HYDRERA ENERGY SERVICES (US) CORP.

Standard Operating Procedure
Harpoon Tank Setup

Division: United States

SOP Title: Harpoon Tank Set up

Effective Date:	January 1, 2021
Review Date:	January 1, 2024

Change History:

SOP Number	Effective Date	Significant Changes	Review/Created by:
Harpoon-001	January 1, 2021	Initial version	Kai Magnussen, Dan Kubek
Harpoon-001	May 1, 2021	Revision 1	Kai Magnussen, Dan Kubek
Harpoon-001	July 8, 2021	Revision 2	Kai Magnussen, Dan Kubek
Harpoon-001	October 12, 2021	Revision 3	Kai Magnussen, Dan Kubek
Harpoon-001	October 15, 2022	Revision 4	Kai Magnussen, Billy Logsdon
Harpoon-001	February 21, 2023	Revision 5	Kai Magnussen

1. **Purpose:** The purpose of this Standard Operating Procedure is to provide guidance to a field technician to properly set up HydrEra's Harpoon Tank System.

2. **Introduction:** HydrEra Energy Services (US) Corp (HES) believes that, the Health and Safety of every employee/contractor is of extreme importance. Towards this idea and with a safe workplace as one of our main goals, every employee, contractor, supervisor, and manager

is committed to supporting our HSE Program. Injury prevention and maintaining a safe and healthy working environment for all our employees, benefits HES, and all who work for and with us. Every employee/contractor of the company is responsible for personal safety and the safety of fellow workers. The responsibility begins with the company president and continues through each level of management to reach every employee/contractor, including even the newest personnel. This responsibility cannot be delegated or otherwise set aside. This same corporate attention to safety transcends to the protection of the general public and also to the physical resources belonging to or leased to HES It is the position of HES that the company's safety policies and procedures will, as a minimum, comply with all federal provincial and local regulations applicable to employee/contractor safety. The HSE program calls for the participation of all employees/contractors working toward an environment in which every job or task is performed in the safest practical manner by a well trained workforce using the proper equipment. The benefits of such efforts are numerous and obvious.

3. **Scope:** This SOP precludes that the worker has the required training, tickets and authorization prior to beginning any operations. This SOP is not meant to take the place of or minimize the need for supervision, training and/or client/customer site requirements. It is also in no way comprehensive (as defined by "cannot be added to"). This SOP can be added to as long as the additions further enhance the following: Safety, environmental protection, productivity, (without compromising the first two).

ATTENTION: Use the personal protective equipment (PPE) and safety procedures for all steps at all times. ANSI/CSA approved hard hat, rated safety glasses, harden toe footwear, gloves and fire rated (FR) clothing are required at all times on job service locations. Hoisted loads are required to have a minimum of one tag line. Personnel are required to be properly harnessed and anchored when exceeding a height of 3 meters. Visual inspections are to be done by all workers on tools and equipment before being put into use. This includes but is not limited to hand tools, ladders, AST tanks and auxiliary equipment.

Harpoon Installation Process

Harpoon Tank installation must be performed by trained individuals and overseen by a HydrEra-trained supervisor. No more than two (2) Short Service Employees (SSE) to be present for a Harpoon installation.

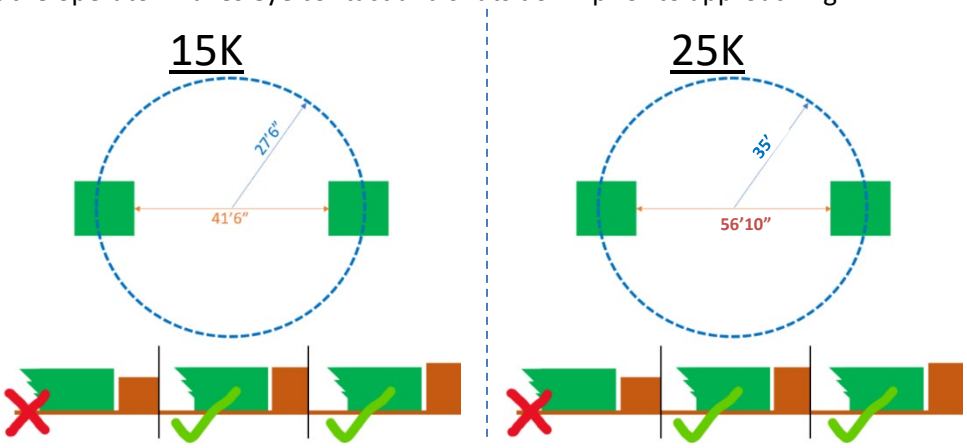
Harpoon Installation Steps:

Required Tool List

4 – 4lbs sledge hammers
4 – Crow bars
4 – Fall arrest harnesses with harnesses
4 – Tool lanyards
1 – Impact driver
1 – Sockets for mayway and suction bolts (3/4”, 1-1/8”, 1-5/16”)
1 – Crescent wrench (or box wrenches in the above sizes)
1 – Shovel
1 – Rake
1 – Push broom
4 – 2x4x8 Blocks for cribbing
1 – Leister heat gun with roller and TPU patches

1. Tank Pad Preparation/Groundwork:

- IMPORTANT: Ground compaction must meet or exceed 95% with no loose or sharp materials
- Approx. 1-2 workers plus operators.
- Work with customer to identify Harpoon location and direction of fill and suction manifolds. Customer should provide level work surface clear of any sharp objects.
- Mark the location of the suction manifold, as per customer request, and mark a square with the dimensions 12’ x 12’.
- Using the suction manifold location as a reference, mark another 12’ x 12’ square exactly (39’6” for 15K, 54’6” for 25K) away, ensuring that the two are square. This will account for and extra foot of room around each manifold to allow for adjustments.
- Dig out these boxes to an approximate depth of 8”. The manifold boxes will be placed into the dug out areas, and levelled at approx. 1” below the grade where the panels will be installed. Use a laser level to confirm the height and level of the placement.
- The top plate of the manifolds must be at or below grade, it cannot be set above grade, as this will affect the setting of the panels. (see below)
- Backfill around manifolds once they are in position. Creating a smoot transition from pad material to manifold edge.
- Visually inspect all welds on the manifolds to ensure there is no damage or cracked welds.
- The interior edges of the two manifold boxes should be 41’6” apart, and be square to each other.
- Measure from the front edge of the manifolds to a distance of (20’9” for 15k, 28’5” for 25K) to confirm your center.
- From this center mark, paint a circle with a radius of (27’6” for 15K, 35’ for 25K) to show where the panels will be placed.
- Use laser level and equipment (skid steer, excavator, etc) to grade pad to within 0.5”+/- off of level. Ensure a safe working distance at all times when working near heavy equipment. Ensure that the operator makes eye contact and shuts down prior to approaching.



- Spacing around the tank must be at least 25 feet when using a telehandler to set panels, and a minimum of 10 feet when setting panels with a crane.
- Check the tank pad area for sharp objects, rocks or any other potential hazards to the liner.

2. Groundcloth Installation:

- Approx. 5 workers.
- Ensure that tank perimeter circle is well marked on the ground.
- Use equipment to place groundcloth roll on edge of perimeter line.
- Groundcloth will be unrolled using equipment and/or manpower. Excessive force must not be used to eliminate damage to ground cloth. The ground cloth is a reusable material for tank installations.
- Once unrolled, check to ensure groundcloth covers tank perimeter line. The groundcloth will have 1’ of material outside the tank wall perimeter
- Unfold both directions and adjust to cover entire tank pad area
- Find center and ensure that the pad center and geo center are lined up
- Ensure suction and fill manifolds are installed properly, with the groundcloth over top the manifolds.
- Locate the inlet ports on both suction and fill manifolds. Cut out holes 3” larger than the rectangular inlet gasket and place over manifold ports. **IMPORTANT:** Ensure there is no overlap of the groundcloth and the inlet gaskets, as this can result in a possible leak.
- Geotextile rolls may be used in place of ground cloth.

3. Setting the Liner(s):

- **NOTE:** This step of the process will be the same whether installing a disposable PVC liner or a reusable TPU liner.
- **NOTE:** All liners have identifying features around the manifold connections to be able to determine the direction of deployment.
- Approx. 5-6 workers.
- **TPU LINERS:** Identifying markers - The reinforced area around the manifold on the manway side is grey, versus blue on the non-manway side.
- Using equipment, place the liner roll on the center point of the tank. The liner will be marked to show which direction the opening for the manway door is situated.
- Flatten/Spread cargo net in all directions to reduce bunches or folds.
- Unroll the liner perpendicular to the manifolds, ensuring the ends of the liner meet the perimeter line.

- PVC LINERS: Identifying markers – There will be a box around the manway-side manifold connection area, and only a line through the center of the non-manway side. These markings will be in the same color as the vertical guide lines.
- Using equipment , place the PVC roll on the non-manway side manifold and unroll towards the manway side manifold.

- For TPU and PVC liners, once unrolled, spread the liner in opposing directions until it is fully deployed towards the perimeter of the tank. The liner does not need to fully meet the wall at this stage.


- Ensure that the engineered liner ports align with the suction and fill manifold ports. Adjust the liner as necessary to ensure perfect placement.
- Ensuring the liner is in the perfect position during this step is not imperative. Adjustment of the positioning of the liner is possible once 2-3 points are lifted up the wall. The liner floor can be adjusted into place at this point.
- Ensure the liner cargo net is present under the liner (TPU only). This will stay in place under the tank floor.
- Fold liner walls back inside the mark on the ground to allow room to place tank walls.

- Fold groundcloth in on top of liner, to protect the liner from the bottom edge of the panels.

- NOTE: when using a PVC liner, or a TPU liner for the first time, it will unroll from the 12 o'clock position to the 6 o'clock position (manifold to manifold) with the manway being in the 5 o'clock position. New liners will be sticky and more difficult to deploy.
- **IMPORTANT**: liners should be constantly inspected inside and out during the deployment of the liner. Any issues will be repaired using the Leister Gun and TPU patches.

4. Placing Tank Panels:

Panel Handling Procedures - Telehandler

- Harpoon panels and attachments are engineered to work safely with 12,000 lb telehandler models including JLG, JCB and Xtreme brands. Panels will connect to HydrEra telehandler attachment for lifting and placement. The telehandler attachment will lock into the center of the panel, with the swing handle engaging the locking mechanism. Once locked in all adjustments can be made using the machine. All personnel must stay back 30 ft during critical lifts (standing the panel) and must keep all body parts clear when making adjustments with the telehandler.
- **IMPORTANT:** When transitioning the panel from horizontal to vertical position, the entire panel must be kept up and off the ground. Panels must only be moved around the work area in the vertical position. Failure to adhere to these guidelines may cause injury or damage to the equipment.
- Harpoon panels can be loaded and offloaded from trucks using the Harpoon attachment or using 4-point lift rigging on the panel d-rings.
- Review Telehandler load chart and SOP. Ensure operators are experienced and licensed to operate specific equipment. One person only should be designated to provide the telehandler operator with signals, however anyone can shut the operator down at any time.

Panel Handling Procedures – Crane

- Harpoon panels are engineered to be safely installed using a crane or picker. Minimum crane sizes to be used are a 30 ton for multiple sets or 100 ton to set the entire Harpoon tank from one position. The crane rigging will attach to the two d-rings on the top rail of the panel.
- **IMPORTANT:** the crane operator must complete a lift plan prior to moving any Harpoon panels.
- Stage panels within the crane's reach. Panels should be stood lifting towards the crane or cross-ways to the cranes position, not away from the crane. Plan for this when offloading panels on location.
- While the crane operator stands the panel, all personnel must remain well outside the panel fall radius, front, rear and on both sides. Panel may shift during this lift.
- Once the panel is standing, with the base on the ground, attach a tag line to each side and guide the panel into place. One person only should be designated to provide signals to the crane operator, however anyone can shut the operator down at any time.

- Approx. 5-6 workers including equipment operators.
- Stage panels near working area.
- Harpoon panels can be safely installed using a 12,000 lb telehandler or a crane (see panel handling section above).

- Attach telehandler #1 to the primary panel. Lift panel vertically and move into position directly on top of the suction manifold. Panel must be centered on the manifold, with end lining up with perimeter circle. Leave a minimum of 3” between the panel and manifold uprights.
- The primary panel will be set centered on the manifold that will be next to the manway panel. The manway panel will be installed second, on the right side of the primary panel. Continue setting panels. Working counterclockwise is simpler when using a crane.

- Telehandler #1 will remain attached to the primary panel, while telehandler #2 or the crane lifts and installs panels 2-8. (shown here using a crane and telehandler)
- The manway panel will always be situated one panel immediately right of the manifold.

- Panels will be placed vertically side by side, while connection plates are rotated and installed over male panel lugs. Install the six (6) bottom connection plates, then work either upwards or downwards with the remaining twelve (12) connectors. Once plates are in place the pressure pin will be installed from the outside-in to lock the connection. Once the pressure pin is installed, a keeper pin will be installed in the pressure pin to prevent any horizontal movement. Continue this for all 18 connection plates, using a man-lift to install the upper connection plates. Ensure that individuals in/operating the man-lift are properly trained and use proper PPE for working at heights. Moving the free end of the panel in and out can help the connection plates be installed efficiently.
- When a panel is set, a small wood block should be placed under the unconnected edge of the panel to allow for easier connection of the next panel. Once the next panel is fully connected, the panel will be lifted and block removed.
- **IMPORTANT:** While personnel are working in the man lift at height, no one may enter the space below the basket. Any falling items could cause serious injury.


- Once the eighth panel is installed, telehandler #1 can release from the primary panel. The two telehandlers (or telehandler and crane) will then work in opposite directions around the tank installing panels. The first telehandler can also be used to begin pulling the liner up and over the walls.
- Measure the panel widths along the perimeter marking as you go to ensure proper placement and spacing.
- Complete the final connection. This may require two pieces of equipment to get into place.

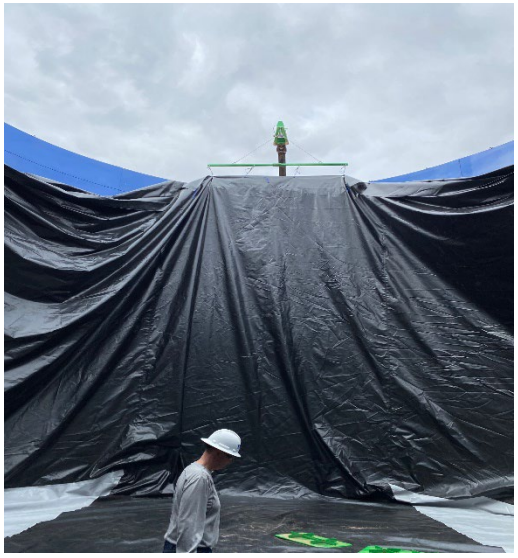

5. Installing the Liner:

- Approx. 5-6 workers.
- Using marking paint draw lines on the ground at the center of each manifold, and 3.75 panels away from each (quarter marks on the tank perimeter)
- Attach the jig winch attachment to the forklift with the spreader bar (add picture). Inspect winch line and hydraulic connections for any damage before using.
- **IMPORTANT:** Proper inspection of winch line should be done by site supervisor. Damaged equipment could cause failure resulting in serious injury or damage to the liner
- Position telehandler or crane in line with the primary panel, directly in front of the suction manifold.
- From the inside of the tank, walk the perimeter and ensure the ground cloth is to the tank wall and goes in the vertical position on the tank wall a minimum of 3".
- Using the jig winch and spreader bar, or crane and spreader bar, lower into tank using a spotter from up above to communicate when the bar is low enough to be hooked to the liner.
- Place the spreader bar centered with the guideline on the liner attaching two slings to the two lifting straps on each side of the guideline
- All personnel in the tank then stand 30' back and inform the spotter above they are clear to lift the liner up and over the walls
- The forklift operator then runs the winch bringing the liner to a height slightly higher than the tank wall.
- Ensuring the liner is square and straight. TPU and PVC liners will have guidelines indicating the center of the four quarters of the liner. These marks must line up with the center of the two manifolds, and perpendicular to the manifolds. The side locations will be found by measuring 3.75 panels away from the center of the manifolds.

- Ensure the ground cloth is properly covering and protecting the liner base.

- Personnel in the manlift will secure liner to the panel using the liner straps and connecting each one to the horizontal securement bar. The liner will be supported by these straps and its own weight on the top edge of the panels until the liner is completely installed, at which point a perimeter strap or cable will be installed to complete the liner installation.
- Proper placement of the liner has the edge of the line at or just above the horizontal securement bar. (This allows for the liner to not be tight or have too much slack. Both can cause damage or failure)
- Use the equipment to keep the liner lifted above the wall. This will allow for the personnel in the man baskets to lift the liner flaps by hand and secure to the horizontal securement bar.
- Once all points have been pulled over the wall, personnel inside will pull liner flat and square with liner running up the wall
- Liner should line up with both manifolds as well as the manway
- Starting at the manway, walk between the liner and the wall to ensure the ground cloth is still in the proper position before installing manway seal
- Install the manway seal, providing an extra egress point. (Line up the manway gasket with the bolt holes on the manway panel, ensure there is no rock or debris between the wall and the gasket, install a bolt at four corners to hold the gasket in place)
- Check for dirt or debris on the backside of the liner as this may cause potential for a leak. The liner will only fit one way.

- Align the liner to fit over the manway gasket on the manway panel. Ensure that the top bolt hole on the liner is in the right position and all other holes line up freely. You should not have to force the liner or create folds. Install over the bolts holding the manway gasket.
- Install the manway seal flange by placing over the liner and onto the bolts holding the manway gasket and the liner. Install remaining bolts and secure tightly.



- While adding water to the Harpoon, the perimeter of the interior MUST be walked and checked by the supervisor ensuring the liner is fully seated to the base of the panels.

- Once the liner is fully pulled up around the tank, install the perimeter strap to cinch the liner tight against the tank walls to prevent wind from entering underneath the liner.

*Double Liner Installation:

- For double lined applications, the primary liner will be lifted into the tank once the secondary liner is installed.
- Repeat the same steps as above to install the primary liner overtop the secondary
- Secure both liners together using their perimeter straps
- Ensure the secondary liner is not pinned by the primary liner around the wall edge. This may require physical inspection between the primary and secondary liners

6. Installing the Manifold Connections:

- Install upper and lower black gasket and the top plate on each of the two manifold boxes. Ensure liner is flat and sealed properly at connection point, and there is no interference with the groundcloth or any pebbles impeding the seal. Install the 24 bolts with washers and nuts, tightening in a lug nut style pattern, using an impact driver and 1-5/16" socket.
- For double lined applications a third gasket will be used so that the top and bottom of each liner is touching a gasket.

7. Installing the Manway Door Connections:

- Install the inner manway connection using the steel ring, then liner, then red rubber gasket against the panel wall.
- Ensure liner is lined up properly and has no folds.
- Ensure there are no tight areas inside the tank where the liner is stressed.
- For double lined applications a second red rubber gasket will be used.
- Install the outer manway connection using the steel door bolted directly to the panel with a red rubber gasket.

8. Installing the Upper Fill Tubes:

- Approx. 2-3 workers
- Lift the upper tubes using the manlift.
- Hold in place while 1-2 workers use man-lift and attach the Victaulic connection outside of tank. Ensure that individuals in/operating the man-lift are properly trained and use proper PPE for working at heights.

- Once the fill tube in in place, connected and over the liner, tighten the wall clamp to prevent movement.

9. Installing the HydrEra Harpoon Monitoring System:

- The HydrEra tank monitoring system can be installed to monitor fluid levels (via pressure sensor or ultrasonic) as well as fluid level.
- The main box will attach to the panel using magnets.
- The antenna magnetic mount should be mounted as high as possible on the outside of the panel, while not being on top of the liner.
- The ultrasonic sensor will be mounted atop the panel wall, aimed down at the fluid.
- The pressure sensor will be installed into the ¾" manifold port, with a T and valve to relieve pressure for a more accurate reading.
- The temperature sensor can be threaded into the manifold port or the manway door port.
- Each connection is specific to its corresponding location.
- Hold the power button until unit turns on.
- Connect your smart phone to the local wireless network
- Open your internet browser and go to the web address 10.10.10.10. The web page will show the information that the system is reading.

10. Tank Completion:

- Prior to adding fluid to the Harpoon Tank, ensure all valves are closed and ports not in use have a blind or blank installed.
- Ensure Manway bolts are torqued to the specifications listed on the safety stickers.
- Do not attempt to use the Harpoon Tank in a manner outside the normal operating procedures outlined on the safety sticker.
- Walk around the tank and do a visual inspection on all connection plates and pins.
- Ensure there is no undue stress on the liner material.
- Ensure that there are no gaps between the bottom of the panels and the ground.
- Contact a representative with any additional questions or concerns.

If any issues arise or you have any questions or concerns please contact HydrEra immediately:

Dan Kubek (587-990-5765)
Kai Magnussen (516-540-9944)
Cody Phillips (307-622-0123)
Billy Logsdon (970-250-9650)

Appendix A

- A minimum 18” of fresh water added to the Harpoon upon completion of setup
- Final walk through of the interior of the Harpoon must performed by a HydrEra trained supervisor
- Once a hydrotest has been performed and 24 hours has passed, HydrEra is cleared of any and all liner liability. At this point the integrity of the Harpoon system has been proven
- A minimum fluid level of 36” must be maintained during normal operation, aside from final emptying/cleanout
- Harpoon not to sit less than one third full for more than 72 hours
- Install/teardown reports to be signed off on by Select rep/customer
- All SOP’s to be signed off on by Select in all regions
- If Harpoon is allowed to freeze the liner integrity may be compromised and must be recertified at a cost to the customer
- Any and all damage to the Harpoon tank or liner system that is deemed to be caused by user error will be repaired/resolved at the cost of the customer