



Vacuum Relief Valve **A-220/A-222 Series**

Installation, Operation & Maintenance (IOM) Manual

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1 Regulations and Safety Requirements

1.1 Regulations

Midland vacuum relief valves are used in contact with a variety of products, many of which are hazardous materials and could cause serious injury or damage if mishandled. 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. However, 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.

This valve should only be installed, operated and maintained by qualified personnel. Read all of these instructions carefully before proceeding.

Operation of the valve must conform to all applicable specifications from TC, AAR, DOT, CFR (Parts 173.31, 174.67, etc.) and other governmental bodies, along with the operating instructions of your company.

1.2 Safety Warnings and Precautions

Please carefully read each of the following warnings and cautions prior to performing any work.

WARNING: 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.



- **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**



WARNING: 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.



CAUTION: Valve-Stem Failure. Cracks and corrosion of vacuum relief valve stems can result in stem failure and uncontrolled venting.



CAUTION: 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.



CAUTION: 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.



CAUTION: Field Repair. The repair procedure for leaking valves in the field is intended only as a temporary repair to get the railcar to an unloading destination. Once the product is unloaded and pressure is relieved, the valve should be removed for a complete inspection and requalification.



NOTICE: Per AAR regulations, as of July 1, 2013, manually activated "Step" vacuum relief valves are prohibited from use on newly built tank cars and from replacement in kind on existing railcars.



NOTICE: Midland manufactures VRVs in various metallic materials with a wide variety of elastomeric seat seals in several sizes and pressure settings available. Exercise care to select the most desirable combination of features for the intended service conditions.



NOTICE: Since the VRVs are frequently small in size, and are set at very low pressures, these valve cannot withstand much abuse. Although the valve's sole purpose is to permit air from the atmosphere to be introduced into the tank when a negative pressure (of a prescribed amount) occurs in the tank, it has been used incorrectly on occasions to ascertain if positive pressure exists in the tank.



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.



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.



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.

NOTICE: The vacuum relief valves are spring-loaded and are actuated by negative pressure in the railcar tank. **There are no provisions for manual activation of the valve.**



NOTICE: To ensure best practice and consistency of your qualification procedure, O-rings, gaskets and wire seals should always be replaced.

Nuts, washers and studs must be closely inspected before re-use or replaced regularly.

Valve components such as the stem, body and spring must be thoroughly inspected.



NOTICE

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



NOTICE

NOTICE: Without consent from the valve manufacturer or railcar owner, repair work is limited to cleaning and polishing. See AAR M1002, Paragraph A3.11.1 of the Tank-Car Specifications.



WARNING

WARNING: Machining Not Allowed. Machining, grinding, welding or other alterations to the valve seat or stem seat is not allowed per AAR M1002, Paragraph A3.11 of the Tank-Car Specifications.



NOTICE

NOTICE: All soft seals need to be replaced at the time of valve qualification.



CAUTION

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.



NOTICE

NOTICE: Maintenance, Scheduled Defined. Scheduled maintenance involves valve inspection and component replacement for valves in-service on tank cars, that is in accordance to the railcar owner's standard qualification and maintenance program, that ensures the valve performs its intended function without failure until its next qualification or for its design life.

NOTICE: Leak Repair Defined. Leak repair is the temporary remediation to a valve observed to be emitting product in an unintended manner. Since leak repair is a temporary measure, once the railcar is unloaded and pressure is relieved, the valve should be removed for complete inspection, repairs, and full requalification in accordance to the railcar owners standard qualification and maintenance program. Leak repair is unscheduled maintenance and is not apart of the scheduled maintenance.



CAUTION

CAUTION: The repair procedure for leaking valves is intended only as a temporary repair to get the railcar to an unloading destination. Once the product is unloaded and pressure is relieved, the valve should be removed for a complete inspection and requalification.

2 Introduction

The Midland Vacuum Relief Valve (VRV) is designed to allow atmospheric air to enter the tank car and protect it from collapse when there is a vacuum condition present.

Features include:

- Available in carbon steel (CS) and stainless-steel (SS) construction
- No-step design eliminates improper cycling of the valve
- Pressure settings from 0.75 psig to 10 psig
- Flanged mounting to meet current AAR regulations

2.1 Technical Specifications

VACUUM RELIEF VALVE PART SYSTEM								
STYLE		CONFIGURATION		PRESSURE SETTING (PSIG)		SEAL MATERIAL*		
						*NOTE: CONTACT MIDLAND FOR ADDITIONAL SEAL MATERIAL OPTIONS.		
A-22X		X-XX				-XX		
CS	0	W-NS	NO-STEP	FR20	PREMIUM SCREEN	(NULL = 0.75)	BUNA-N	BN
SS	2	W-R**	STEP	NULL	NO SCREEN	2	BUNA-N, FOOD GRADE	BNFG
		W-RH**	STEP W/DRAIN			3	ETHYLENE PROPYLENE	EP
						4	ETHYLENE, PROPYLENE, FOOD GRADE	EPFG
						5	VITON A	VA
						10	VITON B	VB
							VITON GL	VL
							CHEMRAZ 505	CZ-505

Table 2-1 VRV Part Designation System



NOTICE

**** NOTICE:** Per AAR regulations, as of July 1, 2013, manually activated "Step" vacuum relief valves are prohibited from use on newly built tank cars and from replacement in kind on existing cars.

2.2 Valve Dimensions

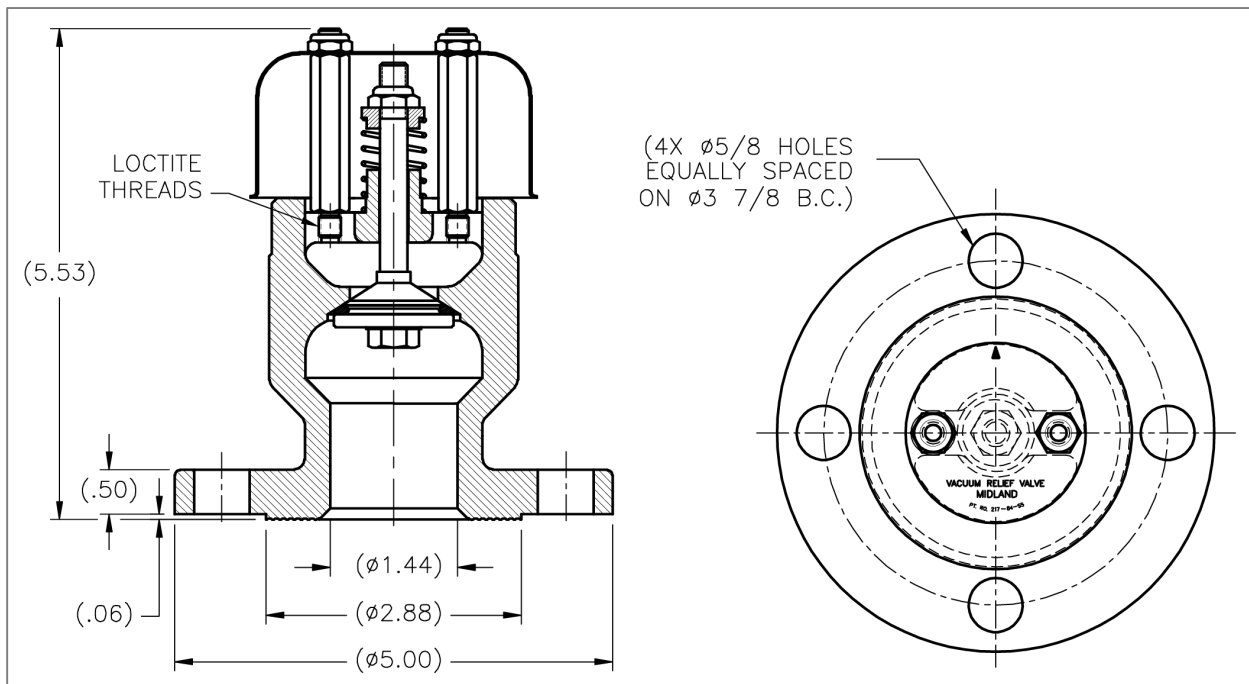


Figure 2-1 A-22X Dimensions

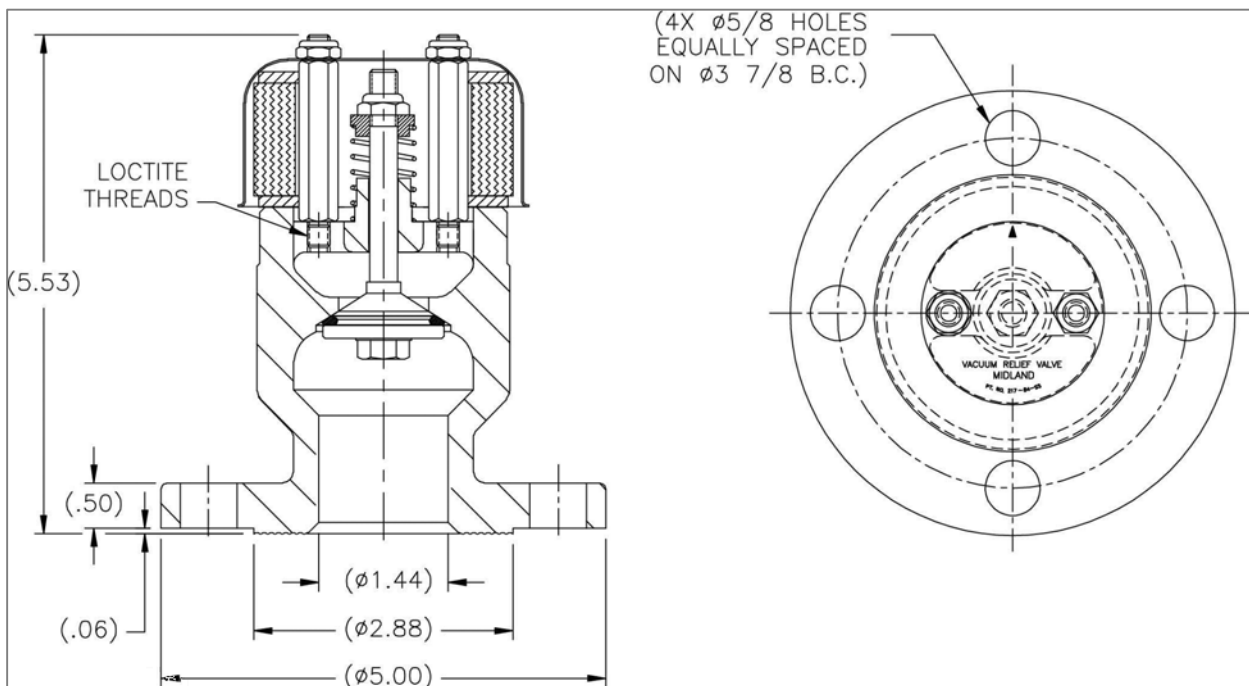


Figure 2-2 A-22X-W-NS-FR20 Dimensions

2.3 Valve Details – Component Identification and Parts Listings

ITEM	QTY.	PART NAME	A-220-W-NS		A-222-W-NS	
			MATERIAL	PART NO.	MATERIAL	PART NO.
1	1	BODY	CARBON STEEL	220-105-CS	STAINLESS STEEL	222-105-MO
2	1	SPRING	STAINLESS STEEL	SEE TABLE	STAINLESS STEEL	SEE TABLE
3	1	SPRING SEAT	STAINLESS STEEL	217-3-SS	STAINLESS STEEL	217-3-SS
4	1	LOCKNUT	STAINLESS STEEL	217-41-SS	STAINLESS STEEL	217-41-SS
5	1	STEM	STAINLESS STEEL	217-50-MO	STAINLESS STEEL	217-50-MO
6	1	PRESSURE SEAL	BUNA-N*	215-6-BN	BUNA-N*	215-6-BN
7	1	WEATHER CAP	STAINLESS STEEL	215-70-SS	STAINLESS STEEL	215-70-SS
8	1	NAME PLATE	STAINLESS STEEL	217-84-SS	STAINLESS STEEL	217-84-SS
9	2	POST	STAINLESS STEEL	217-90-SS	STAINLESS STEEL	217-90-SS
10	2	LOCKNUT	STAINLESS STEEL	720-181-SS	STAINLESS STEEL	720-181-SS

* **NOTE:** Alternate materials are available.

Table 2-2 A-22X-W-NS Parts Listing

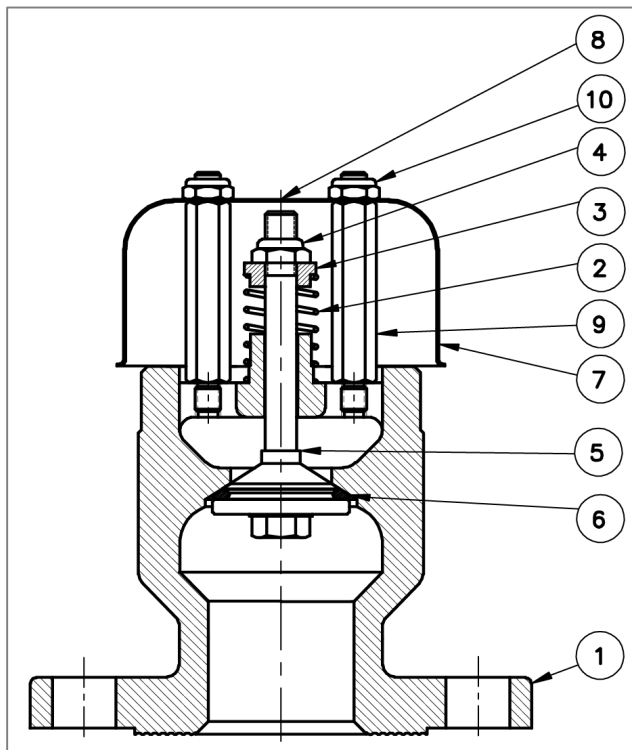


Figure 2-3 A-22X-W-NS Valve Component Identification

VACUUM SETTING (PSIG)	SPRING PART NO.
0.75	215-2-MO
1.5	215-2-MO
3	215-27-MO
4	215-23-MO
5-8	215-24-MO
10	215-25-MO

Table 2-3 Vacuum Settings/Spring Part Numbers

ITEM	QTY.	PART NAME	A-220-W-NS-FR20		A-222-W-NS-FR20	
			MATERIAL	PART NO.	MATERIAL	PART NO.
1	1	BODY	CARBON STEEL	220-105-CS	STAINLESS STEEL	222-105-MO
2	1	SPRING	STAINLESS STEEL	SEE TABLE	STAINLESS STEEL	SEE TABLE
3	1	SPRING SEAT	STAINLESS STEEL	217-3-SS	STAINLESS STEEL	217-3-SS
4	1	LOCKNUT	STAINLESS STEEL	217-41-SS	STAINLESS STEEL	217-41-SS
5	1	STEM	STAINLESS STEEL	217-50-MO	STAINLESS STEEL	217-50-MO
6	1	PRESSURE SEAL	BUNA-N*	215-6-BN	BUNA-N*	215-6-BN
7	1	WEATHER CAP	STAINLESS STEEL	215-70-SS	STAINLESS STEEL	215-70-SS
8	1	NAME PLATE	STAINLESS STEEL	217-84-SS	STAINLESS STEEL	217-84-SS
9	2	POST	STAINLESS STEEL	217-90-SS	STAINLESS STEEL	217-90-SS
10	2	LOCKNUT	STAINLESS STEEL	720-181-SS	STAINLESS STEEL	720-181-SS
11	2	GASKET	NEOPRENE	220-11-NE	NEOPRENE	220-11-NE
12	1	FILTER	STAINLESS STEEL	211-101-SS	STAINLESS STEEL	211-101-SS

* **NOTE:** ALTERNATE MATERIALS ARE AVAILABLE.

Table 2-4 A-22X-W-NS-FR20 Parts Listing

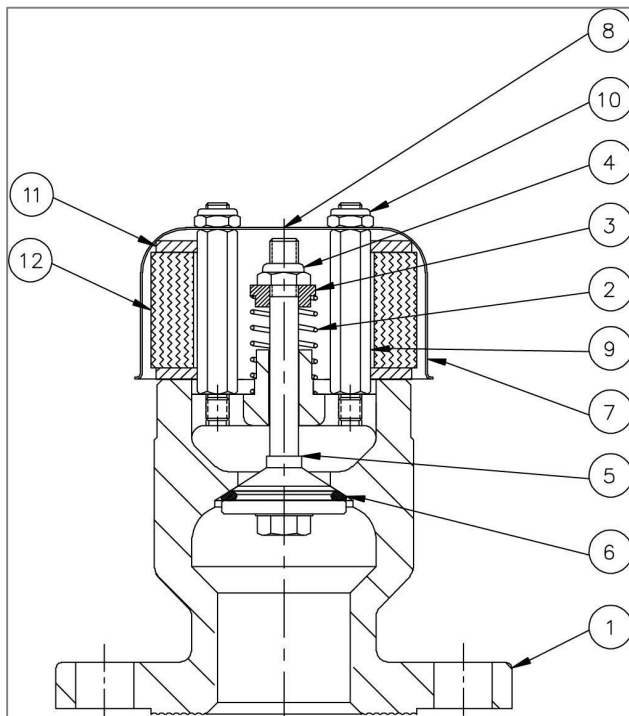


Figure 2-4 A-22X-W-NS-FR20 Valve Component Identification

MODEL NUMBER	VACUUM SETTING (PSIG)	SPRING PART NO.
A-220-W-NS-FR20 A-222-W-NS-FR20	0.75	215-2-MO
A-220-W-NS-FR20-1.5 A-222-W-NS-FR20-1.5	1.5	215-2-MO
A-220-W-NS-FR20-3 A-222-W-NS-FR20-3	3	215-27-MO
A-220-W-NS-FR20-4 A-222-W-NS-FR20-4	4	215-23-MO
A-220-W-NS-FR20-5 A-222-W-NS-FR20-5	5	215-24-MO

Table 2-5 Vacuum Settings/Spring Part Numbers

3 Valve Installation

3.1 Precautions for Mounted-Valve Repair

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



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.

When performing maintenance on a vacuum 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

3.2 Valve Installation Required Tools

SAE Wrench	Component(s)/Description
1-1/4"	Mounting Bolts
Other Tools, Supplies, and Equipment:	
Wire Brush	Rubber Sheet (plug)
Lint-Free Cloth	Gasket (for replacement)
Solvent	

Table 3-1 Required Tools for Valve Installation

3.3 Flanged Valve Installation Procedure

- 3.3.1 Remove the old valve and insert a soft rubber plug into the tank opening. This will prevent debris from entering the tank during cleaning of the valve-mounting groove and studs on the manway cover plate.
- 3.3.2 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.
- 3.3.3 Remove and discard all used gasket material.



CAUTION

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.

- 3.3.4 Using a lint-free cloth and appropriate cleaning solvent, wipe clean the valve and cover-plate sealing surfaces and the mounting-stud threads.
- 3.3.5 Install the new gasket. Ensure it is fully seated.
- 3.3.6 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.
- 3.3.7 Install the nuts and tighten them in 1/3-torque increments in a diagonally alternating sequence, as shown in Figure 3-1. Consult gasket manufacturer for recommended torque requirements.



CAUTION

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.



TIP: Use a 1-1/4" wrench to tighten mounting nuts; max torque of 100 ft-lb is allowed when installing.

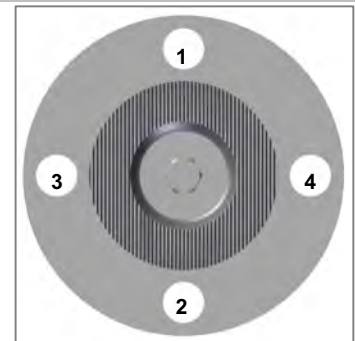


Figure 3-1 Tightening Sequence

3.4 Leak Inspection

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



WARNING

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

3.5 Valve Operation Notes and Precautions



NOTICE

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.

NOTICE: The vacuum relief valves are spring-loaded and are actuated by negative pressure in the railcar tank. **There are no provisions for manual activation of the valve.**

4 Valve Qualification



NOTICE

NOTICE: To ensure best practice and consistency of your qualification procedure, O-rings, gaskets and wire seals should always be replaced.

Nuts, washers and studs must be closely inspected before re-use or replaced regularly.

Valve components such as the top guide, stem, retainer, body and spring must be thoroughly inspected.

4.1 Valve Disassembly Procedure & Required Tools

SAE Wrench	Tool Description	Valve Component	Item No.
5/16"	Wrench	Stem Locknut	4
7/16"	Socket Wrench	Weather Cap Locknuts	10
3/8"	Wrench	Posts	9

Table 4-1 Required Tools for Valve Disassembly



NOTICE

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



CAUTION

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 the minimum and a bench clamp or press used for disassembly.



NOTICE: Please note that following instructions are based on the A-220-W-NS VRV model. Your specific valve model may vary from configuration shown; however, valve-disassembly procedure will be the similar.

4.1.1 Remove the two weather cap locknuts (item 10).



TIP: Use a 7/16" socket wrench.



Figure 4-1 Remove Locknuts

4.1.2 Remove the weather cap (item 7).



Figure 4-2 Remove Weather Cap

4.1.3 Remove the two posts (item 9).



TIP: Use a 3/8" socket wrench.



Figure 4-3 Remove Posts

4.1.4 Remove the stem locknut (item 4).



TIP: Use a 5/16" wrench.

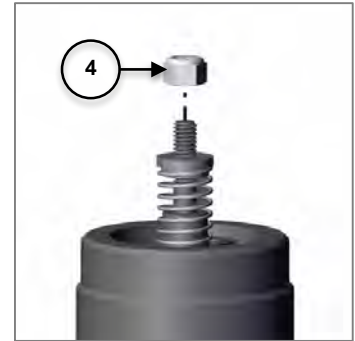


Figure 4-4 Remove Locknut

4.1.5 Remove the spring seat (item 3).



Figure 4-5 Remove Spring Seat

4.1.6 Remove the spring (item 2).

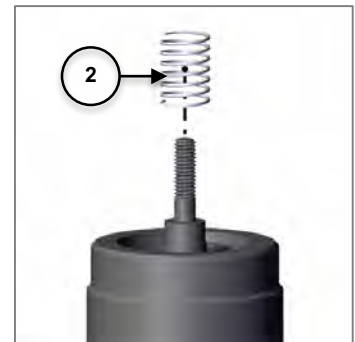


Figure 4-6 Remove Spring

4.1.7 Remove stem (item 5) assembly through bottom of valve.

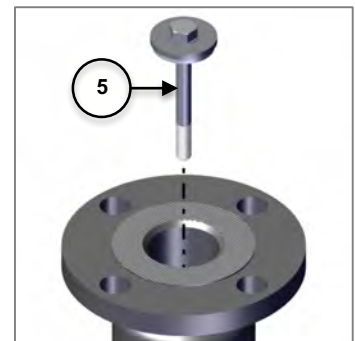


Figure 4-7 Remove Stem Assembly

4.2 Stem Disassembly Procedure



NOTICE

NOTICE: If your company has an approved component cleaning and inspection procedure, follow it. If it does not, follow the processes and procedures set in this manual for valve component cleaning, inspection and, if necessary, replacement. Reassemble the valve per Section 0 of this manual.

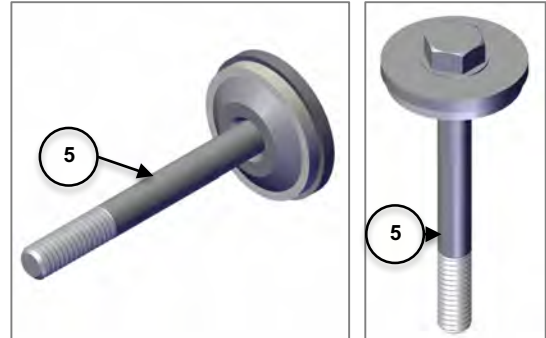


Figure 4-8 Stem Assembly

4.2.1 Remove the pressure seal (item 6) from the stem (item 5).

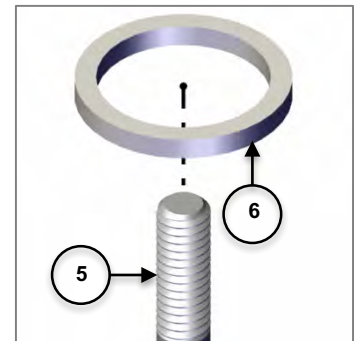


Figure 4-9 Remove Pressure Seal

4.3 Component Inspection

Key components must be thoroughly inspected during the qualification process. These components include the stem, valve body, spring and pressure seal.

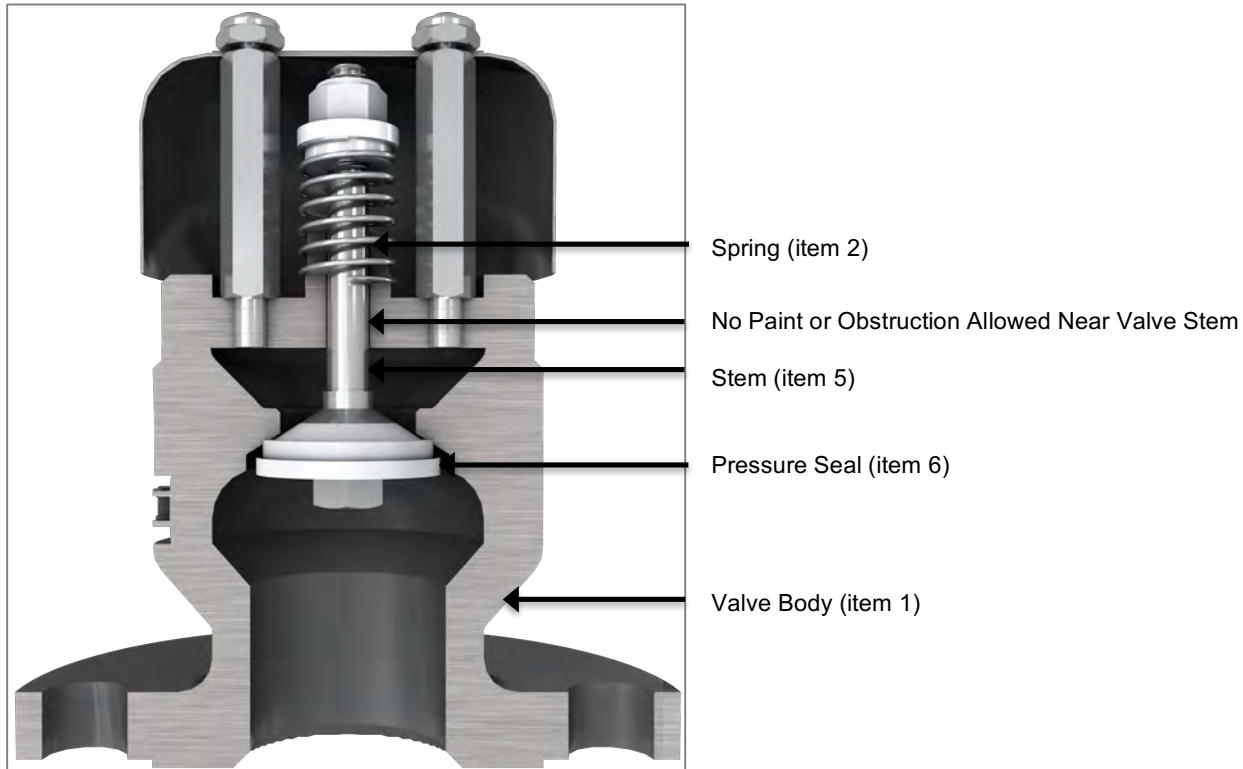


Figure 4-10 Valve-Inspection Points

While the soft seals must always be replaced during this step, Midland also suggests that the nuts, washers and studs be regularly replaced during the qualification process.



NOTICE: 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. 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. 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.



NOTICE: Without consent from the valve manufacturer or car owner, repair work is limited to cleaning and polishing. See AAR M1002, Paragraph A3.11.1 of the Tank-Car Specifications.



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.

4.3.1 Valve Body Inspection

4.3.1.1 Top Stem Guide Inspection

The body (item 1) is principally a structural part. There should be no paint on the top guide section of this part where the valve stem enters it. The area of discharge through the body must be unobstructed by foreign matter that would hinder free flow of discharging fluid.

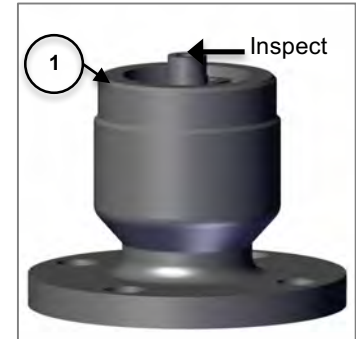


Figure 4-11 Inspect Top Stem Guide

4.3.1.2 Seat/Seal Area Inspection

Inspect and clean seat area. No corrosion is allowed in the sealing areas of the VRV body seat. Light corrosion is allowed on the other surfaces as long as the light corrosion, as defined by the NACE standards, does not cause destruction of the material or impede intended performance of the valve.

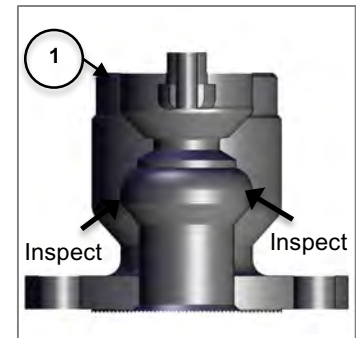


Figure 4-12 Inspect Seat/Seal Area

4.3.1.3 Sealing Surface Inspection (Valve Mounting)

On the underside of the valve body is the surface that seals the valve to the mounting plate on the railcar. Machining of this surface is permitted. A good seating surface is necessary to ensure there are no leaks in this area.

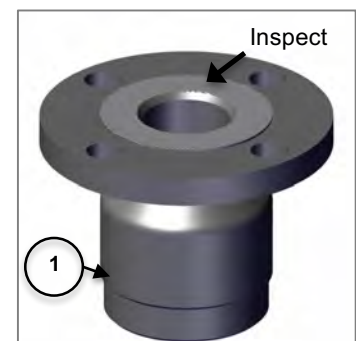


Figure 4-13 Inspect Sealing Surface

4.3.2 Spring Inspection

Inspect the spring (item 2) for corrosion, pitting and cracks. The spring should be replaced if there is any sign of corrosion, pitting or cracks.

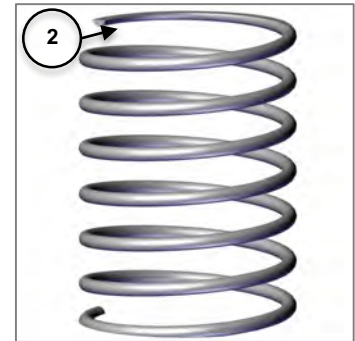


Figure 4-14 Inspect Spring

4.3.3 Stem Assembly Inspection

Remove scale, residual product and other foreign material from the stem.



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 as the threads and the starting point for difficult-to-detect cracking.

The sealing surface is the stem seat. Clean the stem 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.

No corrosion is allowed in the sealing areas of the stem seat. Light corrosion is allowed on the other surfaces as long as the light corrosion, as defined by the NACE standards, does not cause destruction of the material or impede intended performance of the valve.

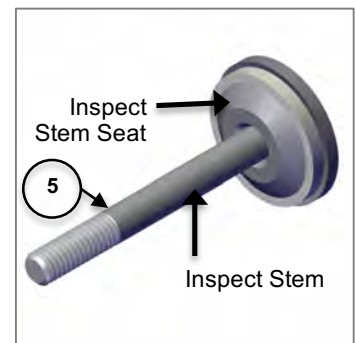


Figure 4-15 Inspect Stem Assembly

4.3.4 Pressure Seal

The pressure seal (item 6) should be inspected for cleanliness and be free of any cuts, nicks or indicators of wear. If any of these conditions exist, the valve seal should be replaced.



NOTICE: All soft seals need to be replaced at the time of valve qualification.

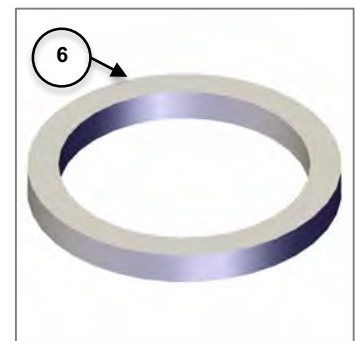


Figure 4-16 Inspect Pressure Seal

4.3.5 Special Inspection Considerations

- 4.3.5.1 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.
- 4.3.5.2 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
- 4.3.5.3 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.

4.4 Valve Reassembly and Required Tools

SAE Wrench	Component(s)/Description	Item #	Torque (ft-lb)
5/16"	Stem Locknuts	4	N/A
7/16"	Weather Cap Locknuts	10	N/A
3/8"	Posts	9	N/A
Other Tools, Supplies, and Equipment:			
Loctite®	Brush		
Fluorolube®			

Table 4-3 Required Tools for Valve Assembly

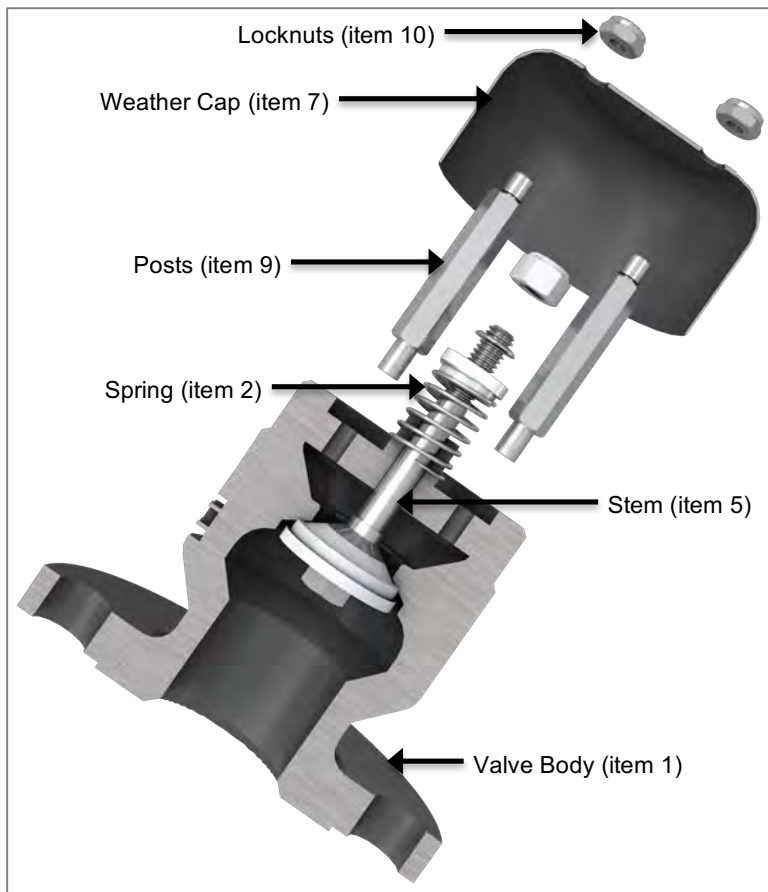


Figure 4-17 Valve Exploded View

4.4.1 Stem Assembly

- 4.4.1.1 Place the pressure seal (item 6) onto stem (item 5) over the stem retainer. Make sure that the seal is seated inside the stem groove all the way around.

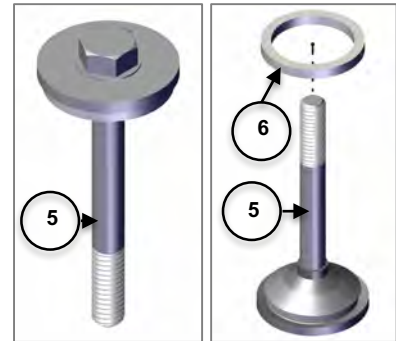


Figure 4-18 Place Seal Onto Stem

4.4.2 Body Preparation Prior to Assembly

- 4.4.2.1 Clean and blow away any debris or dirt from the body (item 1).

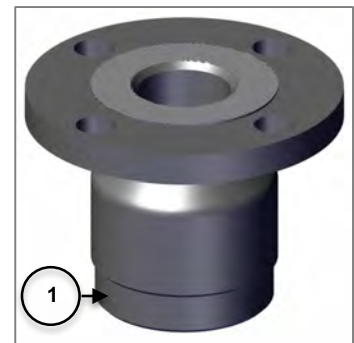


Figure 4-19 Clean Valve Body

- 4.4.2.2 Carefully clamp body (item 1) into a vise for assembly process.

4.4.3 Body and Stem Assembly Procedure

- 4.4.3.1 Apply Fluorolube to the inside of the groove on the stem (item 5) all the way around.
- 4.4.3.2 Carefully place stem (item 5) assembly into body (item 1).

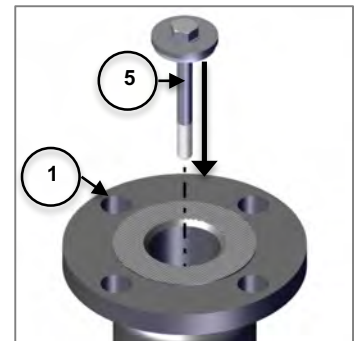


Figure 4-20 Place Stem Assembly into Body

4.4.3.3 Carefully place specified spring (item 2) into body.

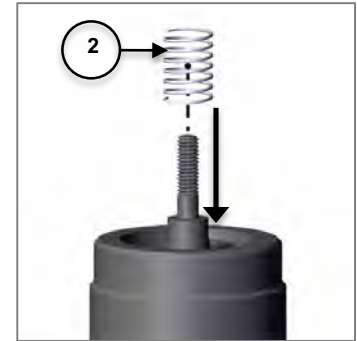


Figure 4-21 Place Spring into Body

4.4.3.4 Install spring seat (item 3).



Figure 4-22 Install Spring Seat

4.4.3.5 Install locknut (item 4).



TIP: Use a 5/16" wrench to tighten.



Figure 4-23 Install Locknut and Tighten



NOTICE: At this assembly stage the valve should be pressure tested in accordance with appropriate regulations with Sections 4.5 and 4.6 of this manual as a guide.

4.5 Testing Process

4.5.1 Special Guidelines & Precautions on Pressure Testing & 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.

Refer to AAR publication "Regulations for Tank Cars." Appendix A applies specifically to valves. This section prescribes the start-to-open pressure (STO), the bubble-tight pressure and their tolerances.

4.5.2 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.

4.6 Valve-Pressure Testing Procedure

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

4.6.1 Initial Setup

- 4.6.1.1 Install the valve on the test fixture.
- 4.6.1.2 Clamp the valve under pressure.
- 4.6.1.3 Take a position allowing observation of the pressure gauge and bubbling of air in the valve seat.

4.6.2 Positive-Pressure (Bubble-Leak) Test

- 4.6.2.1 Apply 165 psig of pressure slowly to the inlet of the valve. Check for any bubbles. Bubbles could indicate the valve's inability to sustain pressure over time and could be an indication of a valve body defect.
- 4.6.2.2 After testing the valve, close the pressure inlet valve to the test chamber, vent the pressure in the test stand. Remove the valve from the test fixture.
- 4.6.2.3 Wipe or blow away any remaining soapsuds and water used in the testing.

4.6.3 Vacuum Test

- 4.6.3.1 Place valve into fixture for final vacuum pressure test.
- 4.6.3.2 Secure the valve completely.
- 4.6.3.3 Increase vacuum until the valve opens. Make note of the setting at which the stem releases from the valve seat.
- 4.6.3.4 Decrease vacuum until the valve closes. Make note of the valve closure setting.
- 4.6.3.5 Set pressure has a minimum and maximum range where the stem should release as indicated on the provided chart. If the valve passes the test, release the pressure and remove the valve.

Set Pressure (psig) – Vacuum	Tolerance Range (psig)	Vapor Tight (psig) – Vacuum
#	OPEN	CLOSED
0.75	0.75 – 1.50	0.50
1.00	1.00 – 1.75	0.50
1.50	1.00 – 2.00	0.75
2.00	1.50 – 2.50	1.00
3.00	2.50 – 3.50	1.50
4.00	3.50 – 4.50	2.00
5.00	4.50 – 5.50	3.50
10.00	9.00 – 11.00	7.00

Table 4-2 Vacuum Pressure Test Settings

- 4.6.3.6 Proceed to Section 4.8 Final Valve Reassembly procedure.

4.7 Valve-Setting Adjustment Procedure

- 4.7.1 Before final assembly, the valve's set pressure is adjusted by turning the threaded adjustment nut (item 3) inside the valve body (item 1).
- 4.7.2 With the valve bottom-side-up, turn the adjustment nut (item 3) clockwise to increase the setting (higher vacuum) and counterclockwise to decrease the setting.
- 4.7.3 Post-Test Procedure
 - 4.7.3.1 After testing the valve, close the pressure inlet valve to the test chamber, vent the pressure in the test stand. Remove the valve from the test fixture.
 - 4.7.3.2 Wipe or blow away any remaining soapsuds and water used in the testing.

4.8 Final Valve Reassembly

- 4.8.1 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. Remove the valve from the test fixture.
- 4.8.2 Wipe or blow away any remaining soapsuds and water used in the testing.
- 4.8.3 Apply Loctite to the threaded areas at the bottom of the two posts (item 9) and install on valve body (item 1) using a 1/4" wrench.



TIP: Use a 3/8" wrench to install posts (item 9).

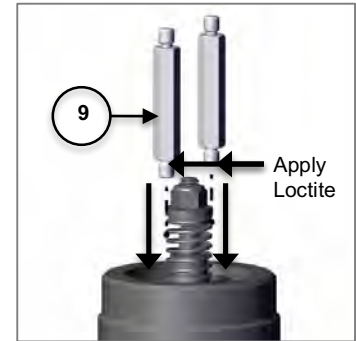


Figure 4-24 Install Posts

- 4.8.4 Install the weather cap (item 7).



Figure 4-25 Install Weather Cap

- 4.8.5 Install locknuts (item 10) and use a hex wrench to tighten both locknuts.



TIP: Use a 7/16" socket wrench.



Figure 4-26 Tighten Locknuts

5 Routine Maintenance



NOTICE: Maintenance, Scheduled Defined. Scheduled maintenance involves valve inspection and component replacement for valves in-service on tank cars, that is in accordance to the car owner's standard qualification and maintenance program, that ensures the valve performs its intended function without failure until its next qualification or for its design life.

NOTICE: Leak Repair Defined. Leak repair is the temporary remediation to a valve observed to be emitting product in an unintended manner. Since leak repair is a temporary measure, once the car is unloaded and pressure is relieved, the valve should be removed for complete inspection, repairs, and full requalification in accordance to the car owners standard qualification and maintenance program. Leak repair is unscheduled maintenance and is not apart of the scheduled maintenance.



CAUTION: The repair procedure for leaking valves is intended only as a temporary repair to get the car to an unloading destination. Once the product is unloaded and pressure is relieved, the valve should be removed for a complete inspection and requalification.

6 Emergency Response for Leaking Valve



NOTICE

NOTICE: Emergency Response is the temporary remediation to a valve observed to be emitting product in an unintended manner. It is possible to replace O-rings on an vacuum relief valve installed on a pressurized tank car. Since leak repair is a temporary measure, once the car is unloaded and pressure is relieved, the valve should be removed for complete inspection, repairs, and full qualification in accordance to the car owner's standard qualification and maintenance program. Leak repair is unscheduled maintenance and is not part of scheduled maintenance.

6.1 Follow All Routine Maintenance Procedures



NOTICE

NOTICE: This manual is not intended to provide all the information necessary to conduct emergency repair procedures. Personnel must be specially trained and qualified in hazmat procedures before attempting to service a leaking valve on a rail tank car.

