

BFGOODRICH CHEMICAL GROUP ENGINEERING DEPARTMENT				DESIGN REQUIREMENTS FOR FLAMMABLE COMPRESSED HYDROCARBON GAS LOADING AND UNLOADING SYSTEMS FOR RAILROAD TANK CARS	ENG. STD.
REV.	B. R. W. H. T. T. T.				ST-525
DATE	07/87				
BY	REB				
APPD.	CEB				Sheet 1 of 3 vs0142S

1.0 SCOPE

It is the intent of this standard to set forth the engineering requirements deemed necessary for the safe design and construction of piping systems for the loading and unloading of tank cars containing flammable compressed hydrocarbon gases. These requirements include safety features which have been found from past experience to be desirable.

2.0 EXPERIENCE

Hazardous operating conditions are caused by excess unloading rates that cause the tank car excess flow valves to cycle between open and shut condition. This cycling can cause vibration and pressure surging in the piping systems that can result in failure of piping components such as quick couplings and flexible hoses.

Inadequately sized piping and/or partially open valves can restrict flow so that in the event of a piping system failure the tank car excess flow valves will not close. Also, there have been emergency incidents where the tank car excess flow valves failed to operate properly because of improper

installation and/or they were faulty. Tank car excess flow valves should not be relied upon for protection against an undesired outflow of material from tank cars during loading and unloading operations.

3.0 REGULATIONS

3.1 OSHA General Industry Standards and Interpretations

Part 1910.110 - Storage and Handling of Liquefied Petroleum Gases
Part 1910.106 - Flammable and Combustible Liquids

3.2 NFPA 58 - Storage and Handling of Liquefied Petroleum Gases

NFPA 30 - Flammable and Combustible Liquids

NFPA 70 - National Electrical Code

NFPA 77 - Recommended Practice on Static Electricity

3.3 ANSI B31.3 - Chemical Plant and Petroleum Refinery Piping

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4.0 REQUIREMENTS

4.1 TANK CAR LOADING

4.1.1 The tank car adaptors to which hoses and/or lines are attached shall be equipped with either a backflow check valve or a self-closing shutoff valve with a means of remote and local closing to protect against an uncontrolled discharge of material from the tank car in the event of a transfer hose or piping failure.

4.1.2 A backflow check valve or a self-closing type shutoff valve with a means of remote and local closing shall be installed in the piping on the plant side of each tank car transfer hose to protect against an uncontrolled discharge of material from the plant piping and storage system in the event of a hose or connection failure.

4.2 TANK CAR UNLOADING

[4.2.1 is pending]
[until a suitable]
[self-closing]
[valve is located.] 4.2.1 The tank car adaptors to which hoses and/or lines are attached shall be equipped with a self-closing valve with a means of remote and local closing to protect against an uncontrolled discharge of material from the tank car in the event of a transfer hose or piping failure.

4.2.2 A backflow check valve shall be installed in the piping on the plant side of each liquid unloading hose to protect against an uncontrolled discharge of material from the plant piping and storage system or other tank car connections.

4.3 The discs in the backflow checks may be provided with a 1/16 inch bleed hole if required for venting/recovering the piping system.

4.4 Quick disconnects shall be the pipe union type with acme threads.

4.5 Hoses shall be compatible with the fluid handled and contain a static ground.

Hoses shall have a bursting pressure of not less than five (5) times the system design pressure.

The recommended hose for vinyl chloride is the corrugate flexible metal tube type with a braided metal jacket.

4.6 All piping shall be designed, fabricated and installed in accordance with ANSI B31.3.

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4.7 Block valves shall be of fire safe design.

4.8 Materials for piping, valves, and fittings shall be steel or nodular iron.

4.9 Piping systems, equipment, railroad tracks and platforms shall be grounded as per ST.711. The sections of track that service the loading/unloading areas shall be electrically isolated from the rest of the track system with insulating rail joints.

5.0 VAPOR DETECTION SYSTEM

A vapor detection and alarm system shall be installed to monitor continuously during the loading/unloading operation. One sensor shall be provided for each tank car station. The sensor shall be located directly under the fixed platform. The vapor detection system shall be set to sound an alarm at a maximum of 25% of the LEL.

6.0 FIRE PROTECTION

Fire protection in the form of fixed fire monitors shall be provided. The number of monitors and their location will depend on the number of loading/unloading stations and their location relative to other plant facilities.

Plans for all such installations should be reviewed with Cleveland Engineering prior to design so insurance and Risk Management issues can be addressed.

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