a suitable discharge line or hose from the discharge outlet to the dump site. During gravity discharge, open the 1115 bleeder regulator valve to vent the cargo tank.

When pressure is desired to speed up the operation or discharge the material to a higher elevation, use only the amount of pressure required. In the event that highly viscous materials are discharged under pressure, open the injection valve to speed the operation by aerating the material. **The injection system is optional and can be installed at the customer's request.**

CAUTION

DO NOT leave the injection valve open while loading with partial vacuum as material carry-over into the pump may occur.

LOADING HOT OIL, LIGHT OIL AND DETERGENTS - These materials may have a tendency to foam or boil when subject to a partial vacuum. Load these materials through the discharge valve, not the inlet valve, to avoid the agitation caused by transfer through the riser. **Throttle the bleeder valve as required to maintain the minimum amount of vacuum necessary to load.** Keeping the bleeder valve throttled throughout filling causes air to rush into the dome, pocketing and cooling the foam and light material, thus preventing carry-over without prematurely activating the 1100 primary float shut-off valve.
This filling operation may have to be periodically stopped to drain the inside scrubber and liquid entry preventor. It is important to remember that loading of these materials cannot be rushed due to their foaming characteristics.

CLEANING TANKS: The cleaning of storage tanks and the removal of bottom sediments is easily accomplished with vacuum. Some larger tanks that do not have shell manways or cleanouts may require removal of lower shell section. Equipment used to assist the vacuum unit performing this service is as follows:

Hydroblaster and/or washdown pump for pressure cleaning and washdown. Duck bill hose nozzles and industrial, heavy duty, straight and curved squeegees.

DISPOSAL OF BOTTOM SEDIMENTS AND SEMI-SOLIDS: Materials that have a tendency to settle may require agitation prior to discharge. Agitation is accomplished by creating a partial vacuum in the cargo tank, then rapidly opening and closing the discharge valve. Repeat this procedure several times until agitation is complete. Off loading should be completed as soon after agitation as possible.

CAUTION

DO NOT let a vacuum-pressure cargo tank loaded with suspended solids sit for an extended period of time. The solids will settle and compact making agitation difficult.

REAR CLEANOUTS: Can be provided to allow removal of compacted solids. Manways from 16_ to 30_ inside diameter are installed horizontal in rear head, between inlet and discharge valves, **flush with the bottom of the cargo tank**, in compliance with **ASME** and **DOT**.

TRANSFERRING FROM ONE TANK TO ANOTHER: Is accomplished by connecting the suction hose to the inlet valve with riser, and the discharge hose to the discharge valve and the point of discharge. Alternate vacuum and pressure procedures, until the transfer is complete, using only the amount of pressure required.

PIPELINE SERVICING AND REPAIRS: In the event of a pipeline break vacuum is the most effect way of cleaning up the oil spill. When the escaping oil penetrates and softens the surrounding soil, the vacuum loaded cargo tank can load the mixture of soil and oil, exposing the pipeline break and keeping the hole dry while the repair is made.

VACUUM LOADING FROM DEEP AND DISTANT SOURCES: Air, water, or steam injection systems designed to be used with the suction hose to increase the speed and depth of the loading process have been used for years and are very effective.

An operator on a ship cleaning job reported that a steam injector installed on the end of the suction hose loaded lead based sludge from a bilge, at a depth of over 85 feet, at a very rapid rate. The material was then discharged by pressure over 40 feet high then off the side of the ship and into cargo tanks.

Experimenting with different loading and unloading procedures and techniques can pay big dividends.

THOMPSON VACUUM-PRESSURE UNITS

OPERATING INSTRUCTIONS - VACUUM LOADED CARGO TANKS

REGULATIONS AND SAFETY

It is the responsibility of the owner to comply with all federal, state and local regulations. The employer must train, and document the training, of all Hazmat employees as required in Section 5107 of the Code of Federal Regulations. In addition the code establishes minimum requirements for design, manufacturing, testing and maintenance of specification cargo tanks.

The latest condensed version of "Cargo Tank Hazardous Material Regulations" can be purchased from:

National Tank Truck Carriers, Inc.
950 North Glebe Road, Suite 520
Arlington, VA 22203-4183
www.tanktruck.org (703) 838-1960

Hazardous Materials must be determined to be compatible with each other, the cargo tank and related components. Concentrations and temperature are critical. We highly recommend the following publication to assist with this determination.

Corrosion Resistance Tables
By: Philip A. Schweitzer, P.E.
Marcel Dekker, Inc.
Cimarron Road, Monticello, NY 12701
(800) 228-1160 Fax: (845) 796-1772

This is a multi volume fingertip reference for engineers and students. This publication is a must for designers and operators of cargo tanks handling hazardous and corrosive material.

DANGER

Vacuum Pump Exhaust - The fumes discharged by the vacuum pump exhaust when vacuum loading hazardous material are directly related to material being loaded and must be conveyed to a safe area or treatment facility.

V**ertical Vacuum Pump Exhaust Stacks** can be lethal depending on the material being vacuum loaded and are a cause of concern.

1. Example - Hydrogen Sulfide (H^2S) a highly toxic gas is heavier than air and will accumulate above the cargo tank when discharged from a vertical exhaust on a calm day, especially in a confined or protected area, and then settle down on those in the area. It may be impossible to escape the gas and could be fatal.
2. Catastrophic accidents have also occurred when attempting to discharge H^2S fumes through a previously contaminated charcoal filter resulting in a violent chemical reaction.

A vacuum loaded cargo tank has a significant advantage because these gases and fumes can be isolated or contained and properly disposed of.

DANGER

Never get under a motor vehicle when the engine is running. Shut-off engine before working on power take-off or driven equipment.

Never attempt to operate power take-off or driven equipment with anyone under the motor vehicle.

Never work on or near an exposed rotating shaft or coupling when the engine is running. You can snag clothes, skin, hair, hands and etc. This can cause serious injury or death.

Never attempt to open manways, seal caps or access openings when the cargo tank is pressurized. Bleeders or self closing sample valves are recommended to be installed interior of seal caps.

Inlet Hose - Keep clear of strong suction when loading with vacuum. Install self closing sample valve interior of seal cap.

Discharge Hose - Will whip under pressure and must be properly secured. Install self closing sample valve interior of seal cap.

The DOT Specified Self Closing System - (S.C.S.) or secondary emergency closure must be capable of shutting the discharge valve to a leak tight position in less than 30 seconds. If the S.C.S. fails the primary manual closure can be used to force the valve closed.

THOMPSON TANK, INC.
P.O. BOX 790, LAKEWOOD, CA 90714-0790 • PHONE: (562) 869-7711 • FAX: (562) 869-7214
WWW.THOMPSONTANK.COM

THOMPSON VACUUM-PRESSURE UNITS

INSPECTION AND PREPARATION BEFORE OPERATION -
THE THOMPSON VACUUM-PRESSURE UNIT SHOULD BE THOROUGHLY INSPECTED AFTER DELIVERY

CAUTION

Our experience has shown that initial mechanical operation and transportation of new units may cause subsequent loosening and/or maladjustment of component parts. We therefore recommend a close inspection of the unit upon delivery, and after approximately four (4) hours of operation, to prevent malfunction or damage. Re-torque suspension, U-bolts, sheaves and drive components.

For maintenance and detailed description, refer to the Air System brochure and applicable data sheets on individual components. Examine inside the tank for hoses and other accessories placed there for shipment. The 1100 primary float shut-off valve in the dome assembly and the 1102 liquid level indicator at the rear of the tank should be inspected for freedom of movement and alignment. In the event of anticipated corrosive service, the periodic application of salt water-proof grease over both of these assemblies will increase their longevity and improve their operation. Inspect and tighten all V-belts and set screws on the pump drive assembly. Check the oil level in the vacuum pump; together with the fuel, oil and coolant levels of any auxiliary engine. Follow the manufacturers' recommendations for maintenance and operation of pumps, engines and other installed components.

OPERATION

Familiarize all operating employees with the detailed operations and maintenance instructions for your specific vacuum pump. Direct all operating employees to read and observe the instructions of any DANGER or CAUTION labels affixed to the unit.

VACUUM LOADING

1. Open intransit shut-off valve
2. Open 1115 bleeder regulator valve
3. Start engine, engage clutch or PTO, set engine RPM.
4. Position 4-way valve to vacuum, close 1115 bleeder regulator valve to regulate vacuum.
5. Connect hose to inlet or discharge, open valve
6. Evacuation of air from cargo tank stops automatically (1100 primary float shut-off valve) when full.
7. Close loading valve, open 1115 bleeder regulator valve, or throttle to regulate vacuum.
8. Decrease engine RPM, disengage clutch or PTO.
9. Close intransit shut-off valve.

GRAVITY UNLOADING

1. Open 1115 bleeder regulator valve, open discharge valve.
2. After load is partially discharged, the inlet valve may be opened to allow additional air to ente tank through riser.

PRESSURE UNLOADING

1. Open in-transit shut-off valve
2. Open 1115 bleeder regulator valve
3. Start engine, engage clutch or PTO, set engine RPM
4. Position 4-way valve to pressure, close 1115 bleeder regulator valve or throttle to regulate pressure.
5. Connect hose to discharge and open valve.
   Caution: Hose will tend to whip under pressure, do not use excessive pressure.
6. When cargo tank is empty, close discharge valve, open bleeder regulator valve.
7. Open drain valves on 1106 LEP and 2107 scrubber. If excessive material is drained, the 1100 float shut-off valve needs adjustment or repair.
8. Decrease engine RPM, disengage clutch or PTO
9. Close in-transit shut-off valve.

CAUTION - INTRANSIT

Intransit shut-off must be in the **closed position** when vacuum-pressure pump is not in use and during transportation.
Intransit shut-off must be placed in the **open position** before using vacuum-pressure pump.
The intransit shut-off is a safety device designed to prevent loss of product after a roll over accident when the cargo tank remains on its side or inverted.

THOMPSON TANK, INC.
P.O. BOX 790, LAKEWOOD, CA 90714-0790 • PHONE: (562) 869-7711 • FAX: (562) 869-7214
WWW.THOMPSONTANK.COM

THOMPSON VACUUM-PRESSURE UNITS

CAUTION - PUMP SPEED

Do not exceed the vacuum pump manufacturer's maximum recommended operating speed (R.P.M.)Power Take-Off and reduction gear ratios vary and the R.P.M. of the power source is not always the same as the pump. An accurate tachometer on the power source and determination of drive ratio is essential to prevent damage. Rotary vane pumps operated below recommended minimum speeds can cause vane chatter and damage the pump.

CAUTION - PUMP

Bleed all vacuum or pressure from the cargo tank before changing position of 4-way valve (vacuum to pressure or pressure to vacuum) to prevent damage to the pump.

CAUTION - LEP & SCRUBBER DRAINS

Never open the **2107 centrifugal scrubber of 1106 liquid entry preventor** drain valves while the unit is under vacuum. This will cause the injection of material into the vacuum pump. With the 1115 bleeder regulator valve open, drain both the inside scrubber and the liquid entry preventor through their respective drain valves after each load. In the event that an excessive amount of material is drained from either component, check the both the 1100 primary and 1103 secondary float shut-off valves for adjustment or malfunction and for leaks in the Air System (see the Air System diagram)

FUNCTION OF AIR SYSTEM COMPONENTS

The 1100 Primary Float Shut-Off Valve will automatically terminate the evacuation when the cargo tank is filled to capacity. By adjusting the height of the float ball the cargo tank capacity can be increased or decreased.

Note: Periodically inspect for damage and alignment.

The 2107 Centrifugal Scrubber will separate material, carried past the 1100 Primary Float Shut-Off Valve, from the air being evacuated. The centrifugal scrubber will also liquefy condensation which would otherwise pass through the 1103 Secondary Float Valve and into the vacuum-pressure pump. Drain after loading - **Do No**t open drain valve under vacuum.

Note: Periodically remove the stainless steel mist eliminator and clean or replace.

The 1106 Liquid Entry Preventor contains **the 1103 Secondary Float Valve** which will terminate the evacuation of air if the 1100 primary fails or the 2107 centrifugal scrubber is overfilled. Drain after loading - **Do Not** open drain valve under vacuum.

Note: If excessive material is drained from the **2107 centrifugal scrubber** or the **1106 LEP** check the **1100 primary** for proper adjustment or damage.

The 1115 Vacuum-Pressure Bleeder Regulator Valve is used to regulate the amount of external pressure (vacuum) for loading and internal pressure for unloading. It is also used to neutralize the cargo tank from the external and internal pressure condition.

Note: **The 1115 Bleeder Regulator Valve** when throttled to regulate the amount of vacuum used to load the cargo tank will also inject atmospheric air into the dome assembly creating a pocket of air surrounding the **1100 primary float shut-off valve** preventing surge and carry over of light material.

The 1176 Inlet Riser and Deflector is designed to discharge above the maximum liquid level and is extended to the top of the inside of the vacuum loaded cargo tank. The riser also allows the operator to use pressure to clear a blocked suction hose without losing any material previously loaded and for transfer from one location to another without disconnecting the hoses.

Efficiency in loading is directly proportional to the size of the lines or hoses used between the cargo tank and the material. Frequently heavier materials can be loaded much more rapidly when skimmed, allowing air to mix with the product at the suction end of the hose. Air or steam can be injected into the suction end of the inlet hose to speed the loading of viscous material and to greatly increase the depth or distance which material can be loaded by vacuum. In the event material must be pulled a great distance, light-weight aluminum tubing can be substituted for heavy vacuum hoses to make up the majority of the line.

Depending on density or viscosity, waste materials may be discharged by gravity or pressure. Connect and secure

THOMPSON TANK, INC.
P.O. BOX 790, LAKEWOOD, CA 90714-0790 • PHONE: (562) 869-7711 • FAX: (562) 869-7214
WWW.THOMPSONTANK.COM