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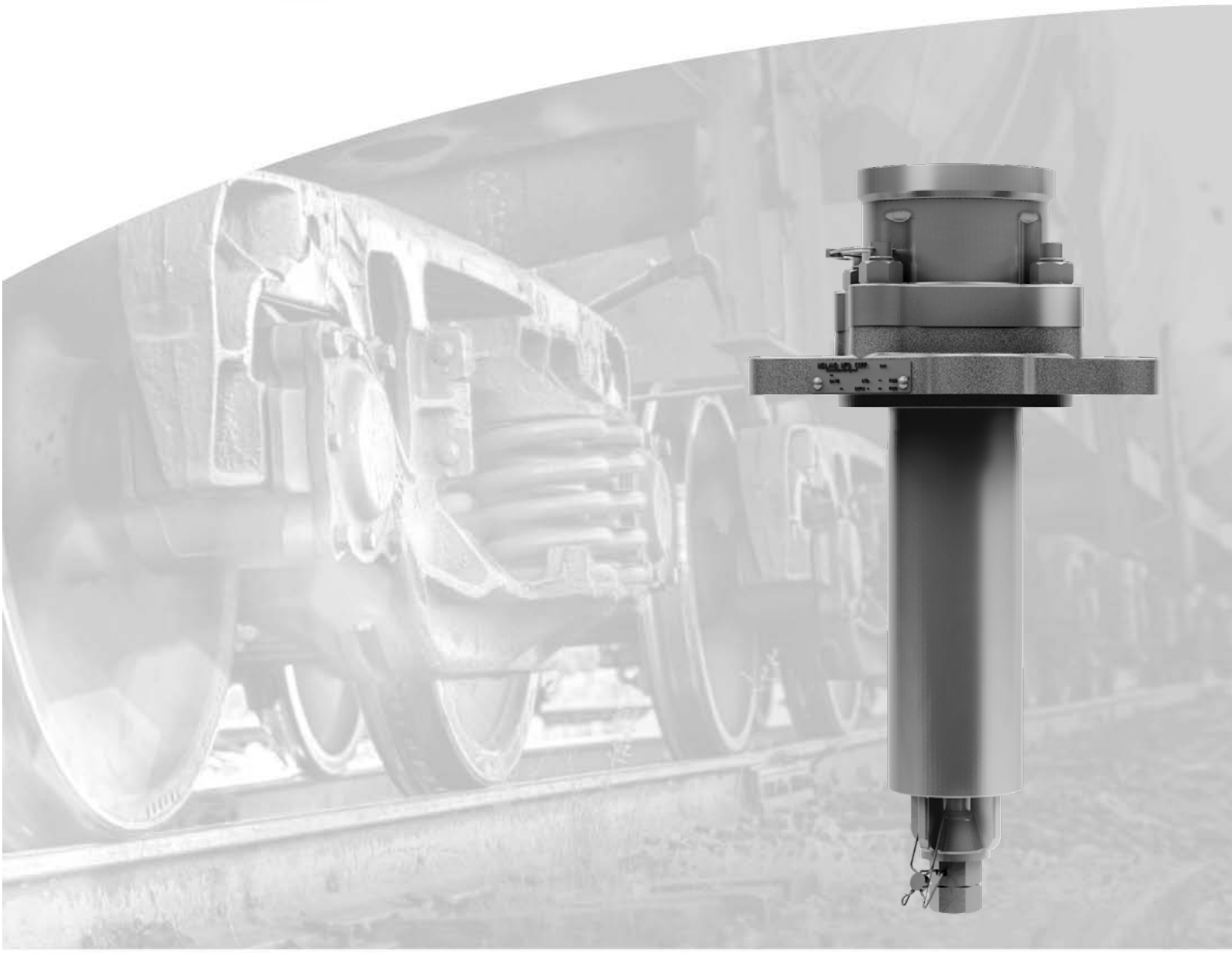

Internal-Style Pressure Relief Valve

A-1000 Series

Installation, Operation & Maintenance (IOM) Manual

Manual content is subject to change.
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1 Regulations and Safety Requirements

1.1 Regulations

Midland internal-style pressure 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 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: 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.

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 of the valve stem or spring breakage may cause a sudden energy release that can discharge component parts a short distance in an uncontrolled manner. Personal injury may be a result.

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

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

CAUTION: 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.

CAUTION: 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.

CAUTION: Valve-Stem Failure. Cracks and corrosion of pressure 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: Deficient Valve Travel. Coil springs that have taken a “set,” resulting in an undersized 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 more than 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.

CAUTION: 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.

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

CAUTION: Field Repair. The repair procedure for leaking valves in the field 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.

CAUTION: O-Ring Replacement. Conducting this procedure may be hazardous (depending on the commodity 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.

CAUTION: Valve Discharge. When the O-ring retainer cap is raised up, there will be a significant amount of product discharging. Have emery paper, a cleaning cloth, replacement O-ring retainer cap (with epoxied O-rings) and silicone grease (typically Kytox GPL204 or equivalent) close at hand. Use a wheel puller, or two (2) screwdrivers 180° apart, to quickly dislodge the O-ring retainer.

2 Introduction

The A-1000 Series Internal-Style Pressure Relief Valve provides flow rates suitable for commodities requiring relatively low flow rates, ranging from 1,109 to 4,705 standard cubic feet per minute (scfm).

2.1 Valve Details – Tongue-and-Groove Series

ITEM	QTY.	PART NAME
1	1	TOP GUIDE
2	1	STEM
3	1	RETAINER
4	1	BODY
5	1	SPRING
6	1	FOLLOWER
7	1	SPRING GUIDE TUBE
8	1	TOP LOCKNUT
9	1	WASHER
10	1	SEAT O-RING
11	1	STEM O-RING
12	1	ADJUSTMENT NUT
13	1	LOCKNUT
14	2	STUD
14A	2	STUD W/HOLE
15	4	NUT
16	2	WIRE SEAL KIT
17	–	–
18	1	NAME PLATE

Table 2-1 Valve Components

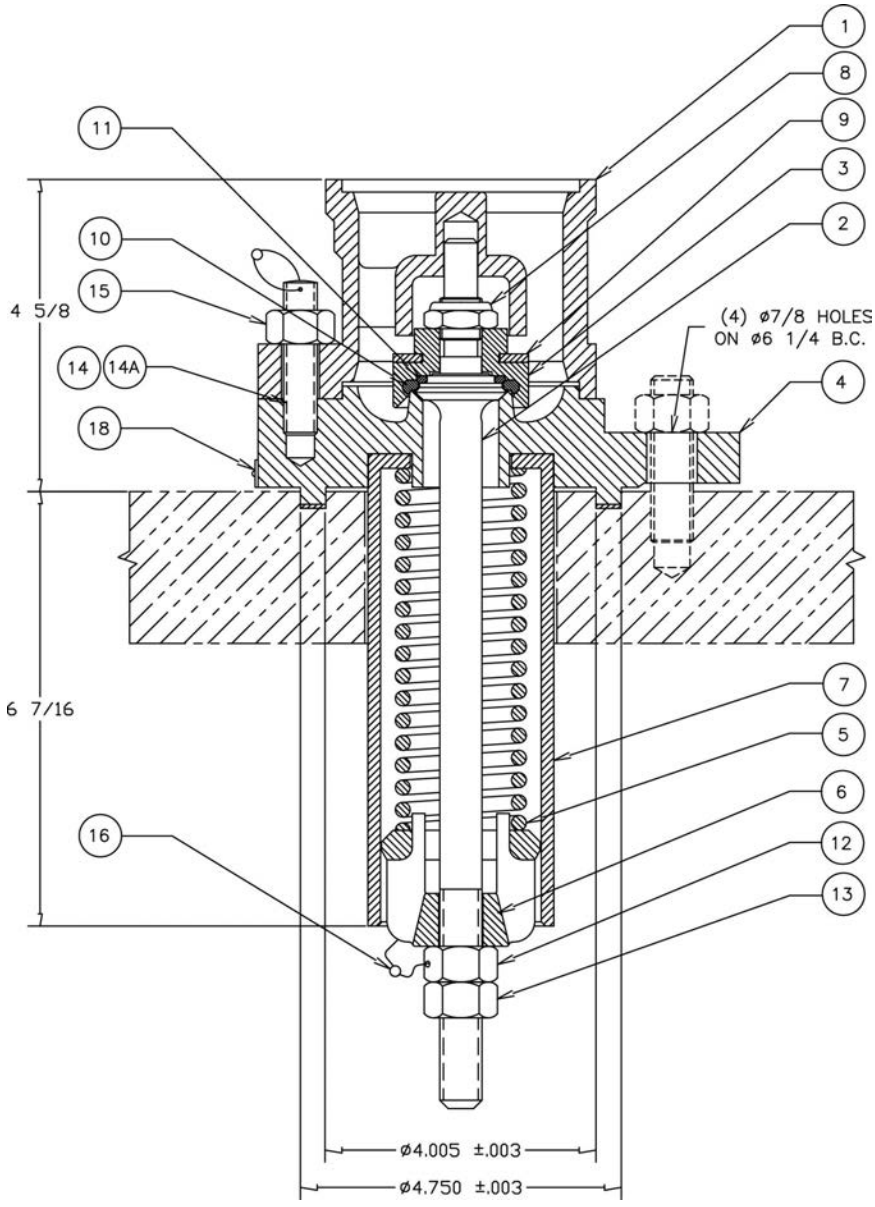


Figure 2-1 Valve Callouts and Dimensions

ITEM	QTY.	PART NAME	A-1075 THRU A-1450 STAINLESS TRIM		A-1079 THRU A-1379 STAINLESS STEEL	
			MATERIAL	PART NO.	MATERIAL	PART NO.
1	1	TOP GUIDE	STEEL W/SS INSERT	10-1-XS	STAINLESS STEEL	10-1-SS
2	1	STEM	STAINLESS STEEL	10-2-SS	STAINLESS STEEL	10-2-SS
3	1	RETAINER	STEEL, PLATED[3]	10-3-CS	STAINLESS STEEL	10-3-SS
4	1	BODY	STEEL	10-4-STD-CS	STAINLESS STEEL	10-4-STD-CS
5	1	SPRING	ALLOY STEEL, PLATED[3]	SEE TABLE NEXT PAGE	STAINLESS STEEL	SEE TABLE NEXT PAGE
6	1	FOLLOWER	STEEL, PLATED[3]	10-6-CS	STAINLESS STEEL	10-6-SS
7	1	SPRING GUIDE	STEEL, PLATED[3]	10-7-CS	STAINLESS STEEL	10-7-SS
8	1	TOP LOCKNUT	STEEL, PLATED[3]	10-8-CS	STAINLESS STEEL	10-8-SS
9	1	WASHER	NEOPRENE	10-9-NE	NEOPRENE	10-9-NE
10	1	SEAT O-RING	BUNA®-N[1]	10-10-BN	BUNA®-N[1]	10-10-BN
11	1	STEM O-RING	BUNA®-N[1]	10-11-BN	BUNA®-N[1]	10-11-BN
12	1	ADJUSTMENT NUT	STEEL, PLATED[3]	10-12-CS	STAINLESS STEEL	10-12-SS
13	1	LOCKNUT	STEEL, PLATED[3]	10-13-CS	STAINLESS STEEL	10-13-SS
14	2	STUD	ALLOY STEEL, PLATED[3]	10-14-AS	STAINLESS STEEL	10-14-SS
14A	2	STUD W/HOLE	ALLOY STEEL, PLATED[3]	10-141-AS	STAINLESS STEEL	10-141-SS
15	4	NUT	STEEL, PLATED[3]	10-15-CS	STAINLESS STEEL	10-15-SS
16	2	WIRE SEAL KIT	SS/LEAD	22-72-PB	SS/LEAD	22-72-PB
17	–	–	–	–	–	–
18	1	NAME PLATE	STAINLESS STEEL	SEE TABLE NEXT PAGE	STAINLESS STEEL	SEE TABLE NEXT PAGE
*SEE APPENDIX A FOR AVAILABLE REPAIR KITS AND O-RING OPTIONS.						

Table 2-2 Valve Component Details – Tongue-and-Groove Series

NOTES:

1. Alternative material available.
2. Standard plating is zinc or cadmium.
3. AAR Approval #PRD092020.

VALVE PART NO.	A-1075 THRU A-1450 STAINLESS-STEEL TRIM			
	PRESSURE SETTING (PSIG)	FLOW RATE (SCFM-AIR)	SPRING PART NO.	NAMEPLATE PART NO.
A-1075	75	1109	10-75-AS	12-75-SS
A-1100	100	1374	10-100-AS	12-100-SS
A-1150	150	2004	10-150-AS	12-150-SS
A-1165	165	2329	10-150-AS	12-165-SS
A-1225	225	2884	10-225-AS	12-225-SS
A-1247	247.5	3070	10-225-AS	12-247-SS
A-1255	255	3477	10-225-AS	12-225-SS
A-1280	280.5	3576	10-300-AS	12-280-SS
A-1300	300	3516	10-300-AS	12-300-SS
A-1330	330	4322	10-300-AS	12-330-SS
A-1375	375	4220	10-375-AS	12-375-SS
A-1450	450	4705	10-450-AS	12-450-SS

Table 2-3 A-1075 Thru A-1450 Stainless-Steel Trim Model Specifications – Tongue-and-Groove Series

VALVE PART NO.	A-1079 THRU A-1379 STAINLESS-STEEL			
	PRESSURE SETTING (PSIG)	FLOW RATE (SCFM-AIR)	SPRING PART NO.	NAMEPLATE PART NO.
A-1079	75	1113	10-79-SS	12-79-SS
A-1104	100	1371	10-104-SS	12-104-SS
A-1154	150	1940	10-154-SS	12-154-SS
A-1169	165	2611	10-165-SS	12-169-SS
A-1229	225	2670	10-229-SS	12-229-SS
A-1251	247.5	3245	10-229-SS	12-251-SS
A-1259	255	3344	10-229-SS	12-225-SS
A-1284	280.5	3697	10-304-SS	12-284-SS
A-1304	300	3695	10-304-SS	12-304-SS
A-1334	330	4262	10-304-SS	12-334-SS
A-1379	375	4615	10-379-SS	12-379-SS

Table 2-4 A-1079 Thru A-1379 Stainless-Steel Model Specifications – Tongue-and-Groove Series

NOTES:

1. Procedures in this manual apply for A-1000-JCP Series Valves.
2. For A-1000-JCP Series Drawings, visit midlandmfg.com.

2.2 Valve Details – Flat-Face Series

ITEM	QTY.	PART NAME
1	1	TOP GUIDE
2	1	STEM
3	1	RETAINER
4	1	BODY
5	1	SPRING
6	1	FOLLOWER
7	1	SPRING GUIDE TUBE
8	1	TOP LOCKNUT
9	1	WASHER
10	1	SEAT O-RING
11	1	STEM O-RING
12	1	ADJUSTMENT NUT
13	1	LOCKNUT
14	2	STUD
14A	2	STUD W/HOLE
15	4	NUT
16	2	WIRE SEAL KIT
17	–	–
18	1	NAME PLATE

Table 2-5 Valve Components

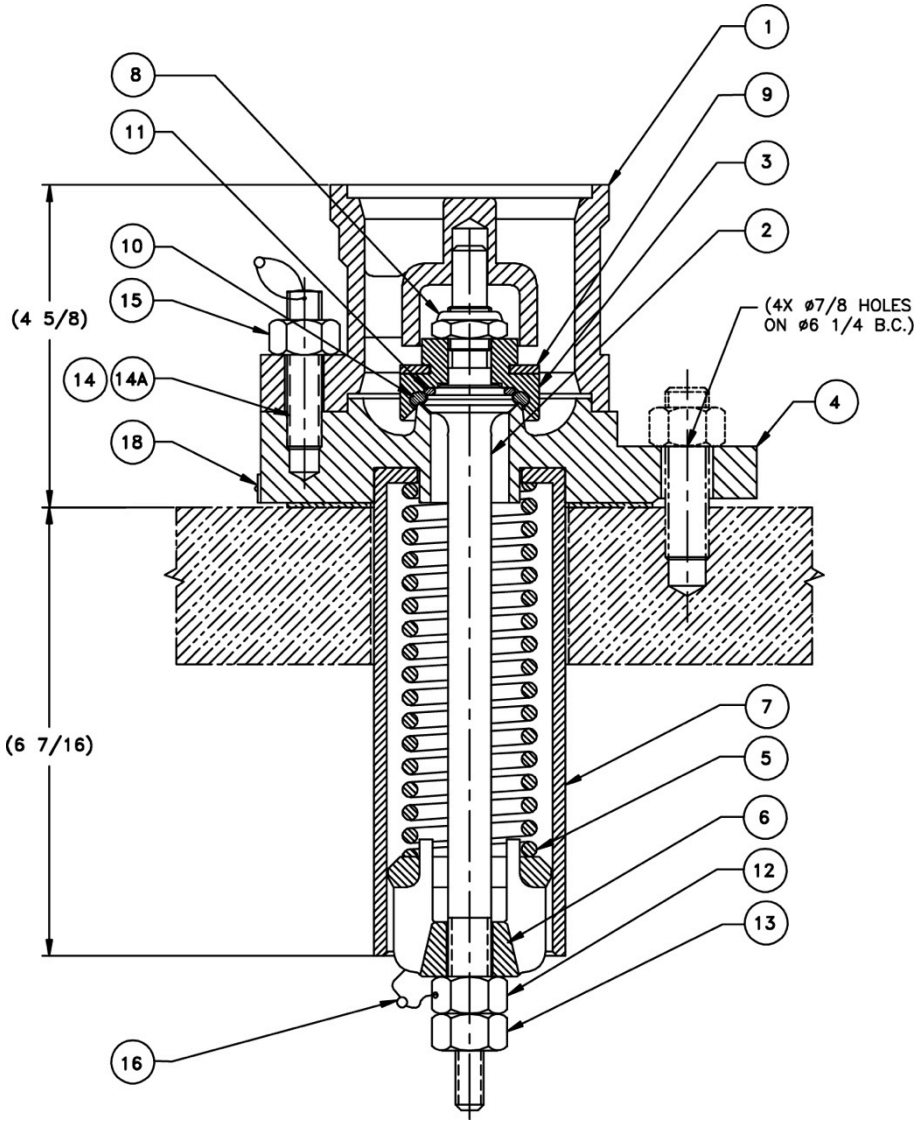


Figure 2-2 Valve Callouts and Dimensions

ITEM	QTY.	PART NAME	A-1075-F THRU A-1450-F STAINLESS TRIM		A-1079-F THRU A-1379-F STAINLESS STEEL	
			MATERIAL	PART NO.	MATERIAL	PART NO.
1	1	TOP GUIDE	STEEL W/SS INSERT	10-1-XS	STAINLESS STEEL	10-1-SS
2	1	STEM	STAINLESS STEEL	10-2-SS	STAINLESS STEEL	10-2-SS
3	1	RETAINER	STEEL, PLATED[3]	10-3-CS	STAINLESS STEEL	10-3-SS
4	1	BODY	STEEL	10-4-FF-SS	STAINLESS STEEL	10-4-FF-SS
5	1	SPRING	ALLOY STEEL, PLATED[3]	SEE TABLE NEXT PAGE	STAINLESS STEEL	SEE TABLE NEXT PAGE
6	1	FOLLOWER	STEEL, PLATED[3]	10-6-CS	STAINLESS STEEL	10-6-SS
7	1	SPRING GUIDE	STEEL, PLATED[3]	10-7-CS	STAINLESS STEEL	10-7-SS
8	1	TOP LOCKNUT	STEEL, PLATED[3]	10-8-CS	STAINLESS STEEL	10-8-SS
9	1	WASHER	NEOPRENE	10-9-NE	NEOPRENE	10-9-NE
10	1	SEAT O-RING	BUNA®-N[1]	10-10-BN	BUNA®-N[1]	10-10-BN
11	1	STEM O-RING	BUNA®-N[1]	10-11-BN	BUNA®-N[1]	10-11-BN
12	1	ADJUSTMENT NUT	STEEL, PLATED[3]	10-12-CS	STAINLESS STEEL	10-12-SS
13	1	LOCKNUT	STEEL, PLATED[3]	10-13-CS	STAINLESS STEEL	10-13-SS
14	2	STUD	ALLOY STEEL, PLATED[3]	10-14-AS	STAINLESS STEEL	10-14-SS
14A	2	STUD W/HOLE	ALLOY STEEL, PLATED[3]	10-141-AS	STAINLESS STEEL	10-141-SS
15	4	NUT	STEEL, PLATED[3]	10-15-CS	STAINLESS STEEL	10-15-SS
16	2	WIRE SEAL KIT	SS/LEAD	22-72-PB	SS/LEAD	22-72-PB
17	–	–	–	–	–	–
18	1	NAME PLATE	STAINLESS STEEL	SEE TABLE NEXT PAGE	STAINLESS STEEL	SEE TABLE NEXT PAGE
*SEE APPENDIX A FOR AVAILABLE REPAIR KITS AND O-RING OPTIONS.						

Table 2-6 Valve Component Details – Flat-Face Series

NOTES:

1. Alternative material available.
2. Standard plating is zinc or cadmium.
3. AAR Approval #PRD092020.

VALVE PART NO.	A-1075-F THRU A-1450-F STAINLESS-STEEL TRIM			
	PRESSURE SETTING (PSIG)	FLOW RATE (SCFM-AIR)	SPRING PART NO.	NAMEPLATE PART NO.
A-1075-F	75	1109	10-75-AS	10-0751-SS
A-1100-F	100	1374	10-100-AS	12-100-SS
A-1150-F	150	2004	10-150-AS	12-150-SS
A-1165-F	165	2329	10-150-AS	12-165-SS
A-1225-F	225	2884	10-225-AS	12-225-SS
A-1247-F	247.5	3070	10-225-AS	12-247-SS
A-1255-F	255	3477	10-225-AS	12-225-SS
A-1280-F	280.5	3576	10-300-AS	12-280-SS
A-1300-F	300	3516	10-300-AS	12-300-SS
A-1330-F	330	4322	10-300-AS	12-330-SS
A-1375-F	375	4220	10-375-AS	12-375-SS
A-1450-F	450	4705	10-450-AS	12-450-SS

Table 2-7 A-1075-F Thru A-1450-F Stainless-Steel Trim Model Specifications – Flat-Face Series

VALVE PART NO.	A-1079-F THRU A-1379-F STAINLESS-STEEL			
	PRESSURE SETTING (PSIG)	FLOW RATE (SCFM-AIR)	SPRING PART NO.	NAMEPLATE PART NO.
A-1079-F	75	1113	10-79-SS	10-0791-SS
A-1104-F	100	1371	10-104-SS	12-104-SS
A-1154-F	150	1940	10-154-SS	12-154-SS
A-1169-F	165	2611	10-165-SS	12-169-F-SS
A-1229-F	225	2670	10-229-SS	12-229-MO
A-1251-F	247.5	3245	10-229-SS	12-251-SS
A-1259-F	255	3344	10-229-SS	12-225-SS
A-1284-F	280.5	3697	10-304-SS	12-284-SS
A-1304-F	300	3695	10-304-SS	12-304-SS
A-1334-F	330	4262	10-304-SS	12-334-SS
A-1379-F	375	4615	10-379-SS	12-379-SS

Table 2-8 A-1079-F Thru A-1379-F Stainless-Steel Model Specifications – Flat-Face Series

3 Valve Installation

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.

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

3.1 Installation Procedure and Recommended Tools

SAE Wrench	Component(s)/Description
1-1/4”	Mounting Stud Nuts
Other Tools, Supplies, and Equipment:	
Torque Wrench	Mounting Stud Nuts
Wire Brush	To Clean the Valves and Cover-Plate Sealing Surfaces
Lint-Free Cloth	To Clean Sealing Surfaces

Table 3-1 Recommended Tools for Valve Assembly

NOTICE

NOTICE: Consult gasket manufacturer and Midland Manufacturing for torque requirements as max torque may vary by valve model. Do not exceed 200 ft-lb.

3.1.1 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.

3.1.2 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. Inspect threads for any sign of excessive wear, corrosion, pitting or other defects. If any are found, the part is rejectable and should be replaced.

3.1.3 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.

3.1.4 Using a lint-free cloth and appropriate cleaning solvent, wipe clean the valve and cover-plate sealing surfaces and the mounting-stud threads. Inspect threads for any sign of excessive wear, corrosion, pitting or other defects. If any are found, the part is rejectable and should be replaced.

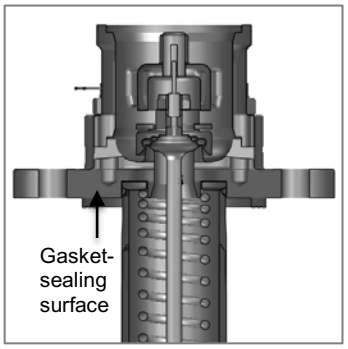


Figure 3-1 Gasket-Sealing Surface

3.1.5 For tongue-and-groove mountings, examine the sides of the groove. 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.

3.1.6 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

CAUTION: Do not use a sharp tool to press the new gasket into place or gasket damage may result.

3.1.7 For tongue-and-groove mountings, inspect the tongue of a new, 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

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

3.1.8 Remove the rubber plug from the cover plate.

3.1.9 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

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.

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

Figure 3-2 Tightening Sequence

NOTICE

NOTICE: This is for installation to the car, so the pattern is on the outside bolts.

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.

3.2 Leak Inspection

3.2.1 Test all newly installed valves to conform to car-owner specifications. No leaks should be 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.

3.3 Valve Operation Notes and Precautions

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.

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. For your convenience, OEM hardware repair kits and O-rings are available (see Appendix A).

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

4.1 Valve Disassembly and Recommended Tools

SAE Wrenches	Component(s)/Description	Item #
3/4”	Nuts for Top Guide (x4)	15
15/16”	Locknut for Spring Adjustment	13
15/16”	Spring Adjustment Nut	12
15/16”	Top Locknut	8
1”	Flats on O-Ring Retainer	3
Other Tools, Supplies, and Equipment:		
Silicone Grease (Kytox GPL204 or equivalent)	Stem	2
Spring Compression Press	Spring	5
Wood Block	For Valve-Stem Support	2
Non-Scratching Tool to Remove O-Rings	O-Rings	10, 11
Screwdriver	O-Ring Retainer	3
Two-Arm Puller	O-Ring Retainer	3

Table 4-1 Recommended 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.

4.1.1 Remove the seal wires (item 16) from the top-guide studs (items 14 and 14A).

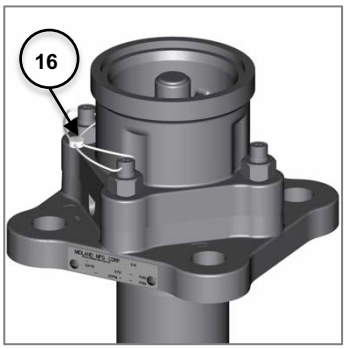


Figure 4-1 Remove Wire Seal

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

TIP: Use a 3/4” wrench to remove the four nuts (item 15).

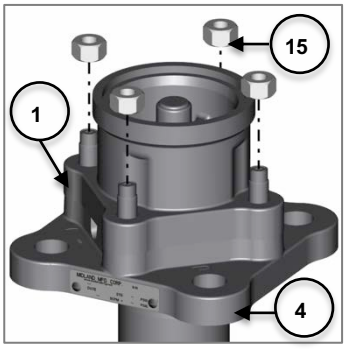


Figure 4-2 Remove the Four Nuts

4.1.3 Remove the top guide (item 1) from the body (item 4).

TIP: You may have to tap it loose with a soft metal or rubber hammer.

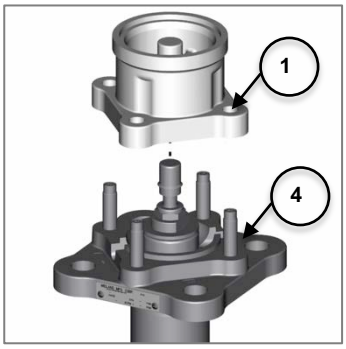


Figure 4-3 Remove Top Guide

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

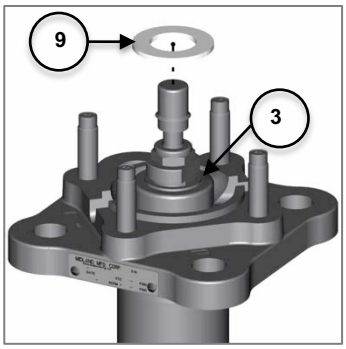


Figure 4-4 Remove Washer

4.1.5 Loosen the top locknut (item 8) with a wrench on the stem (item 2) while holding the retainer in place (item 3) with another wrench.

TIP:

- Use a 15/16” wrench on locknut (item 8).
- Use a 1” wrench to hold the retainer in place (item 3).

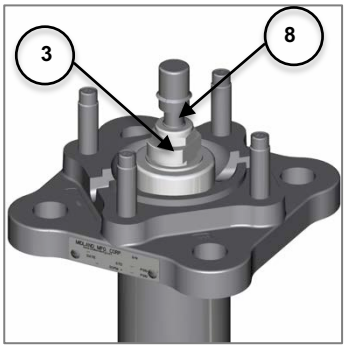


Figure 4-5 Loosen Locknut

4.1.6 Remove the top locknut (item 8) from the valve stem (item 2).

TIP: Use a 15/16” wrench to remove the locknut (item 8).

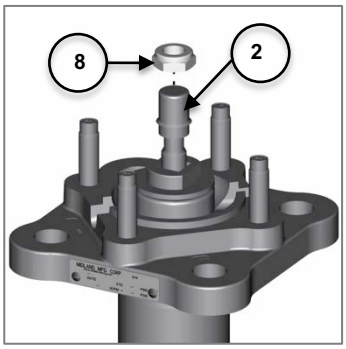


Figure 4-6 Remove Locknut

4.1.7 Lift up the O-ring retainer (item 3).

TIP: A two-arm puller, or a pair of screwdrivers may be required.

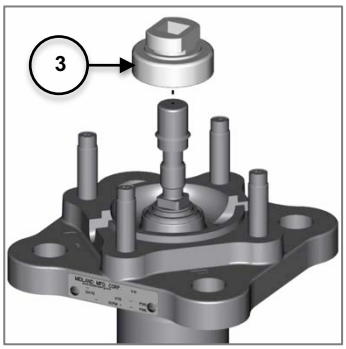


Figure 4-7 Remove Retainer

4.1.8 Remove the O-rings (items 10 and 11) from the O-ring groove of the retainer (item 3).

TIP: Use a non-scratching tool to remove the O-rings.

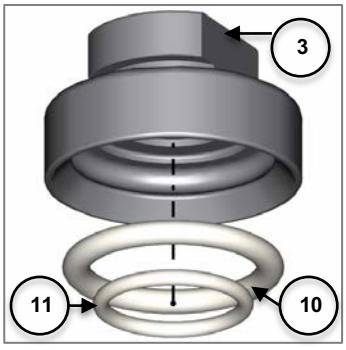


Figure 4-8 Remove O-Rings

4.1.9 Clean and lubricate the stem thread. Inspect threads for any sign of excessive wear, corrosion, pitting or other defects. If any are found, the part is rejectable and should be replaced. Loosen the locknut (item 13) from the adjustment nut (item 12)

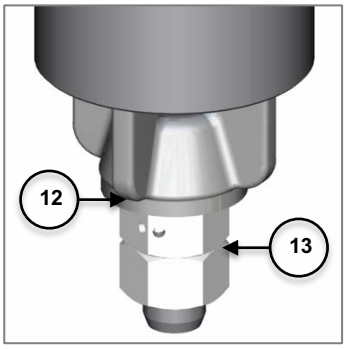


Figure 4-9 Loosen Locknut

WARNING

WARNING: Always point the valve away from yourself in the event of catastrophic failure of the stem; serious injury could occur.

TIP: Use two (2) 15/16” wrenches of suitable length.

4.1.10 Next, remove only the locknut (item 13) from the valve stem (item 2). Do not attempt to remove the adjustment nut at this step.

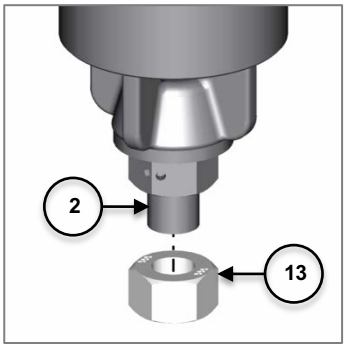


Figure 4-10 Remove Locknut

TIP: Use a 15/16” wrench to remove the locknut (item 13).

WARNING

WARNING: To avoid product or personal injury, the following steps must be performed by certified and trained personel only.

4.1.11 Place the valve into a press having a support block or floorboard to allow pass-through of the valve stem.


Figure 4-11 Place Valve in a Press

4.1.12 Using a press yoke having a cutaway as shown, compress the valve spring enough to allow removal of the adjustment nut (item 12) while taking care to support the valve stem.

TIP: Use a 15/16” wrench to remove the adjustment nut (item 12).

Figure 4-12 Compress Valve Spring

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

CAUTION

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.

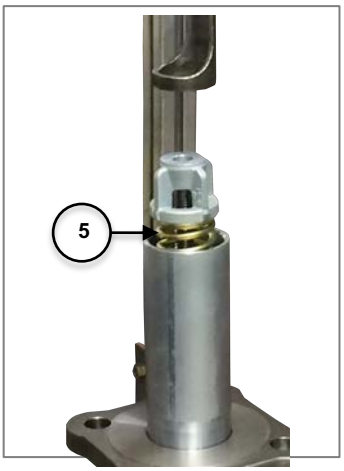


Figure 4-13 Allow Valve Spring to Expand

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

WARNING

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.

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

4.1.16 Remove the spring follower (item 6).

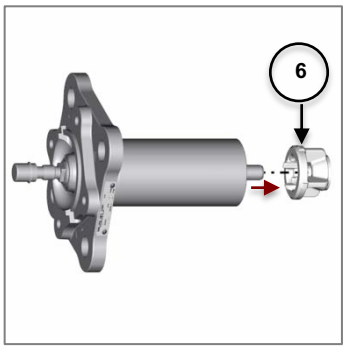


Figure 4-14 Remove Spring Follower

4.1.17 Remove the valve spring (item 5) from the guide tube.

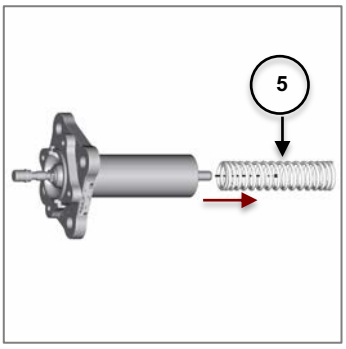


Figure 4-15 Remove Spring

4.1.18 Remove the valve stem (item 2) .

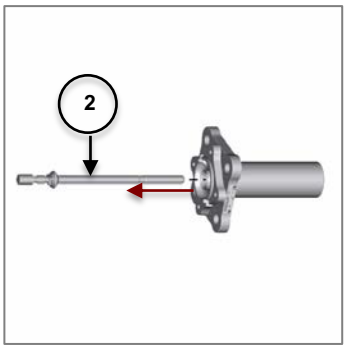


Figure 4-16 Remove Stem

4.2 Component Inspection

Key components must be thoroughly inspected during the qualification process. These components include the top guide, stem, retainer, valve body, spring and spring guide tube.

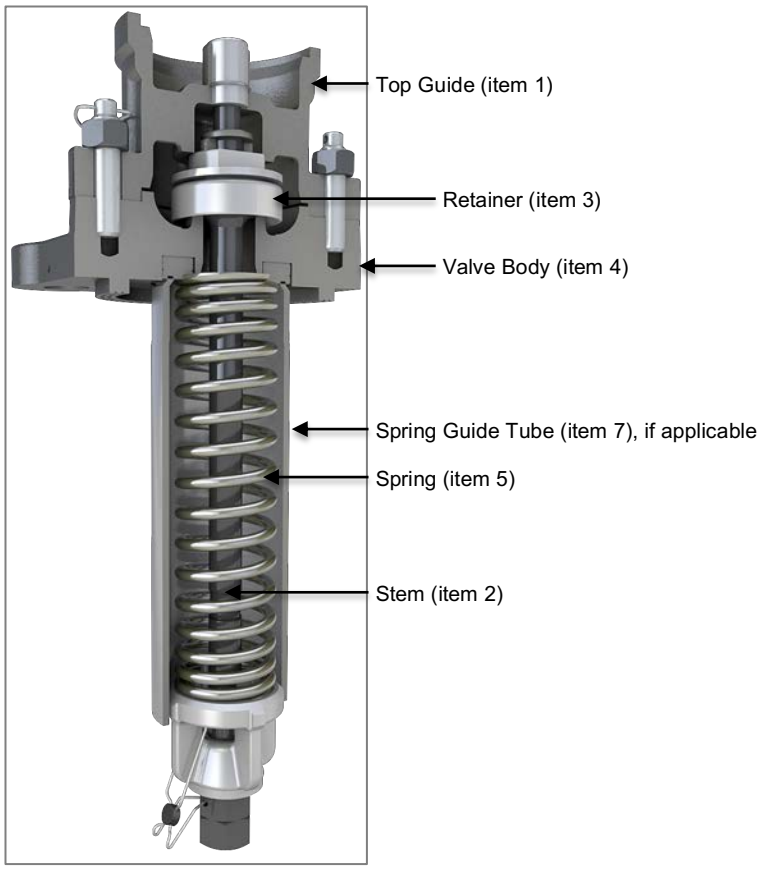


Figure 4-17 Component Inspection

NOTICE: Evaluation of critical component metal surfaces using enhanced inspection methods provides a higher probability of detection of defects than a standard visual inspection and, where applied appropriately, is recommended by Midland Manufacturing. Facilities performing these inspection methods must take steps necessary to ensure that their processes, training and personnel certifications are in compliance with accepted Non-Destructive Testing standards and practices.

NOTICE

The best inspection methods can miss defects when applied incorrectly. A program developed under the guidance of a qualified American Society of Non-Destructive Testing (ASNT) Level III Technician is recommended to achieve desired results. Within such a program, specific evaluation criteria for cracks, pitting, etc., that would identify a part as defective will need to be determined. **As a rule, cracks and pitting detected by these methods or by standard visual inspection are cause for rejection and replacement of a part.**

Refer to AAR MSRP C-111 [M-1002] Appendix J for requirements of non-destructive testing programs and the responsibilities for their administration.

O-Rings, gaskets and wire seals must always be replaced during this step.

Midland suggests that nuts, washers and studs be regularly replaced during the qualification process. Midland provides Repair Kits for this purpose (see Appendix A for repair kits and O-ring options.)

NOTICE

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.

WARNING

WARNING: Machining Not Allowed. Without consent from the valve manufacturer or car owner, machining, grinding, welding or other alterations to the valve seat or stem seat is not allowed per AAR M1002, Paragraph A3.11.1 of the Tank-Car Specifications.

4.2.1 Top Guide Inspection

The top guide (item 1) is a non-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 must be unobstructed by foreign matter that would hinder free flow of discharging fluid. The center hole, which guides the stem, should not be distorted.

Inspect all weld areas for cracks.

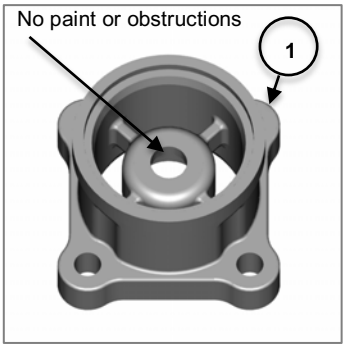


Figure 4-18 Top Guide

4.2.2 Valve Stem Inspection

Remove scale, residual product and other foreign material from the stem (item 2).

Also, inspect for corrosion pitting. Any corrosion pitting is reason for rejection since it may indicate more sev ere corrosion and the starting point for difficult-to-d etect cracking.

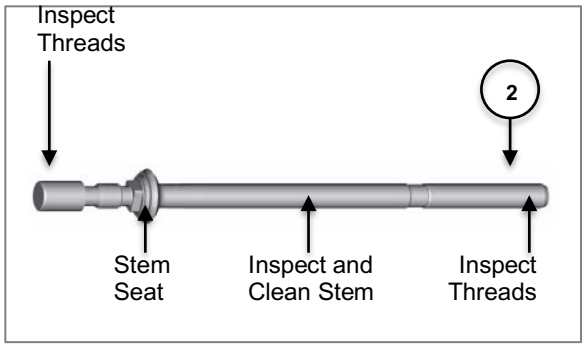


Figure 4-19 Valve Stem

CAUTION

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

WARNING

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

NOTICE

NOTICE: Valve stems of this Midland series are machined from raw forgings. In cutting forging stock to length, the end of the bar may contain surfaces imperfections caused by the cutting tool. The end imperfections may be retained on a finished part and potentially provide false indications when using a magnetic particle or flourescent penetrant inspection. These are not typically critical defects. On parts where repeated indications of these cutting marks are present, they may be eliminated by polishing.

Inspect both sets of threads for any sign of excessive wear, corrosion, pitting or other defects. If any are found, the part is rejectable and should be replaced.

All nickel-bearing stainess steels have a likelihood of galling. Wrenching the adjustment 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.

The sealing surface is the stem seat. Clean the stem seat with emery paper (400-grit) then wipe it clean with a cloth or a suitable solvent. Run your fingernail over the seat surface to detect any flaws.

4.2.3 Stem Runout

NOTICE

NOTICE: Total valve-stem runout can be checked using a uni-level concentricity fixture and gauge (not supplied by Midland). For this or any other devices used to measure runout, refer to your company's or to your specific instrument's IOM for proper use instructions.

The valve stem must be straight and total runout within 0.025" (maximum). If the measurements are greater than 0.025", replace the stem.

WARNING

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: 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.

4.2.4 Retainer Inspection

Since the O-rings must seal against the retainer surfaces, any irregularities can cause the valve to leak. The O-ring retainer (item 3) grooves must be free of gouge marks, corrosion, pits and rust, if any of these are present, replace this part. Clean and inspect the groove by sanding it lightly with emery paper (400-grit). If this does not effectively clean the groove, replace this part.

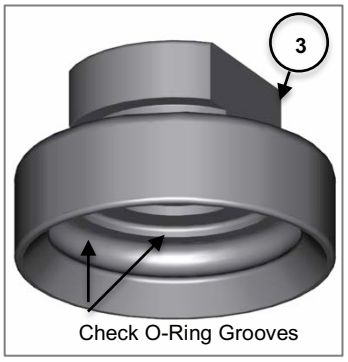


Figure 4-20 Retainer

4.2.5 Valve Body Seat

The valve body sealing (item 4) surface is the crown of the seat. 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 (Appendix A, Paragraph 3.11.1 of MSRP C-III, Specifications for Tank Cars).

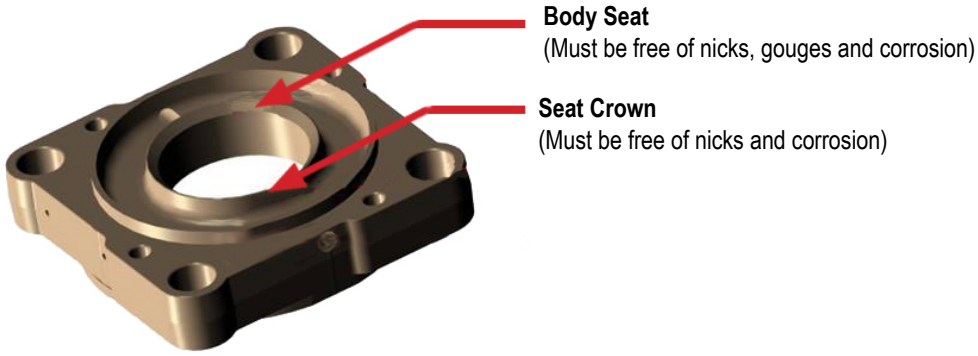


Figure 4-21 Valve-Body Sealing-Surface

WARNING

WARNING: Machining Not Allowed. Without the consent of the manufacturer or car owner, machining, grinding, welding or other alterations to the valve seat or stem seat is not allowed per AAR M1002, Paragraph A3.11.1 of the Tank-Car Specifications.

4.2.5.1 Valve Body Sealing Surface – Tongue and Groove Mount (A-1000 Series)

On the underside of the valve body (item 4) is the tongue surface that seals the valve to the mounting plate on the railcar. Clean the tongue and underside of the valve body with emery paper (400-grit) then wipe it with a cloth and a suitable solvent. Visually inspect for gouges and corrosion. Run your fingernail around the tongue to detect any flaws. Use a flashlight and or magnifying glass if you are uncertain about the condition of this sealing surface. If flaws are unreparable, replace this part.

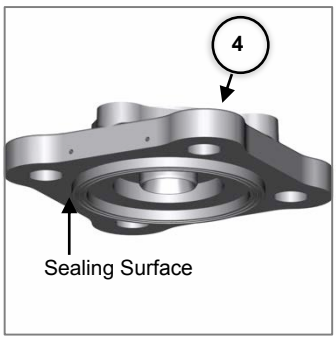


Figure 4-22 Valve Body Sealing-Surface – Tongue & Groove Mount

4.2.5.2 Valve Body Sealing Surface – Flat-Face (A-1000-F Series)

On the underside of the valve body (item 4) is the surface that seals the valve to the mounting plate on the railcar. Clean the sealing surface and underside of the valve body with a soft wire brush then wipe it with a cloth and a suitable solvent. Visually inspect for gouges and corrosion. Use your fingers to detect any flaws. If a gouge is detected that runs from the I.D. to the O.D. of the sealing surface, replace this part.

4.2.6 Spring Inspection

The spring (item 5) is a highly stressed part. The exterior surface must be free of pitting and cracks. Magnetic-particle or dye-penetration inspection (performed by certified and trained personnel) can be used to evaluate the exterior surface and ensure that it is free of cracks and corrosion pits. If any excessive wear over 0.030" of the area is measured or observed, the spring must be replaced.

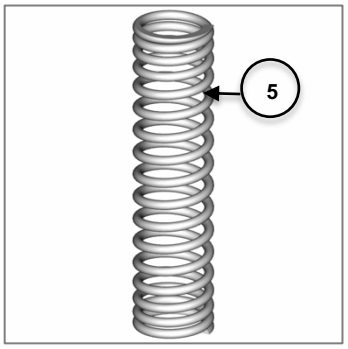


Figure 4-23 Spring Inspection

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.

For Aluminum-Clad Springs: Aluminum-clad springs cannot be inspected by magnetic-particle or dye-penetration methods. No peeling or flaking of the aluminum coating is permissible. If such defects exist, contact Midland for repair or replacement. It is typically more cost-effective to replace a spring having damaged aluminum cladding rather than re-cladding the 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.

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 4-2, replace the spring.

WARNING: Deficient Valve Travel. Coil springs that have taken a "set," resulting in an undersized 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)
10-75-AS	0.225	4.34	6.86
10-79-SS	0.244	4.30	6.38
10-100-AS	0.250	4.57	6.84
10-104-SS	0.250	4.35	6.76
10-150-AS	0.282	5.07	7.28
10-154-SS	0.263	4.98	8.07
10-165-SS	0.282	5.25	8.00
10-225-AS	0.307	5.00	7.21
10-229-MO	0.331	5.32	7.38
10-300-AS	0.363	4.92	6.45
10-304-SS	0.331	5.41	7.84
10-375-AS	0.375	5.12	6.85
10-379-SS	0.363	5.03	6.98
10-450-AS	0.394	5.35	7.04

Table 4-2 Minimum Free-Heights for Spring After Pressing 80% of the Maximum Deflection for Two (2) Minutes

4.2.7 Spring Follower Inspection

The spring follower (item 6) is a structural part that has guides on its outer edges. 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.

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

Figure 4-24 Follower Inspection

4.2.8 Spring Guide Tube Inspection (if applicable)

Visually inspect the guide tube (item 7). There should be no paint on the inside of the guide tube. The area of discharge through the guide tube must be unobstructed by foreign matter that would hinder free flow of discharging fluid. Inspect the guide tube by moving the spring follower 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 follower.

Inspect all weld areas for cracks or pitting.

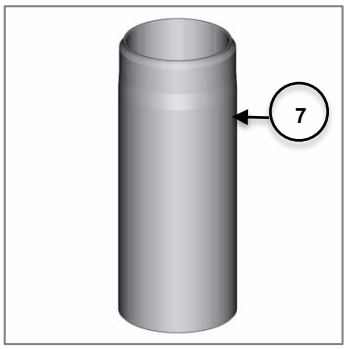


Figure 4-25 Guide Tube Inspection (if applicable)

4.2.9 O-Ring and Gaskets Inspection

O-rings (items 10 and 11) and gaskets (item 9) must be replaced at the time of the periodic valve retest and when the valve is disassembled.

See Appendix A for a list of commonly used O-rings.

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.

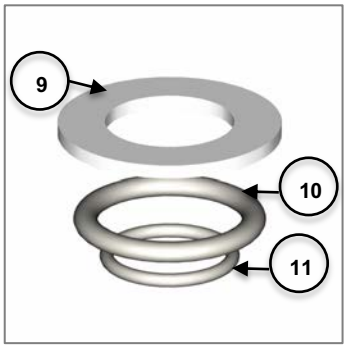


Figure 4-26 Elastomer Inspection

4.2.10 Threaded Components

All threaded components must be thoroughly inspected and cleaned, or replaced. Inspect threads for any sign of excessive wear, corrosion, pitting or other defects. If any are found, the part is rejected and should be replaced.

4.3 Valve Reassembly and Recommended Tools

SAE Wrench	Component(s)/Description	Item #	Torque (ft-lb)
3/4”	Nuts for Top Guide (x4)	15	—
15/16”	Locknut for Spring Adjustment	13	85 - 95
15/16”	Spring Adjustment Nut	12	—
15/16”	Top Locknut	8	65 ± 5
1”	Flats on O-Ring Retainer	3	—
Other Tools, Supplies, and Equipment:			
Spring Compression Press	Spring	5	—
Wood Block	For Valve Stem Support	2	—

Table 4-3 Recommended Tools for Valve Reassembly

4.3.1 Mount the bumper washer (item 9) onto the retainer (item 3).

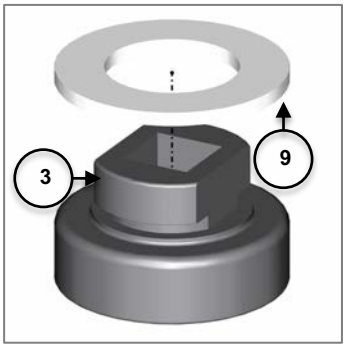


Figure 4-27 Install Washer

4.3.2 Insert the seat O-ring (item 10) and stem O-ring (item 11) into the retainer (item 3).

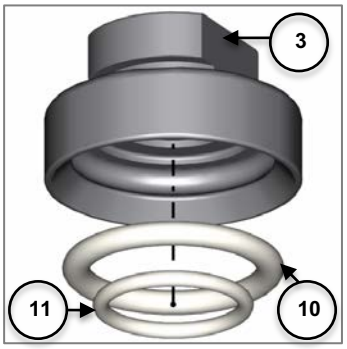


Figure 4-28 Insert O-Rings

4.3.3 Ensure that studs (items 14 and 14A) are tightened into the body (item 4) until they bottom out. Studs with hole (item 14A) must be next to each other.

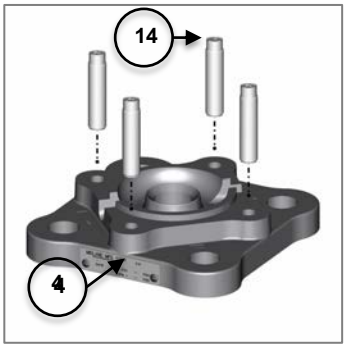


Figure 4-29 Assemble Studs

4.3.4 Insert the stem assembly into the top guide (item 1).

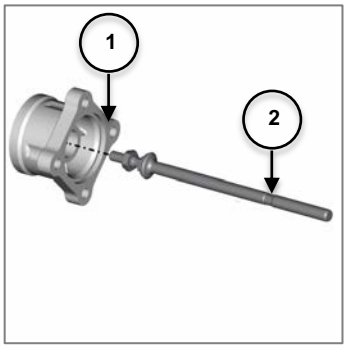


Figure 4-30 Assemble Top Guide and Stem Assembly

4.3.5 Mate the top guide (item 1) and the body (item 4), aligning holes with the studs.

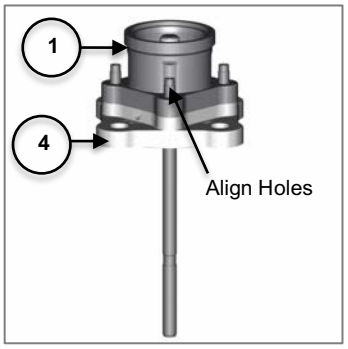


Figure 4-31 Align Body with Studs

4.3.6 Mate the spring guide tube (item 7) with the body (item 4), if applicable.

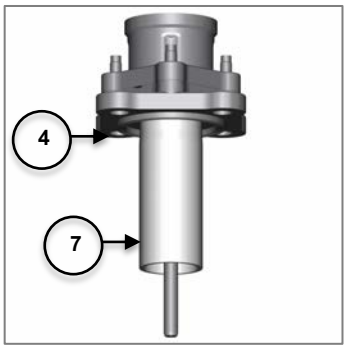


Figure 4-32 Install Guide Tube

4.3.7 Insert the spring (item 5) into the spring guide (item 7).

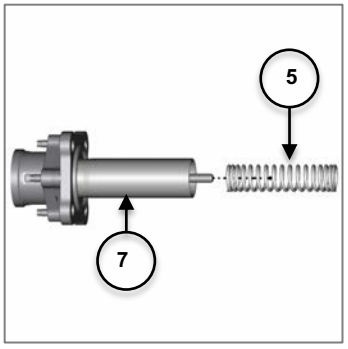


Figure 4-33 Install Spring

4.3.8 Place the spring follower (item 6) onto the stem (item 2) of the stem, spring, and spring guide assembly.

4.3.9 Manually install the stem adjustment nut (item 12) to hold the follower to the stem (item 2).

TIP: Use a 15/16" wrench to install the adjustment nut (item 12).

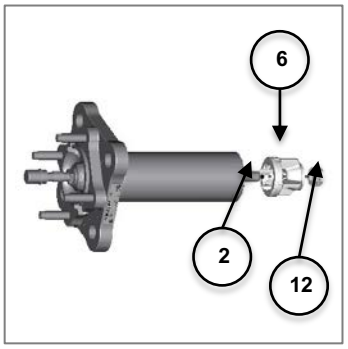


Figure 4-34 Install Follower

4.3.10 Place the assembly from step 4.3.9 into the compression fixture.

4.3.11 Know the required start-to-discharge pressure of the valve you are working on. Using your spring-compression press, slowly compress the spring according to the required start-to-discharge for the valve. Screw on the spring adjustment nut (item 12), then release the compression fixture to remove the valve.

4.3.12 Remove the top guide (item 1).

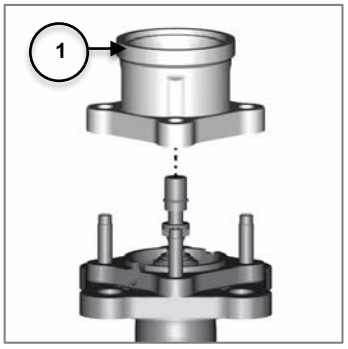


Figure 4-35 Remove Top Guide

4.3.13 Place the retainer (item 3) with the seat O-ring assembly onto the stem (item 2) so that it rests squarely on the valve assembly.

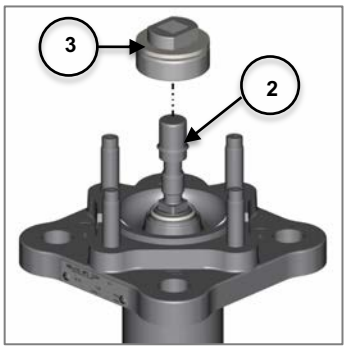


Figure 4-36 Install Retainer Assembly

4.3.14 Screw the top locknut (item 8) onto the stem (item 2).

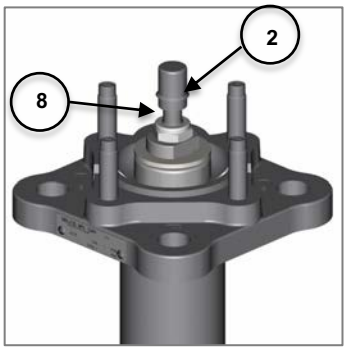


Figure 4-37 Install Top Locknut

4.3.15 While holding the retainer (item 3), tighten the top locknut (8) using a torque wrench calibrated to 65 ± 5 ft-lb.

CAUTION

CAUTION: Be careful to avoid rotation of the stem. Rotation of the stem can damage the seat.

TIP: Use a 15/16" wrench to tighten top locknut (item 8).

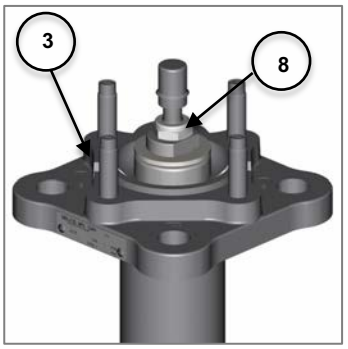


Figure 4-38 Tighten Top Locknut

4.3.16 Screw on and tighten the (x4) mounting nuts (item 15) to the top guide (item 1).

TIP: Use a 3/4" wrench to tighten the mounting nuts (item 15).

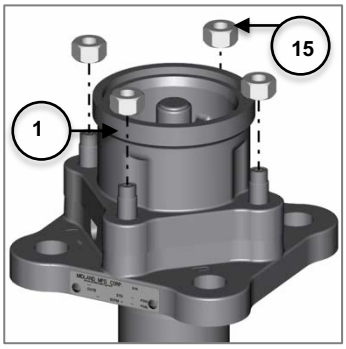


Figure 4-39 Install the Four Nuts

4.3.17 Place locknut (item 13) onto the bottom of the valve stem (item 2).

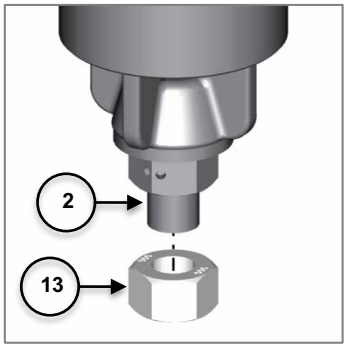


Figure 4-40 Remove Locknut

4.4 Testing Process

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.

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

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 whch no bubbles are detected. Midland recommends that no bubbles be observed for two (2) minutes at vapor-tight.)

4.4.1 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.

4.4.2 Valve-Pressure Testing Procedure

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

4.4.2.1 Install the valve on the test fixture and alternately tighten all of the nuts. Next, seal drain holes of the valve body with putty, or a similar material.

Figure 4-41 Affix Valve to Test Fixture and Seal Drain Holes

4.4.2.2 Fill the valve body with water to allow bubble detection at the valve seat. Take a position allowing observation of the pressure gauge and bubbling of air in the valve body.

CAUTION

CAUTION: Do not look directly down into the valve as debris may discharge upwards.

Figure 4-42 Fill with Water and Observe Gauge

4.4.3 Testing

4.4.3.1 Increase the test air pressure slowly.

4.4.3.2 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 below for valve start-to-discharge (STD) and vapor-tight pressure (VTP) settings.

STD Settings ± 3%	VTP Settings
75 psig ± 3 psig	60 psig minimum
100	80
150	120
165	132
225	180
247	198
255	204
280.5	224
300	240
330	264
375	300

Table 4-4 Start-To-Discharge (STD) and Vapor-Tight Pressure (VTP) Settings

4.4.3.3 Observe the STD pressure and then bleed off the pressure slowly to observe the VTP.

4.4.3.4 Repeat this procedure to ensure performance. The STD and VTP should be consistent.

NOTICE

NOTICE: 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).

4.4.3.5 Record the values.

NOTICE

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

4.4.3.6 When the test results are acceptable, tighten the bottom locknut (item 13) to torque at 85–95 ft-lb.

4.4.3.7 If the STD or VTP is not satisfactory, follow the Valve-Setting Adjustment procedure in Section 4.5.

4.5 Valve-Setting Adjustment Procedure

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

4.5.1 Remove the wire seal (item 16) from the spring adjustment nut, if required.

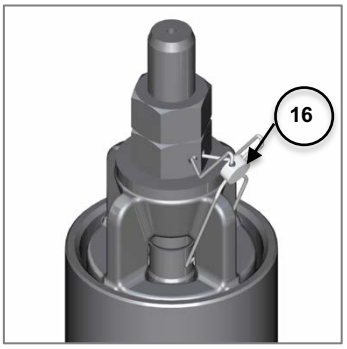


Figure 4-43 Remove Wire Seal

4.5.2 Loosen locknut (item 13) from the spring adjustment nut (item 12).

TIP: Use a 15/16” wrench to loosen the adjustment nut (item 12).

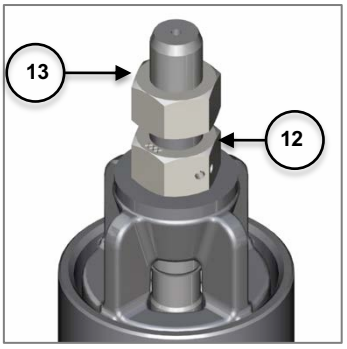


Figure 4-44 Loosen Locknut

4.5.3 Using a press, invert the valve to compress the spring and relieve pressure from the spring-adjusting nut. Use a tubular yoke that is partially cut-away to press down on the spring follower further compressing (or decompressing) the spring.

CAUTION

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. Inspect threads for any sign of excessive wear, corrosion, pitting or other defects. If any are found, the part is rejectable and should be replaced.

Figure 4-45 Compress the Spring

4.5.4 Apply indicator (reference) marks to the bottom spring adjustment nut (item 12) and the spring follower (item 6), and then loosen or tighten the spring adjustment nut two (2) turns.

TIP: Use a 15/16” wrench to tighten the adjustment nut (item 12).

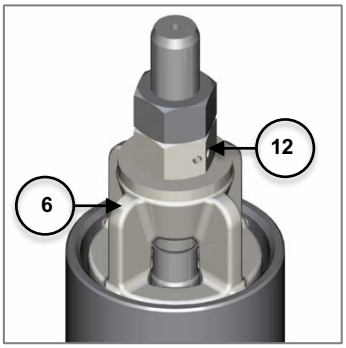
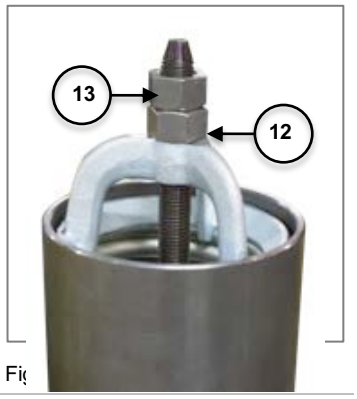


Figure 4-46 Loosen Nuts

4.5.5 Release the spring compressor.

Figure 4-47 Release Spring

4.5.6 Tighten the locknut (item 13) against the spring adjustment nut (item 12) to lock the setting.



Fi

4.5.7 Retest the valve STD and determine how much pressure change occurred when the spring adjustment 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. Refer to Table 4-2 Start-To-Discharge (STD) and Vapor-Tight Pressure (VTP) Settings

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

4.5.9 When the test results are acceptable, tighten the locknut (item 13) to torque at 85–95 ft-lb.

4.6 Post-Test Procedure

4.6.1 After testing the valve, close the pressure inlet valve to the test chamber and vent the pressure in the test stand. Remove putty and drain water. Then remove the valve from the test fixture.

4.6.2 Wipe or blow away any remaining soap suds and water used in the testing.

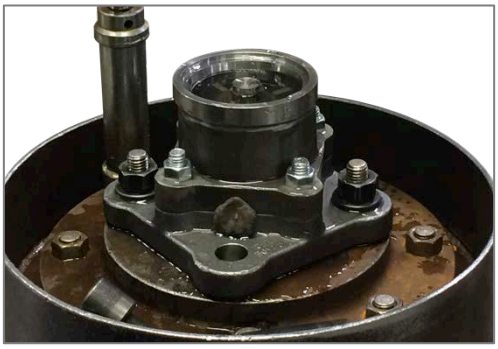


Figure 4-49 Wipe Away Water or Soap Suds

4.6.3 Install seal wire (item 16).

Figure 4-50 Install Seal Wire

4.6.4 For carbon-steel valves, 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.

4.6.5 Permanently attach a metal tag to the valve body with repair/test date, and repair facility identification.

4.6.6 Store the valve in a clean, dry place until ready to use.

5 Routine Maintenance

No regular, periodic maintenance of the mechanical workings of this valve is required outside of regular standard qualification. However, Midland recommends that the installed valve be inspected on a regular basis to ensure that the tamper wire and weather cap are in place and that the external visible valve body is free of any foreign materials that could impact its intended operation.

NOTICE

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

5.1 Repair Procedure

NOTICE

NOTICE: When performing this procedure, it is recommended that there is no pressure in the tank car.

SAE Wrench	Component(s)/Description	Item #
3/4"	Nuts for Top Guide (x4)	15
151/6"	Top Locknut	8
1"	Flats on O-Ring Retainer	3
Other Tools, Supplies, and Equipment:		
Non-Scratching Tool to Remove O-Rings	O-Ring	10, 11

Table 5-1 Recommended Tools for Valve Repair

NOTICE

NOTICE: Replaceable parts for In-Service Maintenance include: top guide (item 1), retainer (item 3), top locknut (item 8), neoprene washer (item 9), seat O-Ring (item 10), stem O-Ring (item 11), studs (items 14 and 14A), stud nuts (item 15), and wire seal (item 16). Refer to pages 6-10 for complete parts listings.

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

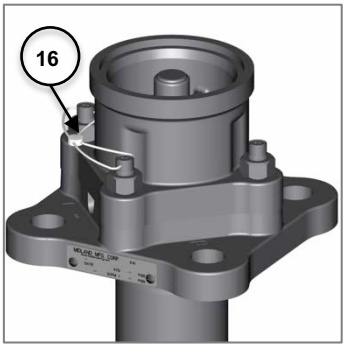


Figure 5-1 Remove Wire Seal

5.1.2 Then, remove the four (4) top guide nuts (items 15) and store them so they won't be dropped or lost.

TIP: Use a 3/4" wrench to remove the top guide nuts (item 15).

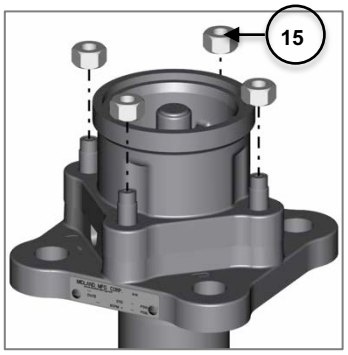


Figure 5-2 Remove Bolts and Set Aside

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

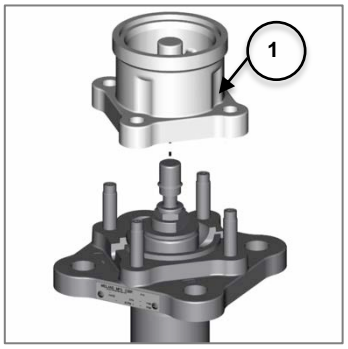


Figure 5-3 Remove Top Guide

5.1.4 Next, put a wrench on the flats of the O-ring retainer (item 3) and another wrench on the top locknut (item 8). 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.

CAUTION

CAUTION: Be careful to avoid rotation of the stem. Rotation of the stem can damage the seat.

TIP: Use a 15/16" wrench for the O-ring retainter (item 3) and the top locknut (item 8).

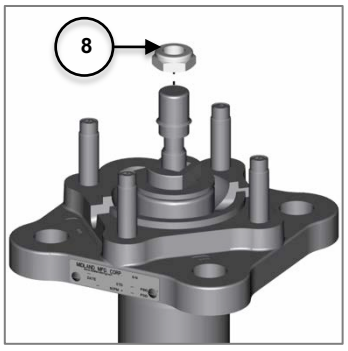


Figure 5-4 Remove Top Locknut

5.1.5 Replace the retainer (item 3).

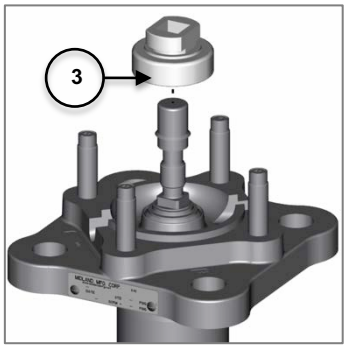


Figure 5-5 Replace Retainer

5.1.6 Insert (2) O-rings (items 10 and 11) into the retainer (item 3).

Figure 5-6 Insert O-Rings

5.1.7 Place the retainer (item 3) with the seat O-ring assembly onto the stem (item 2) so that it rests squarely on the valve assembly.

CAUTION: Rotation of the stem can damage the seat.

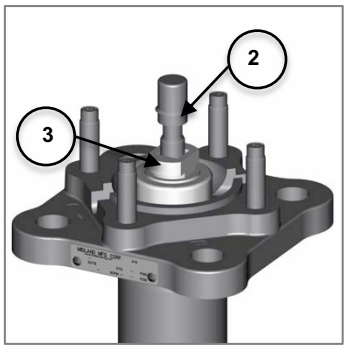


Figure 5-7 Place Retainer

5.1.8 Screw the top locknut (item 8) onto the stem (item 2).

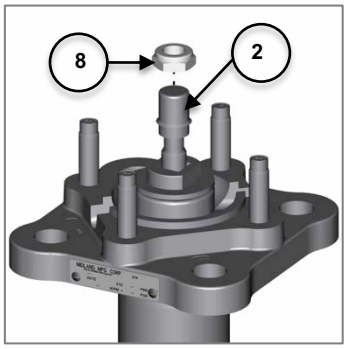


Figure 5-8 Install Locknut

5.1.9 While holding the retainer (item 3), tighten the top locknut (item 8) using a torque wrench calibrated to 65 ± 5 ft-lb.

TIP: Use a 15/16” wrench to tighten the top locknut (item 8).

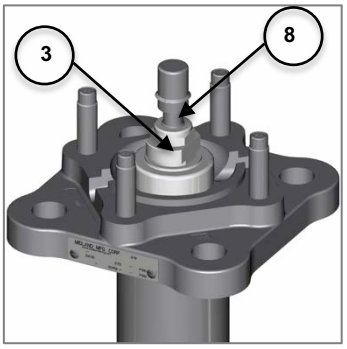


Figure 5-9 Loosen Locknut

5.1.10 Screw on and tighten the (x4) mouting nuts (item 15) to the top guide (item 1).

TIP: Use a 3/4” wrench to tighten nuts (item 15).

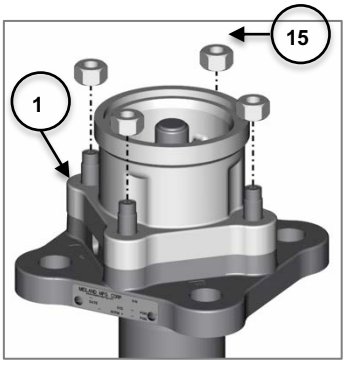


Figure 5-10 Install Mounting Nuts to Top Guide

5.1.11 Testing Process – To complete this process, it will be necessary to pressurize the tank car in accordance with car owner’s requirements.

Bubble leak seat test must be preformed per car owner’s specifications.

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.

CAUTION

CAUTION: Do not look directly down into the the valve, debris may discharge upwards.

NOTICE

NOTICE: If the test results are erratic, troubleshooting is more complex. Consult your surpervising engineer or a Midland Maufacturing representative.

6 Emergency Response for Leaking Valve

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 internal style 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: 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.

Appendix A Elastomer Options

A.1 O-Rings

A wide variety of O-rings are available for specific commodity requirements. Below is a list of the most commonly used O-rings for A-1000 series valves.

Item #	Part # (Ref. Below for Suffix)	Item Description	Examples
10	10-10-XX	Seat O-Ring	10-10-BN = Seat O-Ring, Buna®-N
11	10-11-XX	Stem O-Ring	10-11-NE = Stem O-Ring, Neoprene
	Suffix	Suffix Description	
	BN	Buna®-N	
	BNFG	Buna®-N Food-Grade	
	BNLT	Buna®-N Low-Temperature	
	EP	Ethylene Propylene	
	EPDM	Ethylene Propylene with Diene	
	NE	Neoprene	
	NEFG	Neoprene Food-Grade	
	VA	Viton® A	
	VB	Viton® B	
	VG	Viton® G	
	VGFS	Viton® GFS	
	WBNFG	White Buna®-N Food-Grade	
	WNEFG	White Neoprene Food-Grade	

Table A-1 O-Ring Options

Contact Midland Manufacturing at 1-847-644-0333 for all available O-rings.

MIDLAND

PART OF OPW A DOVER COMPANY

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