



Installation, Operation, Inspection and Maintenance Manual



Kelso One Bolt Manway:

**KKM1
KKM2
KKM3**

Table of Contents

1.0 Introduction	2
1.1 Precautions	2
1.2 Regulations	2
1.3 Technical Specifications	3
1.4 Required Tools/Torque Values	5
2.0 Kelso One Bolt Manway Installation	6
2.1 Procedures	6
2.1.1 New Construction	6
2.1.2 Retrofits	8
3.0 Operation	9
3.1 Open	9
3.2 Close	10
4.0 Inspection	12
4.1 Cleaning	12
4.2 Component Inspection	13
4.3 Leak Testing	16
4.3.1 Equipment and Environment	17
4.3.2 Method	18
4.3.3 Evaluation and Acceptable Criteria	19
5.0 Disassembly and Assembly	19
5.1 Disassembly	19
5.2 Assembly	21
6.0 Maintenance and Part Replacement	24
6.1 Lubrication	24
6.2 Strap Assembly	24
6.2.1 Strap Assembly Replacement	25
6.3 T-Bolt	26
6.4 Lift Assist	28
7.0 Special Guidelines	29
8.0 Warranty Information	29
9.0 Revision Log	30

1.0 Introduction

The next generation Kelso One Bolt Manway (KKM) incorporates today's best and safest technology into a design that discards the traditional 6-8 eye bolt manway in favor of a single T- bolt design. The difference results in a 33-43% loading/unloading efficiency gain, removes the possibility of bent, corroded, improperly repaired and/or cross threaded eye bolts and non-functioning safety bolts. With the Kelso One Bolt Manway, gasket loading and stress is evenly distributed and balanced and safety is optimized by utilization of a latch that is compliant with FRA 49 CFR 179.201.6, ensuring the lid will not open if the car retains excess pressure.

1.1 Precautions

The Kelso One Bolt Manway can be used in the storage and transportation of a wide variety of commodities, many of which are hazardous and could cause serious injury or damage. Only personnel which are properly qualified should open and/or secure this system. Only certified parts from Kelso or one of its authorized representatives should be used on the Kelso One Bolt Manway.



Read these instructions prior to performing maintenance or repairs.

1.2 Regulations

The acceptance and transportation of products are regulated by 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. All personnel should be familiar with and follow these regulations. Nothing in these instructions is intended to conflict with or supersede these regulations.



Note: Specifications are subject to change without notice.

1.3 Technical Specifications

Kelso One Bolt Manway Material Composition

Model No.	Cover	Nozzle	Strap Assembly
KKM1	Carbon Steel	Carbon Steel	Carbon Steel
KKM2	Carbon Steel	316L Stainless Steel	Carbon Steel
KKM3	316L Stainless Steel	316L Stainless Steel	Carbon Steel

Table 1.3.1

Kelso One Bolt Manway Gasket Information

Manway Style	Bolts - Number and Diameter	Gasket Type	Gasket Dimensions (OD X ID X THK)
Kelso One Bolt Manway	1 - 20"	Elastomeric Or Hard	21.625" x 19.5" X .125"

Table 1.3.2

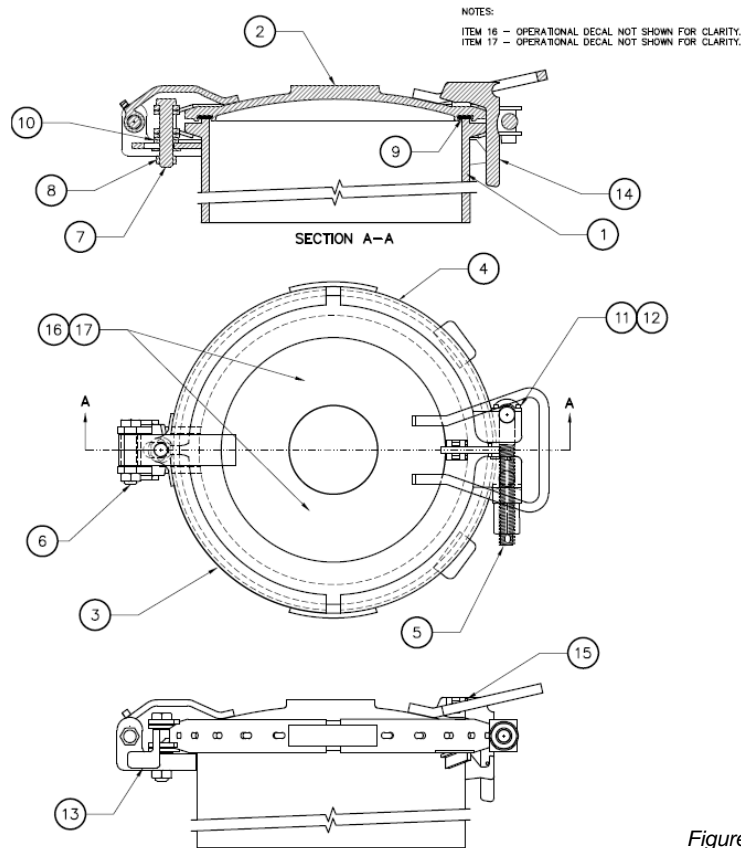
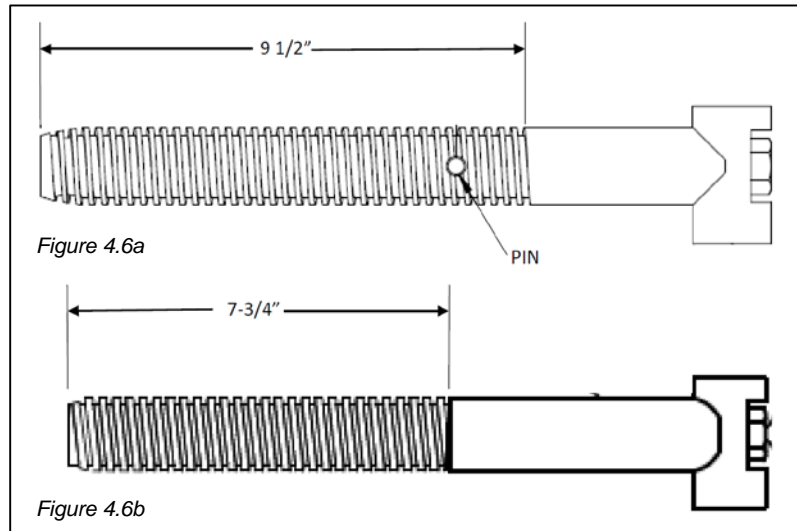


Figure 1.3.3

Item No.	Qty.	Description
1	1	Body Assembly
2	1	Cover Assembly
3	1	Left Strap
4	1	Right Strap
5	1	T- Bolt
6	1	Cover Hinge Bolt
7	1	Strap Hinge Bolt
8	2	Strap Hinge Lock Nut
9	1	Cover Gasket*
10	2	Washer
11	1	T- Bolt Retainer
12	2	T- Bolt Retainer Bolts
13	1	Strap Stop
14	1	Safety Latch
15	2	Safety Latch Bolts
16	1	Operational Decal Open
17	1	Operational Decal Closed

*Gasket not supplied by Kelso®.

Figure 1.3.4



The thread length of the T-bolt has been decreased as of 12/3/2015 to prevent torquing beyond Kelso's One Bolt Manway's safety factor. A pin has been added (*Figure 4.6a*) to prevent over torquing of models with 9 1/2" thread length and the thread length has been decreased to 7-3/4" (*Figure 4.6b*) for future models. Decreased thread count and/or a pin thread stop are acceptable if noticed during inspection.

1.4 Required Tools and Torque Values

Required Tool

Sockets/Wrenches - 7/16" and 2 3/8"	
Allen Wrench - 3/4" and 5/32"	
Ratchet	400 Grit Alum. Oxide Emery Cloth
Screw Driver	Thread Locker
Torque Wrench	Anti-Seize
Wire Brush	Adjustable Wrench
Cutting Pliers	Lint Free Cloth
Rubber Mallet	Kelso Brand Lube or Equivalent
Putty Knife	

Torque Values



The safety factor for torque on the Kelso One Bolt Manway should not exceed 500 ft.-lbs., anything above may result in Kelso One Bolt Manway component(s) failure.

Gasket Material Class/ Family	Torque (ft.-lbs.)	Various Brand Names
Elastomeric (soft)	150 ft.-lbs.*	Viton® A, B & GFS, EDPM, EDPM PC, Buna-N(Nitrile)
Expanded PTFE (hard)	200-250 ft.-lbs.*	Cycle Tight®, Gore-Tex®, GR, Inertex® , SQS Garlock Gylon® 3545
Compressed non-asbestos	300-350 ft.-lbs.*	Garlock Bluegard® 3000, 3200, 3300, 3700, Klingersil® C-4401
Filled PTFE (hard)	300-350 ft.-lbs.*	Garlock Gylon® 3500, 3504, 3510, Glass Filled PTFE, VSP, PBG, Virgin Teflon®

Table 1.3.5

*After the initial installation by OEM or retrofit repair shop, with the straps set in place, torque coupling to 50% of the torque specification; then use a 3lb solid rubber mallet to tap the strap assemblies at the 2, 5, 8 and 10 o'clock positions. Continue to torque to 75% of the torque specification. Repeat the tapping process and torque to 100% of the specification. This process is to ensure conformity of the straps to the cover. After initial installation by OEM or retrofit repair shop this process may be repeated, but is not required. However, this process is suggested during routine certified repair shop maintenance or tank car qualification, on empty and clean car, to maintain conformity.

*Torque values identified are suggested. An additional 50 ft. lbs. of torque may be applied in 25 ft. lb. increments.

*If sealing cannot be achieved, for any reason, do not over torque. Simply reset gasket and repeat sealing procedure.

2.0 Kelso One Bolt Manway Installation

2.1 Procedures

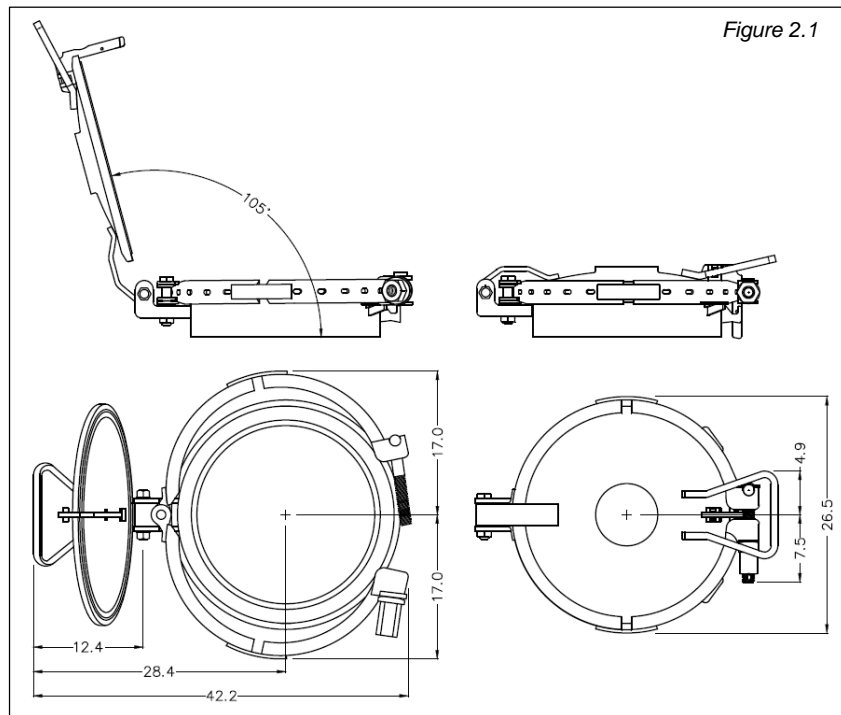


Only companies and their personnel which are qualified and trained shall operate, perform maintenance or test the KKM. All installations must be performed by an AAR certified tank car facility. These instructions should only be used as a guide for the Kelso One Bolt Manway orientation and location relative to the tank and does not supersede the installing facilities operating, safety, welding or quality assurance procedures.

2.1.1 New Construction

1. The Kelso One Bolt Manway system allows for the removal of the cover and straps from the nozzle assembly by

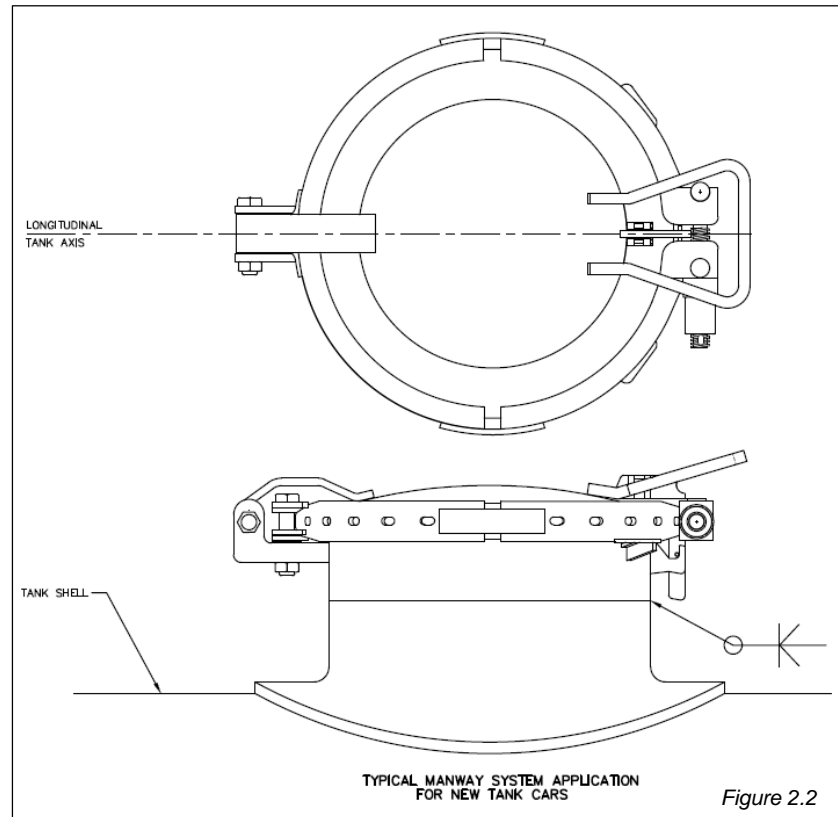
removing the hinge bolt. This may facilitate access and fit up. Refer to (Figure 2.1) to establish installation positioning.



2. Weld per installing facilities approved weld procedures. The manway nozzle crown and gasket groove should be protected to prevent damage due to fit up, welding, unintentional arc strikes and weld spatter. All of this can be repaired. Refer to (Figure 2.2) for application to tank car nozzle.



Preferred alignment of the manway system is with the hinge and handle aligned with the longitudinal axis of the tank on a level plane with the tank. However, 45° off tank longitudinal axis is allowed as long as the cover and the straps are able to swing to the full open position without interference. Refer to (Figure 2.2) for preferred alignment.



3. Remove cover and straps before heat treating tank. Heat treat to installing facilities approved procedures. Refer to section 6.0 for strap replacement and set up.
4. Clean all heat treatment scale from gasket area. Replace cover and straps after heat treatment is complete.
5. Affix "TO OPEN" and "TO CLOSE" operational decals to the outside, top surface area of the cover assembly. These should be affixed to the right and left of the cover handle so they are visible when operating the KKM.

2.1.2 Retrofits



The Kelso One Bolt Manway can be used in the storage and transportation of a wide variety of commodities, many of which are hazardous and could cause serious injury or damage. Prior to the removal of the existing cover, the tank must be prepared for hot work per installing facilities approved procedures.

1. The Kelso manway system allows for the removal of the cover and straps from the nozzle section by removing the hinge bolt. This may facilitate access and fit up.
2. Remove the existing manway cover and prepare manway nozzle so the attachment joint is at maximum or 7-3/16" from the tank shells outer surface. This height will allow compliance with the M1002, Figure E25.1 top fitting requirements. Refer to section 3.0 for manway operation.
3. The nozzle attachment joint shall be level with the tank. If the nozzle is out of round, exceeding weld joint misalignment tolerances, the nozzle must be repaired.



DO NOT deform the Kelso manways system nozzle to mate with an out of round tank nozzle.



As of 12-1-15, welding purpose code C as described under Appendix R paragraph 24.1.2 is to be used for welds to nozzles, in accordance with Table R2 under Appendix R paragraph 24.1 and does not subsequently require PWHT. This is subject to change without notice.

4. Preferred alignment of the manway system is with the hinge and handle aligned with the longitudinal axis of the tank on a level plane with the tank. However, 45° off tank longitudinal axis is allowed as long as the cover and the straps are able to swing to the full open position without interference. (Figure 2.2)
5. Weld per installing facilities approved weld procedures. The Kelso manway nozzle crown and gasket should be protected to prevent damage due to fit up, welding, unintentional arc strikes and weld spatter. All of this can be repaired. Refer to (Figure 2.2) for application to tank car nozzle.



The Kelso One Bolt Manway nozzle may have been prepared with a double bevel joint, however the installing facilities approved weld procedure for joint preparation will prevail. Weld joint may be prepared by thermal cutting, grinding or machining.



If straps are removed during installation, refer to Section 6.0 for strap replacement and set up.

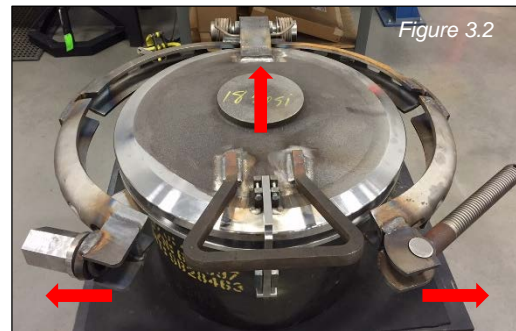
3.0 Operation



Only companies and their personnel which are qualified and trained shall operate the Kelso One Bolt Manway securement systems. Verify that there is no pressure in the tank car before proceeding to open the manway.

3.1 To Open

1. Vent tank prior to opening and remove any security seal from the T-bolt.
2. Rotate the screw coupling counter clockwise to loosen the straps. Back off T-bolt nut completely from the T-Bolt. *(Figure 3.1)* Rotate the T-Bolt away, separate the straps and push back towards the cover hinge. *(Figure 3.2)*



3. Lift the cover slowly until safety latch "A" contacts hasp "B", engaging the safety latch and ensuring tank is vented. *(Figure 3.3)*





Check to ensure no pressure is being vented through the lid/ nozzle gap.

4. Lift the handle, push the safety latch upwards and lower the cover slightly to release latch "A" fully, disengaging the safety latch. (Figure 3.3) Raise the cover to the open position. (Figure 3.4)

3.2 To Close

- With the cover in the open position, verify that a suitable gasket has been installed in the cover, then push the two straps back towards the hinge. (Figure 3.5)



- Lower the cover ensuring the nozzle seat is centered in the gasket groove. Lift the cover slightly and engage latch into hasp.



NOTE: Steps 3 and 4 cannot be performed until the safety latch is in place with the hasp. The Safety Latch will be labeled with a decal or painted red.

- Clean the strap assemblies, the cover and the flange to allow for proper strap seating. Apply lubricant, Kelso® Brand, to the cover, the left/right strap assembly and T- bolt threads prior to closing. (Figure 3.6-3.8) Kelso recommends that the strap and the T-bolt be wiped down and lubricated at every loading.



Figure 3.6



Figure 3.7



Figure 3.8

- Pull straps forward making sure they are on top of the strap guides, engage the screw coupling and T-Bolt then rotate clockwise. Tighten the T-bolt by hand. (Figure 3.9 & 3.10)

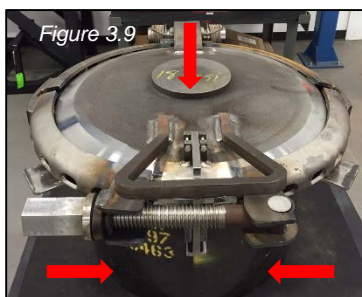


Figure 3.9

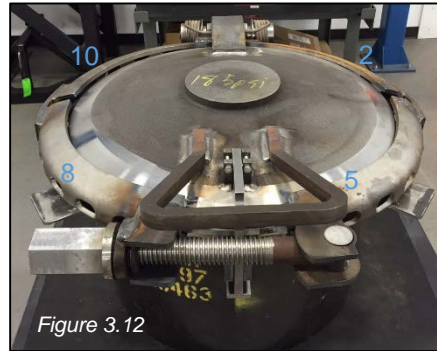


Figure 3.10



Refer to section 1.4 for recommended torque values. All final torque values are the responsibility of the shipper.

- Continue Tightening the T-bolt and coupling until the recommended torque value has been achieved using the following process:
 - a. After the initial installation by OEM or retrofit repair shop, with the straps set in place, torque coupling to 50% of the torque specification; then use a 3 lb solid rubber mallet to tap the strap assemblies at the 2, 5, 8 and 10 o'clock positions. (Figure 3.11 & 3.12) Continue to torque to 75% of the torque specification. Repeat the tapping process and torque to 100% of the specification. This process is to ensure conformity of the straps to the cover. After initial installation by OEM or retrofit repair shop this process may be repeated, but is not required. However, this process is suggested during routine certified repair shop maintenance or tank car qualification, on empty and clean car, to maintain conformity.



4.0 Inspection

The Manway system and components can be visually inspected without removal from the car. Inspection should be made prior to loading the tank, when the tank is unloaded or when suspect operation warrants.

4.1 Cleaning

1. **Cover/Nozzle Mating Surface** – Overspray, paint, debris and/or other foreign on the cover/nozzle mating surface can be removed by using steel wool or a general paint remover. If using steel wool, cleaning should be performed by scrubbing the cover/nozzle mating surface in a circumferential manner, around the nozzle. Kelso Technologies recommends that Kelso Brand Lubricant or a similar moly type lubricant be applied immediately following cleaning. Aggressive or abrasive material should never be applied to the cover/nozzle mating surface.
2. **Straps** – Do not paint straps. Overspray, paint, debris and/or other foreign material on the inside surface of the straps can be removed using a flat “putty knife” or wire brush. Kelso Technologies recommends that the straps be wiped down and Kelso Brand Lubricant or a similar moly type lubricant be applied immediately following cleaning and at every loading.
3. **Serrations** – Serrations are critical to the sealing of the Kelso One Bolt Manway. Extra care and effort should be taken to protect the serrated surface of the nozzle and the cover. Should damage, paint and/or other foreign material build up on the serrations, a chemical solvent can be applied to the serrations to aid in removing. Allow the solvent to penetrate and loosen material. Use a plastic rod to rub the material free of the serrations. A brass hook and

pick can be used to remove stubborn material embedded deep within serrations. Care must be taken to prevent any distortion of the serrations.

Serrations that are physically damaged; gouged, bent, cut and/or missing are a concern in creating an acceptable sealing surface. Should any serration damage occur, the following guidelines can be applied:

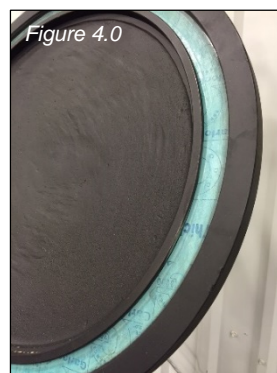
- See separate Kelso Technologies - Kelso One Bolt Manway Serration Repair System procedure for serration repair.
- As long as two grooves are undamaged in the serration pattern of the cover or nozzle the Kelso One Bolt Manway will seal.
- If all serrations are damaged, it is still possible to achieve a seal by applying additional torque to the T-bolt. Never exceed the recommended maximum torque called out in the Kelso service manual.



For question regarding anything beyond the limits stated above contact Kelso Engineering (903) 583-9200.

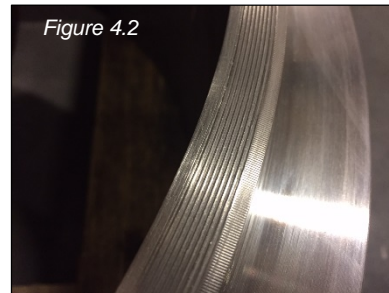
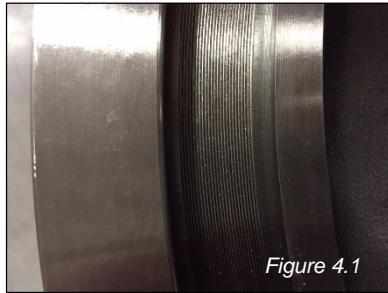
4.2 Component Inspection

1. The elastomeric or hard gasket must be in good condition with no tears or visible damage. The gasket should be secured concentrically in the cover groove. (*Figure 4.0*) If the gasket cannot be retained by the groove, verify the dimension. Excessively worn or stretched gaskets should be replaced.



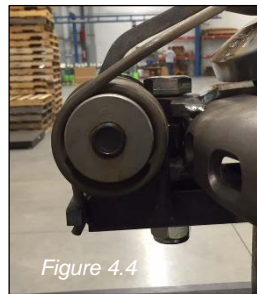
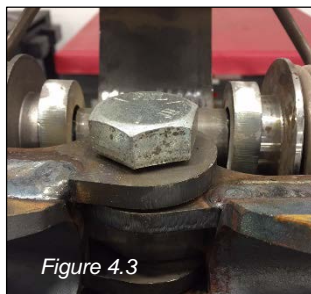
2. The depth of the cover groove must be 0.464" to 0.475" from the flat surface on the underside of the cover.
3. The serrations on the nozzle crown (*Figure 4.2*) and mating surface of the cover gasket groove (*Figure 4.1*) should be free of scratches, nicks and gouges particularly in the radial direction. These surfaces should

also be free from paint, dirt, rust and scale prior to the application of the gasket. A lined crown should be smooth with no runs, pinholes or laps.



Care should be taken to protect the serrations of the nozzle and cover when performing any operation on the Kelso One Bolt Manway System

4. The Nozzle Seat Crown height must be within 0.81" to 0.87" from the top of the nozzle flange.
5. The nozzle flange must be perpendicular to the nozzle OD surface within 0.5 of a degree.
6. Hinge pins for both the strap hinge (*Figure 4.3*) and the cover/nozzle hinge (*Figure 4.4*) are expected to move within the slotted holes. Movement is not a cause for attention.



7. The Strap screw should be replaced if it is visibly bent. The threads of the T-Bolt (*Figure 4.5*) screw should be clean and lubricated. If the threads become slightly galled or flared, it is permissible to run a flat file over the threads. The screw hex nut (*Figure 4.6*) wrenching surfaces should remain flat, if the corners become rounded, replace.



Figure 4.5

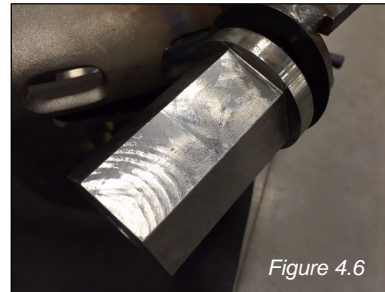


Figure 4.6



The thread length of the T-bolt has been decreased as of 12/3/2015 to prevent torqueing beyond Kelso's One Bolt Manway's safety factor. A pin has been added (*Figure 4.6a*) to prevent over torqueing of models with 9 1/2" thread length and the thread length has been decreased to 7-3/4" (*Figure 4.6b*) for future models. Decreased thread count and/or a pin thread stop are acceptable if noticed during inspection.

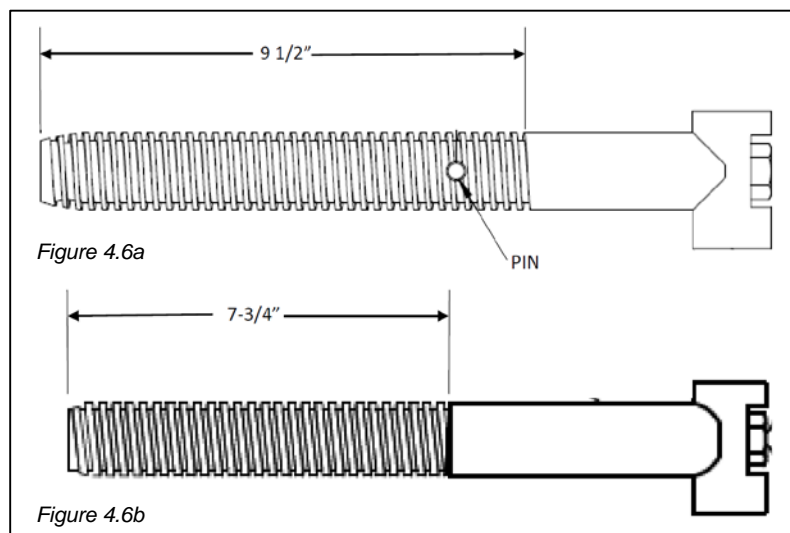


Figure 4.6a

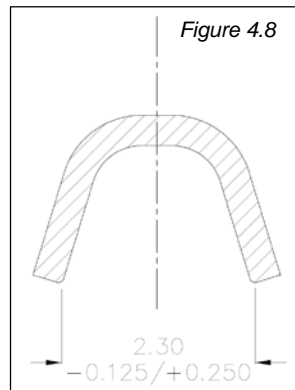
Figure 4.6b

8. The safety latch should be replaced when bent or not functioning properly. (*Figure 4.7*)

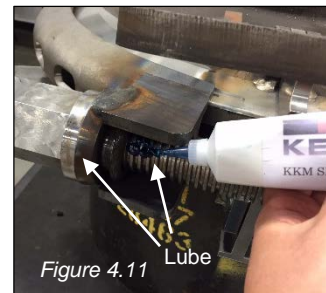


Figure 4.7

9. The straps must open and close properly.
10. The strap opening or profile should measure within 2.175" to 2.550" from the outer tip edges. (Figure 4.8) If outside of this tolerance straps should be replaced.



11. Kelso Brand or similar lubricant should be applied to the strap screw along the threads and to the front conical face of the screw nut and the inner surface of the straps. (Figure 4.9 – 4.11) Kelso Technologies recommends that the T-Bolt be wiped down and lubricated immediately following cleaning and at every loading.



12. The cover and hinge must be in good condition and free of any defects that may impact performance. The cover must open and close freely.
13. The manway must seal properly.
14. The manway system must be decaled or stenciled with the following: KKM, "how to operate – open" and "how to operate – close".
15. Strap Splices and Strap Hinges: The splices holding the strap segments together must not be bent, twisted or separated from the strap segments (no broken welding). The same goes for the hinges welded to the strap ends. (Figure 4.12)



Figure 4.12



There are no significant damages, breaks or bends to the unit which impact its form, fit or function.

4.3 Leak Testing

All testing uses applicable codes and standards based on current editions of Field Manual of the AAR Interchange Rules, AAR M1002 Appendix T, AAR Circular Letters, Customer Specifications, Kelso Technologies Procedure KT-BLT-100, Code of Federal Regulations, ASNT-TC-1A, and ASME Section V.



The following instructions should only be used as an aid for manway system leak testing and do not supersede the testing facilities operating, safety or quality assurance procedures.

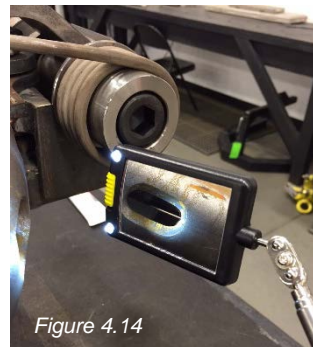
4.3.1 Testing Equipment and Environment

1. To provide a means of pressure testing the Manway system, a series of slots have been located on the strap centerline to provide adequate viewing of the gasket joint and test solution application. Satisfactory solution application can be made with a tubed squeeze bottle, with tube length of at least four inches. (Figure 4.13) Brushed solution application is not recommended.



Figure 4.13

2. Test media will normally be air or inert gas.
3. Lighting, natural or supplemented at the surface being examined shall be sufficient to detect leaks. Adequate lighting can typically be achieved using flash light of 100 foot-candles (1000 lux).
4. Visual aids may be used when direct examination is not convenient. Use a mirror to improve the angle of vision or magnifying glasses to assist in examination. (*Figure 4.14*)



5. The bubble forming solution shall produce a film that does not break away from the area being tested and the bubbles formed shall not break rapidly due to the air drying or low surface tension.
6. Pressure gauges shall conform to applicable codes, standards and procedures. Pressure gauges shall be readily visible to the testing personnel.
7. The temperature of the part being tested should confirm to the leak test solution recommended temperature range.
8. When testing outside, a suitable wind block is recommended to prevent excessive wind from interfering.

4.3.2 Method

1. Test pressure is 30 psi. However, the examining facility test pressure shall prevail.
2. Approved NDT test solution should be applied with a tubed squeeze bottle, directing the flow into the strap slots on an upward angle, also applying at the cover to nozzle joint at the front and back of the cover. Solution should cover the full circumference of the joint. (*Figure 4.15*)
3. To adequately allow smaller leaks to produce bubbles, a dwell time should not be less than 2 minutes. During this dwell time the area being examined should be observed

frequently to ensure bubble growth is not missed and ensure large leaks that may blow the solution away.

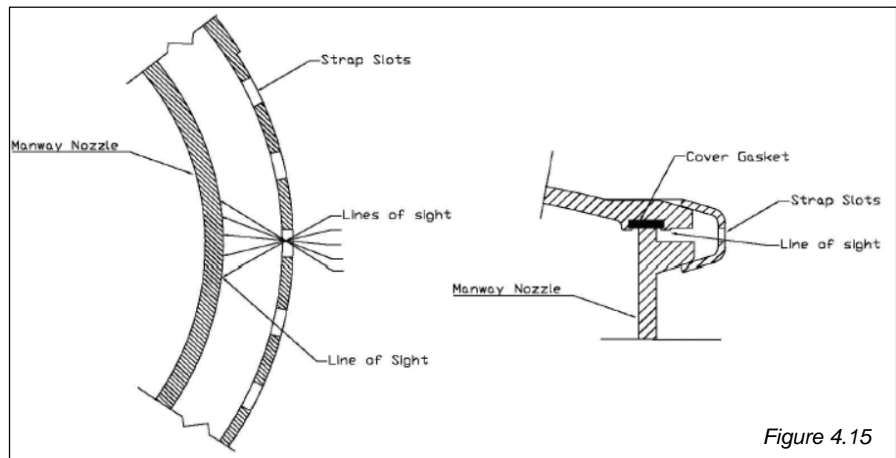


Figure 4.15

4. Examination of the test area can be made visually, by looking through the strap slots and scanning the test area for any indication of leakage. (Figure 4.15)
5. If leakage is observed, the straps connection should be further torqued an additional 50 ft.-lbs. from the original setting, and the system retested.
6. If the system has been torqued to more than the recommended torque and leakage is still observed, remove pressure and open cover, examining the gasket, and the sealing surface of the nozzle and cover gasket groove for defects which may encourage leakage. Replace gasket if necessary.

4.3.3 Evaluation and Acceptance Criteria

1. Unless otherwise specified by referencing code or standard, the area under test is acceptable when no continuous bubble formation is observed.
2. When foam or other bubble formation is observed but continuous growth is not observed the area should be wiped or blown free of solution and the solution reapplied.

5.0 Disassembly and Assembly



All parts and materials designated for use with the KKMS are inspected during the assembly process to meet the specifications as described on the bill of materials and associated drawings in compliance with the AAR M1002 traceability standards.

5.1 Disassembly

1. Open Manway cover to the open position. *(Figure 5.1)*



2. Support the cover in the “open” position by the handle and remove the cover bolt. *(Figure 5.2)* Once cover bolt is removed, push the cover back out of the lift assist (if applicable) and cover hinge guides. *(Figure 5.3)*



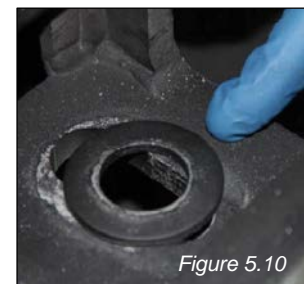
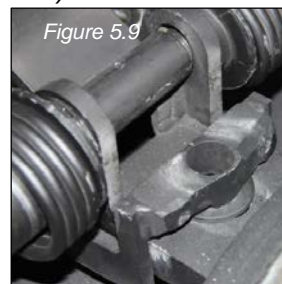
3. Remove the Lift assist spring and drums (if applicable). *(Figure 5.4)* Note the position of each component for reassembly. *(Figure 5.5)* The lift assist is optional equipment and may not be included on all Kelso One Bolt Manways.



4. With the T-bolt disengaged and rotated away, move the strap assemblies to their closed position. (Figure 5.6) Remove the strap hinge bolt and set to the side. (Figure 5.7)



5. Remove the left strap, (Figure 5.8) then the right strap and make note of location and orientation of strap stop and washer as they are removed. (Figure 5.9 & 5.10)



5.2 Assembly

1. Place a flat washer on top of the body hinge assembly being sure to align it with the strap hinge slot. (Figure 5.11)



Note: Flat washers are used as shims to raise and align the left and right strap assemblies with the centerline of the cover/nozzle when closed. The use of both washers may not be required.

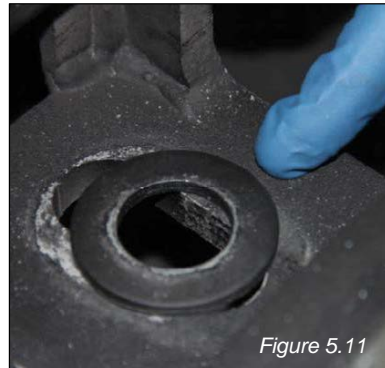


Figure 5.11



Figure 5.12

2. Insert the strap stop bracket on top of the washer with the holes aligned. (Figure 5.12)
3. With the right strap assembly in hand, lift the strap stop so that the bottom strap hinge bracket slides under strap stop and the holes align. (Figure 5.13)

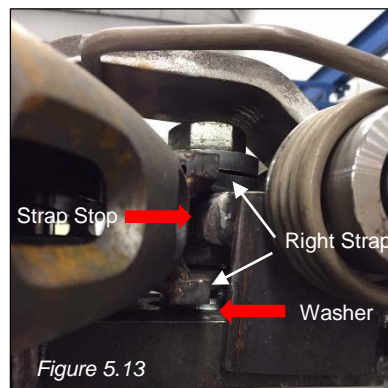


Figure 5.13

4. With the left strap assembly in hand, lift the strap stop so that the bottom strap hinge bracket slides under strap stop and the holes align. (Figure 5.14)

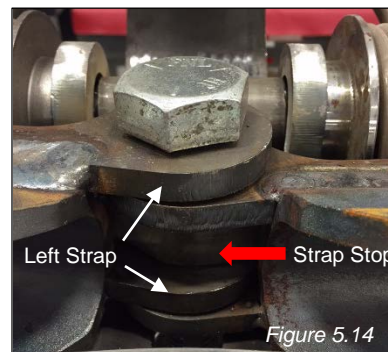
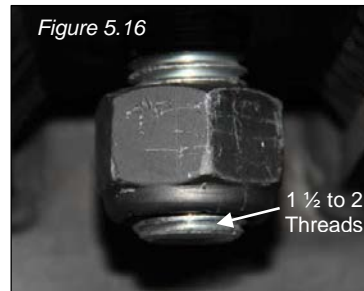


Figure 5.14

5. Insert strap hinge bolt through hole and install Nylon lock nut. Tighten the nut until 1.5 to 2 threads are below the bottom of the nut. (*Figure 5.15 & 5.16*) After tightening the nut, check for movement of the straps. The straps should be able to open and close freely without resistance. If some resistance is noticed, loosen the lock nut by a half turn.



6. Install the lift assist spring and the two hubs into correct location on the cover hinge assembly (if applicable). (*Figure 5.17 & 5.18*)



7. Support the cover by the handle from the rear, push the cover hinge into the cover hinge assembly. (*Figure 5.19*)



8. Add appropriate amount of Loctite to the cover hinge bolt. (*Figure 5.20*) Insert bolt through all components; the lift assist hub (if applicable), the hinge bracket of the nozzle and the cover bracket. (*Figure 5.21*) Apply jam nut and tighten. Note: If equipped with lift

assist tighten bolt until end of bolt is flush with the outside of the hub.
(Figure 5.22)



Figure 5.20



Figure 5.21



Figure 5.22

6.0 Maintenance and Part Replacement



The following instructions apply to the Kelso One Bolt Manway securement system. They should only be used as a guide for manway system part replacement and do not supersede the installing facilities operating, safety or quality assurance procedures.

6.1. Lubrication

The straps require a coating of Kelso® Lubricant or equivalent to the inside surface of the straps and the T- bolt. (Figure 6.1 – 6.3) Kelso recommends that the strap and the T-bolt be wiped down and lubricated at every loading.



Figure 6.1



Figure 6.2



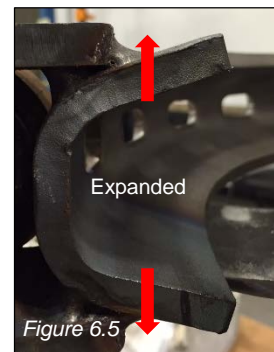
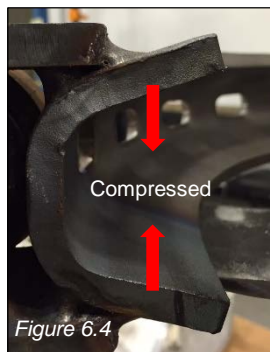
Figure 6.3

6.2. Strap Assembly

The strap assembly is extremely robust and capable of absorbing a large amount of abuse while still performing at an optimal level. Should the strap assembly become distorted the following “field repairs” may prove beneficial before strap replacement is necessary.

- 1. Twisted Straps** – A twisted strap can be straightened by removing the strap assembly from the Kelso One Bolt Manway and applying force in a direction counter to the twist.

2. **Narrow Strap Opening** – If the “C” opening of the strap has been compressed closed (*Figure 6.4*), it can be opened to the appropriate gap (*Figure 4.8*) by using standard tools. Do not apply heat to the strap section to accomplish. The maximum allowable distortion is 1/8”.
3. **Wide Strap Opening** – If the “C” opening of the strap has been expanded (*Figure 6.5*), it can be closed to the appropriate gap (*Figure 4.8*) by using standard tools. Do not apply heat to the strap section to accomplish. The maximum allowable distortion is 1/4”.
4. **Out of Round** – Strap segment radius opened or closed can be corrected using standard tools. Do not apply heat to the strap assembly to accomplish. The maximum allowable distortion is 1/2” in either direction.



When replacing the strap assembly replace the nylon nut of the strap bolt.

6.3. Strap Assembly Replacement

1. Open manway cover (*Figure 6.6*) and remove the strap hinge bolt (*Figure 6.7*).

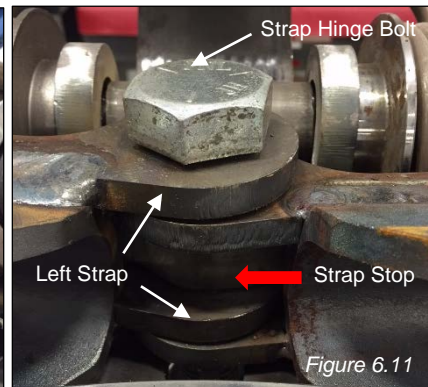
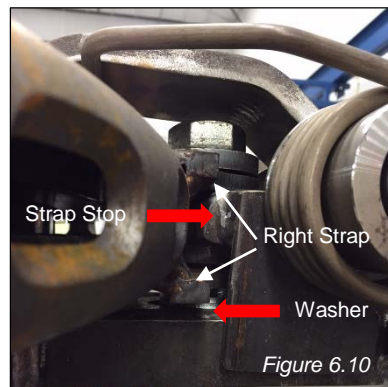


2. Pull the two straps toward the front of the manway, while pushing the strap stop back against the cover hinge bracket.

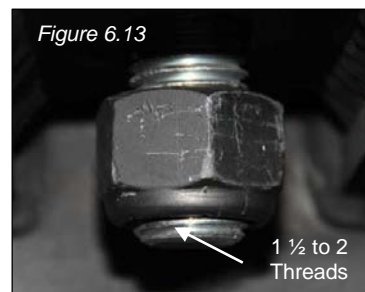
Slide the strap that is to be replaced outward from the hinge (Figure 6.8) and remove strap (Figure 6.9).



3. Place the replacement strap on guide and slide hinge bracket into position meshing with the opposing strap hinge bracket and strap stop (Figure 6.10 & 6.11).

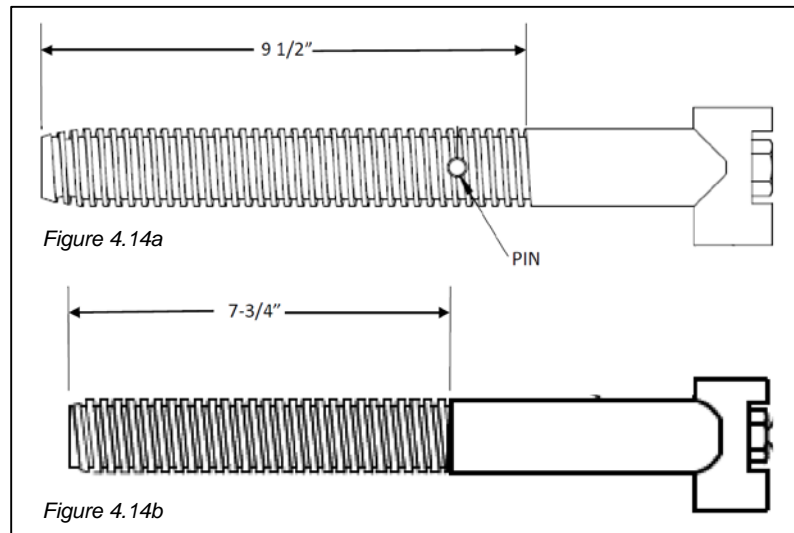


4. Align the strap brackets with the strap stop and replace strap bolt. Close cover and thread T- bolt into hex coupling until straps are snug on the cover.
5. Apply strap bolt nut and tighten the nut until 1.5 to 2 threads are below the bottom of the nut (Figure 6.12 & 6.13). After tightening the nut, check for movement of the straps. The straps should open and close freely without resistance. If resistance is noticed, adjust by loosening the lock nut by a half turn.

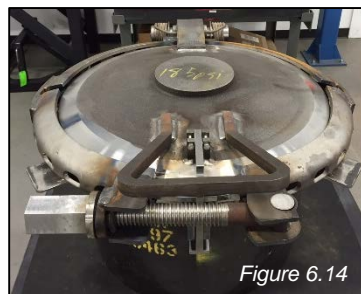


6.4. T-Bolt

The thread length of the T-bolt has been decreased as of 12/3/2015 to prevent torquing beyond the Kelso One Bolt Manway safety factor. A pin has been added (*Figure 4.14a*) to prevent over torquing of models with 9 1/2" thread length and the thread length has been decreased to 7-3/4" (*Figure 4.14b*) for future models. Decreased thread count and/or a pin thread stop are acceptable if noticed during inspection.



1. The T-bolt can be replaced without opening the cover. Disengage T-bolt from strap screw nut (*Figure 6.14*).



2. Remove the 2 bolts from the top retainer bracket (*Figure 6.15*) and remove bracket (*Figure 6.16*).

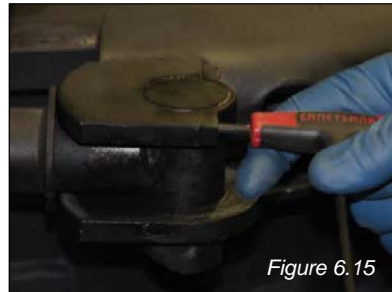


Figure 6.15

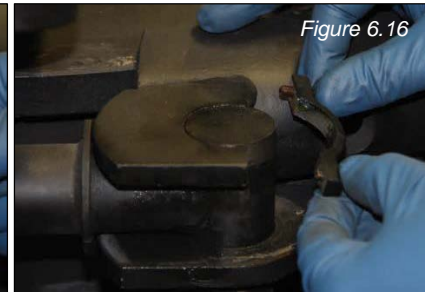
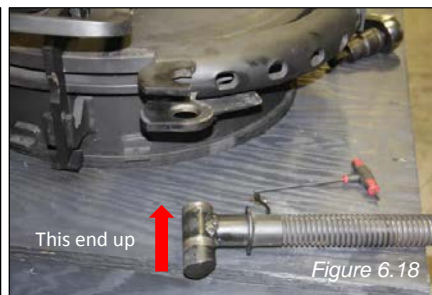


Figure 6.16

3. Swing the T- bolt counter clock-wise outwards until almost perpendicular to the tank car side (*Figure 6.17*). Lift the T- bolt from the remaining retainer bracket.



Figure 6.17



This end up

Figure 6.18



For T- bolts with a single retainer bracket: Swing the T- bolt counter clock-wise outwards until almost perpendicular to the tank car side. The T- bolt can be raised or lowered from its retaining bracket.

4. Apply new T- bolt with retainer, apply Loctite to the retainer bolts and torque bolts to 50 inch-lbs. (*Figure 6.19 & 6.20*).



Figure 6.19



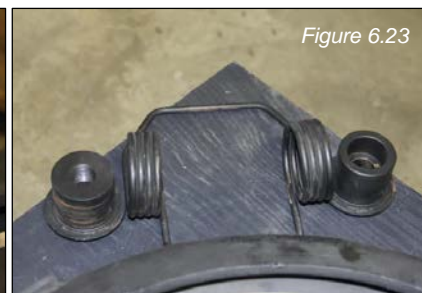
Figure 6.20

6.5. Lift Assist (If applicable)

1. With the cover and straps disengaged, locate and remove the lift assist securement bolt (*Figure 6.21*).



2. Once cover bolt is removed, push the cover back out of the lift assist and spring assembly. (*Figure 5.3*)
3. Remove the lift assist hubs from the spring (*Figure 6.22*) and pry the lift assist spring tail ends off the notch in the spring stop to release tension from the lift assist spring to slide spring out (*Figure 6.23*).



4. Examine lift assist hubs and lift assist spring. Excessively worn or damaged parts should be replaced (*Figure 6.24*). Return the lift assist hubs to spring (*Figure 6.25*).



5. Place lift assist spring tail ends into the notch in the spring stop (*Figure 6.26*). Coat the threads of the lift assist securement bolt with Loctite and thread the bolt through the lift assist hubs, the cover hinge, and bracket holes (*Figure 6.27 & 6.28*). Torque to 25 ft.-lbs. (*Figure 6.29*).



6.6. Serration Repair

See separate Kelso Technologies - Kelso One Bolt Manway Serration Repair System.

7.0 Special Guidelines



Applicable AAR Regulations: Refer to AAR M1002, Appendix D for General Manway Cover maintenance guidelines, Appendix E for General Top Fitting Profile for non-pressure cars and Appendix C for General Manway Style marking guidelines.



Tank cars equipped with Kelso One Bolt Manway System must be properly marked as noted in AAR M1002, Appendix C. Refer to AAR M1002, Appendix R for General Welding to tank car guidelines.

8.0 Warranty Information

See the Warranty Terms and Conditions.

9.0 Revisions to Manual

Revision 4 – Additions/Modifications/Deletions 5/18/2015

- Removed from page 6 drive impact wrench tightening.
- Modified torque value chart on page 6

Revision 5 – Additions/Modifications/Deletions 7/2015

- Removed part number from technical spec on page 4
- Added (!) about refer to Section 1.4 for torque values on page 12
- Step 4 on page 12 revised
- Step 15 on page 14 revised

Revision 6 – Additions/Modifications/Deletions 8/17/2015

- Delete Section 3.4 No. 4

- Revised paragraph under torque chart on page 6
 - Added paragraph under Section 2.1
- Revision 7 – Additions/Modifications/Deletions 10/26/2015
- Section 1.4 added rubber mallet
 - Section 1.4 Torque Values added note on safety factor...should not exceed 850 ft.-lbs...
 - Section 1.4 Strap coupling procedure under torque values chart
 - Section 3.3 step 4 Strap coupling procedure added
 - Section 4.1 step 3 (!)Care should be taken to protect serrations
 - Section 4.1 step 11 Verified strap tolerance...added note straps should be replaced...
 - Section 4.2.2 step 4 Corrected Figure 8 to Figure 7
 - Section 6.0 step 3 noted this end up on picture
- Revision 8 – Additions/Modifications/Deletions 12/3/2015
- Reformat Manual
- Revision 9 – Additions/Modifications 1/14/2016
- Do not Paint Strap Section 4.1 - 4 on page 12
 - Safety Latch Painted Red/Decal Section 3.1 & 3.2 Notes Page 10, 11
 - Lubrication frequency Section 3.2 - 3, 4.1 - 2, 4.2 - 11 and 6.1 Page 11,16,24 and 29
 - Rubber mallet size Section 1.4 - *, 3.2 – 5 a Page 5 and 11
 - Serration Repair 4.1 – 3, 6.6 Page 12 and 29
- Revision 10 – Safety Torque Value Change 850ft-lbs to 500ft-lbs
- Revision 11 – Additions/Modifications/Deletions 10/12/2016
- Match revision on the foot on cover with corresponding page footers.
 - Update address at page footer.
 - Format Required Tools for clarity – Page 5.
 - Delete safety latch note Section 3.1 – Page 10.
 - Note for flat washer added Section 5.2 – Page 21.
- Revision 12 – Modification 12/20/2016-1/4/2016
- “Klincher” replace with “One Bolt Manway”
 - Section 4.2 Line 7. Figure 4.6a and 4.6b added to clarify T-bolt modification
 - Section 6. Figure 4.14a and 4.14b added to clarify T-bolt modification