

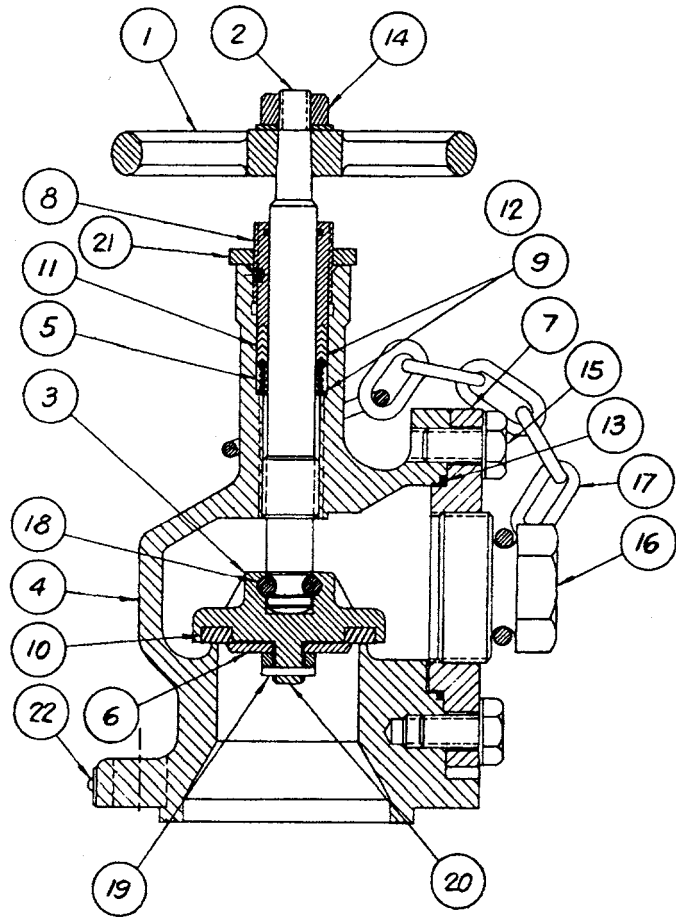


2" and 3" Angle Valves

Installation
Operation
Inspection
Maintenance



ITEM NO.	PART NAME
1	HANDWHEEL
2	STEM
3	SEAT SEAL RETAINER
4	BODY
5	SPRING
6	RETAINER COVER
7	OUTLET FLANGE
8	PACKING SCREW
9	PACKING WASHER (TOP & BOTTOM)
10	SEAT SEAL
11	PACKING
12	STEM SEAL
13	"O" RING OUTLET
14	HANDWHEEL NUT, WASHER
15	BOLT & LOCK WASHER
16	OUTLET PLUG
17	CHAIN
18	STEM RETAINER, 2 NUTS
19	COVER RETAINER
20	RETAINER NUT
21	PACKING LOCK NUT
22	NAME PLATE



CAUTION: IMPORTANT SAFEGUARDS

Midland valves are used in connection with a variety of products, many of which are hazardous materials and could cause serious injury or damage.

Always use extreme caution and proper equipment when involved with hazardous materials.

This valve should only be handled by qualified personnel.

Read all of these instructions carefully before proceeding.

SAVE THESE INSTRUCTIONS!

Installation Instructions



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

1. When the old valve is taken off, put a soft rubber plug into the opening in the cover plate.
2. Wire brush the stud threads so there are good clean threads within 3/4" of the cover plate. Midland makes special thread dies and holders to clean and re-chase rusted stud threads.
3. Take out and throw away the old gasket, being careful not to scratch the metal in the bottom of the groove when removing the old gasket.
4. Examine the sides of the groove to verify that it contains no dents or burrs. Since the valve fits tightly into the groove, any peening over of the edges of the groove may make it difficult to properly seat the valve's tongue into the groove.
5. Up to this point, the new valve should have been kept in its original shipping container. This will keep the valve clean and protect the tongue from getting nicked. 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. If the valve is reconditioned, or a retested one, inspect the tongue by running your fingernail around the edge of the tongue to be sure it is free of nicks, gouges and burrs. The tolerance on the tongue is plus or minus .003", so any irregularity in this surface will make it difficult to seat the valve on the cover plate groove.
7. Take out the rubber plug in the cover plate opening. Holding the valve by the handwheels (item 1) lower it slowly onto the studs.
NOTE: On the 3" angle valve, start all four nuts on the studs while the valve is still 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.
8. Tighten the nuts a little at a time, going alternately from 1 to 3, then 2 to 4. Special crowfoot wrenches with 3/4" drives are available from Midland for tightening the 3/4" heavy hex nuts. Do not tighten down too much on one side because this will cock the valve at an angle and make it impossible to get a good seal on the gasket.
9. Torque the nuts to a level prescribed by your engineering department. In the absence of a recommended company practice, on clean and lubricated threads, it should be safe to torque the 3/4" nuts to 150 to 200 foot-pounds.
10. After the valve has been tightened down on the cover plate, close the valve. To seal the valve it usually is only necessary to torque the valve handwheel about 20 to 30 foot-pounds. Using only the handwheel, without a "cheater" or handle extension, it is only possible to exert about 45 to 50 foot-pounds, which is an excessive amount of torque to close this valve. Under no circumstances should a "cheater" or handle extension be used to close this valve, as overtightening will damage the valve's Teflon seat.
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, take the valve off and send it to the valve maintenance department for rework.

Operating Instructions



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

1. It is important to bear in mind that you should not use a "cheater" or handle extension on 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. The adjustment is set at the factory and normally needs no adjustment on new valves. The packing lock nut (item 21) can be backed off by using a punch or drift positioned on a corner of the nut and tapping it to loosen the nut. Then with a 1-1/16" wrench for the 2" valve, or a 1-5/16" wrench for the 3" valve, tighten down on the packing screw (item 8) and then retighten the lock nut. It is only necessary to snug the lock nut up since its principal function is to keep the packing screw from unwinding if the stem were to bind on the packing screw while opening the valve.

Maintenance Instructions



NOTE: It is important that a periodic retest and preventative maintenance program be established. The AAR has established a retest interval for the maximum length of time between retests, and this schedule should be followed. Your company's experience or your knowledge of the service conditions could dictate a more frequent retest program.

Before starting to disassemble the valve, open and close the handwheel to run the stem (item 2) up and down to be sure that the stem is not bent in the threaded area and is not binding in the threaded part of the body (item 4). Bent stems must be straightened to proceed with the disassembly.

Valve Disassembly

1. Put the valve in a vise, gripping it on the flat faces of the 6" square flange, with the stem horizontal and the side port on the top.
2. Remove the pipe plug (item 16).
3. Take off the 4 side flange bolts and lock washers (item 15).
4. Screw a threaded nipple about 10" long into the removable side outlet flange (item 7). Move it back and forth to loosen the flange and work it out of the valve. It may be necessary to insert two screwdrivers (180° apart) between the flange and the valve body to pry it out.
5. Raise the handwheel slightly to lift the gasket retainer (item 3). Rotate it so that the two nuts (item 18) are facing out the side flange opening. Tighten down on the handwheel to keep the gasket retainer from rotating out of position. Take a 7/16" socket wrench and unscrew the nuts. Using a block of steel that spans both sides of the U-bolt (about 1" wide), tap the block with a

Maintenance Instructions (cont.)

hammer to loosen the U-bolt and push it out about 1/4". Open the handwheel again and rotate the gasket retainer 180°, then tighten down on the handwheel to put tension on the gasket retainer. Then use a hook shape tool (or 2 screwdrivers) to pull the U-bolt out.

6. Raise the stem (item 2) up in the body as far as it will go. It now is possible to take the gasket retainer out of the valve. Needlenose pliers may be helpful in gripping the gasket retainer to extract it through the side port opening.
7. To take the Teflon seat seal (item 10) out of the gasket retainer, put the part into a vise, holding by the two flats with only slight pressure so as not to distort the gasket retainer, and drift the cover retainer (item 19) out. Then unscrew the retainer nut (item 20). Take off the retainer cover (item 6). It may be necessary to cut the Teflon out. If so, do it carefully, so that the metallic surface below is not damaged.
8. It is possible to repack the valve without removing the stem. To replace the valve packing, begin by loosening the lock nut (item 21) by putting a center punch, drift, or blunt screwdriver on the point or corner of the nut and gently tapping with a hammer. Once freed up, use a 1-1/16" open end wrench for the 2" valve, or a 1-5/16" open end wrench for the 3" valve, to unscrew the packing screw (item 8.)
9. The packing (item 11) can now be pulled out of the body with the standard packing tools.
10. The stem can only be removed through the bottom of the valve. Loosen or remove the packing screw (see step number 8). Turn the handwheel to lower the stem as far as it will go. Then take off the handwheel nut, washer, and handwheel. Gripping on the flats of the stem square with an open end wrench or

vise grips, continue to unwind the stem down. If the stem cannot be taken out the last few threads by hand, it will be necessary to lightly grip the bottom of the stem with vise grips to disengage it from the body.

Inspection and Replacement of Parts



NOTE: Whenever the angle valves are retested, we recommend that new O-rings be installed. The Teflon seat seal and packing should be replaced, if there is any question about their serviceability. All replacement parts must be obtained from Midland Manufacturing Corp. No re-machining 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.** This part is designed to fail when the stem is over-torqued. If a spoke is cracked, or broken off, the handwheel must be replaced.
2. **Stem.** Roll the stem on a flat and true surface. It will be apparent if the stem is bowed. If you attempt to straighten it, do not grip or deflect it on the ground surface where the packing seal is achieved, nor in the acme thread, where deformation of the metal would make it difficult to move it freely. All nicks, burrs, pits, scratches, etc., must be eliminated, or discard the stem. Inspect for cracks in the thread root area. If any are detected, discard the stem. Screw the stem through the acme thread of the body with packing screw in place to make sure it moves freely without any binding.
3. **Gasket Retainer.** The retainer nut has to be screwed up tightly on the gasket retainer. If the thread is slightly galled, dress it with a 7/16"-20 hand die for the 2" valve, or a 5/8"-18 hand die for the 3" valve. If the thread is partially stripped, discard the part.

Inspection and Replacement of Parts (cont.)

4. **Body.** Inspect the part for corrosive degradation, particularly in the seat and the side port areas. Clean off these areas to be sure they are free of corrosion, contamination, pits, scratches, etc., that could form leak paths. The threads are 1/2"-13 for the 2" valve, and 5/8"-11 for the 3" valve, on the side flange. If any of the threads are stripped or corroded, discard the body.
5. **Retainer Cover.** If this has been dished due to over-torquing the retainer nut, flatten it in a vise.
6. **Outlet Flange.** The surfaces where the O-ring fits, and the flat gasket surfaces must be free of nicks, scratches, and pits. Similarly, the 2" or 3" NPT must be in good condition. It can be cleaned with the standard NPT hand tap. However, a thread gage should be used to be sure the thread is not oversized. The standard hand-tight engagement is 0.436 inches for the 2" thread, and 0.766 inches for the 3" thread. The acceptable tolerance is plus or minus one thread. If this tolerance is exceeded, a new part must be obtained.
7. **Packing Screw.** The thread is 1 1/4"-12 on the 2" valve, and 1 1/2"-12 on the 3" valve. It must be clean and sharp without nicks, scratches, pits, and other defects that would strip or gall the thread when screwed into the body.
8. **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 seat from the factory. This part is custom made for use on Midland valves only, and must be purchased from Midland.

The remainder of the parts are O-rings, packing, gaskets, bolts, several types of nuts, lock washers, pins, etc. These are inexpensive parts

and to insure that the right sizes, hardnesses, strengths, materials, and correctly dimensioned parts are used, these replacement parts should be obtained from the factory.

Cleaning



NOTE: In preparation for reassembly, all metallic parts should be steam cleaned. Do not use solvents or grease lubricants that are incompatible with the products in the tank. For example, a petroleum based grease may cause an immediate chemical reaction and fire when it comes in contact with chlorine. Contact your supervising engineer for suitable cleaning and lubricating material recommendations. O-rings, and other metallic parts that fit together, should be lightly greased.

Valve Reassembly

1. Place the lower (flat) packing washer (item 9) in the body (item 4).
2. Put the spring (item 5) in the body.
3. Install the upper (curved) packing washer (item 9) in the body, with the convex side up.
4. Both the 2" and the 3" valves use 5 Teflon V-rings (item 11) in the body.
5. Insert the stem seal (item 12) in the packing screw (item 8).
6. Thread the packing screw into the body by pushing down against the spring and turning clockwise to engage the thread. Wrench tighten a couple of turns.
7. Screw down the packing lock nut (item 21) a couple of threads on the packing screw.
8. From the bottom side of the body, insert the handwheel end of the stem (item 2). Screw the stem up until the handwheel flats clear the top of the packing screw.

Inspection and Replacement of Parts (cont.)

Valve Reassembly (cont.)

9. Put on the handwheel (item 1), and then the handwheel lock washer (item 14). By hand, screw the handwheel nut (item 14) onto the stem as far as it will go.
10. Turn the handwheel counter clockwise to move the stem up into the neck of the body. It should move easily. After several turns, stop when the stem thread contacts the lower packing washer (item 9).
11. Position the gasket retainer assembly, which consists of items 3, 5, 10, 19 and 20, into the valve body through the side port so that the seat seal (item 10) is resting on the body seat.
12. Turn the valve handwheel clockwise to lower the stem into the recess in the gasket retainer (item 3). Orient the retainer so the two holes for the retainer are accessible through the side port.
13. Insert the stem retainer U-bolt through the holes in the retainer and the groove of the stem to couple these parts. Lightly tap in the U-bolt so the threaded ends go as far through the gasket retainer holes as the base of the U-bolt will permit.
14. Open the valve about $\frac{1}{4}$ turn and rotate the gasket retainer 180° , and reclose the valve. Install the two retainer nuts (item 18) and tighten them down securely with a socket wrench. It may be necessary to keep the U-bolt forward with one finger on one leg while installing a nut on the other leg.
15. Stretch the outlet O-ring (item 13) onto the outlet flange (item 7). Do not twist the O-ring. Push this assembly into the side port of the body.
16. Screw in the flange bolts with lock washers (item 15) hand tight, and then wrench-tighten the bolts using the alternate tightening pattern. Do not exceed 45 foot-pounds. Check for uniform spacing between the two flange faces. Correct by loosening and retightening.
17. While holding the handwheel in place, wrench-tighten the handwheel nut.
18. The valve is now ready for test.

Testing

1. Bolt the valve to a test fixture with at least a $\frac{1}{2}$ " gap between the gasket retainer and the seat.
2. After the valve is secured to the test fixture, close the valve. It should only be necessary to torque the handwheel about 20 to 30 foot-pounds to achieve a bubble tight seal against a 500 psi air supply to the valve.
3. The 500 psi value stated in this manual, and on the valve nameplate, indicates the capability of the Midland A-720 Angle Valve, and the pressure at which the valve is tested at the factory. Valves must be tested at a pressure appropriate for the application. Typical practice in the valve industry (using ASME B16.34 as a guide) is to test the body at 1.5 times the maximum working pressure (with water or air), and test the seat at 1.1 times maximum working pressure (with air). This applies to the Midland A-720 Angle Valve with the caveat that either test pressure should not exceed 500 psig. Midland's recommendation is to test the A-720 Valve at the above conditions and record those values on a test report, if applicable, and on a tag affixed to the valve which also indicates the organization performing the test. [Note: If the body and seat are tested at 500 psig, the test pressures on the supplemental tag are not required.]
4. There are several acceptable methods of checking for a seat leak, but one simple way is to put pieces of 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 a bubble forming at the hole.

5. After the seat has been satisfactorily tested for leakage, thread the pipe plug into the side port. Open the handwheel to pressurize the body cavity, and inspect for leaks around the pipe plug and the outlet flange with soap suds.
6. Then with soap suds, check the packing gland area. Wrench the packing screw down slowly until the leak stops. Then turn another $\frac{1}{4}$ turn and lower the lock nut on the packing screw. Since this part is only used to keep the packing screw from unwinding when the stem is being opened, it is not necessary to torque it down beyond snugging it up by tapping on the corners of the nuts.

Post Test Procedures

1. After satisfactorily testing the valve, close the pressure inlet valve into the test stand, relieve the pressure, and demount the 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. Open up the handwheel a turn or two to be sure the gasket retainer is not in contact with the body seat.
4. Put the plastic tongue protector over the body insert tongue to prevent damage to it.
5. Put an appropriate preservative or paint on the exterior of the valve, being sure to mask the nameplate so it will be readable afterward.
6. 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

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 and AAR 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.

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 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

NOTICES AND WARRANTY

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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