

**B. F. Goodrich Chemical Company**

A DIVISION OF THE B. F. GOODRICH COMPANY

8100 OAK TREE BOULEVARD • CLEVELAND, OHIO 44131 • PHONE: 216-524-0200

January 6, 1975

RLS-3-75

Gentlemen:

Over the past year, our company has attempted to provide our customers with information pertinent to the vinyl chloride monomer issue. My June 7, 1974 letter focused on the level of residual vinyl chloride monomer (RVCM) present in our PVC latex products and described handling and processing conditions where monomer accumulation could occur. A copy of this letter is enclosed for ready reference.

As noted in the reference letter, efforts toward reducing RVCM levels were underway. As a result of this exploratory effort and subsequent process development and design work, we can now project realistic time and monomer level targets for our PVC latex products. This information will doubtless be useful to processors that are now, or will soon begin, formulating plans for in-plant air quality evaluation and improvement actions.

A high efficiency process for residual monomer reduction has been selected and is expected to be operational by the third quarter. This timing estimate is based on a current schedule for delivery and installation of new process and control equipment. With design performance, an approximate 100 fold reduction in present RVCM levels will be attained. A 10 fold reduction will be achieved effective January 1, 1975, through process modifications utilizing available equipment. Manufacturing specifications will be changed accordingly and these changes are summarized below.

(1)

PVC LATEX

(2)

% RVCM - Solids Weight Basis

Approximate 1974 Average

Target Manufacturing Specifications

January 1, 1975

September 1975

0.1%

0.01% (maximum)

0.001% (maximum)

(1) Geon Latex products, excluding non-PVC Geon 660 series - includes Hycar 2600X189, a PVC modified acrylic latex.

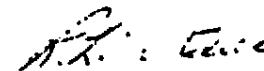
(2) Corresponds to billing weight:

$$\% \text{ RVCM (wet wt. basis)} = \% \text{ RVCM (solids wt. basis)} \times \frac{\% \text{ Total Solids}}{100}$$
AP00034585

While the January 1, 1975 specification of 0.01% (max.) will apply to all new latex production and subsequent bulk shipments, present warehouse drum inventories will be cleared before drum quantities of the lower RVCM product can be readily supplied. During this period of inventory clearing, we will attempt to supply trial quantities of the 0.01% specification product to drum customers that might want to measure the resulting impact on plant air quality. Such special requests can best be handled through direct communication with your area salesman.

The supply projections given here necessarily involve timing estimates that are dependent on equipment deliveries. You will be advised of any complications or delays which could affect these projections.

Sincerely,



R. L. Steller, Product Director
Latex and Specialty Chemicals

/p

AP00034586



B.F. Goodrich

...in pursuit of excellence

Bulletin L-13

**HANDLING
and
STORING**

LATEXES



Good-rite™

LATEX

Geon™
LATEX

Hycar™
LATEX

B. F. Goodrich Chemical Company

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AP00034587

Handling and Storing Latex

This bulletin may be used by anyone concerned with handling latexes, whether in drums or bulk. It is a general aid in maintaining quality latexes, and in minimizing losses from incorrect handling.

Each latex user may be interested in specific information for particular types of equipment. Details of this kind can be obtained through our technical representatives.

drums

B. F. Goodrich Chemical Company supplies latex in 55-gallon, epoxy or phenolic-lined, open-head steel drums; or polyethylene-lined fiber drums.

During the cold winter months every effort is made to ship drummed latex in heated trucks, and to maintain an environmental temperature of 70° F in warehousing.

All winter shipments should be inspected and the temperature checked before accepting the shipment. If there is ice inside the drum, or if the temperature of the latex is below 32° F, note the condition on the delivery receipt copy of the freight bill, REJECT the shipment, and notify your B. F. Goodrich Chemical Company representative immediately.

Some latexes will thicken or exhibit gel formation on the surface if the temperature of the latex is lower than 50° F, but will return to normal if the drums are placed in a warm room, without agitation, until the temperature reaches 90° F. This is particularly true of some nitrile latexes.

The drums should be palletized for warehousing to reduce heat loss into cold floors and to prevent localized chilling. Most latexes are safe between 50° F and 100° F, but for long-term storage we recommend that the temperature be kept near 70° F.

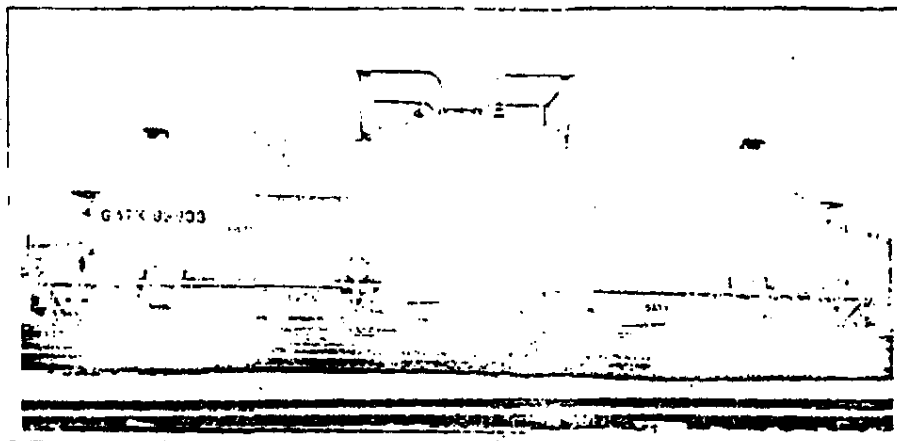
tank trucks

All latex tank trucks are constructed of stainless steel, with two inches of fiberglass insulation. Capacity ranges from 3,000 to 5,000 gallons, with greater availability in the 4,700-gallon size. Three-compartment tank trucks are available on a limited basis. We rely solely on common carriers and the capacity of tank trucks available will depend on the carrier involved.

Pump or pressure unloading equipment can be specified. There are, however, fewer available tank trucks equipped for pressure unloading. Outlet valves are filled with glycerine to prevent freezing in winter months. The small amount of glycerine may be either bled off and discarded, or mixed into the latex, because it will not affect product performance.

Weights are determined by scale weighing for single-compartment tanks, and are calculated for multicompartments tanks. After determining volume of latex (using outage tables), percent total solids, and specific gravity, (measured by Westphal balance) at the latex loading temperature, the weight in each compartment can be calculated this way:

$$\text{Dry pounds} = \text{gallons} \times \text{specific gravity} \times 8.345 \\ \times \frac{\text{percent total solids}}{100}$$



Available tank car capacities are 8,000, 10,000, and 20,000 gallons, with a limited number of three-compartment cars having a 2000-4000-2000-gallon configuration.

All our tank cars are maintained by B. F. Goodrich Chemical Company, but are leased from the car manufacturers. They are epoxy-lined, have six inches of fiberglass insulation, and are equipped for either pressure or pump unloading.

When air-pressure unloading is used, the maximum pressure should be 25 psig.

Glycerine is added to the foot valve on all tank cars, and the latex is loaded at 95° F for added protection in winter months.

After unloading a tank car, close the inside valve only and leave the outside valve open and the plug off.

Normally, tank cars are weighed outbound to obtain the net wet weight of latex. The solids content in the car is then determined by multiplying the net wet weight by the percent total solids.

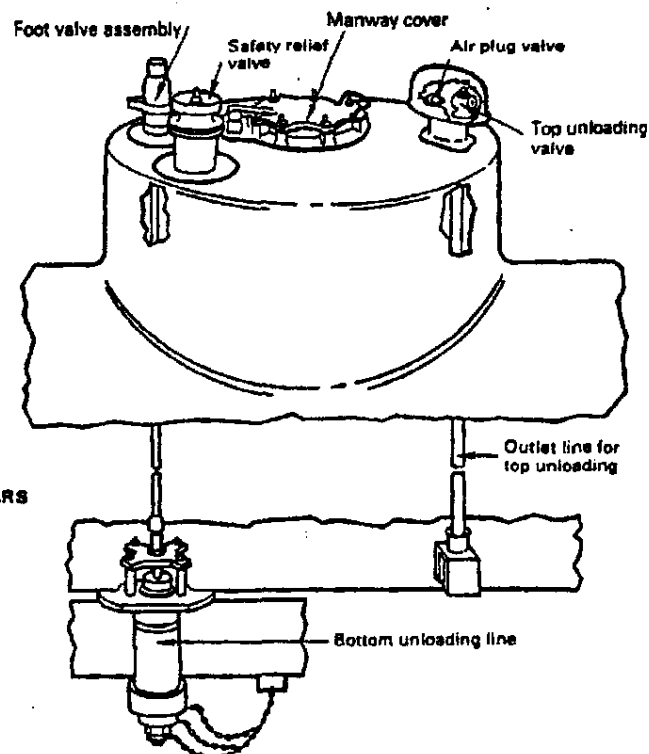
A determination of solids can also be made by obtaining the volume from outage tables and multiplying by the percent total solids and the weight of the latex in pounds per gallon. For example:

$$\text{Dry pounds} = \frac{\text{gallons} \times \text{specific gravity} \times 8.345 \times \text{percent total solids}}{100}$$

DOMES ARRANGEMENT FOR GENERAL SERVICE CARS

The following detail outline of a tank car dome and bottom unloading arrangement is taken from the General American Tank Car Manual.

Figure 1 can be used to approximate the time it would take for a tank car of latex to cool down to a certain temperature after it has been loaded and subjected to an outside temperature of 0° F. For example, a 10,000-gallon car (upper curve) loaded at 100° F (the 90-hour point on the curve) would reach 50° F at the 415-hour point on the curve. Subtracting the 90-hour point from the 415-hour point gives 325 hours—or 13½ days.



**Fig. 1. Heat Flow Chart for Latex Specific Gravity 1.1, Specific Heat 0.62.
Ambient Outside Temperature 0° F**

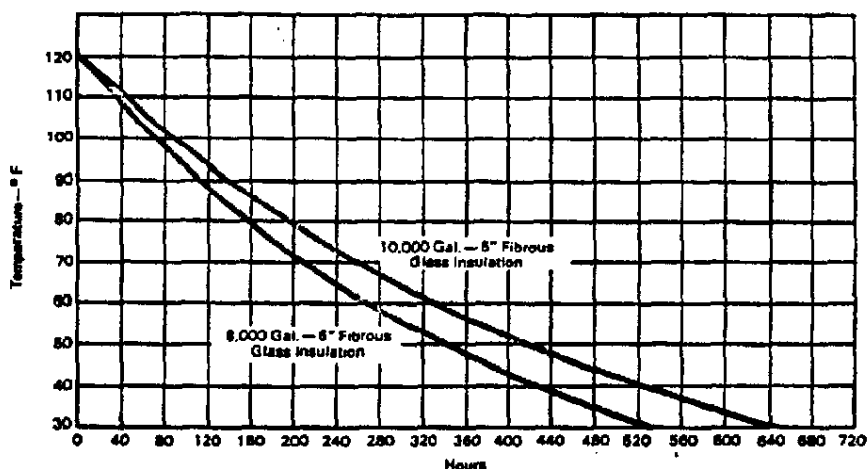
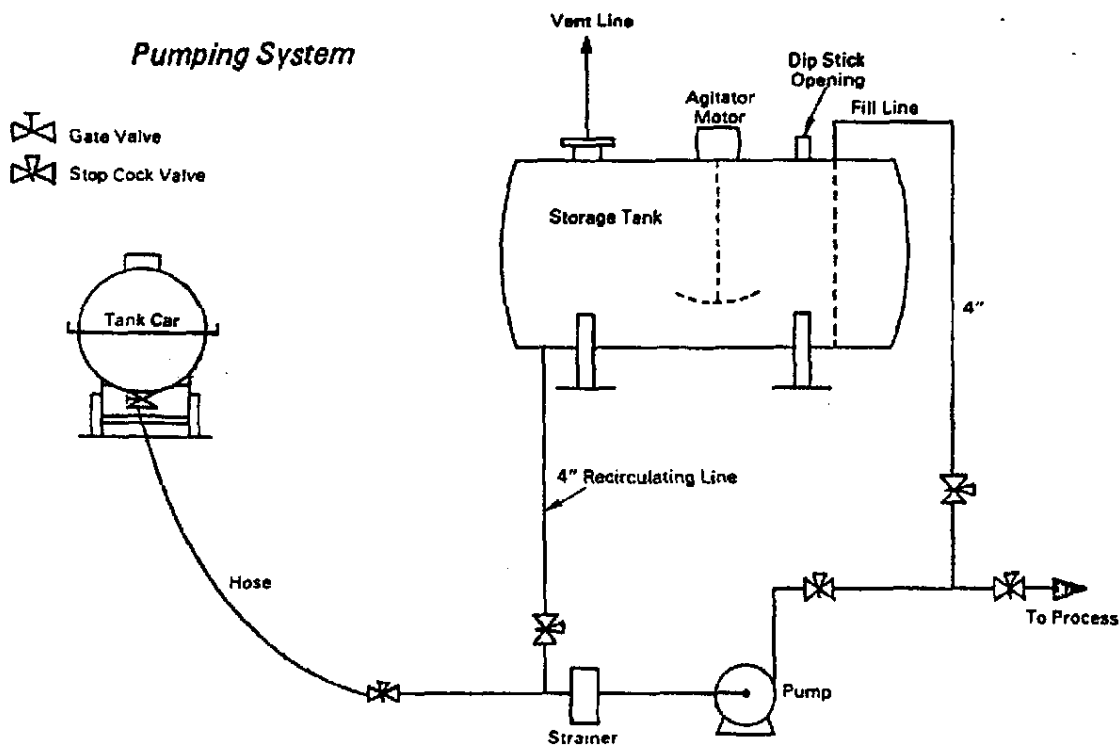


Chart courtesy of General American Transportation Corporation, Chicago

pump unloading

Tank cars may be unloaded by pumps, using the types described in this bulletin under "Pumps". A flexible hose connects the car to the pump. Correct placement of the pump will allow its use in pump-

ing from storage to processing. A strainer in the line on the suction side of the pump will help remove occasional outsized particles or possible contamination from external sources.



Pressure unloading

Steam or air pressure may be used in pressure unloading. Although steam may dilute the latex slightly, about $\frac{1}{4}$ percent on the average, it has the advantage of providing a warm, moist atmosphere on the surface of the latex in the car. It will prevent cold-air shock, which causes coagulum. Steam unloading, at 25 psi or less, is the preferred method in cold weather.

Gravity unloading

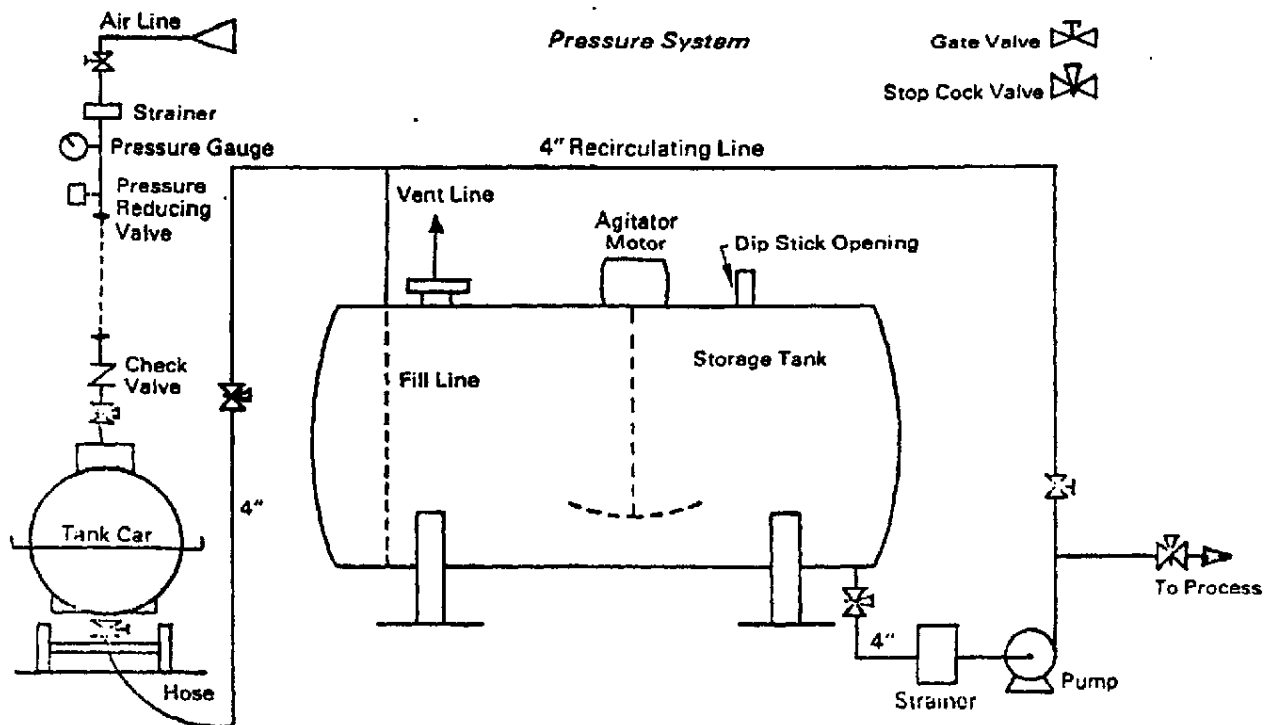
The gravity system is probably the most widely used and easiest. The tank car is simply placed at a higher level than the storage tank and the latex is allowed to flow by gravity. It is also pos-

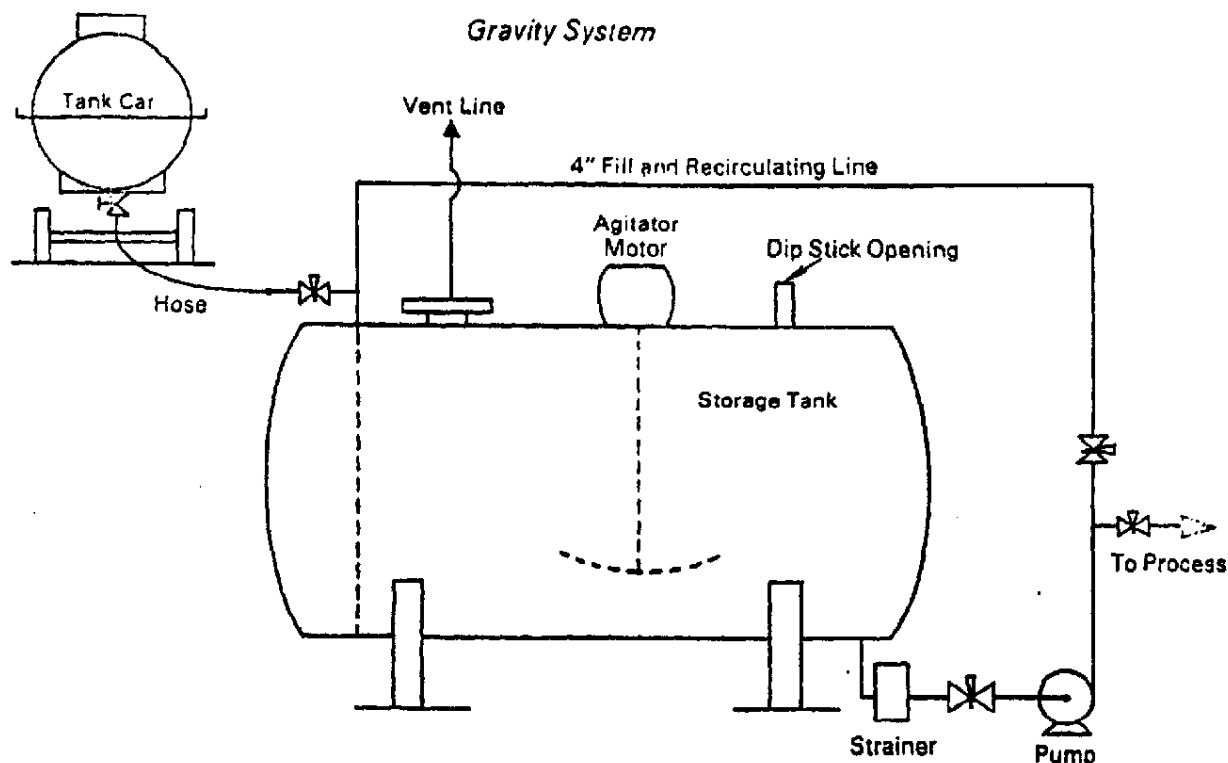
sible to use pressure on the car in this system for faster flow. We recommend 5 to 6 psi steam pressure on gravity unloading to facilitate cleaning of the car.

Sampling

To obtain a representative sample, we recommend that three samples be extracted from a given vessel; at the top, middle, and bottom levels. These three should then be mixed and tested as one.

We do advise testing of our latexes upon receipt to assure that nothing has adversely affected them in transit. We will provide customers with test procedures and product specifications upon request.





dilution water

For many applications, latexes are diluted with water before use. It is important that such dilution water be maintained at 60° F or warmer to prevent any accidental gelation of the latex emulsifier. If local water is noticeably hard or acidic, its effect on the stability of the latex should be determined before use. This is especially true of anionic latexes.

storage equipment

The design of storage facilities will, of course, depend on the specific requirements for each individual application and installation. The importance of keeping all storage vessels and transfer equipment clean cannot be overemphasized. Some types of latexes will permit bacteria growth with ensuing foul odor and instability if stored in tanks which are not cleaned periodically. Tanks should be cleaned every four to six months.

tanks

Ideally, storage tanks should be sized to accommodate a 20 percent excess volume of product so unloading of bulk shipments and plant operations are not impeded.

The recommended materials of construction are Type 304 stainless steel, glass-lined carbon steel, and epoxy or phenolic-coated carbon steel. The latter two types of coatings can be applied with the tank in place. Tile-lined concrete tanks are also satisfactory if they have closed, but vented, tops.

Metals that should be avoided in the construction of a storage tank are zinc, copper, iron, and low-carbon steel. These will either cause breakdown of the polymer, discoloration of the latex, or reduce the latex pH by reacting with the ammonia present in some latexes.

All tanks must be adequately insulated or heated to maintain the latex temperature between 50° F and 80° F. Openings should be provided at the

top and near the bottom for ease of cleaning, and all tanks must be vented. Pressure vessels must conform with state and local codes.

An air breather is recommended for providing moist air in the vapor space of the tank to prevent surface skin formation. This can be a simple air/water contact column, a drawing of which can be provided upon request.

agitation

Periodic mechanical agitation of acrylic, vinyl chloride copolymer, and vinylidene copolymer latexes is required to maintain a homogeneous mixture. Because the specific gravity of these latexes is greater than one, and because of the particle size distribution, settling of the larger particle size portion is possible.

Nitrile and SB latexes need not be agitated. Because the specific gravity is less than one, they will form a small amount of surface skin which must be removed and discarded, leaving a homogeneous suspension without mixing.

The simplest means of agitation is recycling the latex through an unloading pump or the process feed pump back through the tank fill pipe. The process feed pump must, of course, be of sufficient capacity to allow both process feed and take-off for recycle.

Low-speed, non-shear mechanical agitators can also be used. They must be located off-center or set at an angle to prevent foaming and vortexing. Local suppliers of agitation equipment are best suited to design a system for the parameters of the particular tank.

Some suggested suppliers of agitation equipment are:

Mixing Equipment Company, Inc.
138 Mount Read Boulevard
Rochester, New York 14603

Pfaunder Company
Division of Sybron Corporation
West Avenue & Clark Street
Rochester, New York 14603

Chemineer, Inc.
P.O. Box 1000-T
Dayton, Ohio 45401

pumps

Low-speed, open-impeller centrifugal pumps are recommended for all types of latexes. Pumps with close tolerance between rotor and housing, or with high speed may cause shear and subsequent coagulation of the latex. A soft-water seal should be provided for the packing gland to prevent freezing of the shaft, and a water flush line is recommended for cleaning the pump after use.

Air-operated or motor-driven diaphragm pumps are best suited for latex because they move the latex with virtually no shear.

Some suggested suppliers of pumps are:

Ladish Company
Tri-Clover Division
2809 60th Street
Kenosha, Wisconsin
53140

Wilden Pump & Engineering
Company
122069 Van Buren Street
Colton, California 92324

T. Shriver & Company, Inc. LaBour
876 Hamilton Street Division of American
Harrison, New Jersey 07029 Gauge & Machine
Elkhart, Indiana 46514

pipng

Glass-lined carbon steel schedule 40 pipe is most commonly used because of its operating flexibility. Friction-type couplings¹ are recommended for easy assembly, replacement and maintenance around fittings and joints. Stainless steel tubing and pyrex glass pipe are also excellent, and are strong enough to allow flushing and cleaning with warm, soft water or steam. Air can also be used to flush out latex remaining in the piping.

Three-inch diameter pipe is the recommended size, while a minimum diameter of two inches may be adequate. Any extensive transfer lines should be adequately protected from high or low temperatures by proper insulation.

¹Victaulic by Victaulic Company of America, Union, New Jersey (or equal)

We recommended Teflon-coated stainless steel plug-cock and ball valves, stainless steel gate valves, and glass-lined diaphragm valves. Globe valves usually require more maintenance than other types of valves. Other materials should be avoided because of possible reaction with the latex itself.

safety precautions

While all synthetic latexes are water-based materials and relatively safe to handle, residual monomers may accumulate in confined vessels and become explosive. Our latexes are tested for residual monomers by means of gas chromatography to insure that they are safe to handle.

However, explosion-proof motors and other equipment are recommended for best safety in bulk-handling equipment.

vessel entry

Explicit procedures for vessel entry are necessary for cleaning and maintaining storage tanks. Because of the possible danger from harmful agitating equipment, or insufficient oxygen for sustaining life, we recommend certain fundamental precautions and procedures for positive accident prevention. Our own vessel entry procedure is based on Safety Guide SG-10, entitled, "Entering Tanks and Other Enclosed Spaces" written by the Manufacturing Chemists' Association, Washington, D.C. We recommend that a copy of SG-10 be obtained. The highlights of the procedure are:

1. A vessel entry permit must be obtained and certified by the proper personnel.
2. Mechanical agitation equipment must be locked out, and wiring disconnected. Sharp blades or any blunt projections must be covered with a heavy canvas or equivalent.
3. The equipment and that portion of the piping involved must be drained and isolated by a line blank or by disconnecting the lines.
4. Fresh air must be blown into the vessel until a check by an explosion meter indicates a reading of zero. Ventilation must then be maintained.
5. When a man enters the vessel, another man should always be easily available.

Types of latexes available from B. F. Goodrich Chemical Company:

Geon Latex
Vinyl chloride homopolymer
Vinyl chloride copolymer
Vinylidene chloride
Vinyl chloride-acrylic

Hycar Latex
Nitrile
Acrylic

Good-rite Latex
Specialty styrene-butadiene
Vinyl pyridine

The procedures for handling and storing latex suggested in this bulletin are offered in good faith and are believed to be suitable for the purpose. They are offered for information only, since B. F. Goodrich Chemical Company cannot guarantee the results of operations not under its direct control.