



## **Rupture Disc Device (RDD)** **A-430-S, A-432-S & A-434-S Series**

**Installation, Operation & Maintenance (IOM) Manual**

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# 1 Regulations and Safety Requirements

## 1.1 Regulations

Midland fittings and accessories are used in connection with a variety of commodities. Many of those are hazardous materials and could cause serious injury or damage if mishandled.

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

## 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 fitting or assembly.

- **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**



**WARNING: Disc Device Leakage.** Improper seating in the flange groove, loose nuts and damaged gaskets may result in leaks at the rupture disc-mounting joint.



**NOTICE:** The cotter pins are positioned to prevent the nuts from being completely taken off the studs.



**NOTICE:** It may be necessary to use a screwdriver to dislodge the disc. Be careful when using a screwdriver to not gouge into the surface that the disc sits on. Any gouges could result in a leak path around the disc.



**NOTICE:** Routine Maintenance involves RDD inspection and component replacement for devices in-service on tank cars in accordance to the car owner's standard maintenance program to ensure the device performs the intended function without failure until the next qualification, or for the design life. Routine maintenance may be done with the device installed on the railcar.



**WARNING:** Exercise extreme caution when inspecting the RDD and/or its disc if there is any pressure in the tank. Even though there may be only a nominal amount of pressure in the tank, the disc may be weakened or cracked. If there is a hard-plastic disc in the RDD it may shatter explosively. Do not stand directly over the RDD. Be prepared with the proper protective equipment in the event there is an unanticipated product emission through the RDD.



**WARNING:** Do not permit the pressure to exceed 60% of the disc's rated rupture pressure.



**NOTICE:** If the device still leaks after reassembly, do not send it out to have the seat refaced. Consult Midland about the proper remedial steps.



## 2 Introduction

The Midland A-430-S, A-432-S and A-434-S Rupture Disc Devices (RDD) are a non-reclosing pressure-relieving device. They provide reliable, fail-safe operation and are engineered for fast, easy disc replacement in the field, saving installation time and maximizing in-service time.

Features include:

- Operates at pressures from 75 psi to 165 psi
- Heavy-duty construction
- Compatible with a wide range of commodities
- Built-in surge protection

### 2.1 Dimensions

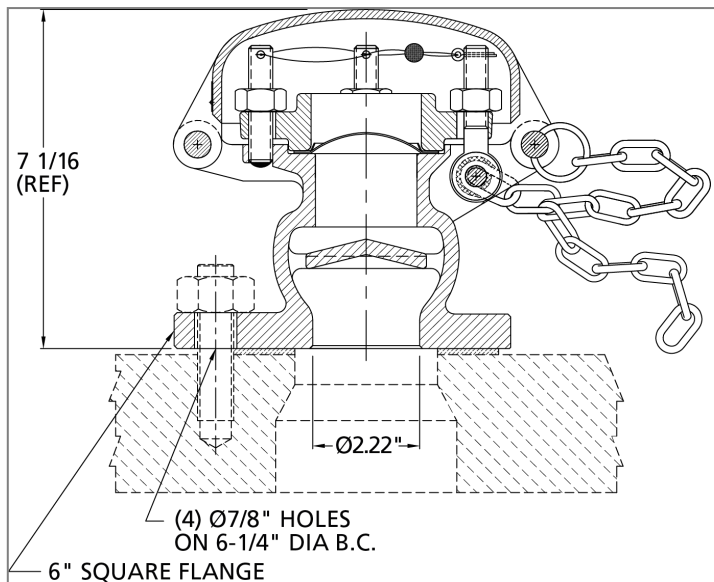


Figure 2-1 Dimensions – A-430-S, A-432-S, A-434-S

## 2.2 Details – Component Identification and Parts Listing

ITEM	QTY	PART DESCRIPTION	A-430-S		A-432-S		A-434-S	
			MATERIAL	PART NO.	MATERIAL	PART NO.	MATERIAL	PART NO.
1	1	TOP COVER	MALL. IRON	425-1-MI	MALL. IRON	425-1-MI	STAINLESS STEEL	429-1-SS
2	1	BASE, FLANGED	STEEL	437-2-CS	STAINLESS STEEL	437-2-SS	STAINLESS STEEL	437-2-SS
3	1	RUPTURE DISC <sup>2</sup>	STAINLESS STEEL <sup>1</sup>	425-3-SS	STAINLESS STEEL	425-3-SS	STAINLESS STEEL <sup>1</sup>	425-3-SS
4	1	RETAINER	DUCTILE IRON	425-4-DI	DUCTILE IRON	425-4-DI	STAINLESS STEEL	429-4-SS
5	1	SWING PIN ASSM.	SS/STEEL	425-5-XS	SS/STEEL <sup>1</sup>	425-5-XS	ALUMINUM/STEEL	429-5-SS
6	4	NUT	STEEL	425-6-CS	STEEL <sup>1</sup>	425-6-CS	STAINLESS STEEL	429-6-SS
7	3	STUD	STEEL	425-7-CS	STEEL <sup>1</sup>	425-7-CS	NITRONIC 60	429-71-N60
8	1	HINGE PIN	STEEL	524-8-CS	STEEL	524-8-CS	STAINLESS STEEL	429-8-SS
9	1	EYEBOLT PIN	STEEL	425-9-CS	STEEL	425-9-CS	STAINLESS STEEL	429-9-SS
10	1	CHAIN	STEEL	24-3-CS	STEEL	24-3-CS	STEEL <sup>1</sup>	24-3-CS
11	4	COTTER PIN	STAINLESS STEEL	429-72-SS	STAINLESS STEEL	429-72-SS	STAINLESS STEEL	429-72-SS
12	1	EYEBOLT	STEEL	425-12-CS	STEEL <sup>1</sup>	425-12-CS	STAINLESS STEEL	429-12-SS
13	1	WIRE SEAL <sup>2</sup>	SS/LEAD	22-72-PB	SS/LEAD	22-72-PB	SS/LEAD	22-72-PB
14	1	TANK CHAIN <sup>2</sup>	STEEL	425-14-CS	STEEL <sup>1</sup>	425-14-CS	STEEL <sup>1</sup>	425-14-CS
15	2	SCREW/RIVET	STAINLESS STEEL	425-15-SS	STAINLESS STEEL	425-15-SS	STAINLESS STEEL	425-15-SS
16	1	NAME PLATE	STAINLESS STEEL	425-16-SS	STAINLESS STEEL	425-16-SS	STAINLESS STEEL	425-16-SS

Table 2-1 Parts Listing – A-430-S, A-432-S, A-434-S

### NOTES:

1. ALTERNATE MATERIALS ARE AVAILABLE
2. NOT FURNISHED UNLESS REQUESTED
3. AAR #PRD102008

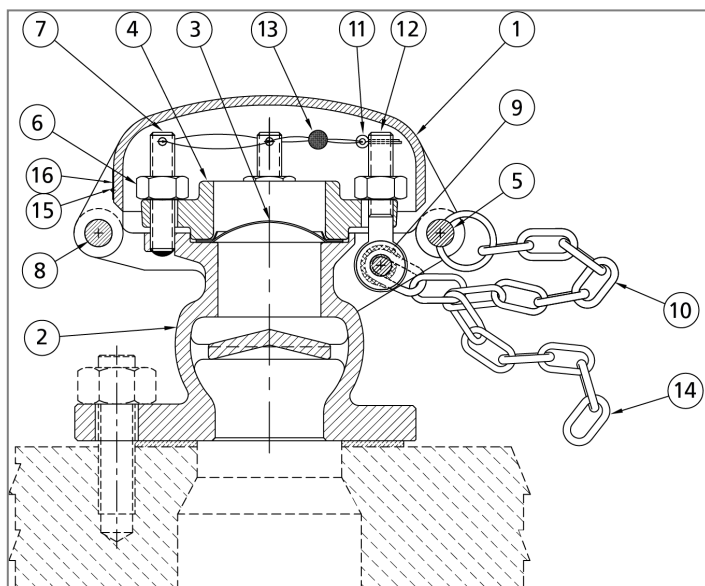


Figure 2-2 Component Identification – A-430-S, A-432-S, A-434-S Series

## 3 Installation and Operation

The pressure-containment element is a rupture disc, which when new is carefully tested in accordance with AAR Appendix A. It is actuated by a pressure buildup inside the tank, due to either substantial heat input into the tank or pressure spikes generated by surging liquid in the tank. It is advisable for all personnel to stay away from the device, unless inspection and maintenance are to be performed on it.

### 3.1 Installation Procedure and Required Tools

SAE Wrench	Component(s)/Description
1-1/4" (Recommended)	Mounting Stud Nuts
<b>Other Tools, Supplies, and Equipment:</b>	
Torque Wrench	Mounting Stud Nuts
Wire Brush	To Clean The Valves And Cover-Plate Sealing Surfaces
Lint-Free Cloth	To Clean Sealing Surfaces
Rubber Sheet	Plug

Table 3-1 Required 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 device 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, and replace if necessary.
- 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 device and cover-plate sealing surfaces and the mounting-stud threads.
- 3.1.5 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.

- 3.1.6 Remove the rubber plug from the cover plate.
- 3.1.7 Position the disc 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.

- 3.1.8 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.



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



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



**TIP:** Use a 1-1/4" wrench to tighten mounting nuts.

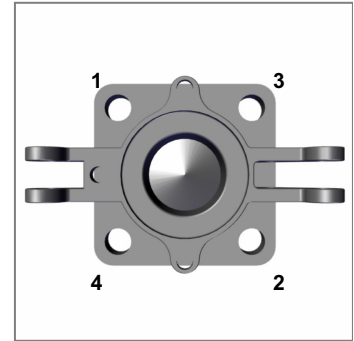


Figure 3-1 Tightening Sequence

## 3.2 Leak Inspection

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



**WARNING: Disc Device Leakage.** Improper seating in the flange groove, loose nuts and damaged gaskets may result in leaks at the rupture disc-mounting joint.

## 4 Qualification



**NOTICE:** Nuts, washers and studs must be closely inspected before re-use or replaced regularly.  
Device components such as the top cover, rupture disc, retainer, and base must be thoroughly inspected.

### 4.1 Disassembly and Required Tools

SAE Wrenches	Component(s)/Description	Item #
1/2" Wrench	Stud Nuts	6
<b>Other Tools, Supplies, and Equipment:</b>		
Wire Cutters	Seal Wire	13
Screwdriver	Retainer and/or Rupture Disc	4, 3

Table 4-1 Required Tools for Disassembly



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

#### 4.1.1 Remove the swing pin (item 5).

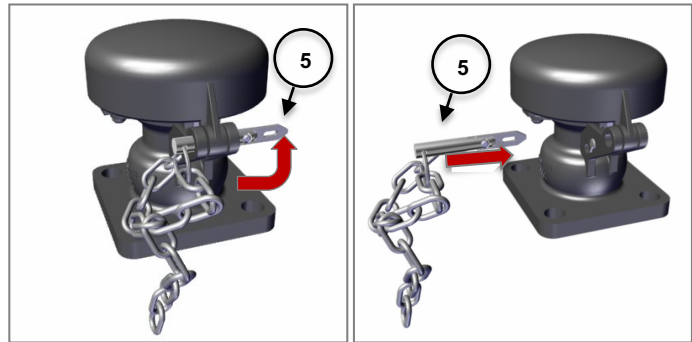


Figure 4-1 Remove Pin

#### 4.1.2 Open the hinged top cover (item 1).

With the hinged top cover open, you can see the rupture disc (item 3), the retainer (item 4) and four (4) nuts (item 6) that fasten to the base (item 2).

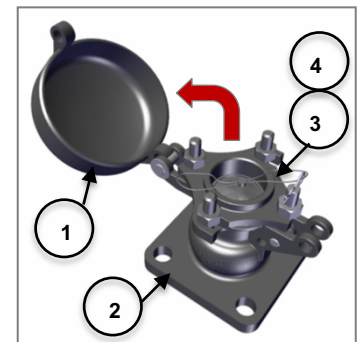


Figure 4-2 Remove Pin

4.1.3 Cut and remove the seal wire (item 13).



**TIP:** Use wire cutters.

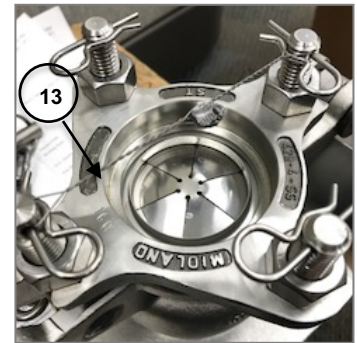


Figure 4-3 Remove Seal Wire

4.1.4 Untighten the four (4) nuts (item 6) up to the stud cotter pins (item 11).



**NOTICE:** The cotter pins are positioned to prevent the nuts from being completely taken off the studs.



**TIP:** Use an 1/2" open-ended wrench to loosen nuts.

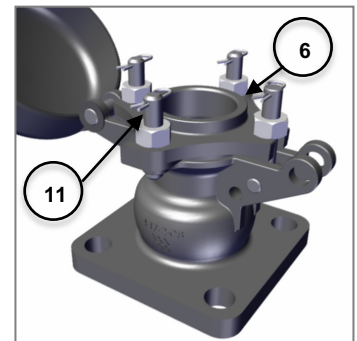


Figure 4-4 Untighten Nuts

4.1.5 The eyebolt (item 12) is hinged to rotate outward. Rotate the eyebolt (item 12) to free the retainer (item 4).

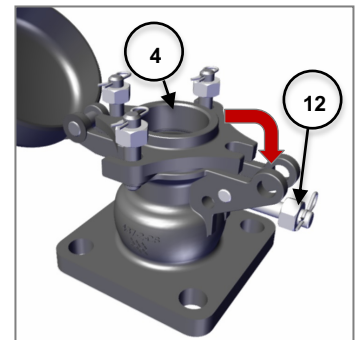


Figure 4-5 Rotate Eyebolt

4.1.6 Remove the retainer (item 4).



**TIP:** If stuck, use a screwdriver to pry it up.

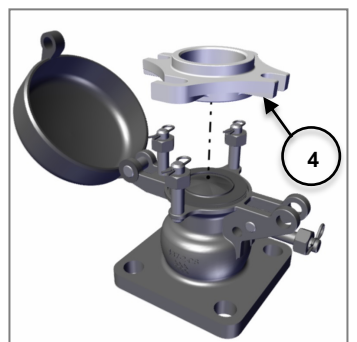


Figure 4-6 Remove Retainer

4.1.7 Remove the rupture disc (item 3) for inspection.



NOTICE

**NOTICE:** It may be necessary to use a screwdriver to dislodge the rupture disc. Be careful when using a screwdriver to not gouge into the surface that the disc sits on. Any gouges could result in a leak path around the disc.

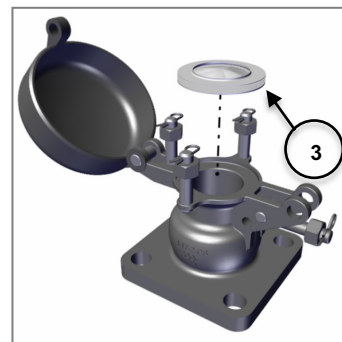


Figure 4-7 Remove Rupture Disc

4.1.8 Remove stud (item 7), nut (item 6) and cotter pin (item 11) assemblies in three locations.

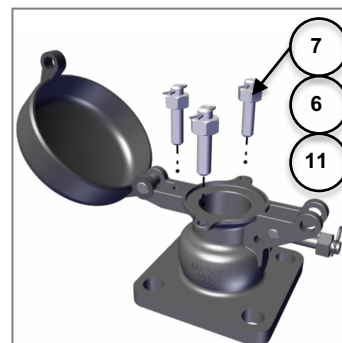


Figure 4-8 Remove Stud/Nuts

## 4.2 Component Inspection

Key components must be thoroughly inspected during the qualification process. These components include the base, disc and retainer.

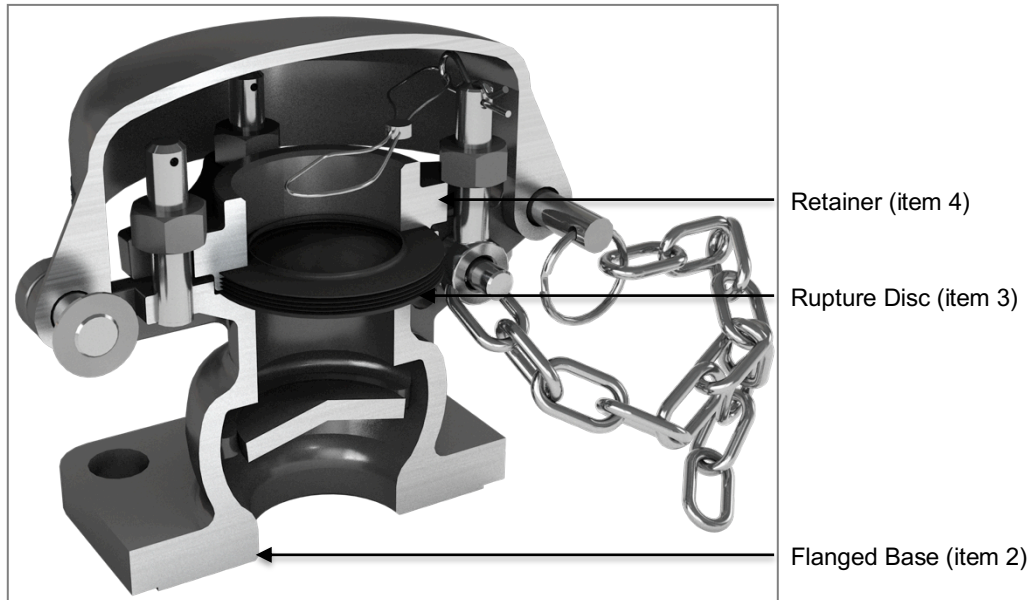


Figure 4-9 RDD Component Inspection



**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.



**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 Base (Flanged) Inspection

Thoroughly inspect the valve base (item 2) for any nicks or imperfections. Clean the sealing surface 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 seat 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 detected, replace this part. **Repair work is limited to cleaning and polishing.**



**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.

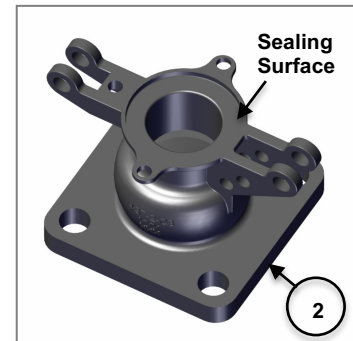


Figure 4-10 Base (Flanged)

#### 4.2.2 Retainer Inspection

Any irregularities can cause the valve to leak. The retainer (item 4) must be free of gouge marks, corrosion, pits and rust, if any of these are present, replace this part; special attention should be paid to the sealing surface. Clean and inspect the seal surface by sanding it lightly with emery paper (400-grit). If this does not effectively clean the groove, replace this part.

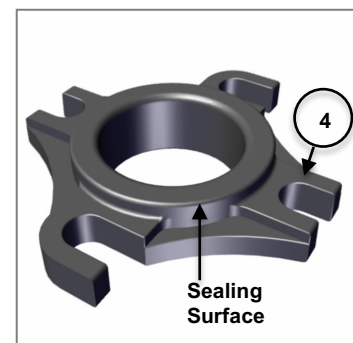


Figure 4-11 Retainer Disc

#### 4.2.3 Rupture Disc Inspection

Inspect the rupture disc (item 3) for cracks, gouges, corrosion or any evidence of malfunctioning. A crack in the rupture disc or the presence of product residue in the center opening of the retainer (item 4) will indicate that the disc must be replaced.

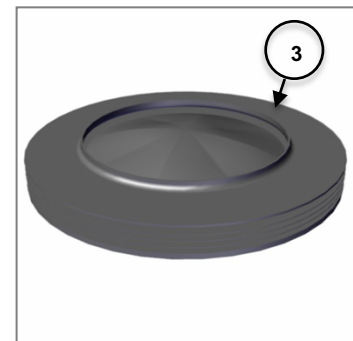


Figure 4-12 Rupture Disc

#### 4.2.4 Stud Inspection

Studs (item 7) should be inspected for corrosion, pitting or defects, and should be replaced if any of these are found.

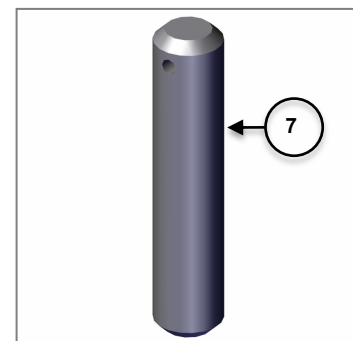


Figure 4-13 Studs

### 4.3 Reassembly and Required Tools

SAE Wrench	Component(s)/Description	Item #	Torque (ft-lb)
1/2" Torque Wrench	Stud Nuts	6	30
<b>Other Tools, Supplies, and Equipment:</b>			
Hammer	—	—	—
Wire Cutters	Seal Wire	13	—

Table 4-3 Required Tools for Reassembly

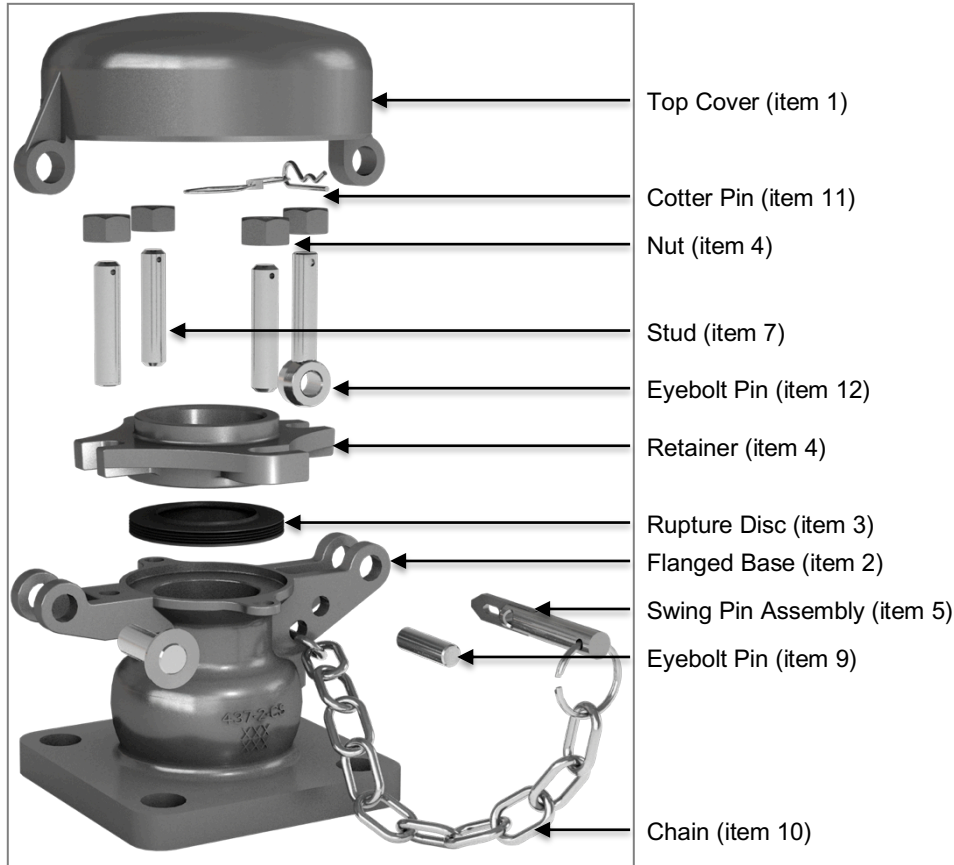


Figure 4-14 RDD Exploded View

- 4.3.1 Locate the three (3) studs (item 7) that go on the base (item 2) and screw them into the base, ensuring that the studs are installed with the side hole facing up.

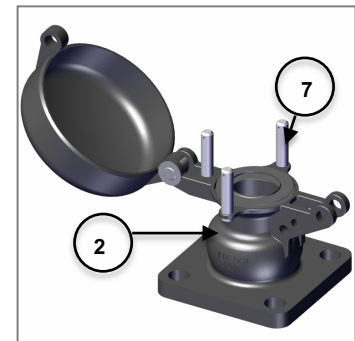


Figure 4-15 Install Studs

- 4.3.2 Turn the base (item 2) upside-down and make sure the studs (Item 7) are slightly past the flush point.

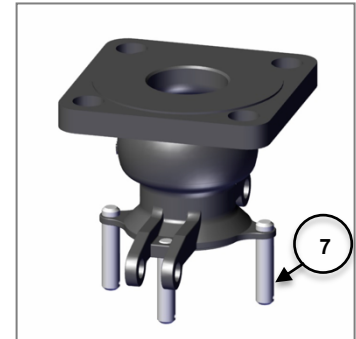


Figure 4-16 Confirm Stud Placement

- 4.3.3 For composite discs (a sandwich of three (3) layers of materials) insert a thin PTFE gasket into the base recess. Softer metals, such as aluminum and lead, will serve as gaskets, so no PTFE gasket is required.

Install the rupture disc (item 3) in place. Ensure correct orientation of the rupture disc when installed; the convex surface should be facing upward.

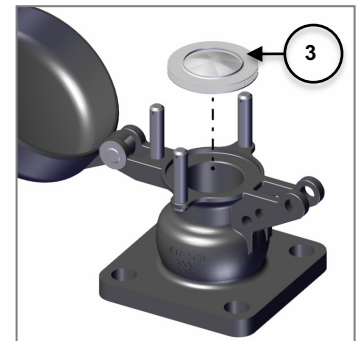


Figure 4-17 Install Rupture Disc

- 4.3.4 Locate the retainer (item 4) and place on the base (item 2) with the lip facing upward.

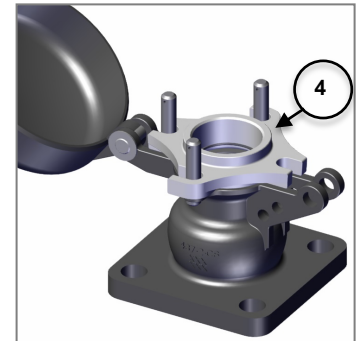


Figure 4-18 Install Retainer

- 4.3.5 Tap the eyebolt (item 12) and pin (item 9) onto the base (item 2), making sure that the pin is flush with the surface on both sides.

Rotate the eyebolt (item 12) up and into its slot on the retainer (item 4).

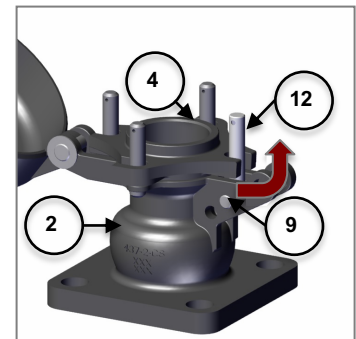


Figure 4-19 Install Eyebolt and Pin

- 4.3.6 Screw the four (4) nuts (item 6) by hand onto the studs (item 7) and eyebolt (item 12) until they bottom out, making sure that the smooth surface of the nut is on the bottom and the writing is on the top.

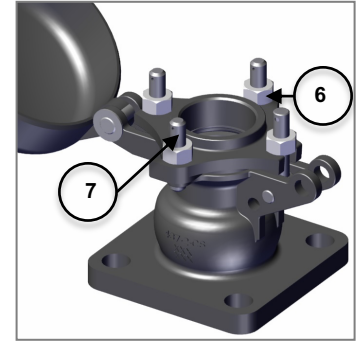


Figure 4-20 Install Nuts

- 4.3.7 Place cotter pins (item 11) in the holes on the four (4) studs (item 7).

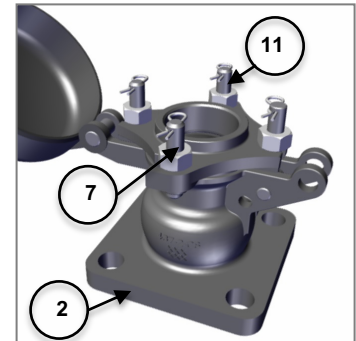


Figure 4-21 Install Cotter Pins

- 4.3.8 Torque the four (4) nuts (item 6) to 30 ft-lb, in three (x3) 10 ft-lb increments.



**TIP:** Use a 1/2" torque wrench to tighten nuts (item 6).

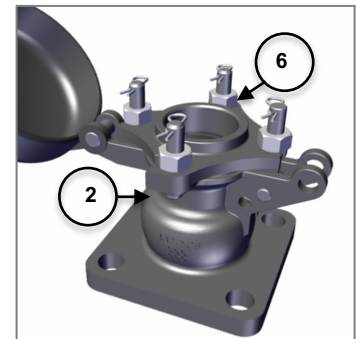


Figure 4-22 Secure Nuts

- 4.3.9 Follow Section 4.4 Testing Process and finish assembly (steps 4.3.10 through 4.3.14) when completed.

- 4.3.10 Install the seal wire through the threads of the two (2) studs (item 7), making sure to place it over the hitch pin.



**TIP:** Use a crimper to seal the wire and twist.

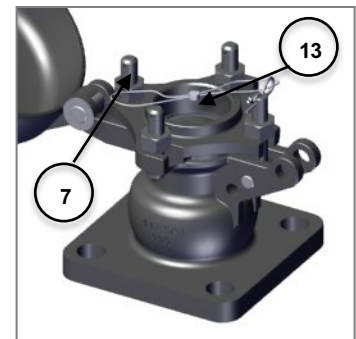


Figure 4-23 Install Seal Wire

- 4.3.11 Close the top cover (item 1) and place the swing pin assembly (item 5) through the front of the base (item 2), making sure that the pin is inserted from right to left.



**TIP:** Use a hammer to slightly tap the hook into position.

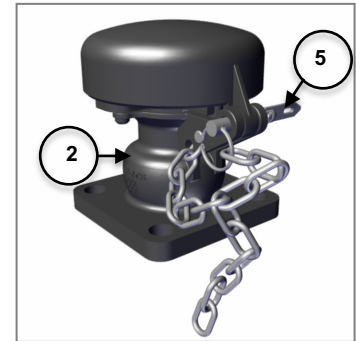


Figure 4-24 Install Chain and Locking Pin

- 4.3.12 Store in a clean, dry place until ready to use.
- 4.3.13 Refer to Sections 4.4 Testing Process and 4.5 Final Assembly when completed.

## 4.4 Testing Process

- 4.4.1 Place the device on the testing fixture and hand-tighten the 1-1/16" nuts.

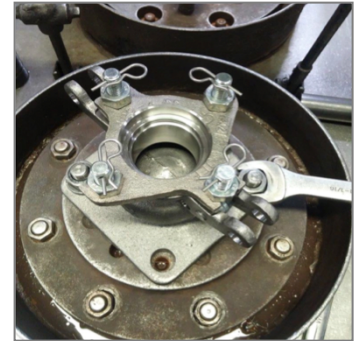


Figure 4-25 Place of Test Fixture

- 4.4.2 Test for two (2) minutes at half the rating of the rupture disc and check for leaks on the rupture disc and around the bottom of the base of the device. If there are leaks, recheck nuts (item 6) tightness. Replace disc (item 3), if necessary, and retest.
- 4.4.3 Remove the device from the test fixture and drain the water out of the rupture disc (item 3).
- 4.4.4 Dry off the device using an air hose; removing any moisture will prevent the vent from rusting during shipping or storage.

## 5 Routine Maintenance



**NOTICE:** Routine Maintenance involves RDD 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. Routine maintenance may be done with the valve installed on the railcar.

### 5.1 Repair Procedure – Rupture Disc

To inspect the rupture disc, all Midland RDDs have a patented inspection capability.



**WARNING:** Exercise extreme caution when inspecting the RDD and/or its rupture disc if there is any pressure in the tank. Even though there may be only a nominal amount of pressure in the tank, the disc may be weakened or cracked. If there is a hard-plastic disc in the RDD it may shatter explosively. Do not stand directly over the RDD. Be prepared with the proper protective equipment in the event there is an unanticipated product emission through the RDD.

- 5.1.1 Remove the swing pin (item 5).
- 5.1.2 Open the top (item 1). It is hinged on the hinge pin (item 8).

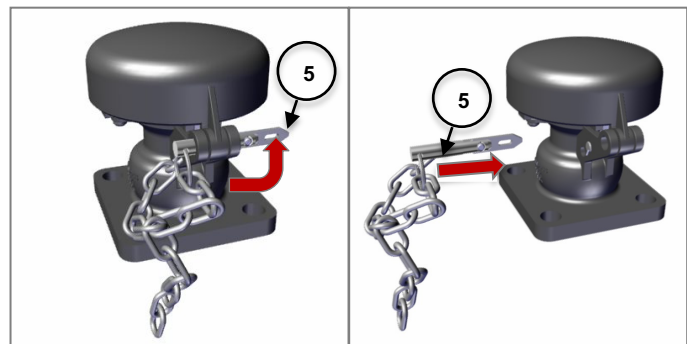


Figure 5-1 Remove Swing Pin

- 5.1.3 Untighten the four (4) nuts (item 6) up to the stud cotter pins (item 11).



**NOTICE:** The cotter pins are positioned to prevent the nuts from being completely taken off the studs.



**TIP:** Use an 1/2" open-ended wrench to loosen nuts.

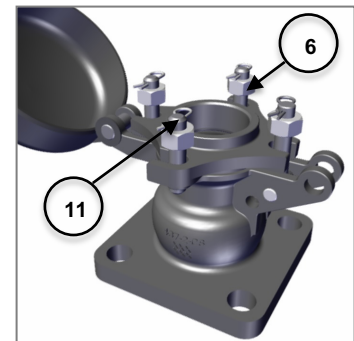


Figure 5-2 Unscrew Nuts

- 5.1.4 The eyebolt (item 12) is hinged to rotate outward. Rotate the eyebolt (item 12) to free the retainer (item 4).

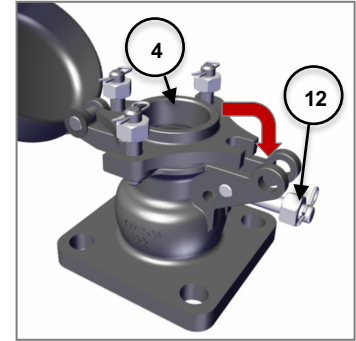


Figure 5-3 Unhinge Eyebolt

- 5.1.5 Remove the retainer (item 4).



**TIP:** If stuck, use a screwdriver to pry it up.

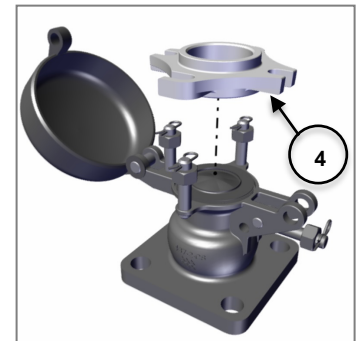


Figure 5-4 Remove Retainer

- 5.1.6 Take out the old rupture disc (item 3). This could result in the creation of a leak path around the disc. Discard the old disc.



**TIP:** It may be necessary to use a screwdriver to dislodge the rupture disc. Be careful when using the screwdriver not to gouge the surface that the disc sits on.

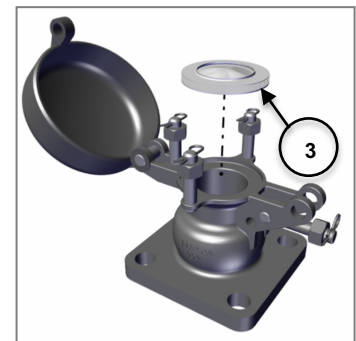


Figure 5-5 Remove Rupture Disc



- 5.1.7 Clean out the recess in the base (item 2) where the rupture disc was located. Inspect the surface to ensure that it is free of defects that would cause a leak around the disc to occur.



**TIP:** Use a wire brush to dislodge any solidified product. Use a clean cloth to wipe away the debris.

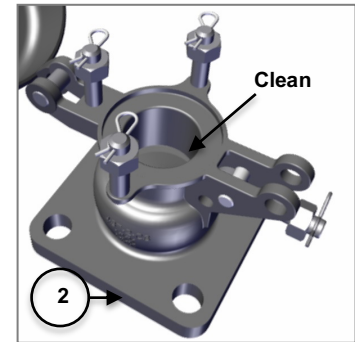


Figure 5-6 Clean Base

- 5.1.8 If you decide to change the rupture disc, be prepared for product to be released through the RDD. Wear suitable protective clothing. Stand upwind of the RDD. Another person should be present to go for assistance if additional help is unexpectedly required.



**WARNING**

**WARNING:** Crack open an air vent valve to check to see if there is pressure in the tank. If pressure escapes, you know there is pressure in the tank. If no pressure escapes from the vent valve, there still is no assurance that there is no pressure in the tank as the air valve may be plugged with product. Always be prepared for the worst conditions and take all necessary precautions.

- 5.1.9 For composite discs (a sandwich of three (3) layers of materials) insert a thin PTFE gasket into the base recess. Softer metals, such as aluminum and lead, will serve as gaskets, so no PTFE gasket is required.

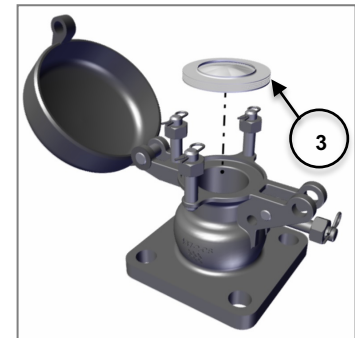


Figure 5-7 Insert PTFE Gasket

- 5.1.10 Put the disc in the recess and reposition the retainer (item 4) (the 3-1/8" diameter surface faces downward) and swing the eyebolt (item 12) to the vertical position.

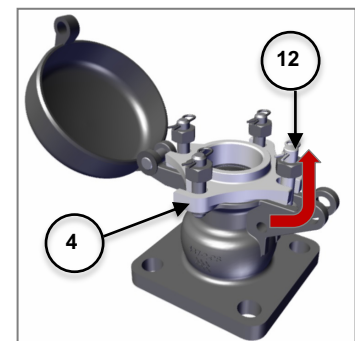


Figure 5-8 Install Retainer and Eyebolt

- 5.1.11 If there is any pressure in the tank, it will try to dislodge the rupture disc as you tighten the four (4) nuts (item 6). Keep the rupture disc centered in the recess with a finger pressing lightly down on it.



**TIP:** Alternately tighten down the nuts in the following sequence: 1 and 3, then 2 and 4, at a torque of 30 ft-lb.

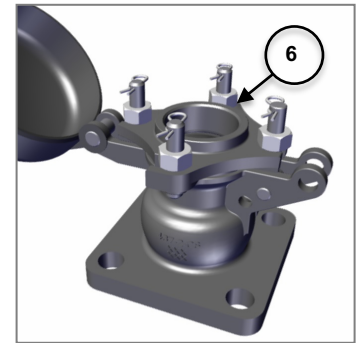


Figure 5-9 Tightening Nuts in Sequence

- 5.1.11.1 Since it may not be possible to get a pressure test for leakage with the RDD assembly mounted on the tank, close the hinged top cover (item 1) and insert the swing pin (item 5).
- 5.1.11.2 If the RDD is being bench-tested, and a new disc has been installed, it is possible to check around the disc for leaks. In this case, bring the pressure in the test chamber up slowly.



WARNING

**WARNING:** Do not permit the pressure to exceed 60% of the disc's rated rupture pressure.

- 5.1.12 Use a liquid leak detector (Snoop®, or similar) around the retainer and in the central cavity above the disc to check for evidence of leakage.
- 5.1.13 If there is leakage between the disc and its seat, disassemble the RDD and reclean the recess in the body. A new disc or gasket may be required.



NOTICE

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

- 5.1.14 If no leaks are apparent, relieve the pressure in the test chamber and un-mount the RDD.
- 5.1.15 Drain whatever water may have accumulated and wipe or blow away with an air hose any soap suds and water that may remain after the test.
- 5.1.16 Put an appropriate preservative or paint on the exterior surfaces of the RDD. Store in a dry place until ready to use.



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