



Non-man Entry
Tank Cleaning

Tank Sweeps System

General Information & Generic Method Statement



<https://nonentrytankcleaning.com>



Tank Sweeps will prevent a build up of sludge on the tank floor by creating a movement of sludge on the tank floor. This movement ensures that any solids are suspended in the mobile oil and do not settle on the tank floor.

The nozzles can be rotated 180 degrees either manually outside the tank by means of a hand wheel or the unit can be operated hydraulically.





Introduction

Pro-line Hydralink Non-man Entry Tank Cleaning Systems offer distinct advantages over traditional Manned-entry techniques. The main advantages are that exposure to hazardous materials and environments is minimised almost to the point of elimination and the tank is cleaned to a gas free environment as per API requirements in the safest and most practical manner. These safety factors, coupled with the economic benefits to the client due to system efficiency and speed makes Non-man Entry Tank Cleaning the optimum method for client requirements.

The Tank Sweeps System was designed for the desludging of bulk fuel and chemical storage tanks by the control and circulation of high velocity liquid streams fitted to the tank shell.

The procedures contained in this document are generic in nature and are not a substitute for the project specific procedures that are always produced for any tank clean.



Tank Sweep Method Statement and General Information

Whilst Tank Sweeps are very easy to operate and are a trouble free method of suspending accumulated oil sludge and residues inside above ground storage tanks, the method of operation is important to achieve a good result and at the same time respecting safety.

The principle of operation is by introducing high velocity streams of crude oil through Tank Sweep Nozzles inside a tank, the sludge inside a tank is disturbed and blended so that all the solids are suspended in the resulting liquid.

Tank Sweeps methods are not to be confused with other methods where nozzles are introduced through holes cut in the tank roof or cut in a tank roof aperture. These methods are very frequently unsuccessful due to several reasons.

The nozzles are small and are limited in their ability to pass large flows at a satisfactory pressure. But each Tank Sweep Nozzle delivers 660m³/hour at 10 bar pressure.

These nozzles rotate endlessly and their direction cannot be controlled or directed to where they may be needed but tankseeps can be controlled and directed.

Tank Sweep Nozzles are directional and can be moved horizontally with a simple hand wheel to exactly where they are needed. With the new Pro-line Hydralink Tank Sweep System, the addition of a mechanical indicator allows the operator to know exactly where a nozzle is pointing.

Nozzles fitted through a tank roof are not submerged and therefore the tank needs to be inerted.

Tank Sweeps are used when the liquid in the tank is 1.5m minimum above the Tank Sweep Nozzle, this ensures that the stream from the nozzle cannot break through the fluid level into the airspace and therefore it is not necessary to inert the tank. If local legislation and/or client procedures demand that a tank is only cleaned when inerted then this is also possible.

Nozzles fitted through a tank roof are only able to disturb the sludge within a limited distance from the nozzle and therefore quite locally to the nozzle's location. This means that to be able to cover the whole tank many nozzles are required to be fitted, but of course their direction cannot be controlled.

With Tank Sweeps a tank up to 50m diameter can be cleaned with two Tank Sweeps, a tank between 50 and 80m diameter requires three Tank Sweeps and a tank of 80 and 100m requires four Tank Sweeps.

Tank Sweeps are side-entry into the tank so there is no need to crane nozzles and hoses onto the tank roof or to send men to work in this very hazardous area.

As the nozzles have full side-to-side movement, the whole tank is covered.



Equipment designed
and built to
international codes.

By using a thermal imaging camera, operators can see if there are any areas where sludge banks remain and direct the Tank Sweep Nozzles to them.

Best results are obtained by starting with all Tank Sweeps facing full left, then every couple of hours the nozzles are turned a few degrees. This is continued until the nozzles have attained full right position. Now the nozzles should be slowly turned full left taking thirty minutes to complete this and then full right in the same time and manner. Next, the nozzles from full right should be turned a few degrees every hour until full left has been achieved. Now, the nozzles should be slowly turned full right taking thirty minutes to do so and then full left in the same time and manner. This is to ensure that solids that have collected in the tank center are dispersed.

Once the sludge has all been disturbed the Tank Sweeps can all be set at approximately 25-30 degrees and the whole tank contents will begin to swirl around in one direction, picking up and suspending all of the solids.

Method when the level in the tank is above the manway for a tank up to 80m diameter.

Tank Sweeps work through side-entry into the tank via the manway using three Tank Sweeps. As the sludge level is above the manways these cannot be removed. Access to the tank will be by the use of "Proline Hydralink Cold Tap Flanges". The Cold Tap Flanges are fitted to three manway lids by first cleaning the manway lid until it is free of paint and rust to ensure that a gasket will make a correct seal with the Cold Tap Flanges. Then, every other nut and bolt securing the manway lid are removed.



Safer and quicker than traditional Manned-entry Cleaning Techniques resulting in less downtime and quicker return-to-service times and the ability for the client to perform secondary tasks e.g. inspection.

The cold tap flange together with a suitable gasket is then fitted to the manway lid and secured.

On completion, the remaining nuts and bolts are removed and replaced with the special washers, nuts and bolts supplied with the cold tap flanges and secured.

The cold tap flange has a stub with an 18" flange fitted to it. An 18" Full Bore Gate Valve is fitted and secured to the flange with a gasket.

A hot tap drilling machine is now required, this can be sourced via an external contractor who specialises in hot tapping or by the use of the Pro-line Hydralink Louis drilling machine. The drilling machine is fitted to the 18" valve and the valve is opened allowing the drilling machine to cut the correct size coupon out of the manway lid. Once cut the drill is withdrawn with the cut coupon and the 18" valve is closed. The drilling machine is removed and replaced by the Tank Sweep with its nozzle in the entered position.

The Tank Sweep is supported and leveled by means of four hand jacks. Once in position, wooden blocks are put in place to take the weight of the Tank Sweep.

The Tank Sweeps are connected by cargo hoses supplied to the filter on the suction side of the Tank Sweep Chamber.



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There is a flange on both sides, so the most convenient one can be used and the other one blanked off.

The filter is connected to the pump suction and the pump discharge is connected to the Tank Sweep delivery side. Before continuing further, the system should be pressure tested with water to ensure that there are no leaks.

If the contents in the tank are not considered pumpable then a "T" should be fitted into the suction line before the filter and connected to a suitable source of crude oil (from another tank).

The 18" valve can now be opened and the Tank Sweep Nozzle is entered hydraulically into the tank with the hydraulic hand pump supplied with each Tank Sweep. All the Tank Sweep Nozzles should be pointing straight ahead.

The fresh crude oil supply line to the pump is opened. The pump is started and run at low speed until the operator sees a liquid bubble shape appearing in front of the Tank Sweep Nozzle using a FLIR thermal imaging camera.

Once this has started, the pump speed can be increased to 2/3 full power and very soon the bubble shape will increase in size. The system should be left running for 20-30 minutes. At this time the pump is stopped, the exterior source of crude oil is closed and the valve on the Tank Sweep Chamber is opened.

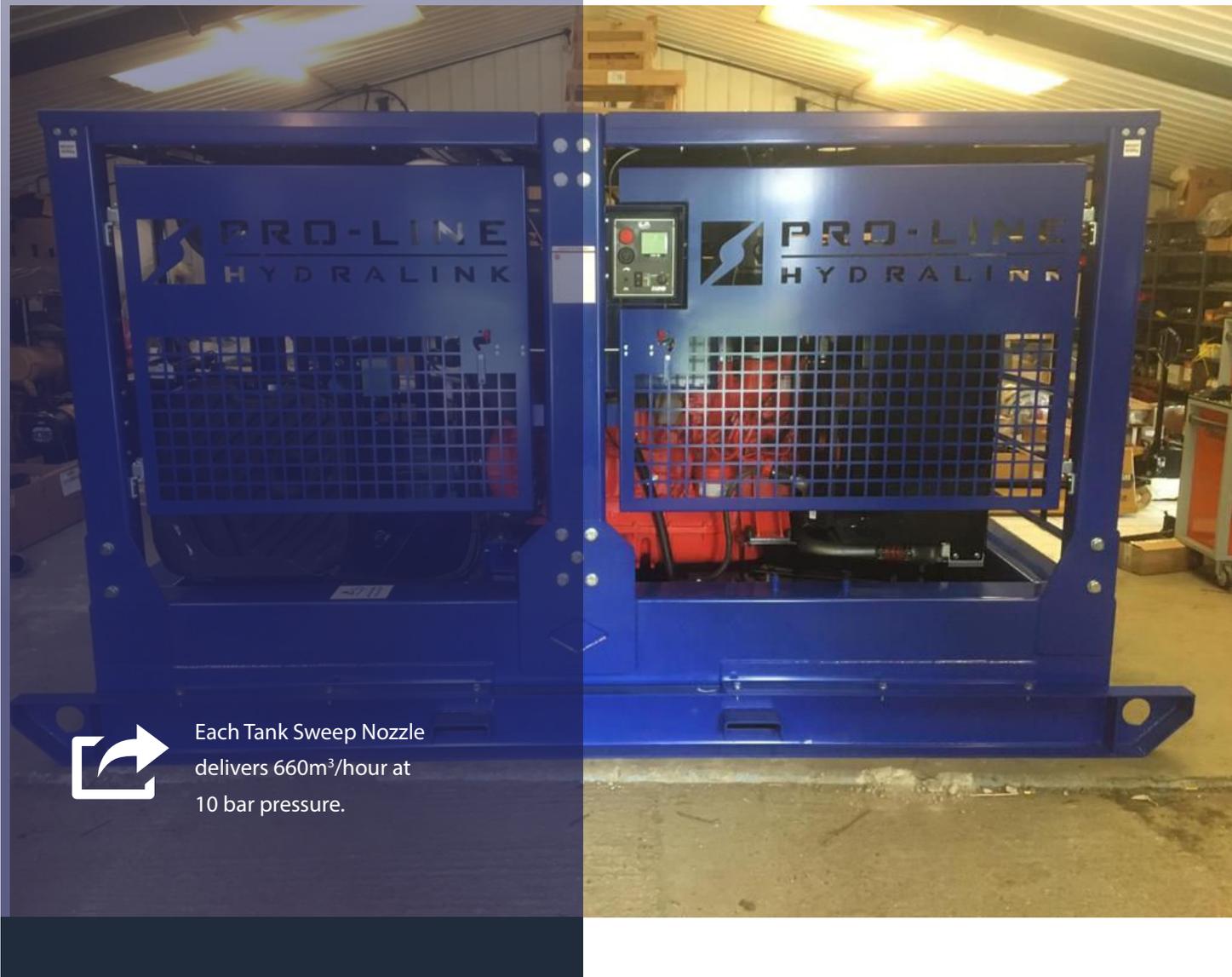
Recirculation of the fluidized oil inside the tank will now start. Gradually, the pump should be brought up to full operating speed and the operator moves the hand wheel of the Tank Sweep Nozzle from left to right about five degrees every few minutes and gradually increasing the angle until full left and full right have been achieved.

This operation will normally take two to three hours and the operator can check that the Tank Sweeps are fluidising the contents using the thermal imaging camera.

Once completed all nozzles should be put to full left with the pump on full power. Every hour the operator should turn the hand wheel to turn each Tank Sweep a few degrees to the right. Once full right has been achieved then the operation is repeated going from right to left. This operation should take about twenty-four hours depending on the tank contents but can be checked with the camera to ensure that it has been completed successfully. There may be sludge banks by the tank shell especially opposite the main incoming line. Any remaining banks of sludge can be dealt with and removed by directing a Tank Sweep Nozzle to them. Now all Tank Sweeps should be set at about twenty-five to thirty degrees from the left. This will ensure a rotation of the whole tank mass of oil picking up and suspending all of the solids.

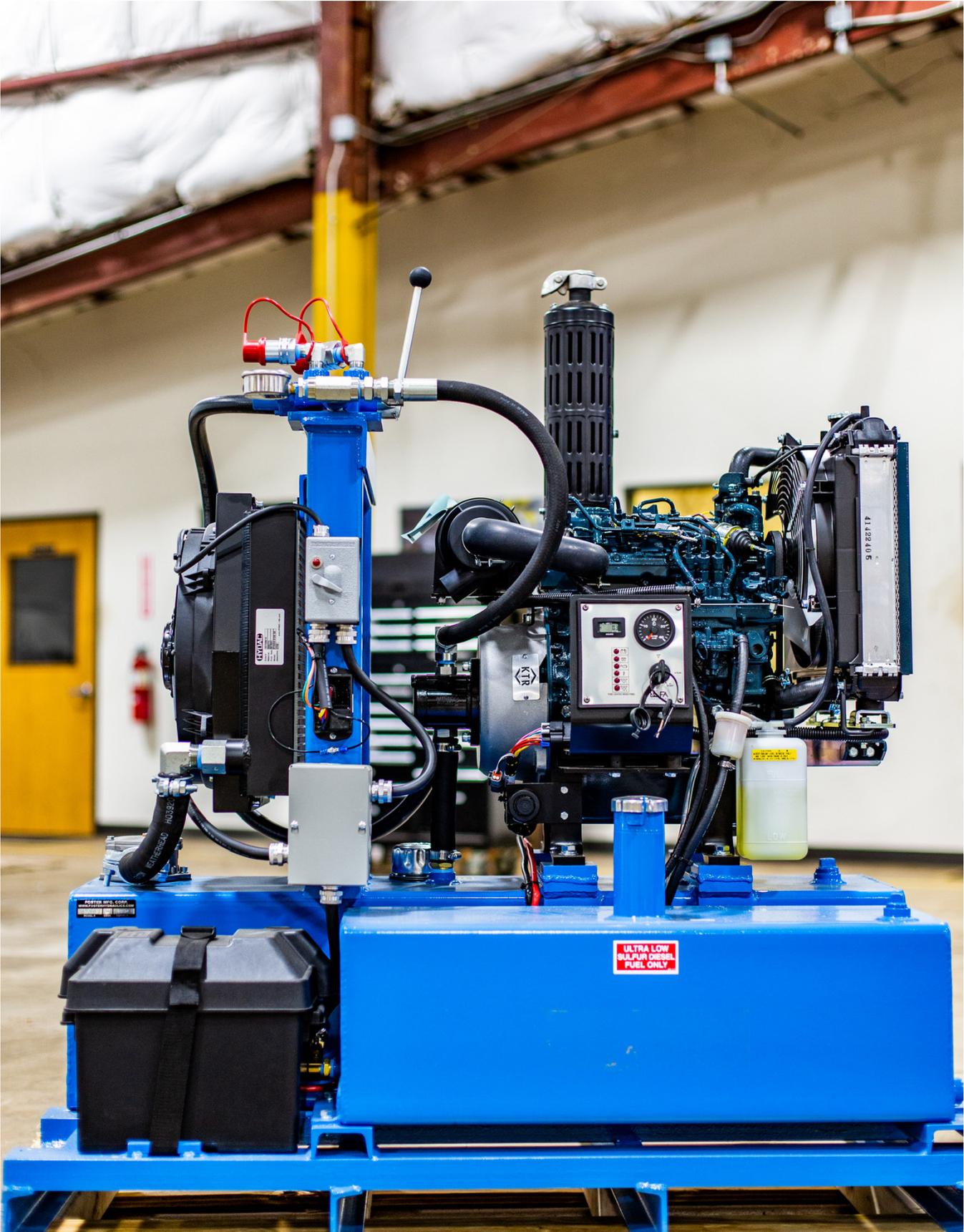
The next operation is entirely dependent upon the tank owner.

1. The Tank Sweeps are stopped and the entire tank contents are pumped down as quickly as possible to wherever the tank owner directs.



2. A slipstream of oil is taken from one of the Tank Sweeps and put through an Oil Recovery System (for example the Salama Oil Recovery System) to remove the solids. The recovered oil is returned to the tank. When tests of the out coming oil show that the required level of solids in the oil has been achieved then the operation is complete and the remaining oil in the tank now meets the required specification and can be pumped away.
3. Whilst the Tank Sweeps are still running, a hydraulic submersible pump is lowered into the tank via the center roof manway. The Tank Sweeps cause a swirling action inside the tank and create a vortex and the solids go into the middle of the tank.
4. The submersible pump is used until such time that the out coming oil has reached an acceptable level of solid content.

Once the tank contents have been removed a water wash can be done using Tank Sweeps but because of the large volume of water required this may not be acceptable. A manual wash and final clean can be carried out if permitted.





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TONY BENNETT - PRO-LINE HYDRALINK INTERNATIONAL SALES & MARKETING DIRECTOR

📍 1701, E Main Street, Eagle Lake, TX 77434

✉️ tony@pro-linehydralink.com

📞 UK: +44 7951 930633 (also on WhatsApp) or USA: +1 832 416 1313

France: +33 (0)9751 70121 - Brazil: +55 2135 133615

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