

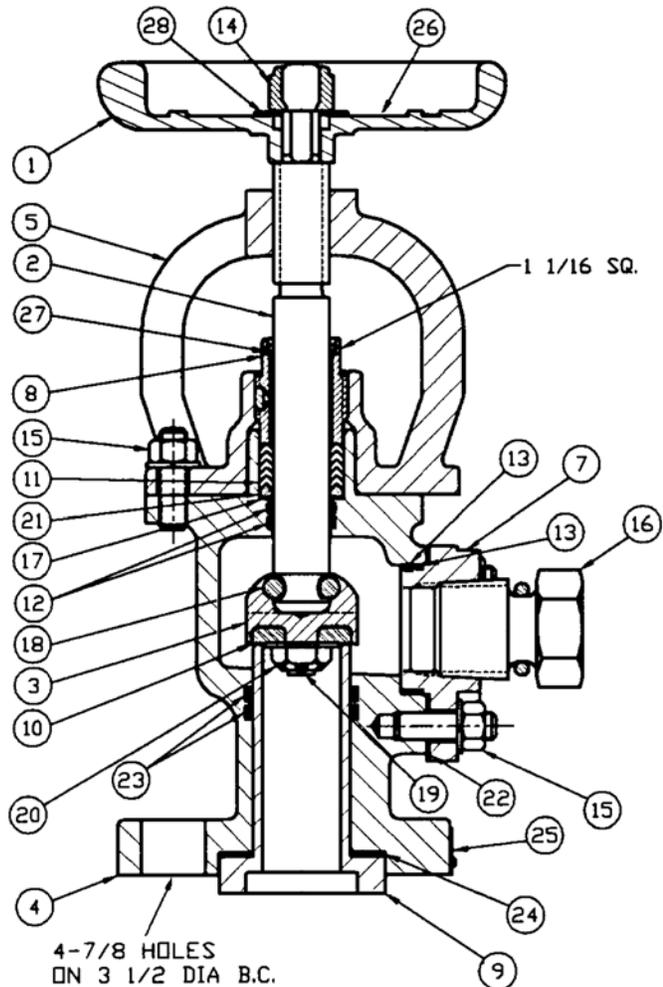
## 1" Angle Valves

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**Installation**  
**Operation**  
**Inspection**  
**Maintenance**



Item	Qty	Part Name
1	1	Hand Wheel
2	1	Stem
3	1	Seal Retainer
4	1	Body
5	1	Bonnet
6		
7	1	Outlet Flange
8	1	Packing Screw
9	1	Body Insert
10	1	Seat Seal
11	5	Packing Ring
12	2	Stem "o" Ring
13	2	Outlet "o" Ring
14	1	Hand Wheel Nut
15A	7	Stud
15B	7	Washer
15C	4	Hux Nut
16	1	Pie Plug & Chain Asm
17	1	Packing Spring
18A	1	U-Bolt
18B	2	Nuts
19	1	Retainer Pin
20	1	Retainer Nut
21	1	Male Packing Adapter
22	1	Outlet Flange Gasket
23	2	Body "o" Ring
24	1	Insert Gasket
25	1	Name Plate
26	1	Instruction Plate
27	1	Wiper
28	1	Flat Washer



## Installation Instructions



**CAUTION:** Be sure the car is empty and clean, and the work area is free of hazardous chemicals that may have been in the car, before removing a valve or installing a new one.

1. When the old valve is taken off, put a soft rubber plug into the cover plate.
2. Wire brush stud threads so there are good clean threads within 3/4" of the cover plate. Properly installed studs will extend 2-1/8" above the cover plate. If the studs extend more than 2-1/8", either the studs are too long, or they do not have the required 7/8" thread engagement in the cover plate, and remedial action should be taken.
3. Remove the gasket in the groove of the cover plate. Avoid scratching the metal in the bottom of the groove. Discard the used gasket.
4. Examine the sides of the groove to verify that there are no dents or burrs there. Since the valve fits tightly into the groove, any peening over of the edges of the groove may make it difficult to properly fit the valve's tongue into the groove. Install a new 1/8" thick gasket.
5. Up to this point the new valve should have been kept in its original shipping container, and/or a special plastic protector should have been positioned over the tongue on the bottom of the valve. **Cradle the valve in your arm and unwind the handwheel (in the "OPEN" direction) to be sure there is no pressure on the Teflon® valve seat when it is bolted onto the cover plate.**
6. Remove the plastic protector on the bottom tongue. Inspect the tongue by running your finger around the edge of the tongue to be sure it is free of nicks, dents and burrs. The tolerance on the tongue is plus or minus .003", so any irregularity in this surface will make it difficult to fit the tongue in the cover plate groove. Similarly, the flat surface of the tongue should be free of imperfections which could cause a gasket leak when the valve is positioned on the cover plate.
7. Take out the rubber plug in the cover plate opening. Holding the valve by the bonnet (item number 5) lower it slowly onto the studs. Start all four nuts on the studs while the valve is still held off the cover plate. then gently lower the valve down on the cover plate and move it back and forth until you feel the tongue go down into the groove on the cover plate. Hand tighten all four nuts.
8. Wrench-tighten the nuts a little bit at a time, going alternately from 1 to 3, then 2 to 4. Do not tighten down too much on one side because this will cock the valve at an angle and may make it impossible to get a good gasket seal.
9. Torque the nuts to a level prescribed by your engineering department. Final torque not to exceed 200 ft-lb.
10. After the nuts have been tightened down on the cover plate, close the valve. **Under no circumstances** should a "cheater" or handle extension be used to close this valve, as over-tightening will damage the valve's teflon seat. the handwheel has been purposely weakened to break if excessive force is used.
11. Inspect the valve for leaks. Follow your company procedures in this testing. the primary areas to check are in the side port area, the packing gland area, and the flange connection between the cover plate and the angle valve. When closing the valve hand tight, if it does not seal completely, remove the valve for repair per maintenance Instructions.

## Installation Instructions (cont.)

12. Attached to the bonnet is a tag that gives operating instructions on one side and on the reverse side are blanks to be filled in. The record of the valve's service experience will be valuable information in evaluating the valve's performance. Fill in information on this tag.
13. A placard with an adhesive backing has been provided with each car set of valves. This gives important operating instructions. The placard should be placed on the underside of the hinged protective housing cover for the guidance of those using these valves.

## Operating Instructions

 **NOTE:** Conform with all applicable CTC, AAR, DOT regulations (Parts 173.31, 174.67, etc.), other governmental bodies and your own company's operating instructions.

1. The important fact to bear in mind with the Midland Valve is that it will seal completely with much less torque than a metal-to-metal seated valve. It should close with the same approximate torquing as with a faucet on wash basin.

 **CAUTION: Do not apply a "cheater" or handle extension to the handwheel.** excessive force will shear through the valve's Teflon® seal, making it harder or impossible to close off. If the valve is leaking at the seat inside the valve and you can't stop it by a firm closing (by hand) of the handwheel, tell your supervisor that the valve is defective and must be removed for reworking.

2. Examine the pipe plug. Be sure its threads are clean, free from corrosion and not worn or crossed. Also look at the threads on the side port to see that they are in good operating condition.

3. This valve has an adjustable packing gland. Use a 1-1/16" wrench to tighten the packing screw (Item number 8). In the event of a packing leak, ensure the packing screw is torqued to a minimum of 30 ft-lb. Increase the packing screw in 1/4-turn increments until the leak stops, then turn an additional 1/4 turn. Unnecessary overtightening will cause excessive frictional drag on the valve stem.

## Maintenance Instructions

 **NOTE:** It is important that a periodic retest and preventative maintenance program be established. To assist in scheduling valves for retest, a tag showing the installation date is attached to the valve. However, **there are two measurements that will indicate if the valve should be repaired sooner, regardless of the scheduled retest date:**

- 1.) If there is less than 1/8" between the bottom of the handwheel and the top of the bonnet, the Teflon® seat has been deformed and needs immediate replacement;
- 2.) If the top of the packing screw (item 8) is within 3/8" of being flush with the yoke surface, the valve must be repacked since no adjustment is remaining. If either condition exists, the valve must be removed and repaired. When the valve is removed from the cover plate, install a protective cover on the exposed bottom tongue of the valve.

Before valve disassembly, open and close the handwheel to run the stem (item number 2) up and down to be sure that the stem is neither bent nor binding in the threaded part of the bonnet (item number 5). Bent stems must be straightened to proceed with the disassembly.

To disassemble the valve, use the following steps:

1. Put the valve in a vise, gripping on the rear

## Maintenance Instructions (cont.)

- strut of the bonnet, with the valve horizontal and the side port facing upward.
- Remove the three side port nuts and lock washers (item number 15).
  - Take the outlet flang (item number 7) off. If it is hard to dislodge, screw a 1" threaded nipple about 10" long into the port. move it back and forth gently to loosen the flange and work it off the valve body (item number 4).
  - Loosen the packing screw (item number 8). Be careful that any trapped chlorine fumes do not release on the person disassembling the valve.
  - Using the handwheel (item number 1), raise the stem (item number 2) up so that the seal retainer (item number 3) is close to the inside top of the body. Put a block of hardwood, or a special plastic spacer obtained from midland (P/N 713-26-NY), in between the bottom of the seal retainer and the top of the body insert (item number 9). **Do not use a steel block**, as it might nick the crowned seating surface of the body insert. t urn the handwheel to screw the stem down, until the top of the body insert is flush with the opening in the body.
  - Raise the stem to permit the removal of the wood block or plastic spacer. Then lower the seal retainer so that the two nuts (item number 18) are facing the side port and the seal retainer is resting on the bottom opening in the body, against the body insert. Use a 7/16" socket wrench to unscrew the two nuts. Then with a block of steel (about 1" wide), that spans both sides of the u-bolt (item number 18), tap the block with a hammer to loosen the u-bolt and push it in about 1/4". Raise the stem, rotate the seal retainer 180° and tighten down again on the stem to hold the seal retainer in place. Using a hook-shaped tool, or needle nose pliers, pull the u-bolt out.
  - Raise the stem up close to the top of the body, releasing the seal retainer, which can now be extracted through the side port by a needle nose pliers.
  - If the body insert has not been pushed out of the body, or cannot be twisted out by hand (note: the body insert is **not threaded** into the body, it is held in place only by the compressive force of two o-rings), then put the plastic insert (mentioned in paragraph 5), or a 1-1/4" diameter wood dowel about 1" long, back through the side port. Screw the stem back down against the plastic spacer, or wood dowel, to force the body insert further out of the valve body. **Do not** put the bottom of the body insert in a vise to assist in removing it as this may deform the tongue and gasket surfaces which are machined to a close tolerance to fit into the groove in the cover plate.
  - Take off the four bonnet nuts and lock washers (item 15). The body should then be able to be disengaged from the bonnet. If it doesn't come off easily, insert a block of wood about 1-3/4" wide by 1-3/4" high into the side port. Screw the stem down to force the bonnet up.
  - Use a 1-1/16" open end wrench to unscrew the packing screw. Then remove the handwheel nut and flat washer (item number 28). Using the handwheel, screw the stem down through the bonnet as far as it can go. It should be possible, by gripping by hand on the retainer end of the stem, to screw it all the way out of the bonnet. If it binds on the last threads, put the retainer end of the stem into a vise, gripping it lightly, and proceed to back the bonnet off the stem.

## Maintenance Instructions (cont.)

11. If the packing rings (item number 11) remain in the body, a hook-shaped tool will dislodge them, as well as the male packing adapter (item number 21), packing spring (item number 17), and the two stem o-rings in the body (item number 12). The hook-shaped tool can be obtained from midland. Its part number is 712-27-c S. This tool should also be used to remove the two body o-rings (item number 23), the two stem o-rings (item number 12), and the outlet o-rings (item number 13).
12. To take the Teflon® seat seal (item number 10) out of the seal retainer, clamp the retainer in a vise, holding it on the two flat with only light pressure, so as to not distort the retainer. Drift out the retainer pin (item number 19), using a standard 1/8" diameter drift. Then unscrew the retainer nut (item number 20). Cut the Teflon® seat seal out. Do it with care, so that the metallic retainer surface beneath is not damaged.

## Inspection and Replacement of Parts

 **NOTE:** The Teflon® seat seal, packing, gaskets and o-rings should be replaced periodically based upon experience. All replacement parts must be obtained from Midland Manufacturing Corp. No remachining of any parts is permitted, except where noted herein. By not observing these prohibitions the purchaser assumes full responsibility and liability for the proper functioning of the valves.

1. **Handwheel.** The part is designed to fail when the stem is over-torqued. The metal around the square fragments. If this metal is cracked in the comers, or broken off, the handwheel must be replaced.
2. **Stem.** Roll the stem in "V" blocks or on a flat surface. It will be apparent if the stem is bowed. If straightening is required, do not grip or deflect it on the ground surface of the packing zone or in the Acme thread zone, where deformation of the metal would foul the threads. All nicks, burrs, pits, scratches, etc., must be eliminated. Inspect for cracks in the thread root area. If any are detected, the stem should be discarded. Screw the stem through the Acme thread of the bonnet, with the packing screw in place to make sure the stem moves freely without any binding.
3. **Seal Retainer.** The retainer nut has to be screwed up tightly on the seal washer. If the retainer thread is slightly galled, chase it with a 7/16"-20 hand die. If the thread is partially stripped, discard the seal retainer.
4. **Body.** Inspect the part for corrosive degradation, particularly in areas where o-rings and flat gasket seals are positioned. Clean off these areas to be sure they are free of pits, scratches, etc. that could form leak paths. The threads are 3/8"-16 on both top and side flange studs. If any of the threads are stripped or corroded, remove and replace the studs.
5. **Bonnet.** Since this is not a pressure containing part, a visual evaluation of its general condition should be made. The Acme thread is 3/4"-6. the thread for the packing screw is 1-1/4"-12. If either thread is stripped, crossed or pitted, the part should be discarded and replaced.
6. **Outlet Flange.** The o-ring groove and the flat gasket surfaces must be free of nicks, scratches, and pits. Similarly, the 1" NPT must be in good condition. If necessary, clean the 1" NPT with a tap. However, a thread gauge should be used to be sure the thread is not oversized. The standard hand engagement is 0.400 inches, and the acceptable tolerance is

## Inspection and Replacement of Parts (cont.)

plus or minus one full turn (0.087 inches). If this tolerance is exceeded, the outlet flange must be replaced.

7. **Pipe Plug.** Wire brush the 1" NPT threads. Inspect for worn, rusted or galled threads. The proper thread profile is a sharp pointed "V". Rounded threads will not seal. Replace the pipe plug if the threads are imperfect.
8. **Packing Screw.** The thread is 1-1/4"-12. It must be clean and sharp without nicks, scratches, pits, and other defects that would strip or gall the bonnet thread when assembled.
9. **Body Insert.** This is a critical part that must be examined carefully. The crown of the seat has a full radius (about 1/16 inch). Run your fingernail around the crown to be sure it is free of any nicks, scratches, or pits. If any of these are present, the part should be discarded and replaced.
10. **Seat Seal.** If the Teflon® seat is deformed by the body insert to a depth of 1/16 inch, or if it has embedded debris, discard it. Replace it with a new seal. This part is made of a special blend of Teflon® and other materials to provide high strength and resistance to cold flow and is not commercially available except from Midland.

The remainder of the parts are o-rings, packing, gaskets, three types of nuts, lockwashers, pins, etc. these are inexpensive parts. To ensure that the right sizes, hardnesses, strengths, materials and correctly dimensioned parts are used, obtain these replacement parts only from Midland.

## Cleaning



**NOTE:** In preparation for reassembly, all metallic parts should be steam cleaned. Be sure the green exterior Teflon® coating is in good condition. If not, the valve must be returned to Midland for re-application of the Teflon® coating. Do not use solvents or grease lubricants that are incompatible with the products in the tank. For example, a petroleum based grease may cause a chemical reaction when it comes in contact with chlorine. Contact your supervising engineer for suitable cleaning and lubricating material recommendations. o-rings and metallic parts that fit together should be lightly greased.

1. Use a small diameter wire wheel or wire brush to clean out the threads of the bonnet and the recess for the packing in the top of the body. Also clean the grooves and the bore where the body insert fits into the body. Clean the side port where the outlet o-ring and the flange gasket seal.
2. With a buffing wheel, clean out the threads of the stem, and remove all traces of chlorine.
3. Deposits on the unthreaded part of the stem.
4. On the outlet flange, remove all traces of chlorine by buffing the flat flange and the ring seal areas. Clean all solidified product, Teflon® tape, etc. from the threads.
5. Clean the underside of the packing screw. It may also be necessary to buff the exterior male threads as well, but take care to not remove part of the Teflon® insert that is used to lock the thread.

## Valve Reassembly

1. Insert the seal retainer assembly (item 3) through the side port into the body.
2. Grease the orifice of the body, particularly in the o-ring groove area. Insert from the bottom end the lower o-ring first, and then install the upper o-ring.
3. Grease the cavity in the base of the body (item 4) for the insert gasket (item 24) and install the gasket.
4. Grease the exterior surface of the body insert (item 9) and insert it into the body, pushing down with the heel of the palm and slowly rotating.
5. Put the bonnet on the body to see if it fits satisfactorily. Make sure that the body and bonnet flanges mate up with no space between them. Then take the bonnet off the body.
6. Apply grease to the Acme thread of the stem (item 2). Screw it into the bonnet (item 5) and run it up and down the full length of the thread. It should thread into the bonnet loosely. Take the stem out of the bonnet. It will be reinserted later.
7. If the packing screw is the new style (see comparisons of the old and new packing screws, Figure 1) and the white PTFE wiper is in good condition, apply a light film of grease on the inside and outside surfaces of the packing screw, and advance to step 8. If there is an old style packing screw with a black o-ring in it, obtain a new packing screw and PTFE wiper from Midland. If the packing screw is of the new larger ID design, P/N 713-81-ml, and there is an o-ring in it, use a hook tool and take out the o-ring.

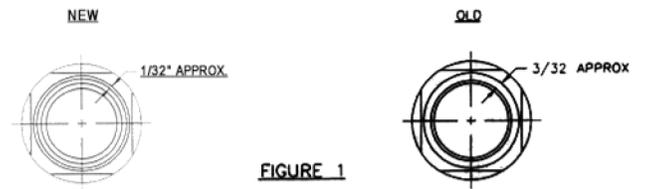


FIGURE 1

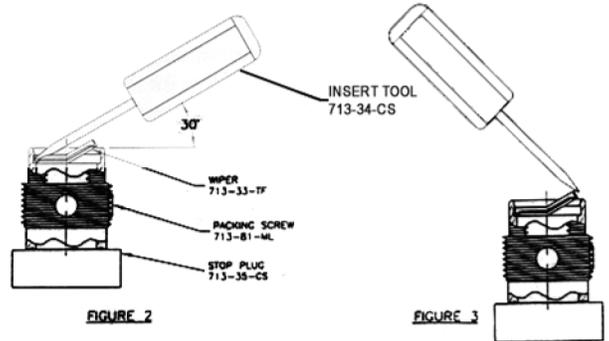
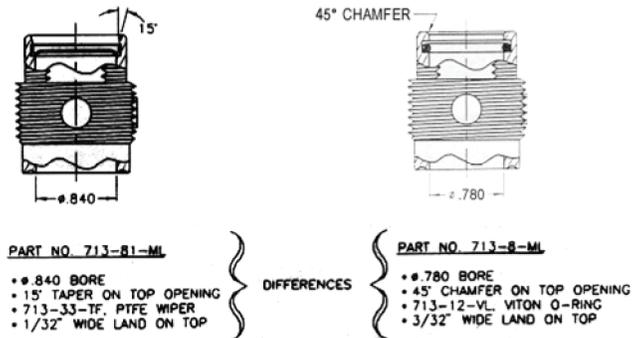


FIGURE 2

FIGURE 3

## Valve Reassembly (cont.)

If there is a PTFE wiper present, but it is damaged, or has taken a permanent set so that it no longer would touch the OD of the valve stem just below the Acme threaded section of the stem, remove that PTFE wiper with a hook tool. Put both the PTFE wiper and the new style packing screw in a cup of hot or boiling water. This will make the wiper softer and easier to position in the groove. To facilitate the installation of a new PTFE wiper, Midland has available a stop lug, P/N 713-35-cS and a screwdriver type insert tool with a thin rounded end, P/N 713-34-cS. Put the packing screw on the stop plug as shown in Figure 2. Holding the screwdriver at a 30° angle, insert the wiper into the groove approximately 1/2 the circumference of the groove. To complete getting the bottom outside edge into the groove, press down with the screwdriver on the outside edge of the wiper as shown in Figure 3. Some wrinkling or waviness of the wiper wall where it contacts the groove will take place, but it can be smoothed out by pressing radially outward with the screwdriver as shown in Figure 2. The lip portion of the wiper that radiates inward does not have to be smoothed out, because it will be stretched as the stem is installed, and the waviness will be removed. Then apply a light film of grease on the inside and outside surfaces of the packing screw.

8. Lightly grease the inside threads, the bore and the bottom flange face of the bonnet (item 5). Tighten the packing screw to 30 ± 3 ft-lb to seat the Teflon® packing rings. Prevailing drag on the stem due to the packing will be about 3 ft-lb.
9. Put item 8 into the bonnet yoke. Engage the screw by only a few threads, so that the bottom of the screw does not protrude below the threaded part of the bonnet.
10. Reapply grease to the entire length of the stem and carefully screw it all the way up into the bonnet.
11. Assemble five Teflon® packing V-rings (item 11) in a stack and apply grease to the inside and the outside of the packing.
12. Put the packing on the stem.
13. Apply a little grease on the metal male packing adapter (item 21). Install it on the stem, with the pointed end nesting into the "V" of the packing, and then put on the lightly greased wave spring. (There is no top or bottom to the wave spring—both sides are the same.)
14. Apply grease to the two o-ring grooves recessed in the top of the body. Grease both o-rings. It should be easier to position the top o-ring, then install the other one into the lower groove. Be sure both o-rings are properly installed in the grooves.
15. Grease the top part of the body flange and put the bonnet assembly on it, inserting the valve stem through the two o-rings of the body.
16. Grease the top flange studs (item 15) on the body and put on the lockwashers and nuts. Wrench the nuts down alternately 1,3,2,4, and tighten firmly, being sure that the lockwashers are tightened flat. (These nuts will be retightened later when the valve is on the test fixture.)
17. Put the handwheel (item 1) on the stem and run it up and down to be sure the stem moves freely.
18. Tighten the packing screw to 30 +10/-0 ft-lb to seat the Teflon® packing rings. Prevailing drag on the stem due to the packing will be about 3 ft-lb.

## Valve Reassembly (cont.)

19. Verify that the U-bolt locknuts (item 18) will start onto the U-bolt. Hold the U-bolt in a vise. Put both nuts on the legs of the U-bolt with the dimpled side of the locknut up. The dimples slightly distort the thread so that it is easier to start by engaging the undistorted threaded side of the locknut on the U-bolt first. Using the t-wrench (or a 7/16" socket wrench) screw both ends onto the U-bolt at least a full thread past the dimpled side of the locknut. Then unscrew both nuts.
20. Rotate the stem down, so that it goes into the top of the cavity of the seal retainer (item 3). Insert the U-bolt.
21. Continue to rotate the stem until the seal retainer is lightly touching the top of the body insert (item 9). The closed end of the U-bolt should be facing the side port opening. With a hammer and screwdriver, or a drift, lightly tap the closed end of the U-bolt to set it in position, then unscrew the stem slightly, and rotate the seal retainer 180°, so that the two threaded ends of the U-bolt are now facing toward the side port, and tighten the stem to put a little compression on seal retainer.
22. Put a locknut in the t-wrench or a 7/16" socket, with the dimpled side of the locknut facing inward in the socket or the t-wrench. Start one locknut on and continue to screw it on several threads to keep the U-bolt from falling back into the seal retainer. Then back off the stem a little bit and reposition the seal retainer, so that the other leg of the U-bolt is in the center of the open port, and put the second nut on.
23. Wrench both nuts down snugly (it is not necessary to tighten them down too securely). Open up the stem several turns. Be sure that the seal retainer moves freely on the stem.
24. If the body insert was pressed down by the seal retainer, it will be necessary to push the body insert back into the body by putting the heel of your palm against it, pushing down and rotating, as in step number 4.
25. Try putting the outlet flange (item 7), without O-rings (item 13) or outlet flange gasket (item 22), into the side port of the body. It should go down all the way, so the facing flange are touching, or within 1/32" of touching.
26. Apply grease to the three studs, in the bore, and on the flange of the side port of the body. Also, put grease on the flange face of item 7 and in the O-ring groove. Put the outlet flange gasket (item 22) on the outlet flange, and then put the outlet O-rings (item 13) on. Rotate the flange to verify that the O-rings are evenly recessed into the grooves of the hub of the flange. Be sure to apply a light coating of grease to the exterior of the outlet O-rings after they are in place on the outlet flange.
27. Press the outlet flange with both hands into the side port of the body. Install the lockwashers and nuts and tighten nuts securely.
28. Put the handwheel washer and nut (item 14) on the stem and tighten down.
29. Install the outlet pipe plug (item 16) in the outlet flange and attach the chain.

## Testing

1. Open the valve. locate the valve onto a test fixture. To avoid damage to the seat seal, open the valve before it is installed on the fixture.
2. Secure the valve to the test fixture
3. Close the valve. It should only be necessary to torque the handwheel about 20 foot-pounds to achieve a bubble tight seal in the valve.
4. There are several acceptable methods of checking for a seat leak, but one simple way is to put a piece of 2"-wide masking tape across the side port. Put a small hole in the center of the tape and cover the hole with a little soap suds solution. Any leak will then result in bubbles forming at the hole.
5. After the seat has been satisfactorily tested for no leak age, thread the pipe plug into the side port, open the valve to pressurize the body cavity, and inspect for leaks around the pipe plug and the outlet flange
6. Verify the proper setting of the packing screws by repeating Step 18 of **Valve Reassembly**.

## Post Test Procedures

1. After satisfactorily testing the valve, close off the supply pressure to the test stand, relieve the pressure. Open the valve handwheel a turn or two to be sure the seal retainer is not in contact with the body insert and unmount the angle valve from the test fixture
2. Drain whatever water may have accumulated, and wipe or blow away with an air hose any soap suds and water used in the testing.
3. Put the plastic tongue protector over the body insert tongue to prevent damage.
4. Do not paint the valve. The monel bonnet and body do not need it, and if paint gets into the threads of the stem and bonnet, the valve will be inoperative.
5. Fill in the test date information on the tag on the valve and store the valve in a dry place until ready to use.

## NOTICES AND WARRANTY

### REGULATIONS

Midland Angle Valves are used in a variety of products, many of which are hazardous materials. The acceptance and transportation of the products are regulated by the Dot in the U.S.A., and in Canada by Transport Canada, as well as other governmental bodies, particularly when used in stationary applications. All personnel should be familiar with and follow these regulations. Nothing in this pamphlet is intended to conflict with or supersede these regulations. The information contained herein is thought to be reliable. It was gathered from knowledgeable sources, but Midland Manufacturing Corp. makes no representations or guarantees about its accuracy or completeness and assumes no liability for this information.

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### Obtaining Product Drawings

Assembly drawings of midland Angle 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.

### 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 merchant ability 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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