

Part Number: A-22075/6, Rev. 1.2

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Internal-Style Pressure Relief Valve A-22075 Series and A-22076 Series

Installation, Operation and Maintenance (IOM) Manual

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1.0 Introduction

The A-22075 Series and A-22076 Series Internal-Style Pressure Relief Valves are high-flow, corrosion-resistant devices designed for use with crude-oil and ethanol tank cars requiring high-flow pressure relief.

- High-quality steel construction
- Triple seals on all potential leak paths to atmosphere
- Easy-to-replace seal design for ease of maintenance

1.1 Technical Specifications

Valve Model	Net Flow Area (in ²)	Flow Rate (scfm)	Valve Pressure Setting (psig)
A-22075/A-22076 Series	20	29,550	75

Table 1-1 Valve Specifications

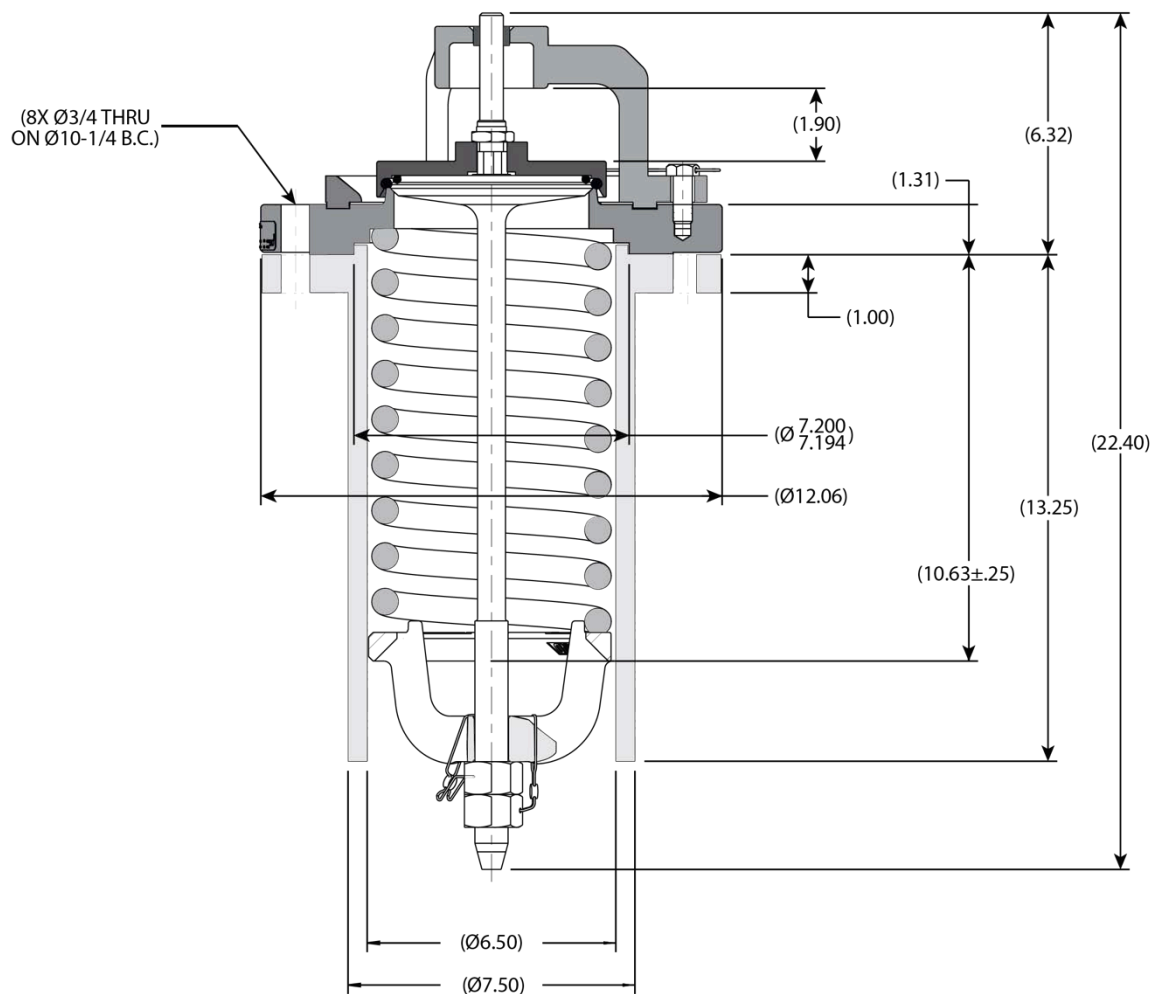


Figure 1-1 A-22075/A-22076 Valve Dimensions

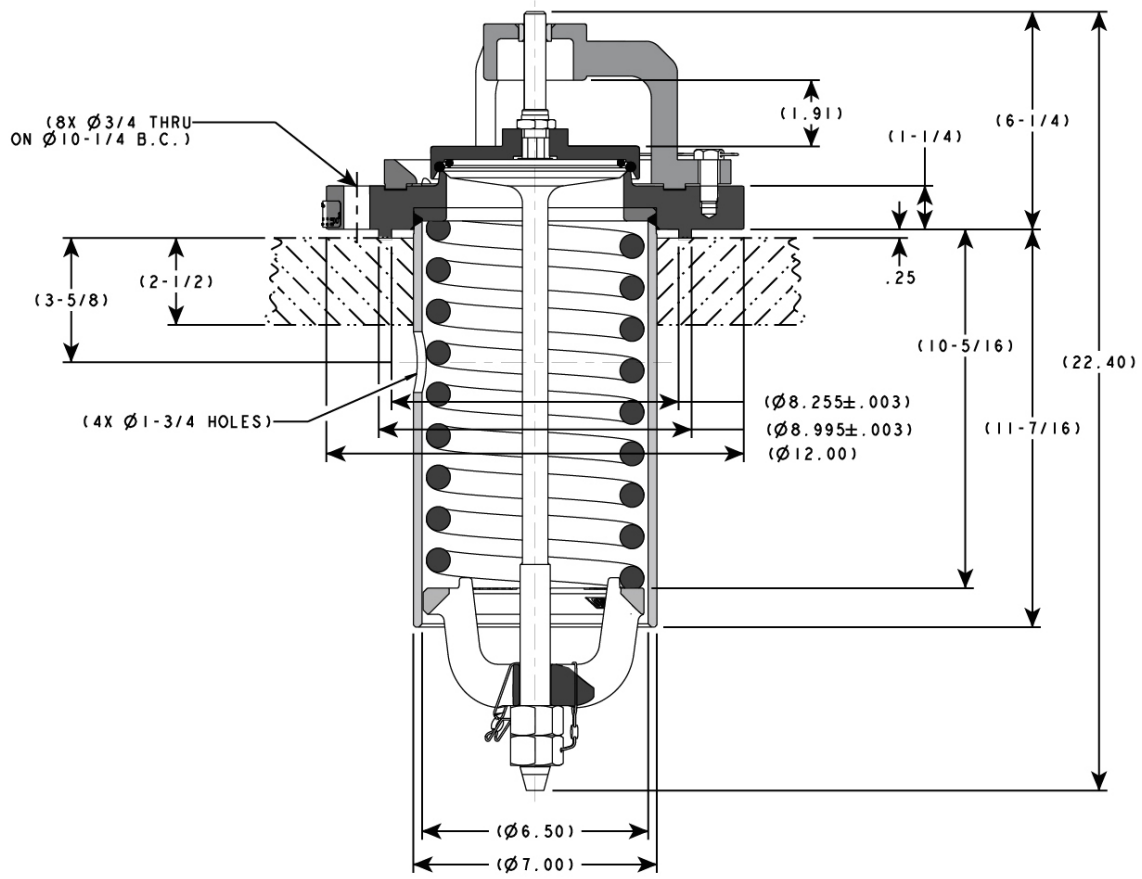


Figure 1-2 A-22075-PI and A-22076-PI Valve Dimensions

1.2 Valve Perspectives

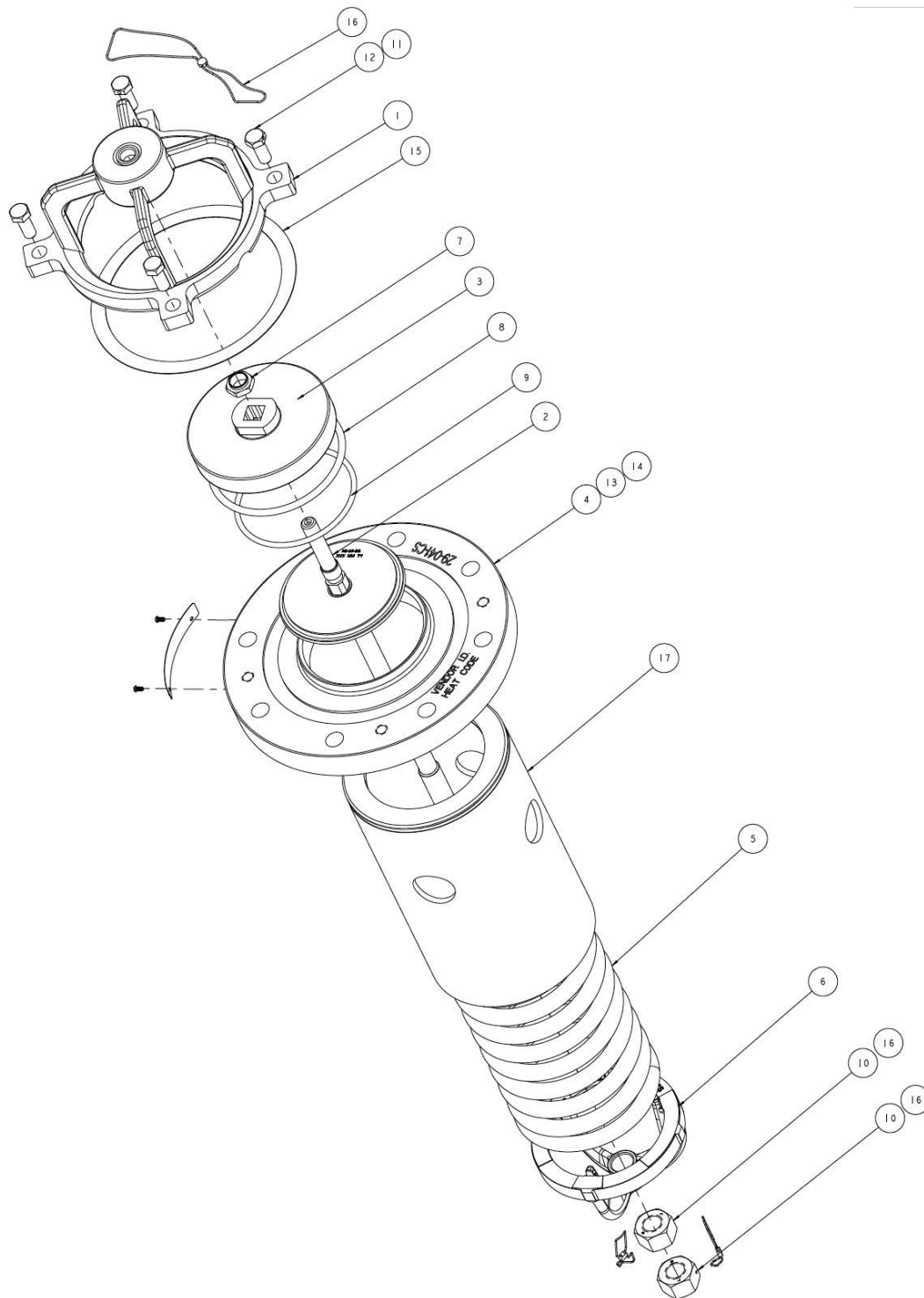


Figure 1-3 A-22075-PI/A-22076-PI Valve Exploded View

Item	Qty.	Part Name
1	1	Top Guide with Insert
2	1	Valve Stem
3	1	Assembly Retainer
4	1	Valve Body
5	1	PRV Spring
6	1	Follower
7	1	Insert Locknut
8	1	O-ring (2-431)
9	1	O-ring (2-351)
10	2	Hex Nut
11	2	Hex-Head Cap Screw
12	2	Hex-Head Cap Screw
13	1	Name Plate
14	2	Drive Screw
15	1	Gasket
16	3	Wire-Seal Kit

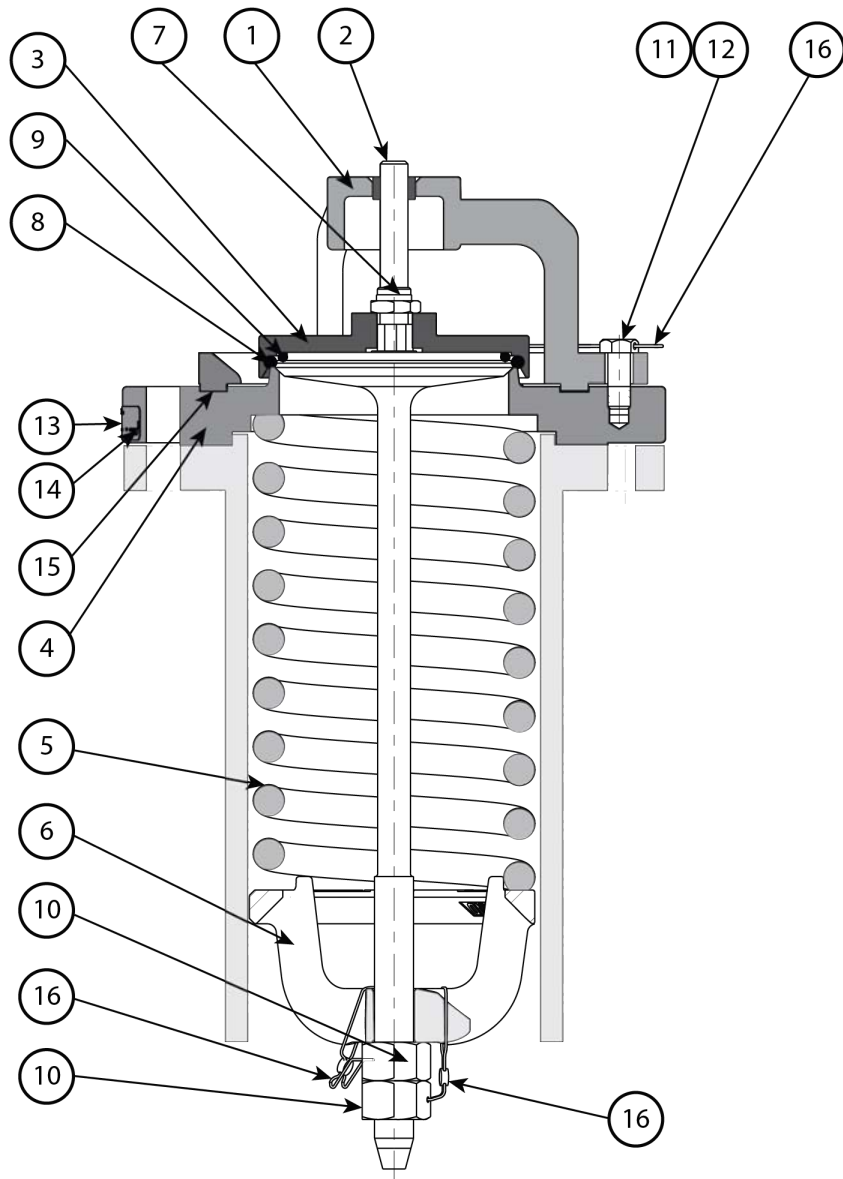


Figure 1-4 A-22075/A-22076 Valve Components

Item	Qty.	Part Name
1	1	Top Guide with Insert
2	1	Valve Stem
3	1	Assembly Retainer
4	1	Valve Body
5	1	PRV Spring
6	1	Follower
7	1	Insert Locknut
8	1	O-ring (2-431)
9	1	O-ring (2-351)
10	2	Hex Nut
11	2	Hex-Head Cap Screw
12	2	Hex-Head Cap Screw
13	1	Name Plate
14	2	Drive Screw
15	1	Gasket
16	3	Wire-Seal Kit
17	1	Tube Assembly

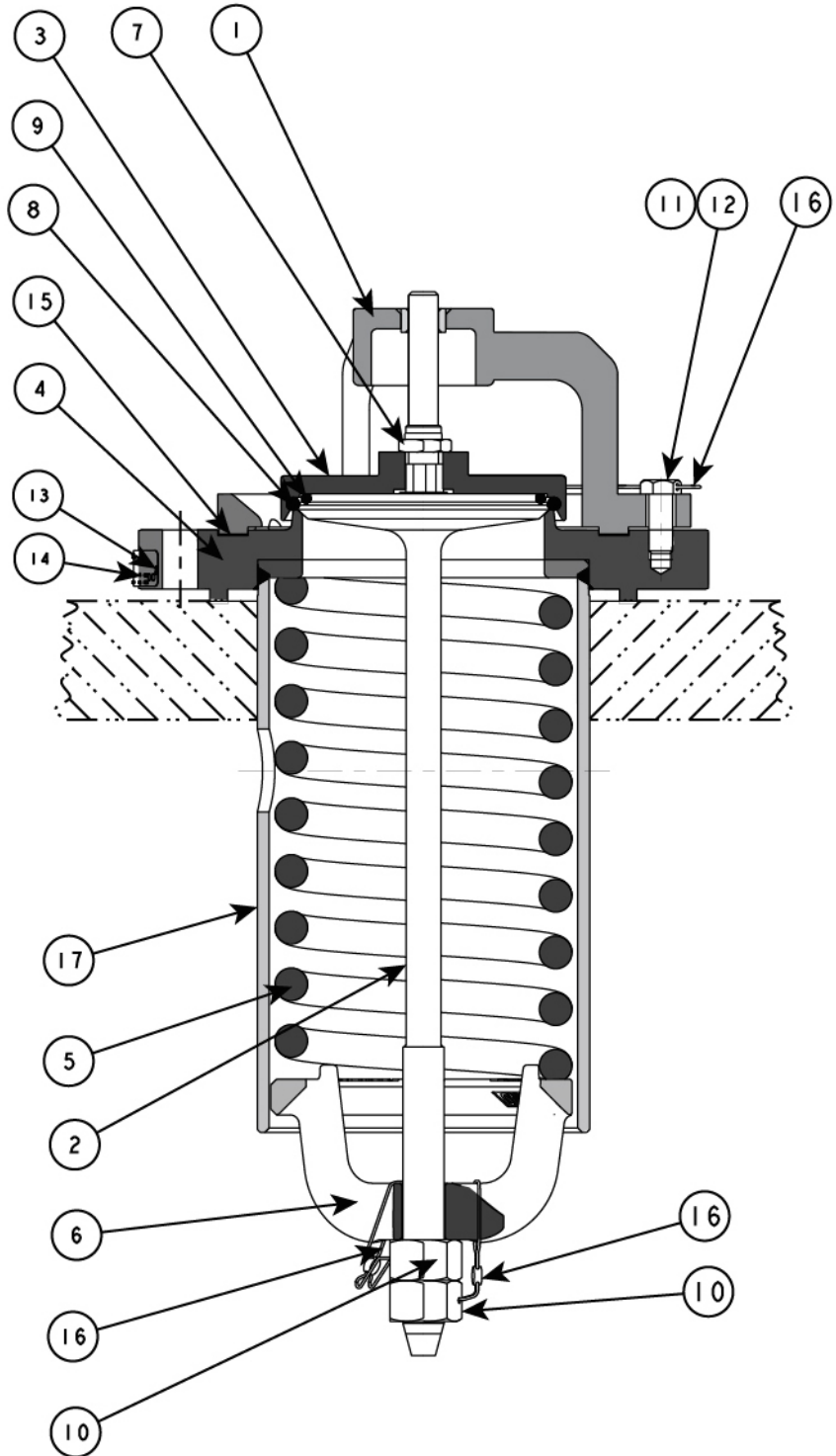


Figure 1-5 A-22057-PI/A-22076-PI Valve Components

1.3 Pre-Installation Regulations/Requirements

1.3.1 Regulations

Midland internal-style valves are used in contact with a variety of products, many of which are hazardous materials. The acceptance and transportation of products are regulated by the DOT and AAR in the U.S.A., and in Canada by CTC and Transport Canada. Regulations of other governmental bodies must be complied with for stationary and mobile applications. All personnel should be familiar with and follow these regulations. Nothing in these instructions is intended to conflict with or supersede these regulations. The information in this document was gathered from knowledgeable sources, but Midland Manufacturing Corporation makes no representations or guarantees about its accuracy or completeness and assumes no liability for this information.

Specifications are subject to change without notice.

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 involved 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.



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 discharging component parts a short distance in an uncontrolled manner. Personal injury may be a result.

1.3.3 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 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 commodities 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			
SAE	Component	Torque (ft-lb)	Item #
3/4"	1/2-13 UNC Grade 8 Top-Guide Bolt	80	11 & 12
1-1/32"	3/4" Retainer Locking Nut	120	7
1-7/16"	7/8-9 UNJ Adjustment and Locking Nut	300	10
1-1/2"	Flats on Small Valve O-ring Retainer		

Table 1-2 Required Tools with Torque Specifications

Other Tools and Supplies	
Screwdrivers	Lint-free Cloth
2-Ton Two-Arm Puller	Emery Paper (400 grit, cut in 1" strips)
Silicone Grease (or equivalent lubrication)	Wire Brush
Torque Wrenches (0 – 300 ft-lb)	

Table 1-3 Additional Recommended Tools and Supplies

2.0 Valve Installation

2.1 Preliminary Considerations

- 2.1.1 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 (6) months old, it may be installed on a tank car without retesting or recalibration.
- 2.1.2 Prior to installation, ensure that the valve remains clean and the gasket-sealing surfaces are not damaged.

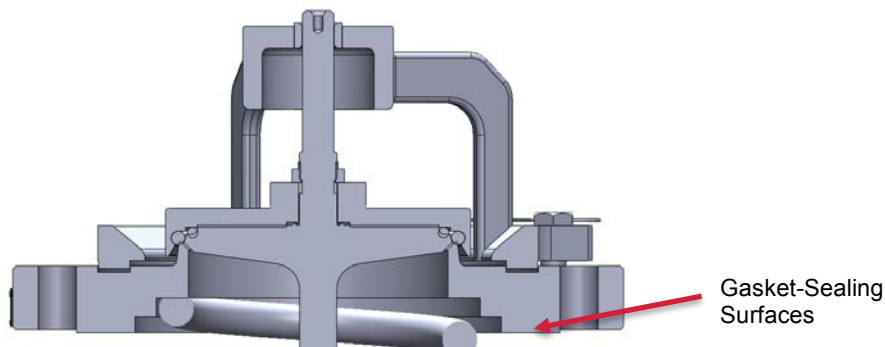


Figure 2-1 Gasket-Sealing Surfaces

2.2 Procedure

- 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 manway cover plate.
- 2.2.2 Using a wire brush, brush the threads of the mounting studs to remove rust or scale. Nuts should move freely on clean studs. Studs should not exhibit excessive corrosion.
- 2.2.3 Remove and discard all used gasket material.



CAUTION: Groove Damage. In order to avoid groove damage, do not scratch the metal in the bottom of the groove when removing the old gasket.

- 2.2.4 Using a lint-free cloth and appropriate cleaning solvent, wipe clean the valve and cover-plate sealing surfaces and the mounting-stud threads.
- 2.2.5 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 the AAR's groove tolerances.
- 2.2.6 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: Do not use a sharp tool to press the new gasket into place or gasket damage may result.

2.2.7 For tongue-and-groove mountings, 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 material to meet AAR tongue tolerances.



CAUTION: To prevent **tongue damage**, do not install a valve having damaged sealing surfaces.

2.2.8 Remove the rubber plug (which was inserted in Step 2.2.1) from the cover plate.

2.2.9 Position the valve gently into the mounting. Align the body holes over the studs and lower the valve while positioning the valve tongue in the cover-plate groove.



CAUTION: Tongue Not in Cover-Plate Groove. Verify that the valve tongue has fit into the cover-plate groove. It must be so engaged before continuing with the next step or valve damage may result.

2.2.10 Install the nuts and tighten them in 1/3-torque increments in a diagonally alternating sequence to a torque specified by the gasket specified, as shown in in Figure 2-2 below. Consult gasket manufacturer for recommended torque requirements.

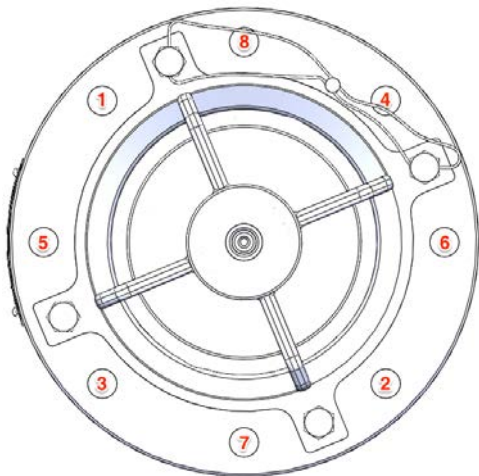


Figure 2-2 Tighten in Alternating Sequence



CAUTION: Uneven Gasket Compression. Do not over-tighten the nuts on one side of the valve as this may tilt the valve and result in uneven gasket compression.

2.3 Leak Inspection

2.3.1 Test all newly installed valves under pressure to confirm that no leaks are present.



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.

2.4 Valve Operation Notes and Precautions



NOTICE: Operation of the valve must conform with all applicable TC, AAR, DOT specifications (Parts 173.31, 174.67, etc.), 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.



CAUTION: Incorrect Setting. Never adjust the spring compression of a valve while it is mounted on the vessel cover plate or incorrect settings may result.

3.0 Valve Disassembly



NOTICE: Valve disassembly should only be done by trained personnel with access to the proper machines, tools, procedures and personal-protective equipment (PPE).

3.1 Procedure



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.

- 3.1.1 Remove the seal wires (item 16) from top-guide bolts (items 11 and 12).

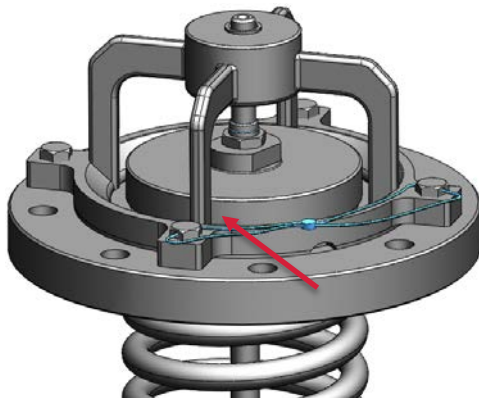


Figure 3-1 Remove Wire

- 3.1.2 Remove the four (4) bolts (items 11 and 12) securing the top guide (item 1) to the valve body (item 4).

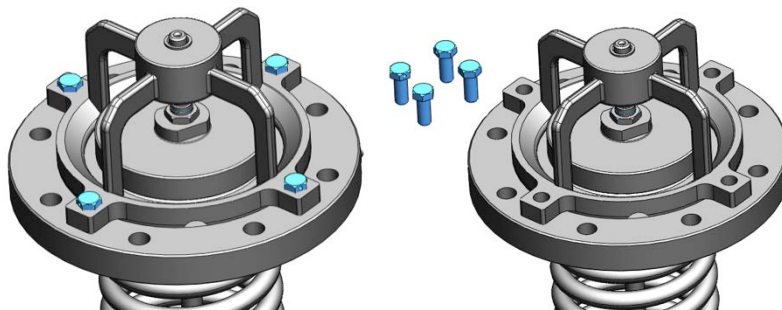


Figure 3-2 Remove Four (4) Bolts

- 3.1.3 Remove the top guide (item 1) from the body (item 4). You may have to tap it loose with a brass hammer.

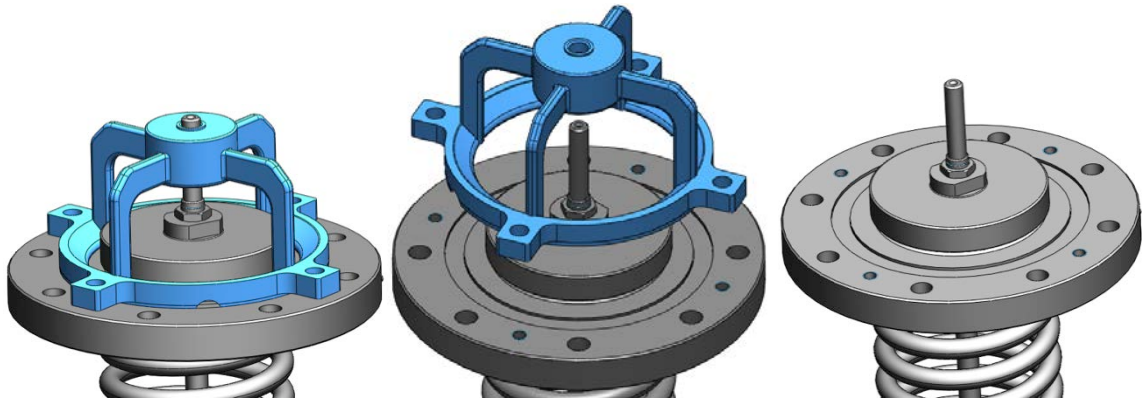


Figure 3-3 Remove Top Guide from Body

- 3.1.4 Remove the sealing gasket (item 15) and dispose.

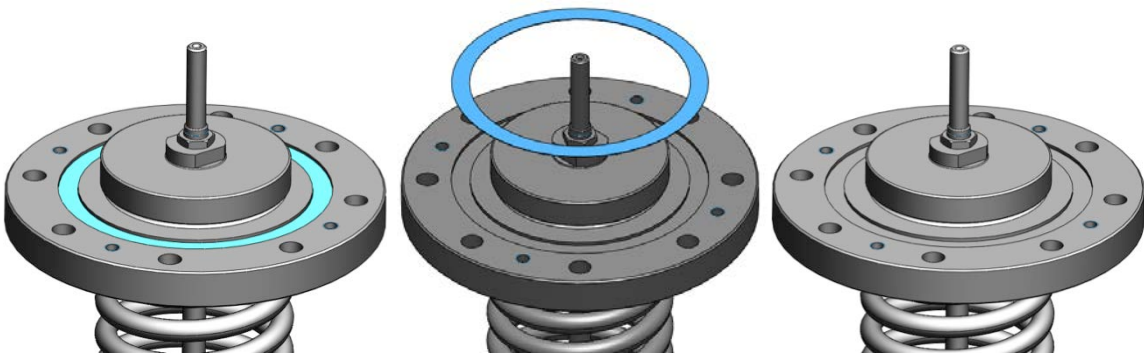


Figure 3-4 Remove Sealing Gasket

- 3.1.5 Loosen the locknut (item 7) on the stem (item 2) while holding the retainer in place. See Table 1-2 for recommended wrench size. Remove the locknut from the valve stem.

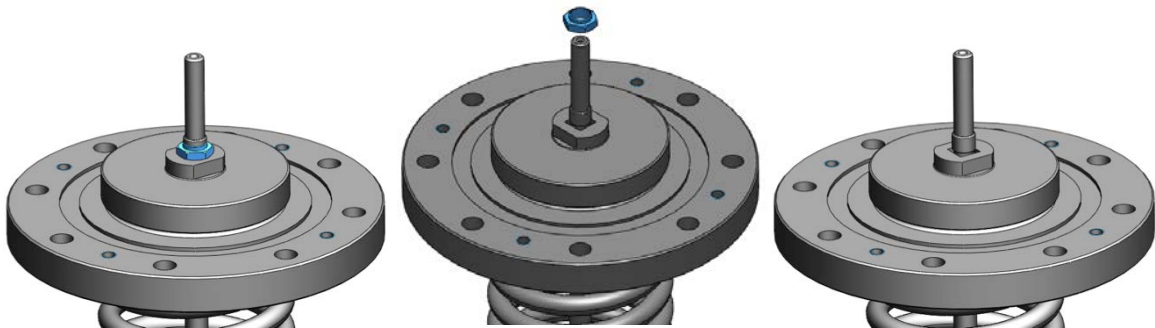


Figure 3-5 Remove Locknut from Valve Stem

- 3.1.6 Lift up the O-ring retainer (item 3), use of a pair of screwdrivers maybe required.

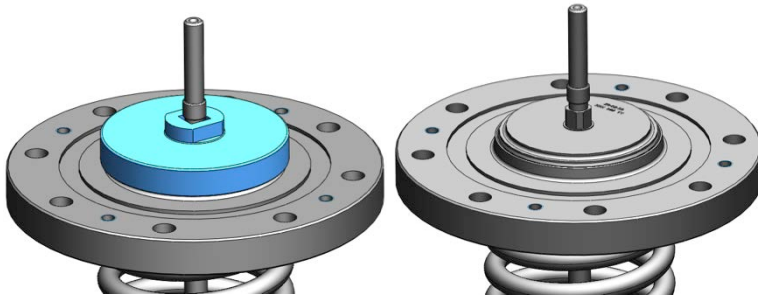


Figure 3-6 Remove Retainer

- 3.1.7 Use a non-scratching tool to remove the O-ring (items 8 and 9) from the O-ring groove of the retainer.

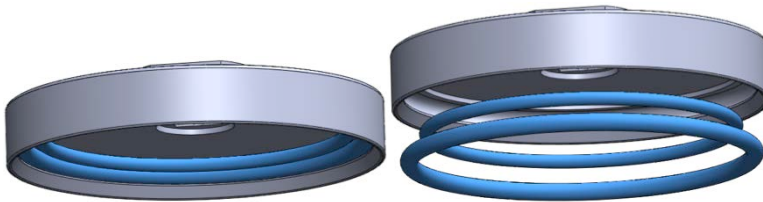


Figure 3-7 Remove O-rings from Retainer

- 3.1.8 Clean and lubricate the stem thread. Loosen the locknut (item 10) from adjustment nut (item 10) using two wrenches of suitable length as shown below. The appropriate wrench length will vary depending on the valve size and physical capabilities of the operator. Refer to Table 1-2 for recommended wrench sizes.

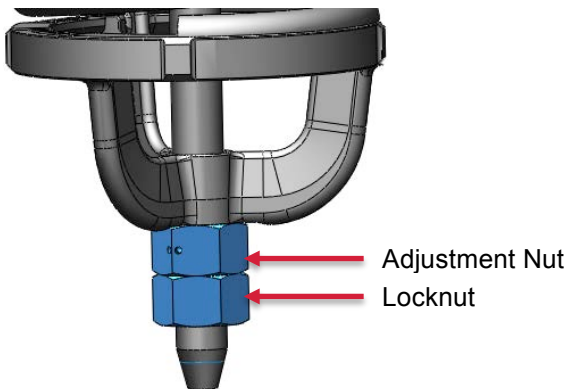


Figure 3-8 Loosen Locknut and Adjustment Nut

- 3.1.9 Remove only the locknut (item 10) from the stem.

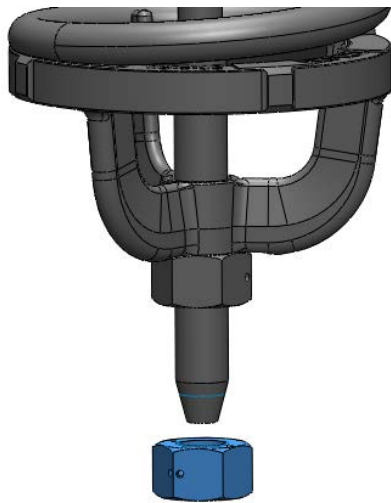


Figure 3-9 Remove Locknut

- 3.1.10 Place the valve into a press having a support block or floorboard to allow pass-through of the valve stem.
- 3.1.11 Using a press yoke having a cutaway as shown in Figure 3-10, compress the valve spring enough to allow loosening of the spring-adjustment nut (item 10). Remove the spring-adjustment nut while taking care to support the valve stem.

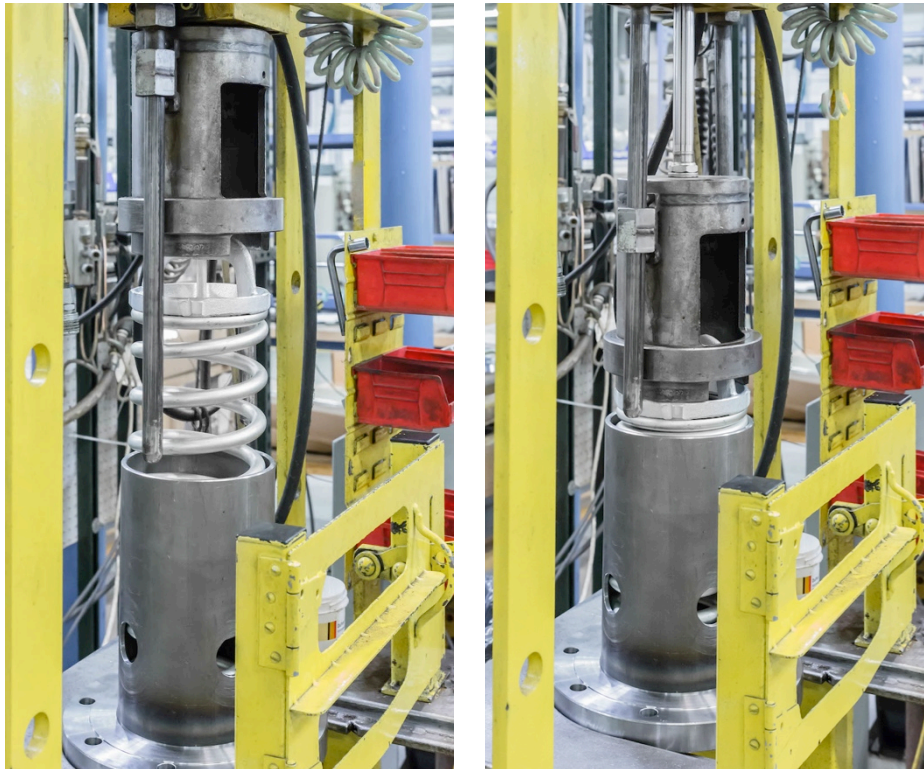


Figure 3-10 Compress the Valve Spring



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.

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



Figure 3-11 Valve-Spring Expansion

3.1.13 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 the valve 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 a constant 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.

- 3.1.14 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.
- 3.1.15 Remove the spring follower (item 6) and the valve spring (item 5) from the valve-guide tube, if present.

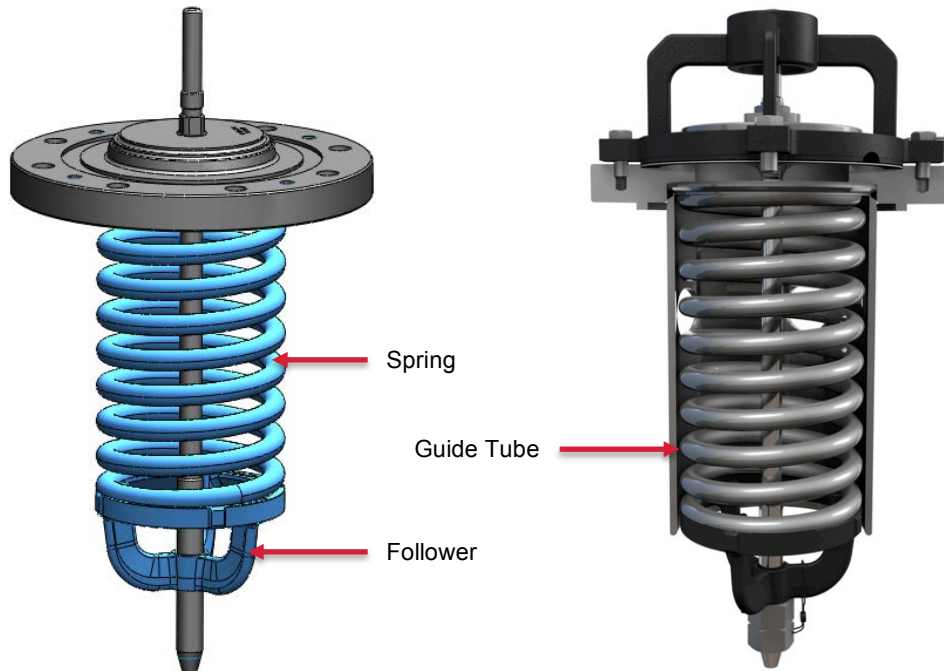


Figure 3-12 Remove Spring Follower, Spring and Valve-Guide Tube

4.0 Valve Inspection

Follow the guidelines in this section for inspecting the condition of 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. Such testing is indicated within this document where mandatory.

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

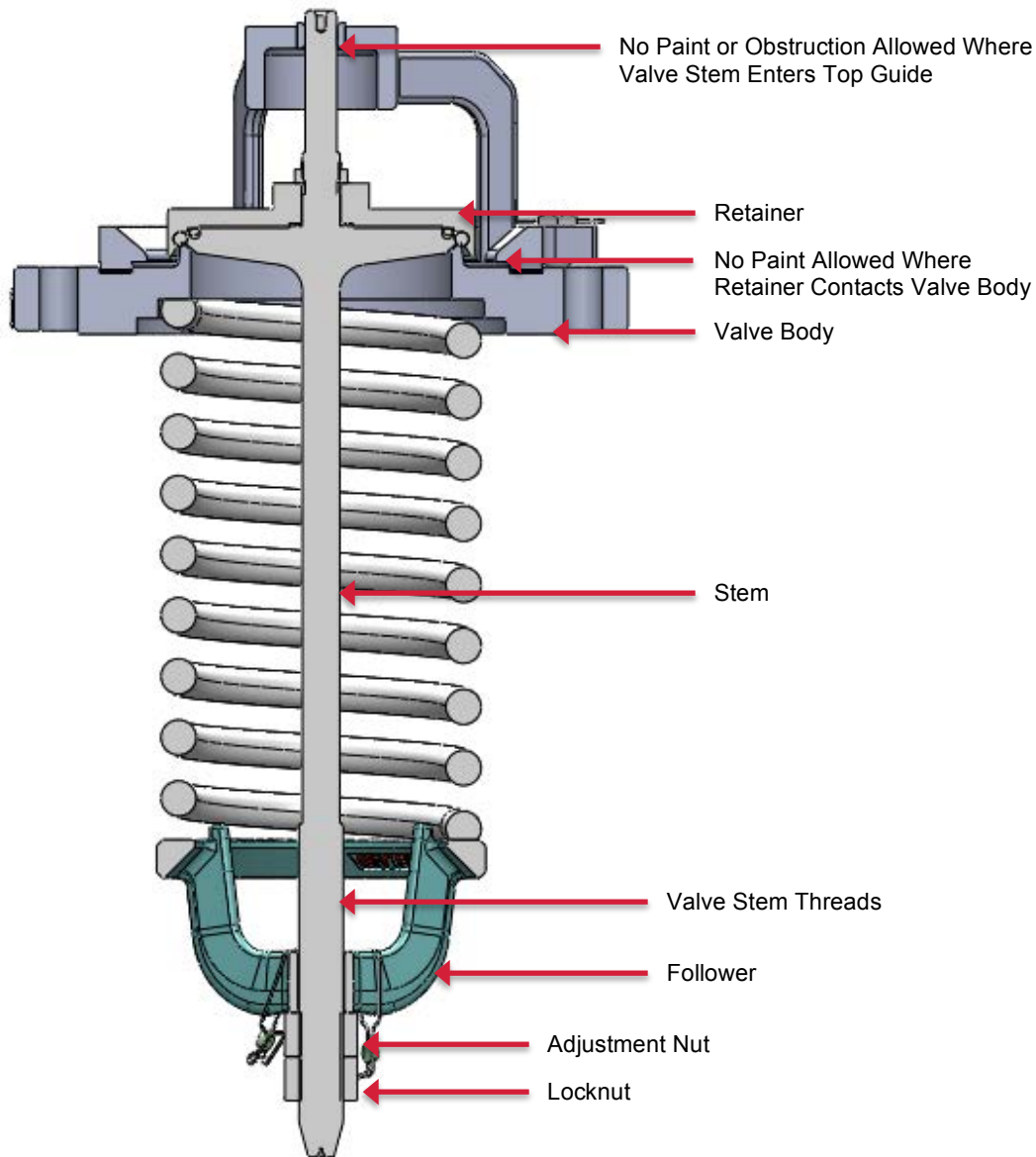


Figure 4-1 Valve Inspection Points

4.1 Inspection Procedure



NOTICE: Repair work is limited to cleaning and polishing. See Paragraph A4.11.1 of the Tank-Car Specifications.



WARNING: Machining Not Allowed. Machining, grinding, welding or other alterations to the valve seat or stem seat is not allowed per AAR M1002, Paragraph A4.11 of the Tank-Car Specifications.

4.1.1 Top Guide

- 4.1.1.1 The Top Guide (item 1) 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 (Figure 4-2) must be unobstructed by foreign matter that would hinder free flow of discharging fluid.

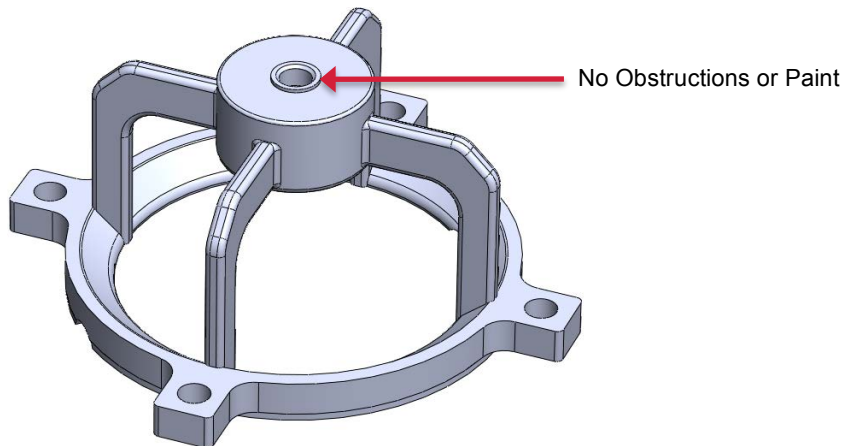


Figure 4-2 Top-Guide Discharge Area

4.1.2 Valve Stem

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

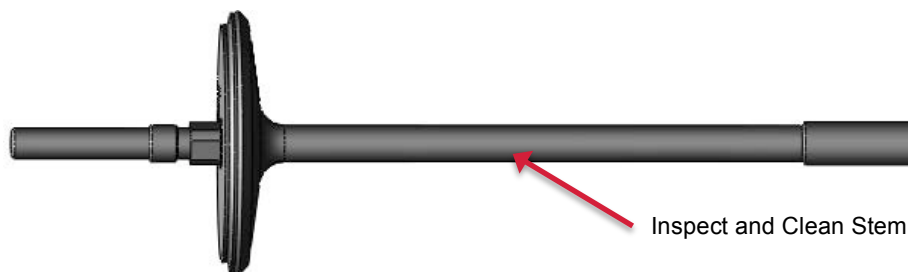


Figure 4-3 Valve Stem



CAUTION: Check for Cracks. Cracks are stress concentrators and can cause catastrophic failure of the stem and uncontrolled venting.

- 4.1.2.2 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.
- 4.1.2.3 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. Always check for galled threads and chase the threads with a thread die or replace stems with significant thread damage.
- 4.1.2.4 The sealing surface is the stem seat (Figure 4-4). 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.

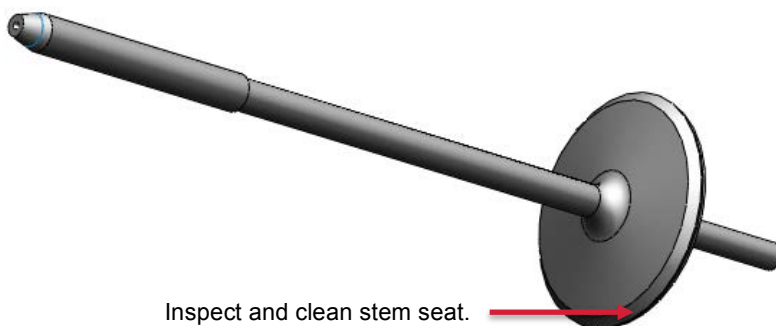


Figure 4-4 Stem Seat Inspection

4.1.3 Valve-Stem Concentricity

- 4.1.3.1 The valve stem must be straight within 0.015" (maximum) TIR. Rotate and center the stem on V-blocks set up with a dial indicator. If the dial indicator readings are not within the allowable tolerance, replace the stem or return it to Midland for repair.

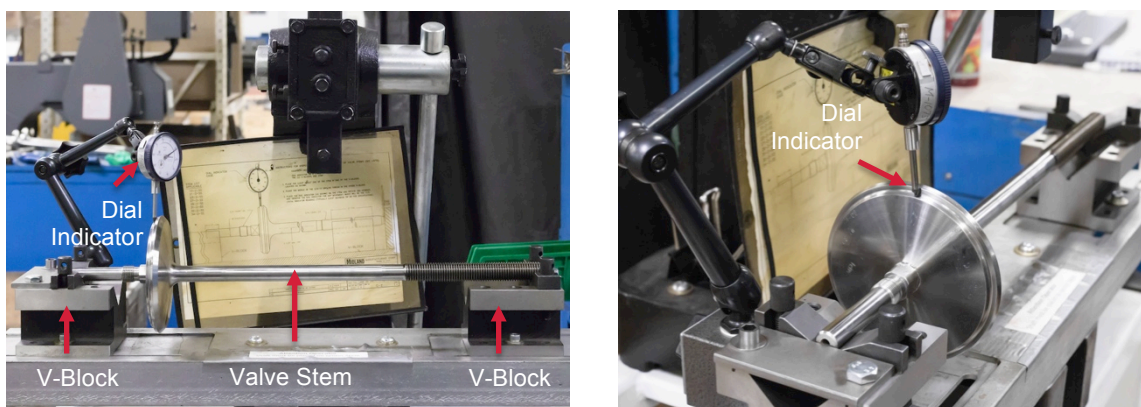


Figure 4-5 Valve-Stem Concentricity Check

WARNING: Valve-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

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 the stem by bending it in a press may result in the buildup of uneven stresses in the stem, which may result in valve malfunction.

4.1.4 O-ring Retainer Grooves

- 4.1.4.1 The grooves (Figure 4-6) 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 the groove, replace this part.

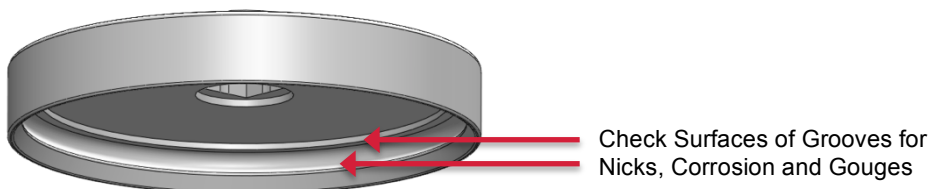


Figure 4-6 Retainer

4.1.5 Valve Body

- 4.1.5.1 The sealing surface is the crown of the seat, (see Figure 4-7). Clean the seat with emery paper (400 grit) then wipe it clean with a cloth and a suitable solvent. Run your fingernail around the surface to detect any flaws.

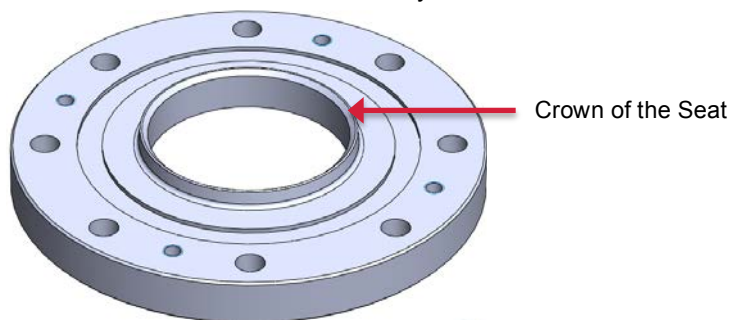


Figure 4-7 Valve Body



NOTICE

NOTICE: Repair work is limited to cleaning and polishing. See Paragraph A4.11.2 of the Tank-Car Specifications.



WARNING: Machining Not Allowed. Machining, grinding, welding or other alterations to the valve seat or stem seat is not allowed per AAR M1002, Paragraph A4.11 of the Tank-Car Specifications.

4.1.6 Sealing Surface (Valve Mounting)

- 4.1.6.1 On the underside of the valve body (item 4) is the surface that seals the valve to the mounting plate on the railcar (Figure 4-8). Machining of this surface is permitted. A good seating surface is necessary to ensure there are no leaks in this area.

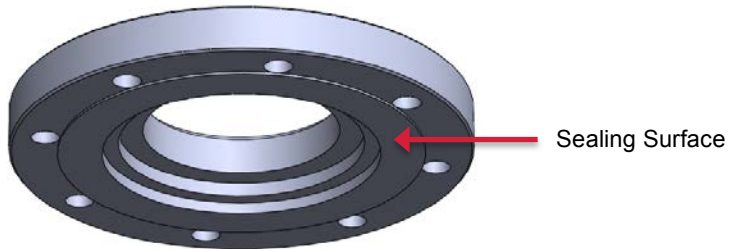


Figure 4-8 Valve-Body Sealing Surface



NOTICE: Please refer to paragraph A4.11.2 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 A4.11.2 of the Tank-Car Specification for machining specifications

4.1.7 Valve Spring

4.1.7.1 This part is highly stressed. The exterior surface must be free of pitting, cracks and corrosion. If any corrosion is observed on the spring, 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 and corrosion pits.

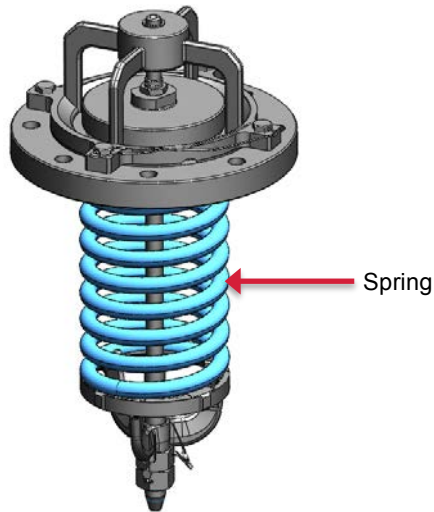


Figure 4-9 Valve Spring



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

4.1.7.2 Test the springs by pressing them to 80% of maximum deflection in a press for two (2) minutes. Remove from the press and then measure the spring free-height. If free-height is less than the minimum indicated in Table 4-1, replace the spring.



WARNING: Deficient Valve Travel. Coil springs that have taken a “set,” resulting in an undersize free-height, will not allow the valve to open fully. 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 or guide tube and adversely affect the pressure settings. If any of the defects mentioned above are observed, the spring cannot be repaired and must be replaced.

Spring Part Number	Wire Size (REF) (Inches)	Height at 80% of Max. Deflection (Inches)	Minimum Free-Height (Inches)
29-051-AS	0.688	9.2	16.18
29-051-SS	0.688	9.2	16.18

Table 4-1 Minimum Free-Heights for Spring After Pressing 80% of the Maximum Deflection for Two Minutes

4.1.8 Spring Follower or Guide Tube

- 4.1.8.1 This structural part has guides on its outer edges (Figure 4-10). Move it up and down the length of the guide tube as indicated below. If it binds, look for dents or gouged surfaces on the inside of the guide tube. Repair the damage to allow free movement of the spring guide.

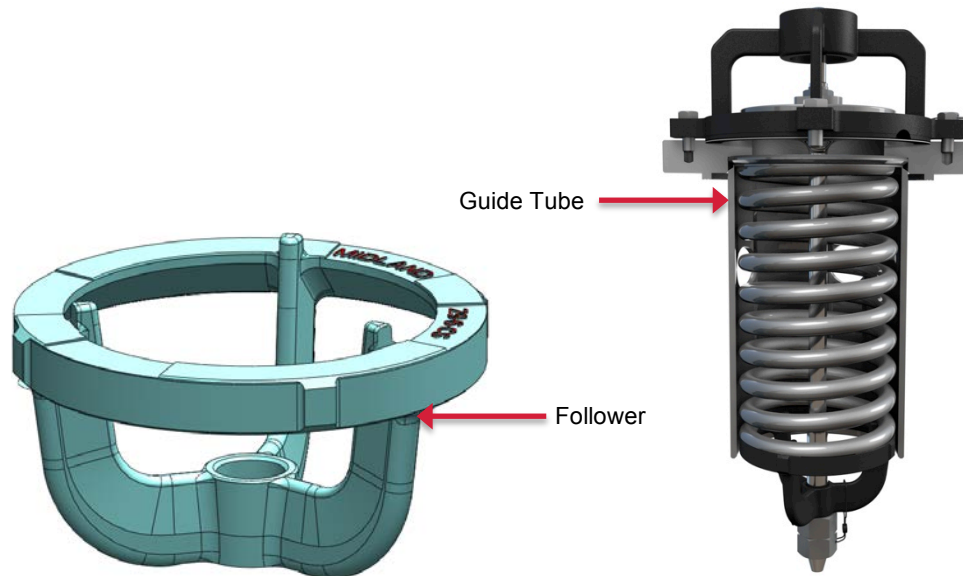


Figure 4-10 Spring Follower and Guide Tube



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

4.1.9 Guide Tube (if applicable)

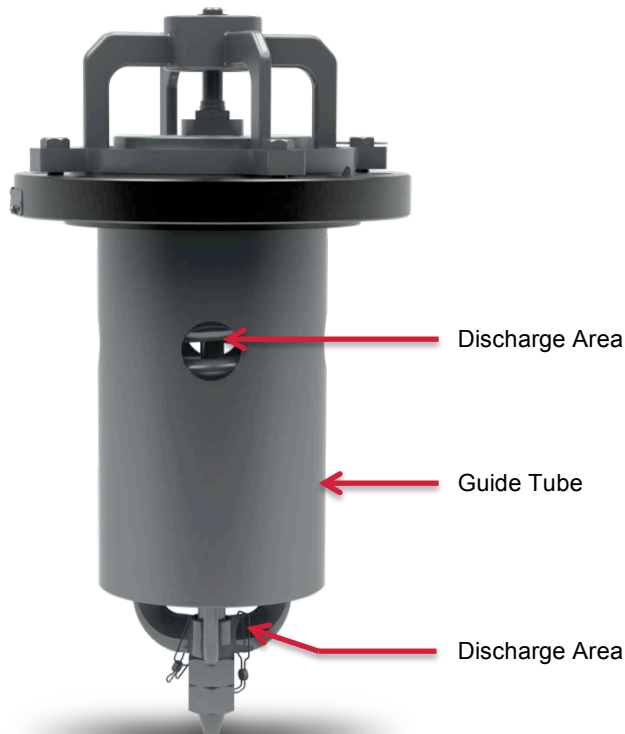


Figure 4-11 Guide Tube

- 4.1.9.1 This guide tube is principally a structural part. There should be no paint on the inside of the guide tube. The area of discharge through the guide tube (Figure 4-11) must be unobstructed by foreign matter that would hinder free flow of discharging fluid. Inspect the guide tube by moving the top guide up and down the length of the guide tube as indicated below. If it binds, look for dents or gouged surfaces on the inside of the guide tube. Repair the damage to allow free movement of the spring guide.



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

4.1.10 O-rings and Gaskets

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

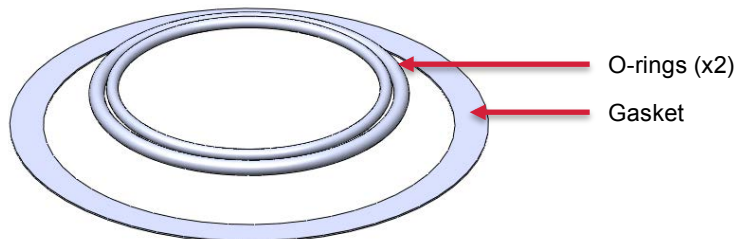


Figure 4-12 O-rings and Gasket



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 fits loosely in the cap, or can only be pushed into the O-ring retainer with difficulty, is quite likely not the correct size. Many of Midland's O-rings are made on special molds to non-standard sizes and are obtainable only from Midland.

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

4.1.11 Stem Threads and Nuts

4.1.11.1 Stem threads and nuts are 7/8-9 **UNJ** thread. **UNC** nuts cannot be used.

4.1.12 Special Inspection Considerations

4.1.12.1 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.

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

4.1.12.3 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

4.1.12.4 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.

5.0 Valve Assembly

For valve assembly, please see valve-disassembly instructions. Reassemble in the reverse order of those instructions.

For recommended torque specifications for A-22075/A-22076 Series valve reassembly, please refer to Table 1-2.

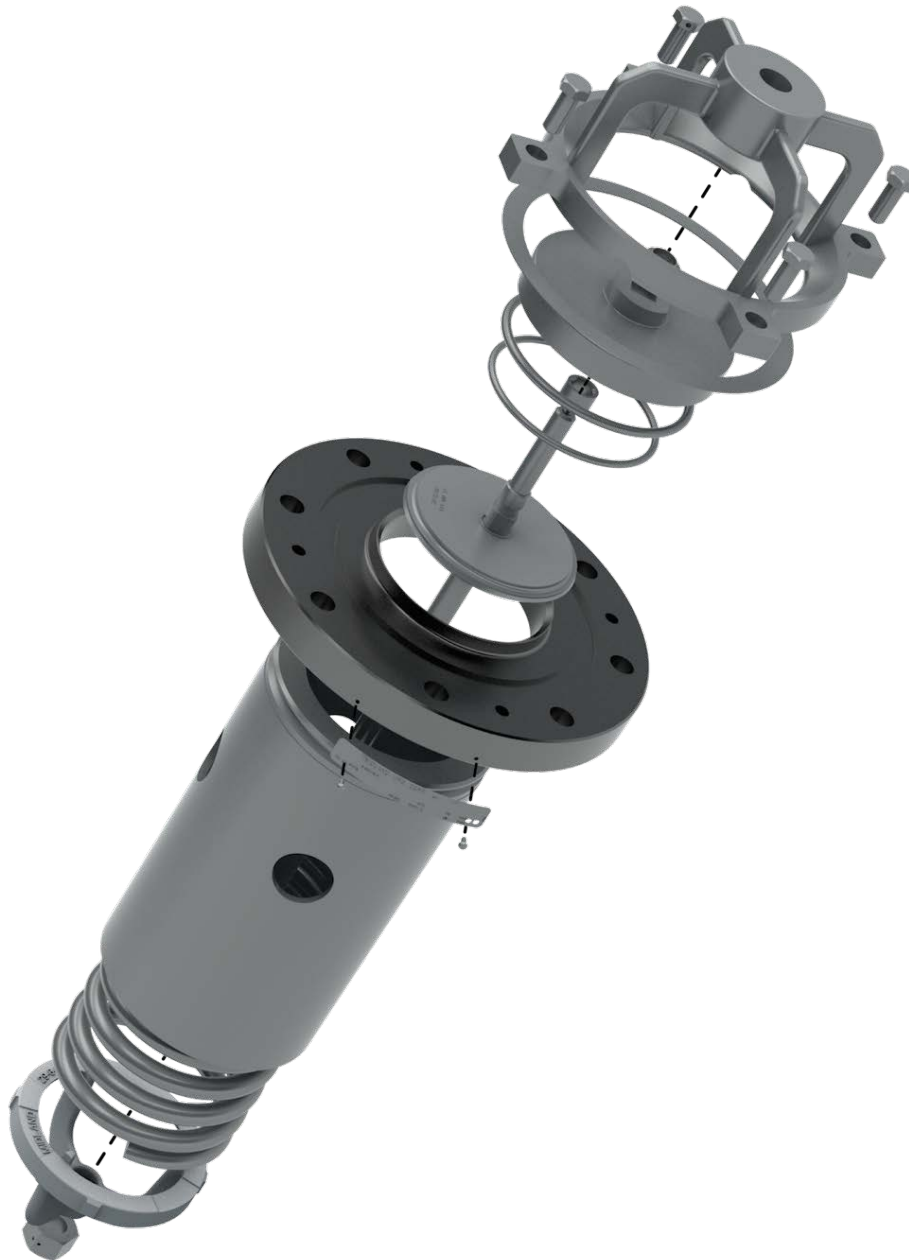


Figure 5-1 Valve Exploded View

6.0 Special Guidelines and Precautions on Pressure-Testing and Adjustment



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.

6.1.1 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.



NOTICE: A “popping pressure” is not specified. It is only necessary to ascertain the STD pressure as pressure is increased, and to establish 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 the pressure at which no further fluid is detected. Midland recommends that no bubbles be observed for two (2) minutes at vaport-tight.)

6.1.2 Test Stand and Gauge Requirements

It is recommended that the test stand mounting must be 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 must be date-tagged.

7.0 Valve-Pressure 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.

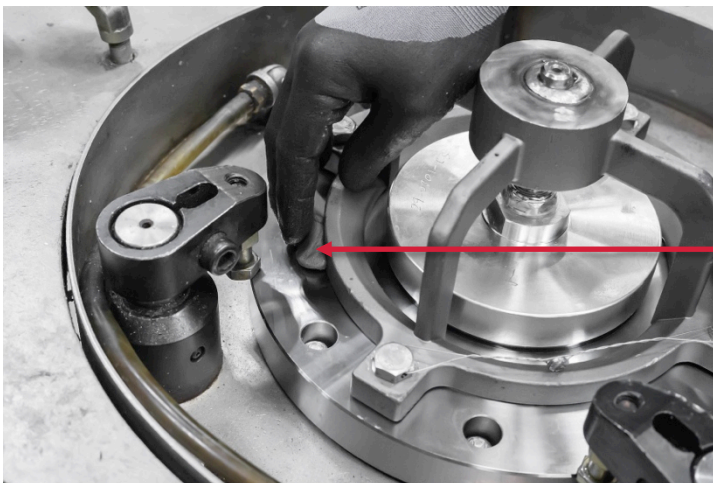
7.1 Initial Setup

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



Figure 7-1 Affix Valve to Test Fixture

7.1.2 Seal drain holes of the valve body with putty, or a similar material.



Seal Drain Holes

Figure 7-2 Seal Drain Holes

- 7.1.3 Fill the valve body with water to allow bubble detection at the valve seat.



Figure 7-3 Fill with Water

- 7.1.4 Take a position allowing observation of the pressure gauge and bubbling of air in the valve body.

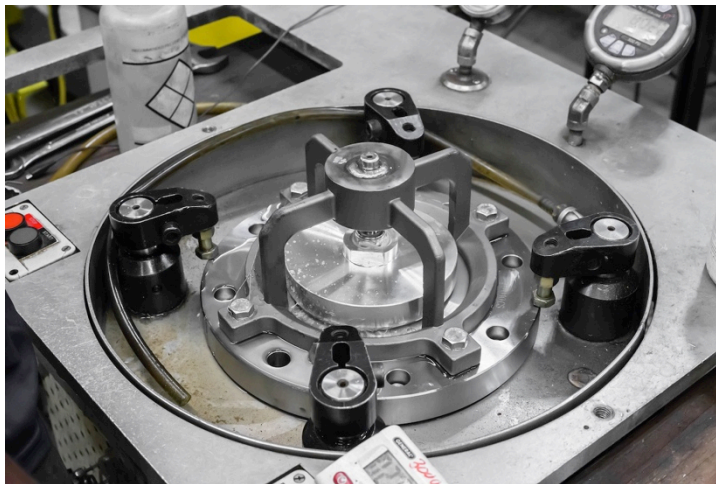


Figure 7-4 Observe Pressure Gauge and Bubbling

7.2 Testing

- 7.2.1 Increase the test air pressure slowly.
- 7.2.2 Increase the air pressure until the valve start-to-discharge (STD) pressure 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. See Table 7-1 for valve start-to-discharge (STD) and vapor-tight pressure (VTP) settings.

STD Settings	VTP Settings
75 psig ± 3 psig	60 psig minimum

Table 7-1 Start-To-Discharge (STD) and Vapor-Tight Pressure (VTP) Settings

- 7.2.3 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.
- 7.2.4 Observe the STD pressure and then bleed off the pressure slowly to observe the VTP.
- 7.2.5 Repeat this procedure at least two (2) more times. The STD and VTP should be consistent in all three (3) occurrences.
- 7.2.6 AAR Specifications 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).
- 7.2.7 Retest the valve.
- 7.2.8 If the test results are erratic, troubleshooting is more complex. Consult your supervising engineer or a Midland representative.
- 7.2.9 When the test results are acceptable, tighten the bottom locknut to torque specifications as indicated in Table 1-2.
- 7.2.10 If the STD or VTP is not satisfactory, take the O-ring retainer cap off the valve and follow the Valve Adjustment procedure in Section 8.0.

8.0 Valve-Adjustment 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.

8.1 Valve-Setting Adjustment

8.1.1 Remove the wire seals from the spring-adjustment nuts.

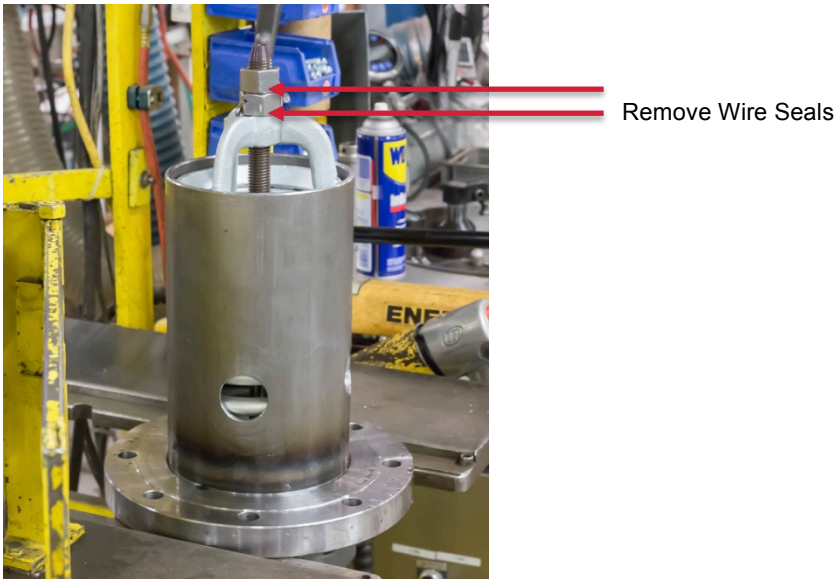


Figure 8-1 Remove Wire Seal

8.1.2 Lubricate the valve stem threads below the two spring-adjustment nuts.

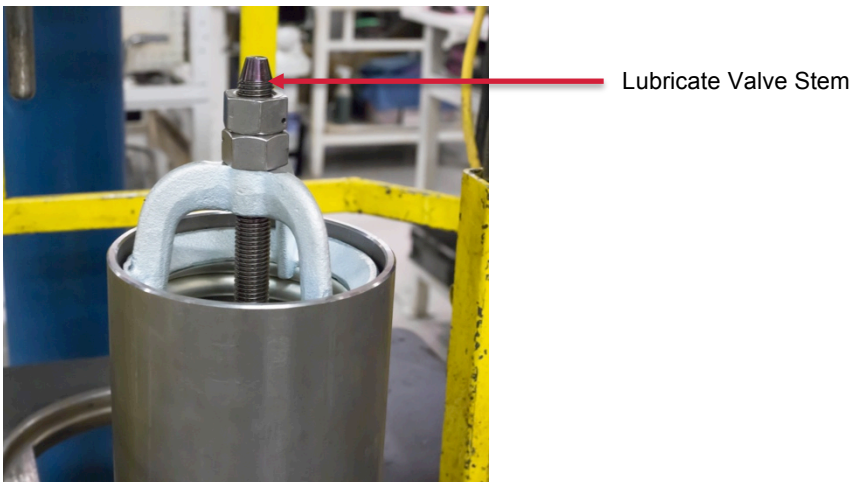


Figure 8-2 Lubricate Valve Stem

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



Loosen Locknut

Figure 8-3 Loosen Locknut

- 8.1.4 Using a manual or an air-operated press, invert the valve to compress the spring and relieve pressure from the spring-adjusting nut. Use a tubular yoke (Figure 8-1) that is partially cut away to press down on the spring follower, further compressing the spring.



Figure 8-4 Compress Valve 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.

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

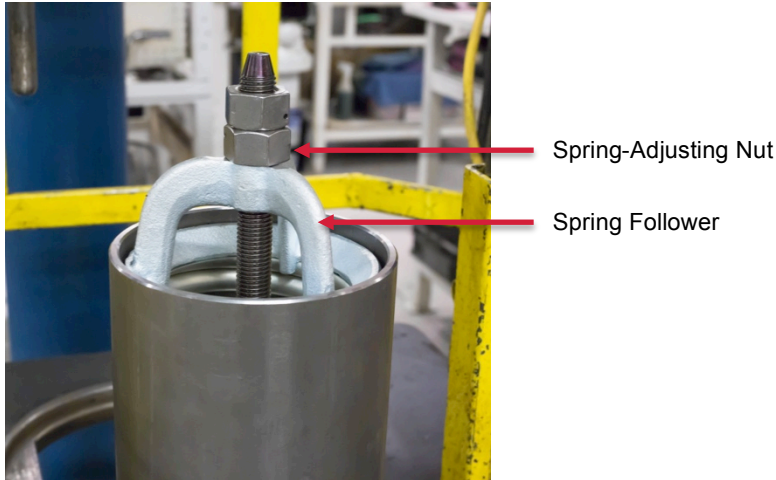


Figure 8-5 Spring-Adjusting Nut

- 8.1.6 Release the spring compressor.



Figure 8-6 Release Spring Compressor

8.1.7 Tighten the locknut against the spring-adjusting nut to lock the setting.

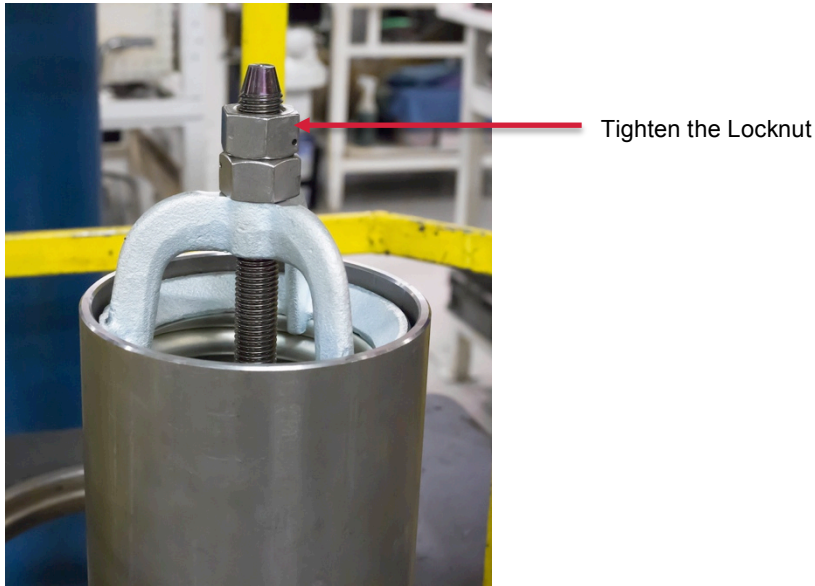


Figure 8-7 Tighten Locknut

8.1.8 Retest the valve STD and determine how much pressure change occurred when the spring-adjusting nut was rotated two (2) turns. Based upon this calculation, re-compress the valve spring and alter the valve adjustment for the midpoint in the STD tolerance range.

STD Settings	VTP Settings
75 psig \pm 3 psig	60 psig minimum

Table 8-1 STD and VTP Settings

8.1.9 If the test results are erratic, troubleshooting is more complex. Consult your supervising engineer or a Midland representative.

8.1.10 When the test results are acceptable, tighten the top nut to the required torque in Table 1-2.

8.2 Post-Test Procedure

- 8.2.1 After testing the valve, close the pressure inlet valve to the test chamber, vent the pressure in the test stand. Remove putty and drain water. Then remove the valve from the test fixture.
- 8.2.2 Wipe or blow away any remaining soapsuds and water used in the testing.

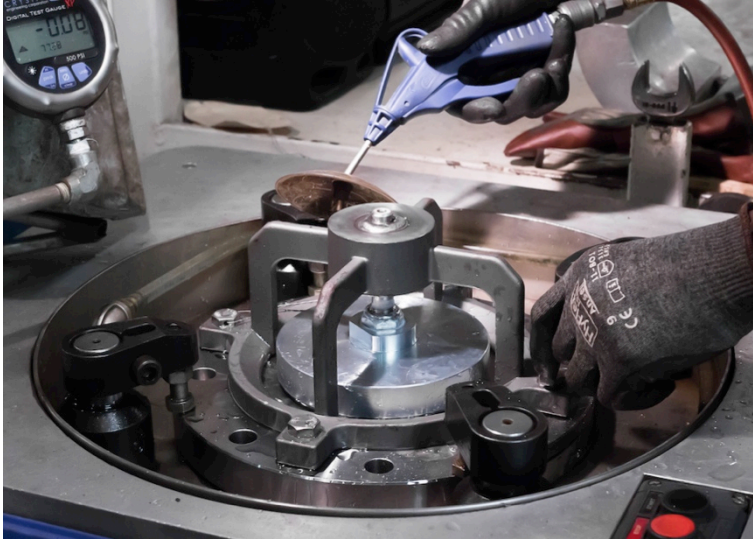


Figure 8-8 Blow Away Remaining Liquid

- 8.2.3 Install seal wires to adjustment nuts.



Figure 8-9 Apply Seal Wire



WARNING: Tongue Damage. A damaged valve tongue may prevent proper sealing on the tank-car mounting and result in leakage of the tank contents.

-
- 8.2.4 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: Mounting Interference. DO NOT paint the sealing surfaces of the valve that will contact the manway's cover-plate surfaces or valve cocking may result.

-
- 8.2.5 Permanently attach a metal tag to the valve body with repair/test date, repair facility identification and technician I.D.
- 8.2.6 Store the valve in a clean, dry place until ready to use.

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

9.1 Prior to Maintenance Tasks Performed

9.1.1 Retesting of Valves in Storage

- 9.1.1.1 Midland valves are factory set and sealed. If they have been left in their original shipping containers, are undamaged, and are no more than six (6) months old, they may be installed without being retested

9.1.2 Required Tools

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

9.2 Leak Repair on a Mounted Valve

- 9.2.1 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.
 - 9.2.2 It is possible to replace only the retainer 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

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: 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.

9.2.3 Remove the top guide seal wire (item 16).

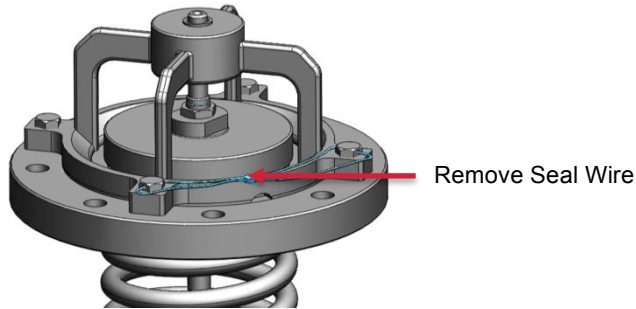


Figure 9-1 Remove Seal Wire

9.2.4 Remove the four (4) top-guide bolts (items 11 and 12) and situate them so they won't be dropped or lost.

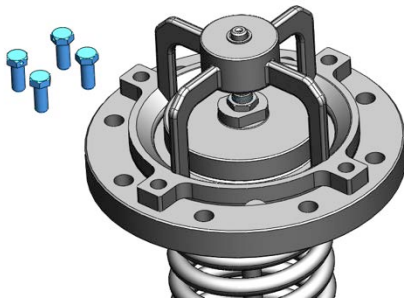


Figure 9-2 Remove Bolts and Set Aside for Later

9.2.5 Mark the top guide (item 1) and body (item 4) with a vertical line to allow the top guide to be reinstalled in the same orientation.

9.2.6 Lift up and remove the top guide (item 1).

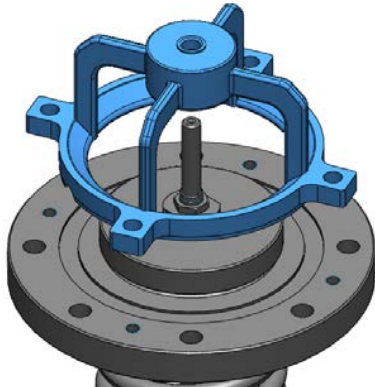


Figure 9-3 Remove Top Guide

- 9.2.7 Put a wrench on the flats of the O-ring retainer (item 3) and another wrench on the top locknut (item 7). See Table 1-2 for recommended wrenches. Hold the retainer in place to prevent it from rotating while backing off and removing the top locknut.

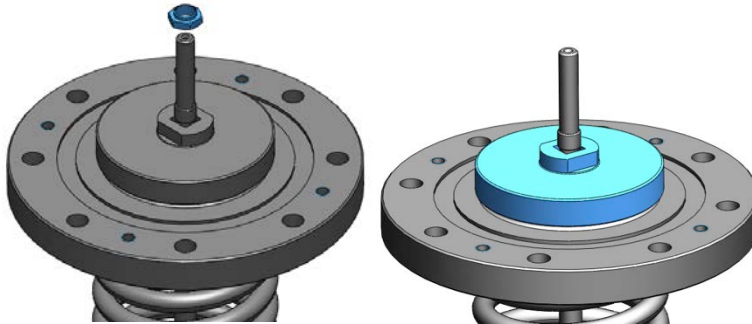


Figure 9-4 Remove Top Locknut, then Retainer



CAUTION: Valve Discharge. When the O-ring retainer cap is raised up, there will be a significant 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.

- 9.2.8 Remove the O-ring retainer (item 3). Remove the two (2) O-rings (items 8 and 9) from the retainer and inspect the O-ring grooves.

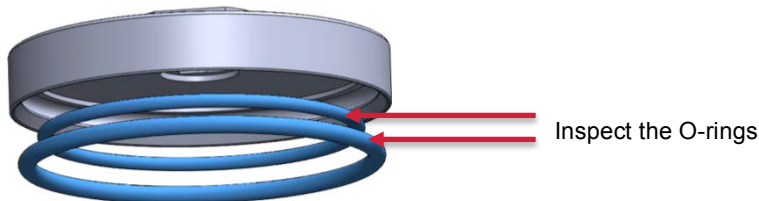


Figure 9-5 Remove Retainer and Inspect O-rings

- 9.2.9 Look carefully for nicks, rust, scale, solidified product and other foreign material on the valve seat. 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 then wipe away any loose residue. Visually inspect this surface to detect any irregularities that may still be there.



Figure 9-6 Inspect Seat Surfaces

- 9.2.10 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.
- 9.2.11 Install the new O-ring retainer (item 3) and secure it with the top locknut (item 7). Take care to prevent rotation of the retainer using two wrenches. Refer to Table 1-2 for tools and torque requirements.

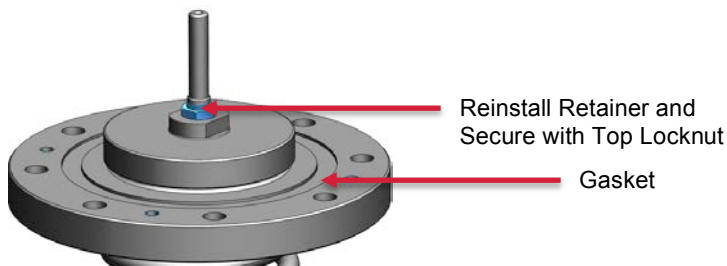


Figure 9-7 Reinstall Retainer and Locknut

- 9.2.12 Install the top guide (item 1) and gasket (item 15), then secure with the four (4) top-guide bolts. Refer to Table 1-2 for tools and torque requirements.

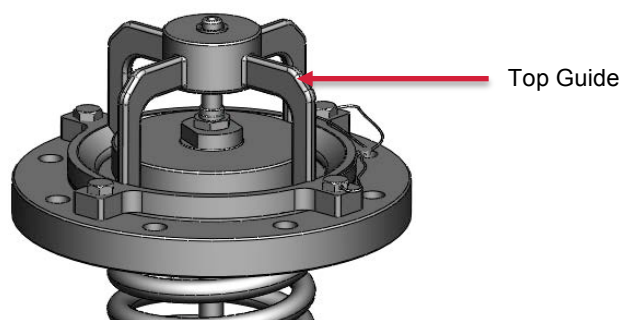


Figure 9-8 Reinstall Top Guide, Gasket and Bolts



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.

- 9.2.13 For special guidelines and precautions on pressure-testing and adjustment and for 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.



NOTICE: 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.]

- 9.2.14 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.
- 9.2.15 Valve-Testing Procedure. If your company has an approved test procedure, follow it. If it does not, this procedure provides essential guidelines.

10.0 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.



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