MIDLAND™

Pressure Relief Valves

Instructions for INTERNAL-STYLE Valve

A-2000

Installation
Operation
Inspection
Maintenance

Doc. No. A-2000, Rev. 1.6, 05/21
Replaces: A-2000, Rev. 1.5, 01/21

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 or installing any valve.

WARNING: These internal-style pressure relief valves are spring-loaded assemblies with a large amount of stored potential energy in the spring. Handle with care to avoid damage to the valve stem which could result in breakage and ejected piece parts.

WARNING: When assembling or disassembling the valve, **DO NOT** position oneself directly in front of the spring and stem. Instead, position oneself to the side away from the valve. Unexpected component failure – valve-stem or spring breakage may cause a sudden energy release that can discharge component parts a short distance in an manner. Personal injury may be a result.

1.1 Preliminary Considerations

New valves are tested, adjusted and sealed at Midland. If a new valve has been left in its original packaging, is undamaged, and is not more than six months old, it may be installed on a tank car without retesting or recalibration. Prior to installation, ensure that the valve remains clean and that the gasket-sealing surfaces (Fig. 1) are not damaged.

1.2 Procedure

1.2.1 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 manway coverplate.

1.2.2 Wire brush the mounting stud threads to remove rust or scale. Nuts should run freely on clean studs. Studs should not exhibit excessive corrosion.

1.2.3 Remove and discard all used gasket material.

CAUTION: Groove Damage
Do not scratch the metal in the bottom of the groove when removing the old gasket.

1.2.4 Clean the valve and coverplate sealing surfaces.

1.2.5 For tongue and groove mountings, examine the sides of the groove. Because the valve tongue fits tightly into the groove, any peening-over of the edges of the groove may make it difficult to properly fit the valve tongue into the groove. If the sides of the groove are peened over, make corrections to meet AAR groove tolerances.

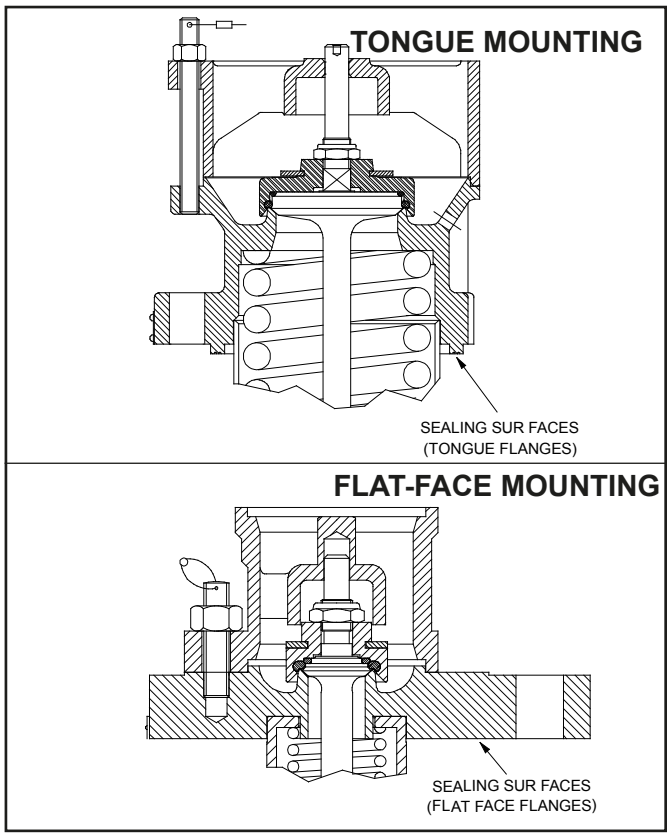


Figure 1 - Gasket-Sealing Surfaces

1.2.6 Install the new gasket. Ensure it is fully seated. When a groove gasket is fully seated, 1/16" of free space should remain above the gasket to permit locating and entry of the valve tongue.

CAUTION: Gasket Damage
Do not use a sharp tool to install the new gasket or gasket damage may result.

1.2.7 Inspect the tongue of a reconditioned or retested valve by running your fingernail around its inner and outer edges to check for damage. The tongue dimensions have diameter tolerances of ±0.003", thus any excess material on these diameters will make it difficult to fit the tongue into the groove. If the tongue is peened over, remove excess deformed material to meet AAR tongue tolerances.

1.0 Valve Installation (cont.)

CAUTION: Tongue Damage
Do not install a valve having damaged sealing surfaces.

1.2.8 Remove the rubber plug (inserted in step 1.2.1) from the cover plate.

1.2.9 Hold the valve by the top-guide crossbars (Fig. 2) and lower it gently into the mounting. Align the body holes over the studs and lower the valve while positioning the valve tongue in the coverplate groove.

CAUTION: Tongue not in Groove
Verify that the valve tongue has fit into the coverplate groove. It must be so engaged before continuing with the next step or valve damage may result.

1.2.10 Install the nuts and tighten them in 1/3-torque increments in an alternating sequence (Figure 3) to a torque specified by the gasket specifie .

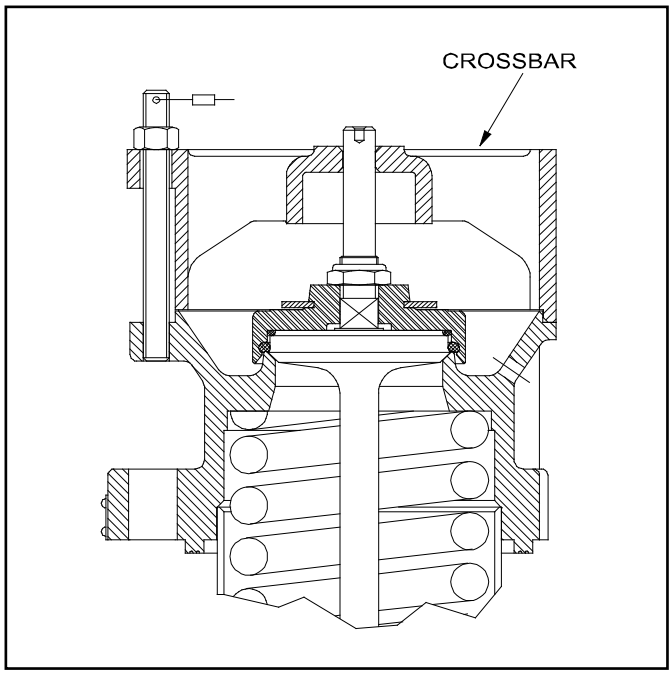


Figure 2 - Valve Crossbar

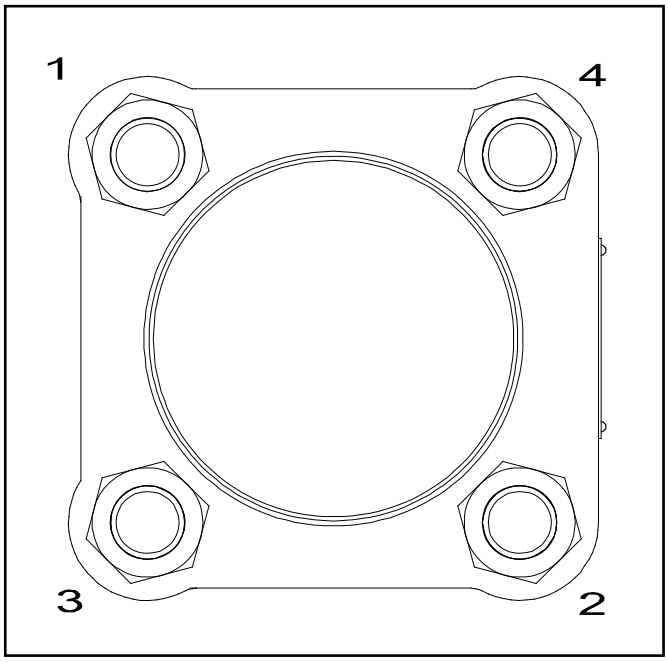


Figure 3 - Mounting-Nut Tightening Sequence

CAUTION: Uneven gasket compression
Do not overtighten the nuts on one side of the valve as this may tilt the valve and result in uneven gasket compression.

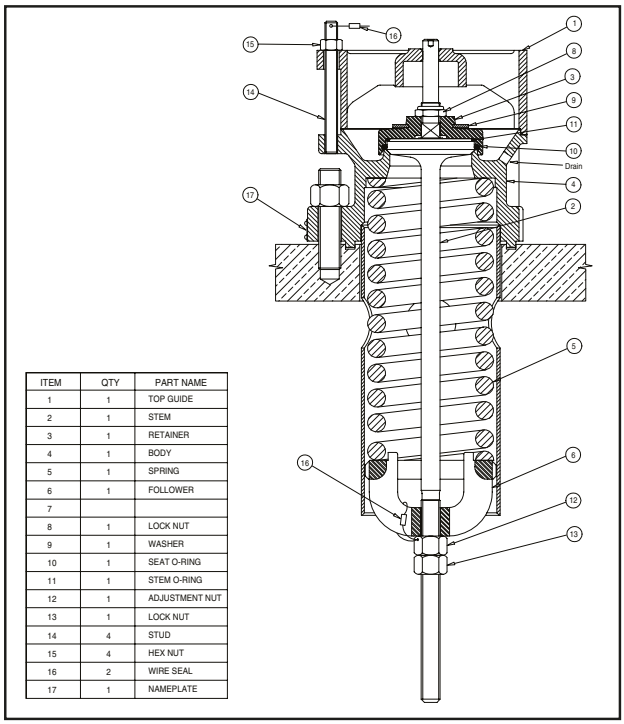
1.2.11 **Inspect for leaks.** Test all newly installed valves under pressure to confirm no leaks exist

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

1.3 Valve Operation Notes and Precautions

- Operation of the valve must conform with all applicable TC, AAR, DOT specifications (Parts 173.31, 174.67), other governmental bodies, and the operating instructions of your company.
- The pressure relief valves are spring-loaded and are actuated by overpressure in the railcar tank. There are no provisions for manual activation of the valve.

2.0 Valve Disassembly (Disassembly is required for inspection per 3.0)



ITEM	QTY	PART NAME
1	1	TOP GUIDE
2	1	STEM
3	1	RETAINER
4	1	BODY
5	1	SPRING
6	1	FOLLOWER
7		
8	1	LOCK NUT
9	1	WASHER
10	1	SEAT O-RING
11	1	STEM O-RING
12	1	ADJUSTMENT NUT
13	1	LOCK NUT
14	4	STUD
15	4	HEX NUT
16	2	WIRE SEAL
17	1	NAMEPLATE

Figure 4 - Valve Components

WARNING: When assembling or disassembling the valve, **DO NOT** position oneself directly in front of the spring and stem. Instead, position oneself to the side as shown in Figure #7. Unexpected component failure - valve-stem breakage - may cause a sudden energy release discharging component parts a short distance in an uncontrolled manner. Personal injury may be a result.

CAUTION: Spring-loaded Assembly. During valve-spring disassembly, the valve contains springs under load. **DO NOT** attempt to disassemble the valve without first reading these instructions or injury may result. Spring pressure must be adjusted to minimum and a bench clamp or press used for disassembly.

2.1 Procedure

2.1.1 Remove the seal wires (item 16) from the adjustment nut (item 12) and from the top-guide studs (item 14).

2.1.2 Remove the four nuts (item 15) securing the top guide (item 1) to the valve body (item 4).

2.1.3 Remove the top guide from the body. You may have to tap it loose with a brass hammer. If the chamber at the top end of the stem is peened over preventing removal of the top guide, it may be necessary to draw file the stem tip.

Figure 5 - Top Locknut Removal Method

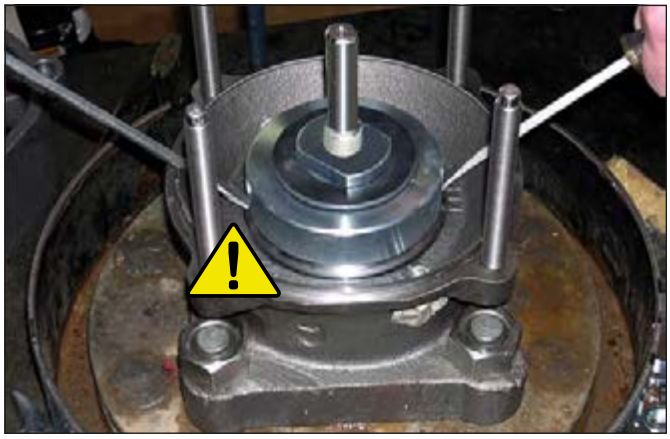


Figure 6 - Prying Up O-Ring Retainer

2.1.4 Remove the rubber bumper washer (item 9) from around the retainer (item 3).

Figure 7 - Loosening the Spring Locknut

2.0 Valve Disassembly (cont.)

2.1.5 Loosen the locknut (item 8) on the stem (item 2) using two wrenches as shown in Figure 5. Remove the locknut from the valve stem.

2.1.6 Pry up the O-ring retainer (item 3) using a pair of screwdrivers as shown in Figure 6.

Figure 8 - Placing Valve in Press

2.1.7 Use a non-scratching tool to remove the O-ring (item 10) from the O-ring groove of the retainer.

2.1.8 Clean and lubricate the stem thread. Loosen the locknut (item 13) from adjustment nut (item 12 using two wrenches of suitable length as shown in Figure 7. The appropriate wrench length will vary depending on the valve size and physical capabilities of the operator. Refer to paragraph 4.6.2.11 for torque values.

2.1.9 Remove only the locknut from the stem.

2.1.10 Place the valve into a press having a support block or floorboard (configured as shown in Figure 8) to allow pass-through of the valve stem and the top-guide studs.

2.1.11 Using a press yoke having a cutaway as shown in Figure 9, compress the valve spring enough to allow loosening of the spring-adjustment nut (item 12). Remove the adjustment nut while taking care to support the valve stem.

CAUTION: The valve stem may or may not stick in the valve seat. Take care when loosening the adjustment nut to prevent the stem from falling loose and sustaining damage. Support the stem and let it down gently.

2.1.12 Slowly and carefully back off the press head allowing the valve spring (item 5) to expand fully.

2.1.13 Remove the valve from the press taking care to lift it by the threaded valve stem (item 2). This will prevent the stem from falling out of the valve body.

WARNING: Valve/Seat Damage
With spring pressure removed from thevalve stem, the stem can easily shift allowing the sealing edges of the stem to contact metal surfaces or to improperly contact the valve seat. When laying the valve onto the workbench, keep lifting force on the valve stem above the spring to keep the valve seated. Lay the assembly down on its side carefully and immediately grasp the opposite (short) end of the stem to prevent valve/seat damage.

2.1.14 Lay the valve on a bench and place a properly sized wooden block beneath the short end of the valve stem to prevent it dropping and damaging the valve seat.

2.1.15 Remove the spring follower (item 6) and the spring (item 5) from the valve guide tube.

Figure 10 - Valve Components

2.2 Valve Reassembly

2.2.1 Reverse the disassembly instructions.

CAUTION: Stem Grease
When reassembling the valve be sure to lubricate the stem threads using PFPE grease. PFPE (perfluoropolyether) grease examples include, but are not limited to: Krytox GLP204, Fluorolube GR-290).

CAUTION: Valve Damage
Never attempt to manually actuate (open) the valve by pressing the threaded stem (Item 1 in Fig. 4) against a hard surface or with prying tools as this may damage the valve and result in improper valve opening/closing in service.

3.0 Valve Inspection

Follow the guidelines in this section for inspecting the condition of the various valve components after disassembly. In some instances a component can be properly evaluated for damage or cracks only with the use of specialized techniques, such as dye-penetration or magnetic-particle testing according to a qualified procedure by certified trained personnel. Testing requirements are indicated where mandatory.

Additionally, specific inspections must be performed during and after reassembly of the valve to ensure proper and reliable operation.

3.1 Procedures

3.1.1 Top Guide

The top guide (Fig. 11) is principally a structural part. There should be **no paint** on the guide bushing of this part where the valve stem enters it, or between adjacent surfaces of the top guide and valve body.

The area of discharge through the top guide (Fig. 5) must be unobstructed by foreign matter that would hinder free flow of discharging flui

3.1.2 **Valve Stem**

Remove scale, residual product, and other foreign material from the stem. Use magnetic-particle or dye-penetration inspection to detect cracks.

3.0 Valve Inspection (cont.)

CAUTION: Check for Cracks

Cracks are stress concentrators and can cause catastrophic failure of the stem and uncontrolled venting.

Also inspect for corrosion pitting. Any corrosion pitting is reason for rejection since it may indicate more severe corrosion at the threads and the starting point for difficult-to-detect cracking.

All nickel-bearing stainless steels have a likelihood of galling. Wrenching the adjusting nut without relieving the spring's load will frequently result

in galled stem threads. A new hex nut should move freely up and down the threads. If the hex nut does not move freely, the stem should be replaced.

3.1.3 **Valve Stem Concentricity**

The valve stem must be straight within the tolerances specified in Table 1 (below). Rotate the stem on V-blocks set up with a dial indicator (Fig. 12). If the dial indicator readings are not within the allowable tolerance, replace the stem or return it to Midland for repair.

Table 1: Valve Stem Tolerances

Valve Model Series Number	TIR Tolerance (Total in Round)
2000	0.025 Inch

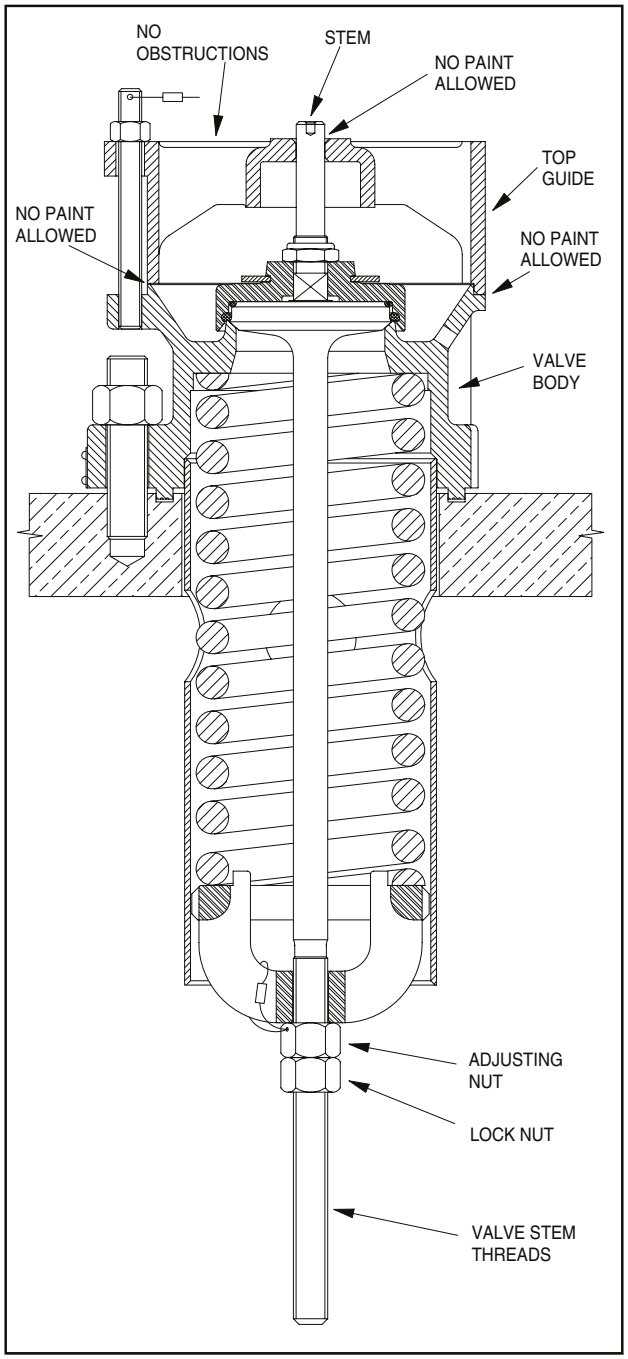


Figure 11 - Valve Components (Inspection)

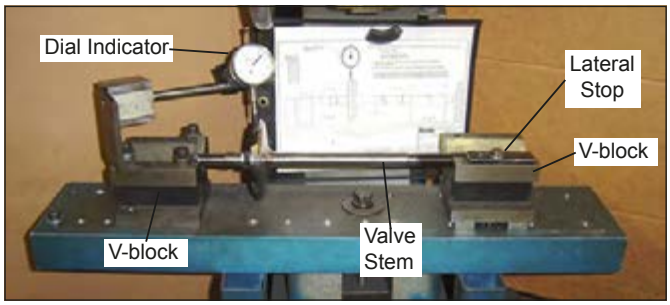


Figure 12 - Valve Stem Concentricity Check

WARNING: Stem Eccentricity
Excessive valve-stem eccentricity will cause binding that can result in high start-to-discharge pressure settings, reduced valve capacity and/or low vapor-tight pressures.

WARNING: Valve Stem Failure
Cracks and corrosion of pressure relief valve stems can result in stem failure and uncontrolled venting.

WARNING: Valve Stem Straightening
Straightening of stem by bending it in a press may result in the buildup of uneven stresses in the stem which may result in valve malfunction.

3.1.4 **O-Ring Retainer Grooves**

The grooves (Fig. 13) must be free of gouge marks, corrosion, pits and rust. Since the O-rings must seal against these surfaces, any irregularities can cause the valve to leak. Clean the groove by sanding it lightly with emery paper (400 grit). If this does not effectively clean it, replace this part.

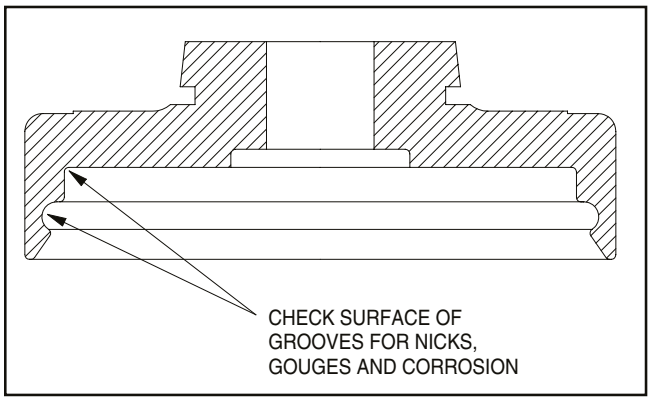


Figure 13 - Retainer O-Ring Grooves

3.1.5 **Valve Body and Stem**

Examine these components as described below.

Valve Body: The sealing surface is the crown of the seat (Fig. 14). Clean it with emery paper (400 grit) then wipe it with a cloth and a suitable solvent. Run your fingernail around the surface to detect any flaws. **Repair work is limited to cleaning and polishing** (Paragraph A4.11.1 of the Tank Car Specifications)

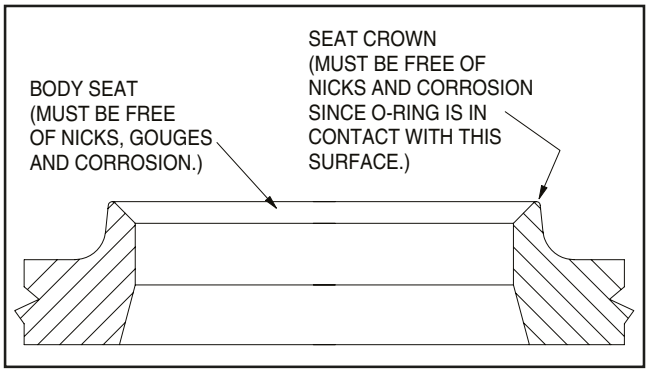


Figure 14 - Valve Body Seat Details

3.0 Valve Inspection (cont.)

Valve Stem: The sealing surface is the stem seat (Fig. 15). Clean the stem seat with emery paper (400 grit) then wipe it clean with a cloth and a suitable solvent. Run your fingernail over the seat surface to detect any flaws. **Repair work is limited to cleaning and polishing.**

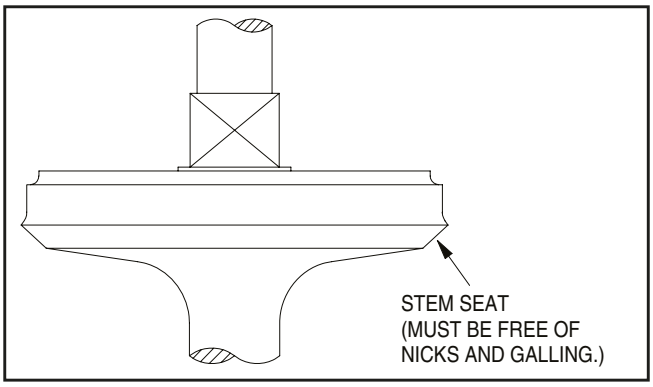


Figure 15 - Valve Stem Seat Details

WARNING: Machining not allowed
Machining, grinding, welding or other alterations to the valve seat or stem seat are not allowed per AAR M1002 (Paragraph A4.11.1 of the Tank Car Specifications).

Sealing Surface (Valve Mounting): On the underside of the valve body is the surface that seals the valve to the mounting plate on the railcar (Fig. 16) Machining of this surface is permitted. (Refer to paragraph A4.11.2 of the Tank Car Specifications.) Also consult Appendix E for the dimensions and applicable tolerances. A good seating surface is necessary to ensure there are no leaks in this area.

NOTE: Some valves do not include a tongue flange. On valves with a flat-face mounting flange, refer to A4.11.2 of the Tank Car Specification for machining specification

3.1.6 **Valve Spring**
This part is highly stressed. The exterior surface must be free of pitting and cracks. Use **magnetic-particle or dye-penetration inspection** (performed by certified trained personnel) to evaluate the exterior surface and ensure that it is free of cracks.

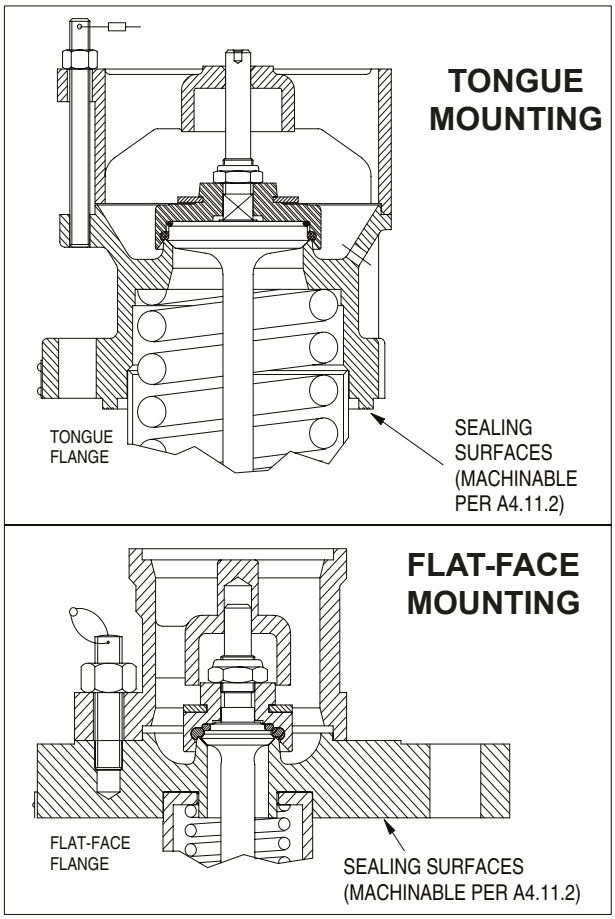


Figure 16 - Machinable Sealing Surfaces

WARNING: Valve Spring Failure
Defects, such as cracks and corrosion pits, in coil-springs can act as stress concentrators. Failure to detect these defects can result in coil-spring breakage and uncontrolled valve venting.

Aluminum Clad Springs
Aluminum-clad springs cannot be inspected by magnetic-particle or dye-penetration methods. No peeling or flaking-o f of the aluminum coating is permissible. If such defects exist, contact Midland for repair or replacement.

NOTE: It is typically more cost-effective to replace a spring having damaged aluminum cladding than to re-clad it.

3.0 Valve Inspection (cont.)

For springs in acceptable condition, perform the load test as follows:

A) Measure the spring free-height and record.

B) Compress the spring to 80% of maximum deflection and hold for two (2) minutes

C) Release the spring and measure the new free-height and record.

D) If the free-height is now less than the Min. Free-Height shown in Table 2, reject the spring and replace it with an acceptable one.

For springs that are installed in valves, and where the coils are visible, observe the spacing between the coils when the spring is in the STD position. There must be enough deflection left to permit the valve stem to fully lift. A minimum of 30% of the deflection (total spacing between spring coils in the free position) should remain after the valve is at the set or STD position.

WARNING: Deficient Valve Travel
Coil springs that have insufficient spacing between coils in the STD position will not allow the valve to open fully. Ensure adequate minimum spacing as described previously. Also, for the A-2000 series valves, the spring should not be bowed more than 1/4" when in the assembled position. Bowing in excess of this amount can cause the spring to rub against the inside wall of the nozzle and adversely affect the pressure settings. If any of the defects mentioned above are observed, the spring cannot be repaired and must be replaced.

3.1.7 Spring Follower or Guide

This structural part has guides on its outer edges (see Fig. 17). Move it up and down the length of the guide tube as indicated below. If it binds, look for dents or bent surfaces in the tube. Repair the dents or damage to allow free movement of the follower.

TABLE 2: MINIMUM FREE-HEIGHT OF SPRINGS AFTER PRESSING TO HEIGHT AT 80% OF MAXIMUM DEFLECTION FOR 2 MIN.

VALVE MODEL NUMBER	SPRING PART NUMBER (*)	WIRE SIZE (INCH)	MIN. FREE HEIGHT (INCH)	HEIGHT AT 80% OF MAXIMUM DEFLECTION (INCH)
A-2085	28-5-AS/AL	0.625	16.02	8.56
A-2089	28-5-MO	0.625	17.30	8.70
A-2095	29-5-AS/AL	0.688	16.65	8.94
A-2097	29-5-AS/AL	0.688	16.65	8.94
A-2099	29-5-SS	0.688	18.31	9.31
A-2169	21-165-SS	0.813	14.25	9.18
A-2165	21-165-AS/AL	0.183	14.53	8.83

(*) AS/AL = AS or ASAL Springs

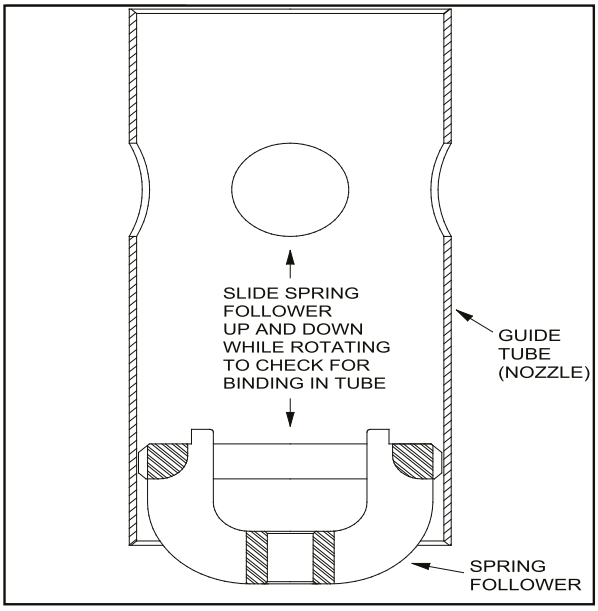


Figure 17 - Spring Follower

3.0 Valve Inspection (cont.)

WARNING: Valve Sticking
If the spring follower binds in the guide tube (nozzle), the valve may stick in the open position or be prevented from opening. Ensure free travel of the follower before reassembling the valve.

3.1.8 O-Rings

These must be replaced at the time of the periodic valve retest and when the valve is disassembled.

CAUTION: O-Ring Degradation
O-rings develop micro cracks, can swell or shrink, and become harder or softer with age and chemical exposure. An O-ring that fi s loosely in the cap, or can only be pushed into the O-ring retainer with difficult, is quite likely not the correct size. Many of Midland's O-rings are made in special molds to nonstandard sizes and are obtainable only from Midland.

CAUTION: Defective Components
If any parts appear defective, it is recommended they be replaced, or consult with Midland for recommended repair techniques when applicable.

3.2 Special Inspection Considerations

3.2.1 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.

3.2.2 Facilities performing recommended dye-penetration and magnetic-particle testing must carry out such testing according to a qualified procedure conducted by certified trained personnel.

3.2.3 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.

3.2.4 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.

4.0 Maintenance

NOTE: 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. However, if your company's experience indicates that a shorter interval is advisable, a program with more frequent retesting should be implemented.

NOTE: It is an AAR requirement (refer to D4.04) that new O-rings be installed when a valve is retested.

4.1 Retesting of Valves in Storage

Midland valves are factory set and sealed. If they have been left in their original shipping containers, are undamaged, and are not more than six months old, they may be installed without being retested.

4.2 Precautions for Mounted-Valve Repair

When performing maintenance on a pressure relief valve that is mounted on a railcar, observe the following precautions.

- Wear protective clothing and equipment suitable for withstanding the materials to which you may be exposed.
- Position yourself on the upwind side of the valve when possible.
- Work with a partner who can help you in the event of an emergency.
- Follow approved safety precautions for hazardous or toxic materials.

4.3 Required Tools

Obtain the required tools and supplies before attempting maintenance procedures.

4.0 Maintenance (cont.)

Recommended Wrenches

SAE	METRIC	Component
3/4"	19 mm	1/2" top guide nut
7/8"	23 mm	5/8" top lock nut
15/16"	24 mm	3/4" top lock nut
1-1/16"	27 mm	Flats on small valve O-ring retainer, 5/8" mounting-stud nuts
1-1/4"	32 mm	Flats on large valve O-ring retainer, 3/4" mounting-stud nuts
1-7/16"	37 mm	7/8" mounting-stud nuts

Other Tools and Supplies

Screwdrivers	Vise Grips
Wheel puller	Lint-free cloth
Silicone grease (or eqiv. lube.)	Emery paper (400 grit, cut in 1" strips)
O-ring retainer cap with O-rings epoxied in place.	

4.4 Leak Repair on a Mounted Valve

It is possible to replace only the retainer cap O-rings on an internal-style valve mounted on a pressurized tank car. This procedure may be conducted to stop minor leakage when valve rebuilding or replacement must be delayed.

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

NOTE: Conducting this procedure may be hazardous (depending on the material in the tank car). Maintenance personnel should be carefully trained before being permitted to perform the procedure below on a pressure relief valve mounted on a pressurized tank.

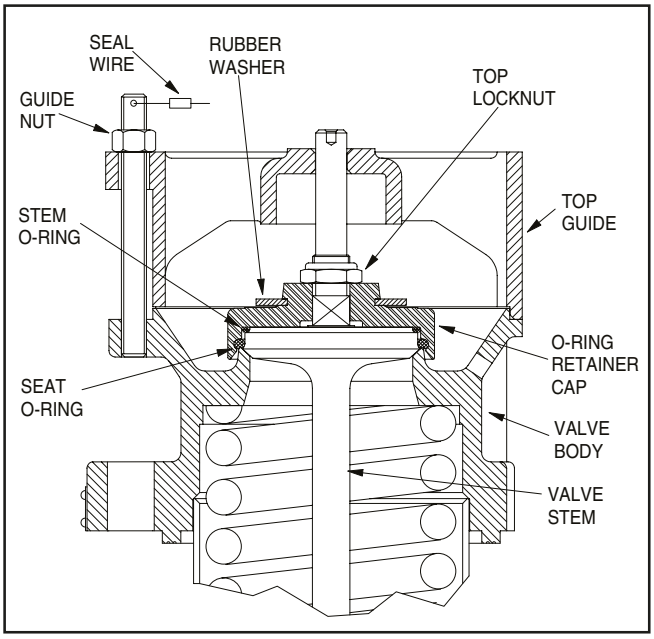


Figure 18 - Internal-style Valve Components

4.4.1 Remove the top seal wire (Fig. 18).

4.4.2 Remove the four top-guide nuts and situate them so they won't be dropped or lost.

4.4.3 Mark the top guide and body with a vertical line to allow the top guide to be reinstalled in the same orientation.

4.4.4 Pry up and remove the top guide.

4.4.5 Put a wrench on the flats of the O-ring retainer and another wrench on the top locknut (see Fig. 19, next page). Hold the retainer in place to prevent it from rotating while backing off and removing the top locknut.

CAUTION: Valve Discharge
When the O-ring retainer cap is raised up, there will be a signifi ant amount of product discharging. Have the emery paper, cleaning cloth, replacement O-ring retainer cap (with epoxied O-rings) and silicone grease close at hand. Use a wheel puller, or two screwdrivers 180° apart, to quickly dislodge the O-ring retainer (Fig. 20, next page).

4.4.6 Remove the O-ring retainer. Remove the two O-rings from the retainer and inspect the

4.0 Maintenance (cont.)

4.4 Leak Repair on a Mounted Valve (cont.)

Figure 19 - Top Locknut Removal/Assembly Method

Figure 20 - Prying Up O-Ring Retainer

O-ring grooves (refer to Figure 21 and see **3.1.4 O-Ring Retainer Grooves** in section **3.0 Valve Inspection**).

4.4.7 Look carefully for nicks, rust, scale, solidifie product, and other foreign material on the valve seat (Refer to Fig. 14 in **3.0 Valve Inspection**, and Fig 22 at right). The O-ring makes its seal on the top of the crown of the valve seat and on a small area (on the outboard side) past the top of the seat. Use emery paper (400 grit) to clean this surface,

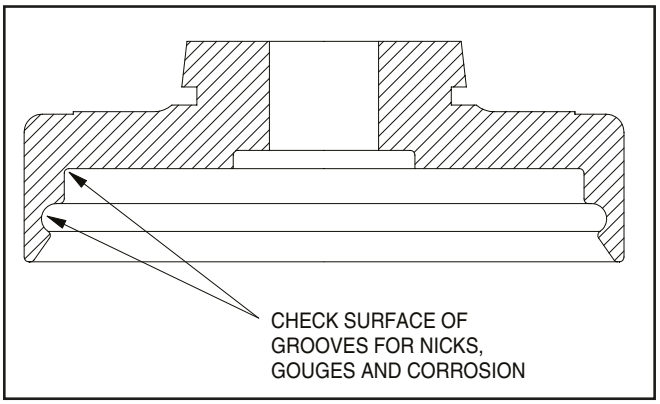


Figure 21 - Retainer O-Ring Grooves

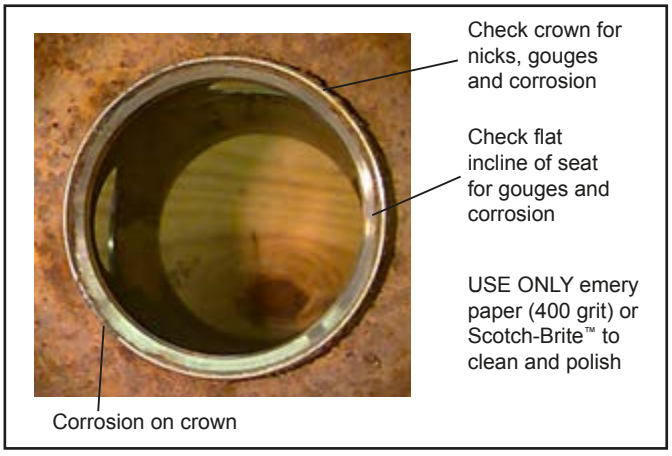


Figure 22 - Valve Seat Inspection

then wipe away any loose residue. Visually inspect this surface to detect any irregularities that may still be there.

Figure 23 - Lubricate Valve Stem Threads

4.0 Maintenance (cont.)

4.4.8 After cleaning and confirming that the valve seat area is clean and free of defects, apply a small amount of lubricant to the exposed thread of the valve stem (Fig. 23).

4.4.9 Install the new O-ring retainer and secure it with the top locknut. Incrementally tighten top locknut, take care to prevent rotation of the retainer by using two wrenches as shown in Figure 19. Torque the top lock nut to 100 +/- 10.

4.4.10 Install the top guide and secure it with the four guide nuts.

CAUTION: Replace Retainer
After the tank-car pressure is relieved, replace the retainer having epoxied O-rings with another one containing non-epoxied O-rings. **If valve leakage exceeds the sealing capability of the O-ring, replace or rebuild the valve.**

4.5 Special Guidelines and Precautions on Pressure Testing and Adjustment

Determining Applicable Pressure Values
Refer to AAR publication "Regulations for Tank Cars." Appendix A applies specifically to valves. This section prescribes the start-to-discharge pressure (STD), the vapor-tight pressure (VTP) and their tolerances.

NOTE: A "popping pressure" is not specified. It is only necessary to determine the STD pressure as pressure is increased, and to determine the vapor-tight pressure as pressure is being reduced. [STD is defined as a continuous discharge in contrast to the start-to-leak pressure, which is defined as the first bubble leak. Vapor-tight is defined as being bubble-tight, with no bubbles for two (2) minutes.]

Test Stand and Gauge Requirements
The test stand must have a mounting equivalent to the AAR M1002 figures E19.14 through E19.23 for the valve being tested. The pressure gauge must meet the requirements of D4.5 Test Gauge Standards and date-tagged.

Specialized Mounting Nozzles
Valves of the A-2035 through A-2169 type require a mounting nozzle duplicating the dimensions of figure E21 of AAR M1002.

WARNING: Use Proper Guide Tube
Testing and setting valves without the proper guide tube will result in incorrect high-pressure settings.

4.6 Pressure Testing and Adjustment Procedures

4.6.1 Valve Testing Procedure

If your company has an approved test procedure, follow it. If it does not, this procedure provides essential guidelines.

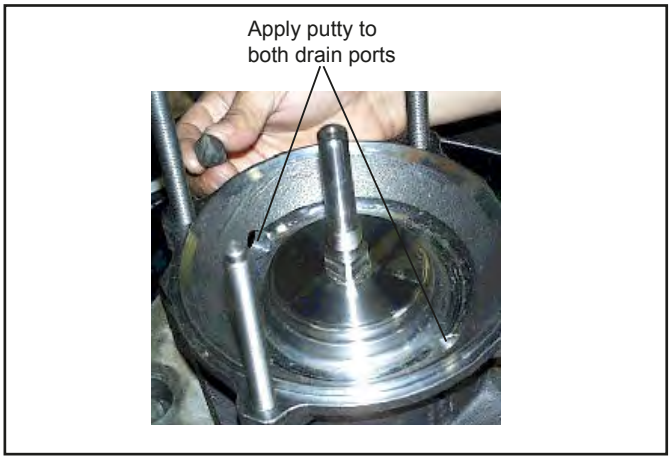


Figure 24 - Blocking Water Drainage with Putty

4.6.1.1 Install the valve on the test fixture and tighten down all the nuts alternately.

4.6.1.2 Seal the drain holes of the bowl or top guide with putty (Fig. 24), or a similar material.

4.6.1.3 Fill the top guide of the valve body with water to allow bubble detection at valve seat.

4.6.1.4 Take a position allowing observation of the pressure gauge and for bubbling of air in the top guide of the valve body.

4.0 Maintenance (cont.)

4.6.1.5 Increase the test air pressure slowly.

4.6.1.6 Increase the air pressure until the valve STD is reached. The initial opening of the valve may be slightly high and not indicative of the actual STD because the O-ring may have been partially stuck to the valve seat.

4.6.1.7 Reduce the air pressure until leakage stops and then reduce pressure to less than one half of the STD pressure. Then slowly increase the pressure.

4.6.1.8 Observe the STD pressure and then bleed off the pressure slowly to observe the VTP for a minimum of two minutes with no bubbles allowed.

4.6.1.9 Repeat this procedure at least two more times. The STD and VTP should be consistent in all three occurrences.

4.6.1.10 AAR Specificat ons state that the VTP is 80% of the STD. Valves with good seats and O-rings should exhibit a VTP above 80% of the STD (usually up to 95% of the STD).

4.6.1.11 If the STD or VTP is not satisfactory, take the O-ring retainer cap off the valve and follow the previous Maintenance instructions in section **4.4 Leak Repair on a Mounted Valve** to replace the retainer cap O-rings.

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

4.6.1.12 Remove the valve from the test fixture

4.6.2 Valve Adjustment Procedure

4.6.2.1 Remove the wire seal from the spring-adjustment nut.

4.6.2.2 Lubricate the valve stem threads below the two adjustment nuts.

4.6.2.3 Loosen the locknut (nearest the free end of the threaded valve stem) a few turns to separate it from the adjusting nut.

4.6.2.4 Using a manual or air-operated press, invert the valve to compress the spring and relieve

Figure 25 - Yoke for Spring Compressing

pressure from the adjusting nut. Use a tubular yoke (Fig. 25) that is partially cut away to press down on the spring follower, further compressing the spring.

CAUTION: Stem Thread Damage
Since all nickel-bearing stainless steels have a likelihood of galling, wrenching the adjusting nut without relieving the spring's load will frequently result in damaged stem threads.

4.6.2.5 Apply indicator (reference) marks to the bottom adjusting nut and the spring follower, and then loosen or tighten the adjusting nut two turns.

4.6.2.6 Release the spring compressor.

4.6.2.7 Tighten the locknut against the adjusting nut to lock the setting.

4.6.2.8 Retest the valve STD and determine

4.0 Maintenance (cont.)

how much pressure change occurred when the adjusting nut was rotated two turns. Based upon this calculation, re-compress the valve spring and alter the valve adjustment for the midpoint in the STD tolerance range.

4.6.2.9 Retest the valve.

4.6.2.10 If the test results are erratic, trouble-shooting is more complex. Consult with your supervising engineer or a Midland repre-sentative.

4.6.2.11 When the test results are acceptable, tighten the lock-nut against the adjusting nut (while holding the adjusting nut stationary) to the applicable torque value shown below. Then install a new wire seal.

A-2000: 150 ±10 ft-lbs.

4.6.2.12 Perform the Post-test Procedures shown below.

Post-test Procedures

4.6.2.13 After testing the valve, close the test stand pressure inlet valve to the test chamber, relieve the pressure in the test chamber and remove the valve from the test fixture

4.6.2.14 Drain off any water that may have accumulated and wipe or blow away any soap suds and water used in the testing.

4.6.2.15 Install a plastic protector over the valve body tongue to prevent damage to it.

4.6.2.16 Apply an appropriate preservative or paint to the exterior of the valve. Be sure to mask the nameplate so that it will be readable afterward.

CAUTION: Paint Interference
DO NOT paint the sealing surfaces of the valve that will contact the mounting cover plate surfaces. Failure to follow this precaution may result in a cocked valve mounting and leakage.

4.6.2.17 Permanently attach a metal tag to the valve body with date of repair and repair facility identification

5.0 NOTICES AND WARRANTY

5.1 Regulations

The 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 conflic 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.

5.2 Obtaining Product Drawings

Assembly drawings of Midland pressure relief 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.

5.3 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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