



Dow

Vinyl Chloride Monomer

Safe Handling Guide



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ENHANCED PRODUCT AND ENVIRONMENTAL STEWARDSHIP



Dow

Contents

Characteristics of Vinyl Chloride Monomer	1
Name	1
Structural Formula	1
General Characteristics	1
Monomer Stability	1
Available Grades	1
Physical Properties and Constants of Pure Vinyl Chloride	2
Hazards and Their Control	4
Health	4
Fire and Explosion Hazards	4
Polymerization Hazards	5
Spills and Leakage	5
Special Personal Protective Equipment	5
Employee Education and Training	5
Transportation	6
Preparing Shipments	6
Tank Cars	6
Barges and Ships	6
Safety Precautions	7
Storage	8
Safety Precautions	8
Tanks and Tank Farms	8
Operating Equipment	10
Effect of Monomer Upon Materials	10
Pressure Control	10
Pumps, Piping and Reactors	10
Instrumentation	10
Vents and Waste Disposal	11
Dow and Product Stewardship	11
Sources of Further Information	12

R&S 100378

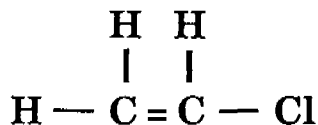
Characteristics of Vinyl Chloride Monomer

Name

Vinyl Chloride
Vinyl Chloride Monomer
Chloroethylene
Chloroethene

R&S 100379

Structural Formula



General Characteristics

At ambient temperatures and pressures pure vinyl chloride monomer is a colorless gas. It has a faintly sweet odor at high concentrations.

A significant health hazard can exist with prolonged contact, even at low concentrations. Because of its toxicity, particularly its carcinogenicity, several Federal agencies have issued regulations for its handling, shipping, venting or use. These agencies include the

Occupational Safety and Health Administration (OSHA), Department of Transportation (DOT), Environmental Protection Agency (EPA), and Consumer Product Safety Commission (CPSC). Their most recent regulations covering vinyl chloride monomer must be adhered to, as well as those of other Federal, state and local agencies.

Vinyl chloride monomer is sold, shipped and stored in the form of a liquefied gas under pressure. It is flammable and, at ambient temperatures, will form explosive mixtures with air. The greatest immediate hazard in handling the monomer is the danger of fire and explosion.

Monomer Stability

Pure vinyl chloride monomer is quite stable and will not free radical homopolymerize at temperatures or pressures encountered in transportation, storing and handling. It does not form peroxides as readily as many other monomers do. Hazardous levels of peroxides will not develop when the monomer is properly handled and stored in the absence of oxygen, as outlined in this bulletin.

Available Grades

Vinyl chloride monomer is usually shipped in the uninhibited form. Low levels of hydroquinone may be added to improve its stability for marine shipment.

Physical Properties and Constants of Pure Vinyl Chloride

Tables 1 and 2 contain the latest information available on the properties of vinyl chloride. These data are taken from the Dow Physical Property Data Bank, which provides a self-consistent set of properties from published literature, internal Dow measurements, calculations and estimations.

Table 1[†]

Property	Temp., °C	Value
Molecular Weight		62.50
Color		Colorless
Odor		Faint Sweet Odor
Melting Point and Heat of Fusion, cal/g	-153.71	18.75
Normal Boiling Point and Heat of Vaporization, cal/g	-13.83	84.55
Flash Point, open cup	-78	
Autoignition Temperature	472	
Flammability Limits, Vol % in air	25	3.6-33
Refractive Index, D Line	25	1.3642
Critical Parameters	T _c =152.6	P _c = 56.0 atm V _c = 174.8 cc/mol Z _c = 0.28
Heat of Formation, Ideal Gas, kcal/mol	25	6.8±1.6
Heat of Polymerization, g to c, kcal/mol		-29.4±2
Volumetric Shrinkage upon Polymerization, approx., %		35
Dielectric Constant at 10 ⁵ Hz	17.2 -21	6.26 7.05
Solubility of Water in Vinyl Chloride, wt %	25	0.11
Solubility of Vinyl Chloride in Water at Saturation Conditions (3.9 atm total pressure), wt %	25	0.86
Henry's Law Const. for Vinyl Chloride in Water, torr/wt ppm	25	0.34
Solubility of O ₂ from Air in Vinyl Chloride at 60 psig, wt ppm	23.8	210±25

[†] These properties are typical of the product, but should not be confused with or regarded as specifications.

For the convenience of the user, extrapolated data are included in Table 2. The last line gives the temperature range of experimental measurement.

Table 2[†]

T, °C	Vapor Pressure mm Hg	Density, Liq. g/cm ³	ΔH_v cal/g	C_{sat} Liquid cal/(g °C)	C_p° , Ideal Gas cal/(g °C)	Viscosity, cps		Thermal Conductivity cal/(sec cm °C)		Surface Tension dyn/cm
						Liquid	Sat. Vapor	Liquid	Sat. Vapor	
-100	2.61	1.105	99.62	0.3272	0.1508	0.607	6.31x10 ⁻³	4.78x10 ⁻⁴	1.04x10 ⁻⁵	33.5
-75	24.48	1.068	95.30	0.3265	0.1607	0.471	7.13x10 ⁻³	4.25x10 ⁻⁴	1.28x10 ⁻⁵	29.9
-50	129.8	1.030	91.06	0.3319	0.1715	0.369	7.99x10 ⁻³	3.77x10 ⁻⁴	1.57x10 ⁻⁵	26.4
-25	469.0	0.9899	86.63	0.3419	0.1828	0.292	8.90x10 ⁻³	3.34x10 ⁻⁴	1.90x10 ⁻⁵	23.0
-13.83 ¹	760.0	0.9712	84.55	0.3470	0.1879	0.263	9.32x10 ⁻³	3.17x10 ⁻⁴	2.07x10 ⁻⁵	21.4
0	1298	0.9473	81.84	0.3537	0.1943	0.232	9.87x10 ⁻³	2.96x10 ⁻⁴	2.26x10 ⁻⁵	19.6
25	2964	0.9016	76.52	0.3665	0.2057	0.186	1.09x10 ⁻²	2.63x10 ⁻⁴	2.69x10 ⁻⁵	16.2
50	5883	0.8518	70.52	0.3815	0.2169	0.151	1.21x10 ⁻²	2.35x10 ⁻⁴	3.18x10 ⁻⁵	12.8
75	10520	0.7960	63.57	0.4032	0.2277	0.123	1.34x10 ⁻²	2.12x10 ⁻⁴	3.77x10 ⁻⁵	9.38
100	17402	0.7308	55.02	0.4422	0.2382	0.101	1.49x10 ⁻²	1.94x10 ⁻⁴	4.43x10 ⁻⁵	6.04
Measured Temperature Range, °C ²		T_m -59 to 60	T_m to 152	T_m to -14	T_m to 500	-40 to 30	-10 to 90	estimated	0 to 400	estimated

[†] These properties are typical of the product, but should not be confused with or regarded as specifications.

¹ Normal Boiling Point

² $T_m = -153.71^\circ\text{C}$

Hazards and Their Control

Health

Recommendations for safe handling are necessarily general because detailed recommendations can be made only for the specific exposures and circumstances of each use.

When vinyl chloride monomer is present in sufficiently high vapor concentrations (about 10,000 ppm), the vapor has an anesthetic action. Repeated exposure of employees to high levels of the vapor has been shown to cause liver injury, acroosteolysis (a bone disease), and angiosarcoma (a cancer) of the liver. Other injuries, including mutagenic (chromosomal) changes, have also been reported, but their relationship to vinyl chloride is not as well established.

According to Occupational Safety and Health Administration (OSHA) regulations 29 CFR 1910.1017, employees' exposure must be controlled to low levels to prevent carcinogenicity. At the low levels met by conforming to OSHA regulations, anesthesia or any other toxic effect is unlikely. Paragraph (c) of this section in the regulations reads:

"Permissible exposure limit. (1) No employee may be exposed to vinyl chloride at concentrations greater than 1 ppm averaged over any 8-hour period and (2) No employee may be exposed to vinyl chloride at concentrations greater than 5 ppm averaged over any period not exceeding 15 minutes.

(3) No employee may be exposed to vinyl chloride by direct contact with liquid vinyl chloride."

Other parts of this section list the requirements for monitoring, regulated areas, methods of compliance, respiratory protection, hazardous operations, emergency situations, employee training, medical surveillance, signs and labels, records and reports.

A copy of the regulation in effect at the time this brochure was published is included inside the back cover. *However, readers should consult OSHA to be sure that their operations comply with the latest regulations.*

Fire and Explosion Hazards

Always handle vinyl chloride with full recognition of its volatility and flammability. The vapors can form flammable mixtures with air at ambient temperatures. In general, precautions should be taken both to keep the material enclosed and to eliminate all sources of ignition. In the laboratory, handle samples of vinyl chloride in a well-ventilated hood and away from all ignition sources.

Most small fires involving vinyl chloride can be extinguished with carbon dioxide (CO₂) or dry chemical agents when these agents are properly applied. Be sure to provide adequate fire extinguishing equipment, either fixed or portable.

Adding water to a pool of liquid vinyl chloride will promote vaporization and increase the hazard of a vapor cloud explosion.

Gaseous vinyl chloride monomer is heavier than air; therefore, vapors coming off a pool of liquid vinyl chloride monomer will stay on the ground and will not disperse readily. Fires that involve large quantities of liquid are difficult to extinguish because vinyl chloride is not miscible with water and, having a lower specific gravity, will float on top of the water.

Equipment that could be exposed to fire should be protected by properly designed and adequately maintained sprinkler systems. For additional protection, use flammable gas detectors to warn of hazardous conditions and to actuate protective devices automatically. Heat-actuated devices can provide additional protection.

Because explosive mixtures may be formed, do not allow vinyl chloride to enter closed drainage or general sewer systems. Regulations may also prohibit such methods of disposal.

The products of combustion of vinyl chloride are hydrogen chloride, carbon dioxide, carbon monoxide and large quantities of black smoke. Phosgene has been reported to be a product of vinyl chloride fires; however, tests have shown that only minute amounts are formed. The real danger is in the large quantities of hydrogen chloride produced.

In the event of a fire, do not permit unauthorized persons to enter the area until the space has been thoroughly sprayed with water and then ventilated to remove all combustion products. Water spray from fogging nozzles directed into the path of the combustion products is highly effective in removing the hydrogen chloride.

Polymerization Hazards

Pure vinyl chloride monomer is quite stable (see page 1, "Monomer Stability") and offers essentially no hazard from free radical homopolymerization when it is stored properly. To prevent polymerization, it can be stored safely by meeting two essential requirements: 1) store the monomer so that it does not contact air (oxygen) or moisture, and 2) store it so as to prevent contamination by free radical initiators or other catalytic impurities.

Spills and Leakage

Because of its toxicity, spills and leaks of vinyl chloride must be prevented by means of proper equipment design, regular maintenance and good operating procedures. Government standards specifying methods of sampling, loading, and handling that are aimed at minimizing emissions of vinyl chloride went into effect September 1986. Standards require the installation of approved area monitoring devices and portable vinyl chloride detectors.

Equipment that contains a significant amount of liquid vinyl

chloride should have remotely operated shut-off valves to reduce the potential of a large spill or fire. Provide adequate drainage to move liquid vinyl chloride away from equipment and personnel along with diking to retain spills.

When spills or leaks occur, remove all sources of ignition from the area immediately. Only properly protected personnel should remain. Small spills usually evaporate rapidly but ample ventilation must be provided. For large spills the recommended action is to cover the surface with a protein-based foam to retard vaporization. When the spill has been confined within a pit or diked area, transfer the vinyl chloride into closed vessels or dispose of it as soon as possible in accordance with all applicable regulations.

Take precautions to prevent contact with liquid vinyl chloride. In case of accidental contact with the liquid, undertake immediate decontamination. Recognize the potential danger of frostbite.

Remove clothing accidentally contaminated with vinyl chloride immediately and wash the body thoroughly with water to remove any material that may have penetrated to the skin. Do not wear clothing again until it is free of vinyl chloride. Dispose of contaminated shoes.

Special Personal Protective Equipment

Respirators must be available for persons who handle vinyl chloride and must be of a type jointly approved by the National Institute

of Occupational Safety and Health (NIOSH) and by the Mining Enforcement and Safety Administration. Current OSHA standards specify the vinyl chloride concentrations at which specific respirators must be used.

Adequate eye protection should be worn whenever there is any possibility of chemical contact.

Employee Education and Training

All persons who work in areas where vinyl chloride liquid or vapor may be present should be thoroughly trained. The training must include several topics that are mandatory under the OSHA standard. Safety with vinyl chloride depends in large part upon the safe handling practices.

Only reliable, properly trained personnel familiar with the MSDS should control the flow and handling of the monomer. All personnel who handle vinyl chloride must be fully aware of the hazards involved, pertinent government regulations and the necessity for immediately reporting to the proper authorities all suspected leaks, malfunctioning equipment or equipment failures. In addition, each person in a vinyl chloride area should know the location and use of personal protective equipment, fire-fighting equipment, alarms, evacuation signals and procedures, safety showers and first aid measures.

Transportation

Preparing Shipments

Vinyl chloride monomer is shipped in tank cars, barges and ships. These vessels must be specially designed and built to prevent the product from contacting copper alloys, aluminum or other materials that could cause the formation of explosive copper acetylides or aluminum chloralkyls.

Vinyl chloride monomer is classified for transportation, by the DOT, as a Flammable Gas. Requirements for packaging, marking, labeling, placarding and preparing shipping papers are published in the Hazardous Materials Regulations (49 CFR, parts 100-199 for rail shipments) and the Coast Guard Regulations (46 CFR for barge and ship shipments). Federal, state and local regulations must be followed while loading or unloading the product. Containers of vinyl chloride must be labeled "CANCER-SUSPECT AGENT."

Tank Cars

Detailed instructions for loading and unloading tank cars of vinyl chloride monomer are found in DOT Regulations (49 CFR). A diagram of the preferred vinyl chloride tank car unloading station is shown in Figure 1.

The preferred type of tank car for vinyl chloride service is a DOT 105 A 300 W equipped with a Midland Manufacturing magnetic gauging device. These 25,000-gal. insulated tank cars have 225 psi pressure

relief valves. Other acceptable tank cars are DOT 112J340 W, DOT 114J340 W, DOT 112T340 W, DOT 114T340 W, and DOT 105A200 W. Any tank car that Dow loads must have a magnetic gauging device.

No external source of heat should ever be applied to tank cars that contain vinyl chloride.

Vinyl chloride gas should be the pressurizing medium used to empty tank cars. Install a suction line from the storage tank to a compressor that will discharge vinyl chloride gas to the vent connection on the car. The pressurizing gas should be virgin VCM as received and should contain no recycled VCM. Do not use inert gases to pressure vinyl chloride from a tank car; use of an inert gas can cause pressure buildup and problems with vent handling and disposal when the car is returned.

A forwarding pump in conjunction with the compressor is recommended to expedite unloading. The pump should be located close to the tank car to minimize pressure drop. Sealless pumps may be used, but steel centrifugal pumps with tandem or double seals are recommended. The pressure on the car must not exceed its designed service pressure. Positive vinyl chloride gas pressure should be left in the tank car after unloading is complete. In no case should air be allowed to enter the car.

Tank cars are equipped with excess-flow check valves that close when the discharge rate is too great. Whenever this check valve closes, the outlet valve must also be closed until the pressure is equalized and the excess-flow check valve reopens.

Barges and Ships

Marine shipments of vinyl chloride monomer must comply with U.S. Coast Guard regulations 46 CFR 151 for barge shipments and 46 CFR 154 for ship movements. Shipments should also comply with regulations of the Intergovernmental Maritime Consultative Organization (IMCO).

Refrigeration is normally required on ships or barges that carry liquid vinyl chloride in order to maintain tank pressure at suitable low levels and to prevent the venting of monomer during transit.

All air is purged from the tanks with nitrogen before it is loaded. Air should not be allowed to enter the tanks during transit.

Dow inspects each ship and barge before it is loaded, and reserves the right to determine the suitability of each vessel and its hardware for transporting vinyl chloride.

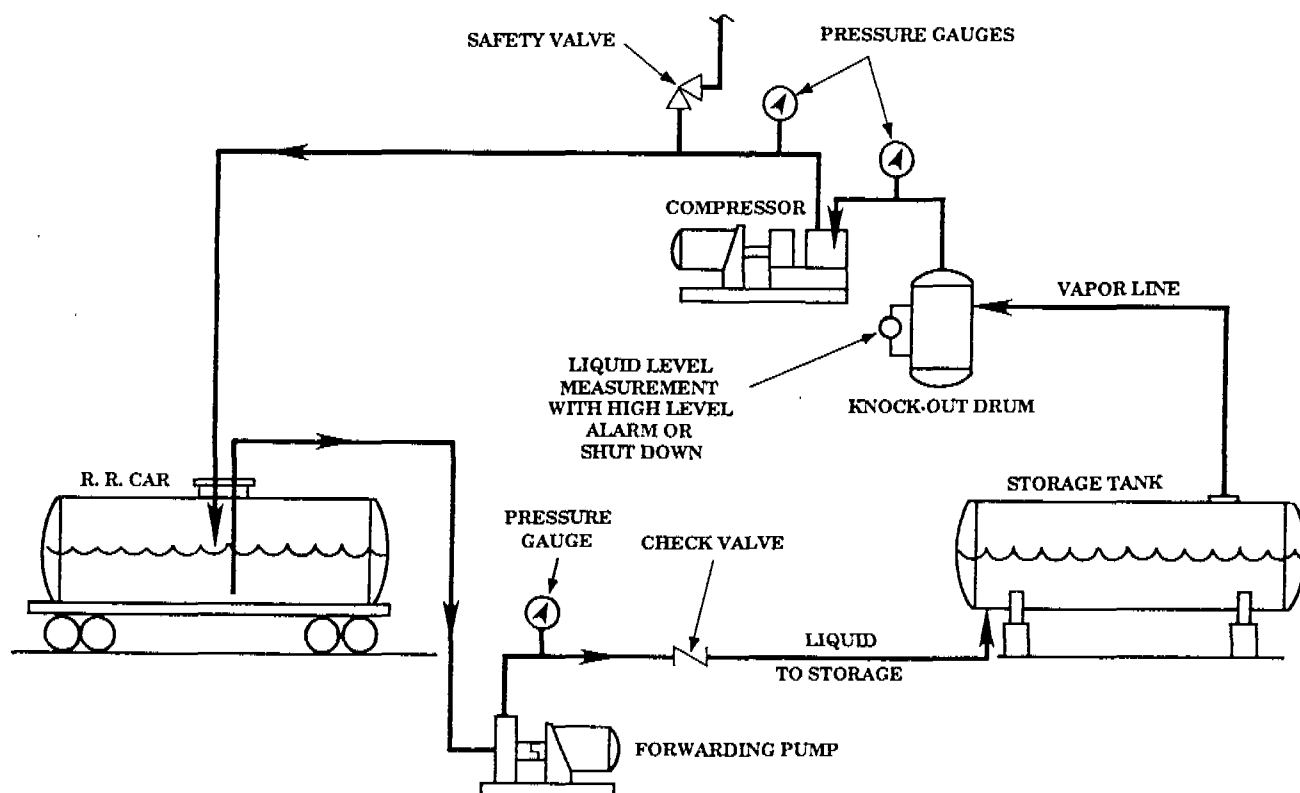
The method of unloading barges and ships is essentially the same as for tank cars. Because of the large loads involved, pumps are always used to unload ships; barges are sometimes unloaded with the compressor alone. Dow's policy is to work with customers to assure proper unloading facilities.

Exercise care when purging tanks on marine vessels after they have been emptied of liquid vinyl chloride. Inert gas must be used to displace the vapors to a non-combustible level before any air is introduced into the tanks. Air and inert gas vented from the tanks during purging will contain vinyl chloride and must be disposed of so as not to create a health or fire hazard.

Safety Precautions

1. Ground all cars, tanks, piping, pumps and equipment.
2. Eliminate all sources of ignition in the area.
3. Provide check valves in all liquid piping from the unloading operation to storage or reactors.
4. Dow's experience has shown that expansion joints should be avoided unless stringent inspection and testing programs are followed. If flexible metallic hoses are used, a test program should be followed.

FIGURE 1 - Vinyl Chloride Tank Car Unloading Station



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Storage

Safety Precautions

Vinyl chloride storage areas should be selected in accordance with local codes. Assistance may be obtained from organizations such as the American Insurance Association, Factory Insurance Association or Factory Mutual Engineering Corporation, Factory Mutual System. All electrical equipment, motors, lights and flashlights in areas where vinyl chloride is stored or handled should conform to the National Electrical Code for Hazardous Areas. Areas where the monomer is stored should be clearly posted as hazardous and the burning characteristics of the

liquid should be clearly defined for the benefit of fire departments.

Tanks and Tank Farms

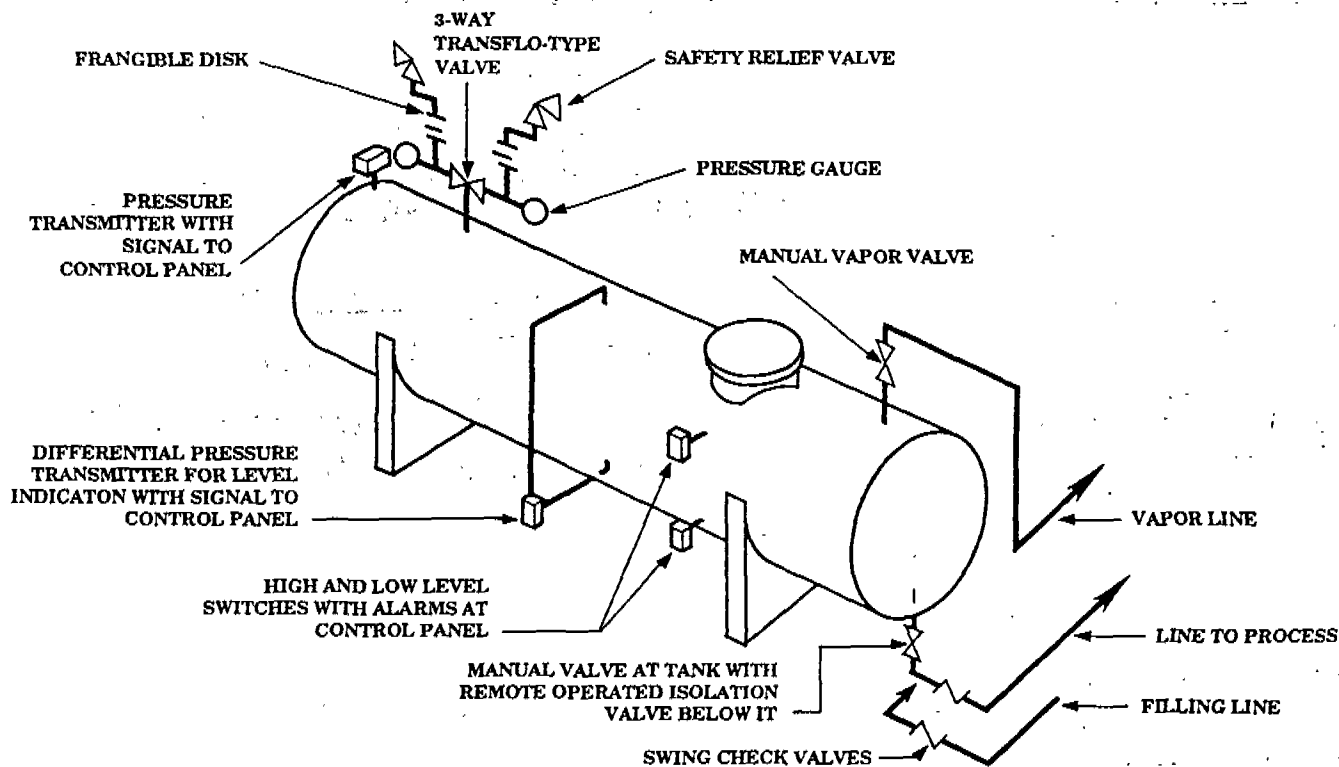
Figures 2 and 3 illustrate one type of recommended storage facility for vinyl chloride monomer.

Vinyl chloride monomer may be stored at normal atmospheric temperatures in steel pressure vessels. Protect the monomer from contact with moisture, air, sunlight and other initiators to prevent quality degradation during storage. All tanks, piping, instrument leads, relief valves and equipment in contact with the

monomer should be of steel and designed to have a working pressure of at least 138 psig. Do not use copper or copper-bearing alloys, or aluminum or aluminum-bearing alloys in storage facilities that put these metals in contact with the monomer or its vapors. Cast iron is not recommended for use in flanges, fittings or equipment.

Liquid inlet lines should enter the bottom of tanks, or extend to the bottom, to prevent static charges from accumulating on filling. In addition, all tanks and filling equipment must be grounded.

FIGURE 2 - Vinyl Chloride Storage Tank



R&S 100386

EPA regulations specify no leakage from vinyl chloride relief valves. This requirement is best achieved by installing a frangible disc under the relief valves as shown in Figure 2.

In case excess pressure ruptures the frangible disc, the pressure relief valve will prevent the loss of the entire contents of the tank after the excess pressure has been relieved. To help prevent excessive pressure buildup, paint exposed tanks with a white or reflecting paint to keep tank skin temperatures below 130°F (54°C). Tanks should not be filled to more than 90% of volume capacity. Do not allow air to enter

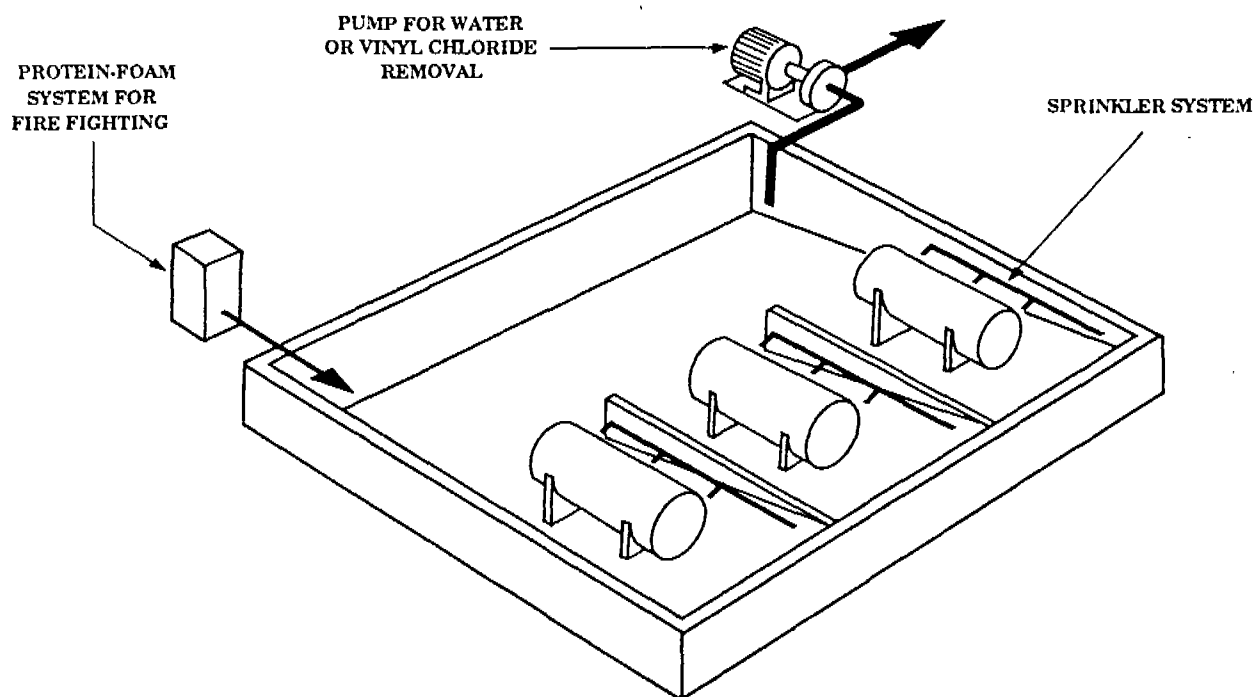
a tank. Relief valve specifications should conform to the requirements of the American Society of Mechanical Engineers (ASME) Unfired Pressure Vessel Code and may be sized in accordance with Volume 1, "Flammable Liquids," of the National Fire Code published by the National Fire Protection Association (NFPA).

Provide drainage of at least 2% slope under the tanks to dispose of the liquid in case of major spills and build adequate diking to confine the liquid. A water-spray system is recommended for keeping the metal tank cool in case of fire. Some means should be

provided to handle water which accumulates in the pit. Equipment for generating protein-based foam should be installed at the pit or be available at the site.

All liquid outlet lines from storage tanks should contain check valves to prevent the contamination of tank contents. Before a tank is put into vinyl chloride monomer service, it must be clean, dry and free of rust and it must be purged with an inert gas until it is free of air. Tanks of 50,000-gal or less capacity are ordinarily constructed in the form of horizontal cylinders. Above 50,000-gal, a sphere or other special shape should be considered.

FIGURE 3 - Vinyl Chloride Tank Farm



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Operating Equipment

Effect of Monomer Upon Materials

Dry vinyl chloride is not corrosive to iron and steel at ambient temperatures. Wet monomer, however, will cause the corrosion of iron and steel, particularly at elevated temperatures, and should be processed in corrosion-resistant equipment. Glass, porcelain, baked phenolic, and nickel linings are satisfactory for use with wet vinyl chloride. Copper or copper-bearing alloys, and aluminum or aluminum-bearing alloys, should never be in contact with vinyl chloride. The use of galvanized steel in contact with vinyl chloride is not recommended.

Many elastomers are attacked by vinyl chloride; however, Teflon resin and certain grades of Viton resin may be used. Other materials suitable for gaskets, seals, or packing include lead, asbestos and carbon.

Pressure Control

Equipment should be designed with due recognition of the high vapor pressure of vinyl chloride, and suitable safety factors must be allowed. Each piece of equipment, even pipelines, that can be sealed off by means of valves should be protected with a pressure-control device. When relief valves are used, they should be placed in pairs to facilitate inspection, cleaning, and replacement. Figure 2 illustrates a pressure relief mechanism on a storage tank. The same system may be used on other types of equipment.

Pumps, Piping and Reactors

At ambient temperatures and unless moisture is present, steel is recommended for pipelines, flanges, pumps, tanks and valves. Cast iron is not recommended.

Centrifugal, positive displacement and gear pumps are all acceptable for use with vinyl chloride monomer, but must comply with EPA requirements for minimizing leaks and fugitive emissions. They must be equipped with either tandem or double mechanical seals, or "canned" centrifugal pumps may be used.

Steel ball valves or plugcocks lined with Teflon resin are recommended in preference to rising-stem valves to minimize leakage. Lubricated valves are not recommended.

Instrumentation

Conventional process controls and recording instruments of the proper materials of construction are acceptable for use with vinyl chloride.

Vents and Waste Disposal

Disposal of liquid or vapor streams that contain vinyl chloride must be carried out so that fire and health hazards are controlled.

The allowable concentration of vinyl chloride in process vents is set by EPA regulations. When the vinyl chloride in a waste vapor stream exceeds this level, the stream must be conducted through a suitable control device to remove vinyl chloride before the stream is

released to the atmosphere. Procedures for clearing and venting vinyl chloride-containing equipment prior to entry are also covered in the EPA standard.

When liquid vinyl chloride must be disposed of, it should be salvaged, if at all possible, by reprocessing through a vinyl chloride purification system. Otherwise, it must be burned in a suitable incinerator system under conditions that will not release

either vinyl chloride or hydrochloric acid to the air and in accordance with all applicable regulations.

A copy of the EPA regulation for VCM in effect at the time this brochure was published by Dow is included in the pocket inside the back cover. However, readers should contact the EPA to be sure that their operations comply with the latest regulations.

Dow and Product Stewardship, the ChemAware[†] Commitment

Dow encourages its customers to review their applications of Dow products from the standpoint of human health and environmental quality. To help ensure that Dow products are not used in ways other than as intended or tested, Dow has instituted the ChemAware program, a renewed commitment to making certain all Dow customers use our products safely. Your Dow sales representative can arrange the proper contacts.

[†]Service mark of The Dow Chemical Company

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Sources of Further Information

Additional information may be obtained from the following organizations or references:

American Insurance Association
85 John Street
New York City, New York 10038
(212) 669-0400

Chemical Manufacturers Association
2501 M. Street, N.W.
Washington D.C. 20037
(202) 887-1100

Factory Mutual Engineering Corporation
Factory Mutual System
1151 Boston-Providence Turnpike
Norwood, Massachusetts 02062
(617) 762-4300

National Fire Protection Association
Batterymarch Park
Quincy, MA 02269
(617) 770-3000

Research and Special Programs Administration
Materials Transportation Bureau
U.S. Department of Transportation
400 7th St., S.W.
Washington D.C. 20590
(202) 366-4433

The Dow Chemical Company
Chemicals and Metals Department
2020 W. H. Dow Center
Midland, Michigan 48674
(517) 636-1000

The Vinyl Institute
Wayne Interchange Plaza II
155 Route 46 West
Wayne, New Jersey 07470
(201) 890-9299

Vinyl and Related Polymers
by Calvin E. Schildknecht
John Wiley & Sons, Inc. (1952)

R&S 100390

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Vinyl Chloride Monomer

Safe Handling Guide



DOW CHEMICAL U.S.A.

AN OPERATING UNIT OF THE DOW CHEMICAL COMPANY

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CHICAGO	Suite 800, 10 Gould Center, 2850 Golf Road, Rolling Meadows, IL	60008 • 312-228-2700
CINCINNATI	Suite 340, Northmark Business Center, 10101 Alliance Road, Cincinnati, OH	45242 • 513-793-6200
CLEVELAND	14955 Sprague Road, Strongsville, OH	44136 • 216-826-6000
DALLAS	Suite 1025-Lock Box 18, One Galleria Tower, 13355 Noel Road, Dallas, TX	75240 • 214-387-2211
DENVER	Suite 310, 6025 South Quebec Street, Englewood, CO	80111 • 303-740-9300
DETROIT	Suite 415, Travelers Tower, 26555 Evergreen Road, Southfield, MI	48076 • 313-358-1300
GRAND RAPIDS	Suite 301, 2100 Raybrook S.E., Grand Rapids, MI	49506 • 616-949-9000
HOUSTON	400 West Belt South, Houston, TX	77042 • 713-978-3700
INDIANAPOLIS	Suite 300, 3905 Vincennes Road, Indianapolis, IN	46268 • 317-872-2716
KANSAS CITY	Corporate Woods, Suite 160, 10890 Benson Drive, Shawnee Mission, KS	66210 • 913-451-2000
LOS ANGELES	Suite 110, 17870 Castleton St., City of Industry, CA	91747 • 818-810-8050
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ROCHESTER	400 Perinton Hills Office Park, Fairport, NY	14450 • 716-425-1200
ST. LOUIS	450 University Club Tower, 1034 S. Brentwood Blvd., St. Louis, MO	63117 • 314-726-5000
SAN FRANCISCO	1676 North California Blvd., Suite 400, Walnut Creek, CA	94596 • 415-930-6400
TAMPA	Suite 450, 5100 W. Kennedy Boulevard, Tampa, FL	33609 • 813-287-8300

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