



Installation, Operation, Inspection and Maintenance Manual



Kelso Truck Manway System:

KTM

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1.0 Introduction

The Kelso Truck Manway incorporates today's best and safest technology. The Kelso Truck Manway discards the traditional 6-8 eye bolt manway in favor of a single bolt design. The difference results in a 33-43% loading/unloading efficiency gain. The single screw design removes the possibility of bent, corroded, improperly repaired and/or cross threaded eye bolts and non-functioning safety bolts. With the Kelso Truck Manway, gasket loading and stress is evenly distributed and safety is optimized by the utilization of a latch that ensures the lid will not open if the tank retains excess pressure.

1.1 Precautions

The Kelso Truck Manway may be used in the storage and transportation of a wide variety of commodities, including many that are hazardous and could cause serious injury or damage. Only personnel who 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 Truck Manway.



Read these instructions prior to performing maintenance or repairs.

1.2 Regulations

The acceptance and transportation of products are regulated by DOT in the U.S.A and in Canada by Transport Canada. Compliance with regulations of other governmental bodies is required. All personnel should be familiar with and follow these regulations. Nothing in these instructions is intended to conflict with or supersede any regulatory guidelines.



Note: Specifications are subject to change without notice.

1.3 Technical Specifications

Kelso Truck Manway Material Composition

Model No.	Cover	Body	Strap Assembly
KTM	Stainless Steel	Stainless Steel	Stainless Steel

Table 1.3.1

Kelso Truck Manway Gasket Information

Manway Style	Bolts - Number and Diameter	Gasket Type	Gasket Dimensions (OD X ID X THK)
Kelso Truck Manway	1 – 7/8"	Elastomeric	21.00" x 19.50" x 0.25"

Table 1.3.2

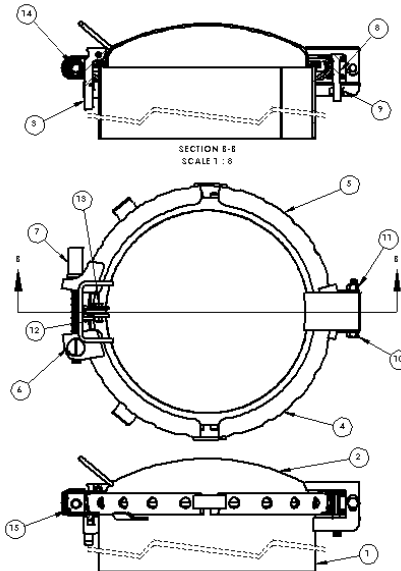


Figure 1.3.3

Item No.	Qty.	Description
1	1	Body Assembly
2	1	Cover Assembly
3	1	Safety Latch Assembly
4	1	Right Strap Assembly
5	1	Left Strap Assembly
6	1	Screw Coupling
7	1	Screw
8	1	Strap Bolt - SS
9	1	Strap Nut – SS
10	1	Hinge Bolt - SS
11	1	Hinge Nut - SS
12	1	Safety Latch Nut – SS
13	1	Safety Latch Bolt - SS
14	1	7/8" E-Clip – SS
15	2	Set Screw - SS
16	1	Gasket* (Not Shown)

*Gasket not supplied by Kelso

Figure 1.3.4

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1.4 Required Tools and Torque Values

Required Tool

Sockets/Wrenches -	5/8" 15/16" 1-1/8"
Allen Wrench -	3/16"
Ratchet	Thread Locker
Flat Screw Driver	Anti-Seize
Torque Wrench	Kelso Brand Lube or Equivalent
Rubber Mallet	

Torque Values



The safety factor for torque on the Kelso Truck Manway should not exceed 150 ft.-lbs., anything above may result in Kelso Truck 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)

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 qualification, on empty and clean tank, to maintain conformity.

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

2.0 Kelso Truck Manway Installation

2.1 Procedures



Only companies and their personnel who are qualified and trained shall operate, perform maintenance or test the KTM. All installations must be performed by a certified facility. These instructions should only be used as a guide for the Kelso Truck 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 Truck Manway allows for the removal of the cover and straps from the body assembly by removing the hinge bolt. This may facilitate access and fit up.
2. Weld per installing facilities approved weld procedures. The manway body 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, see Section 4.1, 3 Serrations, for repair instructions.
3. 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.
4. Remove cover and straps before heat treating tank. Heat treat to installing facilities approved procedures. Refer to Section 5.0 for strap replacement and set up.
5. Clean all heat treatment scale from gasket area. Replace cover and straps after heat treatment is complete.
6. 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 KTM.

2.1.2 Retrofits



The Kelso Truck Manway can be used in the storage and transportation of a wide variety of commodities, including many that 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 body section by removing the hinge and strap bolt. This may facilitate access and fit up.
2. Remove the existing manway cover and prepare manway body attachment joint so that it is at a maximum of designed combined length from the tank shell outer surface. Refer to section 3.0 for manway operation.
3. The body attachment joint shall be level with the tank. If the body attachment joint of the tank is out of round, exceeding weld joint misalignment tolerances, the attachment joint must be repaired.



DO NOT deform the Kelso manway system's body to mate with an out-of-round body attachment joint.

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.
5. Weld per installing facilities approved weld procedures. The Kelso manway body crown and cover 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, see Section 4.1, 3 Serrations, for repair instructions.



The Kelso Truck Manway body 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 5.0 for strap replacement and set up.

3.0 Operation



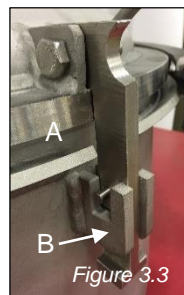
Only companies and their personnel who are qualified and trained shall operate the Kelso Truck Manway. Verify that there is no pressure in the tank before proceeding to open the manway.

3.1 To Open

1. Vent tank prior to opening and remove security seal, if present, from the manway.
2. Rotate the screw counter clockwise to loosen the straps. Back screw off and completely out of screw coupling. Separate the straps and push back towards the cover hinge. (*Figure 3.1 & 3.2*)



3. Lift the cover slowly until safety latch “A” contacts hasp “B”, this will engage the safety latch and ensures that the tank is vented. (*Figure 3.3*)



Ensure that 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. Raise the cover to the open position. (*Figure 3.4*)

3.2 To Close

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



Figure 3.5

2. Lower the cover ensuring the seat of the body 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 contact with the hasp.

3. Clean the strap assemblies, the cover and the flange of any foreign material to allow for proper strap seating. Apply lubricant, Kelso Brand or similar, to the strap contact points on the cover, the inside contact surfaces of the left/right strap assembly and T-bolt threads prior to closing. Kelso recommends that the strap and the T-bolt be wiped down and lubricated at every loading. (Figure 3.6, 3.7 & 3.8)



Figure 3.6

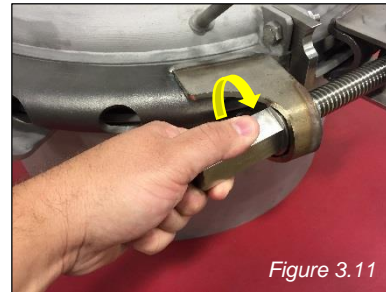
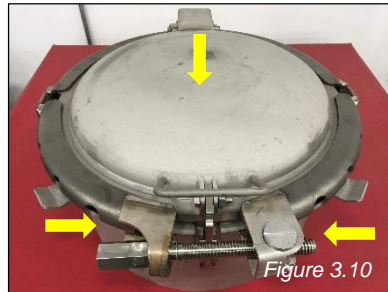


Figure 3.7



Figure 3.8

4. Pull straps forward, make certain that they are on top of the strap guides. Pull the straps together engaging the screw and screw coupling. Rotate screw clockwise and tighten by hand. (Figure 3.10 & 3.11)



Refer to section 1.3.5 for recommended torque values. All final torque values are the responsibility of the shipper.

5. Continue Tightening the T-bolt and coupling until the recommended torque value has been achieved using the following process: (Figure 3.12 & 3.13)
 - 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. 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 qualifications, on empty and clean tank, to maintain conformity.



4.0 Inspection

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

4.1 Cleaning

1. **Cover/Body Mating Surface** – Overspray, paint, debris and/or other foreign material 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/body mating surface in a circumferential manner, around the crown of the body. Kelso Technologies recommends that Kelso Brand Lubricant or a similar type lubricant be applied immediately following cleaning. Aggressive or abrasive material should never be applied to the cover/body mating.
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 type lubricant be applied immediately following cleaning and at every loading.
3. **Serrations** – Serrations are critical to the sealing of the Kelso Truck 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 non-marring tool 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. If any serration damage occurs, the following guidelines may be applied:

- See Section 6.5 - Kelso Manway Serration Repair System procedure for serration repair.
- As long as two grooves are undamaged in the serration pattern on the body crown of the Kelso Truck Manway will seal.
- If all serrations are damaged, it is still possible to achieve a seal by applying additional torque to the screw and screw coupling.

Never exceed the recommended maximum torque referred to the in torque value section of this manual.



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

4.2 Component Inspection

1. The gasket must be in good condition with no tears, cracks, or visible damage. The gasket should be secured concentrically in the cover groove. If the gasket cannot be retained by the groove, verify the dimension. Excessively worn or stretched gaskets should be replaced. (Figure 4.1)



2. The depth of the cover gasket groove must be between 0.350" to 0.410" from the flat surface on the underside of the cover.
3. The serrations on the body crown and the mating surface of the cover gasket groove 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. (Figure 4.2)



Care should be taken to protect the serrations of the body crown and the cover's gasket mating surface when performing any operation on the Kelso Truck Manway.

4. Hinge pins for both the strap hinge and the cover/body hinge are expected to move within the slotted holes. Movement is not a cause for attention. (Figure 4.3 & 4.4)

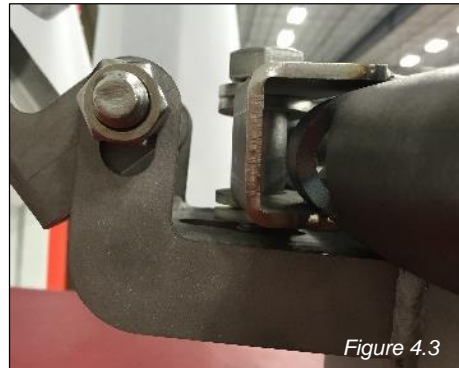


Figure 4.3

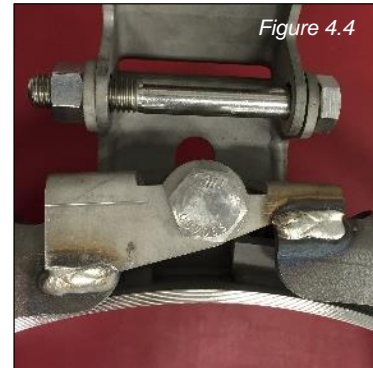


Figure 4.4

5. The strap screw should be replaced if it is visibly bent. The threads of the 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 wrenching surfaces should remain flat, if the corners become rounded, replace. (Figure 4.5 & 4.6)

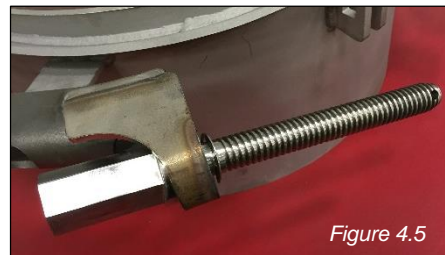


Figure 4.5

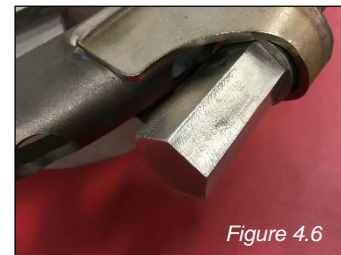


Figure 4.6

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



Figure 4.7

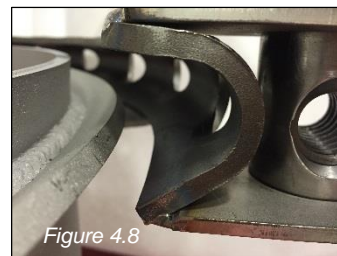


Figure 4.8

7. The straps must open and close properly.
8. The strap opening or profile should measure within 1.540" to 1.600" from the outer tip edges. If outside of this tolerance straps should be replaced. Top lip must remain flat. (Figure 4.8)
9. 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.
10. The manway must seal properly.

11. The manway system must be decaled: KTM, “how to operate – open” and “how to operate – close”.
12. 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 welds). (Figure 4.9)

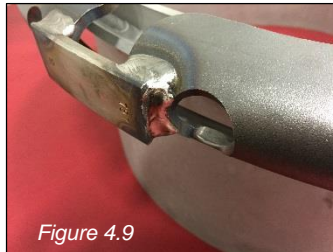


Figure 4.9

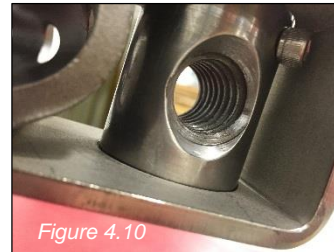


Figure 4.10

13. Strap Coupling and Strap Attachment parts must not be bent, twisted or separated from the strap segments (no broken welds).
14. The screw coupling threads should be clean and lubricated. (Figure 4.10)



There should be 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 DOT407 and DOT412, Customer Specifications and Kelso Technologies Procedures.



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. Brushed solution application is not recommended. (Figure 4.11)



Figure 4.11

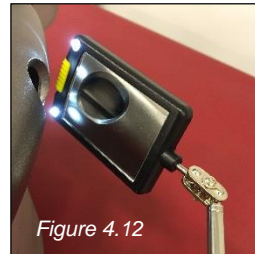


Figure 4.12

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 4.12)
5. The s that
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 conform 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 75 psi (max). 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 at 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.
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 there are no large leaks that may blow the solution away.
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 4.13)

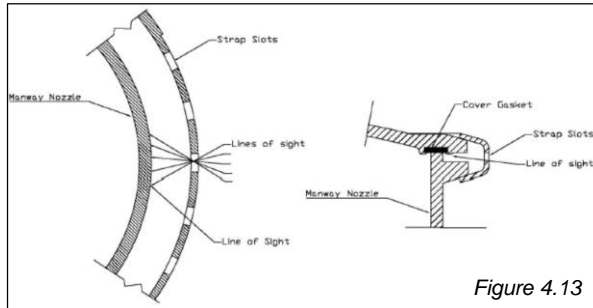


Figure 4.13

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. See section 1.4.
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 KTM are inspected during the assembly process to meet the specifications as described on the bill of materials and associated drawings.

5.1 Disassembly

1. Loosen then remove cover hinge nut only.
2. Support the cover in the “open” position using the handle and remove the cover hinge bolt. Once the cover bolt is removed, push the cover back out of the cover hinge guides located on the body. (Figure 5.1 & 5.2)

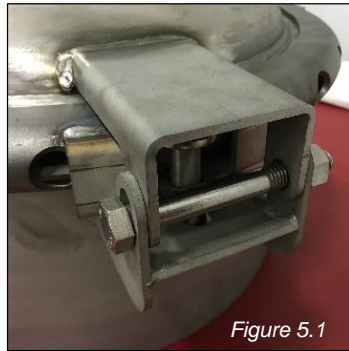


Figure 5.1

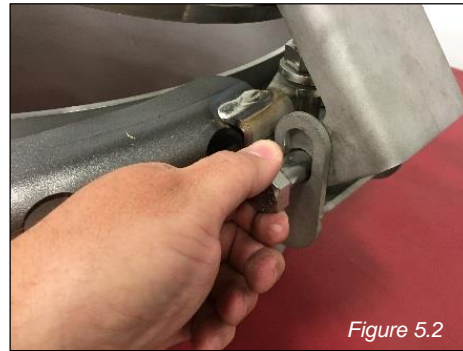


Figure 5.2

3. With the screw and coupling of the strap disengaged move the strap assemblies together in the closed position. Remove the strap hinge nut then bolt and set to the side. (Figure 5.3 & 5.4)



Figure 5.3



Figure 5.4

4. Remove the right strap, then the left strap and make note of location and orientation of each strap as they are removed. (Figure 5.5 & 5.6)



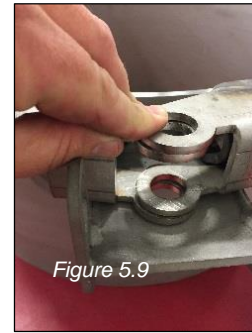
Figure 5.5



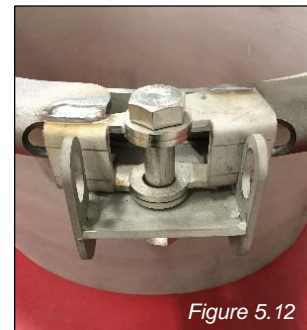
Figure 5.6

5.2 Assembly

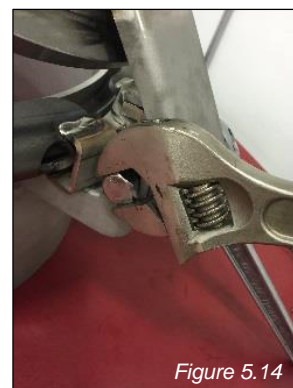
1. Facing the manway with the strap assembly in hand, place the back of the strap on the body hinge guide, aligning the holes of the strap with the slot in of the guide. (Figure 5.7 & 5.8)



2. With the opposite strap assembly in hand place the back of the strap onto the back of the right strap, meshing the straps together. Align the strap holes with the slot of the body hinge guide. (Figure 5.9)
3. Insert strap hinge bolt through hole, apply thread locker and install nut. Tighten the nut wrench tight. 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 nut by a half turn. (Figure 5.10, 5.11 & 5.12)



4. Support the cover using the handle from the rear. Push the cover hinge into the body hinge guide.



5. Insert the hinge bolt through the hinge bracket of the nozzle and the cover bracket. Apply thread locker, insert nut and tighten wrench tight. (Figure 5.13 & 5.14)

6.0 Maintenance and Part Replacement



The following instructions apply to the Kelso Truck Manway. 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 screw. Kelso recommends that the strap and the screw be wiped down and lubricated at every loading. (Figure 6.1, 6.2 & 6.3)



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 Truck 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, it can be opened to the appropriate gap by using standard tools. Do not apply heat to the strap section to accomplish. The maximum allowable distortion is 1/8”. (Figure 6.5) Top lip must remain flat.

3. **Wide Strap Opening** – If the “C” opening of the strap has , it can be closed to the appropriate gap by using standard tools. Do not apply heat to the strap section to accomplish. The maximum allowable distortion is 1/4”. (Figure 6.4) Top lip must remain flat.
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.

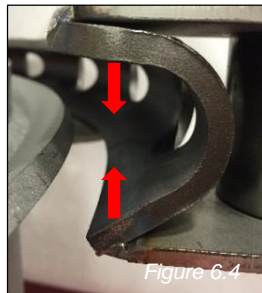


Figure 6.4

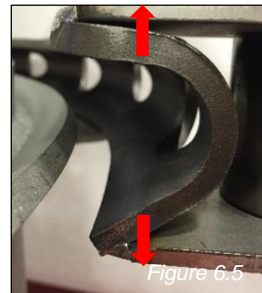


Figure 6.5

6.3. Strap Assembly Replacement

1. Remove the manway cover and the strap hinge bolt. (Figure 6.6 - 6.9)

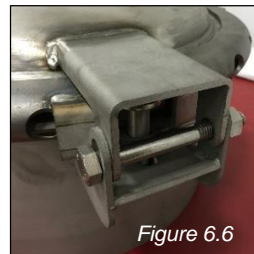


Figure 6.6

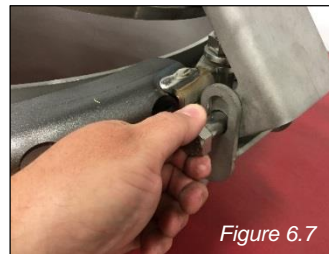


Figure 6.7

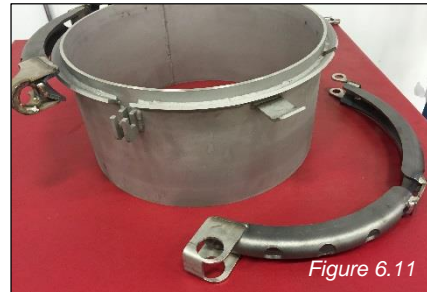


Figure 6.8

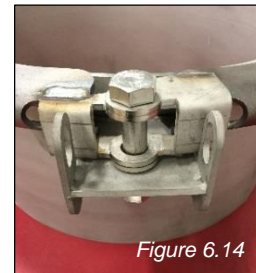


Figure 6.9

2. Pull the two straps toward the front of the manway. Slide the strap that is to be replaced outward from the hinge and remove strap. (Figure 6.10)



3. Place the replacement strap on the body hinge guide and into position, meshing with the opposing strap. (Figure 6.11)
4. Align the holes of the strap brackets with the body hinge guide slot and replace strap bolt. (Figure 6.12 & 6.13)

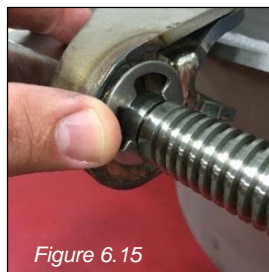


5. Apply strap bolt nut and tighten. After tightening the nut, check for movement of the straps. The straps should open and close freely without resistance. If resistance is noticed, adjust by loosening the lock nut by a half turn. (Figure 6.14)

6.4. Screw and Screw Coupling

Screw

1. The screw can be replaced without opening the cover. Disengage the screw from the strap screw coupling.
2. Remove the “E” clip from the screw. Once removed, pull screw free from the strap. (Figure 6.15 & 6.16)

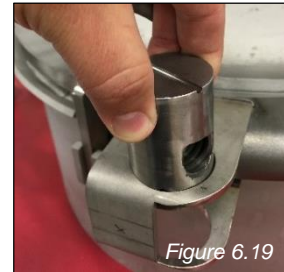
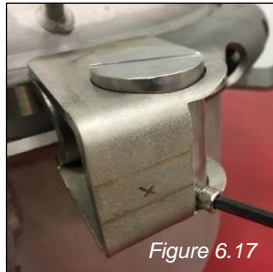


3. To assemble, insert screw into screw bracket, threaded end first.

4. Once screw is fully seated in screen bracket, install “E” clip into the machined groove of the screw.
5. Apply force to fully seat “E” clip.

Screw Coupling

1. Disengage the screw from the strap screw coupling.
2. Remove the 2 set screws from the screw coupling. Once removed, pull screw coupling from the strap. (*Figure 6.17, 6.18 & 6.19*)



3. To assemble, insert coupling into coupling bracket with machined slot facing up.
4. Orientate as pictured in Figure 6.17 & 6.18.
5. Insert set screws and tighten.

6.5 Serration Repair

Product Preparation (Pre Repair)

1. Using a general shop degreasing agent, thoroughly clean the damaged area removing all dirt, oil, salts and other debris from area that extends at least 1”. Proper cleaning of the damaged area is critical to a good repair. Vigorous scrubbing action using a brass wire brush should be used to clean the affected area.
2. After the area has been properly cleaned, the damaged section of serrations should be scrapped using the included dental tool. Scrapping of the damaged area exposes base metal that assists in creating a solid anchor for the repair material to bond.
3. Using compressed air at low volume, “blow dry” the serrations and damaged area removing all residual cleaning agents and debris from the area to be repaired.

Repair Procedure

1. Prepare a small amount of the repair epoxy ensuring that the product is thoroughly mixed. This is indicated when the epoxy has a uniform “gray” coloration throughout.
2. Immediately begin “packing” the mixed epoxy into the damaged area forcing the epoxy down and into the damaged area and serrations.
3. Once the damaged serration 1” extended area has been filled with epoxy, place the enclosed cardboard scrapper onto the surface of the serrations and gently scrap all excess epoxy off.
4. Allow the epoxy to sit undisturbed for 24 hours. Optimal temperature of (60’F – 70’F) is recommended.
5. Using a sharp knife or file, remove all dried epoxy that remains on the sides of the nozzle or has accumulated along the sides of the seal area on the lid.
6. Once the edges of the repair area are clean, begin cleaning the horizontal seal area. Using 400 grit sand paper, begin sanding the repair area to remove build up down to the top of the serrations. Care must be taken to avoid creating a low spot in the damaged area. To ensure that the area has been properly prepared, place the enclosed flat edge over the damaged area to verify that a flat surface is present.

Product Preparation (Post Repair)

1. Using compressed air under low pressure, blow out all dust and debris from the repaired area.

7.0 Warranty Information

See the Warranty Terms and Conditions.

8.0 Revisions to Manual