OxyChem®

Basic Chemicals

Chlorinated Organics
Product Transfer System Design Considerations For Top Unloaded Solvent Tankcars

Features of OxyChem's Top Unloaded Solvent Tank Cars

- No Bottom Outlets
- 20,000 Gallon Normal Capacity (at 2% outage)

All Valves are Mounted in a Protective Housing on Top of the Tankcar, Including:

- 3" Liquid Unloading Valve
- 3" Air/Vapor Return Valve
- 150 psig Safety Relief Valve
- ¾" Sampling Valve

Product Transfer System

Design Considerations

A. Self Priming Pump

For utilization of a pump to transfer product from a top unloaded tank car it must be capable of priming itself. The pump specification must take into consideration that solvents are heavy and have relatively high vapor pressures (see Table 1 for density, viscosity, and vapor pressure curves). An improperly designed pump will not be capable of maintaining a prime, and will either be unable to transfer product, or do so with reduced performance.

B. Non Self-Priming Pump Transfers

Facilities which have pumps without a built-in priming chamber can upgrade the pump by installing a priming reservoir with a capacity of at least 25% greater volume than the volume of the suction hose used in the transfer. Reservoirs should be permanently secured to the pumping station and elevated above the pump suction port. The reservoir is typically top-filled by a ½ inch supply line connected to the suction hose. Discharge is transferred from the bottom of the reservoir to the suction port of the pump by a ½ inch pipe, typically. In this design, the reservoir should be able to withstand the Net Positive Suction Head (NPSH) expected from the pump upon start-up and should be affixed with a pressure and vacuum relief device.

In the event the pump requires service, block valves should be installed on the reservoir's discharge line, as well as a double block and bleed valve arrangement on the suction line supplying the reservoir and pump inlet.
With the exception of the bleed valve, all valves should be opened before start-up and closed immediately upon completion of the product transfer.

Pump transfers will allow the vapors displaced in the receiving tank to be returned to the tank car (the concept of vapor balancing).

If vapor balancing is not employed, the tank car must be vented during unloading.

C. Compressed Gas Transfers

The method of applying a moderate pressure to the tank car to displace product out of the container is perhaps the most economical transfer method. Typically, an inert gas such as air or nitrogen is employed. The compressed gas system should have enough capacity to transfer product at the desired rate, which will be determined by the hydraulics of the unloading station. Typical compressed gas transfer systems employ pressures below 20 psig. A pressure relief valve set at 25 psig maximum, and pressure gauges must be installed to regulate and monitor safe compressed gas pressures.

This method of transfer may introduce contaminants into the product if the air pressure system is not designed to remove moisture and oil.

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Because pressure is applied to the tankcar, the vapors displaced in the receiving tank cannot be returned to the tankcar.

A surge of air/nitrogen pressure may occur through the transfer system and receiving tank when the tankcar goes empty.

OxyChem requires pressure to be removed from the tankcar before returning it to our shipping point due to safety considerations.

D. Pump Assisted with Air/Nitrogen Pressure
To maintain the prime on a pump it may be necessary to apply a slight pressure to the tankcar.

A ¾" or 1" bypass line with block valve between the suction and discharge line is necessary to allow the suction hose to fill with liquid and the vapor/air in the suction hose to pass to the discharge line. This operation should take place before starting the pump. Once pumping has begun, the bypass line valve should be closed.

This method of transfer may introduce contaminants to the product if the air pressure system is not designed to remove moisture and oil.

Because pressure is applied to the tankcar the vapors displaced in the receiving tank cannot be returned to the tankcar.

A surge of air/nitrogen pressure may occur through the transfer system and receiving tank when the tankcar goes empty.

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Table 1 - Solvent Physical Properties

Solvent	Specific Gravity @ 25/25 °C	Vapor Pressure @ 20 °C, mm Hg	Liquid Viscosity @ 20 °C, cP
Carbon Tetrachloride	1.59	91	0.97
Chloroform	1.48	160	0.56
Ethylene Dichloride	1.25	62	0.84
Methylene Chloride	1.32	350	0.48
Perchloroethylene	1.62	13	0.88

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Equipment Suppliers-The following vendors are known to sell equipment that may be needed in a product transfer system. This list is not all-inclusive and is not an endorsement of these companies.

Pumps

Goulds Pumps
240 Fall St.
Seneca Falls, NY 13148
(315)568.2811
www.goulds.com

The Duriron Co./Pump Division
PO Box 1145
Dayton, OH 45401
(513) 226.4000

Air Compressors

Atlas Copco
1800 Overview Dr.
Rock Hill, SC 29730
(803)817.7200
www.atlascopco.us

Gardner Denver Inc.
1800 Garner Expressway
Quincy, IL 62305
(217)222.5400
www.garnerdenver.com

Sullair Corp.
3700 E. Michigan Blvd.
Michigan City,, IN 46360
(800) 785-5247
www.sullair.com

Load Racks

HEMCO Industries
2408 Darbach St.
Houston, TX 77092
800.501.7044
www.hemcoind.com

Carbis Sales
1430 W. Darlington St.
Florence, SC 29501
800.948.7750
www.carbis.net

Further Information: More detailed information on transferring solvents is available upon request through the OxyChem Technical Service Department. Call or write to:

Technical Service Department
OxyChem
Post Office Box 12283
Wichita, Kansas 67277-2283
800-733-1165 Ext. 1
www.oxy.com

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