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ASC Engineered Solutions

Installation, Operation, and Maintenance Manual

F2 Split Body Flanged-End Ball Valve

½"– 10" F2-CS & F2-SS – ANSI Class 150/300/600

F2 QVA

QUADRANT
An ASC Engineered Solution

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INSTALLATION, OPERATING, & MAINTENANCE INSTRUCTIONS

F2 Split Body Flanged-End Ball Valve IOM for:
1/2”- 10” F2-CS & F2–SS – ANSI CLASS 150/300/600

Read these entire instructions carefully before installation or servicing.

GENERAL INFORMATION

Safe and efficient operation of industrial installations requires not only complete knowledge of the engineering and functioning of all machinery and equipment but their continuous proper maintenance as well. Improper operation or maintenance of one single valve may affect the whole plant operation. To help you achieve trouble-free valve performance, general information is provided here for the optimum operation and maintenance of your Quadrant steel ball valves with floating ball design.

DESIGN

All Quadrant F2 series split body-floating ball valves are a two-piece bolted body design. The valves are non-directional and can be installed with either end upstream. These valves are designed and manufactured in strict accordance with ASME B16.34 and either API 608 or API 6D. Valves have flanges drilled and faced in accordance with ANSI B16.5.

1. HANDLING VALVES BEFORE MOUNTING/STORAGE

1.1 Prior to shipment, blind covers are placed on the inlet and outlet of each Quadrant valve for protection from mechanical damage as well as for prevention of intrusion of dust and other foreign objects into valve bore during transit. Do not remove these end protectors before valves are mounted.

1.2 For valve storage, a dust free place is recommended. Care should always be taken to avoid damaging stems. Placing valves directly on the ground or concrete floor is not recommended. Under no circumstances should valves be stored outdoors. Valves are shipped in the open position to protect the ball surface.

1.3 When moving with a crane, valves should be positively rigged around valve bodies and end flanges. In no case should the crane wire be in direct contact with valve stems or operational gears.

1.4 The valve must never be stored in the partially open position. The soft seat can be damaged if the valve is left partially open for long periods. It is recommended that the valve be stored in the full open position to protect the ball and seats.

WARNING

	NOTICE
	**SAFETY FIRST!** FOR YOUR SAFETY, TAKE THE FOLLOWING PRECAUTIONS BEFORE REMOVING THE VALVE ASSEMBLY FROM THE LINE OR BEFORE ANY DISASSEMBLY.

WHAT'S IN THE LINE?

Be sure you know what fluid is in the line. If there is any doubt, double check with the proper supervisor.

ARE YOU PROTECTED? 

Wear any protective clothing and equipment normally required to avoid injury from the particular fluid in the line.

IS THE LINE DEPRESSURIZED? 

Depressurize the line and drain the system fluid. Cycle the valve several times to relieve any pressure still inside the valve.

It is important to refer to the identification plate fastened to each valve for maximum pressure ratings and material description. In case there is any question concerning the valve, refer to Quadrant for maximum ratings.

WARNING

Warning: AT ALL TIMES KEEP HANDS OUT OF THE BALL CAVITY. A REMOTELY ACTUATED VALVE COULD CLOSE AT ANY TIME AND RESULT IN SERIOUS INJURY.

2. VALVE INSTALLATION

NOTICE

Handling equipment is required for the weight involved. The Quadrant ball valve catalog furnishes the approximate weight of the specific valve.

PROCEDURE

2.1 Verify the valve is correct as shown on the piping arrangement. Look at the identification plate, tags, and markings on the valve for size, pressure class, maximum operating pressure and temperature, and materials.

2.2 Remove end connection protectors.

NOTE: As piping sites are usually dusty, be sure not to remove valve end protectors before your valves are ready for mounting.

2.3 Inspect the valve bore for foreign matter and clean them if necessary. Valves are shipped with ends sealed, but during the transit, foreign material may be introduced into the bore.

2.4 Inspect gasket contact faces on valve flanges for any scratches or defects. Correct such scratches or defects with sand paper.

2.5 Install valve in line with either end upstream.

Tighten bolts evenly and alternately on tangential line. The end of tightened bolts should protrude equally above the nut.

NOTE: Make sure that valve and pipeline are aligned accurately.

Valve and pipe interior should be flushed to remove foreign objects which may later cause a fluid leak.

Straightness of pipeline and flange faces should be assured to avoid uneven piping stresses against the valve.

Care should be taken to assure that general stress of the pipeline is not concentrated on the valve.

3. VALVE OPERATION

3.1 Rotation of the valve stem by 90º fully opens or closes the valve. Clockwise rotation closes the valve, and counterclockwise rotation opens it.

Note: To prolong the life of the seats, the ball valve should be fully open or closed. Leaving the ball in a half open/closed position could damage the seats.

3.2 On the pilot run, be sure to detect fluid leakage from the packing area, body-cap coupling, flange gasket or piping flange gasket.

3.3 When leakage is detected from packing area. Retighten packing nut [16] and observe result. Refer to Table 2 and Sketch 1

Note: Care should be taken not to overtighten the packing nut as it would reduce elasticity and consequently sealing performance of packing. If re-tightening does not solve the problem, gland packing should be replaced with new packing.

3.4 When leakage is detected from body-cap joint, tighten the nuts [13] in an alternate fashion per

Figure 1 using the pre-specified torque values in Table 1. If leakage persists, the gasket (spiral wound) [6] should be replaced with a new one. Refer to Table 1, Figure 1, and Sketch 1

4. DAILY VALVE INSPECTION DURING OPERATION – ON STREAM MAINTENANCE

4.1 In order to operate your valve safely and satisfactorily, daily inspection is very important. The following are the main items for your daily inspection.

Fluid leakage

a. leakage from the gland area
b. leakage from the flange connector
c. leakage through the valve body surface

Generation of abnormal noise

a. from the valve itself
b. from the loose bolting
c. from the vibrating pipelines

Visual confirmation

a. correct valve operating position
b. bolting securely tight

4.2 If any of the above problems are detected, remedial measures are to be taken immediately as follows:

Fluid leakage

Refer to section 3.3 and 3.4 "Valve Operation" to remedy leakage from the packing area and flange connection. For the leakage through the valve body surface, a valve repair specialist should be called.

Generation of abnormal noise

Abnormal noise can be distinguished easily from normal noise, if your maintenance engineer gets used to it during daily inspection. For the abnormal noise generated from the valve itself or the Pipelines, your piping engineer should be called. Loose bolting should be immediately re-tightened.

Visual Confirmation

Make sure that the valve is operated in the fully opened or closed position. No intermediate position is recommended.

CAUTION: Ball valves are generally <u>not recommended for throttling service</u>, where the fluid flow or the edge of the ball bore may damage or deform plastic ball seats and cause leakage when they are fully closed. You might have an increased concern with the possibility of seat damage or deformation when your ball valves are used for servicing liquid with extremely high fluid velocity and/or high abrasive service such as slurry or a fluid containing many materials.

For this reason, ball valves are basically to be considered as a measure to fully open or shut off the fluid flow. Leaving your ball valves slightly open (intentionally or unintentionally) should be particularly prohibited because of excessive increase of the fluid velocity through the very narrow slit between the seat and edge of the ball bore, which may damage or deform the ball seats.

PERIODIC VALVE INSPECTION OFF STREAM MAINTENANCE

Inspection should be made periodically to detect wear of the ball stem, corrosion of the body or cap interior, and wear of the threads. Usually, packing, gaskets, bushings, thrust washers, stem bearing, body O-ring, and ball seats are replaced as a part of basic maintenance operations. For a list of recommended spare parts, see Quadrant ball valve catalog or contact a Quadrant Valve representative.

5. DISASSEMBLY PROCEDURE

(Refer to Assembly Illustration on last page for part identification and location.)

5.1 If the valve is in line, isolate the valve from the line pressure.

5.2 Release the pressure from the inlet and outlet ports.

5.3 It is recommended to cycle the valve four to five times to make sure there is no pressure trapped inside the body cavity.

5.4 Before dismantling the valve from the pipeline, mark the flanges adequately in their original location and position to avoid confusion or mistake on subsequent re-installation of valve.

5.5 Remove the valve from line.

NOTE: Care should be taken when disassembling to not scratch the stem, ball, or the body interior. All valve components should be kept isolated for easier examination and reassembly.

5.6 Before disassembly, remove and collect residual objects from valves if any, and note their location. Examination of these records and materials will be found useful for better valve maintenance.

5.7 Scribe witness marks across edges of the coupled body-cap flanges for correct and easy reassembly.

5.8 Fully close the valve, loosen lock bolt [21], and remove the lever handle [20]. Refer to Sketch 1

Note: For ½" - ¾" valves, remove the lock nut [28] and handle [30]. Refer to Sketch 2

5.9 Remove the snap/Tru-Arc ring [19] and lock plate [18]. Refer to Sketch 1

5.10 Remove the packing nut [16], packing bolt [15], Belleville washers [17], and gland flange [14].

5.11 Remove gland bearing assembly [10 and 11] and separate gland bushing [10] from the gland [11].

Note: For ½" - ¾" valves, remove the gland [26]. Refer to Sketch 2

5.12 Remove the body nuts [13] and stud bolts [12] to separate the adapter [2] from the body [1]. If nuts are stuck, apply some lubricant and leave it for a while for easier removal. Refer to Sketch 1

Note: For ½" - ¾" valves, remove the cap bolt [42] to separate the body cap [3] from the body [1]. Refer to Sketch 2

5.13 Remove Adapter [2]. Refer to Sketch 1

Note: For ½" - ¾" valves, remove Body Cap [3]. Refer to Sketch 2

Removal of the adapter/body cap should be done with care not to damage or scratch the flange face.

5.14 Remove the ball [4] from the body [1]. Refer to Sketch 1

NOTE: For ½" - ¾" valves, remove ball [7] from body [1]. Refer to Sketch 2

Removal of the ball should be made with extreme care so that it will not get scratched.

5.15 Remove the seat [3] from body [1] and adapter [2]. Refer to Sketch 1

Note: For ½" - ¾" valves, remove the seat [11] from the body [1]. Refer to Sketch 2

5.16 Remove the body gasket [6]. Refer to Sketch 1

Note: For ½" - ¾" valves, remove the body seal [14]. Refer to Sketch 2

5.17 Remove the stem [5] by pushing stem into the body cavity. Refer to Sketch 1

Note: For ½" - ¾" valves, remove the stem [8]. Refer to Sketch 2

5.18 Remove the stem thrust washer [15] from the stem [5]. Refer to Sketch 1

Note: For ½" - ¾" valves, remove the stem seal [12] from the stem [8]. Refer to Sketch 2

5.19 Remove the Chevron packing [8] from the stuffing box. The packing consists of graphite rings.

Note: For ½" - ¾" valves, remove the stem packing [15] from the stuffing box. Refer to Sketch 2

INSPECTION AND CLEANING

6.1 Wipe off metal parts with a soft cloth using petroleum solvent, steam, or oil.

6.2 Inspect metal parts for damage or burrs on all surfaces. Worn or corroded area of part shall be carefully examined visually or, if necessary, with magnifying glass. Cracks should be carefully detected. Wall thickness should be periodically measured for recording corrosion with the passage of time.

6.3 Part replacement. For recommended spare parts list see Quadrant ball valve catalog.

NOTE: Soft goods should never be re-used after the valve has been disassembled. Always replace soft goods after disassembly with new pieces. The soft goods include: seats, packing, body gasket, bearings, and thrust washer.

7. RE-ASSEMBLY PROCEDURE

(Refer to Assembly Illustration on last page for part identification and location.)

Valve should be assembled in the following sequence after all the component parts have been cleaned and new spare parts have been prepared. Be sure that rust and other soils are out of the seat retaining areas of the body and cap for optimal sealing performance.

7.1 Place the body [1], adapter [2], and ball [4] on a clean solid surface and inspect for damage, paying close attention to sealing surfaces such as stem hole, stuffing box, seat pockets, gasket surfaces, and raised face surfaces. Refer to Sketch 1

NOTE: For ½" - ¾" valves, body [1], body cap [3] and ball [7]. Refer to Sketch 2

7.2 Clean the body [1] adapter [2], and ball [4] to ensure that no dirt and metal debris are trapped in the assembly. Refer to Sketch 1

7.3 Apply a thin layer of lubricant to the seat pocket in both the body [1] and adapter [2]. Refer to Sketch 1

7.4 Inspect seats [3] for nicks, scratches, or other damages. DO NOT install if damaged. Refer to Sketch 1

NOTE: For ½" - ¾" valves, seat [11]. Refer to Sketch 2

7.5 Insert seat [3] into body [1] and adapter [2] seat pockets. Refer to Sketch 1

Note: Apply a thin layer of lubricant to the top surface of the seats after installing them in the valve.

7.6 Push stem thrust washer [7] onto the stem [5] until washer contacts with the stem flange.

Note: Before installing the stem in the valve, apply a thin layer of lubricant to the stem.

For ½" - ¾" valves, stem seal [12] onto the stem [8]. Refer to Sketch 2

7.7 Carefully insert the stem [5] into the body [1] from inside body cavity. Refer to Sketch 1

Note: For ½" - ¾" valves, stem [8] into the body [1]. Refer to Sketch 2

7.8 Rotate stem [5] to closed position and carefully install ball [4] into valve body [1] by sliding ball stem slot onto stem. Refer to Sketch 1

Note: For ½" - ¾" valves, stem [8] to the closed position and carefully install ball [7] into valve body [1]. Refer to Sketch 2

7.9 Spray some aerosol lubricant (WD 40) on top of ball [4] and rotate stem [5] open and closed several times to make sure the ball does not interfere with the body casting.

7.10 Insert Chevron Packing rings [8] into stem [5] seal area. Refer to Sketch 1

Note: Make sure not to damage packing when inserting into the stem seal area. Graphite packing is very fragile.

For ½" - ¾" valves, stem seal [12] into stem [8] seal area. Refer to Sketch 2

7.11 Insert gland bushing [10] into gland [11]. Refer to Sketch 1

7.12 Place gland assembly (gland with bushing installed) over stem [5] and into stem seal area in the body. Refer to Sketch 1

NOTE: ½" - ¾" valve does not include a gland flange or gland bolting skip steps 7.13 through 7.15.

7.13 Place gland flange [14] over the stem [5]. Refer to Sketch 1

7.14 Install packing bolting [15]. The packing bolts will be inserted from the top; install two Belleville spring washers [17] with the large diameters together then install the packing nut [16]. Refer to Sketch 1

7.15 Tighten stop plate bolting evenly and diagonally by alternating the force applied to each bolt until required torque is achieved. Required torque is listed in table 2 below.

NOTE: For ½" - ¾" valve, apply a small amount of anti-seize compound on gland [26] threads. Thread gland [26] into the body [1] and tighten until required torque is achieved. Refer to Sketch 1

7.16 Insert the spiral wound gasket [6] into the body [1]. Refer to Sketch 1

NOTE: For ½" - ¾" valves, body seal [14] in to the body [1]. Refer to Sketch 2

7.17 Apply a small amount of anti-seize compound on stud threads. Install studs [12] into the body [1] with markings pointing upward so it can be visible when looking at the nut on the assembled valve.

7.18 CRITICAL: Rotate ball [4] to closed position before installing the adapter [2].

7.19 Place adapter [2] onto valve body [1]. Refer to Sketch 1

Note: Adapter will only align with body in one orientation due to bolt pattern. In most cases, align heat codes and foundry marks. If adapter bolt holes do not line up with body bolts when heat codes are aligned, then rotate slowly until bolt holes align with body studs.

7.20 Install nuts [13] onto studs [12]. Torque nuts evenly and diagonally in star pattern as shown in figure 1 to appropriate torque level. See table 2 below for bolt torque.

Note: Using a calibrated torque wrench, start to torque flange bolts in 25% increments of the final torque until the final torque is reached using a start cross pattern as shown in figure 1.

7.23 Place lock plate [18] over the stem [5]. Refer to Sketch 1

Note: For ½" - ¾" valves, the locking mechanism is built into the body so skip step 7.23 through 7.24. Refer to Sketch 2

7.24 Install Tru-Arc/snap-ring [19] on the stem groove. Refer to Sketch 1

7.25 Install lever handle [20] on valve: put handle over stem [5] and tighten lock bolt [21]. Refer to Sketch 1

NOTE: For ¾" valve Place handle [30] over stem [8], then place nut [28] on top of handle, and tighten with appropriate wrench.

TEST AND INSPECTION

8.1 Check the valve operating condition by fully opening and closing several times. Make sure that lock plate matches extreme operating position of the valve.

8.2 All valves, after reassembly, should be subjected to hydrostatic or pneumatic seat test to insure valve performance.

Table 1) Body Bolting Torque In-lbs. (Ft-Lbs.) according to Valve Size

Class 150	½"	¾"	1"	1.5"	2"	2.5	3"	4"	6"	8"	10"
F2-WCB	266	354	80	110	135	135	135	(17)	(35)	(45)	(70)
F2-CF8M			60	80	100	100	100	150	(25)	(35)	(50)

Class 300	1"	1.5"	2"	3"	4"	6"	8"
F2-WCB	110	135	110	(17)	(45)	(70)	(90)
F2-CF8M	80	100	80	150	(35)	(50)	(70)

Class 600	1"	1.5"	2"	3"	4"	6"
F2-WCB	110	(17)	(17)	(45)	(70)	(90)
F2-CF8M	80	150	150	(35)	(50)	(70)

Table 2) Gland Bolting Torque

Valve Size	Bolting Torque Per Bolt
1"	37 in-Lbs.
1-1/2"	42 in-Lbs.
2"	42 in-Lbs.
2-1/2"	42 in-Lbs.
3"	123 in-Lbs.
4"	20 Ft.-Lbs.
6"	28 Ft.-Lbs.
8"	46 Ft.-Lbs.
10"	98 Ft.-Lbs.

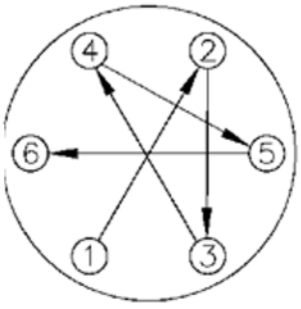
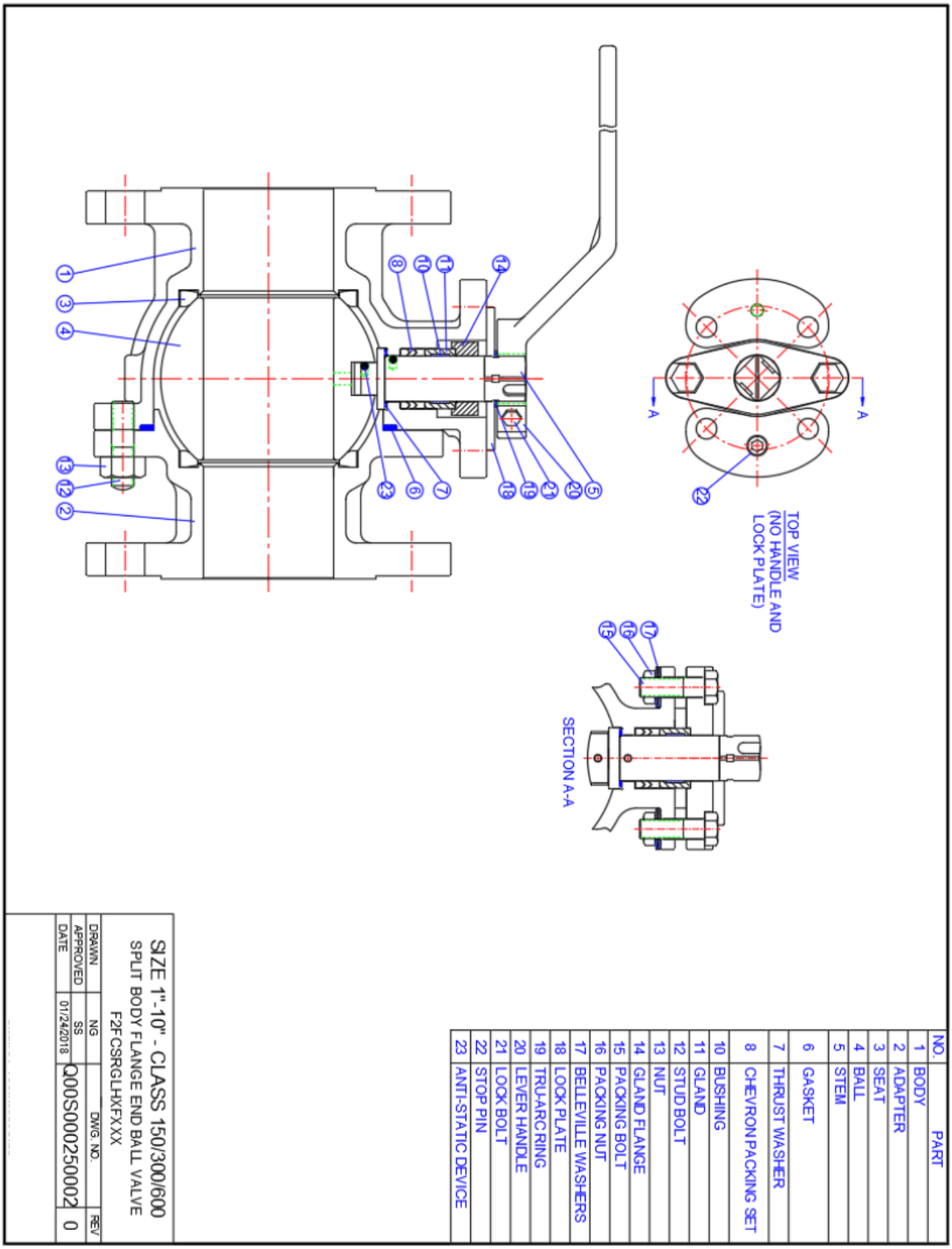


Figure 1: Star pattern for tightening body boltling

Assembly Illustrations

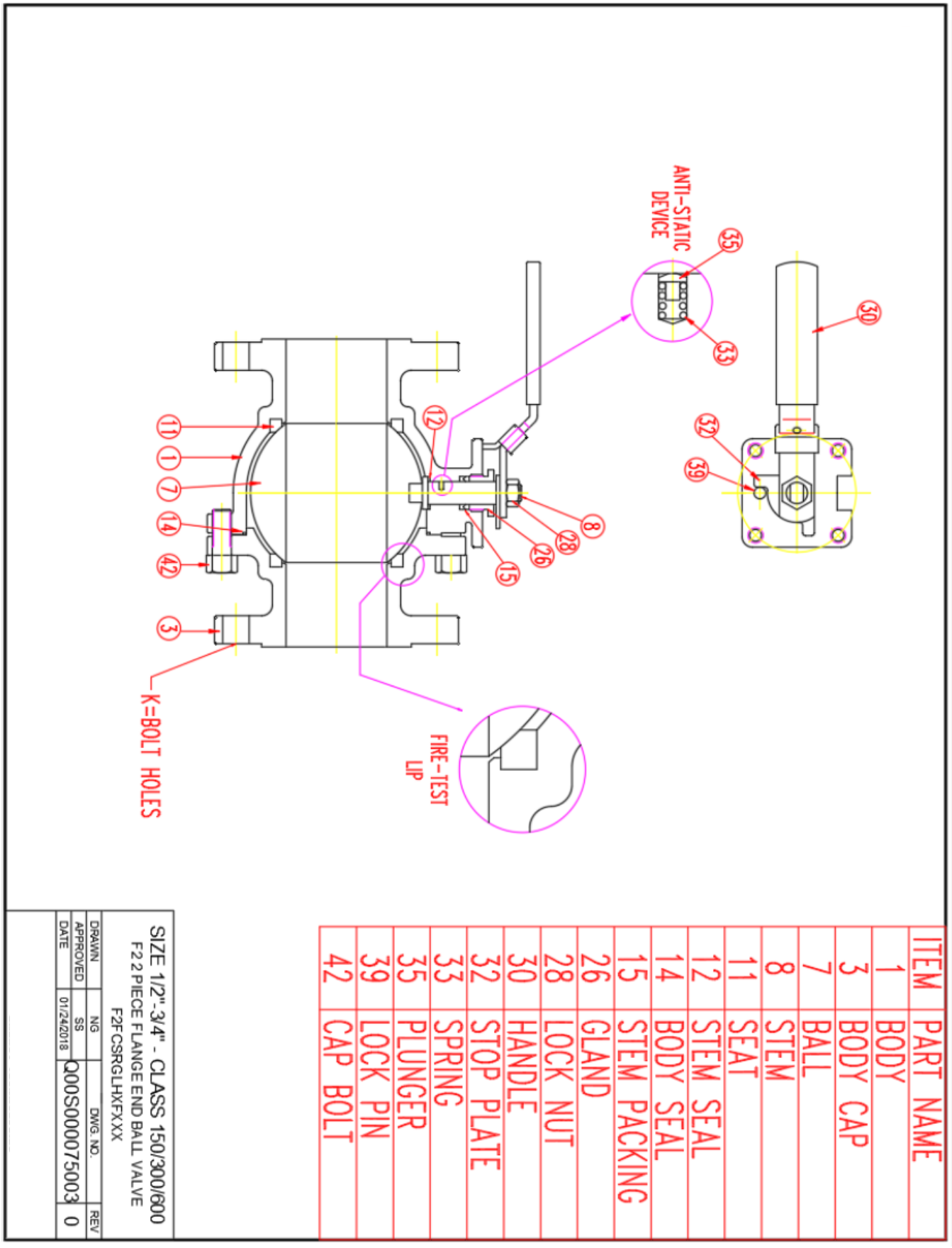


NO.	PART
1	BODY
2	ADAPTER
3	SEAT
4	BALL
5	STEM
6	GASKET
7	THRUST WASHER
8	CHEVRON PACKING SET
10	BUSHING
11	GLAND
12	STUD BOLT
13	NUT
14	GLAND FLANGE
15	PACKING BOLT
16	PACKING NUT
17	BELLEVILLE WASHERS
18	LOCK PLATE
19	TRU-ARC RING
20	LEVER HANDLE
21	LOCK BOLT
22	STOP PIN
23	ANTI-STATIC DEVICE

SIZE 1"-10" - CLASS 150/300/600
SPLIT BODY FLANGE END BALL VALVE
F2FCSRGLHXFXXX

		DWG. NO.	REV
DRAWN	NG		
APPROVED	SS	Q00S000250002	0
DATE	01/24/2018		

Sketch 1


ITEM PART NAME
1 BODY
3 BODY CAP
7 BALL
8 STEM
11 SEAT
12 STEM SEAL
14 BODY SEAL
15 STEM PACKING
26 GLAND
28 LOCK NUT
30 HANDLE
32 STOP PLATE
33 SPRING
35 PLUNGER
39 LOCK PIN
42 CAP BOLT
ANTI-STATIC DEVICE
FIRE-TEST LIP
K=BOLT HOLES
SIZE 1/2"-3/4" - CLASS 150/300/600
F2 2 PIECE FLANGE END BALL VALVE
F2FCSRGLHXFXXX
DRAWN NG
APPROVED SS
DATE 01/24/2018
DWG. NO. Q00S000075003
REV 0

Sketch 2

About ASC Engineered Solutions

ASC Engineered Solutions is defined by quality—in its products, services and support. With more than 1,400 employees, the company's portfolio of precision-engineered piping support, valves and connections provides products to more than 4,000 customers across industries, such as mechanical, industrial, fire protection, oil and gas, and commercial and residential construction. Its portfolio of leading brands includes ABZ Valve®, AFCON®, Anvil®, Anvil EPS, Anvil Services, Basic-PSA, Beck®, Catawissa, Cooplet®, FlexHead®, FPPI®, Gruvlok®, J.B. Smith, Merit®, North Alabama Pipe, Quadrant®, SCI®, Sharpe®, SlideLOK®, SPF® and SprinkFLEX®. With headquarters in Commerce, CA, and Exeter, NH, ASC also has ISO 9001:2015 certified production facilities in PA, TN, IL, TX, AL, LA, KS, and RI.

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