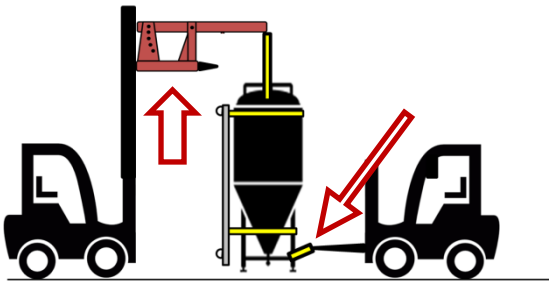
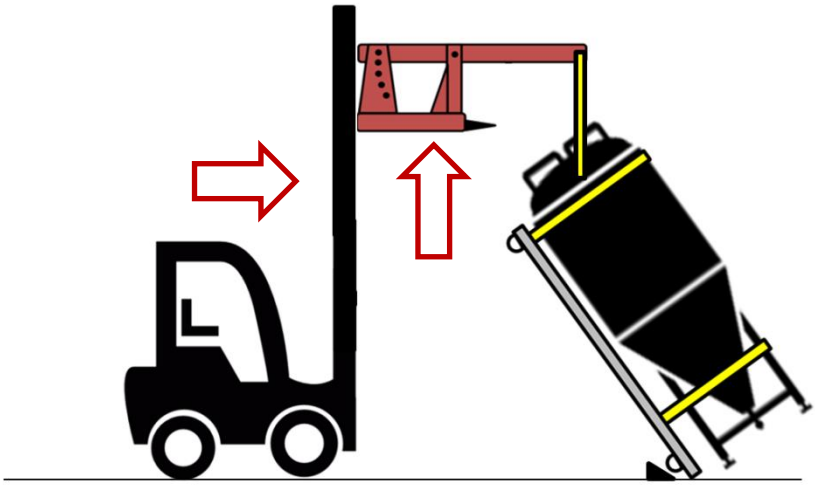
PREMIER
STAINLESS SYSTEMS

MOVING, RIGGING AND STANDING UP TANKS





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PREMIER STAINLESS SYSTEMS

MOVING, RIGGING AND STANDING UP TANKS

This document is made to help a professional rigging crew understand the dynamics of our equipment.

RULE #1: BE CAREFUL! Everyone involved needs to be focused should a strap come loose or a tank move in a way that is not expected. Serious injury or DEATH can result. Premier Stainless highly recommends using a professional rigging crew to move and place tanks! Premier Stainless is not liable for any damage cause by customer handling.

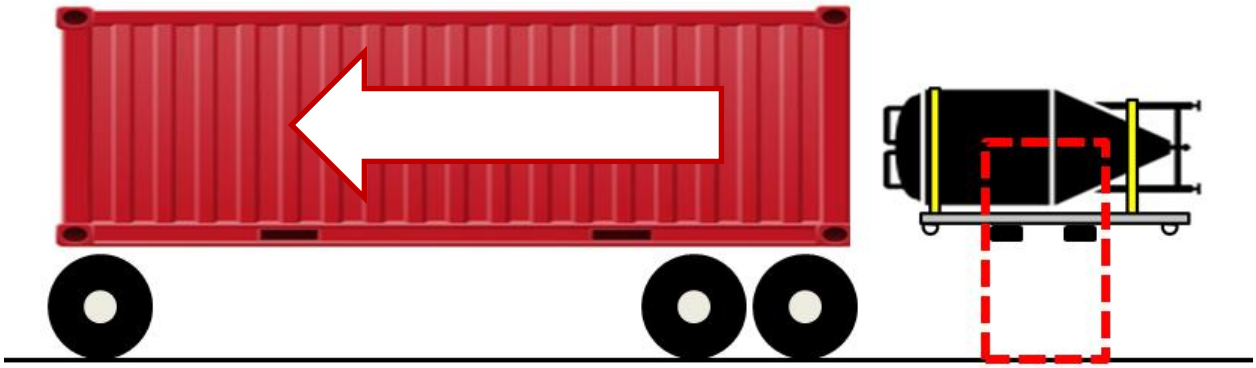
For those customers that choose to do it yourselves, make sure you are using a triple mast forklift in good working order. Straps, shackles and other lifting gear should be checked for damage prior to use. A good set of fork extensions will be required in most cases. Following are some general instructions with photos:

When moving the tanks on the lift, if the tanks are suspended by the lifting lugs a helper(s) should walk with the tank to control the swinging that will be encountered. If the tank is lifted on the underside or leg crossbars a helper should still be used to "keep a hand" on the tank to control any tendency to be off balance (if the rolling surface/floor is uneven or sloped for drainage). In cases where the rolling surface is rough (potholes in the street or similar obstacles) and will cause the lift to rock in an unpredictable way, the tank should be strapped to the lift. Strapping can be done from the lugs to the lift's cage or mast and/or straps around the crossbars and forks. When bringing tanks downhill strapping is advised to prevent the tank from sliding off the forks. Another method to handle a downhill grade would be to back the forklift down the hill.

Unloading Containers without a Load dock

For lay down tanks in containers, unstrap ONLY the tank(s) you are unloading immediately next. Put your forks under the cradle and bring the tank out most of the way until you get close to the back wheels.

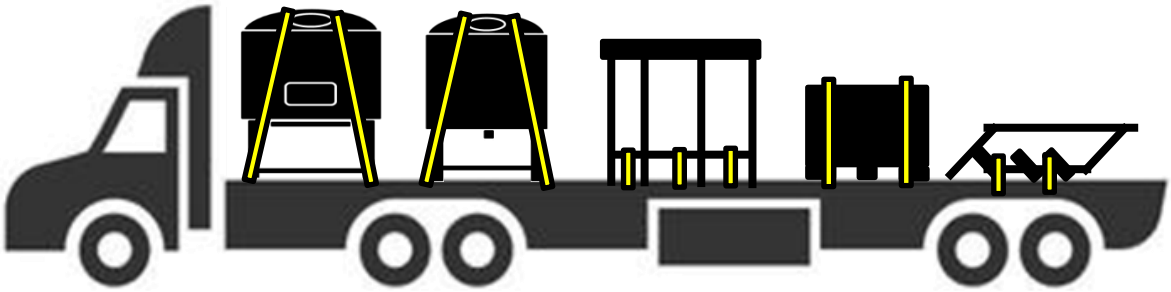
While keeping the Forklift in place, have another forklift come on the side and pick up the tank as evenly as possibly (based on weight not on length). You may back up the first forklift to get it out of the way. Lift the tank so it is suspended.



Have the truck driver move forward while you have spotters watching to ensure nothing touches. Once the tank is clear, the driver may stop and you can move the tank wherever you need to. In some cases you may be able to swing the tank out of the truck instead of the driver pulling forward.

Ensure you have fork extensions as these are required nearly all times when unloading containers.

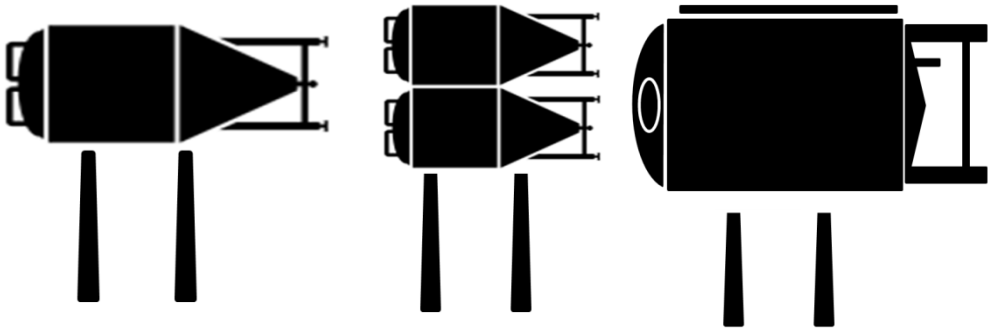
Unloading Tanks from a Truck load



Insert the foot pegs, brewhouse pegs are typically put in the Mash Tun for ease of access when moving/assembling the brewhouse. Cellar tank pegs and pads are shipped with the tanks. Use of anti-seize on the threads is recommended.

Tank Handling

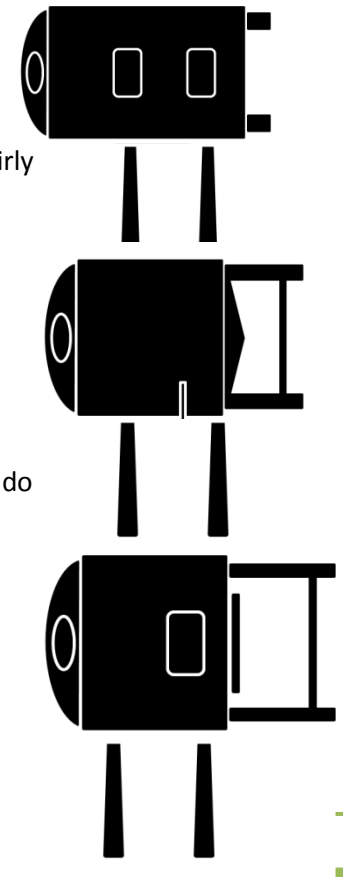
*Shown is the approximate best placement for forks when picking up tanks **on a cradle**.*



<u>Lay down Fermenters/ Brites/ CLT/ HLT</u>

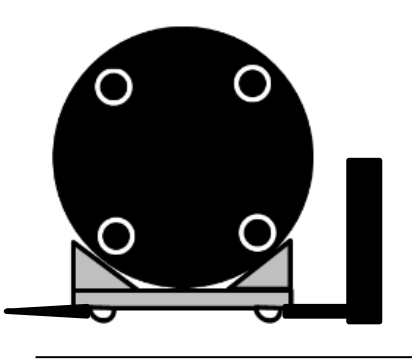
- Move the forks toward the cradle at the most weight-centered points. On Brites, CLT, and HLT, that is usually in the center of the tank with your forks at full spread. On fermenters this is having at least one fork where the cone meets the middle of the tank, with your forks at full spread.
- Do not go very fast with these tanks.
- Do not make any sharp turns.
- For tanks that are too long, you may have to do a swing method to fit them in the doorways.
- Some tanks are very large and it can be worth it to merely place the tank sideways to a door and roll it in.

<u>Lay down brewhouse tanks</u>



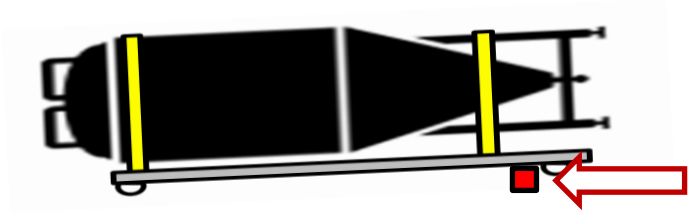
- *Combi tanks*:
    - The weight should be fairly evenly distributed, pick the tank up fairly centered with forks at full spread.
- *20- 30 bbl kettle, whirl, and Mashtuns*
    - The weight distribution may vary. The points of contact for your forks on the cradle, with your fork at full spread, should be towards the middle of the tank itself, not based upon the legs. Always do a 3 inch test- raising the entire tank about 3 inches to see where the weight lies, and if it's fairly even on the forks, then do a shake test to ensure it is safe to move.
- *20- 30 Mash/Lauter or Lautertuns*
    - Weight distribution will vary, always do a three inch test for balance and stability before moving the tank

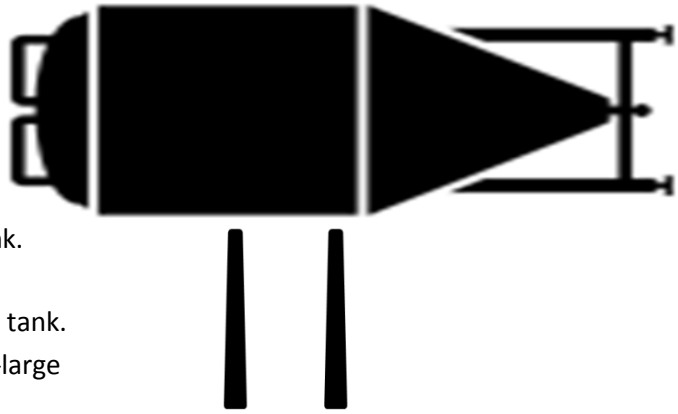
- Pinch in your forks slightly so you can fit between the wheels.
- Slide your forks under the cradle and do a 3 inch test for balance. *(See Right)*
- Pinch out if possible to grasp the tanks' cradle.
- Do a shake test to ensure good balance before moving.
- In extreme cases, you may need to have small ratchet straps from the cradle to the forks to make sure the tank stays put.



Lay down extra-large tanks (80bbl and up)

- Before picking up the tank, in some cases you may have to lift one side slightly up and put a 4x4 under the cradle for the forks to reach the other side. The 4x4 allows just enough wiggle room for the forks, even with a bowing cradle. (see picture to right)
- **ALWAYS** have a spotter when moving any tank, especially 60 BBL tanks and up as you will have difficulties seeing around the tank.
- **NEVER** move a tank into the road without a spotter.



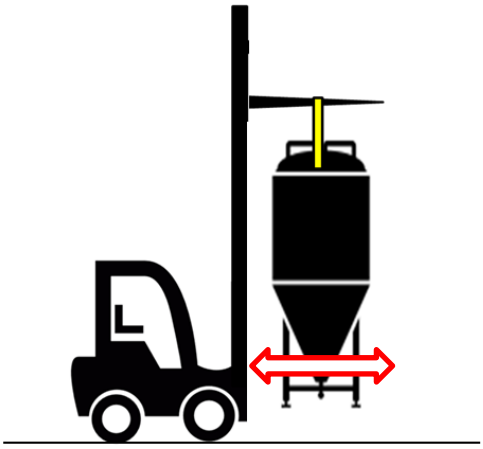


- The weight distribution may be different on every tank. Don't be surprised if you have to readjust your forks multiple times to find the center of the weight on the tank.
- Always move very, very slow when handling an extra-large tank
- Do not make any sudden turns. Make slow, fluid movements.

Stand up Fermenters, Brites, HLT & CLT

- ❖ *Never move any tank that exceeds your forklift's max rating not only in weight but height as well. (These ratings can be found in most Forklift manuals.)*
- ❖ *Some HLT and CLT may be moved around EXTREMELY slowly from the bottom beams for very short distances, but this is not recommended.*
- ❖ *Before moving a tank by the top of it, look out for anything that may get in the way of the forklift mast such as roll up doors, lights, or wires.*
- Fermenters, Brites, HLT's and CLT's -at, or under, 20 BBL can be moved from the earholes on the top of the tanks.

- Take a 6-8 ft strap (depending on the diameter of the tank) and hook one D-link through one side of the strap and connect it to one side of the tank at the top earhole.
- Move your forklift with your forks pinched together (if you have spread capabilities, otherwise have them full spread and locked in place) right over the middle of the tank, about 6-8 inches away from the highest point.
- Throw the strap over the top of the forks, don't let the strap twist. The straighter the strap, the easier it is to make adjustments.
- With the strap straight, connect the other D-link to the strap and secure it to the opposite earhole.
- While there is no tension on the straps, spread your forks out wide.
- Slowly raise your forks so there is even tension on both sides of the strap, from the forks to the earholes of the tank.
- You'll be able to lift up the tank at this point, keeping it about 6-10 inches from the ground at its lowest point.
- The tank *will* swing back and forth like a pendulum. One way to avoid this is by driving slowly and fluidly as well as lightly pumping the brakes, which allows the momentum to be driven down instead.



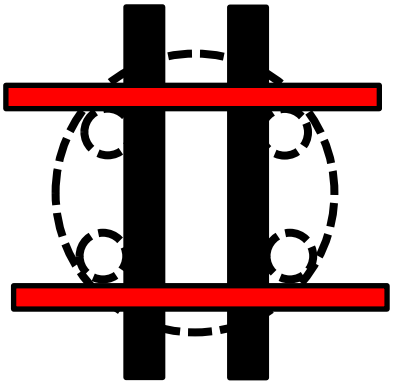
- Once the tank is in place, slowly lower the forks until the tank is settled on the ground and the tension is off of the straps enough to loosen the D-links.
- Pinch in your forks.
- Once you undo one of the D-links from the tank and the strap, move the D-link to your forklift toolbox and throw the strap over the forks to the other side.
- You may drive away from the tank once it is safe to do so.
- Undo the other D-link and put both the strap and D-link in your forklift toolbox.

Brewhouse tanks

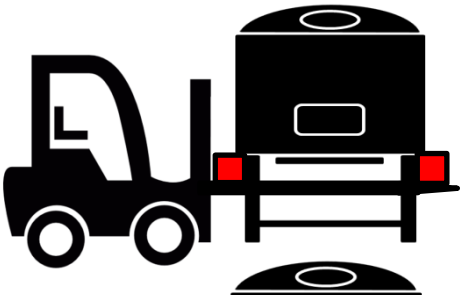
- **Standing Kettles, Mash-tuns, & flat bottom Whirlpools**

The kettle will have the largest vent stack on top, as well as a small drip line with a ball-valve. A Mashtun-only vessels will have a crown for the mixer motor as well as a bottom ferrule slightly off to one side.(If you're able to look inside you will see a large circular holding place for the mixer with a Teflon ring inside.)

How 4X4 should be placed:



- In most cases the bottom is fairly flat with 1-2 ferrules at the bottom. The beveled bottom is evident in all tanks. Avoid the ferrules.
- Move your forks under the main vessel, not the support bars, and spread until you're a couple inches from each side (when tank is small enough to do so).
- With your spotter making sure you're clear, move your forks up until you barely touch the bottom of the tank. Spread fully or until tank is pinched.
- Lift up and tilt back slightly until you're at about a 5% incline towards the forklift.

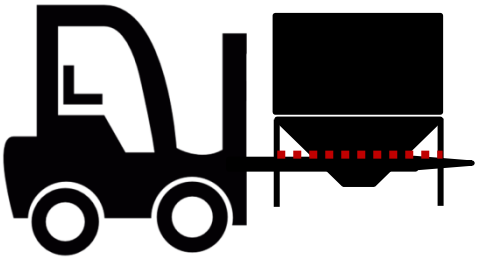


- **Standing Mash/lautertuns, Lautertuns, & Conical Whirlpools**
  - Get your forks situated the same as stated above but do not bring fork up! Place wood (4x6) across both forks on both the front and back of the tank so there is clearance for the drain manifold piping or cone.
  - With your spotter checking for clearance, slowly lift your forks up until the tank is a few inches above the ground and pinch out.

- **Standing Combi Tanks**
  - Same as kettles and flat bottom whirlpools except be significantly slower and lower to the ground as they are top heavy

- **Kettle with condenser**
  - They are much heavier than a standard kettle, drive accordingly.

- **Grist case**
  - Square/rectangle grist cases will have support beams you can pick up from. Be aware of the drain port before lifting your forks.



Additional Clearance and Safety for Tank Handling

Mash Tun rigging, 4X4s on forks and crossing front and back to clear piping.

Similar setup to Mash Tun with Whirlpool tank to protect conical bottom.

Strapping tank to forklift for added security.

Strapping the tank crossbars to the forks.

Alternative Rigging

Figure 1

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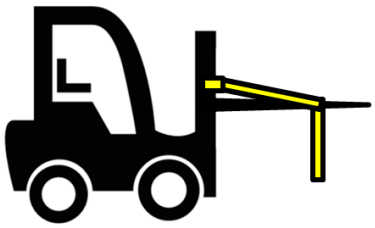
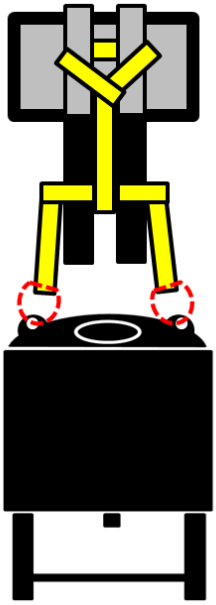


Figure 2

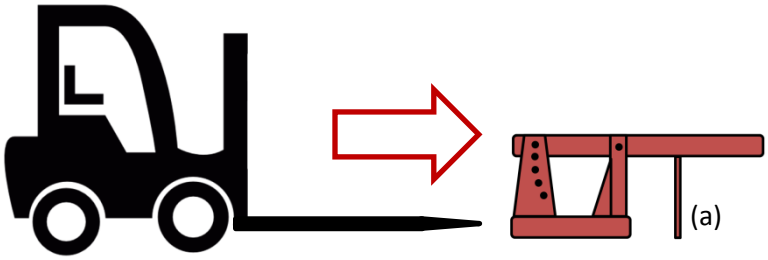


At Premier Stainless Systems we use a boom extension on our forklift for better rigging capabilities, but not everyone will be able to use this type of rigging. In cases where you are not able to use a boom extension, you may use a similar strap rigging as seen above to mimic the same effect. In any of the following pictures, if you do not have a boom extension such as in Figure 1, you may use Figure 2 instead.

The best way to do this is, using the appropriate weight rated 4 foot strap, loop it within itself around your forks as close together as they can go for the best stability. At the end of the 4 foot strap, loop in an appropriate weight rated long strap that will not be in the way of any ferrules, etc… as well as will not have anything hitting the forks. Ideally you would like to have the tank a minimum of 2-3 feet away from the forks at any one point for personal and equipment safety.

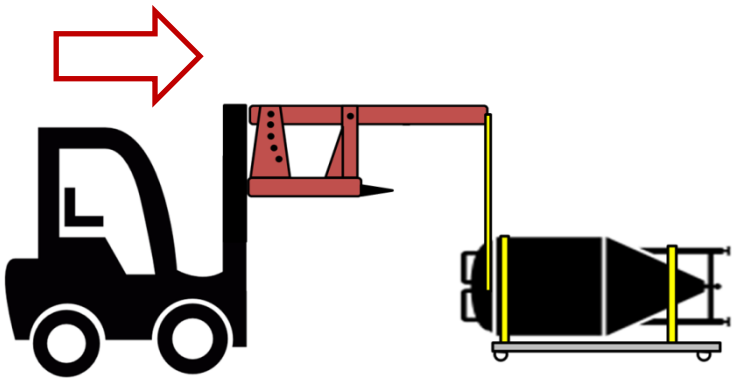
A. Tank stand up Procedure

1. Take off your forklift extensions and pick up the *boom (is cases where you do not have the boom lift extension see Alternative Rigging)*. Pinch out your forks and tilt all the way back, securing the boom. Extend out the boom to the desired setting dependent upon the diameter of the tank. Put the “balance beam” (a) up and secured.

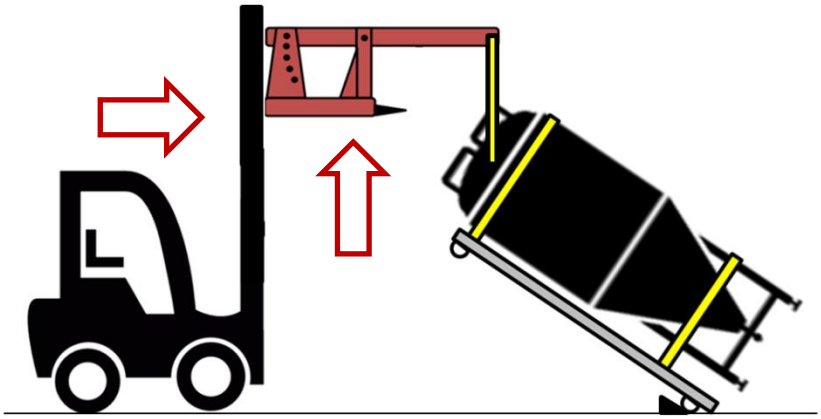


2. Go to the laying down tank and center your boom and hook to the center of the top of the tank.

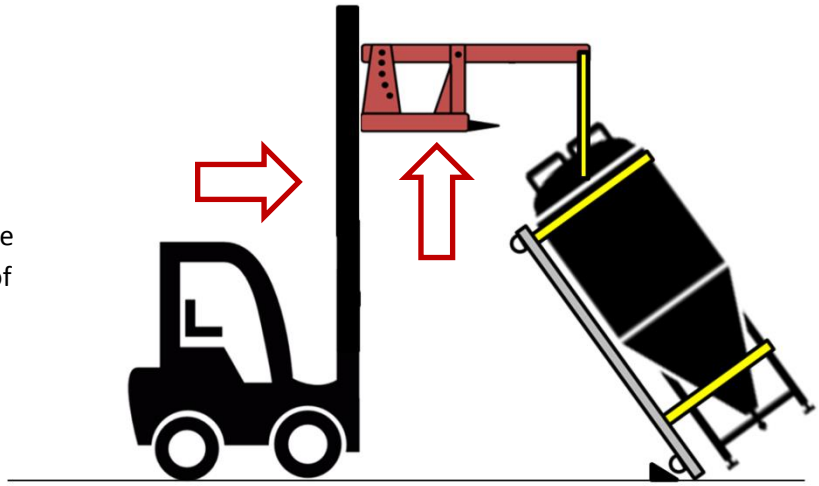
3. With your boom and forklift centered, connect the straps with D-links to the earholes on top of the tank. Make sure anything that could impede the strap is removed temporarily from the tank. Avoid any ferrules.



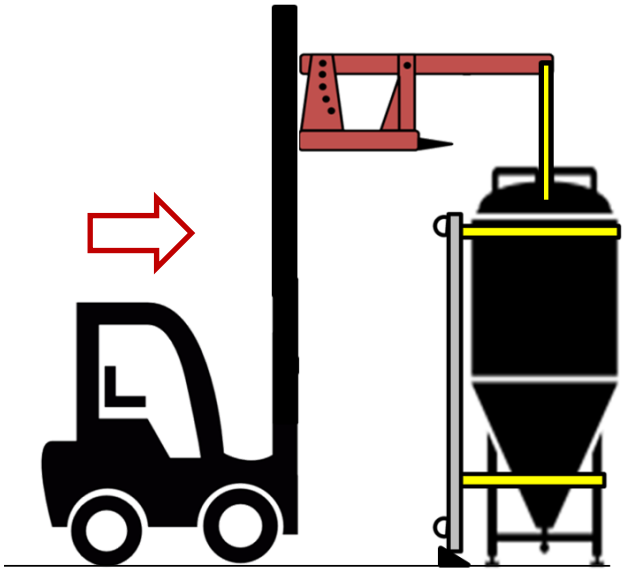
4. Block the wheels so the tank will not move as much. Start to raise the forks, while driving forward. You may either: drive forward, stop, go up, stop, repeat or slowly do a diagonal motion with the forks and machine driving forward, which ever you are more comfortable with. The most important part is keeping the strap as close to completely vertical throughout the process as shown.



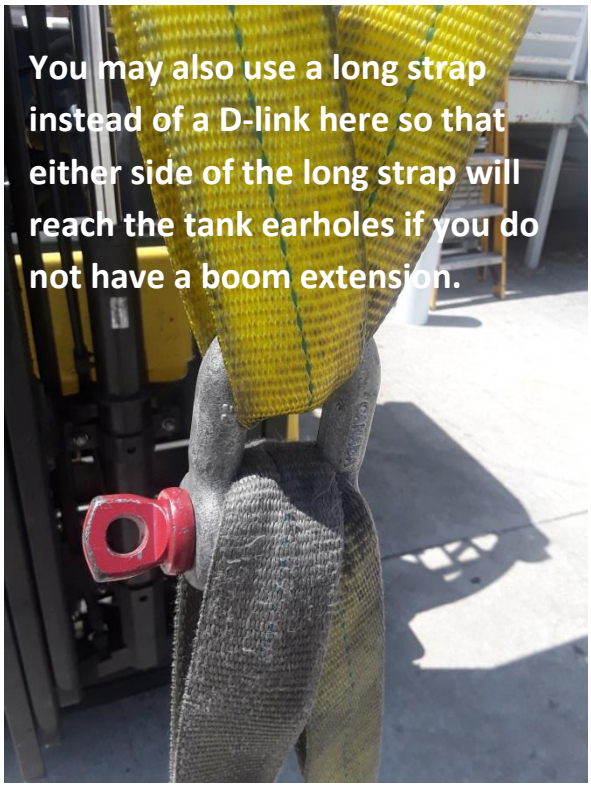
5. Continue to do an upward diagonal motion until the legs touch the ground. In cases where there are short legs or the legs will not touch the ground because of the cradle, use another forklift to stabilize the tank as shown later.



6. Once you reach the “tipping point” you may slowly drive forward while keeping tension on the strap (adjusting up or down as necessary) until all legs are on the ground. Once tank is fully standing, bring forks and boom down to release tension and remove strap and D-links. Move onto section **E**.

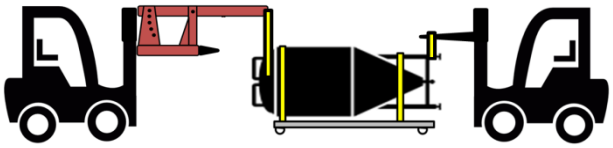


B. **In cases where two forklifts should be used to lift or lie down a tank (or if you are not able to use a boom lift extension) use this strapping method to attach the tank to the forklift.**

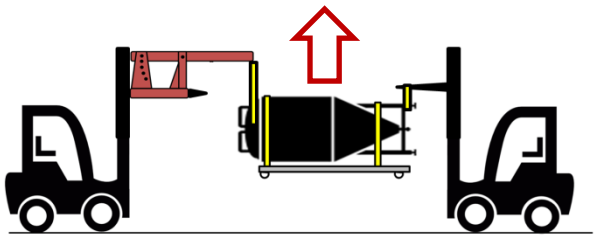


C. Using Two Forklifts for standing up Tanks

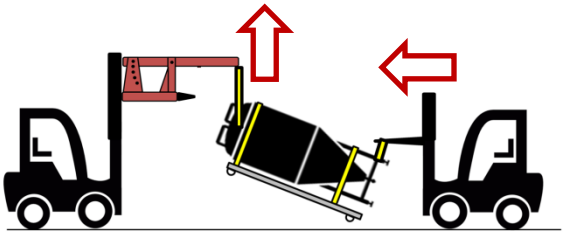
1. Using strapping methods for boom lift from section **A** and without boom lift in section **B**, get the tank set up as shown to right.



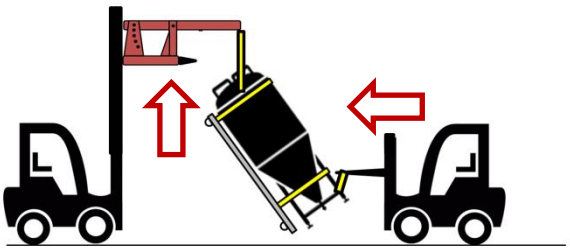
2. Using the radios, both drivers will communicate to lift the tank at the same rate until about 2 feet parallel to ground.



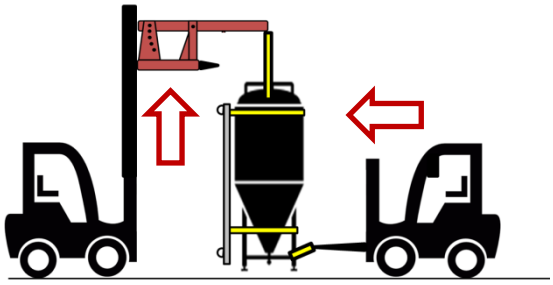
3. While Forklift 1 (left) is going straight up, Forklift 2(right) will slowly move forward, keeping the entirety of tank a minimum of 12 inches from the ground at all times



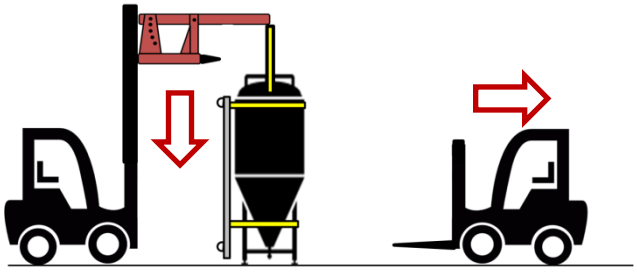
4. Continue Forklift 1 (left) going straight up while Forklift 2 (right) moves forward while adjusting fork height accordingly, always keeping tension, but not working against Forklift 1.



5. Once tank is completely vertical and about a foot off the ground, loosen all tension from straps on legs connecting to Forklift 2. Disconnect straps.

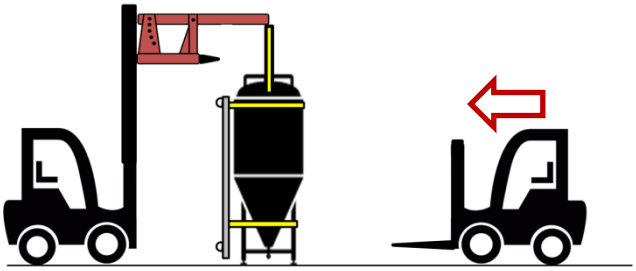


6. Move Forklift 2 and any straps or obstacles out of the way and lower tank with Forklift 1 until fully seated on the ground. Move on to section **E**.

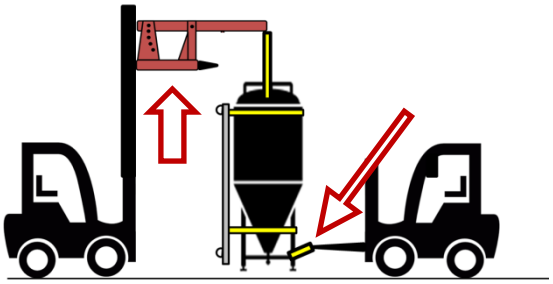


D. Using Two Forklifts for Laying Down Tanks

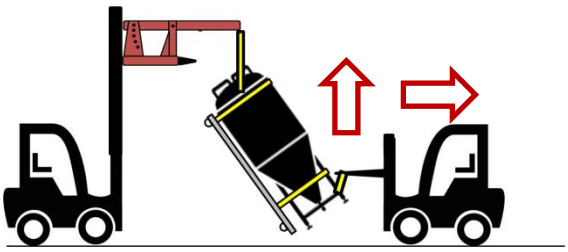
1. Move Forklift 1 (left) completely centered above tank and secure with strap and D-links. Bring Forklift 2 (right) close to tank and use strapping method from section B to secure tank legs.



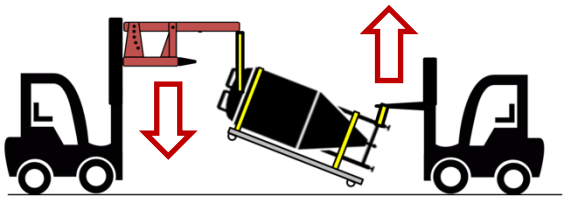
2. Move Forklift 1 forks up until tank is about a foot above the ground. Get tension on leg straps with Forklift 2.



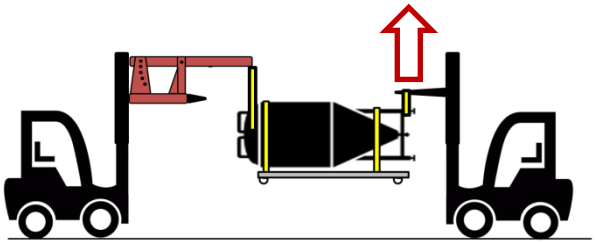
3. Keep Forklift 1 in position while Forklift 2 backs up while raising its forks until the tank is evenly spaced from both forklifts.



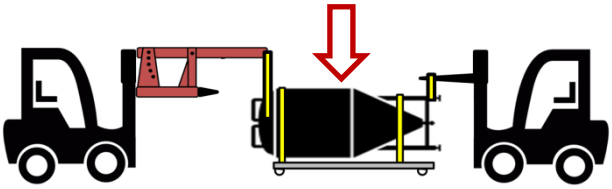
4. Once the tank is evenly spaced between the forklifts, Forklift 1 will start to lower its forks while Forklift 2 will raise its forks. Both Forklifts will remain stationary.



5. Adjust forks until tank is completely level and parallel to the ground, about 2 feet in the air.

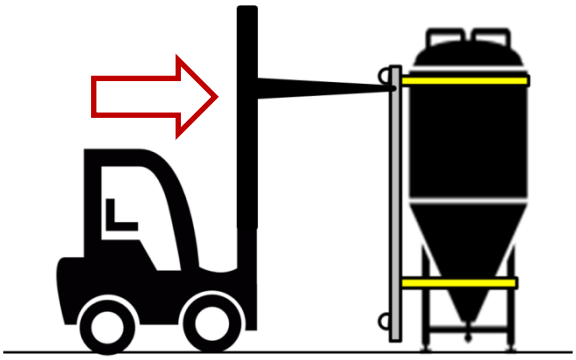


6. Both forklifts will lower the tank at the same time for an easy transition to the ground. Unhook your straps.

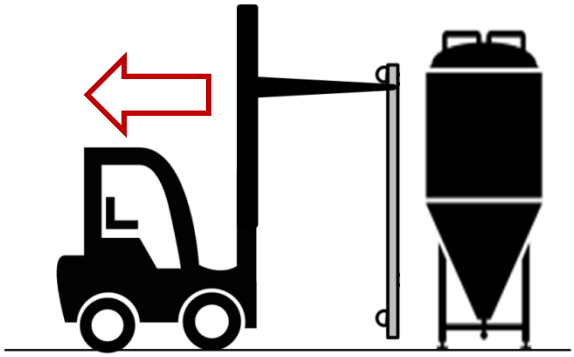


E. Removing Cradles from Tanks

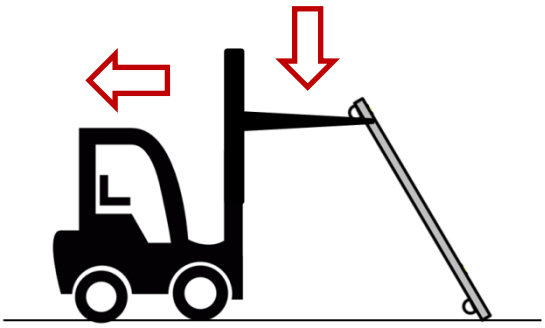
1. While tank is now standing, have your spotter get the tips of both of your forks just underneath the top of the cradle as shown to the right. Be careful not to touch the tank itself.



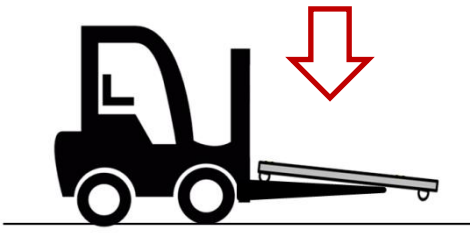
2. Cut or loosen straps to detach cradle. Make sure the forks will catch the cradle before doing so. Once the cradle is on the forks, back the forklift away slowly from the tank and move to an open area.



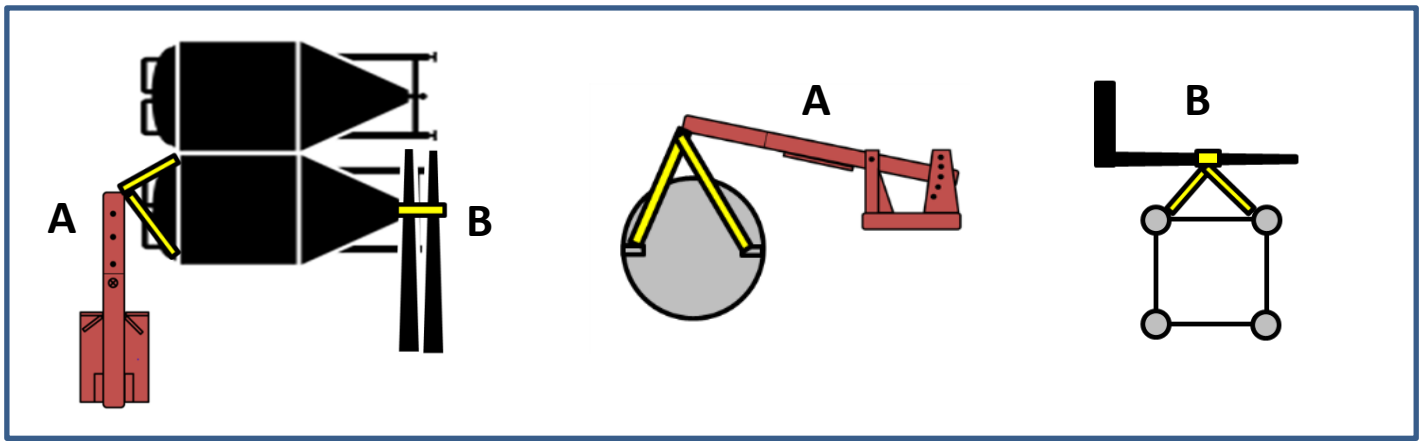
3. Start to back up the forklift while lowering the cradle to the ground until one side touches and starts to act like the picture shown to the right.



4. Stop the forklift, lower your forks until the cradle is on the ground and pick it up.

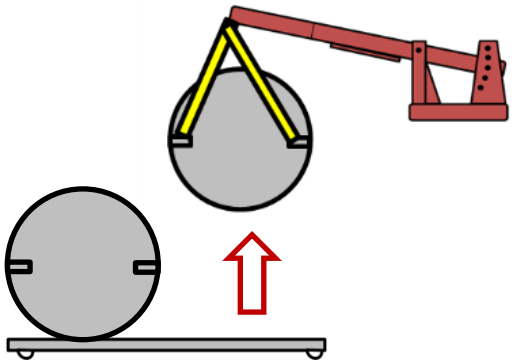


F. Standing up *One* Tank from a Two-Pack Lay down

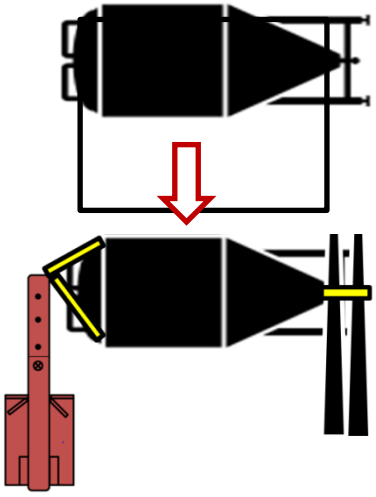


1. Using two forklifts, strap each side of the tank as shown above. Undo the straps holding the tank to the cradle. Keep foam on tanks if possible. ***You may need to move arms to avoid the strap.***

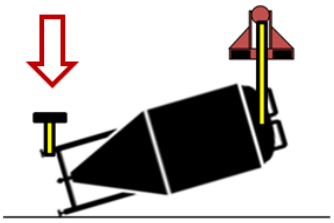
2. Both forklifts move in sync to lift the tank straight up (see right) until you clear the uppermost part of the cradle. You may have to both back up a few inches here and there to avoid damaging the other tank during this step.



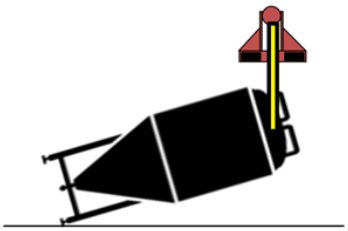
3. Both forklifts move in sync to back up and be clear of the cradle or anything close by.



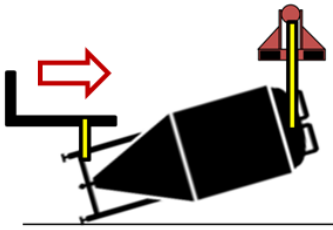
4. Your tank should be about 3-4 feet in the air parallel to the ground as shown.



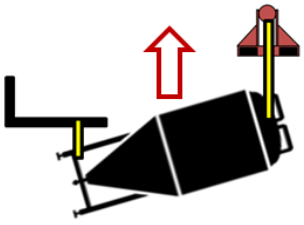
5. Forklift B will slowly lower their side until the legs are on the ground (use wood under the legs to prevent damage.)



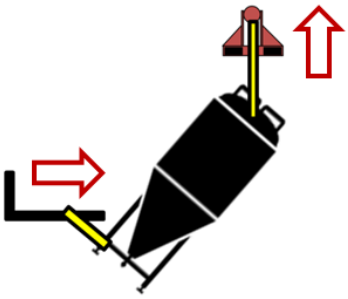
6. Unstrap and back up Forklift B.



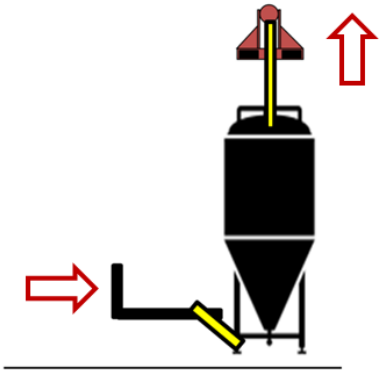
7. Bring Forklift B around so the forks are facing the tank and re-strap in same fashion as before.



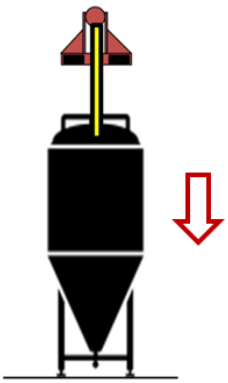
8. Bring both forklifts up in sync.



9. As Forklift A lifts straight up, Forklift B will start to move forward to controlled swing tank to vertical under Forklift A. Adjust fork height accordingly.



10. Continue moving Forklift B forward (watching your fork distance from tank) until tank is completely vertical and about a foot or less from the ground.



11. Unstrap Forklift B. Bring tank straight down with Forklift A until fully grounded.

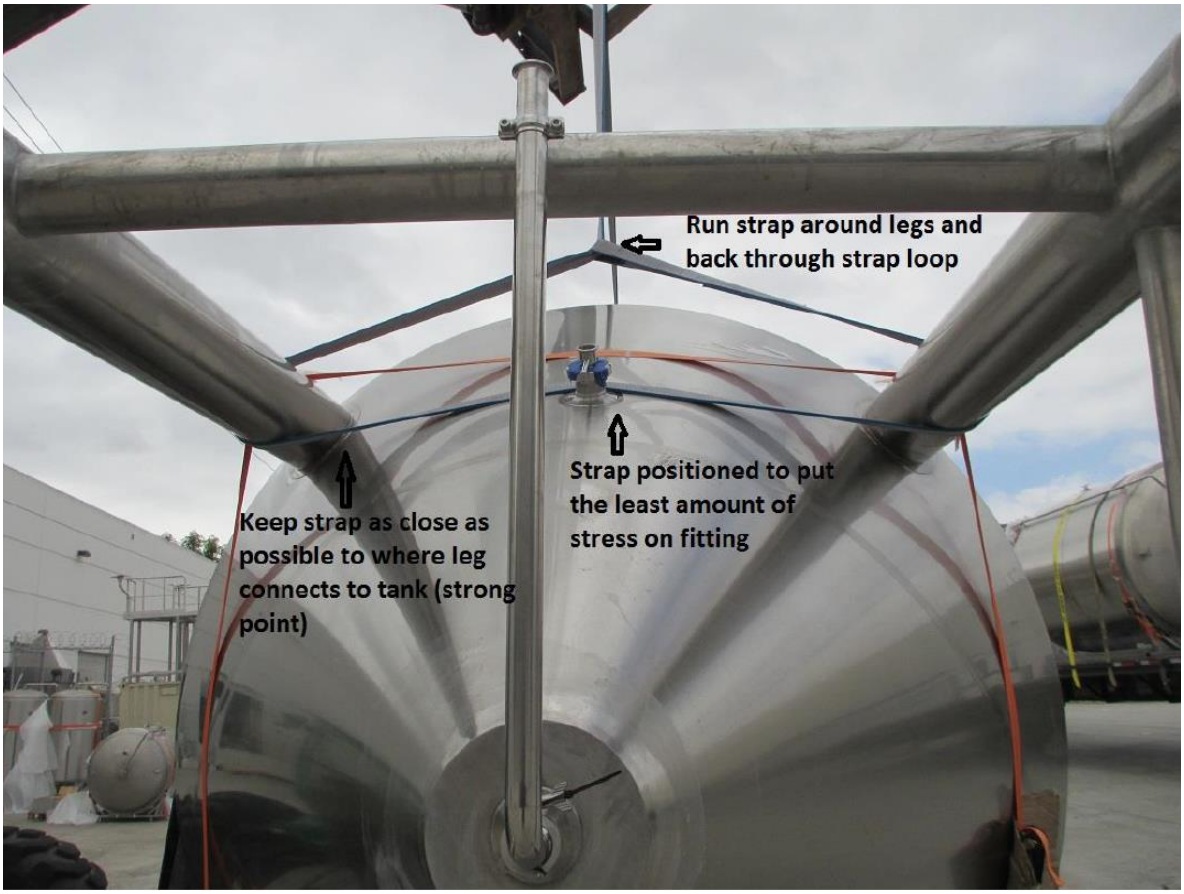
12. In cases where both tanks are needed to be stood up, follow this procedure for first tank, then use lifting method C with the following modifications:

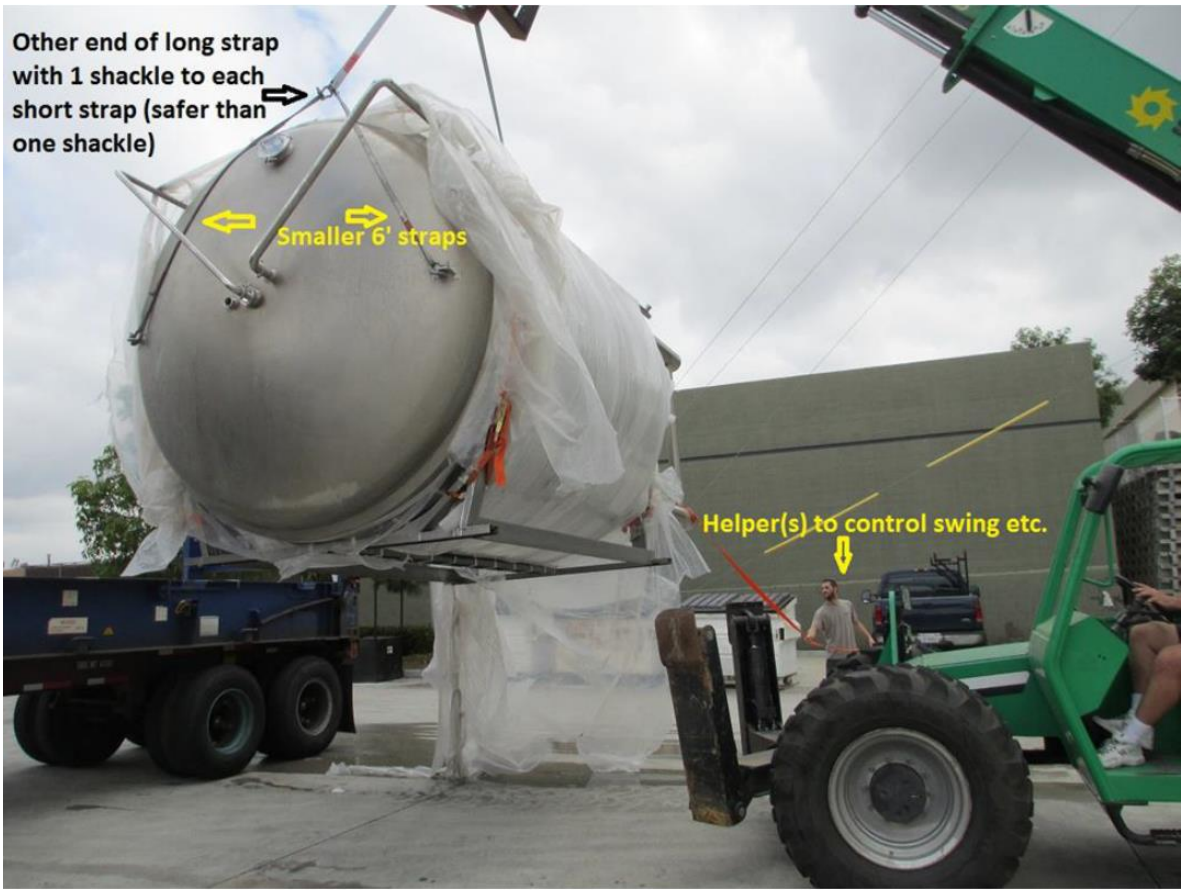
- Unstrap tank from cradle first.
- On step C-2, slide cradle out of the way before continuing.

Appendix:

MOVING THE REALLY BIG STUFF

Tanks in the 120 bbl and above range will arrive in “open containers” or on flat bed trailers. The support carts are welded to the platform of the “containers” and the welds need to be ground off to enable the tank to be moved. The support carts are not capable of taking the load if lifted from the bottom, do not attempt to lift the tanks in this manner or damage (or possibly dropping the tank if the cart buckles) will be likely. Most large forklifts with long forks do not lift high enough to use for proper lifting of large tanks and a boom lift like the one pictured will be required. The most important part of the lifting process is getting the balance of the strap correct so one end or the other of the tank is not prone to slipping resulting in the tank ending up in a position that is hard to negotiate safely setting it down after lifting. The best way to gauge the balance is to pick the tank up slowly, see if there is a “heavy” end and reposition the lift as needed to get the tank to pick up while staying nice and horizontal. If something changes unexpectedly while lifting, the boom lifts have tilting options on both the forks and the lift’s chassis that can help get the tank into a safe position to set down. In the example shown, the long strap was 30 feet long, the two shorter straps on the top of the tank were 6 feet long. Tanks as large as 150 bbl were lifted with these straps. Ensure you have the proper weight rated straps before continuing.


Run strap around legs and back through strap loop
Strap positioned to put the least amount of stress on fitting
Keep strap as close as possible to where leg connects to tank (strong point)


Other end of long strap with 1 shackle to each short strap (safer than one shackle)
Smaller 6' straps
Helper(s) to control swing etc.


Check tank balance by lifting slightly, use helpers to steady any swing encountered
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