

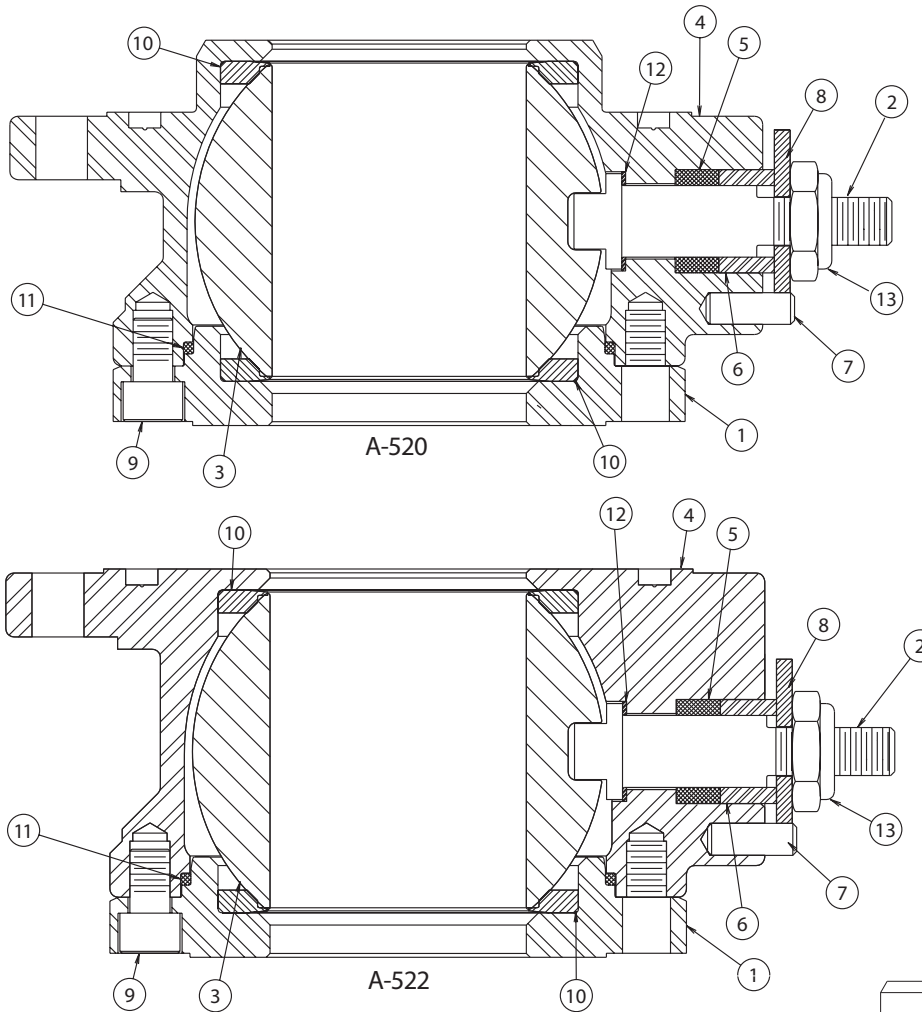


4" Ball Valve - Bottom Outlet

Instructions for Series A-520 and A-522

**Installation
Operation
Inspection
Maintenance**





ITEM	QTY	PART NAME
1	1	CAP
2	1	STEM
3	1	BALL
4	1	BODY
5	1	PACKING
6	1	SPACER
7	1	PIN
8	1	STOP PLATE
9	4	CAPSCREW, HEX-SOC, 5/8"-11UNC-2A X 1" LG
10	2	SEAL, BALL
11	1	SEAL, VALVE BODY
12	1	WASHER, THRUST
13	1	LOCKNUT, HEX, THIN, 1 1/8"-12UNF, NY. INSERT
14	1	NAMEPLATE
15	1	HANDLE (Optional)
16	1	WASHER, HANDLE (Optional)
17	1	BOLT, HANDLE (Optional)

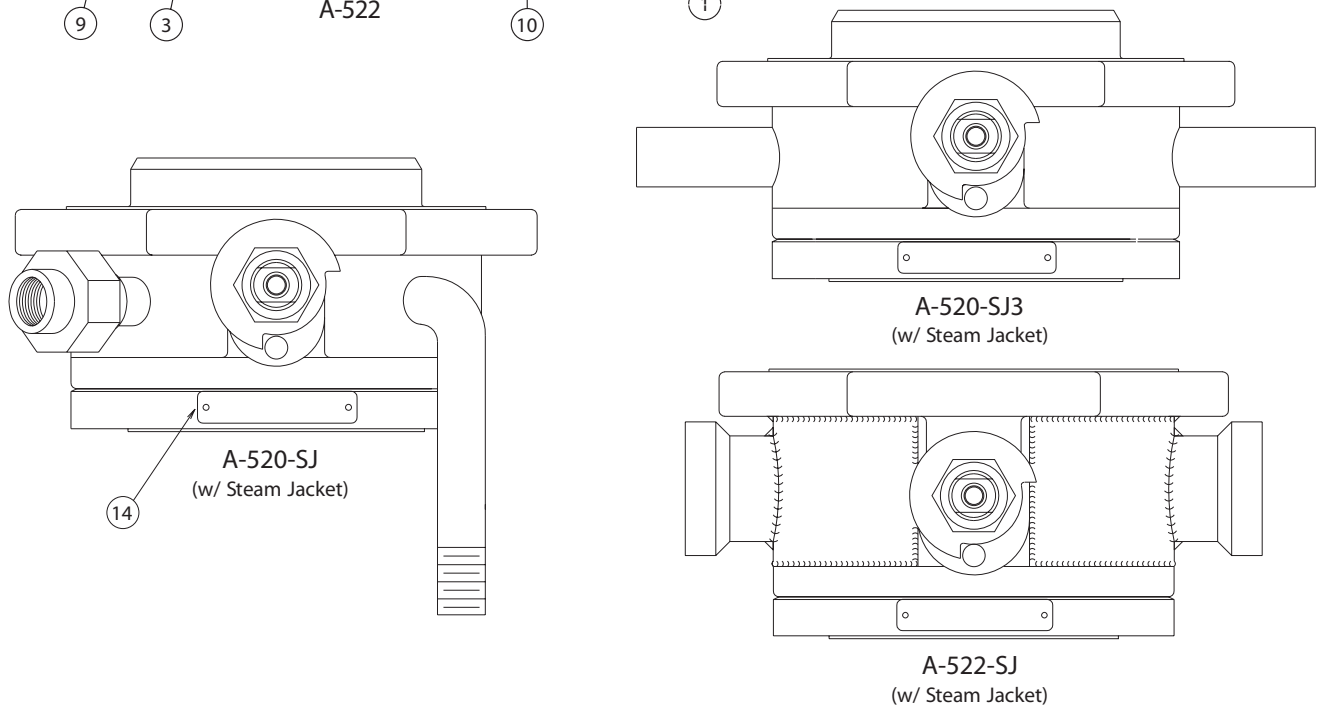


Figure 1 - Ball Valve Components and Steam Jacket Configurations

1.0 VALVE INSTALLATION



CAUTION: Toxic Hazard To avoid exposure to toxic or hazardous materials, make sure the tank car is empty and clean, and that the work area is free of hazardous chemicals before removing a valve or installing a new one.

1.1 Preliminary Considerations

New valves have passed final inspection at Midland. If a new valve has been left in its original shipping container, is undamaged, and is not more than six months old, it may be installed on a tank car without retesting.

Keep the new valve in its original shipping container. This will ensure it remains clean and will protect the gasket groove and ball (Fig. 2) from nicks and damage.

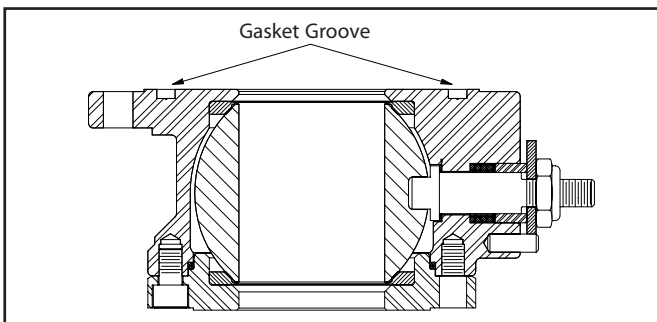


Figure 2 - Valve Gasket Groove

1.2 Installation Procedure

1.2.1 Remove the old valve from the tank car. If the valve includes a steam jacket, cut or disconnect the steam lines from the valve taking care to preserve the integrity of the valve's original steam inlet and outlet piping.

1.2.2 Clean the tank car mounting flange and saddle plate (if present) of all product, debris and corrosion. Wipe the inside-bottom of the tank near the outlet opening to remove loose debris. *Clean out the threaded holes in the mounting flange to ensure easy installation of the new mounting hardware.

1.2.3 Using a lint-free cloth and appropriate cleaning solvent, wipe clean the mounting flange and tongue.

1.2.4 Inspect the sides and edges of the tank car mounting-flange tongue. Because the valve fits tightly over the tongue, any peening-over of its edges may make it difficult to properly seat the new valve. Mounting-flange surfaces should be flat within 0.015 inches TIR. If any irregularities are found, correct them according to approved repair practices.

1.2.5 Inspect the gasket groove of the reconditioned or retested valve for nicks and burrs. The mounting-flange tongue and gasket groove dimensions have diameter tolerances of ± 0.003 ", thus any excess material on these diameters will make it difficult to locate the valve groove onto the tongue. If minor irregularities are found, correct them according to approved repair practices. Report any significant damage to your supervisor before continuing.



CAUTION: Gasket Damage
Do not use a sharp instrument to press the new gasket into place or gasket damage may result.

1.2.6 Install the new gasket in the gasket groove of the valve. Ensure it is fully seated. When the gasket is fully seated, 3/16" of free space should remain above the gasket to permit locating and entry of the mounting-flange tongue.

1.2.7 Install the ball valve in the open position (Fig. 3) so the ball surfaces are protected during the following steps. Do not install the valve handle at this time.



Figure 3 - Ball Valve in Open Position

1.0 VALVE INSTALLATION

1.2 Installation Procedure (cont.)



CAUTION: Potential Lifting Injury
The ball valve, with the outlet cap in place, weighs in excess of 95 pounds (depending on model). Use mechanical assistance or additional manpower when lifting and locating the valve during installation.

1.2.8 Raise the valve up to the tank car mounting-flange surface with the valve-handle shaft oriented so that it is pointing away from the tank car. Carefully align the mounting-flange tongue with the gasket groove in the valve, while also taking care to align the mounting holes in the valve flange with those in the mounting flange.

1.2.9 Raise the valve only until its gasket groove engages with the mounting-flange tongue.

1.2.10 Install four (4) mounting bolts 90° apart and tighten them gradually in an even sequence only enough to retain engagement of the valve with the mounting-flange tongue.

1.2.11 Remove the mechanical lifting device.

1.2.12 Install the remaining four (4) mounting bolts.

1.2.13 Tighten all eight (8) mounting bolts alternating diagonally as shown in Figure 4. Do not over tighten one side as it may tilt the valve and prevent a proper seal.

1.2.14 Tighten the mounting bolts in 1/3 torque increments to a final torque setting prescribed by your engineering department.

1.2.15 Ensure that an even gap exists all around between the valve flange and the mounting flange. The gap should be 1/8" to 3/16", depending on the mounting-flange tongue height (which may vary between 5/16" and 3/8").

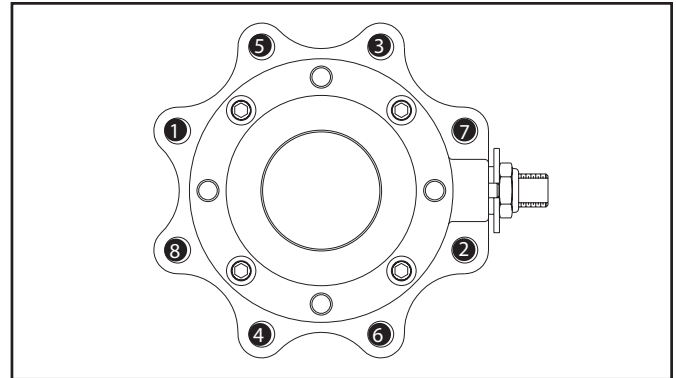


Figure 4 - Mounting Bolt Tightening Sequence

1.2.16 If the valve includes a steam jacket, connect the steam supply and return lines to the valve ports according to the prescribed practices of your company.

1.2.17 Install the valve handle onto the valve shaft with the Nord-lock washer and cap screw provided.

1.2.18 Fully close and open the valve a few times to confirm free operation. Check that the valve handle fits into both the "Open" and "Closed" brackets that secure its position.



WARNING: Valve Leakage
Improper flange-tongue seating in the valve groove, loose bolts and damaged gaskets may result in leaks at the valve mounting joint.

1.2.19) **Inspect for leaks.** Follow your company leak testing procedure.



NOTE: Valve Operation
Operation and use of the valve must conform with all applicable TC, AAR, DOT (Parts 173.31, 174.67, etc.), other governmental bodies, and the operating instructions of your company.

2.0 VALVE INSPECTION

Follow these instructions and guidelines for assessing the condition of a leaking ball valve prior to rebuilding it.

2.1 Disassembly for Inspection

Follow the steps below to disassemble the valve.

2.1.1 Locate the valve on a bench and preferably on a pressure test fixture to which it may be bolted for safety and rigidity during hardware removal. Secure it with the 8-bolt flange downward (Fig. 5).

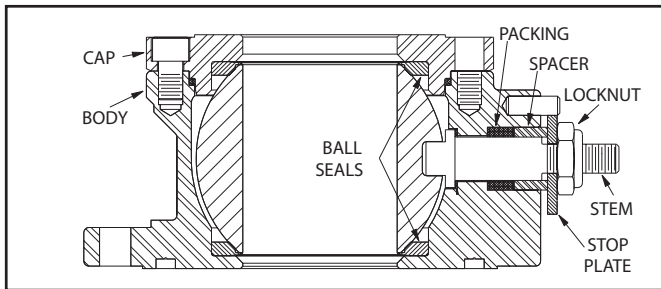


Figure 5 - Valve Inverted

2.1.2 Set the valve to the closed position. This must be done to allow removal of the valve ball. Then remove the valve handle by removing the cap screw and lock washer from the valve stem.

2.1.3 Remove the outlet cap assembly (if present).

4) Remove the four socket hex head capscrews from the valve cap.

WARNING: Valve Damage
Avoid forceful tool contact with seal-support surfaces when removing ball seals and stem packing, or damage may result.

2.1.5 Carefully lift off the valve cap taking care to avoid its contacting the valve ball. Remove the ball seal from the cap plate.

2.1.6 Reach both hands into the valve body on either side of the valve ball. Lift the ball out of the body and set it on a padded surface (Fig. 6).



Figure 6 - Valve Ball Removal

2.1.7 Remove the locknut from the valve stem by turning it counterclockwise (Fig. 5).

2.1.8 Remove the stop plate and then carefully press the valve stem into the body cavity and remove it. The use of a brass or plastic hammer may be required to overcome the resistance of the compressed stem packing.

2.1.9 Remove the stainless steel spacer collar from the valve stem bore.

2.1.10 Remove the Teflon packing from the valve stem bore. Avoid scratching or gouging the interior surfaces of the valve stem bore.

2.1.11 Carefully remove the ball seal from the inside-bottom of the valve body.

2.1.12 Clean all the disassembled components to facilitate inspection.

2.2 Inspection of Components

Inspect the valve body, ball and stem components as described below.

2.2.1 Valve Body Inspection

2.2.1.1 Check the valve body and the cap ball-seal surfaces for signs of corrosion, cracks and scratches. No defects are allowed.

2.0 VALVE INSPECTION

2.2.1 Valve Body Inspection (cont.)

2.2.1.2 Use a light to inspect the valve stem bore for gouges or corrosion. It must be free of defects.

2.2.2 Valve Ball Inspection

2.2.2.1 Clean the valve ball with solvent (to remove any adhering product), or in an ultrasonic bath.

2.2.2.2 Slide your fingernail over scratches to determine severity (Fig. 7). If your fingernail is unable to “catch” in an abrasion, it is not of a depth that would allow leakage or affect the ball seals.



Figure 7 - Checking Scratch Severity

WARNING: Do not repair valve ball! Attempts to repair scratches or gouges will result in a change of the ball diameter. This will cause deficient sealing and result in valve leakage. Replace a ball having scratches that fail the fingernail severity test.

2.2.2.3 If any scratches fail the fingernail test, replace the ball. It cannot be repaired

2.2.3 Valve Stem Components Inspection

2.2.3.1 The 1-1/8"-12 UNF threads should pass a thread ring Go gauge test. If the threads exhibit stripping or unrepairable damage, replace the valve stem.

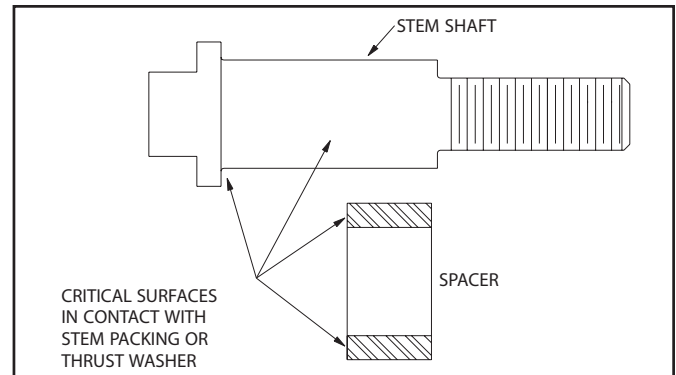


Figure 8 - Valve Stem and Spacer Surfaces

2.2.3.2 Inspect the surfaces of the spacer bushing that contact the stem packing and thrust washer (Fig. 8). Also, inspect the surface of the stem shaft. These surfaces should be smooth and clean.

2.2.3.3 Inspect the valve stem locknut for damage to the threads and the nylon locking insert. Replace the locknut if damage is observed and if the nylon insert is cracked, embrittled or frayed.

2.3 Special Inspection Considerations

2.3.1 Previous procedures may not cover all conditions encountered in the field. Therefore, it is the responsibility of the repair facility to contact an authorized Midland technical representative for recommendations regarding unusual valve conditions or repair circumstances that may be encountered.

2.3.2 Evaluation of critical component metal surfaces of the valves after cleaning and inspection by the repair facility are the responsibility of the repair facility.

2.3.3 Where numerical tolerances cannot be provided, the disposition of the part or parts is under the jurisdiction of the repair facility and dependent on its experience and judgement.

3.0 MAINTENANCE

3.1 Leak Checking in the Field

Because of the ball valve's simplicity, the only maintenance procedure consists of checking the valve for leaks. If the valve is leaking from its outlet port, rebuild or replace it. If minor leakage is detected only at the valve-stem packing, remove the handle and increase the tightening torque on the locknut, but do not exceed 150 Ft.-Lbs. If this fails to stop the leak, rebuild or replace the ball valve.

3.2 Valve Assembly and Testing (at 70°F)

3.2.1 Test Equipment Requirements

Test Stand and Gauge Requirements

The test stand must have an appropriate mounting for the valve being tested. The pressure gauge must meet the requirements of D4.5 Test Gauge Standards and be date tagged.

Valve Testing Procedure

If your company has its own reassembly/test procedure, follow it. If it does not, this procedure provides essential guidelines.

3.2 Valve Assembly and Testing Procedure

Perform this procedure only after you have conducted the procedures in **2.0 Valve Inspection** for determining the condition of the valve components, repairing or replacing them.

3.2.1 Ensure that you have all the valve components at hand, including the new seal kit that contains the valve-body seal, the valve-stem thrust washer, the valve-stem packing (5 pcs.) and the two ball seals. Figure 9 shows all the valve components.

3.2.2 Thoroughly clean the valve components to remove paint, dirt, oils and tank car product from all surfaces. Clean the valve ball with an appropriate



Figure 9 - Valve Components (A-522)

solvent or immerse it in a heated, ultrasonic bath to ensure removal of all particulates. Dry and wipe down the valve ball and all valve interior surfaces with a lint-free cloth. Secondary cleaning is recommended during assembly procedure handling of components.

3.2.3 Mount the valve body onto the assembly fixture and secure it in place.

3.2.4 Install the thrust washer onto the valve stem as shown in Figure 10.




Figure 10 - Installing Thrust Washer

3.2.5 Insert the valve stem through the shaft bore from inside the valve body. Ensure that it seats properly.

3.0 MAINTENANCE

3.2 Valve Assembly & Testing Procedure (cont.)

 **CAUTION: Packing Ring Order**
There are three types of Teflon rings that comprise the valve-stem packing (5 rings total). Do not alter their arrangement or improper sealing will result. Their correct stack-up is shown below (Fig. 11).

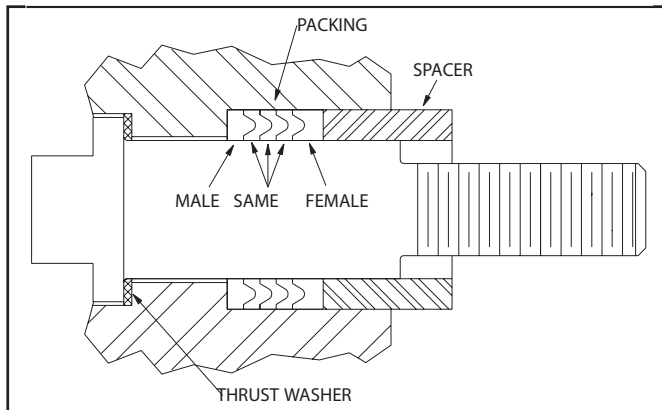


Figure 11 - Packing Rings Orientation

3.2.6) Install the packing (5 rings) onto the valve stem, pushing them into the shaft bore (Fig. 12).



Figure 12 - Installing Packing and Spacer

3.2.7 Insert the spacer collar into the shaft bore (Fig. 12). It will protrude about 1/4" when seated. This is normal.

3.2.8 Install the stop plate as shown in Figure 13 so that the valve will be closed in the full-clockwise position (unless specific applications require full CCW position).



Figure 13 - Installing Stop Plate

3.2.9 Install the locknut and torque it to 150 Ft.-Lbs.

3.2.10 The gap between the stop plate and the valve body must be 1/8" minimum, 1/4" maximum.

3.2.11 Secure the test sealing cap onto the valve body (Fig. 14). Torque the cap bolts to 50 Ft.-Lbs.



Figure 14 - Valve Stem Leak Test

3.2.12 Pressurize the assembly with air to 60 PSI for 2 minutes using a blind flange or outlet leg closure. During this period, apply leak detecting fluid (snoop) to the exterior of the spacer protruding from the shaft bore while watching for any bubbles and foaming. **NO LEAKS ARE ALLOWED.**

3.2.13 Depressurize the valve body and remove the sealing cap. Wipe off any remaining water.

3.0 MAINTENANCE

3.2 Valve Assembly & Testing Procedure (cont.)

3.2.14 Wipe down one of the ball seals and then place it into the bottom seat of the valve body, flat side downward (Fig. 15). Be very careful to avoid damaging the seal during installation.



Figure 15 - Installing First Ball Seal

3.2.15 Wipe down the large, Teflon, valve body seal and then place it into the top of the valve body (Fig. 16). This will prevent the valve ball from touching the body during ball placement.



Figure 16 - Body Seal Installation

3.2.16 Clean the valve ball with warm water and soap, or immerse it in a heated ultrasonic bath (125-150°F) for 5 minutes. Then rinse the ball with clean, cold water. Dry it with a lint-free cloth. Allow it to return to room temperature before continuing.

3.2.17 Perform a final check of the ball for scratches or nicks. Run your fingernail around both rims of the ball (Fig. 17). Any damage is cause for rejection.



Figure 17 - Checking for Nicks

3.2.18 Rotate the valve stem so that its end that engages the ball slot is oriented vertically.

3.2.19 Carefully place the valve ball into the valve body aligning the ball slot with the stem end as shown in Figure 18.



Figure 18 - Placing the Valve Ball

3.2.20 Check the inside surfaces of the cap plate for nicks and debris.

3.2.21 Wipe down the second ball seal and then place it into the seat of the cap plate, flat side downward (Fig.19). Be very careful to avoid damaging the seal during installation.



Figure 19 - Installing Ball Seal in Cap Plate

3.0 MAINTENANCE

3.2 Valve Assembly & Testing Procedure (cont.)

3.2.22 Place the cap plate onto the body (Fig. 20).



Figure 20 - Placing Cap Plate on Body

3.2.23 Orient the cap so that the nameplate (or its holes) straddle the valve stem (Fig. 21).



Figure 21 - Name Plate Holes Orientation

3.2.24 Fully open the valve with a wrench.

3.2.25 Apply two drops of Loctite 242 (Medium - or equiv.) to the threads of four (4) hex socket head cap screws and then screw them into the four counterbore holes as shown in Figure 22.

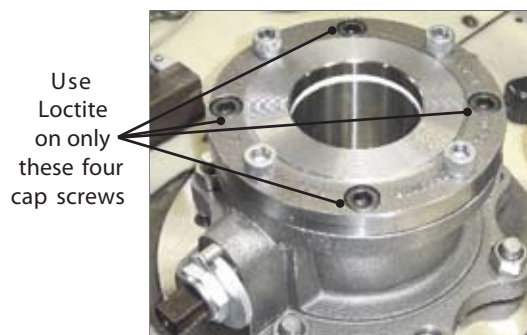


Figure 22 - Valve Cap Screws Installation


3.2.26 Install the four (4) extra 5/8"-11 UNC 2A 1-3/4" long cap screws, without Loctite (Figure 22).

3.2.27 Tighten the eight cap bolts in a crisscross sequence until the cap plate contacts the body. Then tighten them to 130 Ft.-Lbs.

3.2.28 Use a .002 inch feeler gauge to confirm that the cap is in contact with the valve body all around, with no gaps allowed (Fig. 23).



Figure 23 - Checking Cap-to-Body Contact

NOTE: Cap Bolt Torque
 If uniform cap-to-body contact is not achieved, increase the torque on the cap bolts in 40 Ft.-Lbs. increments until it is, but do not exceed a maximum of 250 Ft.-Lbs.

3.2.29 Attach the updated valve nameplate to the cap. It must be oriented upside down (with respect to the valve position in these photos) so that it will read properly when the valve is inverted and mounted on the tank car.

3.2.30 Remove the valve from the assembly fixture and install protective caps in both ports.

3.2.31 Store the valve for at least 12 hours at room temperature to allow compression setting of the ball seals.

3.2.32 Remove the protective caps from the valve ports. Install the valve on the assembly/test fixture.

3.2.33 Use an applicable valve handle (two feet long) to fully close the ball valve (with the stem stop plate contacting the stop pin).

3.0 MAINTENANCE

3.2 Valve Assembly & Testing Procedure (cont.)

3.2.34 Pour water into the valve outlet port so that it covers the sealing area (Fig. 25).



Figure 25 - Immersing Seal for Leak Test

3.2.43 If applicable, install thread protectors on the steam jacket inlet and outlet nipples.

3.2.44 Spray the valve's exterior surfaces with WD-40 or equivalent dry lubricant.

3.2.45 Store the valve in a cardboard box or in a protective enclosure.

- I 3.2.35 Apply air pressure to the valve at 60 PSI.
- 3.2.36 Brush away initial bubbles and look for any new ones during a 2-minute dwell period. NO NEW BUBBLES ARE ALLOWED. If any new bubbles appear during this period, the valve must be rejected.
- 3.2.37 Siphon or wipe the water from the valve port. Blow it dry with an air gun.
- 3.2.38 Depressurize the valve body.
- 3.2.39 Fully open the valve and install a protective cap in the outlet port.
- 3.2.40 Remove the four (4) 5/8"-11 UNC 2A 1-3/4" long cap screws from the valve cap.
- 3.2.41 Remove the valve from the assembly/test fixture.
- 3.2.42 Clean the mounting flange and gasket groove. Install a protective cap in the inlet port.

4.0 NOTICES AND WARRANTY

4.1 Regulations

Midland valves are used in contact with a variety of commodities, many of which are hazardous materials. The acceptance and transportation of products are regulated by the DOT and AAR in the U.S.A., and in Canada by CTC and Transport Canada. Regulations of other governmental bodies must be complied with for stationary and mobile applications. All personnel should be familiar with and follow these regulations. Nothing in these instructions is intended to conflict with or supersede these regulations.

The information in this document was gathered from knowledgeable sources, but Midland Manufacturing Corporation makes no representations or guarantees about its accuracy or completeness and assumes no liability for this information. Specifications are subject to change without notice.

4.2 Obtaining Product Drawings

Assembly drawings of Midland bottom outlet ball valves are available at no charge, and will be mailed upon request. Address any questions concerning valve maintenance or usage to the Engineering Dept., Midland Manufacturing Corp.

4.3 Warranty

Midland warrants the products of its own manufacture to be free of defects in material and workmanship for a period of one (1) year from the date of invoice. Furnished materials and accessories purchased from other manufacturers are warranted only by and to the extent of those manufacturers' warranties, if any.

MIDLAND MAKES NO WARRANTY OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, OTHER THAN AS SPECIFICALLY STATED HERE. MIDLAND MAKES NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR USE. Midland's

obligation under this warranty is strictly limited, at its option, to: 1) repair or replacement at its factory of a like quantity of product; 2) refunding to purchaser money paid to Midland for its product; or 3) issuance of written authorization for the Purchaser to repair or replace, at costs comparable to Midland's normal manufacturing costs, those parts proven defective; provided that Purchaser has given to Midland immediate notice upon discovery of such defect. Merchandise claimed to be defective shall not be returned without first obtaining Midland's written consent. The undertaking of repair or replacement by the Purchaser, or its agents, without Midland's written consent, shall void Midland's warranty and relieve Midland of all responsibility. Under no circumstances shall Midland be liable for any direct, incidental, consequential or other damages of any kind in connection with the installation, operation, maintenance, repair, inspection or other use of any product purchased from it.



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