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ASC Engineered Solutions

Installation, Operation, and Maintenance Manual

M2 Three–Piece Ball Valve NPT & Socket Weld

¼"– 2–½" M2–CS & M2–SS – All Sizes ASME B16.34 Class 800

M2 QVA

QUADRANT
An ASC Engineered Solution

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INSTALLATION, OPERATING, & MAINTENANCE INSTRUCTIONS

M2 Three-Piece Ball Valve NPT & Socket Weld IOM for:
1/4"- 2-1/2" M2-CS & M2-SS - All Sizes ASME B16.34 CLASS 800
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 three-piece design.

DESIGN

All Quadrant M2 series ball valves are a three-piece bolted body design. The valves are non-directional and can be installed with either end upstream. These valves are designed and manufactured in accordance with ASME B16.34, API 608, and NACE MR01-75.

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 the 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.

Inspect pipe threads for any damage caused in shipment or handling.

2.4 Install valve in line with either end upstream.

2.4.1 If equipped, confirm Male NPT threads on piping to be assembled to valve meet gauging specifications of ASME B1.20.1 (NPT) or B1.20.3 (NPTF).

2.4.2 Thread the pipe into the valve end connections by hand first, and then use a standard pipe wrench. Before assembling the pipe and valve, apply pipe dope or PTFE tape to the threads on the pipe.

NOTE: Make sure that valve and pipeline are aligned accurately. Thread sealant/lubricant is required to establish a seal between the piping threads and valve threads. It will not be possible to establish a leak-free seal without thread sealant.

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

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

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

2.5 Installation- Socket Weld or Butt Weld Ends

2.5.1 Inspect piping to be welded to valve for correct preparation and any damage.

2.5.2 Place handle in FULL OPEN POSITION.

2.5.3 Wrap a rag that has been soaked with WATER around center of valve body and secure. Do not wet weld ends.

2.5.4 Insert piping into one socket weld end (or align pipe to butt weld end) and "tack" weld in two spots.

2.5.5 Wait one minute, then insert piping into opposite weld end and "tack" weld in two spots.

2.5.6 Before welding, confirm valve location, orientation and clearance is acceptable.

2.5.7 Weld pipe to one end of valve using appropriate wire/filler materials as quickly as possible.

2.5.8 Allow assembly to cool for at least 5 minutes.

2.5.9 Confirm rag is still wet- if not, re-soak rag and re-secure to center of valve body.

2.5.10 Repeat step 2.5.7 for opposite side.

3. VALVE OPERATION

3.1 Rotation of the valve stem by 90° 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, or piping connection.

3.3 When leakage is detected from packing area. Retighten packing nut [9] 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 body bolts [12] in an alternate fashion per Figure 1 using the pre-specified torque values in Table 1. If leakage persists, the body seal [8] should be replaced with a new one.

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 body-cap connection. For 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 not recommended for throttling service, 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, body seal, thrust washers, and ball seats are replaced as a part of basic maintenance operations. For a list of recommended spare parts, see Quadrant ball valve catalog.

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 ends 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 handle nut [10], and remove the lever handle [11]. Refer to Sketch 1

5.9 Remove the handle stop [13]. Refer to Sketch 1

5.10 Remove the packing nut [9]. Refer to Sketch 1

5.11 Remove the body bolts [12] to separate the body caps [2] from the body [1]. Refer to Sketch 1

5.12 Remove body cap [2]. Refer to Sketch 1

5.13 Remove the seat [5] from body [1]. Refer to Sketch 1

5.14 Remove the ball [3] from the body [1]. Refer to Sketch 1

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

5.15 Remove the body seal [8] from each body cap [2]. Refer to Sketch 1

5.16 Remove the stem [4] by pushing stem into the body cavity. Refer to Sketch 1

5.17 Remove the stem thrust washer [6] from the stem [4]. Refer to Sketch 1

5.18 Remove the packing set [7] from the stuffing box. The packing consists of graphite or R-PTFE rings. Refer to Sketch 1

6. 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 parts. The soft goods include seats, packing set, body seal, 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 body caps for optimal sealing performance.

7.1 Place the body [1], insert [2], and ball [3] 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

7.2 Clean the body [1], body cap [2], and ball [3] 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]. Refer to Sketch 1

7.4 Inspect seats [5] for nicks, scratches, or other damages. DO NOT install if damaged. Refer to Sketch 1

7.5 Insert one seat [5] into body [1] seat pocket. Refer to Sketch 1

7.6 Insert one body seal [8] into the body cap [2]. Refer to Sketch 1

7.7 Place one body cap [2] onto valve body [1]. Secure the body cap to the body with the body bolts [12] using the correct torque values from table 1. Refer to Sketch 1

7.8 Push the thrust washer [6] onto the stem [4] until the thrust washer contacts the stem flange. Refer to Sketch 1

7.9 Carefully insert the stem [4] into the body [1] from inside the body cavity. Refer to Sketch 1

7.10 Rotate stem [4] to closed position and carefully install ball [3] into valve body [1] by sliding ball stem slot onto stem. Refer to Sketch 1

7.11 Spray some aerosol lubricant (WD 40) on top of ball [3] and rotate stem [4] open and closed several times to make sure the ball does not interfere with the body [1] or body cap [2]. Refer to Sketch 1

7.12 Place the remaining seat [5] into body [1] seat pocket. Refer to Sketch 1

7.13 Insert the remaining body seal [8] into the body cap [2]. Refer to Sketch 1

7.14 Place the remaining body cap [2] onto the valve body [1]. Secure the body cap to the body with the body bolts [12] using the correct torque values from table 1. Refer to Table 1 and Sketch 1

7.15 Insert the packing set [7] into stem seal area. Refer to Sketch 1

7.16 Place packing nut [9] over stem [4] and into stem seal area in the body. Refer to Sketch 1

7.17 Tighten the packing nut [9] until the required torque is achieved. Required torque is listed in table 2. Refer to Table 2

7.18 Install the handle stop [13]. Refer to Sketch 1

7.19 Install handle [11] on valve: put handle over stem [4] and tighten handle nut [10]. Refer to Sketch 1

8 TEST AND INSPECTION

8.1 Check the valve operating condition by fully opening and closing several times. Make sure that lock mechanism 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. (In.-Lbs.) according to Valve Size

Size-Full Port	Size-Reduced Port	Cap Bolt Torque (In.-Lbs.)
1/4”- 1/2”	1/2”- 3/4”	221
3/4	1”	398
1”	1-1/4”	708
1-1/2”	2”	850
2”	2-1/2”	708

Table 2) Packing Nut Torque

Size-Full Port	Size-Reduced Port	Packing Nut Torque (In.-Lbs.)
1/4”- 1/2”	1/2”- 3/4”	87
3/4”-1”	1”-1-1/4”	174
1-1/4”-1-1/2”	1-1/2”-2”	260
2	2-1/2”	260

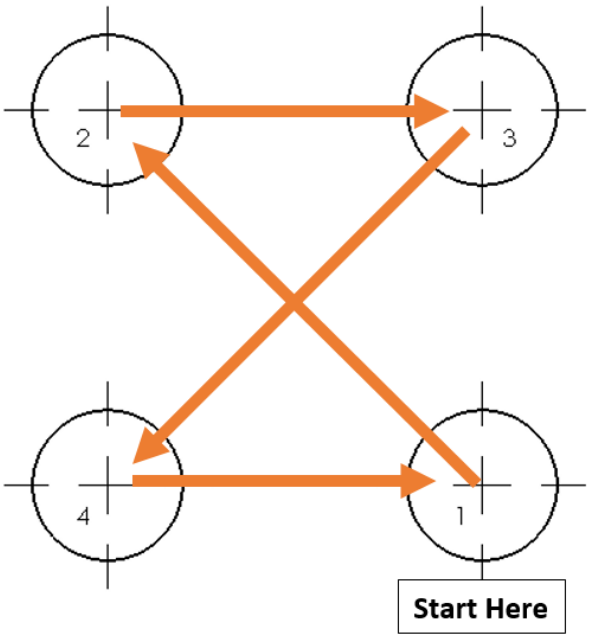
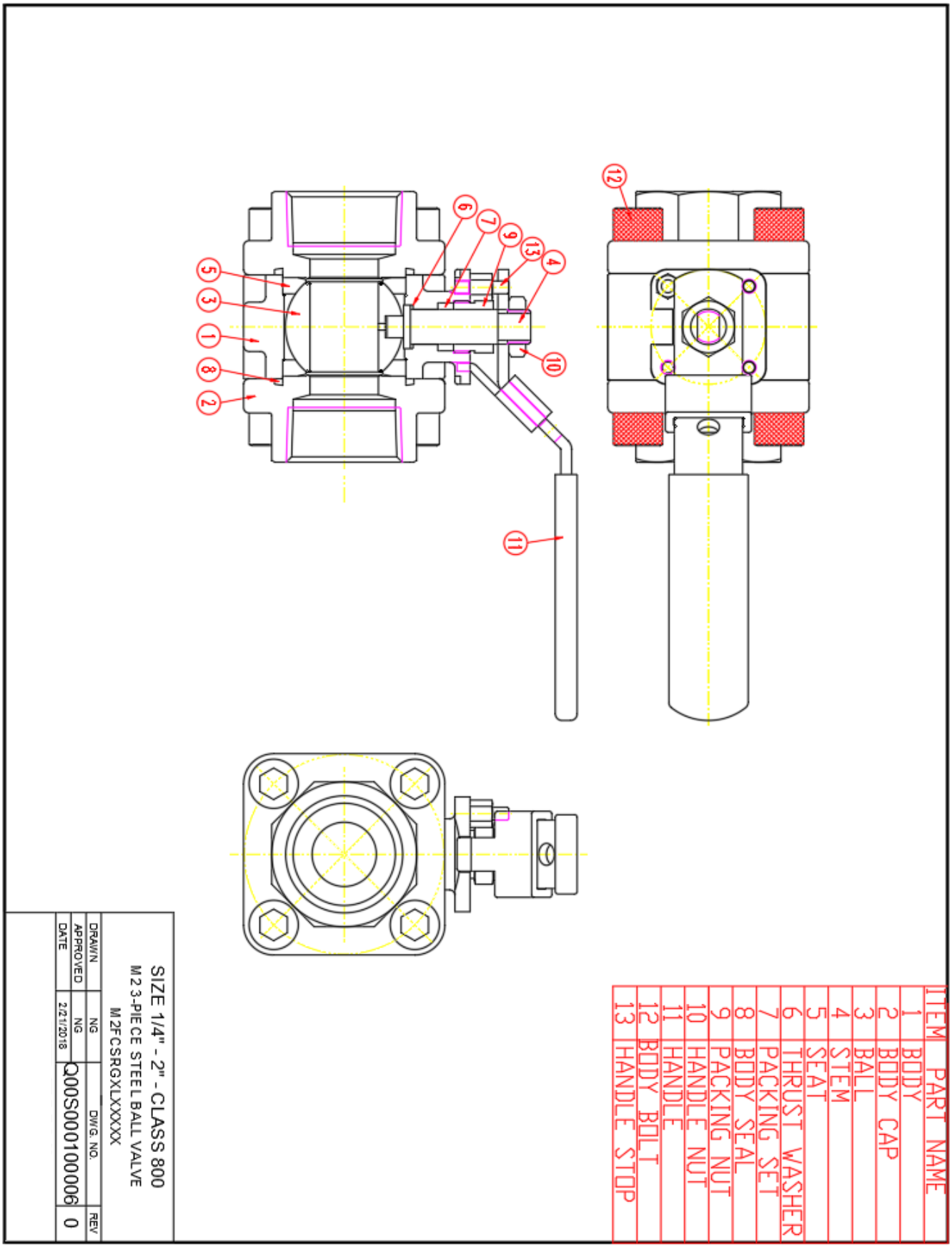


Figure 1) Torque Pattern

Assembly Illustrations



Sketch 1

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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