

The Baier Rail Single Bolt Manway

Installation, Maintenance, and Operation Manual

Updated as of 07/22/2022



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1. General

a. Introduction

Please read this manual prior to using the product, and follow the proper operation, inspection, and maintenance.

b. Safety First



i. All BTSB Manway installations must be performed at an Association of American Railroads (AAR) certified tank car facility and by trained personnel. The following instructions should only be used as a supplemental guide and in no way supersede the operating, safety, welding, or quality assurance procedures of the tank car facility.

ii. Although the manway cover includes a lift-assist spring, maintenance personnel should use extreme caution when interacting with the BTSB manway cover assembly while it is in the open position to avoid injury from accidental closure.

c. Warranty

i. Go to <https://baierrail.com/documents/#documents-warranty>

2. Product Description

a. Models

MODELS	DESCRIPTION	DIM "A"
<i>COVER ASSEMBLIES</i>		
BTSB	Cover Assy, carbon steel construction with stainless steel O-ring sealing surfaces	N/A
BTSB-SS	Cover Assy, stainless steel on all surfaces in contact with commodity (internally)	N/A
<i>NOZZLES</i>		
BNTZ-R-5	Nozzle, Retrofit, stainless steel on all surfaces in contact with commodity (internally)	5.5
BNTZ-SS-9.625	Nozzle, New Construction, DOT-111, stainless steel on all surfaces in contact with commodity (internally)	9.625
BNTZ-SS-12.5	New Construction, DOT-117, stainless steel on all surfaces in contact with commodity (internally)	12.5

b. Envelope Dimensions and Part Identification

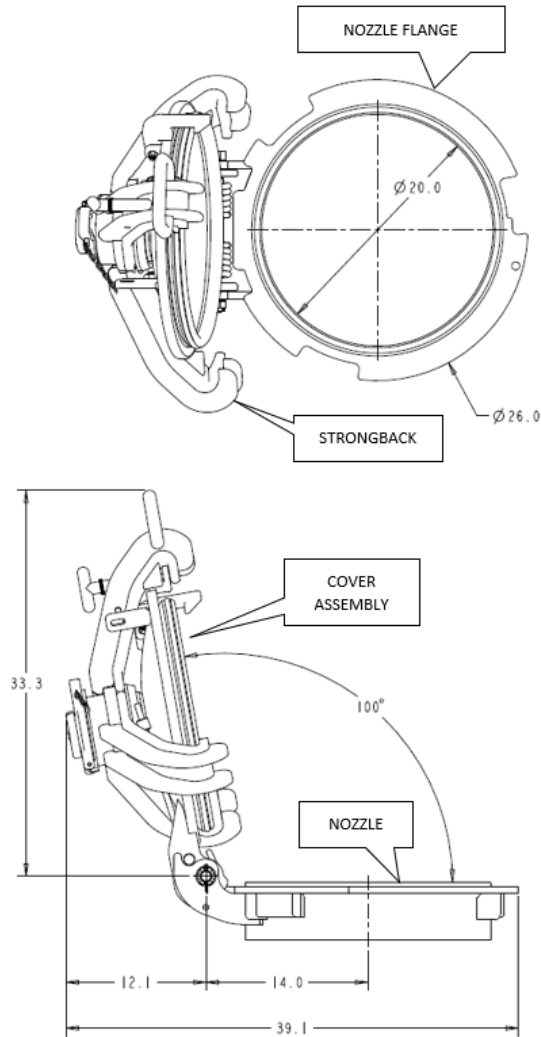


Figure 1A - Envelope Dimensions – Shown in Open-Lock-Position

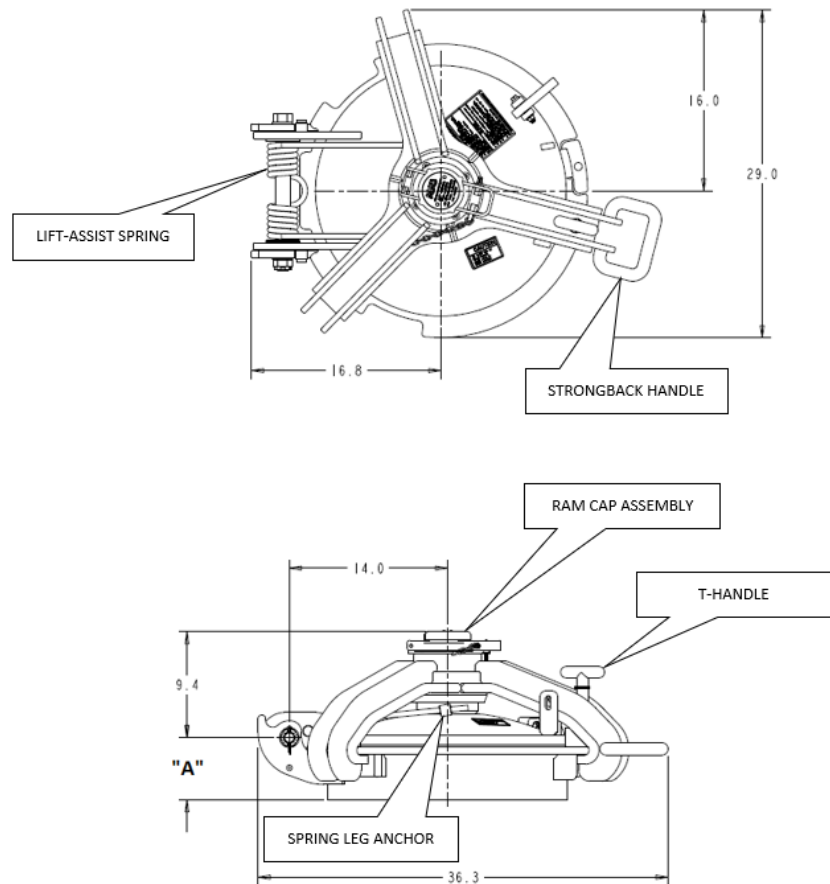


Figure 1B - Envelope Dimensions – Shown in Closed-Lock-Position

- c. Shipping
 - i. Nozzles and cover assemblies are shipped separately. This allows the cover assemblies to be safely stored while the nozzles are being welded to the tank car. All Baier Rail cover assemblies and nozzles are interchangeable.

3. Inspection of Sealing Elements (Inspect before adding to tank car)

- a. Nozzle Sealing Surface
 - i. The nozzle sealing surface must be free from damage, debris, or defects. If the sealing surface needs to be repaired or cleaned, follow the instructions in section 5.b.ii.2.a.
 - ii. See figure 2 for inspection dimensions.
- b. Cover O-ring Channel
 - i. The cover O-ring channel must be free from damage, debris, or defects. If the sealing surface needs to be repaired or cleaned, follow the instructions in section 5.b.ii.2.a.
 - ii. See figure 3 for inspection dimensions.
- c. Cover O-ring

- i. Inspect the cover O-ring for defects such as cuts, tears, debris, or raised areas. If any defects are found, the O-ring must be replaced before using the BTSB manway.

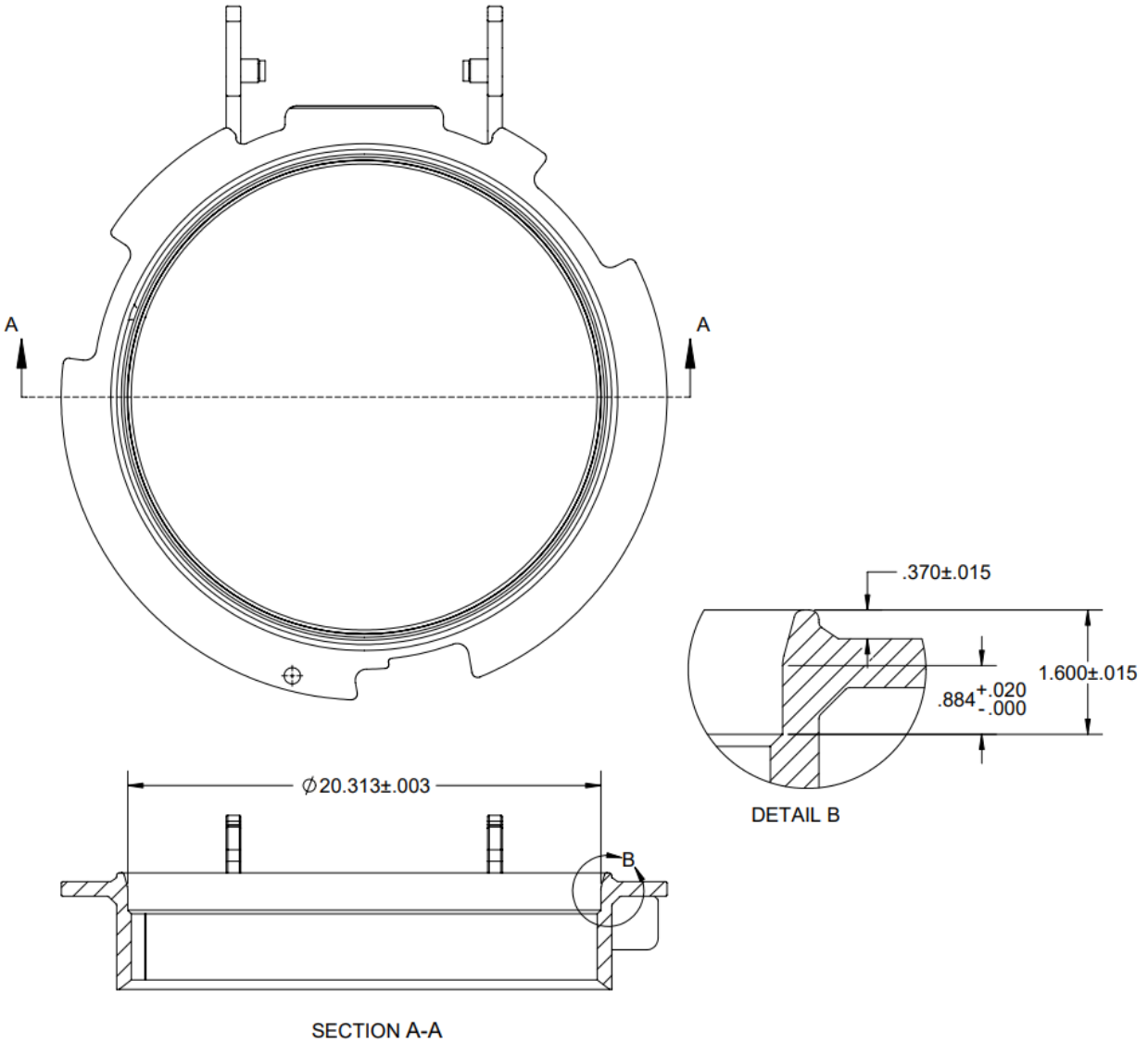


Figure 2- Nozzle Incoming Inspection Dimensions

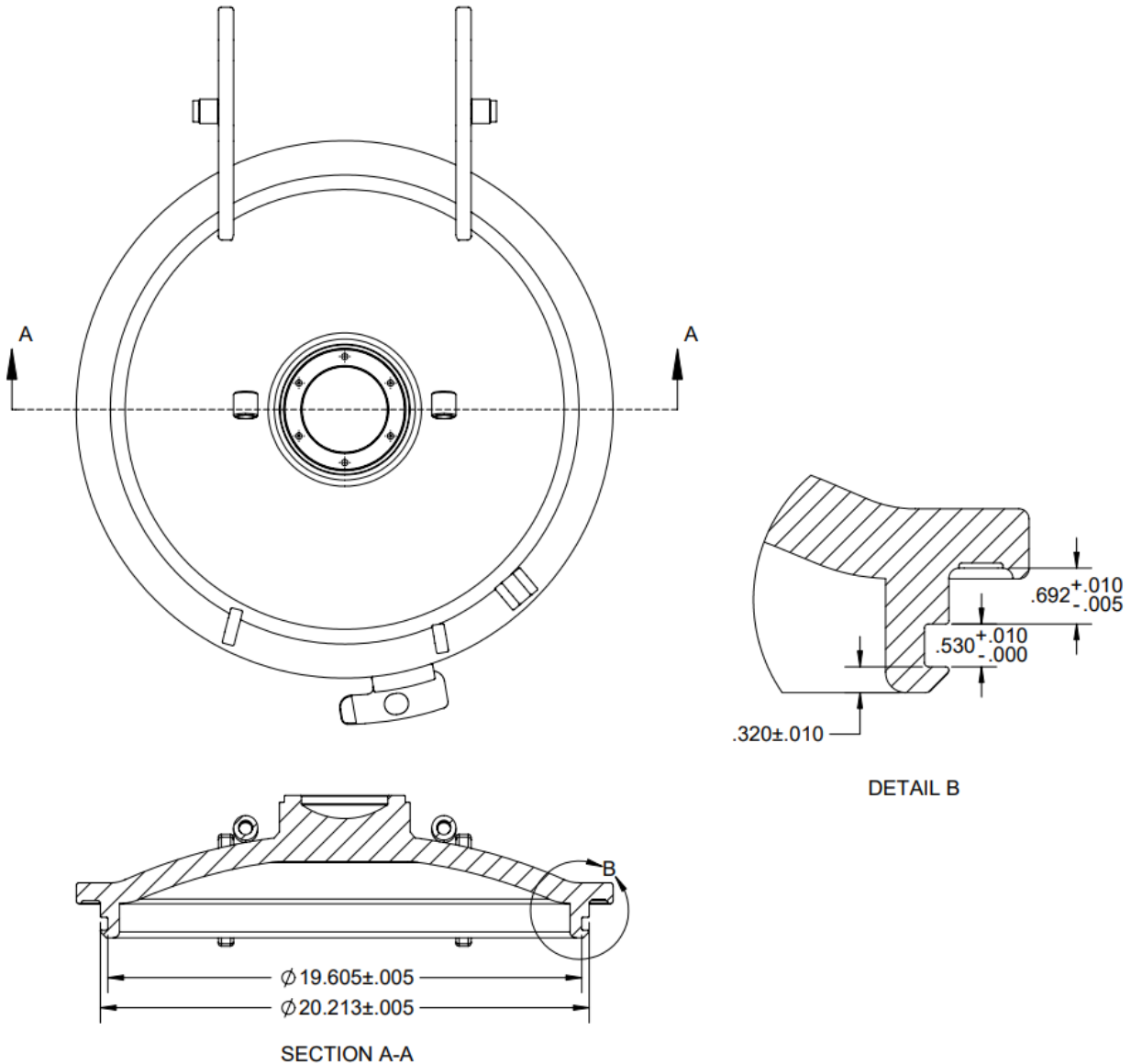


Figure 3- Cover Incoming Inspection Dimensions

4. Adding the Nozzle to the Tank Car

- a. Regardless of whether the nozzle is applied in a new tank car build or retrofitted into an existing tank car there are several actions in production that can affect the nozzle shape and its ability to provide an effective seal once the cover assembly is added. While some distortion of the nozzle must be allowed due to normal tank car production processes, keeping the nozzle sealing surface as round as possible, and free of damage are key to ensuring a good seal. The following actions should be carefully monitored as the tank moves through the various stages of production.
 - i. Welding. The high heat generated during welding can potentially create nozzle distortion. For this reason, use Baier Rail's stabilizing fixture (available from

- Baier Rail's distributor) and the "back step" welding method. Contact Baier Rail Sales for more information.
- ii. Choosing the stub nozzle material type. If welding Baier Rail's retrofit nozzle to a nozzle stubbed out from the tank, carbon steel is recommended for the stub nozzle in all cases, due to its superior mechanical properties over stainless steel. It is more apt to maintain its shape as welding is performed.
 - iii. Normalizing the tank. If welding any Baier Rail nozzle prior to normalizing the tank, use Baier Rail's stabilizing fixture during weld and keep it in place throughout tank normalization and cool down.
 - iv. Transporting the tank using overhead cranes. If using an overhead crane to transport the tank during build, insure there is adequate support for the tank to keep its shape, and subsequently the shape of the nozzle. The use of internal tank shoring is recommended, as well as leaving the Baier Rail stabilizing fixture in place.
 - v. Hydro testing. Filling and emptying the tank of water at this stage can have an influence on nozzle shape. Because the cover assembly is used to seal up the tank during hydro, the Baier Rail stabilizing fixture noted above cannot be used. A separate fixture is available for use in hydro testing. Contact Baier Rail Sales for more information.
 - vi. Welding the outer tank shell to the nozzle. While this activity may have less impact to nozzle roundness than those listed above, to eliminate any uncertainty use the Baier Rail stabilizing fixture.
 - vii. Use the right tools. When using any tools be careful to avoid impacting the nozzle sealing surface abruptly, causing dings or scratches, which can negatively affect its ability to provide seal.
- b. After all production processes have been completed, the acceptable out-of-round condition of the nozzle sealing surface is 20.293 – 20.373 diameter, in any direction. Baier recommends taking nozzle measurements at various stages. If, for any reason, the nozzle sealing surface has moved outside of the 20.293-20.373 diameter allowable specification by the time hydro test is completed a hydraulic ram may be used to bring it back into specification; however, be sure to use this tool prior to welding the outer tank shell to the nozzle. Contact Baier Rail Sales for more information on the use of hydraulic rams.

5. Installing the Cover Assembly

a. Cover Assembly Position



- i. The cover assembly should be installed in the open position, when there is no tension on the Lift-assist spring. See Figure 4.
- ii. Use an appropriate means to lift and support the weight of the cover assembly, then align the hinge holes of the cover with the hinge holes of the nozzle.
- iii. Insert the two legs of the lift assist spring into the corresponding anchors on the top of the cover.

- iv. Note the orientation of the center loop of the spring in figure 4. This orientation is necessary to ensure when the cover assembly is closed, the center loop comes to rest on the nozzle in a manner which provides spring lift assist.
- v. Insert the hinge hardware according to Figure 4, with the bolt inserted from left to right.

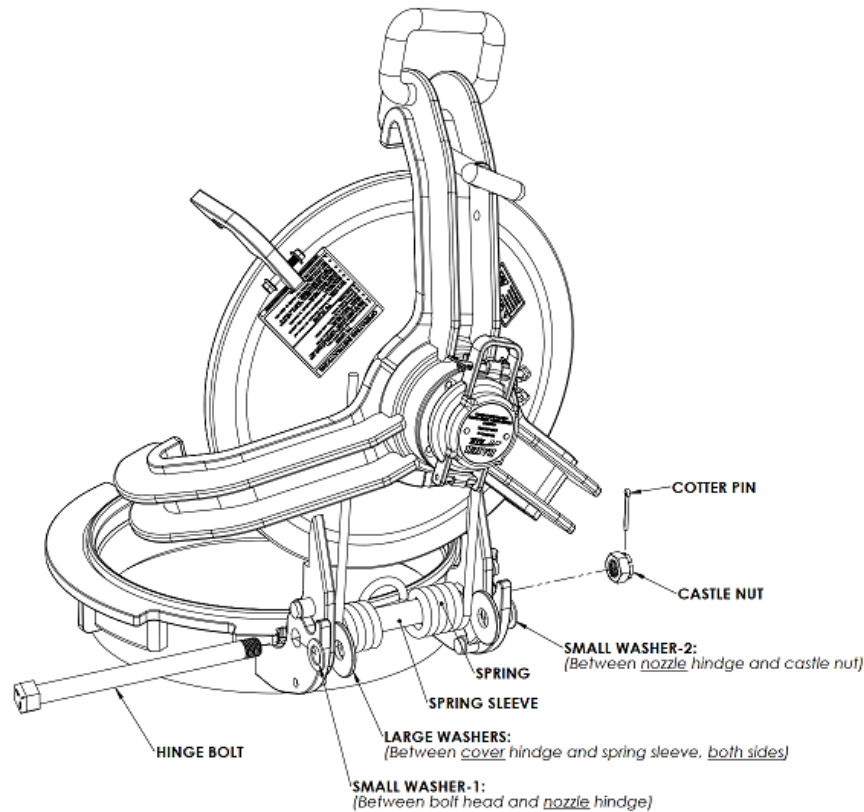


Figure 4 – Lift Assist Spring Orientation and Hinge Hardware Arrangement

- vi. Install the castle nut on to the bolt and thread it until the crown of the bolt passes the hole location on the bolt.
- vii. Using pliers, insert the cotter pin into the hole on the bolt, and bend the cotter pin end back to prevent disengagement.
- viii. Install the O-ring. Align the O-ring into the channel and pull until it snaps into place.



- ix. Close the cover. The loop of the spring should now come into contact with the nozzle flange so that the spring supports the weight of the cover. **IMPORTANT:** Keep hands and other body parts away from the nozzle opening at all times to avoid risk of injury.

b. Closing the Cover Assembly

- i. Note that the strongback is locked in relation to the cover by means of a spring-loaded T-handle locking pin. This is called the **open-lock-position**. With one hand pushing the cover assembly down on the strongback's main handle, pull the T-handle up, and turn the strongback clockwise. Release the T-handle and

continue to turn until the spring-loaded pin of the T-handle releases and fully engages the corresponding hole in the nozzle flange. This is called the **closed-lock-position**. If the strongback does not freely move from one position to another it is due to contact between the surfaces of the strongback arms and the nozzle flange. To eliminate this contact, turn the ram so that the nozzle flange is equally positioned between the strongback “claws” and “wedges” (See figure 5).

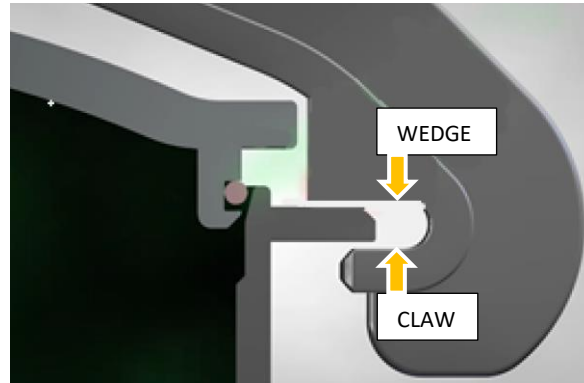


Figure 5 - Strongback in Neutral Position

Note: The claws bear up against the bottom side of the nozzle flange when closing the cover assembly. The wedges bear down against the upper side of the nozzle flange, applying to force to lift the cover assembly out of the nozzle containment.

- ii. With the strongback in the **closed-lock-position** turn the ram clockwise, approximately 5 ½ turns, using a ¾ - inch drive hand tool until the cover is fully seated, which is when the ram will no longer turn. A three-foot breaker-bar is recommended, which can easily produce the torque needed to close the cover. **Do not exceed 200 ft-lbs. of torque to ensure the cover is not difficult to open.**

For more detailed instructions see instructional videos at

<https://baierrail.com/videos/>.

c. Ram Cap Assembly

- i. The ram cap assembly has dual functions. First, it acts as a cover for the ram to help keep dirt, water, and debris from entering the threaded area and interfering with the ram function. Second, the square boss on the underside of the ram cap cover helps restrict the ram from back-driving when closed. The cap movement is limited to a ¼ turn, effectively keeping the cover and strongback in a locked and sealed position.
- ii. The cover assembly must be in the down, locked and sealed position for the ram cap assembly to properly close and for its locking pin to pass freely through the

features that lock it into place. If the locking pin cannot pass through freely, it is an indication that the cover assembly is not down, locked, and sealed. See following illustrations in Figure 6 for details.

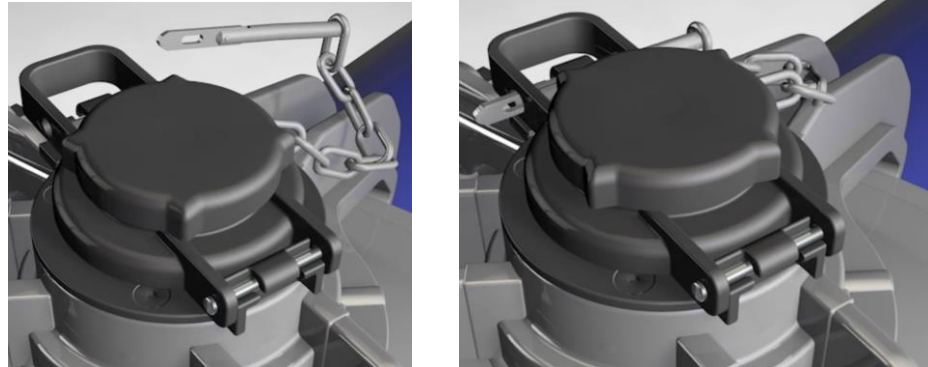


Figure 6 - Cap Assembly and Locking Pin

- d. Opening the Cover Assembly
 - i. Remove the lock-pin and open the ram cap assembly.
 - ii. Using a $\frac{3}{4}$ - inch drive, turn the ram counter-clockwise (approximately $5 \frac{1}{2}$ turns) until it stops to release any residual pressure present in the tank car. Then turn the ram clockwise $\frac{1}{2}$ turn to allow the strongback to swing freely to the **open-lock-position**.
 - iii. Lift the T-handle and rotate the strongback counter-clockwise. Release the T-handle and continue to turn until the spring-loaded pin of the T-handle releases and fully engages the corresponding hole in the nozzle flange. The strongback is now in the **open-lock-position**. If the strongback does not freely move from one position to another it is due to contact between the surfaces of the strongback arms and the nozzle flange. To eliminate this contact, turn the ram so that the nozzle flange is equally positioned between the strongback claws and wedges (See figure 5). Note: The claws bear up against the bottom side of the nozzle flange when closing the cover assembly. The wedges bear down against the upper side of the nozzle flange when opening the cover assembly.
 - iv. Lift the cover assembly up by the strongback handle until the safety latch engages.
 - v. Release safety latch.
 - vi. Continue lifting the cover assembly until fully opened and resting in the over center open position.

6. Maintenance and Part Replacement

- a. Greasing the Single-Bolt Ram
 - i. The ram is pre-greased at the factory; however, it can be re-greased as needed by pushing grease through a Zerk fitting at the bottom of the ram square socket (See figure 7).

1. Fill grease through the Zerk fitting until grease begins to exit through the vent location at the front of the cap assembly, directly under the locking pin channel, as indicated in the following illustration.
2. Continue to purge until exiting grease is free of discoloration due to wear or contaminants.
3. To maintain warranty and maximize product life, use a performance synthetic grease of lithium or lithium complex type thickener, with a service temperature range of -25 to 266°F (-32 to 130°C).

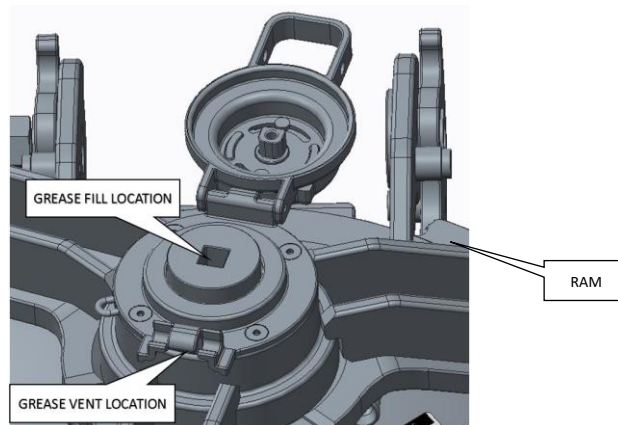


Figure 7 - Grease Fill and Vent Locations

b. Replacing the Cover O-ring

i. Removal

4. The seal is an encapsulated O-ring, consisting of a silicone core encased by a Teflon[®] jacket. When removing the O-ring, be careful not to damage or puncture the jacket. **DO NOT** use a screwdriver or knife to remove O-ring. Use a dull, flat tool, such as a tire lever iron, as shown below (not included). If the jacket becomes damaged by a tool, or has excessive wear, it must be replaced.



ii. Installation

5. **Use only Baier Rail encapsulated O-rings. Using unauthorized O-rings will void the warranty and may produce unintended results, including non-accidental release of commodities (NARs).** No tools are required for installation. Insert a section of the O-ring into the cover assembly O-ring retaining groove. Run the O-ring around and pull into the groove until it snaps into place.



6. Seal surface damage

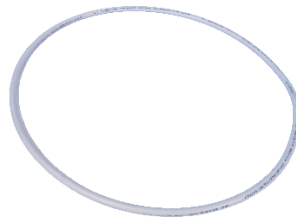
- a. The nozzle and cover surfaces that come into contact with the O-ring must be clean and visually inspected for defects. These



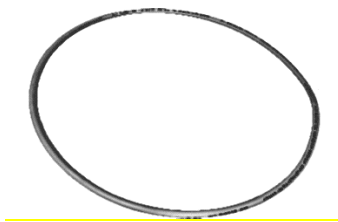
surfaces should be smooth, although very minor machining marks, gouges, nicks, and other defects should not prevent sealing. Seal surface defects suspected of impairing sealing, must be repaired by welding and / or machining. Corroded surfaces and debris must be cleaned to expose a clean, smooth profile.

c. Replacement Parts

REPLACEMENT PARTS LIST (Includes mounting hardware where applicable)	
DESCRIPTON	PART NO.
O-RING, COVER, ENCAPSULATED, SILICONE CORE / PTFE JACKET	08867-705A
O-RING, COVER, VITON GF-S	08867-708A
CAP ASSEMBLY	08867-102A
LIFT ASSIST SPRING ASSEMBLY	08867-191A
SAFETY LATCH	08867-192A
T-HANDLE	08867-190A



O-ring, Cover, Encapsulated, Silicone Core / PTFE Jacket, 08867-705A



O-ring, Cover, Viton GF-S, 08867-708A



Cap Assembly 08867-102A



Lift-Assist Spring Assembly 08867-191A



Safety Latch 08867-192A



T-Handle 08867-190A

- a. For replacement of cap Assembly, lift-assist spring assembly, safety latch and T-Handle see these and other helpful videos at <https://baierrail.com/videos/>.

