



INSTALLATION GUIDE

QUICKSWAP

Model(s): Standard and With Tag Axle

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Original Instructions



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REVISION HISTORY

Revision	Date	Description
1	2022-04-07	Added Figure 5 - Chassis dimensions - Quickswap with jack legs and receivers to Section 3.2 - Tractor chassis. Added Section 5.7 - Welding the back receiver (Quickswap with jack legs only).
0	2022-03-09	Initial release

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H. WARRANTY TERMS

EQUIPMENT

TRUCK MOUNTED RECOVERY EQUIPMENT

SLIDING SYSTEM COMPONENTS

TOWING ACCESSORIES MANUFACTURED BY INDUSTRIES NRC

ACCESSORIES MANUFACTURED BY A THIRD PARTY

TERMS

12 MONTHS FROM "IN SERVICE" DATE. NO MORE THAN 24 MONTHS.

10 YEARS FROM DATE OF MANUFACTURING.

12 MONTHS FROM DATE OF MANUFACTURING.

THIRD PARTY WARRANTY APPLIES.

WATCH IT ON YOUTUBE

Watch the Quickswap installation video on YouTube: <https://youtu.be/dueikP1VXIY>



ABOUT THIS MANUAL

This manual will teach you how to safely install a Quickswap towing assembly onto a tractor. The Quickswap assembly is for tractor models with single, tandem and triaxles.

This manual contains the following sections, which you should read and follow in the order they are presented:

- Section 1 Safety information
- Section 2 Identifying the main parts
- Section 3 Technical specifications
- Section 4 Preparing for installation
- Section 5 Installing the frame
- Section 6 Installing accessories
- Section 7 Installing the hydraulic and electrical systems
- Section 8 Re-installing items removed from the tractor

Document conventions

The following conventions are used throughout this document.

NOTE: We highly recommend that you read this procedure completely before starting the installation of your Quickswap assembly.

See also section **Warning messages** for messages related to safety.

Disclaimer

This manual, including specifications of the equipment, is subject to change without notice. Make sure you have the latest version of this manual prior to beginning installation.

Applicable models and serial numbers

This manual is intended for use with the following models with serial numbers within the following ranges only:

- QS-001 to ...
- QT-001 to ...

WARNING MESSAGES

DANGER

Indicates a hazardous situation that, if not avoided, will result in serious injury or death. A danger may or may not involve a property damage hazard.

WARNING

Indicates a hazardous situation that, if not avoided, could result in serious injury or death. A warning may or may not involve a property damage hazard.

CAUTION

Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury. A caution may or may not involve a property damage hazard.

NOTICE

Indicates information that should be read to avoid equipment damage.

1 SAFETY INFORMATION

- You must first receive proper training before you install the Quickswap assembly: installation should be performed only by properly trained personnel.
- Prior to installation, inspect every component and look for any defective or missing part. Advise NRC of any defect found. Do not install a defective component.
- Begin installation only when you have all the required components.
- Always wear personal safety devices:



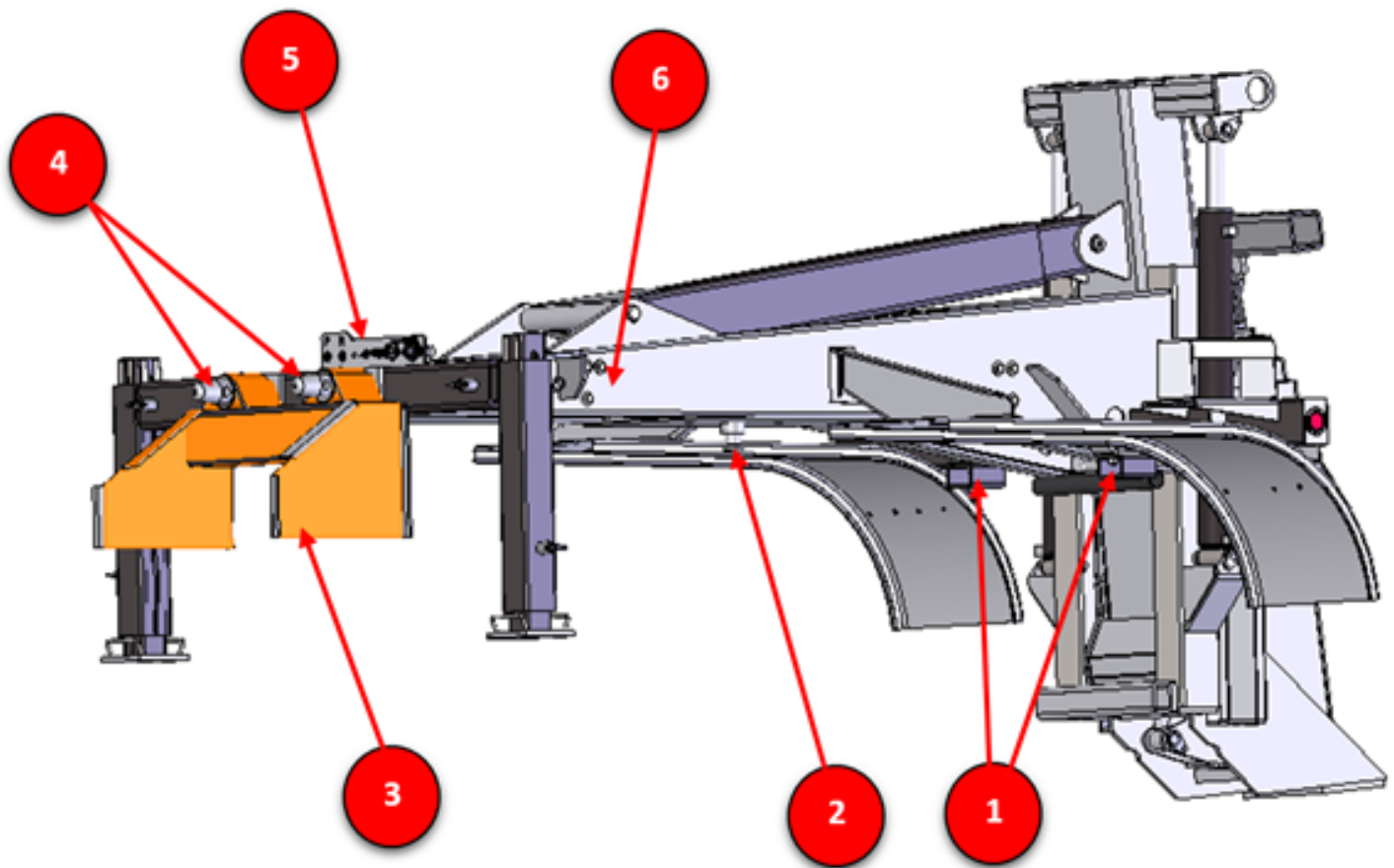
- Always respect lifting device capacities and follow the operating procedure.

2 IDENTIFYING THE MAIN PARTS

See the section that corresponds to your Quickswap model.

2.1 Quickswap standard model

Figure 1 shows the parts of the Quickswap standard model (without a tag axle). This assembly is to be installed on the tractor frame. The only component that remains permanently attached to the tractor frame is the Quickswap front receiver, shown in orange in Figure 1 (3). You can remove the remainder of the assembly when needed. The parts identified in this figure are referred to throughout this manual:



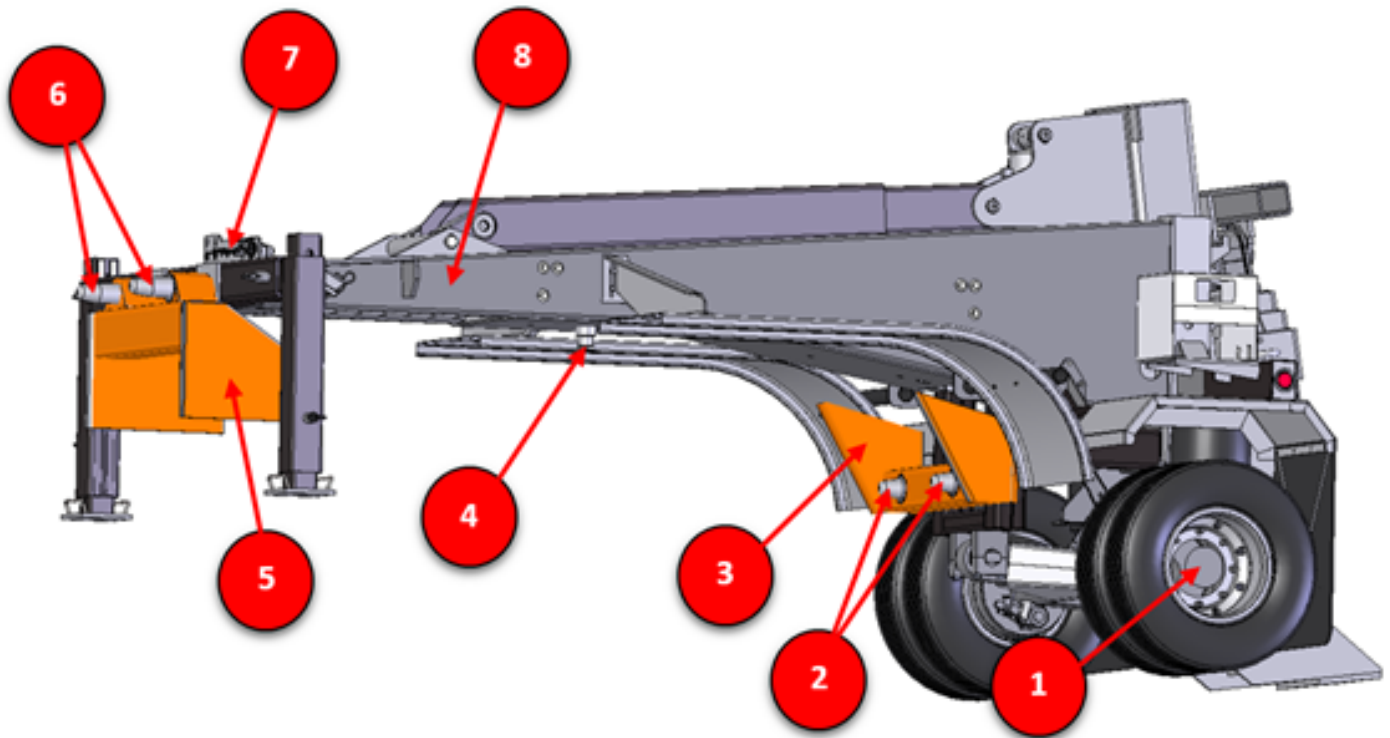
- | | |
|---|---------------------|
| 1. Rear support | 2. King pin |
| 3. Front receiver (front adaptor) | 4. Front guide pins |
| 5. Electrical and hydraulic connector panel | 6. Quickswap frame |

FIGURE 1 - QUICKSWAP STANDARD MODEL - MAIN PARTS

- **Rear support:** Figure 1 (1). When the Quickswap assembly is installed, the supports (one on each side) sit on top of the tractor frame on both sides.
- **King pin:** Figure 1 (2). When Quickswap assembly is installed, this pin slides into the fifth wheel to secure the assembly in place.
- **Front receiver:** Figure 1 (3). This is the only component that needs to be permanently fixed to the tractor frame. The assembly then slides in and out of this fixed receiver to allow quick removal and installation.
- **Front guide pins:** Figure 1 (4). These large pins are removable. When you install Quickswap assembly, these pins slide into the front receiver Figure 1 (3) and hold the assembly firmly in place.
- **Electrical and hydraulic connectors' panel:** Figure 1 (5). When Quickswap assembly is installed, proper connections have to be made for hydraulic and electrical components at the back. This is the panel where these connections are made, as described in section 7 Installing the hydraulic and electrical systems.
- **Quickswap frame:** Figure 1 (6). The Quickswap frame supports all Quickswap components, some of which are the accessories that need to be attached, as described in section 6 Installing accessories.

2.2 Quickswap model with tag axle

Figure 2 shows the parts of the Quickswap model with the tag axle. Apart from the tag axle, the only difference for this model is that it has a rear receiver Figure 2 (3), instead of a rear support. In Figure 2, both receivers are shown in orange and are the components that are permanently installed on the tractor frame.



- | | |
|---|---------------------|
| 1. Tag axle | 2. Rear guide pins |
| 3. Rear receiver (rear adaptor) | 4. King pin |
| 5. Front receiver (front adaptor) | 6. Front guide pins |
| 7. Electrical and hydraulic connector panel | 8. Quickswap frame |

FIGURE 2 - QUICKSWAP MODEL WITH TAG AXLE - MAIN PARTS

3 TECHNICAL SPECIFICATIONS

Technical specifications of the components of both Quickswap models, and technical specifications and requirements of the tractor chassis are listed in the following sections.

DANGER

Failure to comply with the requirements presented in this section may lead to unsafe tractor use and could cause serious injury or even death.

3.1 General specifications

TABLE 1 – GENERAL SPECIFICATIONS - WITH TAG AXLE (IN METRIC [IMPERIAL])

Element	HD	SHD, SSHD-4, LSHD-3, LSHD-4
Basic weight	3,640 kg [8,090 lb]	
Lift rating - Retracted	15,900 kg [35,000 lb]	23,400 kg [50,000 lb]
Lift rating - Extended	6,830 kg [15,000 lb]	9,000 kg [20,000 lb]
Reach - Retracted	1,854 mm [73"]	2,184 mm [86"]
Reach - Extended	2,838 mm [111.75"]	3,448 mm [135.75"]
Tow rating	36,288 kg [80,000 lb]	40,824 kg [90,000 lb]
Tilt angle	Up: 6° Down: 30°	Up: 5° Down: 25°
Height	1,219 mm [48"]	1,143 mm [45"]
Fifth wheel height	1244.6 mm - 1270 mm [49" - 50"]	
Wheel bolt pattern	Number of bolts: 8 Bolt circle: 275 mm [10.827"] Hub bore diameter: 221.2 mm [8.709"] Bolt hole diameter: 24.8 mm [0.975"]	

! DANGER

Installation of larger tires will not increase axle capacity, but will reduce brake performance.

3.2 Tractor chassis

The tractor onto which you mount a Quickswap assembly must meet the specifications described in Table 2, Figure 3, Figure 4, Figure 5, Figure 6, and Table 3.

TABLE 2 - SPECIFICATIONS OF THE TRACTOR CHASSIS - WITH TAG AXLE (IN METRIC [IMPERIAL])

Element	HD	SHD, SSHD-4, LSHD-3, LSHD-4
Wheelbase (minimum)	6,350 mm [250"]	6,985 mm [275"]
Cab to rearmost axle	3,607 mm [142"]	
Tandem axle spread	1,329-1,398 mm [52-55"]	
Frame RBM ¹ (min. per rail)	240 kN-m [2,125,000 lbs-in]	291 kN-m [2,575,000 lbs-in]
Frame	Double frame (recommended): 273 mm x 9.5 mm with 250.8 mm x 6.35 mm [10 3/4" x 3/8" with 9 7/8" x 1/4"] or equivalent Single frame (acceptable): 295.3 mm x 9.5 mm [11 5/8" x 3/8"]	
Front axle	Minimum: 12,000 lbs Recommended: 14,000 lbs	
Rear axle	Minimum: 38,000 lbs Recommended: 40,000 lbs or more	

¹Resisting Bending Moment

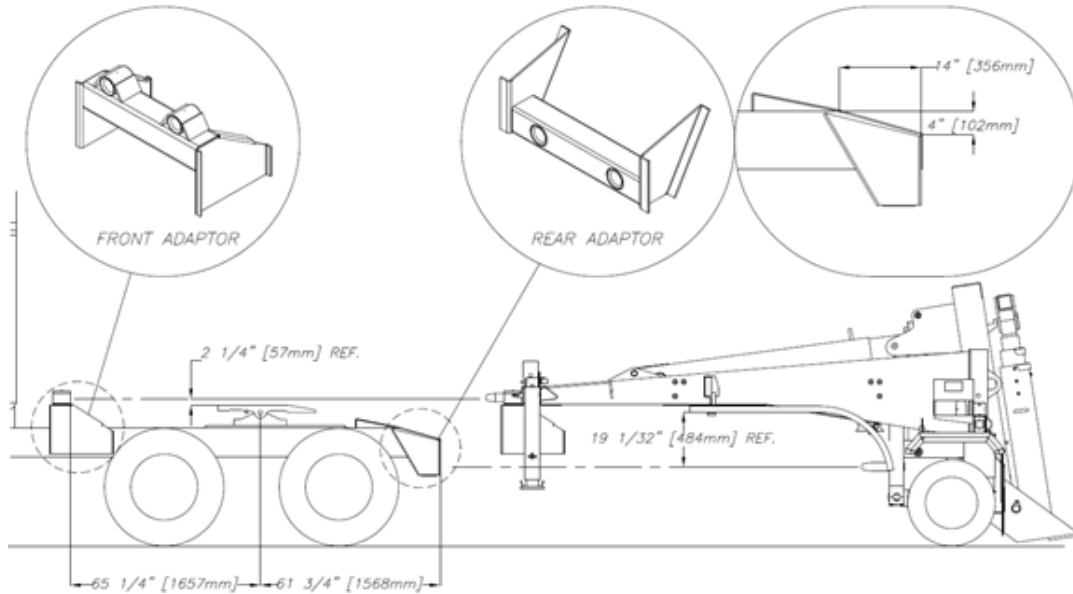


FIGURE 3 - TRACTOR CHASSIS ADAPTER'S REQUIREMENTS

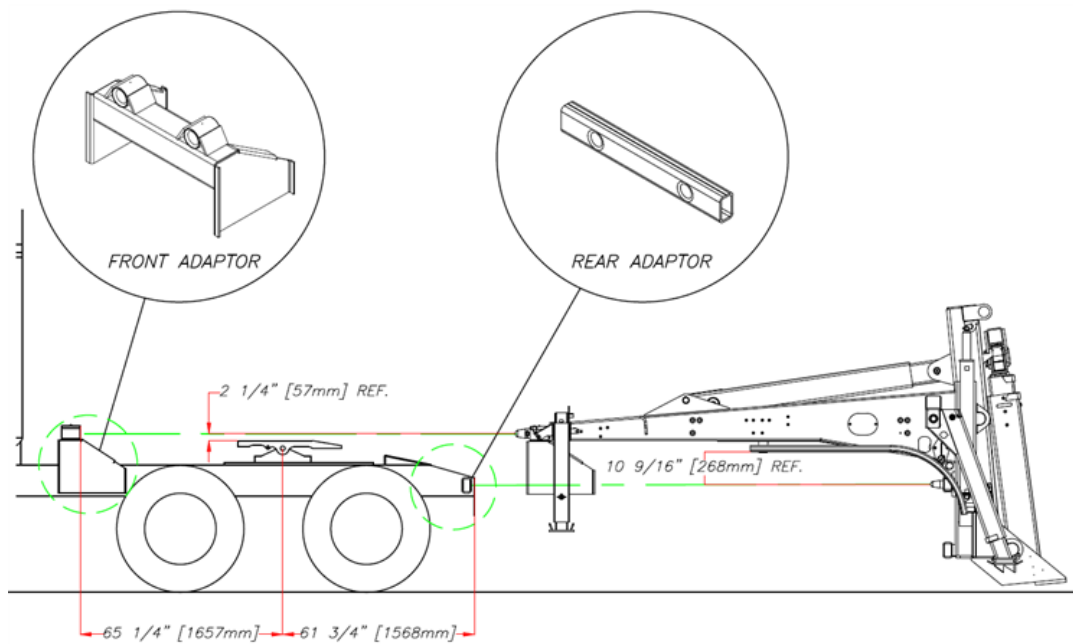


FIGURE 4 - TRACTOR CHASSIS ADAPTER'S REQUIREMENTS - QUICKSWAP WITH JACK LEGS AND RECEIVERS

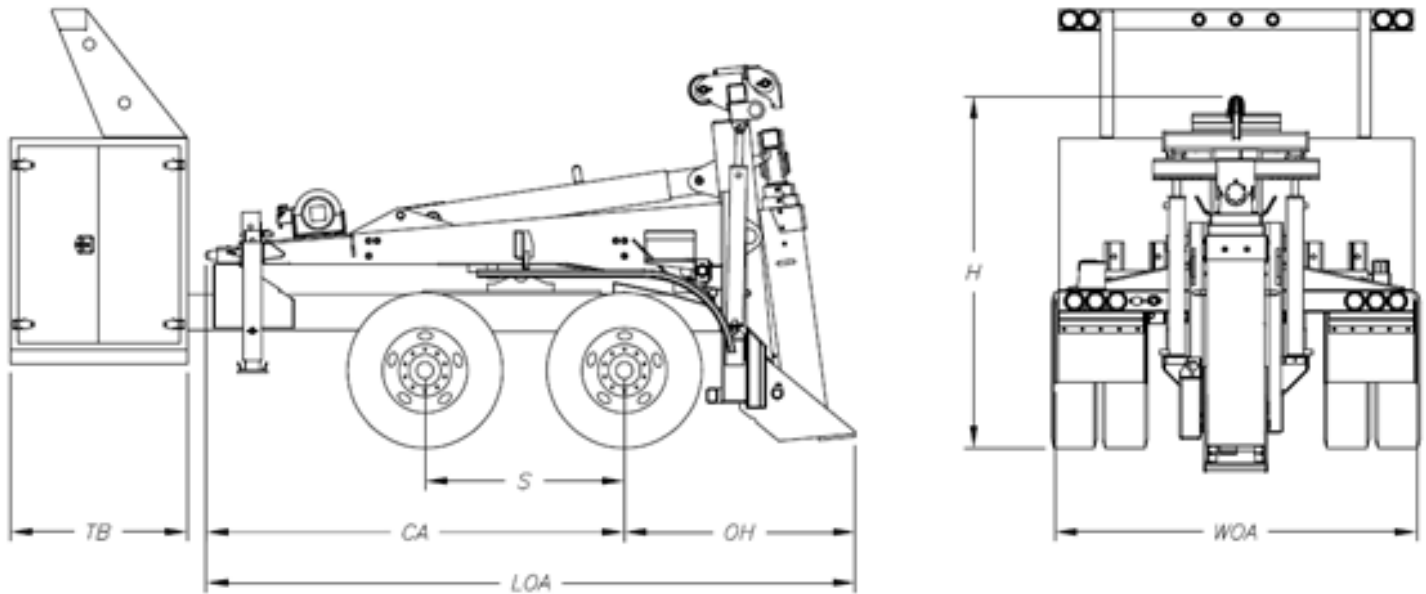


FIGURE 5 - CHASSIS DIMENSIONS - NO TAG AXLE

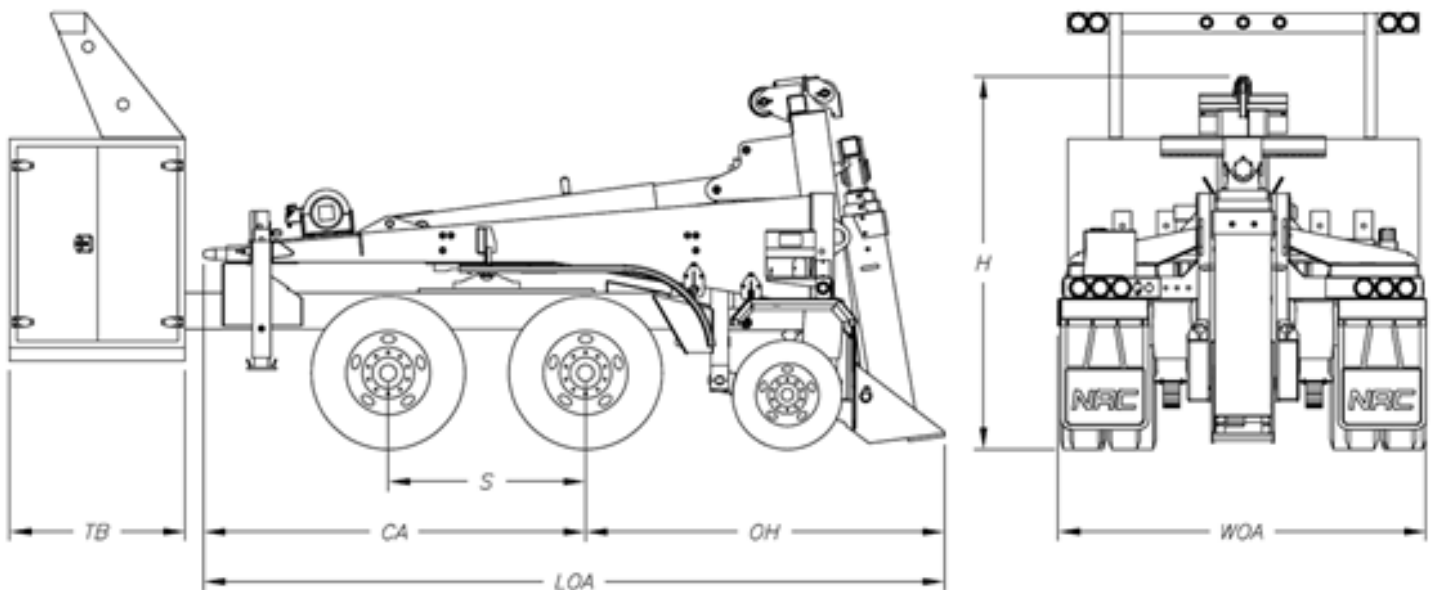


FIGURE 6 - CHASSIS DIMENSIONS - WITH TAG AXLE

TABLE 3 - DIMENSIONS OF THE CHASSIS (IN MM [IN])

Dimension Code	No Tag Axle	With Tag Axle
S	1,372 [54]	1,372 [54]
CA ¹	2,880 [113]	2,654 [104]
OH ²	1,590 [63]	2,495 [98]
LOA	4,469 [176]	5,150 [203]
TB	609-1830 [24-72] ³	609-1830 [24-72] ⁴
H	2,413 [95]	2,413 [95]
WOA	2,494 [98]	2,558 [101]

¹The CA and OH values for the Quickswap with jack legs model will vary based on the rear adaptor position. The ideal rear adaptor position for weight distribution and handling of the towing vehicle is 1,568 mm [61 3/4"] from the centre of the tractors' fifth wheel (see Figure 4).

²Idem as #2

³In 100-mm [4-inch] increments

⁴In 100-mm [4-inch] increments

3.3 Hydraulic system

TABLE 4 – SPECIFICATIONS OF THE HYDRAULIC SYSTEM (IN METRIC [IMPERIAL])

Element	Value for All Models
Operating pressure	207 bar [3,000 psi]
Pump flow	64 L/min [17 USG/min]
Tank volume	53 L[14 USG]

4 PREPARING FOR INSTALLATION

NOTE: We highly recommend that you read this procedure completely before starting the installation of your Quickswap assembly.

The installation procedure is very similar for both Quickswap models (standard or with tag axle). This procedure is written for the standard model, but when there are differences for the model with a tag axle, they are noted.

4.1 Preparing the tractor

You must install the Quickswap assembly as far as possible toward the front of the tractor frame so that more weight is carried at the front. Remove any accessories or other hardware that would prevent you from installing the assembly. This would include disconnecting electrical cables or hydraulic hoses.

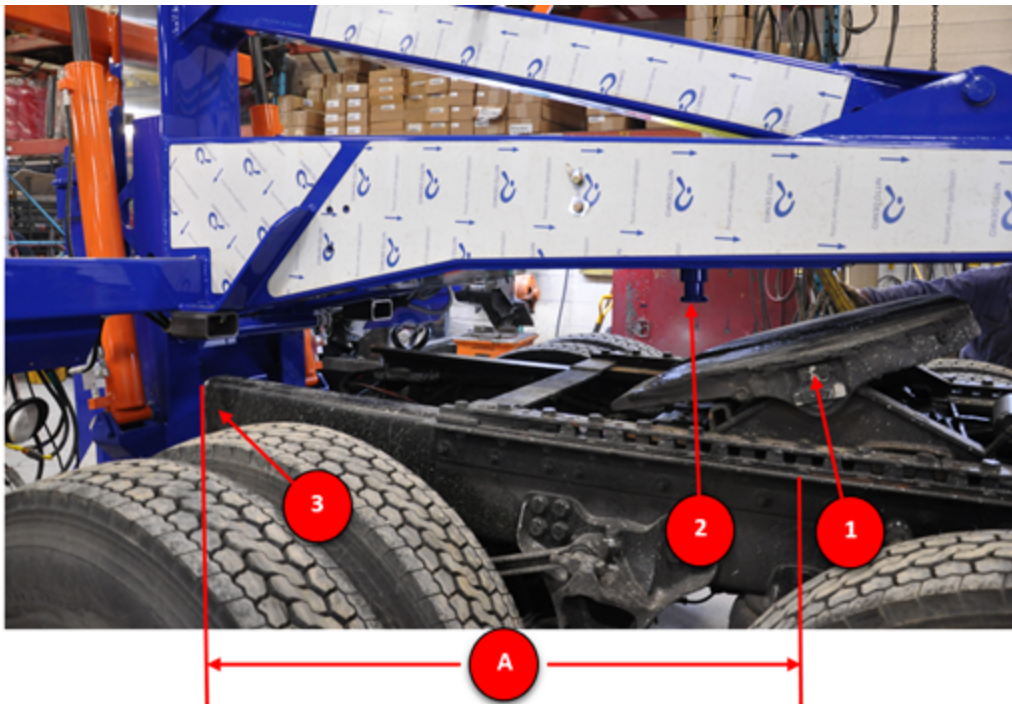
4.2 Positioning the fifth wheel

Before cutting the tractor frame, position the fifth wheel to leave just enough space for installing the Quickswap.

Figure 7 shows the Quickswap assembly in its near-final position on the tractor frame. The king pin (No. 2 in Figure 7) must slide into the centre of the fifth wheel. The distance between the end of the tractor frame and the centre of the fifth wheel must be 62 inches.

If you are planning on driving the tractor without the Quickswap, leave the rear tractor lights on the tractor frame and make sure that they will not interfere with the Quickswap once it is installed.

NOTE: You may have to move the rear lights to a location where they will not interfere with the Quickswap.



- 1. Tractor's fifth wheel
- 2. King pin
- 3. End of tractor frame
- A. Distance between end of tractor frame and centre of fifth wheel (62")

FIGURE 7 - POSITIONING THE QUICKSWAP ASSEMBLY ON THE TRACTOR FRAME

Move the fifth wheel as follows:

1. Unlock the fifth wheel.
2. Move the fifth wheel as close as possible to and no further than 62" from the end of the tractor frame. 62 inches will leave 1/2" of play.

NOTE: If you are keeping the rear tractor lights installed on the tractor frame (because you are planning to also drive the tractor without the Quickswap installed), measure from the rear end of the lights when positioning the fifth wheel. This will ensure that the rear tractor lights will not interfere with the Quickswap once it is installed.

3. Lock the fifth wheel in place.
4. Measure 62" from the centre of the fifth wheel and mark where the tractor frame should be cut.

4.3 Cutting the tractor frame

1. Cut the tractor frame on the marking.

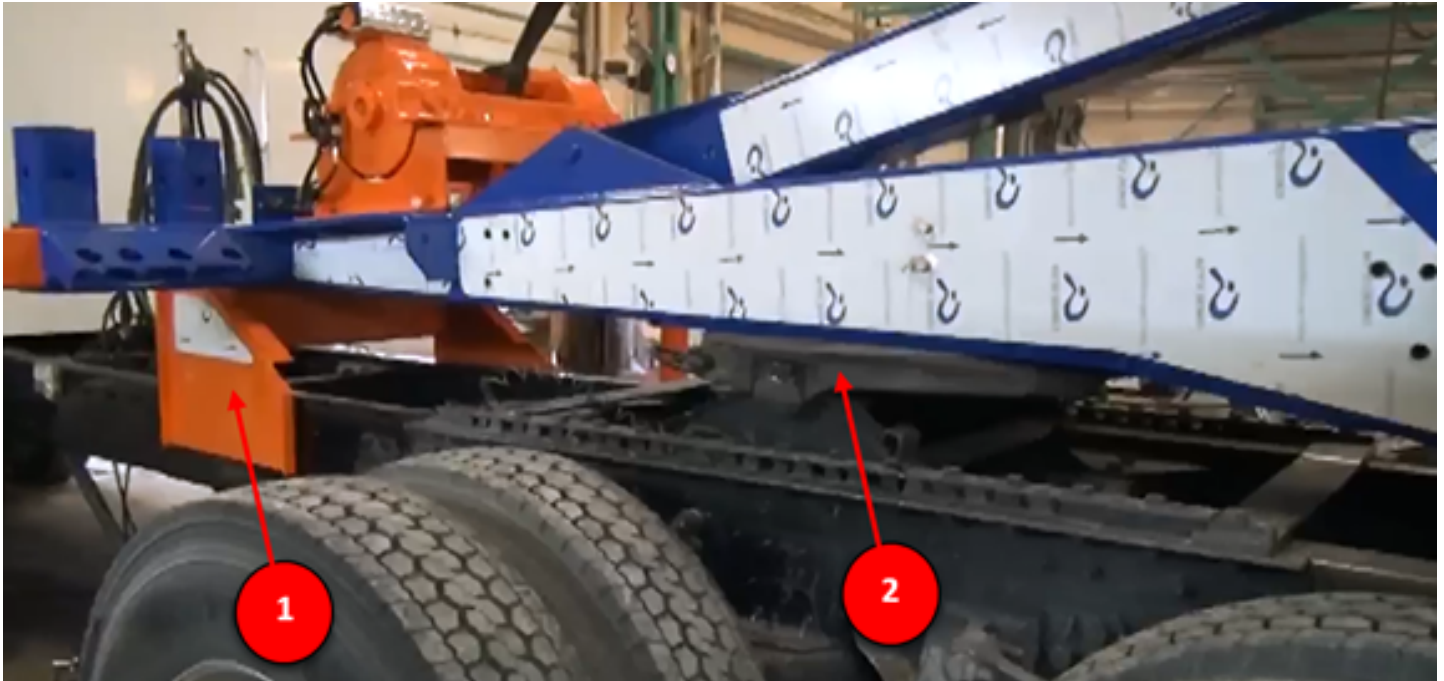
5 INSTALLING THE FRAME

Before placing the Quickswap assembly on the tractor, ensure that the front and rear receivers are already attached. If they are not, slide the front and rear receivers over the guide pins and secure them in place.

To install the frame, follow the subsections in the order they are presented.

5.1 Placing the Quickswap assembly on the tractor

Use heavy lifting equipment to slide the Quickswap assembly over the tractor frame until the king pin is locked into the fifth wheel as shown in Figure 8.



1. Quickswap front receiver

2. Tractor's fifth wheel

FIGURE 8 - FRONT RECEIVER AND KING PIN LOCKED IN POSITION

The front receiver is now in position for attachment to the tractor frame, but before you attach it, you must level the Quickswap assembly.

5.2 Levelling the Quickswap assembly on the tractor

There are three parts to leveling: the first leveling, installing shims, and then a final levelling.

5.2.1 First leveling

The Quickswap frame must be level and can be checked in the position shown in Figure 9 (1).

1. Put a level at the bottom of the Quickswap frame and verify that it is level.
2. If the frame is not level, use the lifting equipment controller to correct the level.
3. Check the level on the other side of the tractor.
4. If both sides are not the same, you will need to adjust them with shims under the rear support, as described in 5.2.2 Installing temporary shims.

NOTE: If the tractor has an air suspension, make sure it is fully inflated, stable and level before you check the level of the Quickswap frame.



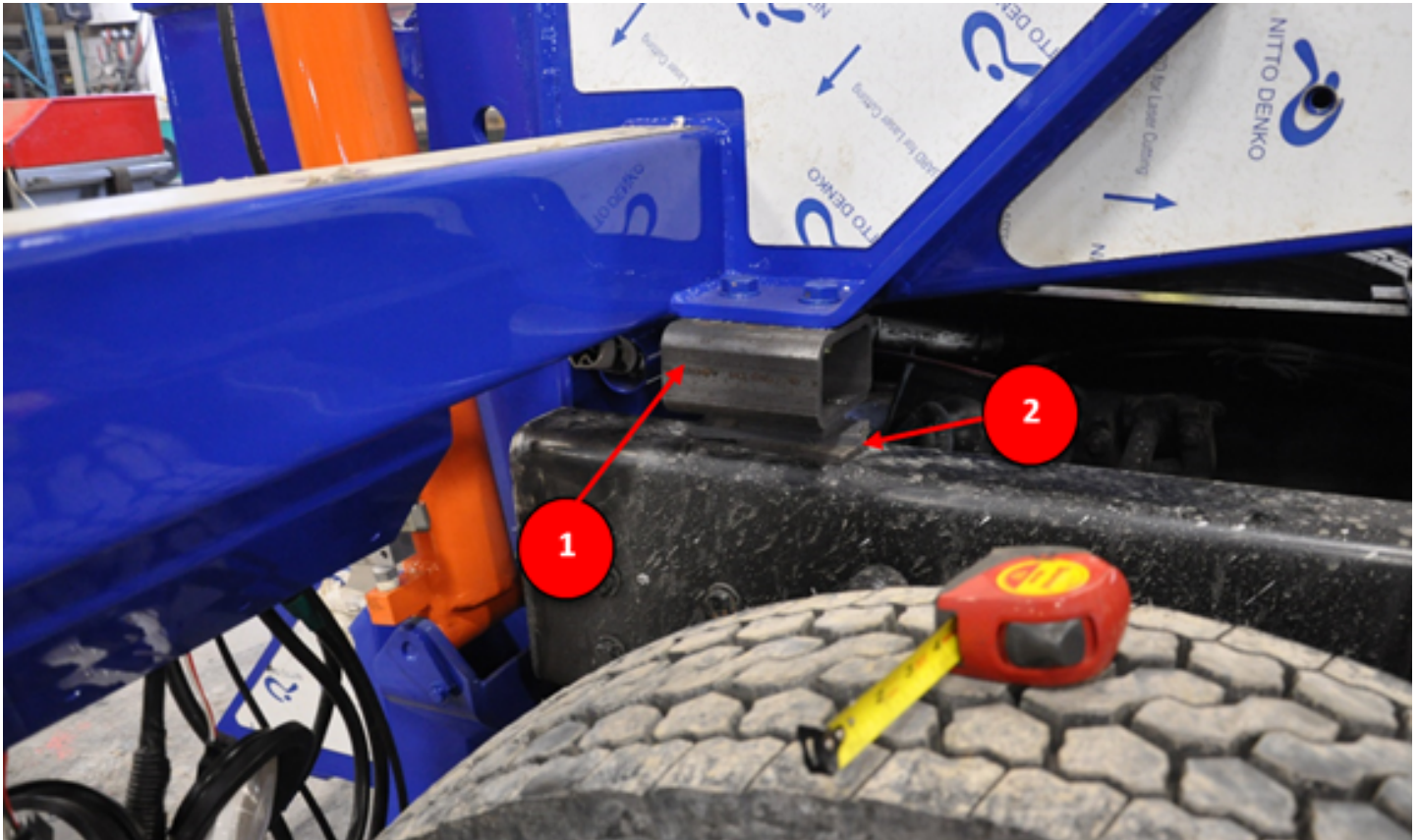
1. Level under Quickswap frame

2. Lifting equipment control

FIGURE 9 - LEVELING THE QUICKSWAP FRAME

5.2.2 Installing temporary shims

Insert shims under the rear support, on both sides, as shown in Figure 10. Do not permanently secure the shims before the Quickswap frame has been leveled, since further adjustment might be needed.



1. Rear Support

2. Temporary Shim

FIGURE 10 - TEMPORARY SHIMS UNDER THE REAR SUPPORT

5.2.3 Final levelling

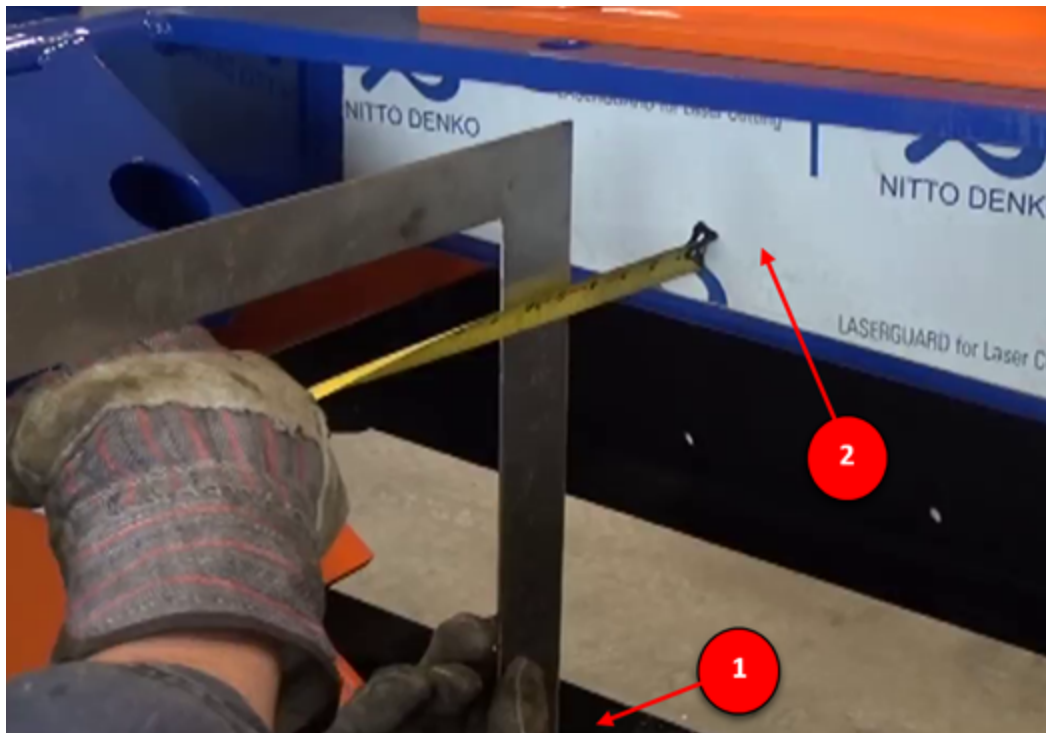
Once the shims have been placed, the full weight of the Quickswap assembly should rest on the rear support and shims, and you must again verify the level of the assembly, as described in 5.2.1 First leveling.

You may need to lift the Quickswap assembly from the rear support to adjust the shims properly so the assembly is level. Repeat the level check and shim adjustments as often as needed so that the assembly is level on both sides.

5.3 Centring the Quickswap assembly on the tractor

The Quickswap assembly must be in centred in relation to the front of the tractor frame, where the front receiver must be fixed. To verify that it is centred, take a measurement on each side of the tractor:

1. Using a square on the tractor frame, hold it vertically as shown in Figure 11.
2. Measure the distance between the square and the Quickswap frame.
3. Repeat this measurement on the opposite side.
4. If the measurements differ by more than 1/8", adjust the Quickswap frame accordingly by moving it. This new position of the frame will be fixed by adding an appropriate shim between the tractor frame and the side of the front receiver, as shown in the next section.



1. Tractor frame

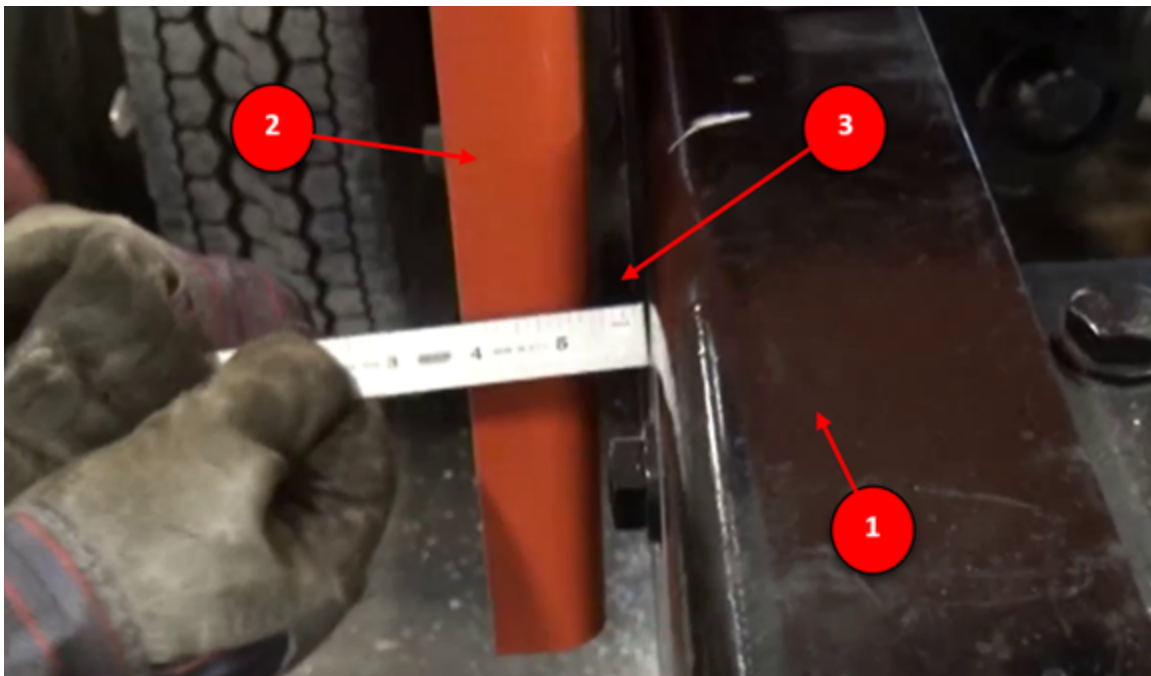
2. Quickswap frame

FIGURE 11 - CHECKING THAT THE QUICKSWAP ASSEMBLY IS CENTRED

5.4 Fixing the front receiver onto the tractor

NOTE: Like the front receiver, the rear receiver of the Quickswap model with tag axle has been manufactured with a standard angle for a North American tractor frame. Install the rear receiver in the same way as the front receiver.

Once the Quickswap assembly has been centred, there should be a gap between the side of the front receiver and the tractor frame as shown in Figure 12 (3). Shims must be inserted to fill the gap and then bolted with the front receiver to the tractor frame.



1. Tractor frame
2. Side of Quickswap front receiver
3. Gap between the front receiver and the tractor frame where the shim will be inserted

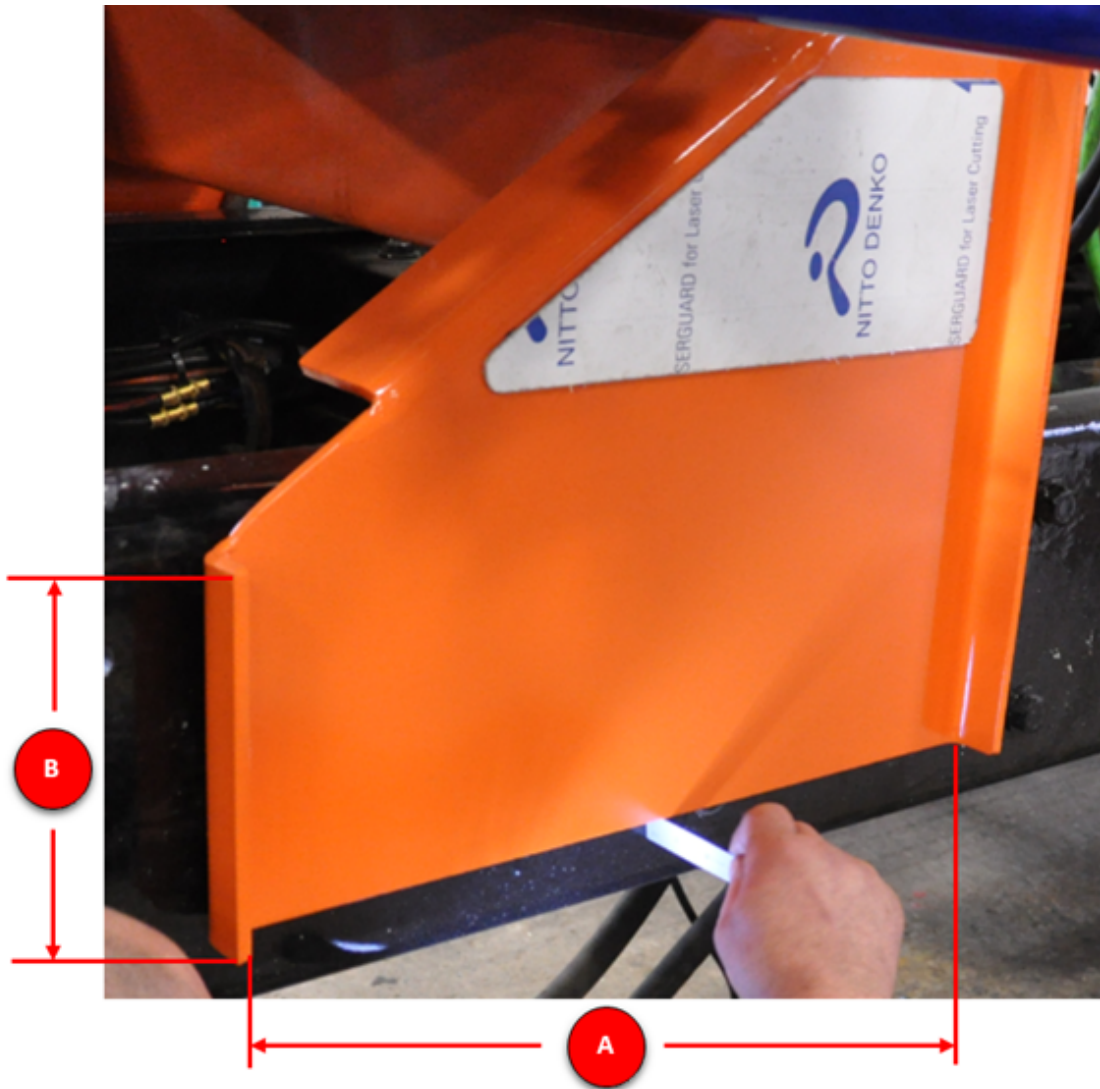
FIGURE 12 - MEASURING THE THICKNESS REQUIRED FOR THE SHIM

5.4.1 Measuring the shims for the front receiver

Measurements must be taken on both sides to prepare the appropriate shims for insertion between the front receiver and the tractor frame.

1. Measure the required thickness for the shim by measuring the gap between the front receiver and the tractor frame. This is where the shim will be inserted, as shown in Figure 12 (3). Check both at the top and the bottom of the gap to see if there is a difference.

2. Measure the width (A) and length (B) of the shim as shown in Figure 13. All measurements must be taken on both sides since there may be differences, especially in the thickness.



A. Width of shim

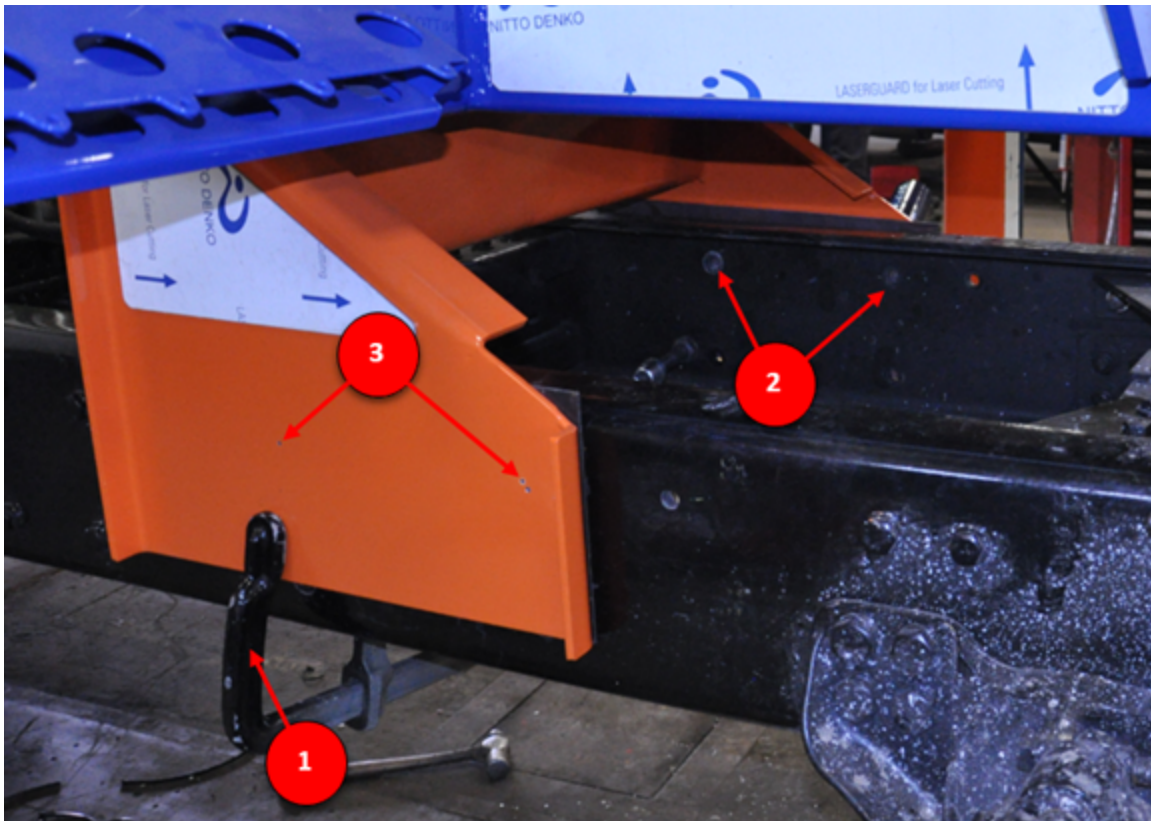
B. Length of shim

FIGURE 13 - MEASURING SHIM LENGTH AND WIDTH

3. When the shims are ready, insert them and clamp the tractor frame and front receiver together, with the shims in place, as shown in Figure 14 (1).

5.4.2 Planning the holes and installing the bolts

Each side of the front receiver must be fastened by at least six (6) bolts, roughly equidistant. Since tractor frames usually have pre-drilled holes, we recommend that you use these first. An example is shown in Figure 14 (2).



1. Clamp
2. Pre-drilled holes on tractor frame
3. Holes drilled with small bit

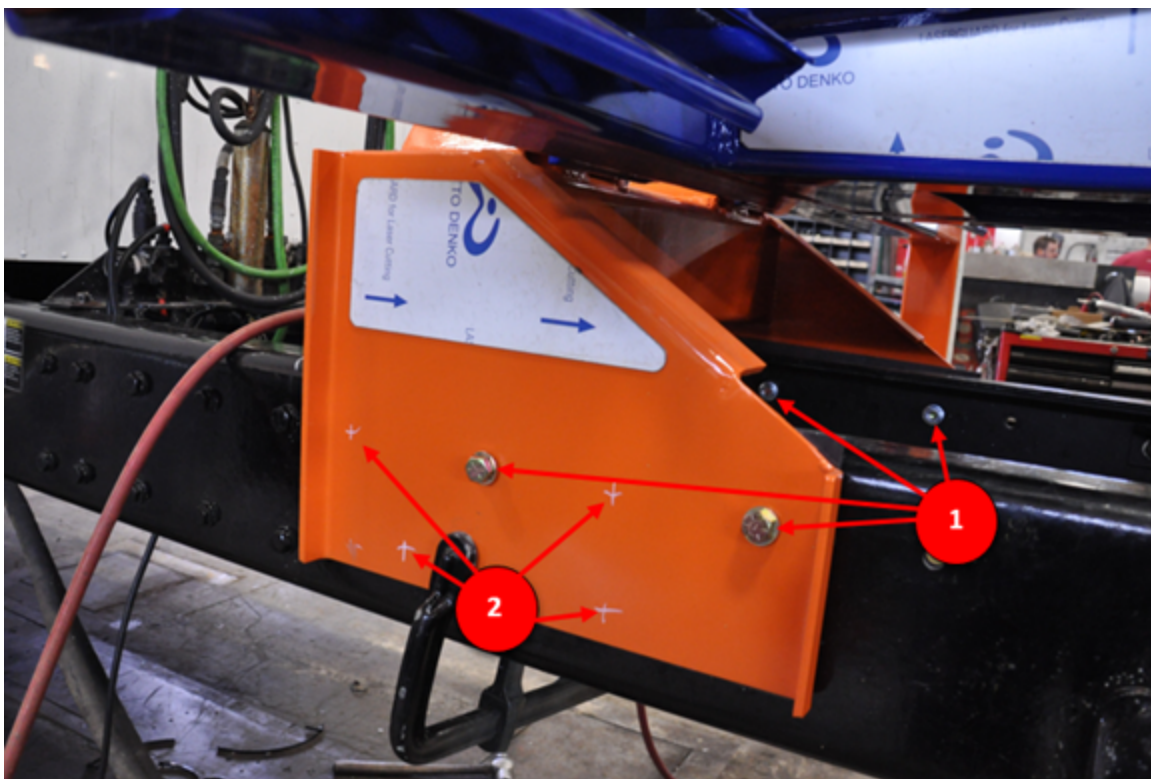
FIGURE 14 - FIRST STEP IN PLANNING HOLES AND INSTALLING BOLTS

1. Using a small bit at first to ensure proper positioning of the hole, drill all the way through from the inside, where the pre-drilled holes are located. Figure 14 (3) shows the results as seen from the outside.
2. Enlarge the holes to their final size (5/8") and install the bolts, but do not tighten them. The result is shown in Figure 15 (1).

3. Plan the positions for the remaining holes, keeping them equidistant as much as possible. Avoid putting them too close to another hole in the frame or in a position where there might be other obstacles. Figure 15 (2) gives an example of four more positions for holes.

NOTE: See the tractor bodybuilder manual for any additional information regarding the drilling the tractor frame.

4. Once the hole positions are marked, you can tighten the bolts that were first installed.
5. Remove the clamp.
6. Drill the holes all the way through.
7. Install all other bolts.
8. Tighten the bolts.



1. First bolts installed

2. Locations planned for remaining bolts

FIGURE 15 - FINAL STEP IN PLANNING AND INSTALLING BOLTS

5.5 Verifying the position of the Quickswap assembly

Before removing the detachable part of the Quickswap assembly to finish the installation, verify that its final position is approximately 1 inch from the back wheel. If it is more than 1 inch, you should remove the assembly and cut the tractor frame again to bring the Quickswap assembly as close as possible to the front of the tractor.

To improve weight distribution and handling of the towing vehicle, position the Quickswap assembly as far forward as possible, making sure there is no chance of contact with the tractor wheels, suspension, axle or other moving parts.

For a Quickswap with jack legs, precisely mark the rear adaptor position onto the frame to weld it at the correct height (see 5.7).

5.6 Removing the Quickswap assembly

You will need to remove the Quickswap frame from the front receiver to be able to weld the shims under the rear support. However, before removing the Quickswap frame, you must first measure the thickness required for these shims so the permanent ones can be prepared. Both sides should be measured independently since they may be different for each.

To remove the Quickswap frame from the front receiver:

1. Unlock the king pin from the fifth wheel. An example is shown in Figure 16 (1) where the Lock/Unlock handle needs to be pulled out to release the king pin from the fifth wheel.
2. With heavy lifting equipment, pull the Quickswap frame out of the front receiver, which is the only part that remains attached permanently to the tractor frame (see Figure 17).



1. Lock/Unlock handle

FIGURE 16 - UNLOCKING THE KING PIN



FIGURE 17 - THE FRONT RECEIVER FASTENED TO THE TRACTOR

5.7 Welding the back adaptor (Quickswap with jack legs only)

NOTE: Always refer to truck body builder manual for welding instructions on the truck frame.

1. Measure the length of the frame inside rail and cut the back receiver 1/8" shorter.
2. Adjust the height of the tube using the marks you previously did and weld it in place.

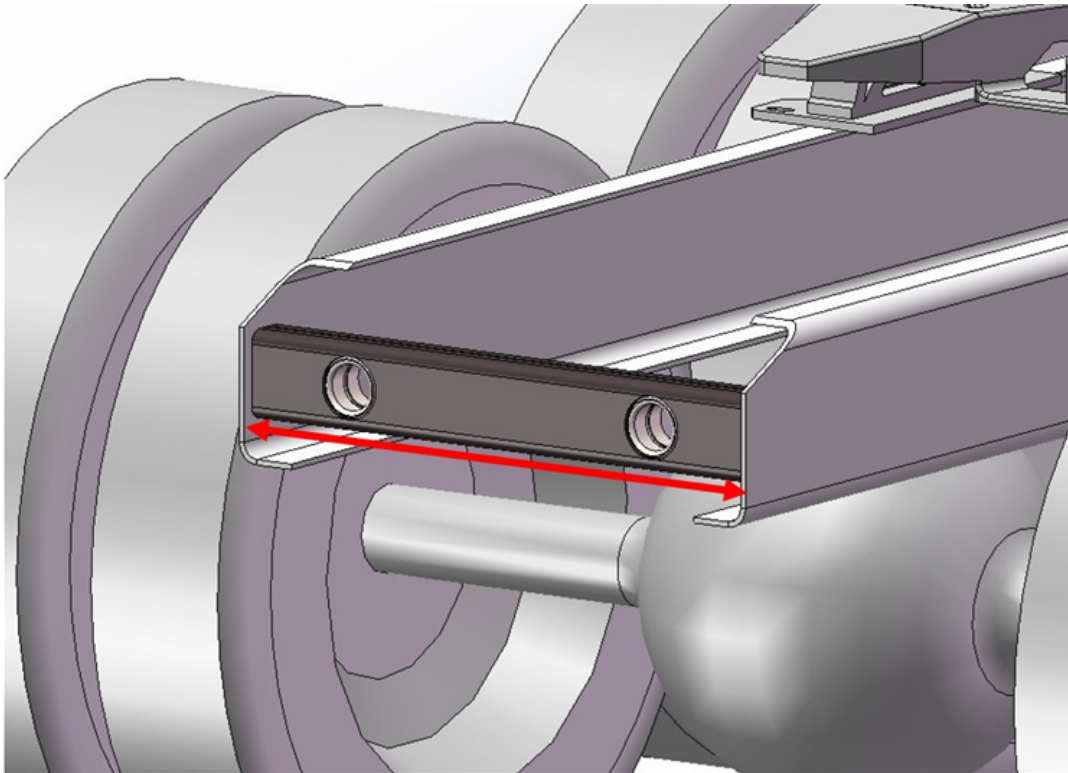


FIGURE 18 - WELDING THE BACK RECEIVER (QUICKSWAP WITH JACK LEGS ONLY)

5.8 Welding the frame plates

A plate needs to be welded onto the back of the tractor frame, where it was cut, as shown in Figure 19.



1. Tractor frame

2. Frame plate

FIGURE 19 - WELDING THE FRAME PLATE

5.9 Welding permanent shims onto the rear support

You must weld permanent shims onto the Quickswap rear support, as indicated in Figure 20.

If the thickness of the shims differs for each side, make sure you weld the correct shim onto the correct side.

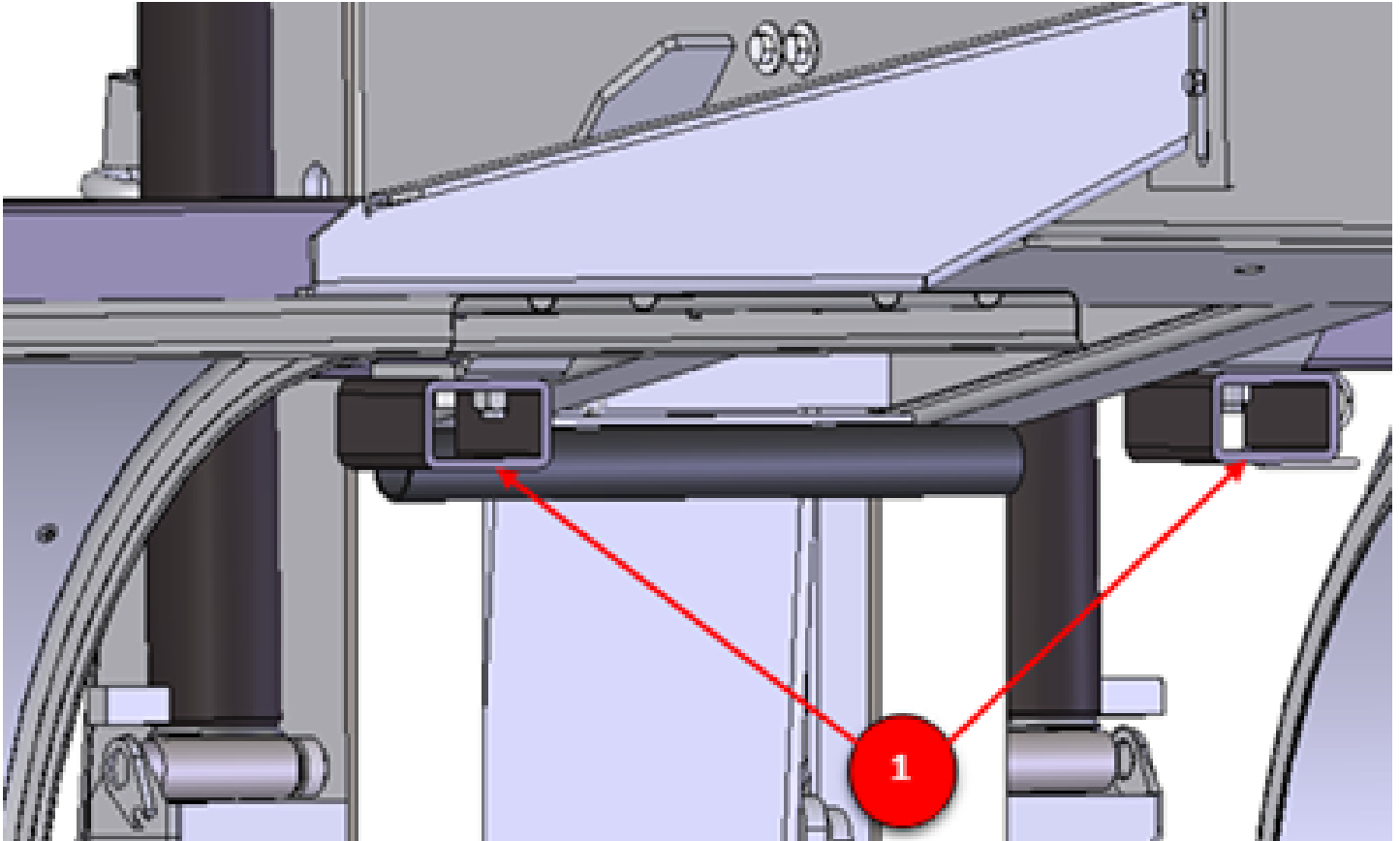
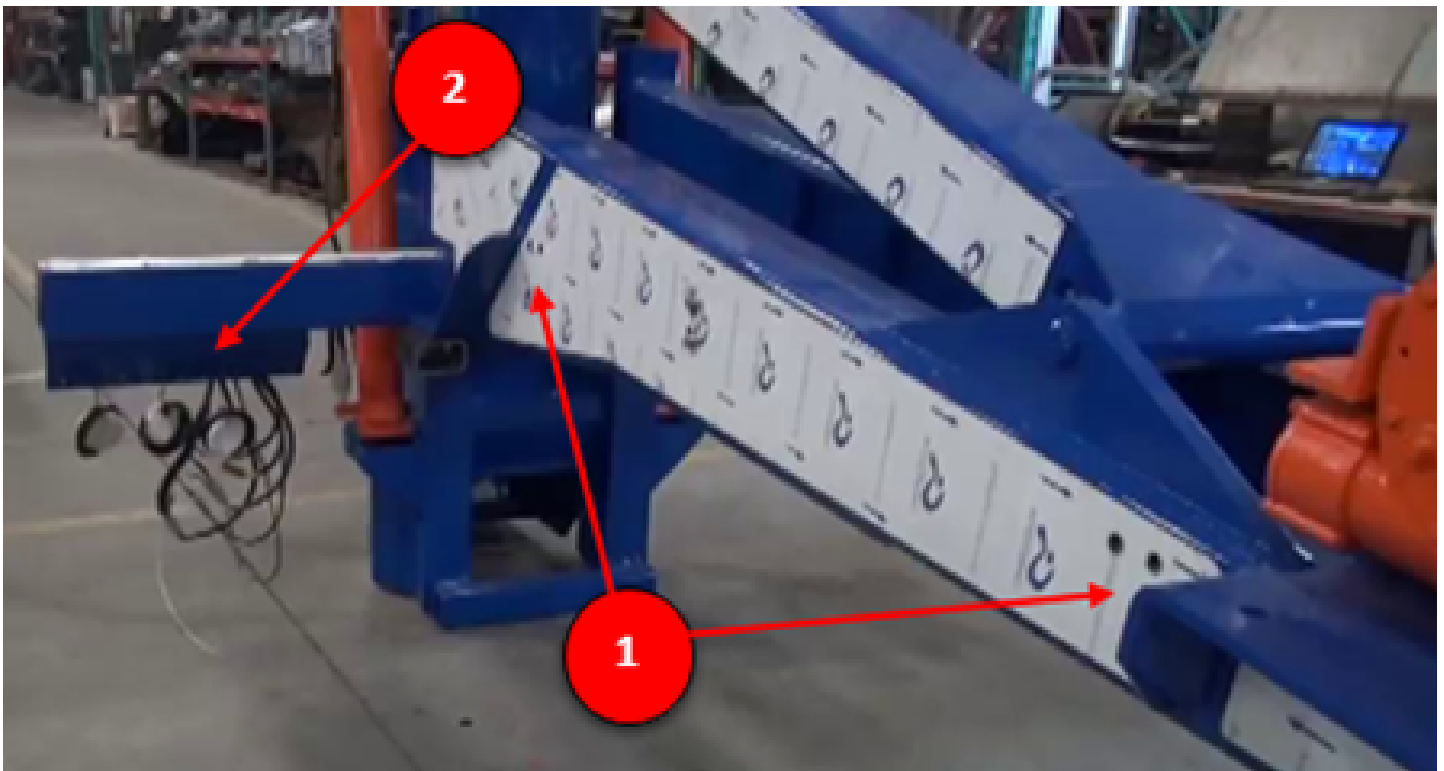


FIGURE 20 - WHERE TO WELD SHIMS UNDER THE REAR SUPPORT

6 INSTALLING ACCESSORIES

Pre-drilled holes and attachments have been provided on both sides of the Quickswap frame (see Figure 21) for the toolbox and the fenders.

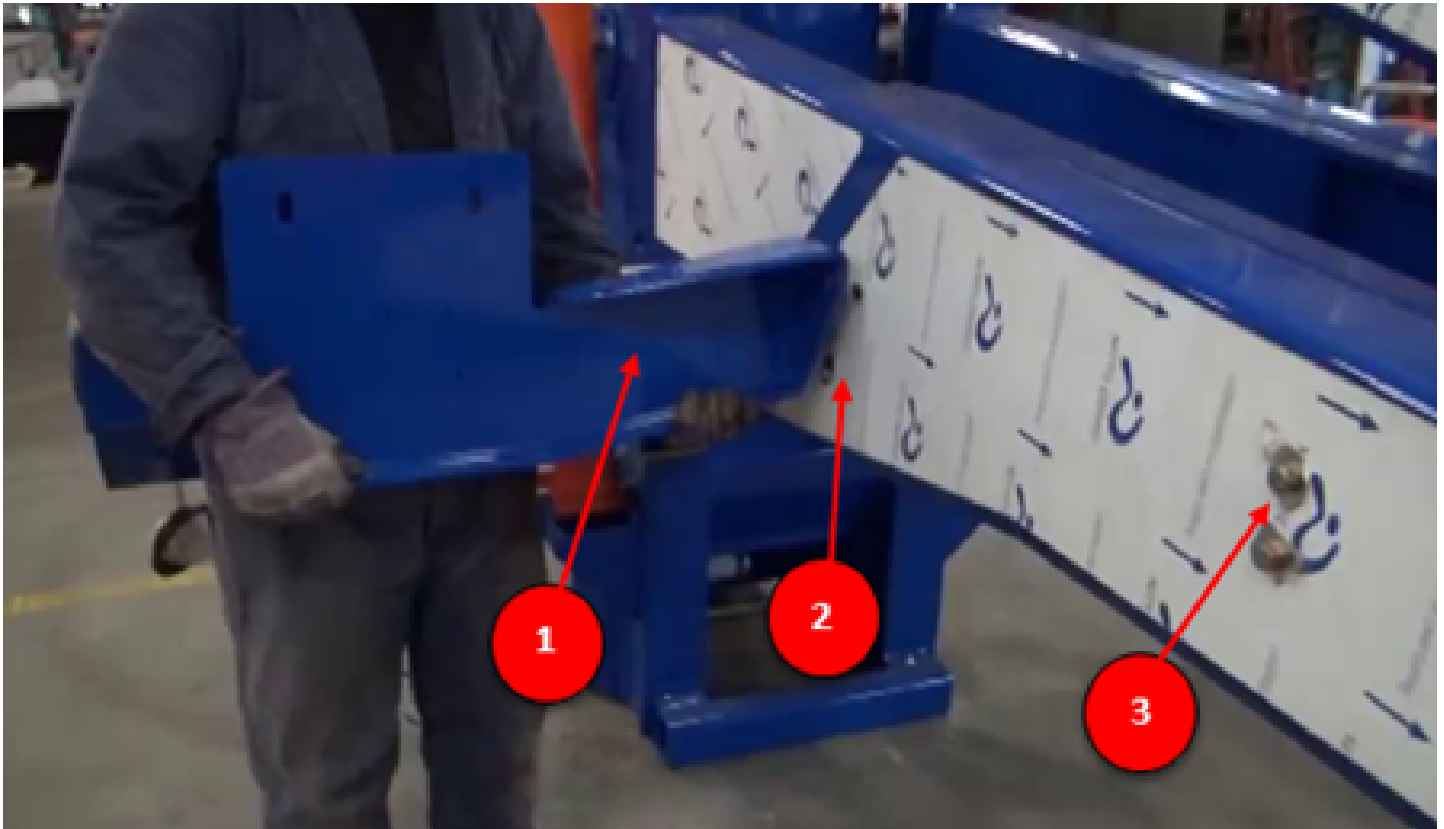


1. Holes to attach toolbox brackets

2. Attachments for fenders

FIGURE 21 - ATTACHMENTS FOR ACCESSORIES

To install the toolbox, you must first install the brackets to hold it in place. Figure 22 shows how the left toolbox bracket fits onto the pre-drilled holes in the frame.



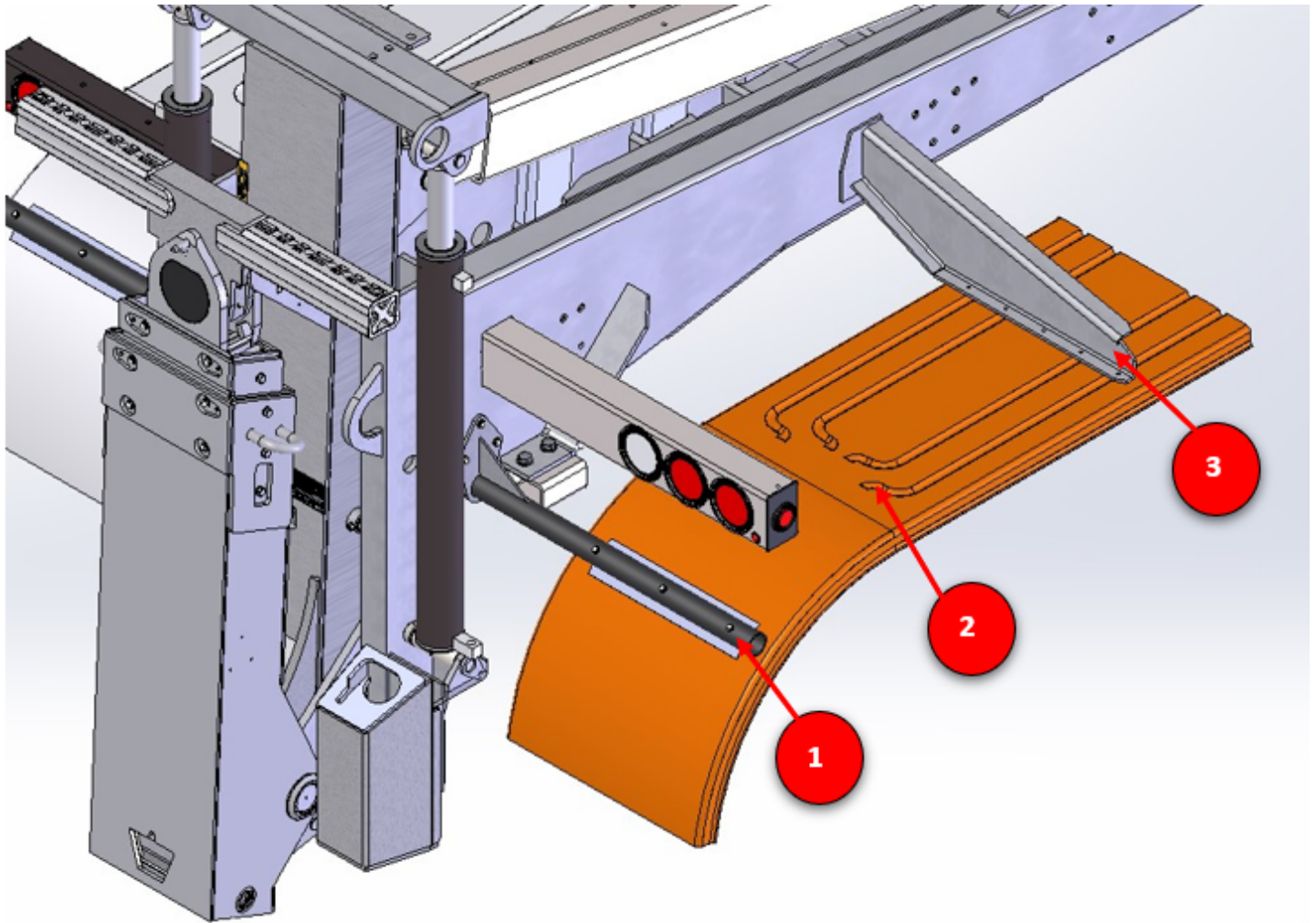
1. Toolbox bracket
2. Holes to attach toolbox brackets
3. Attachments for fender bracket

FIGURE 22 - BRACKETS FOR TOOLBOX AND FENDERS

Once the brackets are installed securely, slide the toolbox between the brackets and then fasten it to each bracket with the bolts provided.

Fenders can be attached in two ways:

1. If the toolbox is not installed, install a fender bracket onto the frame using the bolts provided (see No. 3 in Figure 23). Then attach the fender (No. 2) to that bracket and to the support at the back (No. 1)
2. If the toolbox has been installed, the bracket is not necessary since you will bolt the fender to the toolbox and to the support (No. 1 in Figure 23)



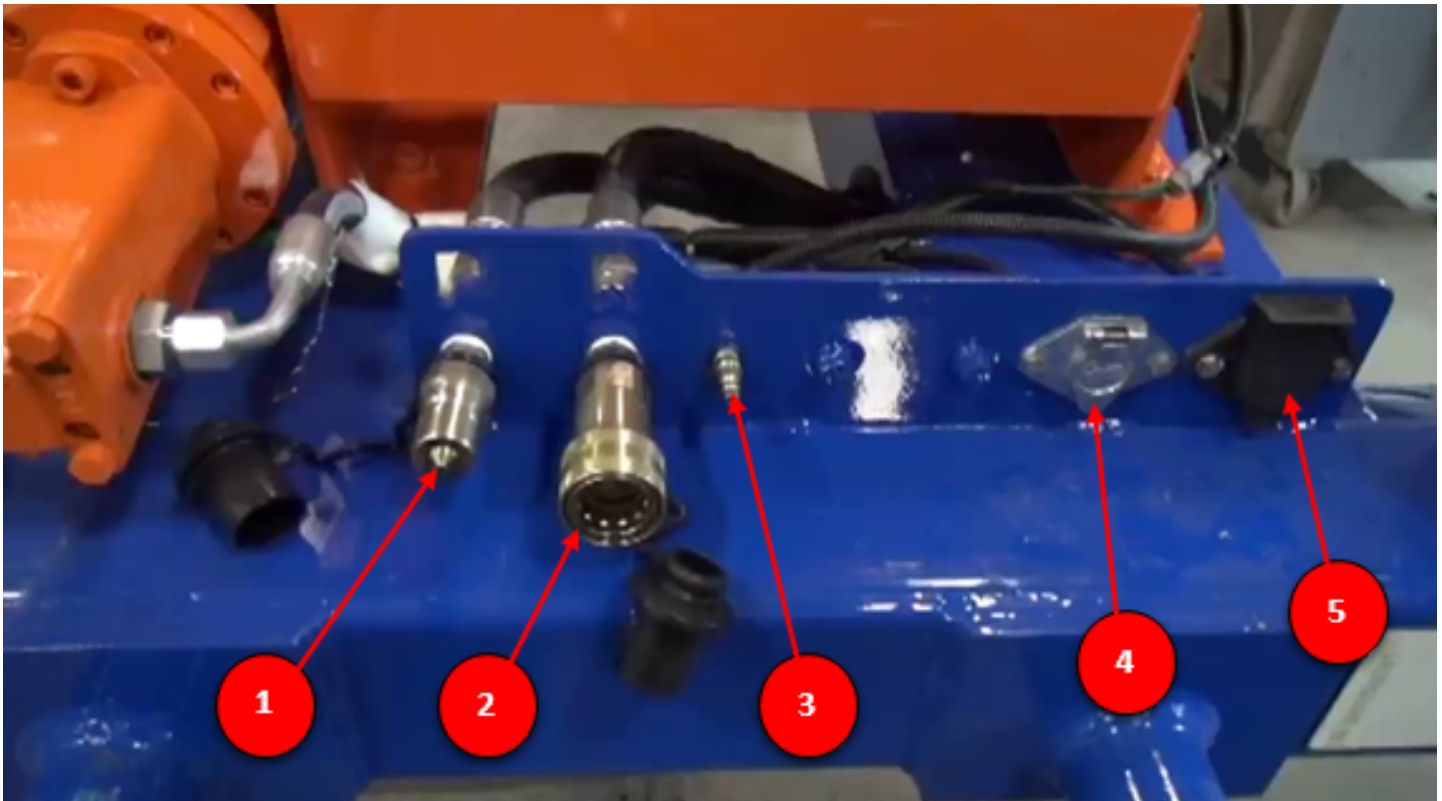
- 1. Fender support
- 3. Fender bracket

- 2. Fender

FIGURE 23 - FENDER INSTALLED WITHOUT THE TOOLBOX

7 INSTALLING THE HYDRAULIC AND ELECTRICAL SYSTEMS

Your Quickswap model has a built-in panel for making hydraulic and electrical connections as shown in Figure 24.



- | | |
|-------------------------------------|---------------------------------------|
| 1. Hydraulic pressure | 2. Hydraulic return |
| 3. Air for the winch clutch release | 4. Electrical back-up light connector |
| 5. Seven-pin electrical connector | |

FIGURE 24 - PANEL FOR ELECTRICAL AND HYDRAULIC CONNECTORS

Items 1 and 2 in Figure 24 are quick couplers for the hydraulic system. You will have to install the corresponding hydraulic quick couplers on the tractor hoses.

Items 4 and 5 in Figure 24 are the electrical connectors. The connector pins are identified in Figure 25 and Figure 26.

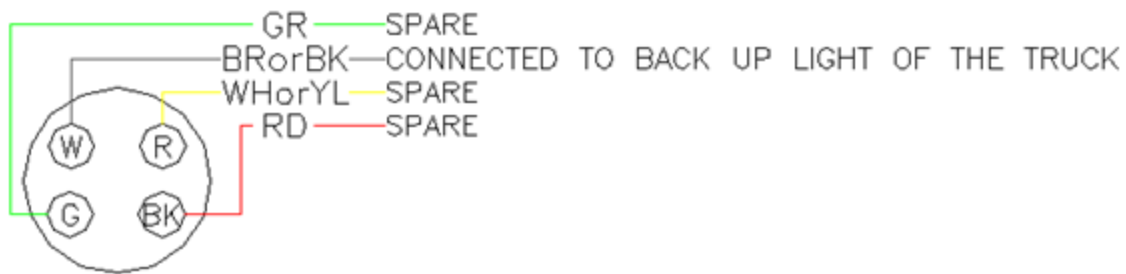


FIGURE 25 - PIN IDENTIFICATION FOR THE ELECTRICAL BACK-UP LIGHT CONNECTOR

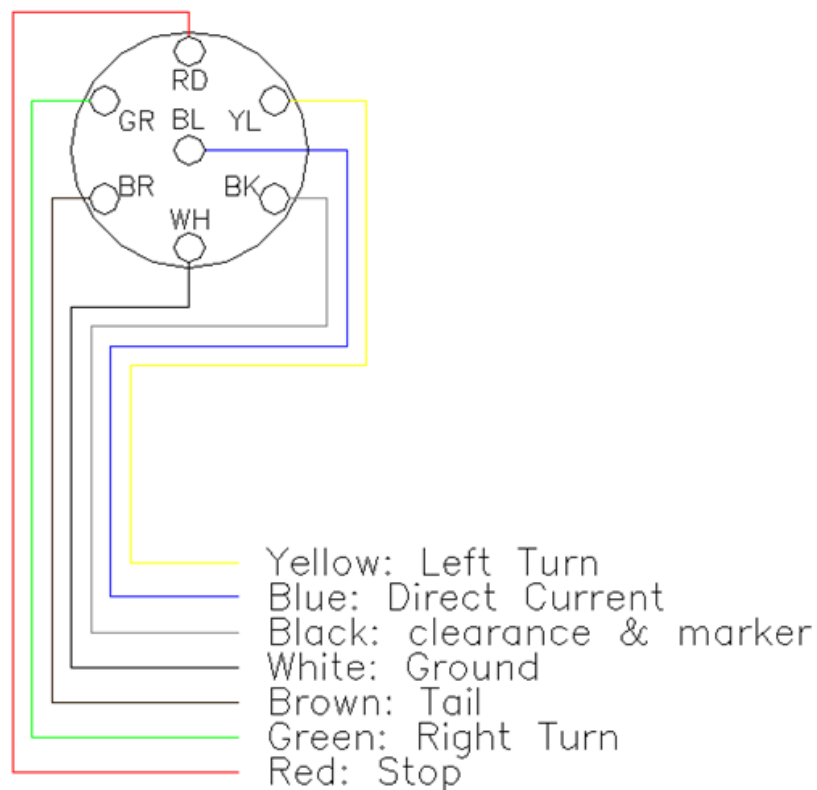
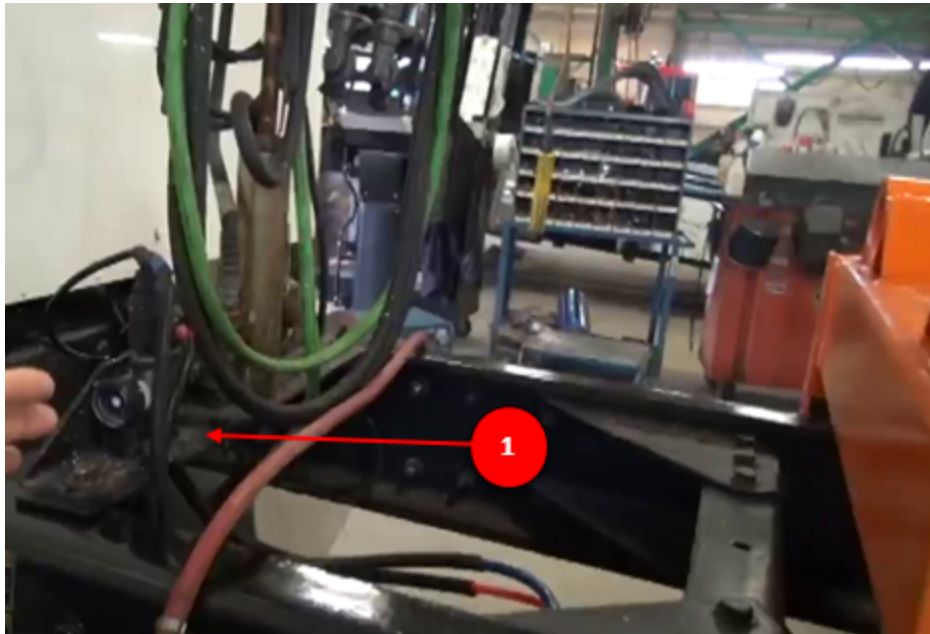


FIGURE 26 - PIN IDENTIFICATION FOR THE SEVEN-PIN CONNECTOR

8 RE-INSTALLING ITEMS REMOVED FROM THE TRACTOR

The items you removed before the installation of the Quicksnap assembly should be re-installed at this time. Every tractor is different, so here we are only giving an example of the tractor that was used to write this procedure.

Re-install the metallic hose support and any electrical wiring that was in the way and removed (see No. 1 in Figure 27). Re-install this metallic support as close as possible to the front receiver, reconnect all hoses and cables, and adjust the hydraulic pressure.



1. Example of equipment that was removed

FIGURE 27 - EQUIPMENT THAT WAS REMOVED BEFORE INSTALLATION

8.1 Adjusting the hydraulic pressure

The Quickswap towing assembly has a single hydraulic system. The maximum pressure needs to be verified and adjusted to 2500 psi (210 bar).

1. Make sure all hydraulic hoses are properly connected to the Quickswap assembly.
2. Start the engine and set the throttle to between 600 and 800 RPM.

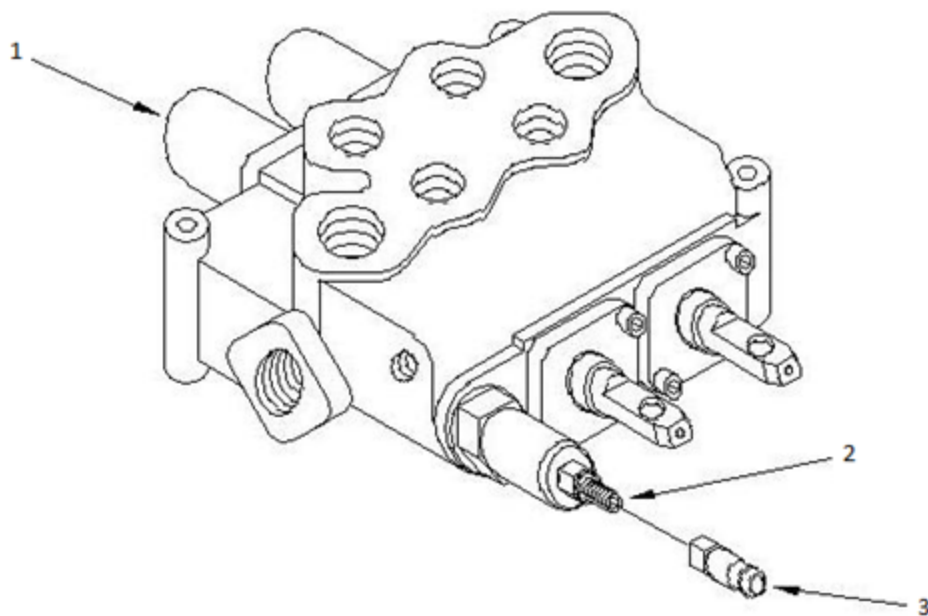
NOTE: This will ensure appropriate reading of the pressure gage.

3. Engage the power take off (PTO).
4. Check for leaks in hydraulic pressure/return hoses.
5. Unscrew the locking device (No. 3 in Figure 28) on the valve, pull the underlift lever in, and turn the adjusting device (No. 2 in Figure 28) until the pressure reaches 2800 psi on the pressure gage.

NOTE: Pulling in the underlift lever when it is at its limit puts the hydraulic pressure at its maximum. This way, you can adjust the maximum pressure using the adjusting device. Using another control lever in this way would also work.

6. Put the locking device back in place.

NOTE: The pressure gage is normally located in the control compartment on driver's side. If there is no pressure gauge, use a removable pressure gauge on one valve bank function.



- 1. Cap
- 3. Locking device

- 2. Adjusting device

FIGURE 28 – ADJUSTING THE HYDRAULIC PRESSURE

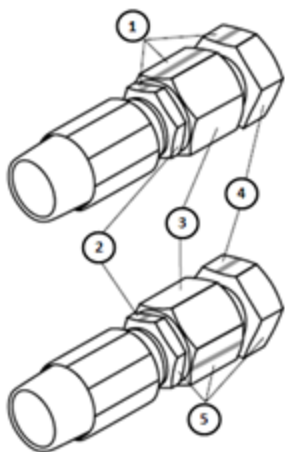
8.2 Connecting hydraulic lines - general guidelines

This section provides some general guidelines to follow when working with a hydraulic system. All illustrations are from Gates Hydraulics.

1. Make sure work is carried out in a clean environment to avoid contamination of the hydraulic lines.

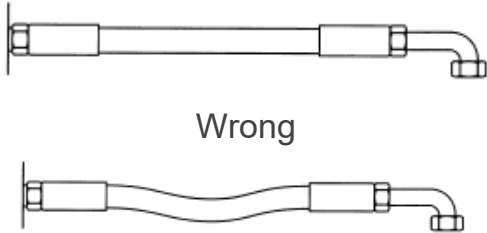
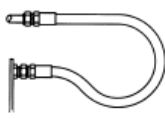

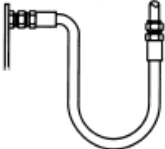
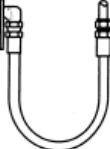
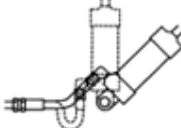
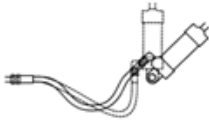

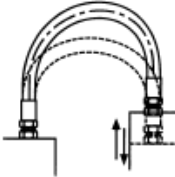
2. Properly tighten coupling as indicated below:

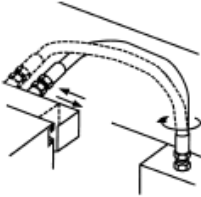
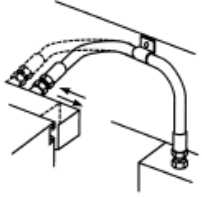
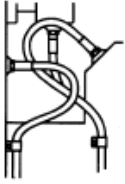
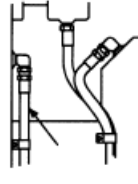
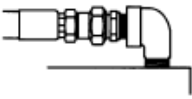
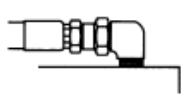
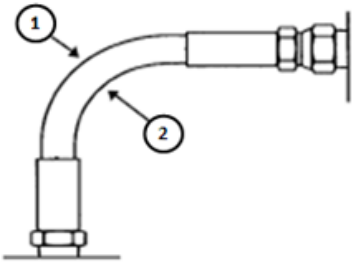
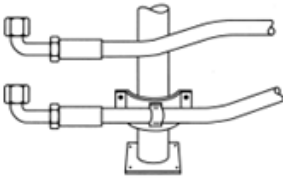
Flats method of verifying coupling torque.

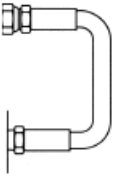
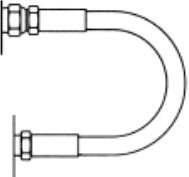
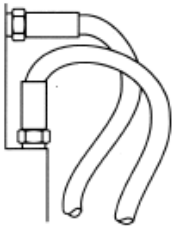
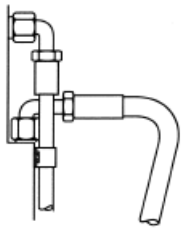
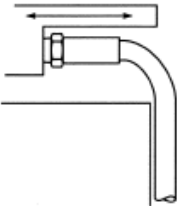
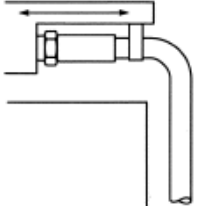
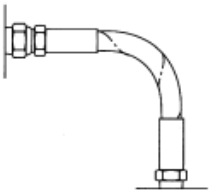
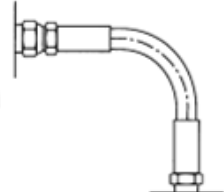


- a. Once the coupling is hand tight, mark a straight line over the backup hex, nut, and adapter.
- b. Backup Hex
- c. Full-Torque Nut
- d. Adapter
- e. Tighten until the marks are misaligned by the specified values. This example is two flats. The backup hex mark should stay aligned with the adapter mark.

3. Use proper hose routing as described below:

		<p>When hose installation is straight, allow enough slack in the hose line to provide for length changes, which will occur when pressure is applied.</p>
<p>Wrong</p> <p>Right</p>		
		<p>When the radius is below the required minimum, use an angle adapter to avoid sharp bends.</p>
<p>Wrong</p>	<p>Right</p>	
		<p>Use proper angle adapters to avoid tight bends in the hose.</p>
<p>Wrong</p>	<p>Right</p>	
		<p>Adequate hose length is necessary to allow movement on flexing applications and to avoid abrasion.</p>
<p>Wrong</p>	<p>Right</p>	
		<p>Prevent twisting and distortion by bending the hose in the same plane as the motion of the port to which the hose is connected.</p>
<p>Wrong</p>	<p>Right</p>	

 <p>Wrong</p>	 <p>Right</p>	<p>Avoid twisting of hose lines bent in two planes by clamping the hose at the change of plane.</p>
 <p>Wrong</p>	 <p>Right</p>	<p>Route the hose directly by using 45° and 90° adapters and fittings. Avoid excessive hose length to improve appearance.</p>
 <p>Wrong</p>	 <p>Right</p>	<p>Reduce the number of pipe thread joints by using hydraulic adapters instead of pipe fittings.</p>
		<p>a. No pressure b. High pressure</p> <p>To allow for length changes when the hose is pressurized, do not clamp on bends. This allows the curves to absorb changes. Do not clamp high and low pressure lines together.</p>
 <p>Wrong Right</p>		<p>High ambient temperatures shorten hose life, so make sure the hose is kept away from hot parts. If this is not possible, insulate the hose.</p>

 <p>Wrong</p>	 <p>Right</p>	<p>To avoid hose collapse and restricted flow, keep the hose bend radius as large as possible. See the hose specification tables for the minimum bend radius.</p>
 <p>Wrong</p>	 <p>Right</p>	<p>Elbows and adapters should be used to relieve strain on the assembly, and to provide neater installations which will be easier to inspect and maintain.</p>
 <p>Wrong</p>	 <p>Right</p>	<p>Run the hose so that it avoids rubbing and abrasion. Often, clamps are required to support long hose runs or to keep the hose away from moving parts. Use clamps of the correct size. A clamp too large allows the hose to move within the clamp, causing abrasion.</p>
 <p>Wrong</p>	 <p>Right</p>	<p>When installing a hose, make sure it is not twisted. Pressure applied to a twisted hose can break the hose or loosen the connections.</p>

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