions.

#### A. VALVE IN FULL OPEN POSITION

The handle is parallel with the pipeline.

Valves with actuators should be checked for actuator -valve alignment. Misalignment will result in high operational torque and damage to valve stem and seals

#### B. VALVE IN FULL CLOSED POSITION

The handle is perpendicular to the pipeline.

Please observe all cautions and warnings to maintain the valve in a safe operating condition.

### 3.0 STEM SEAL ADJUSTMENT:

Stem seal leakage may be corrected without disassembly by tightening the packing gland nut until such leakage stops. If the leakage continues or valve operating torque becomes excessive, the seals are worn and replacement will be necessary.

***WARNING: DO NOT remove packing gland or any other valve parts while line is under pressure!***

- For 1/2"- 2", if slight leakage is noted at stem, straighten lock washer tab, tighten stem nut to flatten Bellville Washers, back stem nut off 1/4 turn, secure lock washer tab.
- For sizes larger than 2", simply tighten gland bolts evenly until leak stops. Do not over tighten.

### 4.0 GENERAL INFORMATION FOR ON-SITE INSTALLATION:

- Always use proper tools in a clean work area.
- Before installing the valves, the pipes must be flushed clean of dirt, burrs, and welding residues, or the seats and ball surface will be damaged.
- The valve is uni-directional and must be installed with the arrow stamped on the body pointed in the intended direction of flow. Should the marking be missing or worn, the Body of the valve should be the downstream end.
- Our Metal Seated Valves operate best in flowing media. To reduce initial torque and allow for startup cycling, the ball and seats come coated with a thin layer of machine oil. If this is not acceptable for your particular application, please notify the factory at the time of order.

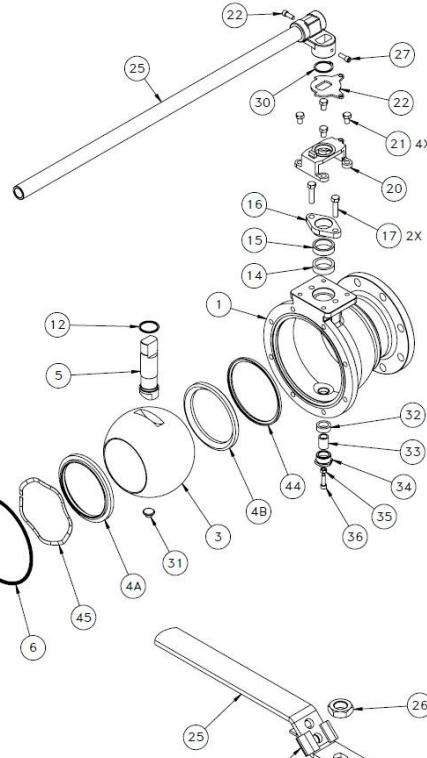
## 5.0 DISASSEMBLY AND REMOVAL OF INTERNAL COMPONENTS:

**CAUTION:** Line must be depressurized before disassembly. Valve should be cycled to assure there is no pressure is trapped in valve cavity. Ball valves can trap pressurized media when closed. The valve must be flushed with the ball half open to remove any hazardous media that may be present in the body cavity. Multiple flushes may be required to reduce the quantities of hazardous media to a safe level. Refer to appropriate MSDS information for the media for a guide to safe exposure levels. The appropriate personal protective equipment must be used to avoid exposure to hazardous media that may still be present.

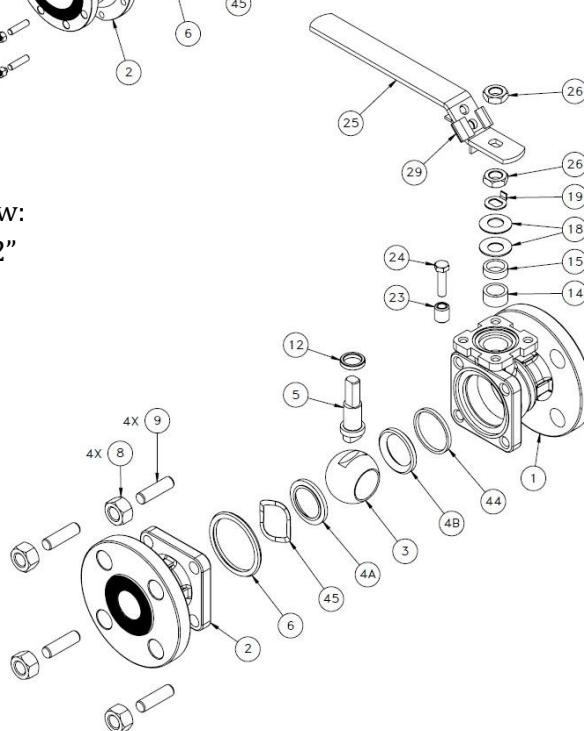
1. Support the valve by the body vertically in a bench vise with the end cap up. Use wooden blocks to avoid marring or distorting the body. Valves too large to be held in a vise should be placed on an elevated platform with the body flange down. The body should be attached by bolts or clamps to the platform so that it will not move during servicing.
2. As parts are removed, clean and inspect each one for damage and wear. Damaged or worn parts should be replaced.
3. Loosen handle nut and remove the handle and stop plate if present.
4. Remove gland nut, Belleville washers or gland flange screws, flange and gland.
5. Remove the body end cap nuts. Lift off the end cap. The end cap seat may come out with body end or it may be left on top of the ball. Remove the end cap seat from the end cap or ball.
6. Remove the body seal gasket.
7. Rotate the stem so ball is in the fully closed position. Lift the ball from body, using a strap and lift device, if necessary. NOTE: Extreme care should be taken to avoid damage to the ball.
8. Remove the body seat.
9. The stem must be removed from inside the body – a tap on the top of the stem should loosen it. The thrust washer should come out with the stem. Remove the stem packing.
10. Store the removed stem and seat components in a sealed bag.
11. **For 6 & 8 inch valve only:** Remove the plastic pin seat. Remove pin packing from the ball support assembly by loosening and then removing the support nut along with the support pin. Remove the exposed packing using a packing removal tool.

## Valve Components

Exploded View:  
 2½" through 8"



Exploded View:  
 ½" through 2"



Ball Support (parts 31-36)  
 included in valves 6" & up

## REASSEMBLY:

**NOTE:** The valve may be assembled and operated dry when no lubricants are allowed in the system; however, light lubrication of mating parts during assembly will reduce the initial operating torque and improve longevity. Stem and body fastener threads should be lubricated with an anti-seize compound during assembly, particularly if the service temperature will be in excess of 300F.

1. Clean both seat cavities on the body and end cap prior to reassembly of the valve. Inspect the internal machined surfaces of the body and end cap for pitting and rust. Clean any rust or scale with steel wool or Scotch-Brite pad. Carefully flush the body to remove any residue from the cleaning pads.
2. Closely inspect the edges of the lapped surfaces on the Downstream Seat, Upstream Seat, and Ball, for any flake or sharp edge remaining from the coating process. Use Cratex® Round Sticks with an Extra Fine grit to polish any imperfection on the edge. Extreme care must be taken to not scratch the sealing surface. Any flake of coating that may be swept between the ball and seat may cause galling. Following any polishing, thoroughly clean the part to remove any residue.
3. Support the valve body vertically in a bench vise with the end cap side up. The valve body should be secure to prevent movement during service.
4. **For 6 & 8 inch valve only:** Install metal pin seat and graphite pin packing from the conversion kit in ball support assembly.
5. Install the replacement metal thrust washer from the conversion kit onto the replacement stem and slide the stem in through the body. Install the supplied graphite packing, original packing gland, Belleville washers, and packing gland nut or stem nut, as required. No thrust washer or packing protectors are used.
6. Gently and carefully install the Graphite Gasket into the Body seat cavity. Place the Downstream Seat (identifiable by the 3 ring teeth on the back side) into the seat pocket on top of the Graphite Gasket, ensuring Downstream Seat is fully slotted into the Graphite Gasket.
7. Turn the stem CW to the **CLOSED** position. Apply a light film of break-in lubricant (light machine oil) to the surface of the replacement ball. Line up the ball slot with the stem tang and slide the ball into position.
8. **For 6 & 8 inch valve only:** Adjust the ball support assembly by turning the small set nut (located immediately below the larger support nut) counterclockwise on the tuning screw to loosen the set nut. Then, turn the larger support nut clockwise to compress the pin packing as necessary to stop leakage of line media around support nut threads. Using finger pressure only, rotate the tuning screw clockwise until the pin seat

Table 1: BODY BOLT TORQUE

VALVE SIZE	F15 (lb.in.)	F30 (lb.in.)
1/2"	140	140
3/4"	140	140
1"	210	210
1-1/4"	210	210
1-1/2"	550	550
2"	550	550
2-1/2"	550	550
3"	550	1000
4"	550	1000
6"	1000	1000
8"	1000	1450

lightly contacts the surface of the ball. Then, rotate the tuning screw  $\frac{1}{4}$  turn in the counter-clockwise direction to slightly retract the pin seat from the ball surface. Lock the tuning screw in place by tightening the set nut against the support nut by turning the set nut clockwise while holding the tuning screw head stationary with a wrench. This completes the ball support adjustment.

9. Install a wave spring of the proper size from the conversion kit onto the back side of the second metal seat. This seat, with wave spring, should be oriented with the rounded seating surface facing towards the ball. The seat (with wave spring) can now be installed into the end cap.
10. Install the body seal in the gasket recess located in the end of the body.
11. Place the end cap back onto the body and line up end flange, carefully guiding the end cap over the seat set and onto the body. Install the nuts only finger tight so

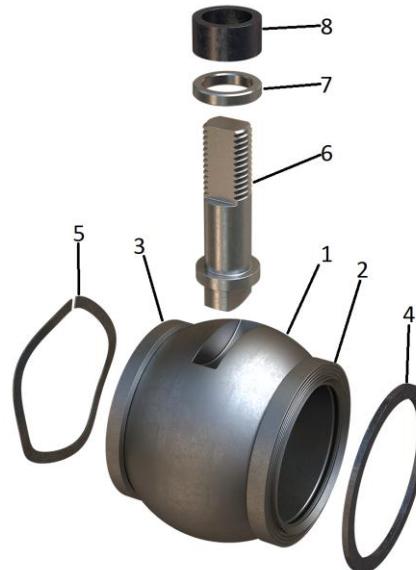
**NOTE:** Be certain to align bolt holes on the end flanges with one another during the reassembly process as it is possible to assemble the valve with the bolt holes incorrectly oriented.

12. Install body joint nuts and tighten each one gradually in a star-type pattern to the torque specified in Table 1. Apply 25% of the total torque on each cycle.

**WARNING: Extreme care must be exercised during installation of the body stud nuts to assure that body studs are fully engaged. Confirm that at least one stud thread is exposed beyond the flange on the body side and beyond the nut on the cap side.**

13. Cycle the valve slowly, with a gentle back and forth motion, to build gradually to the full quarter turn. Feel for any grinding or irregularities as an initial check for galling or impurities that must be cleaned prior to service.
14. Test the valve as described in Section 7.0 below.

<b>METAL SEAT CONVERSION KIT COMPONENTS</b>	
ITEM	PART NAME
1	BALL
2	DOWNSTREAM SEAT
3	UPSTREAM SEAT
4	GRAPHITE GASKET
5	WAVE SPRING
6	STEM
7	THRUST WASHER
8	GRAPHITE PACKING



## 6.0 ASSEMBLY TESTING:

### 6.1 HIGH PRESSURE HYDRO SEAT TEST

1. Assemble valve together with a testing apparatus including ported blind flanges such pressure up to MOP can be applied to the Upstream side of the valve, and leak rates in the form of both bubbles and drops can be measured from the Downstream side of the valve.
2. Secure the valve vertically with the Downstream side up (i.e. with the Body up).
3. Fill the valve and testing apparatus fully with water and close the valve. After closing the valve, the water levels should be such that any further water leaking through the valve will cause drops to form and fall from the testing apparatus.
4. Gradually apply pressure to the valve until the pressure reaches MOP and monitor the leak rate for a minimum of 2 minutes. Consult the Acceptable Leak Rate Table below for acceptance criteria.
  - a. For F15-CL150 valves, WCB valves have a MOP of 285psi and CF8M valves have a MOP of 275 psi
  - b. For F30-CL300 valves, WCB valves have a MOP of 740psi and CF8M valves have a MOP of 720 psi
5. Relieve all pressure from the valve from the pressure source without actuating the valve.
6. Opening the valve, and fully drain the water from the test apparatus.

### 6.2 AIR SEAT TEST

1. Close the valve and arrange the apparatus such that any air leaking through the valve will cause the formation of a bubble at the top of a water column.
2. Gradually apply 50-60psi air to the valve and monitor the leak rate for a minimum of 2 minutes. Consult the Acceptable Leak Rate Table below for acceptance criteria.
3. Relieve all pressure from the valve from the pressure source without actuating the valve.

### 6.3 LIGHT CYCLE TEST

1. While under 50-60psi air pressure, manually cycle the valve 10 times through its full stroke. While cycling, feel for any grinding or sticking points that may be indications of galling or damage.
2. Perform another Air Seat Test to verify that the valve sustained no damage in cycling. Should the leak rate have increased significantly, disassemble the valve and inspect the Seats and Ball for damage.

**NOTE:** If the leak rate is higher than required, cycling the valve further may improve the seal tightness.

## Acceptable Leak Rate Table

Valve size (in)	Class IV hydro	Class V hydro		Class V Air		Class VI Bubbles/min
	mL/min @50 psi	(Cl 150) mL/min	(Cl 300) mL/min	mL/min	Bubbles/min	
8	3633	1.14	2.96	37.6	250.67	45
6	1892	0.86	2.22	28.2	188.00	27
4	794	0.57	1.48	18.8	125.33	11
3	435	0.43	1.11	14.1	94.00	6
2.5	295	0.36	0.93	11.75	78.33	4
2	189	0.29	0.74	9.4	62.67	3
1.5	104	0.21	0.56	7.05	47.00	2
1	39	0.14	0.37	4.7	31.33	1
0.75	22	0.11	0.28	3.525	23.50	0.42
0.5	12	0.07	0.19	2.35	15.67	0.19

### 7.0 REINSTALLATION IN THE PIPELINE

- Before installing the valves, confirm that the pipe is cleaned of dirt, burrs, and welding residues, or the seats and ball surface will be damaged.
- Confirm that the pipe runs are correctly aligned and spaced for the valve being installed. Do not use the flange bolting to pull the pipe flange ends into alignment.
- Do not support the weight of the valve by the actuator, mounting bracket or top works alone. Always support the weight of the body directly. These valves are heavy and lifting by the bracket may damage the bracket or introduce misalignment causing the mechanism to fail.
- The valve may be fitted in any position on the pipeline. If in a horizontal position, it is preferred to have the valve stem up.
- Confirm that the flange gaskets are compatible with the intended service.
- Use fasteners of the correct type and grade.
- Follow the installation instructions recommended by the manufacturer for the gasket.

## 8.0 STORAGE:

### 8.1 SHORT TERM STORAGE:

- Short term storage is defined as storage of products and equipment to be used in the construction of a project for periods of one to three months.
- Ball valves should remain in the original shipping containers be placed on pallets of wood or other suitable materials. End protectors should remain on the valve ends to prevent the entrance of dirt.
- Valves should be stored in the open position to protect the ball and seats.
- Storage of ball valves can be in an open uncovered area provided provisions are made for inclement weather such as tarps or sheeting. Valves with electric actuators shall be stored under cover until ready for installation.

### 8.2 LONG TERM STORAGE:

- Long term storage is storage of products and/or equipment for periods of three months or more.
- Valves should be stored in the open position to protect the ball and seats.
- Ball valves should remain in the original shipping containers placed on pallets of wood or other suitable materials and stored indoors. End protectors should remain on the valve ends to prevent the entrance of dirt. The storage environment should be dry and not have severe swings in temperature and humidity.

## 9.0 SAFETY TIPS AND WARNINGS

1. Read completely and understand all instructions provided prior or beginning installation or maintenance.
2. Before installation confirm that valve is suitable for the intended service.
3. Make sure that line is depressurized and drains are open/monitored during installation
4. Before working on valve being in service make sure that service media has been flushed and line is safe. Make sure that all applicable MSDS sheets are available. Follow all safety related procedures.
5. Before disassembly valve shall be cycled several times to assure there is no pressure trapped in body cavity.
6. During assembly make sure that all threaded connections are safe and have proper engagement.
7. During the pressure test of reassembled valve follow all safety precautions to avoid possible injury. (Use of proper test equipment, correct parts assemblies, follow test procedures)
8. While line is under pressure DO NOT remove packing gland or any other valve parts.