



Closed Loop Unloading of Solvent Tank Trailers

Closed loop unloading systems are designed to minimize solvent vapor emissions during transfer by exchanging the liquid solvent in the trailer with the storage tank vapors. Closed loop unloading systems can rely on a customer-supplied unloading pump or a carrier-supplied unloading pump. For customers providing the transfer pump, a self-priming centrifugal pump can help minimize priming problems that other pump designs may encounter. Seal leakage may be controlled by using a dry cut-off sealless pump, or by using dual mechanical seals with an appropriate barrier fluid. Regardless of the specific system design, all closed loop transfers require a vapor return hose/piping system and an appropriate vapor return hose connection on the delivery trailer.

Customer Supplied Unloading Pump (Fig. 1)

Unloading with a customer-supplied pump is a common method of closed loop transfer. The customer's pump pulls product from the trailer and discharges it into the storage tank while a separate vent line transfers tank vapors back to the trailer. This system allows the unloading hose and any fixed piping located on the intake-side of the pump to be evacuated of solvent during pump operation. Piping on the discharge side of the pump will still contain solvent after the transfer is complete. Presence of residual solvent in the delivery hose is minimized.

Truck Mounted Unloading Pump (Fig. 2)

This method of transfer utilizes a tractor or trailer-mounted pump which is supplied by the carrier. Depending on the type of pump, this system may not be able to completely discharge all of the product from the unloading hose and inlet line once the transfer is complete. Since the unloading hose must be manually drained, these systems may not satisfy state or local requirements for 'closed loop' transfer. When ordering, the customer must specify a carrier-supplied pump when relying on this type of system.

Securing Connections

Vapor recovery connections are typically located on top of the trailer dome, but in some instances may be installed at ground level. Typical vapor return tank trailer connections are of either Camlok or Chicago-type design. Since the type, diameter, and style of connector as well as its location on the tank trailer will affect the type of equipment necessary, it is important for both the customer and carrier to understand the system and agree in advance on who is to provide the necessary equipment.

Residual Product

A small amount of product may be present in the unloading hose after the transfer is complete. The customer is responsible for handling this residual. Many customers recover this residual for use in their operation. It is never acceptable to drain the residual product onto the ground. If the residual must be discarded, it must be handled as a hazardous waste.

Where a supply of dry, inert, pressure-regulated gas is available, residual product remaining in the hose can be 'blown' into the receiving tank. This operation requires the carrier to supply a 'blow-down tee' between the pump and unloading hose. Storage tanks and solvent handling systems must be designed to handle the additional gas introduced into the storage system from this operation. In order to minimize solvent vapor emissions, the excess gas may be vented to a refrigerated chiller, an activated carbon bed, or sent to a vent incinerator.

The compressed gas can be supplied by the carrier's delivery tractor air compressor, or from a customer supply. Customer inert gas supplies must be regulated to 30 psig maximum and should be passed through a filter and dryer to reduce the potential for particle and moisture contamination.

If a 'blow-down tee' is not available on the carrier's equipment, residual product left in the solvent hose can be manually drained into an appropriate, clean receptacle by 'walking the hose'. This requires a valved drain tee at the customer's inlet fitting, manual lifting of hoses, and may subject employees to potential solvent vapor exposures. In some states or localities it may not be acceptable to open the line to the atmosphere for the purpose of draining.

Regardless of the method selected for handling residual product, customers are not permitted to install a 'blow-down tee' at the inlet fitting for the purpose of 'blowing' residual product back into the delivery trailer.

Design Considerations

The customer's product inlet fitting should be designed with a valved drain tee to facilitate the controlled relief of excess pressure on the unloading hose and the capture of any residual product.

Inlet fittings and customer-supplied pumps are generally designed to be positioned lower than the trailer discharge pipe to gravity-assist in priming and draining. Systems designed to accept a short unloading hose (supplied by customer), or no more than one standard length of carrier-supplied hose (20 ft.), will reduce the amount of residual product that must be handled.

Product transfer and vapor return hoses are most commonly fitted with 2-inch stainless steel female Camlok quick connect fittings. The customer's inlet must be equipped to accept these fittings. Caps should always be installed on the fittings when not in use. If different fittings are to be used, the requirements must be specified when placing orders. NOTE: Camlok fittings are not dry disconnects.

If adding excess air or nitrogen into a storage system, it is important to confirm that the tank and auxiliary equipment are appropriately vented or pressure rated. Pressure/vacuum relief devices are always recommended for storage tanks.

Safety and Regulatory Considerations

In accordance with DOT regulations carriers cannot "cap" the unloading hose following transfer and travel with residual product in hoses or piping [49 CFR 173.33(3)(e)]. It is the customer's responsibility to ensure that delivery hoses are properly drained after unloading is complete.

Trailer grounding is required when transferring flammable liquids. However, trailers unloading non-flammable chlorinated solvents generally remain ungrounded.

Carrier Requirements

If the customer wants a "valved blow-down tee" or other special equipment or fittings to be supplied by the carrier, these requirements must be specified when ordering and

arranged for the carrier. Requirements should be clearly indicated as part of the order. Be aware that some carriers will not supply certain items. It is the customer's responsibility to ensure that both the equipment and method used for unloading will satisfy all state or local requirements.

A valved blow-down tee is generally equipped with a standard 3/4 inch air quick connect fitting (Chicago type). The compressor mounted on the tractor would typically be supplied by air. Again, all arrangements must be confirmed in advance.

The most common trailers used for chlorinated solvent bulk transport are MC307 or MC312 manufactured before 09/95 and MC407 or MC412 trailers manufactured after 09/95. The maximum allowable working pressures for these trailers are 25 psig and 30 psig respectively.

Trailers should never be pressured when unloading with a closed loop system. However, if nitrogen or air is introduced into a trailer, the pressure should never exceed the maximum allowable working pressure listed on the trailer specification plate. Due to safety and environmental concerns, empty trailers are not to be transported under pressure.

Further Information can be obtained by calling or writing:

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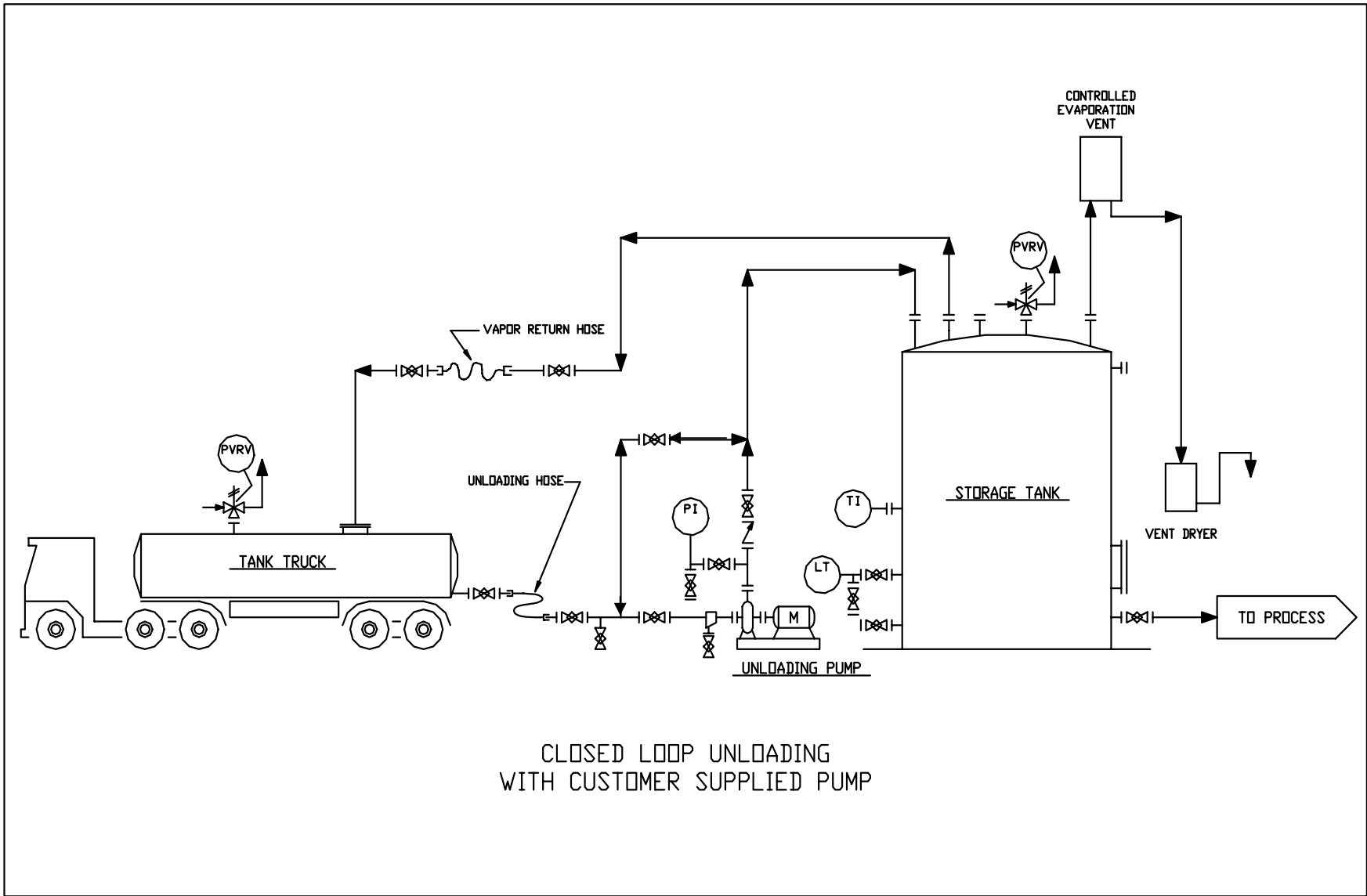


FIGURE 1

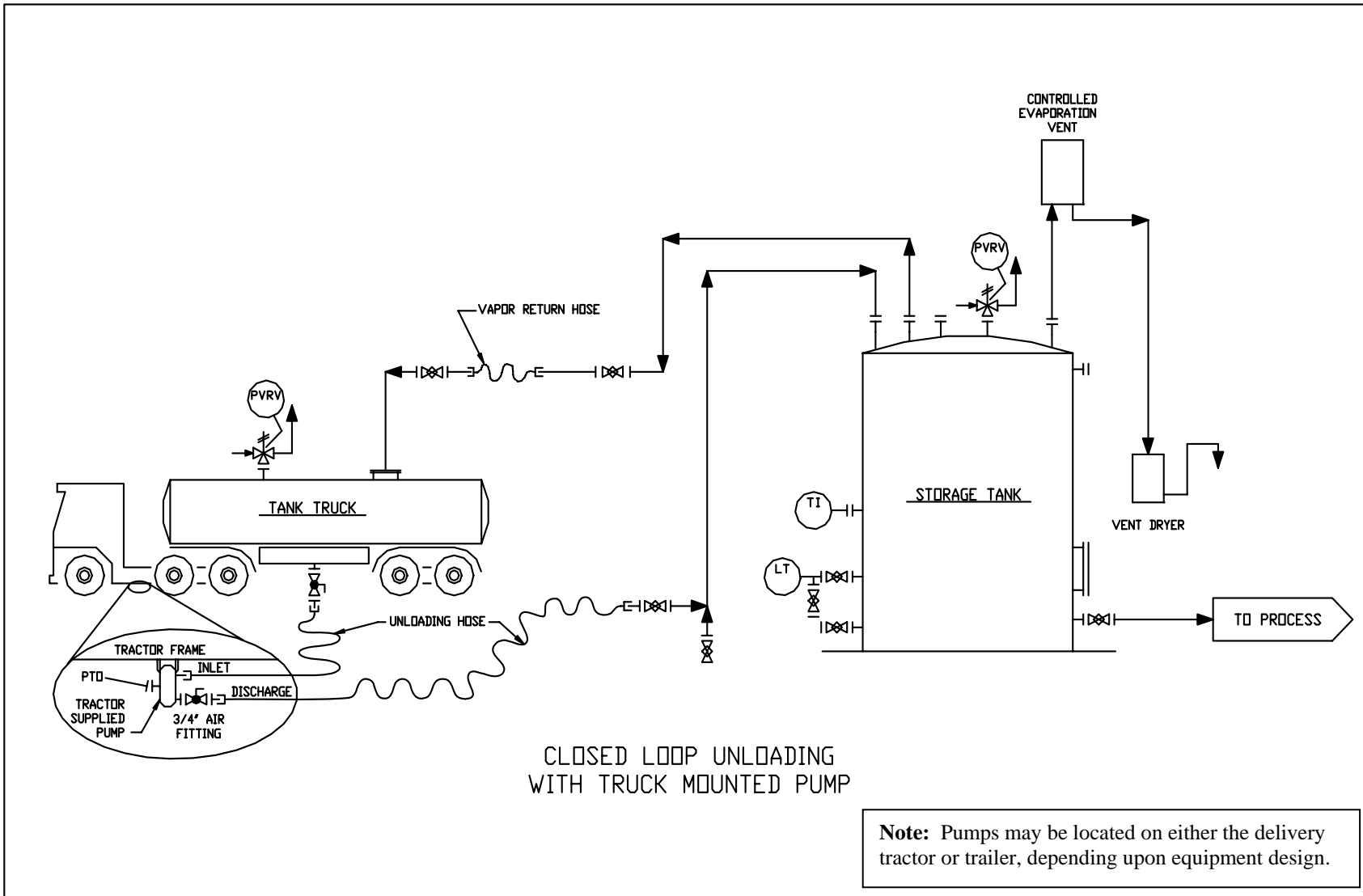


FIGURE 2