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Top-Transfer 3" Angle Valve A-730 & A-734 Series

Installation, Operation and Maintenance (IOM) Manual

Table of Contents

1.0	Introduction	3
1.1	Technical Specifications	3
1.2	Valve Components.....	4
1.3	Pre-Installation Regulations/Requirements.....	5
2.0	Valve Installation.....	7
2.1	Preliminary Considerations	7
2.2	Installation Procedure	7
3.0	Operating Procedure.....	9
3.1	Opening the Valve	9
4.0	Maintenance	10
4.1	Prior to Maintenance Tasks Performed	10
4.2	Leak Repair on a Mounted Valve.....	10
5.0	Valve Disassembly.....	11
6.0	Valve Inspection and Replacement Parts	15
7.0	Valve Reassembly	19
7.1	Cleaning.....	19
7.2	Reassembly Procedure.....	19
8.0	Valve Testing Procedure.....	23
8.1	Testing Procedure.....	23
8.2	Post-Test Procedures	24
9.0	Warranty	25

1.0 Introduction

Tank cars equipped with the Midland A-730/A-734 series Top-Transfer Angle Valves offer long-term reliability and ease of maintenance leading to more efficient operations.

Applications include:

- Liquefied Petroleum Gas (LPG) applications
- For the loading and unloading of pressure tank cars

1.1 Technical Specifications

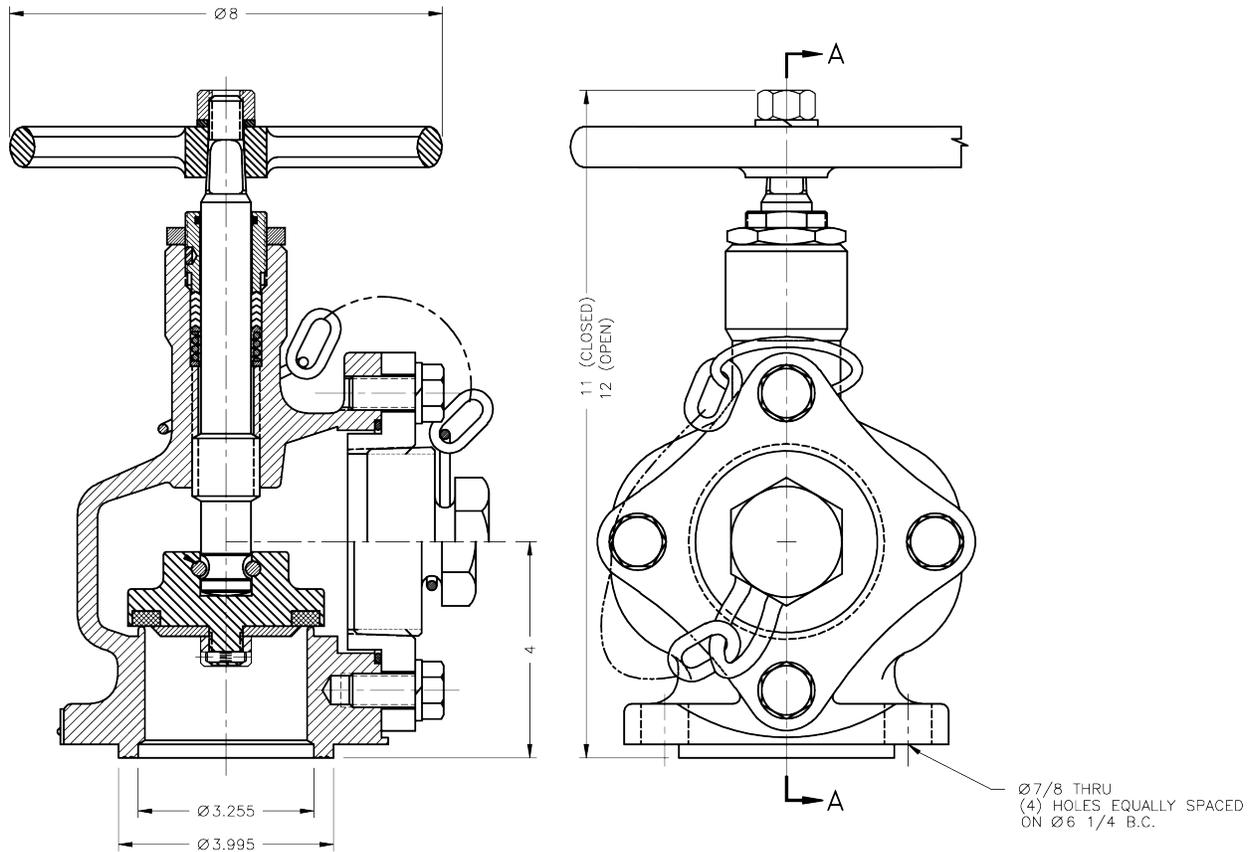


Figure 1-1 A-730 and A-734 Valve Dimensions

1.2 Valve Components

Item	Qty.	Part Name
1	1	Handwheel
2	1	Stem
3	1	Retainer Assembly
4	1	Body
5	1	Spring
6	-	Retainer Cover
7	1	Outlet Flange
8	1	Packing Screw w/Insert
9A	1	Packing Washer Top
9B	1	Packing Washer Bottom
10	-	Seat Seal
11	7	Packing
12	1	Stem Seal
13	1	O-Ring Outlet
14	1	Handwheel Nut
15A	4	Bolt
15B	5	Lock Washer
16	1	Outlet Plug
18A	1	Stem Retainer
18B	2	Nut
19	-	Cover Retainer
20	-	Retainer Nut
21	1	Packing Locknut
22	1	Name Plate

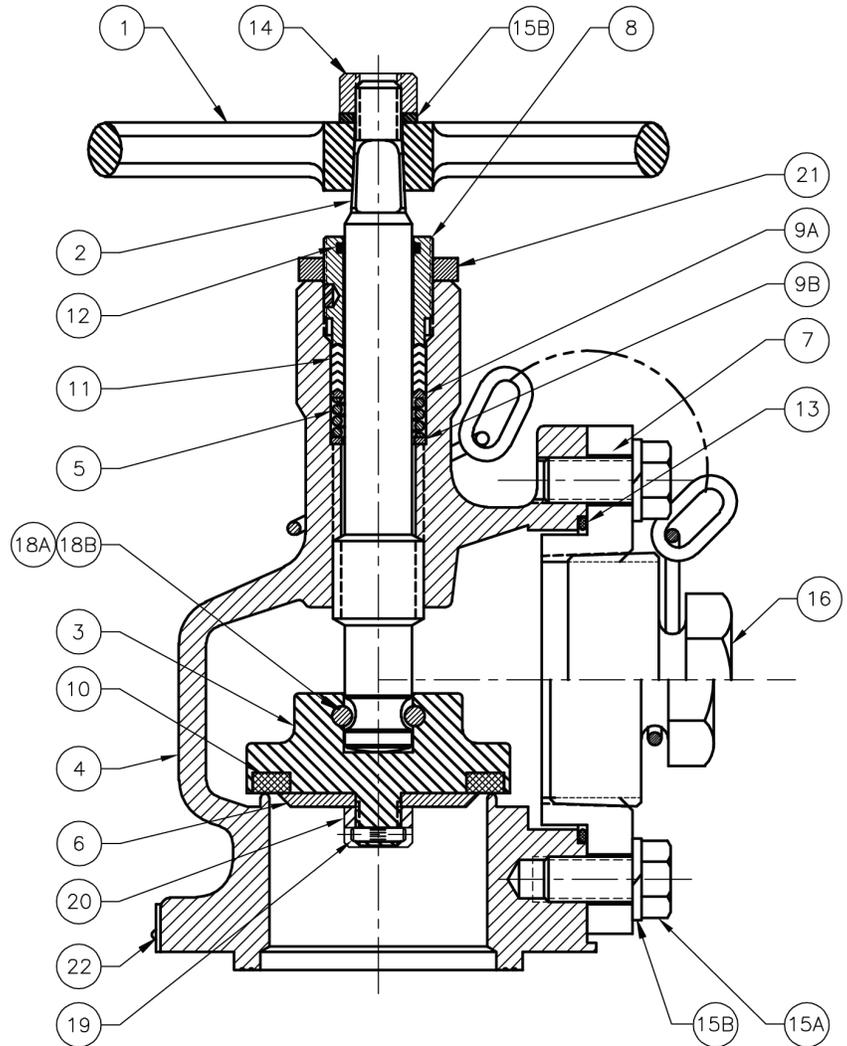


Figure 1-2 A-730 & A-734 Valve Components

1.3 Pre-Installation Regulations/Requirements

1.3.1 Regulations

Midland Angle Valves are used in a variety of tank cars, many of which carry hazardous materials. The acceptance and transportation of the products is regulated by the DOT and AAR in the U.S.A., and by Transport Canada in 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 manual is intended to conflict with or supersede these regulations.

Specifications are subject to change without notice.

1.3.2 Safety Precautions

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

This valve should only be installed, operated and maintained by qualified personnel.

Read all of these instructions carefully before proceeding.



CAUTION: Toxic Hazard. Always use extreme caution and proper equipment when working with hazardous materials. 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 or installing any valve.

1.3.3 Precautions for Mounted-Valve Repair

When performing maintenance on an angle valve that is mounted on a railcar, observe the following precautions:

- Wear protective clothing and equipment suitable for protecting you from the materials to which you may be exposed
- Position yourself on the upwind side of the valve when possible
- Work in a well-ventilated area
- Work with a partner who can help you in the event of an emergency
- Follow approved safety precautions for hazardous or toxic materials
- Obtain MSDS sheets for all the materials used with the associated valve

1.3.4 Required Tools

Before arriving at the installation site, obtain the required tools and supplies prior to performing the procedures indicated in this guide.

Recommended Wrenches		
Size	Component	Item #
7/16" Socket	Stem Retainer	18
3/4" SAE or 3/4" Crowfoot Wrench	Mounting Nuts (not supplied)	--
1-5/16" SAE	Packing Screw	8
5/8" Socket	Retainer Nut	20

Table 1-2 Required Tools

Other Tools and Supplies	
Screwdrivers	Lint-free Cloth
Torque Wrenches (0 – 50 ft-lb)	Emery Paper (400 grit, cut in 1" strips)
Silicone Grease (or equivalent lubrication)	Wire Brush

Table 1-3 Additional Recommended Tools and Supplies

2.0 Valve Installation

2.1 Preliminary Considerations

- 2.1.1 Prior to installation, ensure that the valve remains clean and the gasket-sealing surfaces are not damaged.

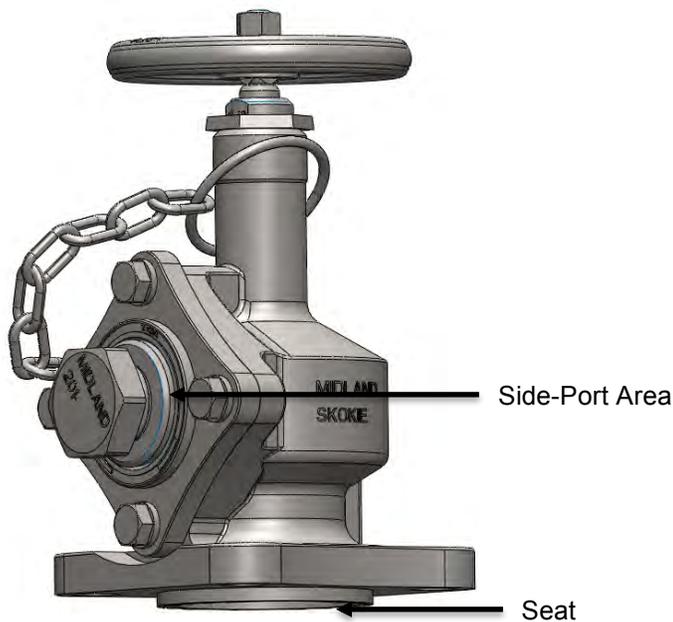
2.2 Installation Procedure



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

- 2.2.1 Remove the old valve and then insert a soft rubber plug into the tank opening to prevent debris from entering the tank during cleaning of the valve-mounting groove and studs on the man-way cover plate.
- 2.2.2 Wire-brush the stud threads of the cover plate until clean. Properly installed studs will extend 3/4" within the cover plate.
- 2.2.3 Remove the gasket in the groove of the cover plate. Avoid scratching the metal in the bottom of the groove. Discard the used gasket.
- 2.2.4 Examine the sides of the groove to verify that there are no dents or burrs. Since the valve fits tightly in the groove, any peening of the groove edges may make it difficult to properly fit the valve's tongue into the groove.
- 2.2.5 Up to this point, the new valve should have been kept in its original shipping container and 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.
- 2.2.6 If the valve is reconditioned, or retested, inspect the tongue by running your fingernail around the edge of the tongue to ensure it is free of nicks, gouges and burrs. The tolerance on the tongue is plus or minus 0.003"; therefore, any irregularity in this surface will make it difficult to seat the valve on the cover plate groove.
- 2.2.7 Take out the rubber plug from the cover plate opening. Holding the valve by the handwheel (item 1) lower it slowly onto the studs.
- 2.2.8 Start all four (4) nuts on the studs while the valve is still on the cover plate. Then gently lower the valve down onto the cover plate and move it back and forth until you feel the tongue go down into the groove on the cover plate.
- 2.2.9 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 shift the valve at an angle and may make it impossible to get a tight gasket seal. Special crowfoot wrenches with 3/4" drives are available from Midland for tightening the 3/4"-heavy hex nuts.
- 2.2.10 Torque the nuts to a level prescribed by your engineering department. In 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 ft-lb.

- 2.2.11 After the nuts have been tightened down on the cover plate, the valve should be “closed.” To seal the valve it is only necessary to torque the valve handwheel approximately 20 to 30 ft-lb. 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.
- 2.2.12 Inspect the valve for leaks according to your company’s procedures for this testing. The primary areas to check are in the side-port area, the packing gland area, the flange connection between the cover plate, and the valve and seat. In order to check the seat for leaks on an installed valve on the tank car, pressure may be applied to the outlet flange with the valve in the “closed” position. Look for any pressure decay. Keep in mind that some compensation would need to be made for pressure changes as temperature changes. This is recommended in the event that there is no procedure in place from your company to test the valve’s seat when installed on a tank car. When closing the valve, hand-tighten. If it does not seal, remove the valve for repair per Maintenance Instructions in Section 4.0.



3.0 Operating Procedure

3.1 Opening the Valve



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

- 3.1.1 Bear in mind with the Midland angle valve that it will seal completely with much less torque than a metal-to-metal seated valve. It should close with the same approximate torqueing as with a faucet on a wash basin. Turn the handwheel clockwise to close the valve; turn the handwheel counterclockwise to open the valve.



CAUTION: Do not use an extension or cheater on the valve handle. If it does not move freely, report this to the tank car supervisor. The tank may be pressurized, contain solidified product, or the valve may be jammed.

- 3.1.2 Examine the pipe plug. Be sure its threads are clean, free from corrosion and not worn or crossed. Also, examine the threads on the side port to see that they are in good operating condition.
- 3.1.3 This valve has an adjustable packing gland. Use a 1-3/4" wrench to tighten the packing screw (item 8). In the event of a packing leak, ensure the packing screw is torqued to a minimum of 65 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. Then snug the locknut (Item 21) to keep the packing screw from unwinding during operations.



Figure 3-1 Plug & Packing Locknut

4.0 Maintenance



NOTICE

NOTICE: It is essential to establish a periodic retesting and preventive maintenance program for pressure relief valves. The DOT and AAR have set forth a retesting interval that should be considered the maximum length of time between tests. If your company's experience indicates that a shorter interval is advisable, a program with more frequent retesting should be implemented.

NOTICE: New O-rings should be installed when a valve is retested.

4.1 Prior to Maintenance Tasks Performed

4.1.1 Required Tools

- 4.1.1.1 Obtain the required tools and supplies before attempting maintenance procedures. Table 1-3 outlines some suggested tools that will be needed.

4.2 Leak Repair on a Mounted Valve

- 4.2.1 Repair the retainer O-rings. Exception: When performing that procedure, there should be no pressure in the test chamber and the retainer O-rings should be loose, not epoxied into the O-ring retainer as specified in that procedure.
-



CAUTION

CAUTION: The repair procedure for a mounted valve is intended only as a temporary repair. Once the product is unloaded and pressure is relieved, the valve should be removed for further repairs and full requalification.



NOTICE

NOTICE: It is the responsibility of the car owner to develop a maintenance and qualification program that ensures the valve and fittings meet the performance specifications. Midland's guidelines are meant to assist in the development of the maintenance and qualification program.

NOTICE: Midland identifies the replacement of the face plate or outlet flange, on a Midland angle valve, not to be a part of the Resealing, Rebuild or Remanufacturing of the valve or fitting. The face plate or outlet flange may be changed as a regular part of maintenance, without removal from the rail car. All proper assembly techniques, torque specification as well as leak testing are required to be performed to ensure the proper performance requirements are met.

5.0 Valve Disassembly

- 5.1.1 Before valve disassembly, open and close the hand wheel to run the stem (item 2) up and down to ensure that the stem is neither bent nor binding in the threaded part of the body (item 4). Bent stems must be straightened to proceed with the disassembly.

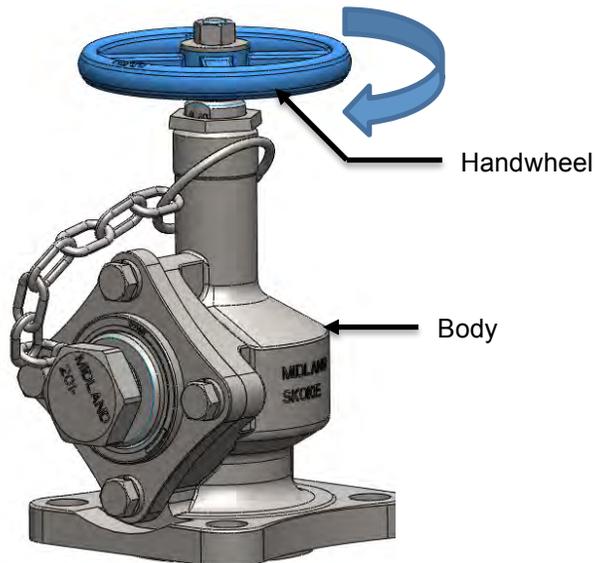


Figure 5-1 Turn Handwheel

- 5.1.2 Place 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.
- 5.1.3 Remove the pipe plug (item 16).



Figure 5-2 Pipe Plug Removed

5.1.4 Take off the four (4) side flange bolts and lock washers (items 15A and 15B, respectively).

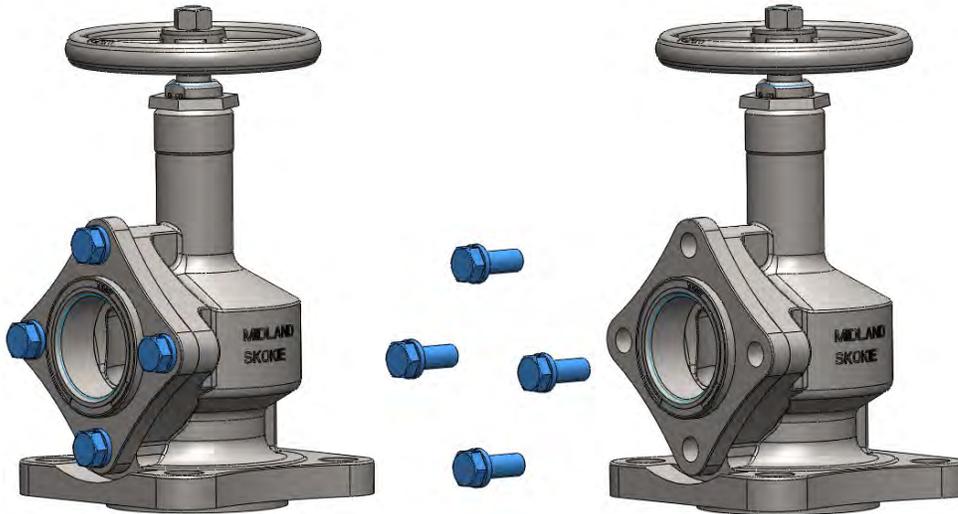


Figure 5-3 Remove Flange Bolts and Washers

5.1.5 Screw a threaded nipple approximately 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 (2) screwdrivers (180° apart) between the flange and the valve body to pry it out.

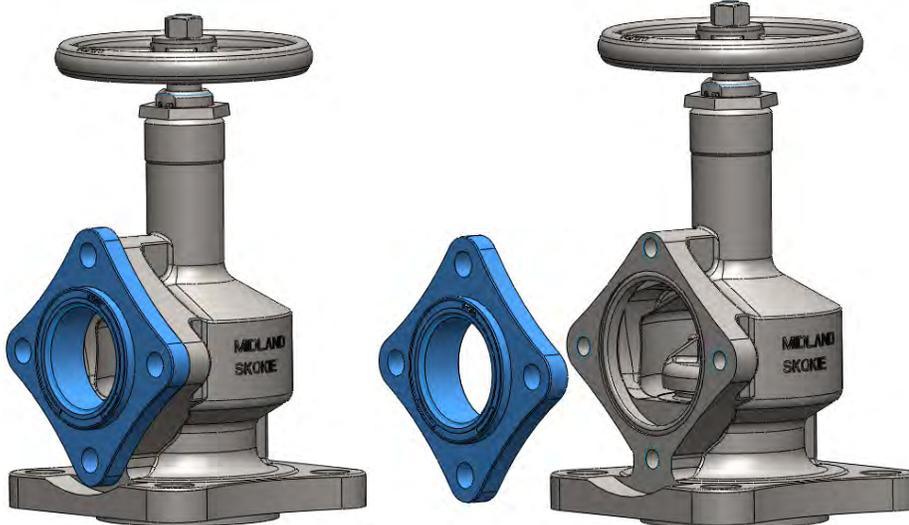


Figure 5-4 Remove Outlet Flange

- 5.1.6 Raise the hand wheel slightly to lift the gasket retainer (item 3). Rotate it so that the two (2) 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.

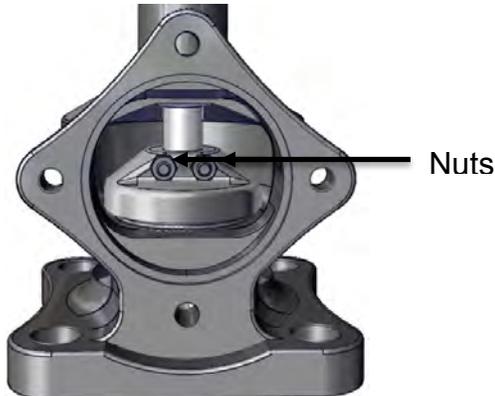


Figure 5-5 Rotate Handwheel to View Nuts

- 5.1.7 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 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 two screwdrivers) to pull the U-bolt out.

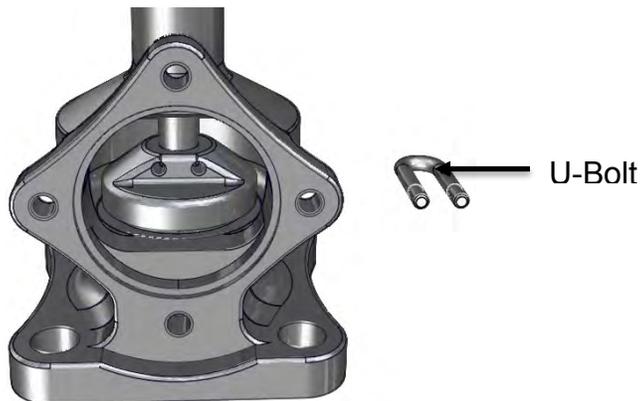


Figure 5-6 Remove Nuts and U-Bolt

- 5.1.8 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. Needle-nose pliers may be helpful in gripping the gasket retainer to extract it through the side port opening.

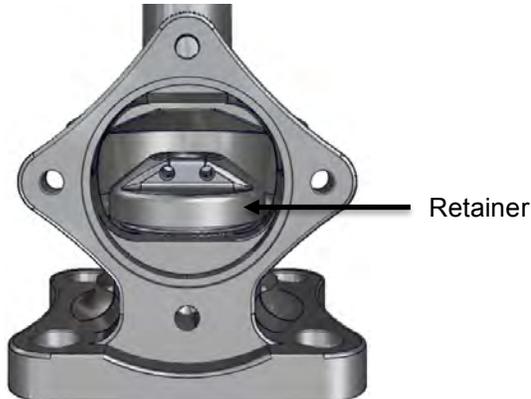


Figure 5-7 Remove Retainer

- 5.1.9 It is possible to repack the valve without removing the stem. To replace the valve packing, begin by loosening the locknut (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 1-5/16" open end wrench to unscrew the packing screw (item 8.)

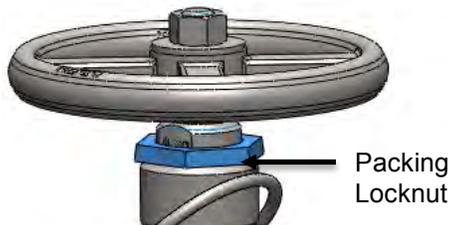


Figure 5-8 Loosen Locknut and Remove Packing

- 5.1.10 The packing (item 11) can now be pulled out of the body with the standard packing tools.



Figure 5-9 Remove Packing

- 5.1.11 The stem can only be removed through the bottom of the valve. Loosen or remove the packing locknut (see step number 5.1.9). 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.

6.0 Valve Inspection and Replacement Parts



NOTICE: Whenever angle valves are retested, it is recommended 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.

- 6.1.1 **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.



Figure 6-1 Handwheel

- 6.1.2 **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 cracks 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.



Figure 6-2 Valve Stem

- 6.1.3 **Gasket Retainer.** The retainer nut has to be screwed up tightly on the gasket retainer. Recommended Torque is 40 ft. lbs. If the thread is slightly galled, dress it with a 5/8"-18 hand die for the valve. If the thread is partially stripped, discard the part and replace the retainer assembly.



Figure 6-3 Gasket Retainer

- 6.1.4 **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 5/8"-11 for the valve on the side flange. If any of the threads are stripped or corroded, discard the body.



Figure 6-4 Valve Body

- 6.1.5 **Retainer Cover.** If this has been dished due to over-torquing the retainer nut, flatten it in a vise.



Figure 6-5 Retainer Cover

- 6.1.6 **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 0.766 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.



Figure 6-6 Outlet Flange

- 6.1.7 **Packing Screw.** The thread is 1½"-12 on the 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.



Figure 6-7 Packing Screw

- 6.1.8 **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 retainer assembly from the factory. This part is custom made for use on Midland valves only, and must be purchased from Midland.

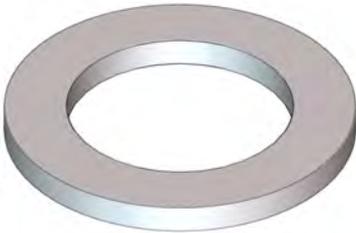


Figure 6-8 Seat Seal

- 6.1.9 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, hardness, strengths, materials, and correctly dimensioned parts are used, these replacement parts should be obtained from the factory.

6.1.10 Special Inspection Considerations



NOTICE: Repair work is limited to cleaning and polishing.



WARNING: Machining Not Allowed. Machining, grinding, welding or other alterations to the valve seat or stem seat is not allowed.



NOTICE: Please refer to paragraph A3.11.2 of the Tank-Car Specifications and consult Appendix E for dimensions and applicable tolerances.

NOTICE: Some valves do not include a tongue flange. On valves with a flat-face mounting flange, refer to A3.11.2 of the Tank-Car Specification for machining specifications.

- 6.1.10.1 Previous procedures may not cover all conditions encountered in the field. Therefore, it is the responsibility of the repair agency to obtain approval from Midland for inspection, evaluation, repair and maintenance procedures not covered herein.
- 6.1.10.2 Facilities performing recommended dye-penetration and magnetic-particle testing must carry out such testing according to a qualified procedure conducted by certified trained personnel.
- 6.1.10.3 Evaluation of critical component metal surfaces of the valves after cleaning, inspection and specialized testing performed by agencies other than the repair facility are the responsibility of the repair facility.
- 6.1.10.4 Where numerical tolerances cannot be provided, the disposition of the internal integrity and surface quality of parts is under the jurisdiction of the repair facility and dependent on its experience and judgment.

7.0 Valve Reassembly

7.1 Cleaning



NOTICE

NOTICE: 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 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. 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.

7.2 Reassembly Procedure

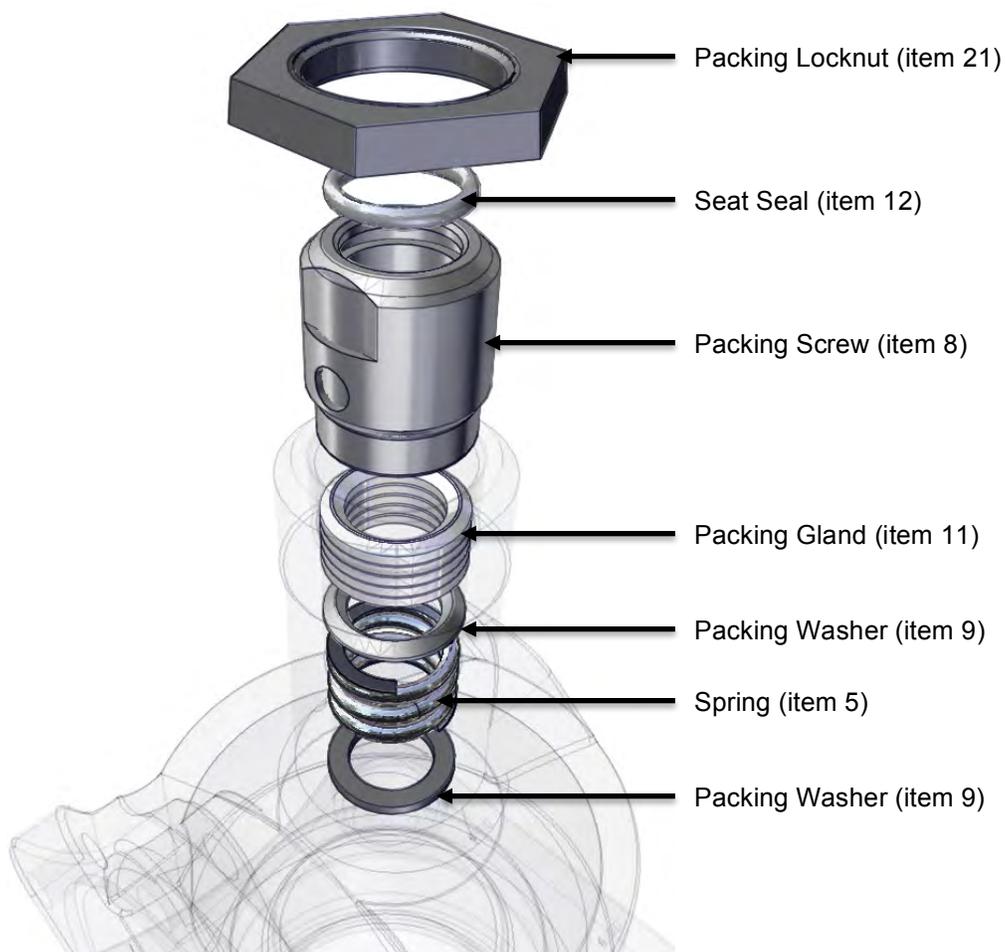


Figure 7-1 Reassembly Steps 7.2.1 through 7.2.7

- 7.2.1 Place the lower (flat) packing washer (item 9) in the body (item 4); see Figure 7-1.
- 7.2.2 Put the spring (item 5) in the body; see Figure 7-1.
- 7.2.3 Install the upper (curved) packing washer (item 9) in the body, with the convex side up; see Figure 7-1.
- 7.2.4 The 3" valve uses 5 Teflon V-rings (item 11) in the body; see Figure 7-1.
- 7.2.5 Insert the stem seal (item 12) in the packing screw (item 8); see Figure 7-1.
- 7.2.6 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.
- 7.2.7 Screw down the packing locknut (item 21) a couple of threads on the packing screw); see Figure 7-1.
- 7.2.8 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; see Figure 7-2.

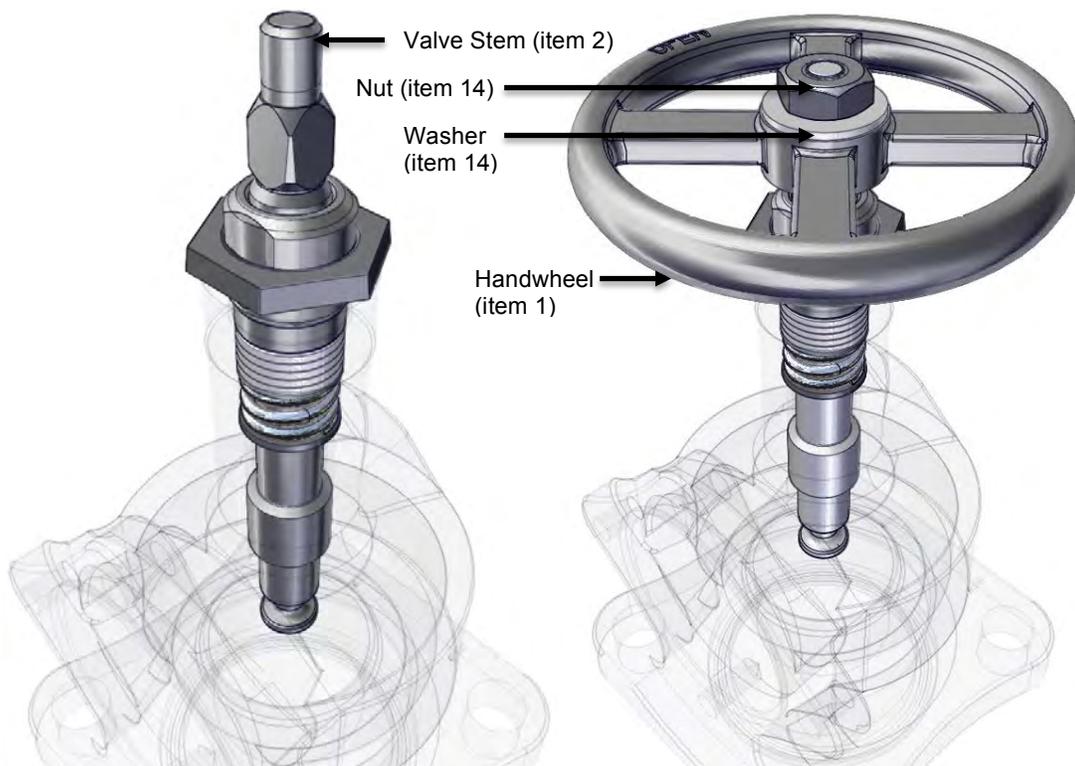


Figure 7-2 Reassembly Steps 7.2.8 through 7.2.10

- 7.2.9 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; see Figure 7-2.
- 7.2.10 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 comes into contact with the lower packing washer (item 9); see Figure 7-2.
- 7.2.11 Position the gasket retainer assembly into the valve body through the side port so that the seat seal (item 10) is resting on the body seat; see Figure 7-3.

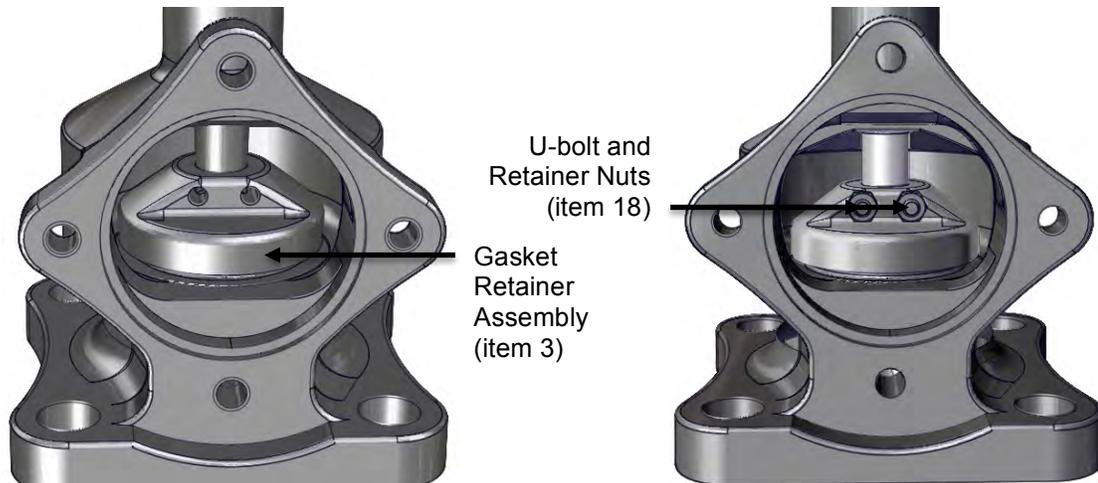


Figure 7-3 Reassembly Steps 7.2.11 through 7.2.14

- 7.2.12 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; see Figure 7-3.
- 7.2.13 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; see Figure 7-3.
- 7.2.14 Open the valve about ¼-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; see Figure 7-3.

- 7.2.15 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; see Figure 7-4.

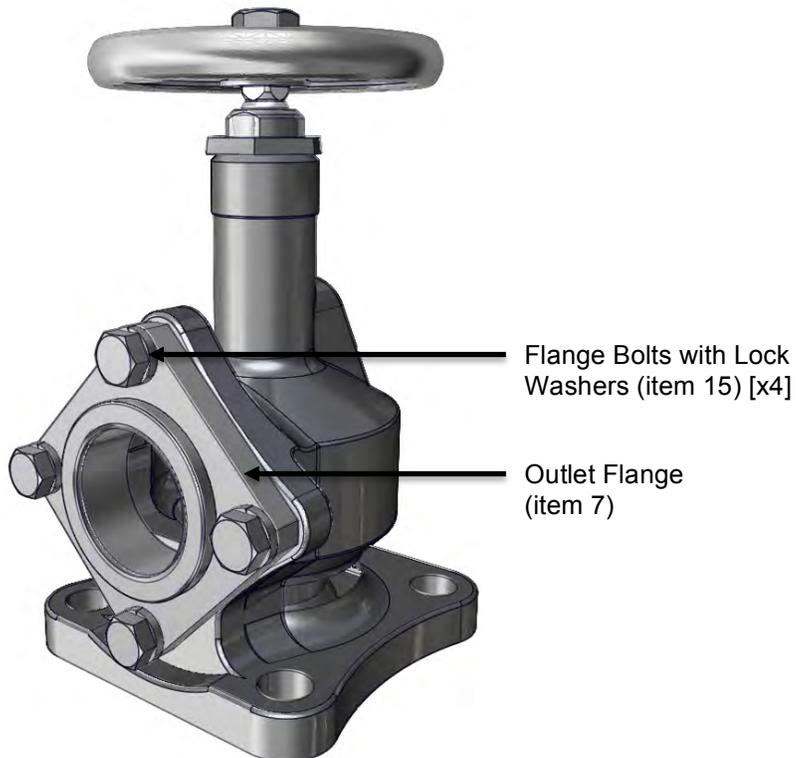


Figure 7-4 Reassembly Steps 7.2.15 through 7.2.16

- 7.2.16 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; see Figure 7-4.
- 7.2.17 Tighten the packing screw to 65 ft-lb to seat the Teflon® packing rings. Prevailing drag on the stem due to the packing will be about 3 ft-lb (4 N·m).
- 7.2.18 Tighten the packing locknut to 65 ft-lb to seat the Teflon® packing rings.

8.0 Valve Testing Procedure

If your company has an approved test procedure, follow it. If it does not, these procedures provide essential guidelines in regards to pressure testing.



CAUTION: Safety Protection. Wear appropriate safety glasses or face-shield and protective clothing when conducting this procedure. Valve testing involves high-velocity air and water flow that can cause injury.

8.1 Testing Procedure

- 8.1.1 Locate the valve onto a test fixture.
 - 8.1.2 Secure the valve to the test fixture with at least 1/2" gap between the gasket retainer and the seat.
 - 8.1.3 After the valve is secured to the test fixture, close the valve. It should only be necessary to torque the handwheel to 30 ft-lb to achieve a bubble-tight seal against a 600 psig air supply to the valve.
 - 8.1.4 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).
-



NOTICE: If the body and seat are tested at 500 psig, the test pressures on the supplemental tag are not required.

- 8.1.5 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.
- 8.1.6 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.
- 8.1.7 Then with soap suds, check the packing gland area. Wrench the packing screw down slowly until the leak stops. Then turn another 1/4-turn and lower the locknut 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 beyond snugging it up by tapping on the corners of the nuts.

8.2 Post-Test Procedures

- 8.2.1 After satisfactorily testing the valve, close-off the supply pressure to the test stand, relieve the pressure and un-mount from test fixture.
- 8.2.2 Open valve to drain any water that may have accumulated, then wipe or blow away, with an air hose, any soap suds and water used during testing.
- 8.2.3 Open the handwheel a turn or two to be sure that the gasket retainer is not in contact with the body seat.
- 8.2.4 Put the plastic tongue protector over the body insert tongue to prevent damage to it.
- 8.2.5 Put an appropriate preservative, such as WD 40 or equivalent, or paint on the exterior of the valve, be sure to mask off the nameplate so it will remain readable afterwards.
- 8.2.6 Fill in the test date information on the tag located on the valve. Store the valve in a dry place until ready to use.

9.0 Warranty

Midland Manufacturing Corp. 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.



OPW Global Operations

- 1 OPW Corporate Headquarters
- 2 OPW Fuel Management Systems
- 3 OPW Retail Fueling
- 4 OPW Engineered Systems
- 5 Midland Manufacturing
- 6 Civacon
- 7 PDQ Manufacturing Inc.
- 8 OPW Mexico
- 9 OPW Latin America
- 10 Poland/Petro Vend of Poland, Inc.
- 11 OPW EMEA Headquarters
- 12 OPW EMEA Czech Republic
- 13 OPW FTG Europe
- 14 OPW India
- 15 OPW Asia Pacific
- 16 OPW Russia